TRANSISTOR RADIO SECTION

Admiral Radio

5E5B CHASSIS

Note: For information on etched wiring and transistors, refer to Admiral Service Manual No. 5559 and "Admiral Service Information For Transistors" No. 5586.

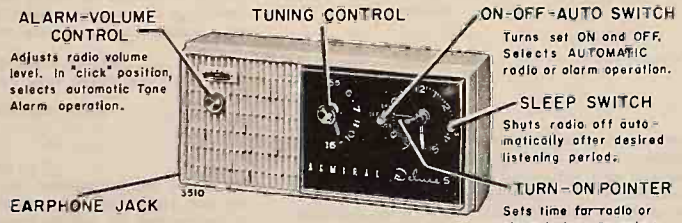


Figure 1. Front View of Set, Showing Controls.

SPECIFICATIONS

ANTENNA: Built-in Ferro-Scope (ferrite bar).

CIRCUIT: Superheterodyne using five PNP type transistors and two germanium diodes.

CLOCK: (Westclox) Battery operated Timer, with automatic regulation.

FREQUENCY RANGE: Standard broadcast band: 535 to 1620 KC, ± 5 KC.

INTERMEDIATE FREQUENCY: 455 KC.

POWER SUPPLY: Four 1½ volt ordinary penlight "AA" size batteries or equivalent size mercury batteries.

SPEAKER: 2¾" PM with Alnico V magnet. Voice coil impedance, 12 ohms.

GENERAL

This personal size, all transistor, portable, clock radio is an AM broadcast band receiver that is automatically controlled by a self regulated, battery operated clock. The clock has an easy-to-read dial with luminous hands and is operated on a single 1½ volt battery. This feature makes this entire set cordless and usable anywhere.

TRANSISTOR PERSONAL CLOCK RADIO

MODEL	COLOR	NAME	CHASSIS
Y793	White		
Y797	Tan		5E5B
Y798	Green		

All models have Vernier tuning, an Electronic Buzzer Alarm, a Sleep Switch and provision for using an external Ear-phone.

BATTERY INFORMATION AND REPLACEMENT

Radio power is supplied by four 1½ volt ordinary (pen-light) "AA" size batteries, or equivalent size mercury batteries. See Battery list.

If reception is weak, distorted (muffled) or if radio fails to operate, it is recommended that batteries be checked by complete replacement.

To replace batteries, remove back cover by inserting a small coil into one of the slots between back cover and front panel and twist. Remove battery holder as shown in figure 2. Replace batteries as shown in figure 3.

The battery holder is an oval shaped tube with end caps. The right cap (from rear) is permanently attached to the board. The holder (with batteries) is then pushed into the attached cap. A flange on the bottom of the tube goes through the board for anchorage, while springs inside the tube maintain the batteries under proper tension.

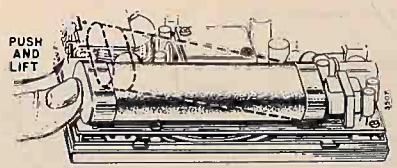


Figure 2. View Showing Method of Removing Battery Holder from Chassis Board.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

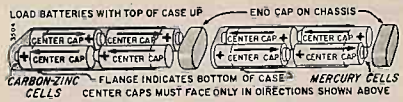


Figure 3. Battery Holder, Showing Ordinary and Mercury Batteries in Correct Positions.

IMPORTANT: Arrows, + marks and battery outlines are shown on holder to indicate the directions that the battery center caps should face when placed into the holder. Note especially the difference between ordinary (carbon-zinc) batteries and mercury batteries. Mercury batteries have polarity just the reverse of ordinary batteries. Therefore, if mercury batteries are to be used they must be placed into the holder exactly opposite the ordinary batteries.

If one or more batteries is reversed the radio will play incorrectly or not at all. If radio fails to play, sounds weak, noisy or distorted after installing new batteries, turn set off immediately and check for improper battery installation.

Never leave extremely weak or dead batteries in the set as leakage may develop, thus causing corrosion damage to parts and wiring.

Batteries listed below, or an equivalent substitute may be used.

PENLIGHT BATTERIES

CARBON-ZINC BATTERIES

Burgess .....Z	General 900
Eveready 915	Ray-O-Vac .....R7 or 7LP

MERCURY BATTERIES

Eveready E502	Mallory RM502R

TO REPLACE CLOCK BATTERY: Pull old battery straight out of clip. Insert a fresh "C" size 1.5 volt battery in clip so that center-cap (positive terminal) points toward radio chassis. When viewing set from rear the clock is at left as in figure 4. **If battery is reversed, clock will not operate.**

Figure 4. View Showing Clock Battery in Correct Position.

SERVICING THE CLOCK

SETTING THE TIME: To set clock to the correct time, pull out Time Set knob on back of set. Rotate hands in a clockwise direction only.

AUTOMATIC TIME REGULATION: The clock has an automatic regulation mechanism which automatically compensates for "fast" or "slow" clock operation when normal time setting procedures are used.

1. If clock is running "slow," set hands up to correct time. Setting the hands in a clockwise direction will cause the clock to run a little faster.
2. If clock is running "fast," set hands back to correct time. Setting the hands in a counterclockwise direction will cause the clock to run a little slower.

TO SET TURN-ON POINTER: Push in Time Set knob and turn Turn-On pointer counterclockwise until it indicates the time desired for radio (or alarm) to turn on.

IMPORTANT CLOCK INFORMATION:

When setting the clock to the correct time, determine the correct direction of rotation and turn slowly to bring hands directly to correct position. **Do not overset hands so that they must be turned back.**

If the hour hand is turned counterclockwise past the Turn-On pointer setting, the pointer will be pulled along with the hour hand and will need resetting.

The speed of the clock mechanism has been preregulated at the factory. After initially setting clock, reset hands only when time must be corrected. **Unnecessary setting of the hands can result in an error in regulation.**

When resetting clock, a period of over one hour must be allowed between each change in time setting, for the self regulating mechanism to be effective.

CLOCK REPLACEMENT

NOTE: Do not attempt to break the seals on the clock used in these models. Consult your Admiral distributor for the address of the nearest parts and service station for clock used in this set.

To remove clock, first, remove the knobs by pulling them straight out. Remove the back cover as instructed above.

Second, remove clock battery and battery holder which is held by one phillips head, self tapping screw, at the center of the holder.

The clock is held in place by two "S" shaped brackets also mounted with phillips head screws.

When unsoldering clock leads note the polarity markings on the clock to prevent wiring the replacement clock incorrectly.

REMOVING CHASSIS FROM CABINET

To remove cabinet back, simply insert a small coin into one of the slots on the bottom edge and twist.

To remove chassis from cabinet front, first remove the knobs by pulling them off. Remove the back cover as instructed above. Remove the four screws at the corners of the etched board. Lift entire chassis (etched board with all components) out of the cabinet front.

To remove clock see information under "CLOCK REPLACEMENT."

CIRCUIT DESCRIPTION

This receiver uses 5 PNP transistors and 2 germanium diodes.

Frequency conversion is accomplished by Q1, an "Autodyne" type converter, while Q2 and Q3 act as IF amplifiers. The diode (CR2) functions as both detector and AVC with Q4 and Q5 as a class B operated push-pull output stage.

Note that a reflex circuit, R19 and C14, enable Q3 to function as both IF amplifier and audio driver. The recovered sound taken from a tap on the primary (point 6 of T3) is sufficient to operate the driver transformer T4.

Automatic volume control is applied to two stages, Q1 and Q2, by the two diodes, CR1 and CR2 respectively.

The diode (CR1) is used to produce a more uniform AVC action, particularly on strong signals. CR1, effectively in parallel with the primary of T1, is biased so that it does not conduct on weak signals. However, with stronger signals, the collector current of Q2 decreases due to the AVC action from CR2. As a result the voltage drop across R9 decreases causing a bias reduction on CR1.

If the signal is strong enough, the bias of CR1 is cancelled and conduction takes place. CR1 then becomes effectively a low impedance shunt across R1, thus reducing the gain of Q1.

SERVICE HINTS

Precautions To Take While Servicing Transistor Radios

A transistor is quite durable, but is extremely sensitive to heat and the application of incorrect DC operating voltages. Both can destroy the "transistor action".

Before actual servicing, give all wiring and components a visual check. Look for cracks or breaks in the foil on the etched circuit board, poor solder joints, corroded or loose battery contacts, dirt or solder between leads, etc.

Next, test the total battery voltage with the set "on".

An ohmmeter check of a transistor circuit is not recommended unless it is known that the voltage of the meter does not exceed the ratings of the transistors and the capacitors in the circuit. In general, make sure the voltages applied do not exceed the ratings and is of the correct polarity.

When replacing transistors, or components, make sure the power is "off".

Avoid excessive heat while soldering, by using long nosed pliers between transistor, or component and the joint to be soldered.

TESTING TRANSISTORS

The transistors used in this set are junction type. This type of transistor is more apt to become shorted than open. A shorted transistor will cause an enormous increase in current from the power supply. Thus a quick check is to measure the no signal current drain with a milliammeter connected in series with the leads from the power supply. See schematic for normal no signal current drain for this set. Transistors often become shorted because of excessive current flow, which is usually indicative of circuit trouble. If a transistor is found to be shorted, check the circuit carefully before installing a new one. Excessive current drain is also a good indication of shorted components.

OHMMETER TEST OF TRANSISTORS

In general, the forward current through a transistor should never be allowed to exceed 15 ma. A milliammeter can be used to determine whether any particular ohmmeter is safe to use in testing transistors.

For ohmmeter testing purposes, any two sections of a transistor can be considered as two germanium diodes connected back-to-back. See figure 5A.

Figure 5B illustrates the relative resistances for PNP type transistors used in this set. The polarity signs shown in the illustration indicate the polarity of the ohmmeter leads. The transistors must be removed from their sockets to make this check. Low resistance readings will range between 50 and 500 ohms or more. High resistance readings will range from .1 megohm to several megohms, depending on the ohmmeter used and the transistor type.

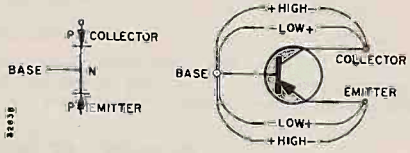


Figure 5A. Germanium Diode Equivalent.

Figure 5B. Ohmmeter Test of Transistor.

ALIGNMENT PROCEDURE

Alignment of a transistor radio is similar to alignment of an ordinary vacuum-tube radio. However, there is somewhat more interaction between the RF and IF circuits, thus requiring greater care in the setting of the adjustments as well as repetition of some of the steps. Therefore, for best results, follow the alignment procedure exactly as given below.

a. Fresh batteries should be used.

b. Set Volume control at maximum.

c. Connect output meter across output transformer secondary. For best results, have speaker disconnected, use 12 ohm load.

d. Use lowest output of signal generator that will produce adequate indication on lowest scale of output meter. IMPORTANT: Output level should be held at 25 mw. or less. The voltage reading at the 25 mw. level is approximately 1.8 volts across the 12 ohm load.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Radiated Signal. †Loop of several turns of wire, or place generator lead close to receiver for adequate signal.	455 KC	Gang fully open	3rd IF 2nd IF 1st IF	*Ⓐ Ⓑ and Ⓒ for maximum output.
2	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	Ⓓ for maximum output.
3	Repeat "Step 1" several times until there is no further increase in the output.				
4	Same as "Step 1".	§ 1400 KC	Tune in generator signal	Antenna Trimmer	Ⓔ for maximum output.
	NOTE: After completing "Step 4" the tuning range should be 535 KC to 1620 KC; ±5 KC. If this range cannot be obtained continue with Steps 5, 6 and 7.				
5	Same as "Step 1".	535 KC	Gang fully closed	Oscillator Coil Core	Ⓕ for maximum output.
6	Repeat "Step 2"; then repeat Steps 5 and 2 several times until oscillator covers required range.				
7	Repeat "Step 4".				

† If signal generator does not produce sufficient output for usable reading, clip hot lead of generator to RF stator plates terminal of gang; clip ground lead to frame of gang. Adjust Ⓐ Ⓑ and Ⓒ for usable output only. Then return to "Step 1".

* If difficulty is experienced in obtaining signal output, first rotate IF slugs out several turns, then slowly adjust slugs in until output is obtained. Caution: Rotating slugs too far inward will damage ceramic capacitor contained in IF can.

§ Antenna trimmer Ⓔ should first be adjusted for maximum output with generator tuned to 1400 KC. Then try to increase output by rocking gang or generator slightly while readjusting trimmer.

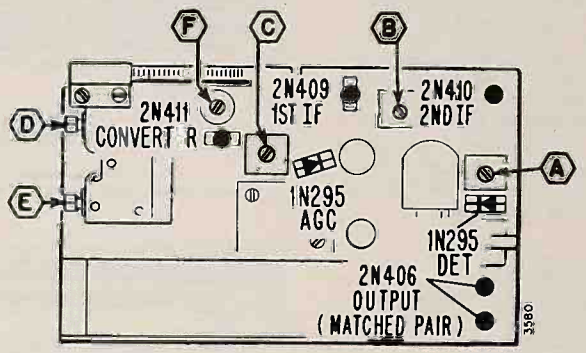


Figure 6. Transistor and Alignment Point Locations.

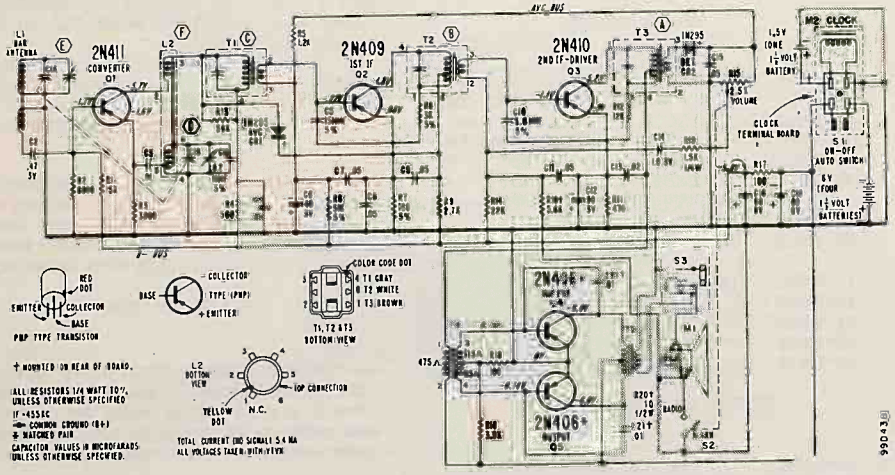


Figure 7. Rear View of Etched Circuit Board. Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

VOLTAGE DATA

- Voltages shown measured with no signal, using fresh batteries.
- Volume control at minimum; dial set at low frequency end.
- All readings made with VTVM between transistor terminals and B plus (ground).
- All voltages are negative.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	15,000 ohms, ¼ watt	60B 45-153
R2	6,800 ohms, ¼ watt	60B 45-682
R3	2,900 ohms, ¼ watt	60B 45-292
R4	560 ohms, ¼ watt	60B 45-561
R5	1,200 ohms, ¼ watt	60B 45-122
R6	51,000 ohms, ¼ watt, 5%	60B 44-513
R7	160 ohms, ¼ watt, 5%	60B 44-161
R8	3,000 ohms, ½ watt, 5%	60B 44-302
R9	2,700 ohms, ¼ watt	60B 45-272
R10	5,600 ohms, ¼ watt	60B 45-562
R11	470 ohms, ¼ watt	60B 45-471
R12	12,000 ohms, ¼ watt	60B 45-123
R13	56,000 ohms, ¼ watt	60B 45-563
R14	22,000 ohms, ¼ watt	60B 45-223
R15	2,500 ohms, Volume control (includes Alarm Switch S2)	75B 51-2
R16	3,900 ohms, ½ watt	60B 45-392
R17	100 ohms, ¼ watt	60B 45-101
R18	100 ohms, ¼ watt	60B 45-101
R19	1,500 ohms, ¼ watt	60B 45-152
R20	10 ohms, ½ watt	60B 8-100

CAPACITORS

Sym.	Description	Part No.
C1A, C1B	123.1 mmf, max, ant / 73.4 mmf, max, osc gang	68B 75-1
C2	.47 mf, 3 volts, ceramic disc	65B 45-16
C3	.01 mf, 500 volts, cer. disc	65D 10-41
C4	.05 mf, 30 volts, cer. disc	65B 45-6
C5	15 mmf, 500 volts, 5%, NPO temp. coeff	65D 10-143
C6	40 mf, 3 volts, electrolytic	67B 32-9
C7	.05 mf, 30 volts, cer. disc	65B 45-6
C8	.05 mf, 30 volts, cer. disc	65B 45-6
C9	.05 mf, 30 volts, cer. disc	65B 45-6
C10	5.6 mmf, 500 volts, 5%, cer. disc, N750 temp. coeff	65D 10-176
C11	.05 mf, 30 volts, cer. disc	65B 45-6
C12	90 mf, 3 volts, electrolytic	67B 32-10
C13	.02 mf, 30 volts, cer. disc	65B 45-9
C14	1.0 mf, 3 volts, cer. disc	65B 45-15
C15	.05 mf, 30 volts, cer. disc	65B 45-6
C16	60 mf, 6 volts, electrolytic	67B 32-8
C18	8.2 mmf, 5%, 500 volts, cer., disc., NPO temp. coeff	65D 10-131
C19	60 mf, 6 volts, electrolytic	67B 32-8
C20	.01 mf, 50 volts, cer. disc	65B 45-20
C21	.01 mf, 50 volts, cer. disc	65B 45-20

COILS, TRANSFORMERS, ETC.

Sym.	Description	Part No.
L1	Antenna, Ferrite Bar	69B 218-9
L2	Oscillator Coil, with Yellow dot	69B 232-5
T1	Transformer, 1st IF, with Gray dot	72C 182-8
T2	Transformer, 2nd IF, with White dot	72C 182-9
T3	Transformer, 3rd IF, with Brown dot	72C 182-10
T4	Transformer, Driver	79B 84-1
T5	Transformer, Output	79B 85-1

MISCELLANEOUS CHASSIS PARTS

Sym.	Description	Part No.
M1	Speaker, 2¾" PM	78B 125-3
M2	Clock	(See Clock Parts)
S1	Off-on Switch	Part of M2
S2	Radio-Alarm Switch	Part of R15
S3	Jack, Earphone	88B 39-3
	Bracket, for mtg jack	15B 198-1
	Nut, for mtg jack	88B 39-50
	Earphone and plug assembly	ES 201
	Holder, Battery Radio	70B 178-1
	Clock	A 7597
	Socket, Transistor	87B 63-1
	Screw, 4-40 x ½, BHPHST chassis mtg. (special for plastic)	1A 71-5-71

TRANSISTORS AND DIODES

Sym.	Description	Part No.
Q1	Transistor (Converter) 2N 411	57B 1-24
Q2	Transistor (IF Amp) 2N 409	57B 1-41
Q3	Transistor (IF Amp-Driver) 2N 410	57B 1-40
Q4	Transistor (Output) 2N406*	57B 1-27
Q5	Transistor (Output) 2N406*	57B 1-27
CR1	Diode (AVC)	1N 295
CR2	Diode (Detector-AVC)	1N 295

*Matched Pair

CABINET PARTS

Cabinet Front		
	Model Y793, White	34E 142-2
	Model Y797, Tan	34E 142-8
	Model Y798, Green	34E 142-4
Cabinet Rear		
	Model Y793, White	34E 142-1
	Model Y797, Tan	34E 142-7
	Model Y798, Green	34E 142-3
Crystal, Clock Front		24C 29-1
Dial Plate, Insert, "DeLuxe 5"		23C 352-1
Knob, Tuning		33D 326-2
Knob, Volume		33D 326-1
	Spring for above Knobs	18B 5-2
Pointer, Dial		25B 70-1

CLOCK PARTS

Clock (Westclox) Timer (Battery operated)		91C 32-5
Knob for Clock, clear		91C 23-10

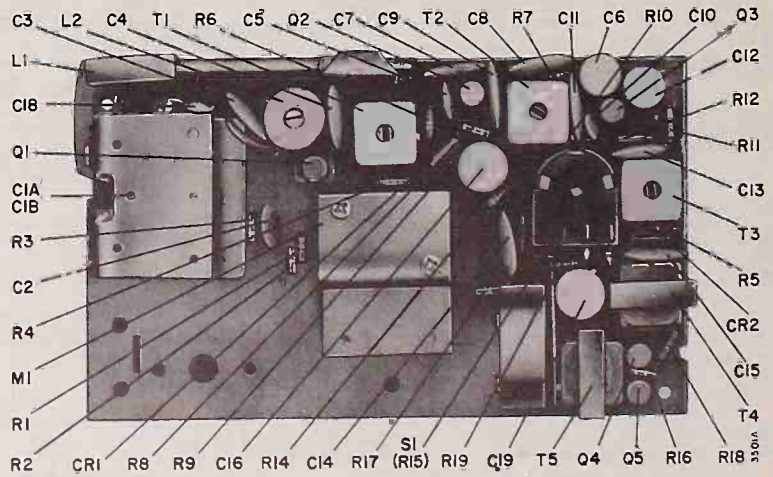


Figure 8. Top View of Chassis Showing Parts Locations.

CHASSIS: 5E5B

Admiral

SERVICE MANUAL SUPPLEMENT S830A FOR 8S1C CHASSIS

Use this supplement together with Service Manual No. S830 when servicing models using the 8S1C chassis.

TRANSISTOR CLOCK RADIO

ODEL	COLOR	CHASSIS
311B	Black and White	8S1C
316B	Gold and White	8S1C

GENERAL

A unique feature of the models using the 8S1C ssis is an electronic Tone Alarm which is ed on automatically by the clock.

The tone alarm switch is mounted on the Vol- control (R27). To have the Tone Alarm, ead of the radio, turn on automatically, turn volume control to the left until it clicks.

NOTE: It is not possible to have radio and m "on" at the same time. Also note that ning off Tone Alarm turns on the radio. The o (and Tone Alarm) Off-On switch is loca- at the left side of the clock.

Another added feature is a newly developed, pensating type diode used as an outpnt bias ulator. The action of this diode is to com- sate for the effects of reduced battery sup- voltage due to aging, temperature, load, us- , etc.

SERVICE HINTS

The tuning slugs in the 2nd and 3rd IF trans- ners are accessible from the rear, but are ated near the top of the can. Use care if e than one to the right is required, to pre- damage to the slug against the top of the .

The secondary (top) slug of T1 is accessible after removing chassis from the cabinet t or removing the tuning knobs and escutch- under the knobs.

To improve sound quality in the 8S1A chassis er production) R31 (27,000 ohms, 1/2 watt) istor was wired in parallel with R24 (6,800 ms). Also the foil connecting the emitters of and Q8 was opened. To make this change, remove leads of R25 and R26, use a sharp pen knife or razor blade to cut away the foil and re- place R25 and R26 leads into the two separate connection points created by the cutting of the foil.

S830 PARTS LIST ADDITIONS AND CORRECTIONS

ADDITIONS

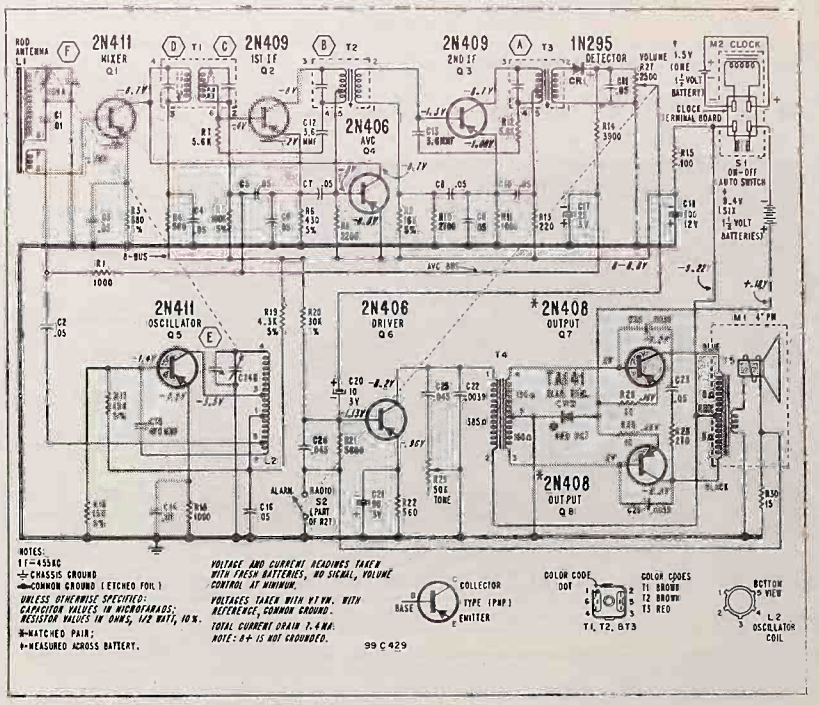
R27	2,500 ohms, Volume control 8S1C chassis (includes S2)	75D 1-126
R30	15 ohms, ½ watt	60B 8-150
R31	27,000 ohms, ½ watt	60B 8-273
C26	.045 mf, 30 volts, cer. disc	65B 45-11
C28	.0039 mf, 50 volts, cer. disc	65B 45-14
C29	.0039 mf, 50 volts, cer. disc	65B 45-14
T5	Transformer Output	79D 33-22
S2	Switch, Radio-Alarm (8S1C only)	Part of R27
Bracket, Clock Support and Clock Battery Holder Assembly		A7522
Spring, Compression Ring for Knobs for tuning dial 33D296-1		18A 5-12
for tuning knob 33D296-2		18A 5-17

TRANSISTORS AND DIODES

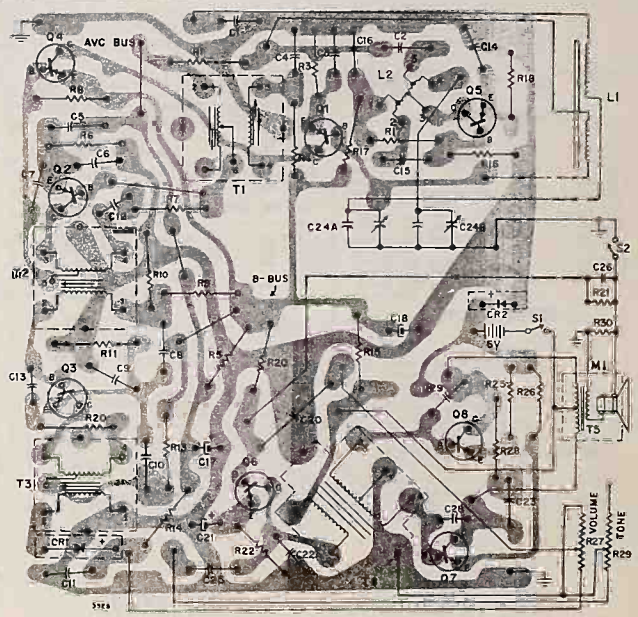
Q1	Transistor (Mixer) 2N411	57B 1-24
Q2	Transistor (1st IF) 2N409	57B 1-22
Q3	Transistor (2nd IF) 2N409	57B 1-22
Q4	Transistor (AVC) 2N406	57B 1-27
Q5	Transistor (Oscillator) 2N411	57B 1-24
Q6	Transistor (Driver)	
	Early production - 2N408	57B 1-42
	Later production - 2N406	57B 1-27
Q7	Transistor (Output) matched pair	
Q8	Chassis 8S1A - 2N270	57B 1-19
	Chassis 8S1C - 2N408	57B 1-42
CR1	Diode (Detector-AVC) 1N87G/1N295	57B 1-2
CR2	Diode (Output Bias Regulator) TA141	57B 1-29

CORRECTIONS

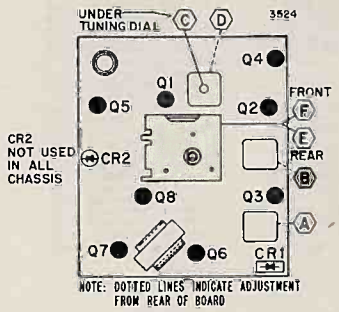
R27	2,500 ohms, Volume control 8S1A chassis only	75D 1-122
C25	.045 mf, 30 volts, cer. disc	65B 45-11



Schematic of 8S1C Chassis.



Rear View of Etched Circuit Board, Used in 8S1C Chassis.



Transistor and Alignment Point Locations.

Admiral Radio

8T1A CHASSIS

Note: For information on etched wiring and transistors, refer to Admiral Service Manual No. 5559 and "Admiral Service Information For Transistors" No. 5586.

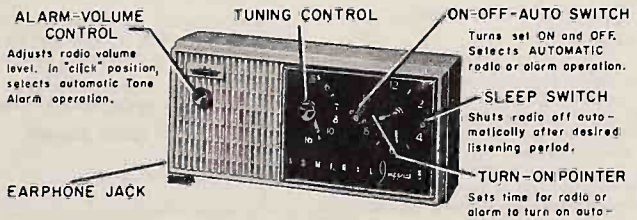


Figure 1. Front View of Set, Showing Controls.

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CIRCUIT: Superheterodyne using eight PNP type transistors and one germanium diode.

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FREQUENCY RANGE: Standard broadcast band: 535 to 1620 KC.

INTERMEDIATE FREQUENCY: 455 KC.

POWER SUPPLY: Four 1½ volts, "AA" size, penlight flashlight batteries.

SPEAKER: 2¾" PM with Alnico V magnet. Voice coil impedance, 12 ohms.

GENERAL

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TRANSISTOR PERSONAL CLOCK RADIO

MODEL	COLOR	NAME	CHASSIS
Y821	Black and White	The Holiday	8T1A
Y822	Coral and White		

All models have Vernier tuning, an Electronic Buzzer Alarm, a Sleep Switch and provision for using an external Ear-phone.

BATTERY INFORMATION AND REPLACEMENT

Radio power is supplied by four 1½ volt ordinary (pen-light) "AA" size batteries, or equivalent size mercury batteries. See Battery list.

If reception is weak, distorted (muffled) or if radio fails to operate, it is recommended that batteries be checked by complete replacement.

To replace batteries, remove back cover by inserting a small coil into one of the slots between back cover and front panel and twist. Remove battery holder as shown in figure 2. Replace batteries as shown in figure 3.

The battery holder is an oval shaped tube with end caps. The right cap (from rear) is permanently attached to the board. The holder (with batteries) is then pushed into the attached cap. A flange on the bottom of the tube goes through the board for anchorage, while springs inside the tube maintain the batteries under proper tension.

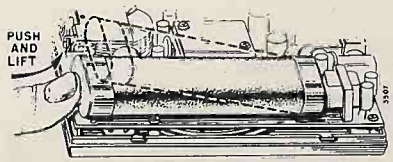


Figure 2. View Showing Method of Removing Battery Holder from Chassis Board.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

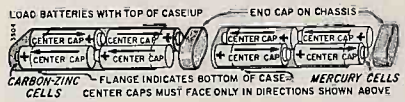


Figure 3. Battery Holder, Showing Ordinary and Mercury Batteries in Correct Positions.

IMPORTANT: Arrows, + marks and battery outlines are shown on holder to indicate the directions that the battery center caps should face when placed into the holder. Note especially the difference between ordinary (carbon-zinc) batteries and mercury batteries. Mercury batteries have polarity just the reverse of ordinary batteries. Therefore, if mercury batteries are to be used they must be placed into the holder exactly opposite the ordinary batteries.

If one or more batteries is reversed the radio will play incorrectly or not at all. If radio fails to play, sounds weak, noisy or distorted after installing new batteries, turn set off immediately and check for improper battery installation.

Never leave extremely weak or dead batteries in the set as leakage may develop, thus causing corrosion damage to parts and wiring.

Batteries listed below, or an equivalent substitute may be used.

PENLIGHT BATTERIES

CARBON-ZINC BATTERIES

Burgess .....Z	General 900
Eveready 915	Ray-O-Vac .....R7 or 7LP

MERCURY BATTERIES

Eveready E502	Mallory RM502R

TO REPLACE CLOCK BATTERY: Pull old battery straight out of clip. Insert a fresh "C" size 1.5 volt battery in clip so that center-cap (positive terminal) points toward radio chassis. When viewing set from rear the clock is at left as in figure 4. **If battery is reversed, clock will not operate.**

Figure 4. View Showing Clock Battery in Correct Position.

SERVICING THE CLOCK

SETTING THE TIME: To set clock to the correct time, pull out Time Set knob on back of set. Rotate hands in a clockwise direction only.

AUTOMATIC TIME REGULATION: The clock has an automatic regulation mechanism which automatically compensates for "fast" or "slow" clock operation when normal time setting procedures are used.

1. If clock is running "slow," set hands up to correct time. Setting the hands in a clockwise direction will cause the clock to run a little faster.
2. If clock is running "fast," set hands back to correct time. Setting the hands in a counterclockwise direction will cause the clock to run a little slower.

TO SET TURN-ON POINTER: Push in Time Set knob and turn Turn-On pointer counterclockwise until it indicates the time desired for radio (or alarm) to turn on.

IMPORTANT CLOCK INFORMATION:

When setting the clock to the correct time, determine the correct direction of rotation and turn slowly to bring hands directly to correct position. **Do not overset hands so that they must be turned back.**

If the hour hand is turned counterclockwise past the Turn-On pointer setting, the pointer will be pulled along with the hour hand and will need resetting.

The speed of the clock mechanism has been preregulated at the factory. After initially setting clock, reset hands only when time must be corrected. **Unnecessary setting of the hands can result in an error in regulation.**

When resetting clock, a period of over one hour must be allowed between each change in time setting, for the self regulating mechanism to be effective.

CLOCK REPLACEMENT

NOTE: Do not attempt to break the seals on the clock used in these models. Consult your Admiral distributor for the address of the nearest parts and service station for clock used in this set.

To remove clock, first, remove the knobs by pulling them straight out. Remove the back cover as instructed above.

Second, remove clock battery and battery holder which is held by one phillips head, self tapping screw, at the center of the holder.

The clock is held in place by two "S" shaped brackets also mounted with phillips head screws.

When unsoldering clock leads note the polarity markings on the clock to prevent wiring the replacement clock incorrectly.

REMOVING CHASSIS FROM CABINET

To remove cabinet back, simply insert a small coin into one of the slots on the bottom edge and twist.

To remove chassis from cabinet front, first remove the knobs by pulling them off. Remove the back cover as instructed above. Remove the four screws at the corners of the etched board. Lift entire chassis (etched board with all components) out of the cabinet front.

To remove clock see information under "CLOCK REPLACEMENT."

CIRCUIT DESCRIPTION

This receiver uses 8 PNP type transistors and one germanium diode. Q1 is an untuned RF stage used primarily to provide additional sensitivity.

Frequency conversion is accomplished by Q2 (mixer) with Q5 acting as a separate oscillator. Q3 and Q4 are the 1st and 2nd IF amplifiers and CR1 functions as detector and AVC diode.

Q7 and Q8 are a class B operated push-pull output stage while Q6 and T4 act as a transformer coupled driver stage for the class B output.

Automatic volume control is applied to three stages, the RF amplifier (Q1), mixer (Q2) and the first IF amplifier (Q3) to provide uniform AVC action over a wide range of signal strength.

SERVICE HINTS

Precautions To Take While Servicing Transistor Radios

A transistor is quite durable, but is extremely sensitive to heat and the application of incorrect DC operating voltages. Both can destroy the "transistor action".

Before actual servicing, give all wiring and components a visual check. Look for cracks or breaks in the foil on the etched circuit board, poor solder joints, corroded or loose battery contacts, dirt or solder between leads, etc.

Next, test the total battery voltage with the set "on".

An ohmmeter check of a transistor circuit is not recommended unless it is known that the voltage of the meter does not exceed the ratings of the transistors and the capacitors in the circuit. In general, make sure the voltages applied do not exceed the ratings and is of the correct polarity.

When replacing transistors, or components, make sure the power is "off".

Avoid excessive heat while soldering, by using long nosed pliers between transistor, or component and the joint to be soldered.

TESTING TRANSISTORS

The transistors used in this set are junction type. This type of transistor is more apt to become shorted than open. A shorted transistor will cause an enormous increase in current from the power supply. Thus a quick check is to measure the no signal current drain with a milliammeter connected in series with the leads from the power supply. See schematic for normal no signal current drain for this set. Transistors often become shorted because of excessive current flow, which is usually indicative of circuit trouble. If a transistor is found to be shorted, check the circuit carefully before installing a new one. Excessive current drain is also a good indication of shorted components.

OHMMETER TEST OF TRANSISTORS

In general, the forward current through a transistor should never be allowed to exceed 15 ma. A milliammeter can be used to determine whether any particular ohmmeter is safe to use in testing transistors.

For ohmmeter testing purposes, any two sections of a transistor can be considered as two germanium diodes connected back-to-back. See figure 5A.

Figure 5B illustrates the relative resistances for PNP type transistors used in this set. The polarity signs shown in the illustration indicate the polarity of the ohmmeter leads. The transistors must be removed from their sockets to make this check. Low resistance readings will range between 50 and 500 ohms or more. High resistance readings will range from .1 megohm to several megohms, depending on the ohmmeter used and the transistor type.

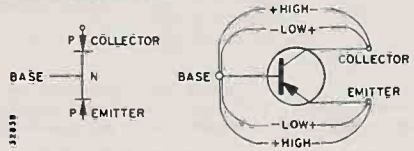


Figure 5A. Germanium Diode Equivalent.

Figure 5B. Ohmmeter Test of Transistor.

ALIGNMENT PROCEDURE

Alignment of a transistor radio is similar to alignment of an ordinary vacuum-tube radio. However, there is somewhat more interaction between the RF and IF circuits, thus requiring greater care in the setting of the adjustments as well as repetition of some of the steps. Therefore, for best results, follow the alignment procedure exactly as given below.

a. Fresh batteries should be used.

b. Set Volume control at maximum.

c. Connect output meter across output transformer secondary. For best results, have speaker disconnected, use 12 ohm load.

d. Use lowest output of signal generator that will produce adequate indication on lowest scale of output meter. IMPORTANT: Output level should be held at 25 mw. or less. The voltage reading at the 25 mw. level is approximately 1.8 volts across the 12 ohm load.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Radiated Signal. †Loop of several turns of wire, or place generator lead close to receiver for adequate signal.	455 KC	Gang fully open	3rd IF 2nd IF 1st IF	* Ⓐ Ⓑ and Ⓒ for maximum output.
2	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	Ⓓ for maximum output.
3	Repeat "Step 1" several times until there is no further increase in the output.				
4	Same as "Step 1".	§ 1400 KC	Tune in generator signal	Antenna Trimmer	Ⓔ for maximum output.
	NOTE: After completing "Step 4" the tuning range should be 535 KC to 1620 KC; ±5 KC. If this range cannot be obtained, continue with Steps 5, 6 and 7.				
5	Same as "Step 1".	535 KC	Gang fully closed	Oscillator Coil Core	Ⓕ for maximum output.
6	Repeat "Step 2"; then repeat Steps 5 and 2 several times until oscillator covers required range.				
7	Repeat "Step 4".				

† If signal generator does not produce sufficient output for usable reading, clip hot lead of generator to RF stator plates terminal of gang; clip ground lead to frame of gang. Adjust Ⓐ, Ⓑ and Ⓒ for usable output only. Then return to "Step 1".

* If difficulty is experienced in obtaining signal output, first rotate IF slugs out several turns, then slowly adjust slugs in until output is obtained. Caution: Rotating slugs too far inward will damage ceramic capacitor contained in IF can.

§ Antenna trimmer Ⓔ should first be adjusted for maximum output with generator tuned to 1400 KC. Then try to increase output by rocking gang or generator slightly while readjusting trimmer.

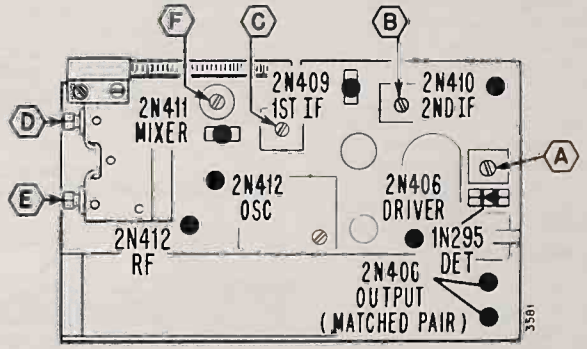
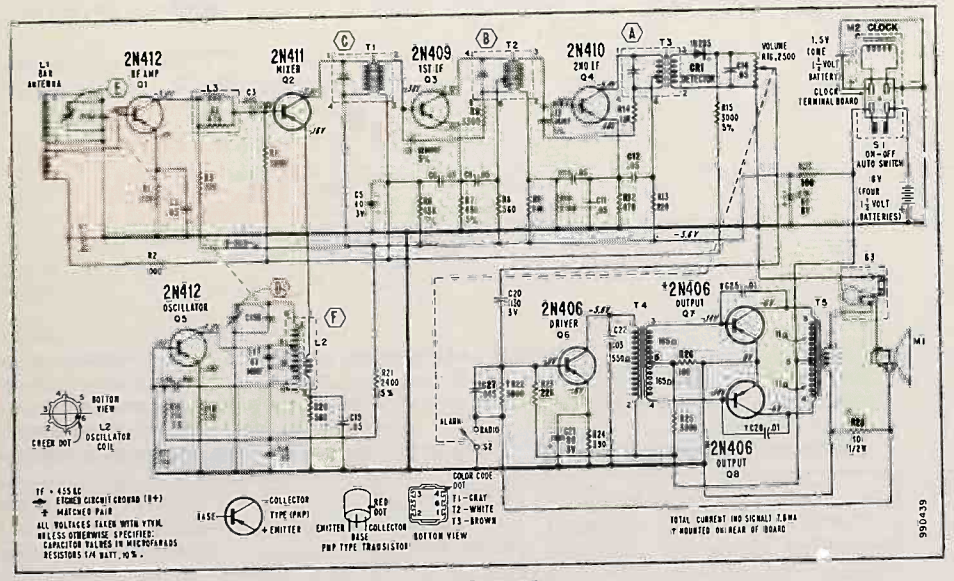


Figure 6. Transistor and Alignment Point Locations.



VOLTAGE DATA

- Voltages shown measured with no signal, using fresh batteries.
- Volume control at minimum; dial set at low frequency end.
- All readings made with VTVM between transistor terminals and B plus (ground).
- All voltages are negative.

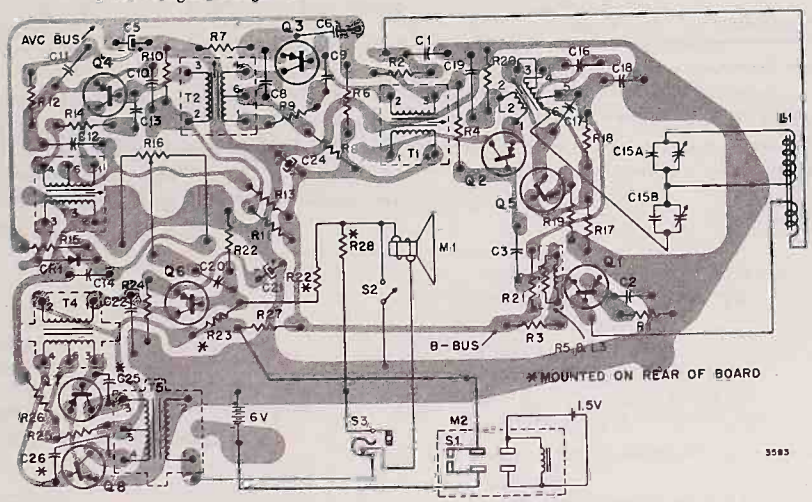


Figure 7. Rear View of Etched Circuit Board. Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	220 ohms, ¼ watt	60B 45-221
R2	1,000 ohms, ¼ watt	60B 45-102
R3	220 ohms, ¼ watt	60B 45-221
R4	3,900 ohms, ¼ watt	60B 45-392
R5	470 ohms, ½ watt	Part of L3
R6	43,000 ohms, ¼ watt, 5%	60B 44-433
R7	430 ohms, ¼ watt, 5%	60B 44-431
R8	560 ohms, ¼ watt	60B 45-561
R9	3,300 ohms, ¼ watt	60B 45-332
R10	2,700 ohms, ¼ watt	60B 45-272
R11	18,000 ohms, ¼ watt	60B 45-183
R12	470 ohms, ¼ watt	60B 45-471
R13	220 ohms, ¼ watt	60B 45-221
R14	18,000 ohms, ¼ watt	60B 45-183
R15	3,000 ohms, ¼ watt, 5%	60B 44-302
R16	2,500 ohms, Volume control, (Includes Off-on Switch S1)	75B 51-2
R17	15,000 ohms, ¼ watt	60B 45-153
R18	20,000 ohms, ¼ watt, 5%	60B 44-203
R19	270 ohms, ¼ watt	60B 45-271
R20	560 ohms, ¼ watt	60B 45-561
R21	2,400 ohms, ¼ watt, 5%	60B 44-242
R22	5,600 ohms, ¼ watt	60B 45-562
R23	22,000 ohms, ¼ watt	60B 45-223
R24	390 ohms, ¼ watt	60B 45-391
R25	3,900 ohms, ¼ watt	60B 45-392
R26	100 ohms, ¼ watt	60B 45-101
R27	100 ohms, ¼ watt	60B 45-101
R28	10 ohms, ½ watt	60B 8-100

CAPACITORS

C1	.05 mf, 30 volts, cer. disc	65B 45-6
C2	.05 mf, 30 volts, cer. disc	65B 45-6
C3	.005 mf, 500 volts, cer. disc	65D 10-1
C5	40 mf, 3 volts, electrolytic	67B 32-9
C6	.05 mf, 30 volts, cer. disc	65B 45-6
C8	.05 mf, 30 volts, cer. disc	65B 45-6
C9	11 mmf, 500 volts, 5% cer. disc, N750 temp. coeff	65D 10-175
C10	.05 mf, 30 volts, cer. disc	65B 45-6
C11	.05 mf, 30 volts, cer. disc	65B 45-6
C12	.05 mf, 30 volts, cer. disc	65B 45-6
C13	5 mmf, 500 volts, 5%, cer. disc, NPO temp. coeff	65D 10-161
C14	.05 mf, 30 volts, cer. disc	65B 45-6
C15A, C15B	123.1 mmf, max. ant. } gang	68B 75-1
C15B	73.4 mmf, max. osc. } gang	68B 75-1
C16	.001 mf, 500 volts, cer. disc	65D 10-53
C17	47 mmf, 500 volts, cer. disc	65D 10-80
C18	.05 mf, 30 volts, cer. disc	65B 45-6
C19	.05 mf, 30 volts, cer. disc	65B 45-6
C20	1 mf, 3 volts, cer. disc	65B 45-15
C21	90 mf, 3 volts, electrolytic	67B 32-10
C22	.03 mf, 30 volts, cer. disc	65B 45-8
C24	60 mf, 6 volts, electrolytic	67B 32-8
C25	.01 mf, 50 volts, cer. disc	65B 45-20
C26	.01 mf, 50 volts, cer. disc	65B 45-20
C27	.045 mf, 30 volts	65B 45-11

COILS, TRANSFORMERS, ETC.

L1	Antenna, Ferrite Bar	69B 218-1
L2	Oscillator Coil, with Green dot	69B 232-7
L3	Coil, RF Coupling, with Black dot (wound on resistor R5)	73C 5-38
T1	Transformer, IF, with Gray dot	72C 182-8
T2	Transformer, IF, with White dot	72C 182-9
T3	Transformer, IF, with Brown dot	72C 182-10
T4	Transformer, Driver	79B 84-1
T5	Transformer, Output	79B 85-1

MISCELLANEOUS CHASSIS PARTS

M1	Speaker, 2¾" PM	78B 125-3
M2	Clock	See Clock Parts
S1	Switch, Off-on	Part of M2
S2	Switch, Radio-Alarm	Part of R16
S3	Jack, Earphone	88B 39-3
	Bracket for Mtg. S3	15B 1981-1
	Nut for Mtg. S3	88B 39-50
	Earphone and Plug Assembly	ES 201
	Holder, Battery	
	Radio	700B 178-1
	Clock	A 7597
	Socket, Transistor	87B 63-1
	Screw, 4-40 x ½ BHPHST chassis mtg. (special for plastic)	1A 71-5-71

TRANSISTORS AND DIODES

Q1	Transistor (RF amplifier) 2N 412	57B 1-25
Q2	Transistor (mixer) 2N 411	57B 1-24
Q3	Transistor (1st IF) 2N 409	57B 1-22
Q4	Transistor (2nd IF) 2N 410	57B 1-23
Q5	Transistor (oscillator) 2N 412	57B 1-25
Q6	Transistor (driver) 2N 406	57B 1-27
Q7	Transistor (output) } 2N 406*	57B 1-27
Q8	Transistor (output) }	
CR1	Diode (Detector-AVC)	1N 295

*Matched Pair

CABINET PARTS

Cabinet, Front, White	34E 142-2
Cabinet, Rear	
Model Y821, Black	34E 142-6
Model Y822, Coral	34E 142-5
Crystal, Clock Front	24C 29-2
Dial Plate, Insert, "Imperial 8"	33D 352-2
Knob, Tuning	33B 326-2
Knob, Volume	33B 326-1
Spring for above knobs	18B 5-2
Pointer, Dial Scale	25B 70-1

CLOCK PARTS

Clock (Westclox) Timer	91C 32-5
Knob for Clock	91C 23-10

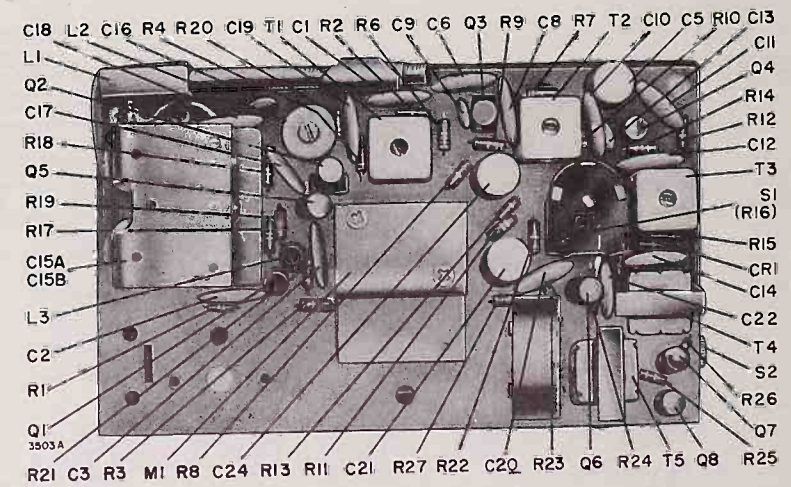


Figure 8. Top View of Chassis Showing Parts Locations.

CHASSIS: 8T1A

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N194A	Mixer - OSC
2N233A	1st & 2nd IF
2N306	Driver
2N1059	Output

SPEAKERS

Type: Permanent Magnet
Size: 4"
Voice Coil Impedence 16 ohms

POWER SUPPLY

6 - 1 1/2V "D" Size Cells
Eveready, Burgess, NEDA,
Ray-o-Vac

POWER OUTPUT

Undistorted	150 MW
Maximum	200 MW

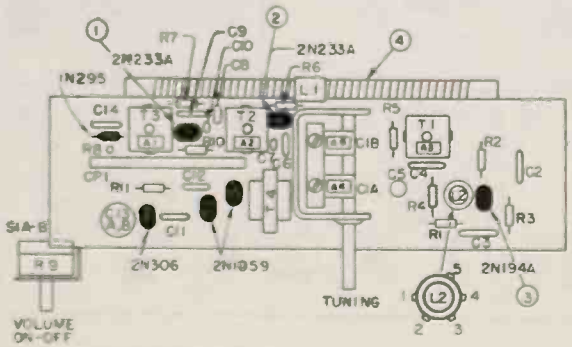
ALIGNMENT PROCEDURE

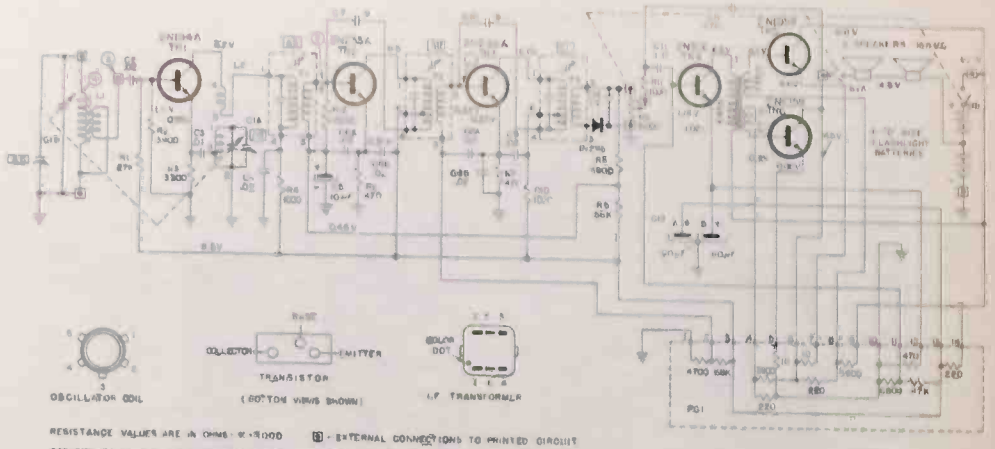
Output meter reading to indicate 50 milliwatts 1.27V
Output meter connection..... Across speaker voice coils
Connection of generator ground lead..... Common Ground
Generator Modulation..... 30% 400 cycles
Position of volume control..... Fully clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1B	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





OSCILLATOR COIL

TRANSISTOR (BOTTOM VIEWS SHOWN)

I.F. TRANSFORMER

RESISTANCE VALUES ARE IN OHMS - K=1000 ⊞ = EXTERNAL CONNECTIONS TO PRINTED CIRCUIT

CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µF), AND VALUES GREATER THAN 1.0 ARE IN MMFD - MICROFARADS (µµF) EXCEPT WHERE NOTED

VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.

NO SIGNAL BATTERY CURRENT 7 MA. TO 10 MA.

SIGNAL TEST POINT	TEST FREQUENCY	SIGNAL GENERATOR	INPUT FOR 50MW OUTPUT (1.27 V ACROSS 16Ω)
1	455 KC	.05 µf	3000 µv
2	455 KC	.05 µf	80 µv
3	455 KC	.05 µf	6 µv
4	1000 KC	STANDARD LOOP	200 µv/m

Model 2599 47245 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47314	Variable	2.75
C2,6,9,14		.02 µf., Disc	
C3		.01 µf., Disc	
C5	44396-4	10 µf., 10V., Elect.	.90
C6A, B, 8A, B		.02 µf., Dual Disc	
C7, 10		9 µµf., Disc	
C11		1 µf., 3V., Disc	
C12		270 µµf., Disc	
C13A, B	44397-3	80-80/12V., Elect.	1.80
		RESISTORS	
R1		27K., 1/2W., 5%	
R2, 8		3900 ohm, 1/2W., 10%	
R3		5300 ohm, 1/2W., 10%	
R4, 10, 11		1000 ohm, 1/2W., 10%	
R5		56K., 1/2W., 10%	
R6, 7		470 ohm, 1/2W., 10%	
R9, 9A, B	44506-27	Control, Volume, 5000 ohm	1.50
R12		5000 ohm, 1/2W., 10%	

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	46861-3	Rod Antenna Assembly	2.00
L2	45783-8	Coil, Oscillator	1.88
T1	45900-11	Transformer, 1st I.F.	1.75
T2	45900-12	Transformer, 2nd I.F.	1.75
T3	45900-13	Transformer, 3rd I.F.	2.00
T4	46604-4	Transformer, Input	2.50
		MISCELLANEOUS	
	47236-67	Cabinet Front Assembly, White	7.00
	45433-192	Cabinet Back, Charcoal	9.00
	45843-19	Battery Door, Charcoal	.60
	45468-67	Knob, Volume	.30
	47240	Knob, Tuning	.90
PC1	47054-1	Coupling, Unit	1.50
	47274-1	Battery Carriage	2.00
SPK	44600-5	Speaker, 4" P.M., 16 ohm v.c.	3.75
	45611-31	Nameplate	.30

*Cabinet Front Assembly includes nameplate and dial scale.

MODEL 7595 SPECIFICATIONS CHASSIS 1.47200

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N1086	Mixer-Osc
2N448	IF
2N449 or 2N1121	Reflex IF
2N1097	Output

SPEAKER
Type: Permanent Magnet
Size: 3 1/2", 12 ohm

POWER SUPPLY
4 - "C" Size Flashlight cells

POWER OUTPUT

Undistorted	30 MW
Maximum	45 MW

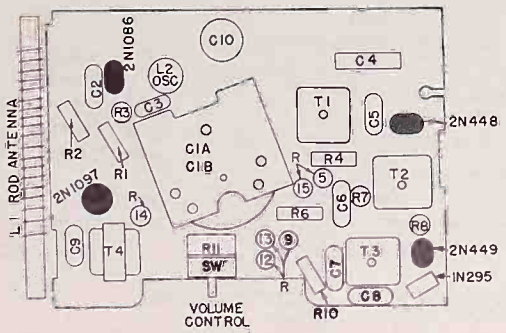
ALIGNMENT PROCEDURE

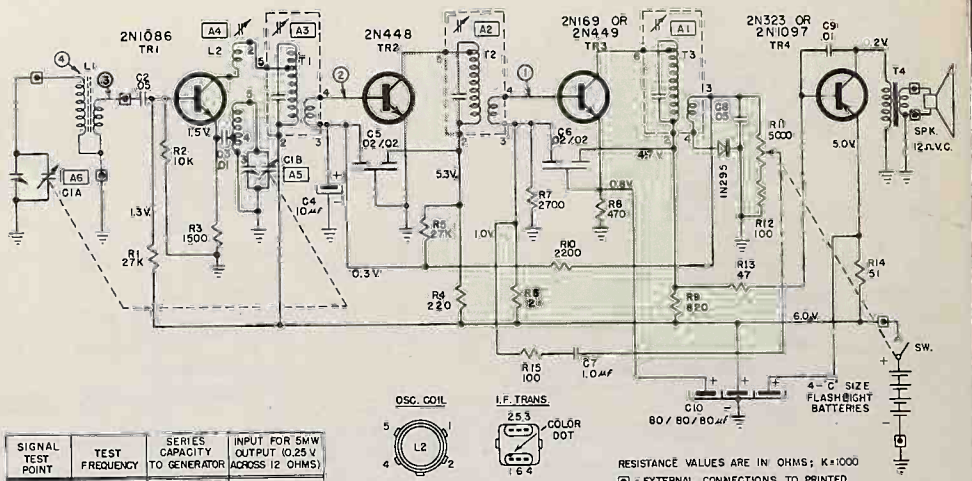
Output meter reading to indicate 5 milliwatts ..... .25V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 400 Cycles
Position of volume control ..... Fully Clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 μf	C1A	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open	1670 Kc		*Test Loop	A5	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

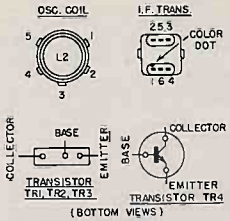
*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





SIGNAL TEST POINT	TEST FREQUENCY	SERIES CAPACITY TO GENERATOR	INPUT FOR 5MW OUTPUT (0.25 V ACROSS 12 OHMS)
1	455 KC	.02μf	3500μV
2	455 KC	.05μf	200μV
3	455 KC	.05μf	8μV
4	600 KC	.05μf	500μV/M



RESISTANCE VALUES ARE IN OHMS; K=1000
= EXTERNAL CONNECTIONS TO PRINTED CIRCUIT.
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (μf), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (μμf) EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47125	Variable	2.75
C2, 8		.05 μf., Disc.	
C3, 9		.01 μf., Disc.	
C4	44396-4	10/10 V., Elect.	.90
C5, 6		.02 μf., Dual Disc.	
C7		1 μf., Disc.	
C10A, B, C	46823-1	80-80-80/12V., Elect.	2.25
		RESISTORS	
R1, 5		27K., 1/2W., 10%	
R2		10K., 1/2W., 10%	
R3		1500 ohm, 1/2W., 10%	
R4		220 ohm, 1/2W., 10%	
R6		12K., 1/2W., 5%	
R7		2700 ohm, 1/2W., 5%	
R8		470 ohm, 1/2W., 5%	
R9		820 ohm, 1/2W., 5%	
R10		2200 ohm, 1/2W., 10%	
R11	46800-2	Control, Volume & Switch, 5000 ohm	1.75
R12, 15		100 ohm, 1/2W., 10%	
R13		47 ohm, 1/2W., 10%	
R14		51 ohm, 1/2W., 5%	

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	45534-14	Antenna Rod	2.00
L2	45783-10	Coil, Oscillator	1.25
T1	45900-8	Transformer, 1st I.F.	1.75
T2	45900-9	Transformer, 2nd I.F.	1.75
T3	45900-10	Transformer, 3rd I.F.	1.75
T4	45838-2	Transformer, Output	2.00
		MISCELLANEOUS	
	46789-67	Cabinet Front, Off White	2.50
	46611-19	Cabinet Back, Charcoal	1.75
	46611-53	Cabinet Back, Pink	1.75
	46690-19	Battery Cover, Charcoal	.50
	46690-53	Battery Cover, Pink	.50
	46811-19	Knob, Tuning, Charcoal	.75
	46811-53	Knob, Tuning, Pink	.75
	46691-6	Battery Contact	.25
	46691-4	Battery Clip, Plus	.25
	46691-5	Battery Clip, Minus	.25
	43959	Diode, 1N295	.75
SPK	46523-3	Speaker, 3 1/2" P.M., 12 ohm	4.25
	46810-67	Knob, Volume, On-Off	.25
	46692-2	Handle, Brass	.75

MODEL 9594 SPECIFICATIONS CHASSIS 1. 47500

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N194A	Mixer-OSC
2N233A	1st & 2nd IF
2N1251	Driver
2N1101	Output

SPEAKERS

Type: Permanent Magnet
Size: 2 3/4"
Voice Coil Impedence .45 ohms

POWER SUPPLY

4 - Size "AA" Penlights
Eveready, Burgess, NEDA,
Ray-o-Vac

POWER OUTPUT

Undistorted	60 MW
Maximum	90 MW

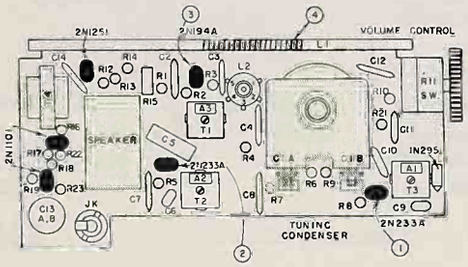
ALIGNMENT PROCEDURE

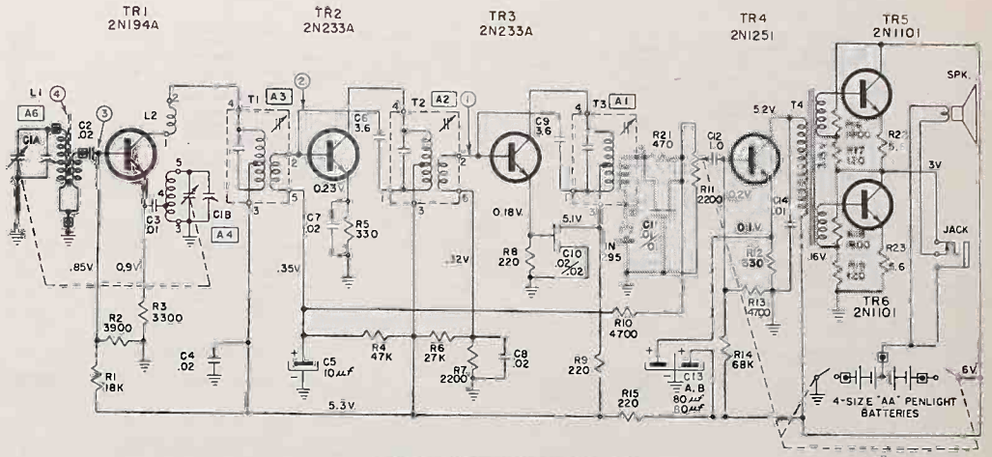
Output meter reading to indicate 5 milliwatts ..... .245 V
Output meter connection..... Across speaker voice coil
Connection of generator ground lead..... Common Ground
Generator Modulation..... 30% 400 cycles
Position of volume control..... Fully clockwise
Position of tone control..... Maximum clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1A	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open 1400 Kc 600 Kc	1670 Kc 1400 Kc 600 Kc.		*Test Loop *Test Loop *Test Loop	A4 A6 Check Point	Oscillator Antenna

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





SIGNAL TEST POINTS	TEST FREQUENCY	SIGNAL GENERATOR CONNECTION TO GENERATOR	INPUT FOR 5MW OUTPUT (47V. ACROSS 45Ω)
①	455KC	.05 µf	1500µV
②	455KC	.05µf	60µV
③	455KC	.05µf	10µV
④	1000KC	STANDARD LOOP	350µV/M

CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µf), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµf) EXCEPT WHERE NOTED.

VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.

RESISTANCE VALUES ARE IN OHMS; K=1000

⏚ - COMMON GROUND SYMBOL.
⊟ - EXTERNAL CONNECTION TO PRINTED CIRCUIT.
TOTAL BATTERY CURRENT DRAIN UNDER NO SIGNAL CONDITIONS, 7 TO 11 MA.

Model 9594 47155 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47431	Variable	3.00
C2,4,7,8		.02 µf., Disc.	
C3,14		.01 µf., Disc.	
C5	44396-4	10 µf., 10V., Elect.	.90
C6,9		3.6 µµf., Disc.	
C10		.02 µf., Dual Disc.	
C11		.01 µf., Dual Disc.	
C12	44684-9	1 µf., Disc.	.75
C13A, B	44397-3	80/80 µf., 12V., Elect.	1.50
		RESISTORS	
R1		18K ohm, 1/2W., 10%	
R2		3900 ohm, 1/2W., 10%	
R3		3300 ohm, 1/2W., 10%	
R4		47K ohm, 1/2W., 10%	
R5, 12		330 ohm, 1/2W., 10%	
R6		27K ohm, 1/2W., 10%	
R7		2200 ohm, 1/2W., 10%	
R8, 9, 15		220 ohm, 1/2W., 10%	
R10, 13		4700 ohm, 1/2W., 10%	
R11	46800-4	Control, Volume & Switch, 2200 ohm	2.00
R14		68K ohm, 1/2W., 10%	
R16, 18		1800 ohm, 1/2W., 10%	
R17, 19		120 ohm, 1/2W., 10%	
R21		470 ohm, 1/2W., 10%	
R22, 23		5.6 ohm, 1/2W., 10%	

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	44511-6	Antenna Rod	2.25
L2	45783-12	Coil, Oscillator	1.25
T1	47163-1	Transformer, 1st I.F.	2.00
T2	47163-2	Transformer, 2nd I.F.	2.00
T3	47163-3	Transformer, 3rd I.F.	2.00
T4	45604-3	Transformer, Input	2.50
		MISCELLANEOUS	
	46921-29	Cabinet Back, Black	2.50
	46921-67	Cabinet Back, White	2.50
	46922	Cabinet Front	3.25
	46658-29	Knob, Volume, Black	.25
	46658-67	Knob, Volume, White	.25
	47427-29	Knob, Tuning, Black	.50
	47427-67	Knob, Tuning, White	.50
	46923-1	Handle, Brass	.75
SPK	44280-2	Speaker, 2 3/4" P.M., 45 ohm v.c.	6.00
	43959	Diode	.75
	44548	Earphone Jack	.75
	47414	Battery Holder	.25
	47179-1	Battery Contact, Tap	.25
	47181-1	Battery Spring, Plus	.25
	47181-2	Battery Spring, Minus	.25

MODEL 9595 SPECIFICATIONS CHASSIS 1.47600

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N194A	Mixer-Osc.
2N233A	IF
2N1101	1st Audio
2N1101	Driver
2N1101 (Two)	Output
1N294 (Two)	Diodes

SPEAKER

Type: Permanent Magnet
Size: 3 1/2", 45 ohm v.c.

POWER SUPPLY

4 - "C" Size Flashlight cells

POWER OUTPUT

Undistorted	90 MW
Maximum	140 MW

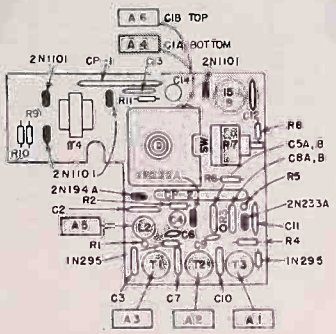
ALIGNMENT PROCEDURE

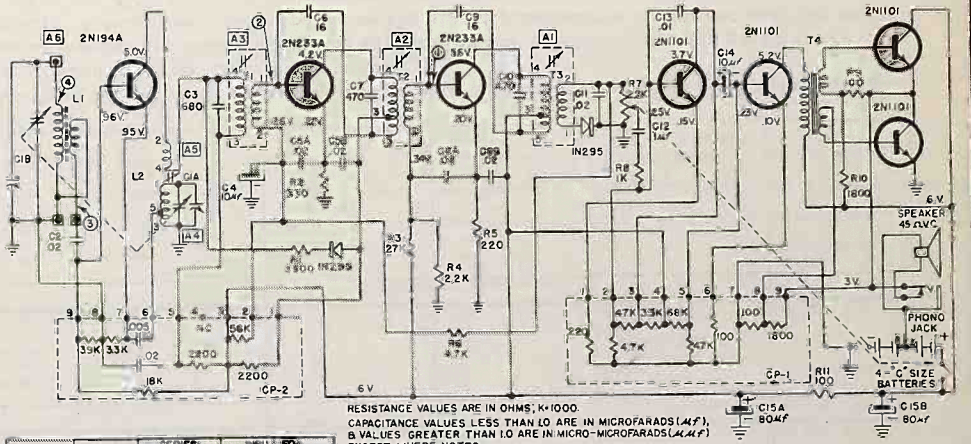
Output meter reading to indicate 5 milliwatts ..... .475V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 400 Cycles
Position of volume control ..... Fully Clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1B	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

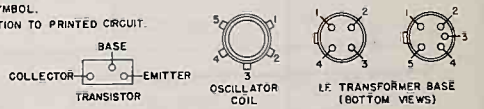
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





SIGNAL TEST POINT	TEST FREQUENCY	SERIES TO GENERATOR	INPUT FOR 5 MW OUTPUT ACROSS 475 Ω
	455 KC	.05µf	900 µV
	55 KC	.05µf	30 µV
	455 KC	.05µf	5 µV
	1000 KC	STANDARD LOOP	200 µV/m

RESISTANCE VALUES ARE IN OHMS, K=1000.
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µf), & VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµf) EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED & VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.
⏚ = COMMON GROUND SYMBOL.
◉ = EXTERNAL CONNECTION TO PRINTED CIRCUIT.



SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47424	Variable	3.25
C2, 11		.02 µf., Disc.	
C3		680 µµf., Mica	
C4, 14	44396-4	10 µf., 10V., Elect.	.90
C5A, B, 8A, B		.02 µf., Disc., Dual	
C6, 9		16 µf., Disc.	
C7, 10		470 µµf., Mica	
C12		1 µf., Disc.	
C13		.01 µf., Disc.	
C15A, B	44397-3	80/80 µf., 10V., Elect.	1.50
		RESISTORS	
R1		3300 ohm, 1/2W., 10%	
R2		330 ohm, 1/2W., 10%	
R3		27K., 1/2W., 10%	
R4		2200 ohm, 1/2W., 10%	
R5		220 ohm, 1/2W., 10%	
R6		4700 ohm, 1/2W., 10%	
R7	46800-1	Control, Volume & Switch, 2200 ohm	2.50
R8		1000 ohm, 1/2W., 10%	
R9, 11		100 ohm, 1/2W., 10%	
R10		1800 ohm, 1/2W., 10%	
		COILS & TRANSFORMERS	
L1	45534-13	Antenna Rod	2.00
L2	45783-9	Coil, Oscillator	1.25
T1	44855-12	Transformer, 1st I.F.	1.75
T2	44855-13	Transformer, 2nd I.F.	2.00

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMER (continued)	
T3	44855-14	Transformer, 3rd I.F.	2.00
T4	45604-3	Transformer, Output-Input	2.50
		MISCELLANEOUS	
	*AA47461-67	Cabinet Front Assembly, White	6.50
	*AA47461-59	Cabinet Front Assembly, Gray	6.50
	*AA47461-19	Cabinet Front Assembly, Charcoal	6.50
	46611-67	Cabinet Back, White	1.75
	44611-59	Cabinet Back, Gray	1.75
	44611-19	Cabinet Back, Charcoal	1.75
	46690-67	Battery Cover, White	.50
	46690-59	Battery Cover, Gray	.50
	46690-19	Battery Cover, Charcoal	.50
	46692-1	Handle, Chrome	.35
	46656-60	Nameplate, aluminum	.25
	46658-67	Knob, Volume-Off-On, White	.25
	46658-59	Knob, Volume-Off-On, Gray	.25
	46658-19	Knob, Volume-Off-On, Charcoal	.25
	46659	Knob, Tuning	.75
	46807	Knob, Station Indicator	.35
SPK	46523-2	Speaker, 3 1/2" P.M., 45 ohm	4.25
	46691-1	Battery Clip, Plus	.25
	46691-2	Battery Clip, Minus	.25
	43955	Diode, 1N295	.75
CP1	46000-5	Coupling Unit	1.00
CP2	46000-4	Coupling Unit	1.50
	46691-3	Contact Clip	.25
	47474	Phono Jack	.75

*Cabinet Front Assembly includes cabinet front, grille insert, and dial scale.

MODEL 9594 SPECIFICATIONS CHASSIS 1. 47500

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N194A	Mixer-OSC
2N233A	1st & 2nd IF
2N1251	Driver
2N1101	Output

SPEAKERS

Type: Permanent Magnet
Size: 2 3/4"
Voice Coil Impedence .45 ohms

POWER SUPPLY

4 - Size "AA" Penlights
Eveready, Burgess, NEDA,
Ray-o-Vac

POWER OUTPUT

Undistorted	60 MW
Maximum	90 MW

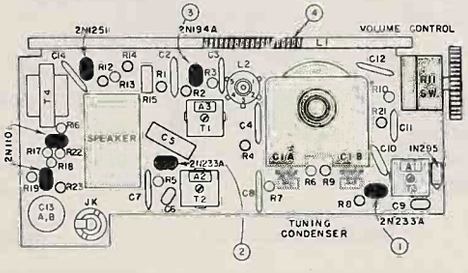
ALIGNMENT PROCEDURE

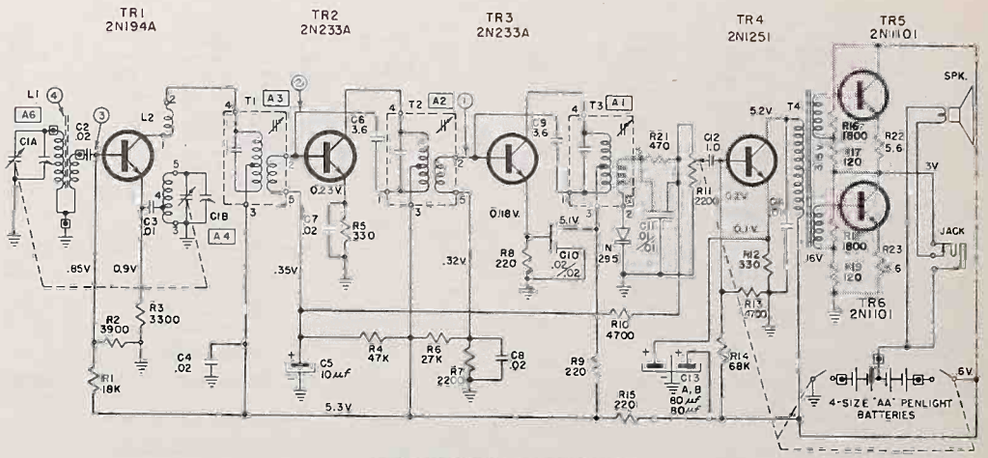
Output meter reading to indicate 5 milliwatts ..... .245 V
Output meter connection..... Across speaker voice coil
Connection of generator ground lead..... Common Ground
Generator Modulation..... 30% 400 cycles
Position of volume control..... Fully clockwise
Position of tone control..... Maximum clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1A	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open 1400 Kc 600 Kc	1670 Kc 1400 Kc 600 Kc.		*Test Loop *Test Loop *Test Loop	A4 A6 Check Point	Oscillator Antenna

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





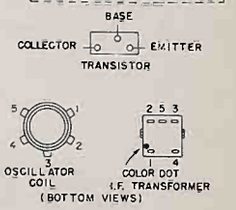
SIGNAL TEST POINTS	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR	INPUT FOR 5MW OUTPUT (.47V ACROSS 45 Ω)
	55	.06µf	1500µV
	455KC	.05µf	60µV
3	455KC	.05µf	10µV
	1000KC	STANDARD LOOP	350µV/M

CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µf), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµf) EXCEPT WHERE NOTED.

VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.

RESISTANCE VALUES ARE IN OHMS; K=1000.

⏚-COMMON GROUND SYMBOL.
⊟-EXTERNAL CONNECTION TO PRINTED CIRCUIT.
TOTAL BATTERY CURRENT DRAIN UNDER NO SIGNAL CONDITIONS, 7 TO 11 MA.



Model 9594 47155 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47431	Variable	3.00
C2,4,7,8		.02 µf., Disc.	
C3,14		.01 µf., Disc.	
C5	44396-4	10 µf., 10V., Elect.	.90
C6,9		3.6 µµf., Disc.	
C10		.02 µf., Dual Disc.	
C11		.01 µf., Dual Disc.	
C12	44684-9	1 µf., Disc.	.75
C13A, B	44397-3	80/80 µf., 12V., Elect.	1.50
		RESISTORS	
R1		18K ohm, 1/2W., 10%	
R2		3900 ohm, 1/2W., 10%	
R3		3300 ohm, 1/2W., 10%	
R4		47K ohm, 1/2W., 10%	
R5, 12		330 ohm, 1/2W., 10%	
R6		27K ohm, 1/2W., 10%	
R7		2200 ohm, 1/2W., 10%	
R8, 9, 15		220 ohm, 1/2W., 10%	
R10, 13		4700 ohm, 1/2W., 10%	
R11	46800-4	Control, Volume & Switch, 2200 ohm	2.00
R14		68K ohm, 1/2W., 10%	
R16, 18		1800 ohm, 1/2W., 10%	
R17, 19		120 ohm, 1/2W., 10%	
R21		470 ohm, 1/2W., 10%	
R22, 23		5.6 ohm, 1/2W., 10%	

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	44511-6	Antenna Rod	2.25
L2	45783-12	Coil, Oscillator	1.25
T1	47163-1	Transformer, 1st I.F.	2.00
T2	47163-2	Transformer, 2nd I.F.	2.00
T3	47163-3	Transformer, 3rd I.F.	2.00
T4	45604-3	Transformer, Input	2.50
		MISCELLANEOUS	
	46921-29	Cabinet Back, Black	2.50
	46921-67	Cabinet Back, White	2.50
	46922	Cabinet Front	3.25
	46658-29	Knob, Volume, Black	.25
	46658-67	Knob, Volume, White	.25
	47427-29	Knob, Tuning, Black	.50
	47427-67	Knob, Tuning, White	.50
	46923-1	Handle, Brass	.75
SPK	44280-2	Speaker, 2 3/4" P.M., 45 ohm v.c.	6.00
	43959	Diode	.75
	44548	Earphone Jack	.75
	47414	Battery Holder	.25
	47179-1	Battery Contact, Tap	.25
	47181-1	Battery Spring, Plus	.25
	47181-2	Battery Spring, Minus	.25

MODEL 9595 SPECIFICATIONS CHASSIS 1.47600

FREQUENCY RANGE

Broadcast	540-1670 Kc
IF	455 Kc

TRANSISTORS AND FUNCTIONS

2N194A	Mixer-Osc.
2N233A	IF
2N1101	1st Audio
2N1101	Driver
2N1101 (Two)	Output
1N294 (Two)	Diodes

SPEAKER

Type: Permanent Magnet
Size: 3 1/2", 45 ohm v.c.

POWER SUPPLY

4 - "C" Size Flashlight cells

POWER OUTPUT

Undistorted	90 MW
Maximum	140 MW

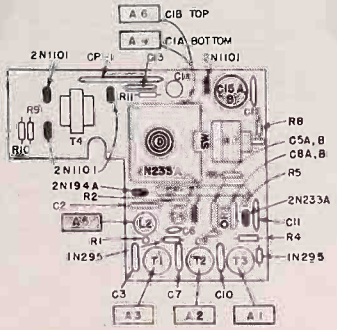
ALIGNMENT PROCEDURE

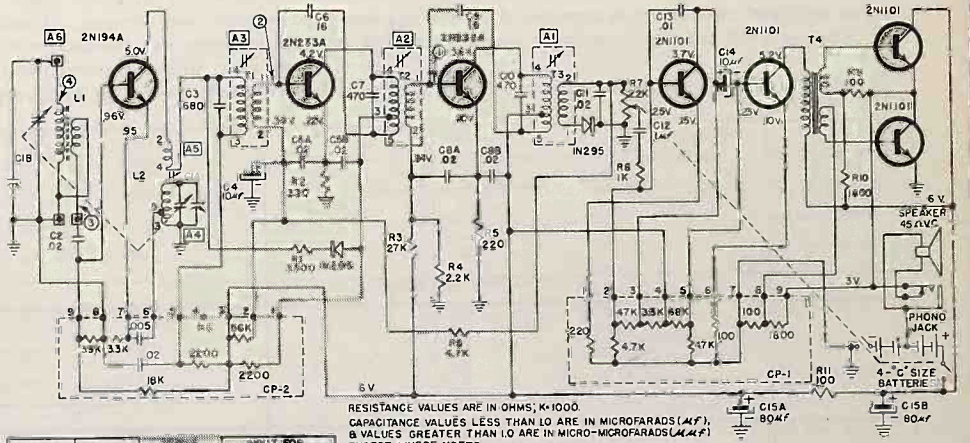
Output meter reading to indicate 5 milliwatts ..... .475V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 400 Cycles
Position of volume control ..... Fully Clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1B	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

*Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

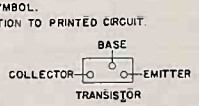
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

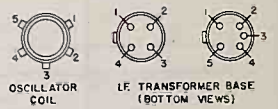




SIGNAL TEST POINT	TEST FREQUENCY	SIGNAL GENERATOR CONNECTION TO GENERATOR	INPUT FOR 5 M W OUTPUT 475 V ACROSS 45 Ω
1	455 KC	.05 µf	900 µV
2	455 KC	.05 µf	30 µV
3	455 KC	.05 µf	5 µV
4	1000 KC	STANDARD LOOP	200 µV/m

RESISTANCE VALUES ARE IN OHMS; K=1000.
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µf), & VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµf) EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED & VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.
⏚ = COMMON GROUND SYMBOL.
◉ = EXTERNAL CONNECTION TO PRINTED CIRCUIT.

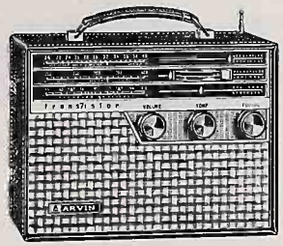




SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	47424	Variable	3.25
C2, 11		.02 µf., Disc.	
C3		680 µµf., Mica	
C4, 14	44396-4	10 µf., 10V., Elect.	.90
C5A, B, 8A, B		.02 µf., Disc., Dual	
C6, 9		16 µµf., Disc.	
C7, 10		470 µµf., Mica	
C12		1 µf., Disc.	
C13		.01 µf., Disc.	
C15A, B	44397-3	80/80 µf., 10V., Elect.	1.50
		RESISTORS	
R1		3300 ohm, 1/2W., 10%	
R2		330 ohm, 1/2W., 10%	
R3		27K., 1/2W., 10%	
R4		2200 ohm, 1/2W., 10%	
R5		220 ohm, 1/2W., 10%	
R6		4700 ohm, 1/2W., 10%	
R7	46800-1	Control, Volume & Switch, 2200 ohm	2.50
R8		1000 ohm, 1/2W., 10%	
R9, 11		100 ohm, 1/2W., 10%	
R10		1800 ohm, 1/2W., 10%	
		COILS & TRANSFORMERS	
L1	45534-13	Antenna Rod	2.00
L2	45783-9	Coil, Oscillator	1.25
T1	44855-12	Transformer, 1st I.F.	1.75
T2	44855-13	Transformer, 2nd I.F.	2.00
T3	44855-14	Transformer, 3rd I.F.	2.00
T4	45604-3	Transformer, Output-Input	2.50
		MISCELLANEOUS	
	*AA47461-67	Cabinet Front Assembly, White	6.50
	*AA47461-59	Cabinet Front Assembly, Gray	6.50
	*AA47461-19	Cabinet Front Assembly, Charcoal	6.50
	44611-67	Cabinet Back, White	1.75
	44611-59	Cabinet Back, Gray	1.75
	44611-19	Cabinet Back, Charcoal	1.75
	46690-67	Battery Cover, White	.50
	46690-59	Battery Cover, Gray	.50
	46690-19	Battery Cover, Charcoal	.50
	46692-1	Handle, Chrome	.35
	46656-60	Nameplate, aluminum	.25
	46658-67	Knob, Volume-Off-On, White	.25
	46658-59	Knob, Volume-Off-On, Gray	.25
	46658-19	Knob, Volume-Off-On, Charcoal	.25
	46659	Knob, Tuning	.75
	46807	Knob, Station Indicator	.35
SPK	46523-2	Speaker, 3 1/2" P.M., 45 ohm	4.25
	46691-1	Battery Clip, Plus	.25
	46691-2	Battery Clip, Minus	.25
	43959	Diode, 1N295	.75
CP1	46000-5	Coupling Unit	1.00
CP2	46000-4	Coupling Unit	1.50
	46691-3	Contact Clip	.25
	47474	Phono Jack	.75

*Cabinet Front Assembly includes cabinet front, grille insert, and dial scale.

MODEL 9598 SPECIFICATIONS CHASSIS 1.47700



MODEL 9598

3 Wave Bands

International

Seven Transistor Portable

FREQUENCY RANGE

Broadcast	540-1670 Kc
Longwave	180 - 400 Kc
Shortwave	2.1 - 6.3 Mc
IF	455 Kc

TRANSISTOR AND FUNCTIONS

2N370	Mixer - Osc.
2N371	Convertor
2N410 or 2N218 (Two)	I. F.
2N408	Driver
2N270 (Two)	Output

SPEAKER

Type: Permanent Magnet
Size: 5 inch 3.2 ohm v.c.

POWER SUPPLY

8 - "D" Size Flashlight cells

POWER OUTPUT

Normal	300 MW
Extended	50 MW

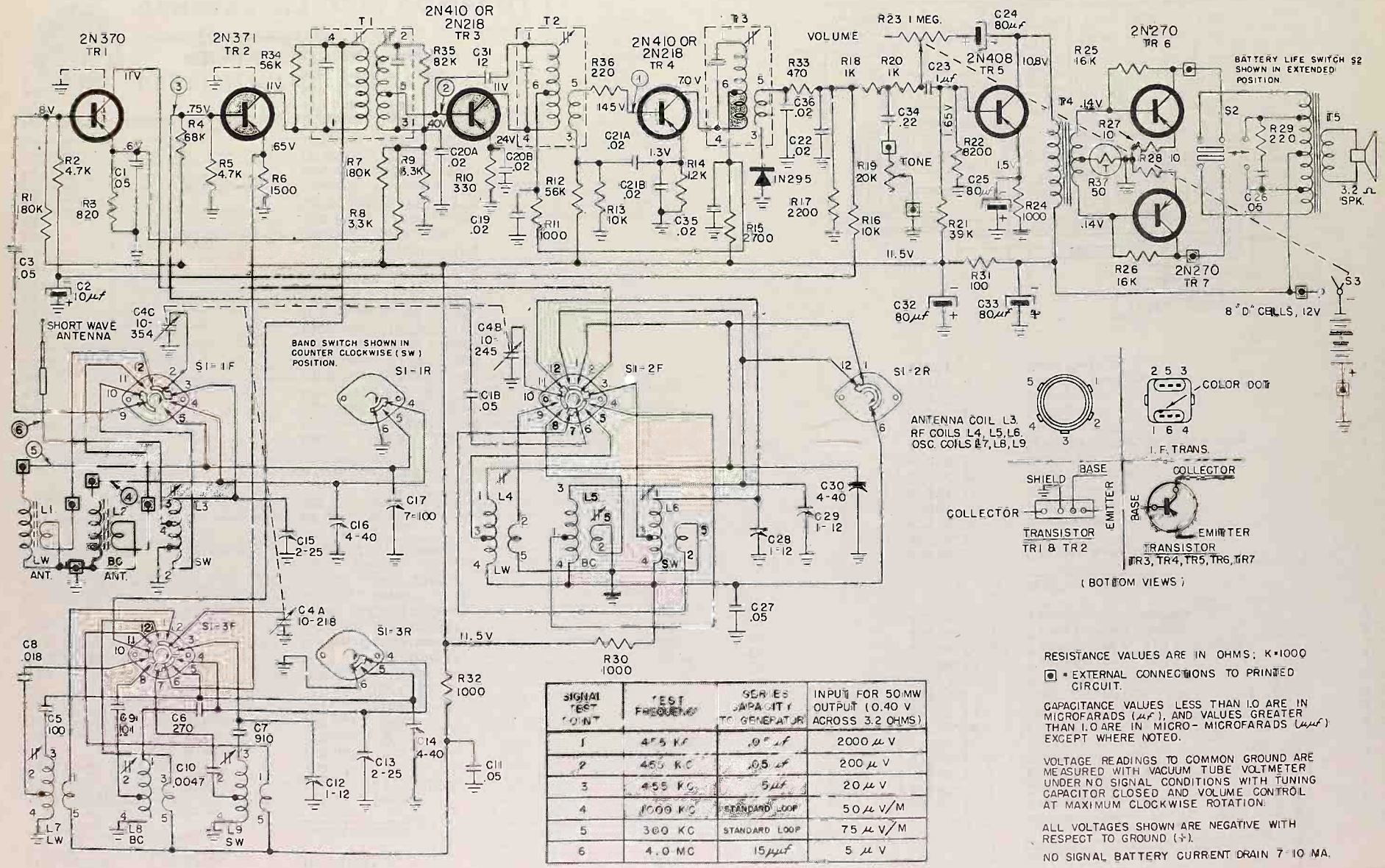
ALIGNMENT PROCEDURE

Output meter reading to indicate 50 milliwatts ..... .4 V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 400 Cycles
Position of volume control ..... Fully Clockwise

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Adjust Trimmers in Order Shown	Function of Trimmer
		BROADCAST ALIGNMENT			
Open	455 Kc	.05 μf	C4C	T3, T2, T1	I.F.
1650 Kc	1650 Kc	.05 μf	C4C	C13	Oscillator
600 Kc	600 Kc		Loop	C16, C29	BC Ant. & R.F.
1400 Kc	1400 Kc		Loop	C16, C29	BC Ant. & R.F.
		LONG WAVE ALIGNMENT			
425 Kc	425 Kc	.05 μf	C4C	[illegible]	LW Oscillator
200 Kc	200 Kc		Loop	L4 (Rock Variable)	LW R.F.
400 Kc	400 Kc		Loop	C17, C30	LW Ant. & R.F.
		SHORT WAVE ALIGNMENT			
2.1 Mc	2.1 Mc	.05 μf	C4C	L9	SW Oscillator
6.3 Mc	6.3 Mc	.05 μf	C4C	C12	W Oscillator
2.5 Mc	2.5 Mc	15 μμf	Whip Antenna	L3, L6 (Rock Variable)	SW Ant. & R.F.
5.5 Mc	5.5 Mc	15 μμf	Whip Antenna	C12, C28 (Rock Variable)	SW Ant. & R.F.

Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.



SIGNAL TEST POINT	TEST FREQUENCY	SERIES CAPACITY TO GENERATOR	INPUT FOR 50 MW OUTPUT (0.40 V ACROSS 3.2 OHMS)
1	455 KC	.05 μf	2000 μV
2	455 KC	.05 μf	200 μV
3	455 KC	5 μf	20 μV
4	1000 KC	STANDARD LOOP	50 μV/M
5	300 KC	STANDARD LOOP	75 μV/M
6	4.0 MC	15 μμf	5 μV

RESISTANCE VALUES ARE IN OHMS; K=1000

▣ = EXTERNAL CONNECTIONS TO PRINTED CIRCUIT.

CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (μf), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (μμf) EXCEPT WHERE NOTED.

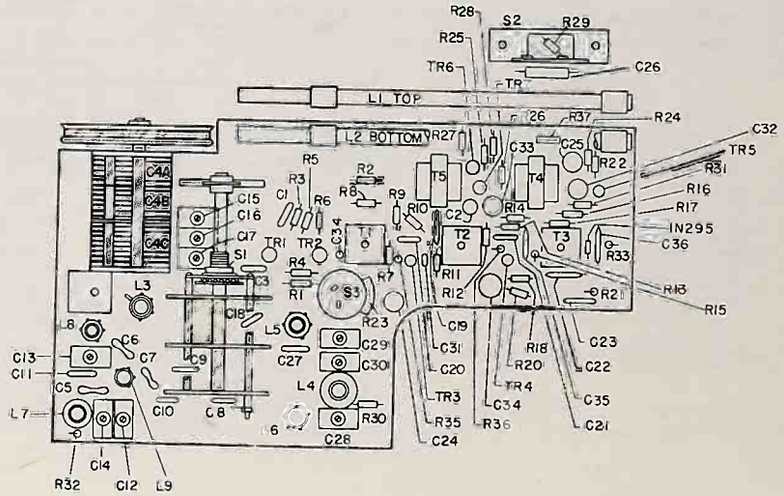
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.

ALL VOLTAGES SHOWN ARE NEGATIVE WITH RESPECT TO GROUND (⏚).

NO SIGNAL BATTERY CURRENT DRAIN 7-10 MA.

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1, 3, 11, 18, 27		.05 µf., Disc.	
C2	47668-1	10 µf., 12V., Elect.	1.20
C4A, B, C	47298	Variable	4.50
C5	47660-1	100 µµf., Mica	.25
C6	47660-2	270 µµf., Mica	.25
C7	47660-3	910 µµf., Mica	.25
C8		.018 µf., Disc.	
C9		.01 µf., Disc.	
C10		.0047 µf., Disc.	
C12, 28, 29	47392-1	1-12 µµf., Trimmer	.35
C13, 15	47392-2	2-25 µµf., Trimmer	.35
C14, 16, 30	47392-3	4-40 µµf., Trimmer	.35
C17	47392-4	7-100 µµf., Trimmer	.35
C19, 22, 35, 36		.02 µf., Disc.	
C20A, B, 21A, B		.02 µf., Dual Disc.	
C23		1 µf., Disc.	
C24, 25, 32, 33	47668-2	80 µf/12V., Elect.	1.20
C26		.05 µf., P.T.	
C31		12 µµf., Disc.	
C34		.22 µf., P.T.	
		RESISTORS	
R1, 7		180 K., 1/2W., 10%	
R2, 5		4700 ohm, 1/2W., 10%	
R3		820 ohm, 1/2W., 10%	
R4		68K., 1/2W., 10%	
R6		1500 ohm, 1/2W., 10%	
R8, 9		3300 ohm, 1/2W., 10%	
R10		330 ohm, 1/2W., 10%	
R11, 18, 20, 24, 30, 32		1000 ohm, 1/2W., 10%	
R12		56K ohm, 1/2W., 10%	
R13, 16		10K ohm, 1/2W., 10%	
R14		1.2K ohm, 1/2W., 10%	
R15		2700 ohm, 1/2W., 10%	
R17		2200 ohm, 1/2W., 10%	
R19	47500-1	Control, Tone, 20K	.75
R21		39K ohm, 1/2W., 10%	
R22		8200 ohm, 1/2W., 10%	
R23, S3	45250-19	Control, Volume & Switch, 1 meg.	1.50
R25, 26		16K ohm, 1/2W., 5%	
R27, 28		10 ohm, 1/2W., 10%	
R29, 36		220 ohm, 1/2W., 10%	
R31		100 ohm, 1/2W., 20%	
R33		470 ohm, 1/2W., 10%	
R34		56K., 1/2W., 10%	
R35		82K., 1/2W., 10%	
R37	47793-1	50 ohm, Thermistor	.75

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	46861-2	Antenna Rod, LW	2.00
L2	46861-1	Antenna Rod, BC	2.00
L3	47657-1	Coil, Antenna	1.50
L4	47654-1	Coil, R.F., LW	1.50
L5	47655-1	Coil, R.F., BC	1.50
L6	47656-1	Coil, R.F., SW	1.50
L7	45783-14	Coil, Oscillator, LW	2.25
L8	45783-13	Coil, Oscillator, BC	2.25
L9	47391-1	Coil, Oscillator, SW	2.25
T1	47733-1	Transformer, 1st I.F.	2.50
T2	45900-14	Transformer, 2nd I.F.	1.50
T3	45900-15	Transformer, 3rd I.F.	2.25
T4	45604-5	Transformer, Input	2.50
T5	47658	Transformer, Output	2.75
		MISCELLANEOUS	
	47650-19	Cabinet Assembly	22.50
	47288-1	Grille	5.00
	47313-29	Nameplate	.30
	47297	Dial Crystal	7.00
	47293-70	Knob, Switch	.35
	47294-29	Knob, Volume & Tuning	.35
	47276-2	Battery Carriage	2.00
SPK	45599-6	Speaker, 5" P.M., 3.2 ohm	4.75
	47303	Antenna, SW	2.75
	47386-1	Pulley	.50
	47387-1	Pointer	.50
S2	47305	Switch, Battery Saver	.35
S1	47291	Band Switch	8.00



GENERAL ELECTRIC COMPANY

PRODUCT SERVICE, RADIO RECEIVER DEPARTMENT
869 BROAD ST., UTICA, NEW YORK

PRELIMINARY SERVICE DATA

S-CT455
RADIO
MODEL
CT455

SPECIFICATIONS	
CABINET:	Ebony, White, and Gold
ELECTRICAL RATING:	Radio: 4.5 Volts DC Clock: 1 1/2 Volts DC
BATTERIES:	Radio: 3 carbon penlight cells Eveready #915, 1015, Burgess Z, Mallory M15, or equivalent or 3 Mercury cells Eveready E9, Mallory ZM9, or equivalent.
	Clock: 1 "D" size flashlight battery Eveready 950, A100, E95, Burgess 2R, or equivalent.
POWER OUTPUT	10% Distortion .1 W Maximum: .125 W
OPERATING FREQUENCIES:	Tuning Range: 540 - 1600 Kilocycles I.F. : 455 Kilocycles

GENERAL INFORMATION

The Model CT455 is an all battery operated 6 transistor clock-radio.

The alarm tone is developed by an oscillation in the radio circuit which causes an audio signal. When the alarm-volume knob is in the alarm position, R20 acts as a feed-back resistor connecting the output stages to the base of TR4 to produce the audible signal.

Weak radio batteries will prevent the alarm from sounding at desired level, therefore be sure fresh batteries are always in radio.

The clock battery must be replaced immediately when clock stops.

Service on defective clock units (Telechron Catalog Number C128G2) should be referred to the nearest G. E. Servicenter or G. E. Service Station.

CHASSIS REMOVAL

1. Remove two screws from cabinet back, lift cabinet back off.
2. Remove four screws holding circuit board to cabinet bosses (do not remove the two screws that secure antenna holder to circuit board.)
3. Remove volume control.
4. Remove output transformer from speaker.
5. Carefully lift chassis board out.

SPEAKER REMOVAL

1. Remove cabinet back.
2. Remove two screws holding output transformer mounting plate on speaker.
3. Remove antenna holder from circuit board.
4. Remove clips that secure speaker to cabinet bosses.
5. Carefully lift speaker out.

TROUBLESHOOTING

The total radio battery current drain should always be ascertained before proceeding with the servicing of this receiver. To measure the total radio battery current, unsolder the red lead attached to the + terminal on the chassis side of the battery compartment and insert a milliammeter in series with the lead and + terminal. The total current drain should be between 12-18 mils. All current measurements must be made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions.

An excessive current reading may mean a shorted transistor; no current will indicate that a transistor, associated circuit component, or a battery is defective. Current readings should be taken only with fresh batteries.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK RADIO:
1. Check radio battery voltage for 4.5 volts.
2. Check battery current.
3. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

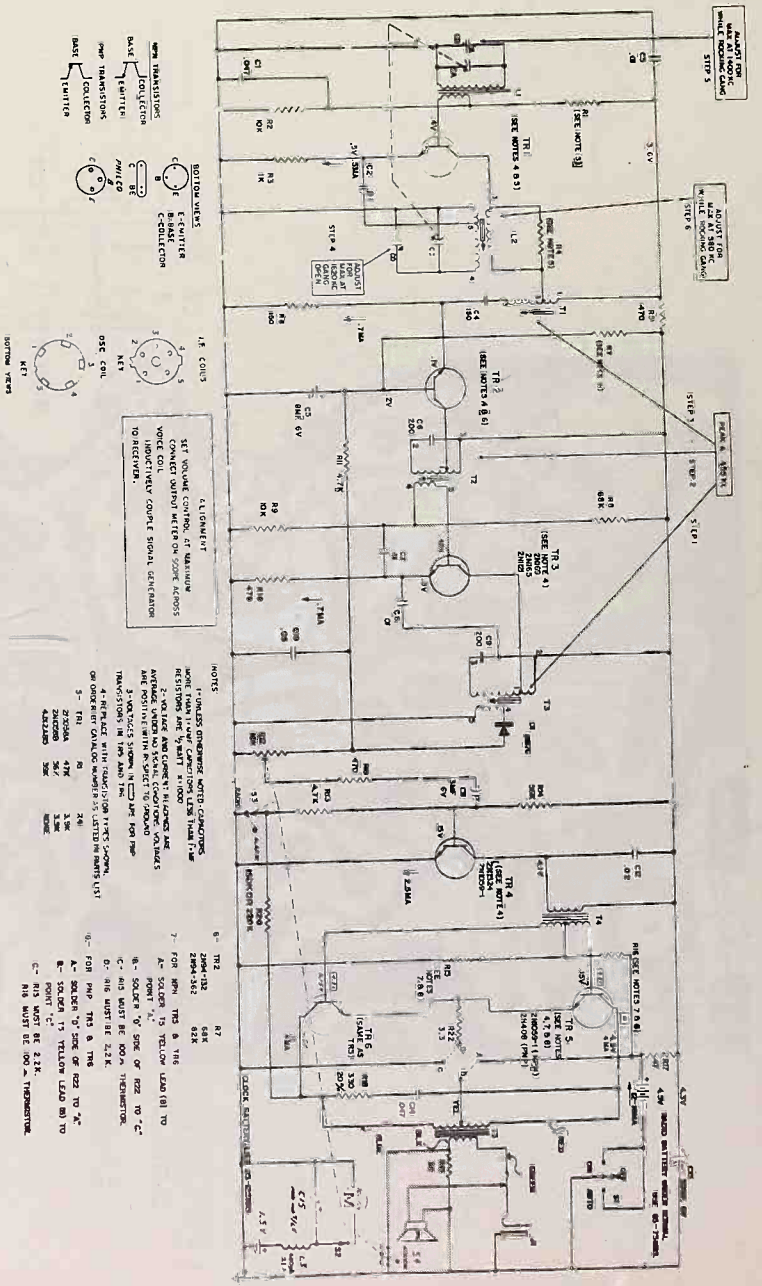
Intermittent, weak, distorted audio or motorboating is frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

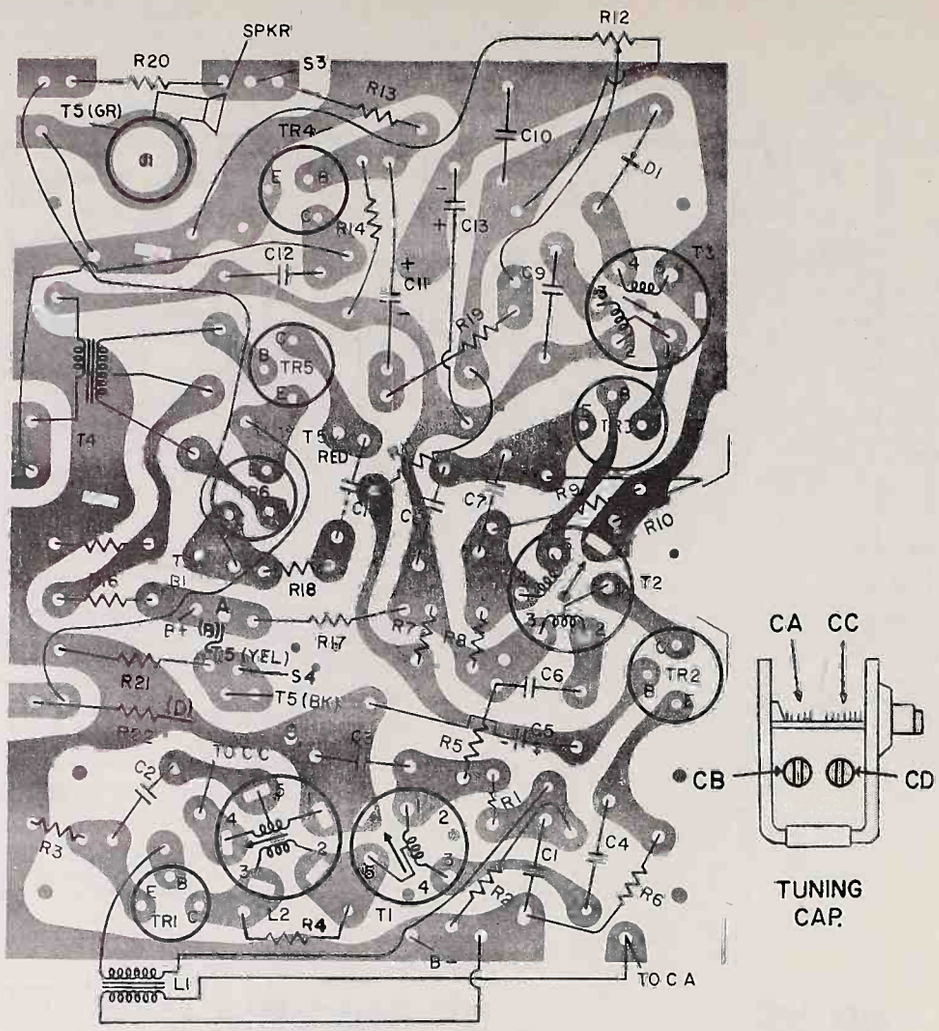
Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

Receivers are manufactured with either identical NPN transistors in the TR5 and TR6 stages or identical PNP transistors in these stages. When replacing a TR5 or TR6 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

If an identical transistor is not obtainable, TR5 and TR6 must be converted to either PNPs or NPNs as per notes 7 or 8 on the schematic.

PRELIMINARY REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2,3,7,8	.01mf., 450V.	.30
RS-1024	C10	.05mf., 50V.	.50
RS-1225	C6,9	200mmf.,300V.	.25
RS-1460	C11	3mf., 6V.	1.10
RS-1462	C5	8mf., 6V.	1.65
RS-1996	C4	150mmf.,300V.	.35
RS-2283	C12	.02mf., 50V.	1.10
*-RS-2402	CA,B,C,D	Tuning Capacitor	4.10
*-RS-2404	C13	50mf., 6V.	1.10
	C1,14	.047mf., 50V	
RESISTOR			
RS-1995	(See Notes 7 & 8)	100Ω thermistor	.70
POTENTIOMETER			
*-RS-2403	R12,S3,S4	Vol. Cont. 10K. & sws.	3.10





COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		TRANSISTORS AND DIODE	
RS-1531	TR1	Oscillator-Converter	3.55
RS-1547	TR2	1st I.F.	3.15
RS-1548	TR3	2nd I.F.	2.40
RS-1549	TR4	Driver	1.65
RS-1549	TR5-6 (NPN)	Audio Output (use when TR5 and TR6 are NPN)	1.65
RS-1548	TR5-6 (PNP)	Audio Output (use when TR5 and TR6 are PNP)	2.40
RS-1811	D1	Diode	1.90
		COILS AND TRANSFORMERS	
*-RS-2395	T5	Output Transformer	3.00
*-RS-2396	T4	Driver Transformer	3.30
*-RS-2397	T1	1st I.F.	2.35
*-RS-2398	T2	2nd I.F.	2.35
*-RS-2399	T3	3rd I.F.	2.35
*-RS-2400	L2	Oscillator Coil	1.60
*-RS-2401	L1	Antenna	1.85
		MISCELLANEOUS	
RS-1195		Phone Jack	.90
RS-1363		Screw, Tuning Knob	.40
RS-1991		Speaker, 2 3/4"	7.25
RS-2324		Speaker Clip.....Pkg.5	.25
*-RS-2384		Stud, Timer Slot.....Pkg.3	.30
*-RS-2385		Slide, Timer Slot.....Pkg.5	.25
*-RS-2386		Stud, Compartment Door	.25
*-RS-2387		Slide, Compartment Door.....Pkg.5	.25
*-RS-2388		Battery Contact.....Pkg.5	.25
*-RS-2389		Battery Contact (Pos.).....Pkg.2	.30

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS (CONT'D.)	
*-RS-2390	Battery Contact (Neg.).....Pkg.2	.30
*-RS-2391	Screw, Cabinet	.35
*-RS-2392	Rubber Gasket.....Pkg.5	.25
*-RS-2393	Rubber Bumper (cabinet foot).Pkg.5	.25
*-RS-2394	Rubber Grommet (timer to cab)Pkg.5	.25
*-RS-2405	Screw, (Gang to cab.).....Pkg.5	.25
*-RS-2406	Screw, (Cab. Lock).....Pkg.5	.25
*-RS-2407	Screw, (T5 to Speaker).....Pkg.5	.25
*-RS-2408	Screw, (Volume Knob to shaft) Pkg.5	.25
	CABINET AND APPEARANCE ITEMS	
*-RB-1138 (Assem.)	Cabinet Front Grille Dial Insert Decorative Strip Decorative Insert	5.95
*-RB-1139 (Assem.)	Cabinet Back Stud Slide	1.30
*-RS-2347	Crystal	.60
*-RS-2348	Grille Assem.	1.00
*-RS-2349	Knob, Clock, (time-alarm)....Pkg.3	.30
*-RS-2376	Knob, Clock, (on-off,auto)...Pkg.3	.30
*-RS-2377	Knob, Tuning	.80
*-RS-2378	Knob, Volume	.35
*-RS-2379	Battery Compartment Door	.75
*-RS-2380	Dial Insert	.80
*-RS-2381	Decorative Strip	.25
*-RS-2382	Decorative Insert	.30
*-RS-2383	Sleep Switch Knob	.30

*- Denotes Items Not Previously Cataloged.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

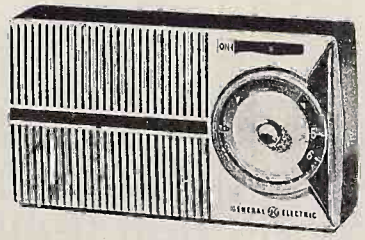
Prices Are Suggested List Prices Subject To Change Without Notice.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P745A-1

ER-S-P745A
RADIO
MODELS
P745A,B
P746A,B

SPECIFICATIONS	
CABINET:	Plastic, P745A,B, Ebony P746A,B, Ant. White and Turquoise
ELECTRICAL RATING:	4.5 Volts D.C.
BATTERIES:	Carbon Pen-Light Cells: (3) Eveready #915, #1015, E91 or (3) Burgess Z, #930, or (3) Mallory M15 Mercury Cells: (3) Eveready E9, or (3) Mallory ZM9
OPERATING FREQUENCIES:	Tuning Range 540 - 1600 KC IF Frequency 455 KC



GENERAL INFORMATION

The models P745A,B and P746A,B are all transistor battery operated pocket portable radios.

The difference between the "A" and "B" versions is the "push point" (detent) tuning feature on the "B" version. Station frequencies are pre-set by inserting a blunt point or pencil firmly into the small hole located opposite 750 KC on the tuning knob. The slight pressure applied to the pencil makes a detent in the detent insert under tuning knob. A spring attached to the bottom of knob will "fall into a detent" as the tuning knob is turned, thereby "locking" knob on the station frequency that was pre-set.

An earphone jack for private listening is provided on the speaker end of the receiver. When the earphone is plugged in, the speaker is automatically silenced.

Bias for TR5 is developed by a sliding class A output circuit consisting of D2, T4, and C15.

Under signal conditions, an AC voltage is developed across T4 and coupled to D2 through C15. When D2 conducts, the AC voltage is filtered by R14 and C14, then fed to the emitter of TR5. R15 is the emitter bias resistor. At no signal conditions, the TR5 base bias is provided by R14 and R15. Increased battery life is also realized from this circuit.

TO REMOVE CIRCUIT BOARD

1. Remove cabinet back by twisting a coin in either of the two slots provided along bottom of the cabinet.
2. Remove the four screws that secure the circuit board to cabinet bosses. (SEE COMPONENT WIRING DIAGRAM FOR MOUNTING SCREW POSITIONS.)
3. Remove the two screws that secure circuit board to speaker. (SEE COMPONENT WIRING DIAGRAM FOR MOUNTING SCREW POSITIONS.)
4. Swing circuit board out of cabinet front. Leave all connecting leads attached to volume control and tuning capacitor.

TROUBLESHOOTING

A check of the battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions.

The total receiver current drain is 15 to 20 mils. This is measured by inserting a milliammeter in series with the batteries.

If an excessive total current drain is recorded, the individual collector current readings of each transistor should be checked. An excessive current reading may mean a shorted transistor; no current will indicate that a transistor or associated circuit components are defective.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 4.5 volts.
2. Check battery current.
3. Check transistor collector currents.
4. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. The battery terminals should be cleaned to insure positive electrical contact.

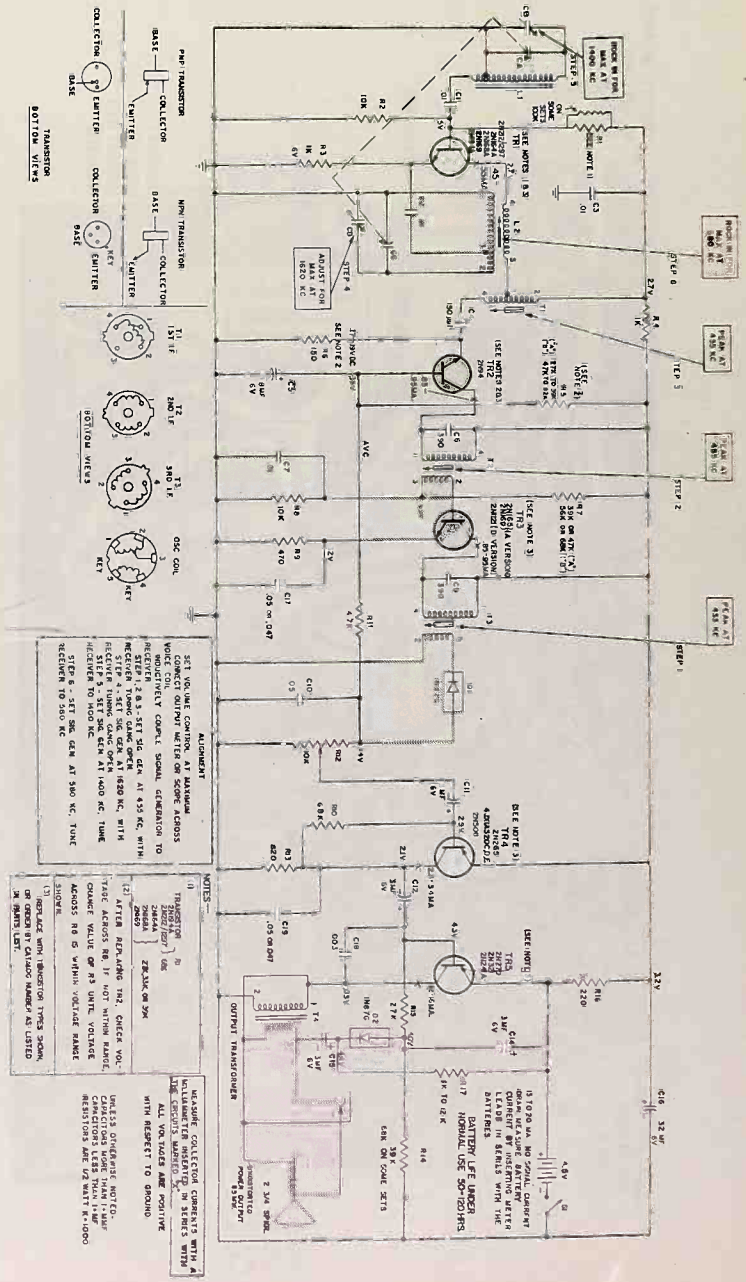
TRANSISTOR REPLACEMENT

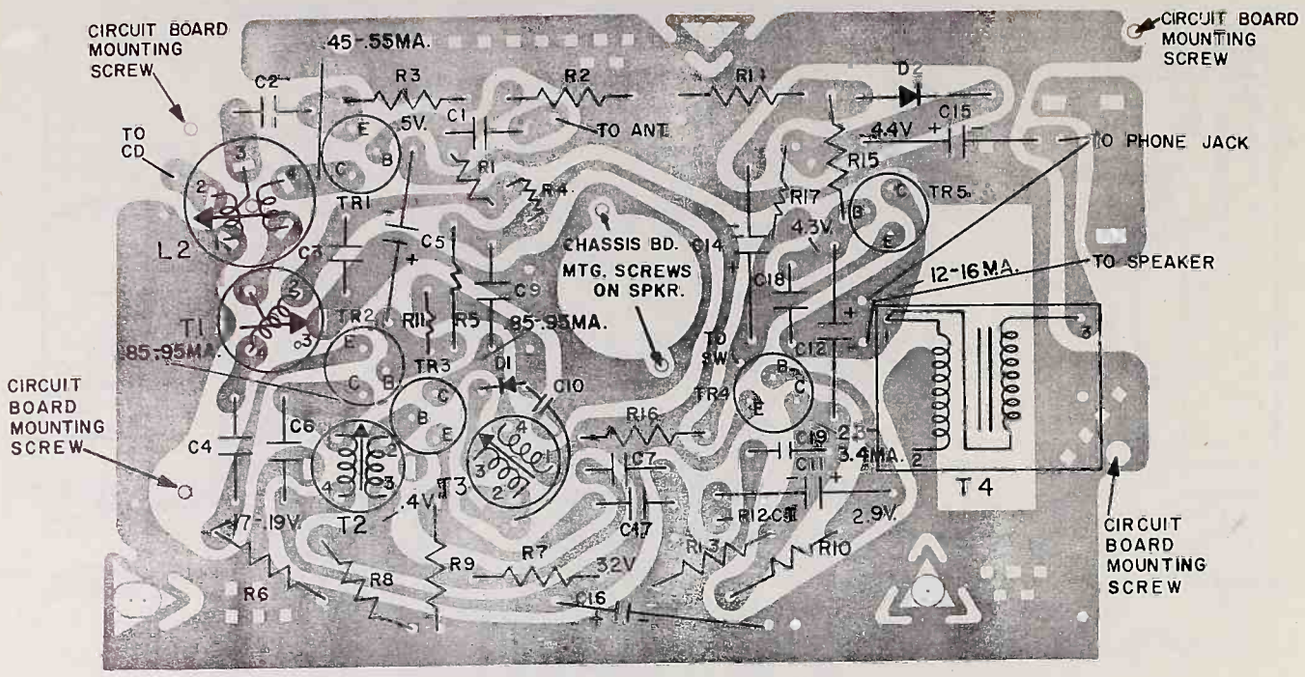
When replacing a defective transistor, be sure to observe correct lead positions, as shown on the schematic diagram in outline form.

TR5 has a "heat sink" mounted on it. It is important that the "heat sink" remain insulated from any contact with ground and all component leads.

REPLACEMENT OF COMPONENTS

After removing a defective part, clean the mounting holes of all solder; replacement part can then be inserted more easily and a better solder connection can be accomplished. Apply a soldering iron just long enough to heat the terminal to remove the component. Too much heat may damage a component.





REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
RS-1022	C1,7	.01mf., 450V	.30
RS-1024	C10,17,19	.05mf., 50V	.50
RS-1047	C16	32mf., 6V	1.45
RS-1378	CA,B,C,D	Tuning Cap.,P745A,P746A	4.15
RS-1460	C11,12, 14,15	3mf., 6V	1.10
RS-1462	C5	8mf., 6V	1.65
RS-1514	C18	.003mf., 100V	.25
RS-1996	C4	250mmf., 300V	.35
RS-2034	CA,B,C,D	Tuning Cap.,P745B,P746B	4.10
RS-2035	C6,9 C2,3	390mmf., 300V .01mf., 50V	.35
		POTENTIOMETER	
RS-1379	R12,S1	Volume Control 10K,& Sw	2.75
		COILS AND TRANSFORMERS	
RS-1372	T4	Trans., Audio Output	3.00
RS-1373	L2	Coil, Oscillator	1.20
RS-1374	T1	Trans., 1st. I.F.	1.90
RS-1375	T2	Trans., 2nd. I.F.	2.10
RS-1376	T3	Trans., 3rd. I.F.	2.10
RS-1380	L1	Antenna	1.60
		TRANSISTORS AND DIODE	
RS-1533	TR1	Osc. Conv.	3.20
RS-1531	TR1	Osc. Conv. (2N 242/1297)	3.55
RS-1547	TR2	1st. I.F.	3.15
RS-1538	TR3	2nd. I.F. ("A" ver. only)	3.05
RS-1553	TR3	2nd. I.F. ("B" ver. only)	3.05
RS-1546	TR4	Audio Amplifier	2.95
RS-1542	TR5	Audio Output	3.20
RS-1811	D1,2	Diode	1.90
		MISCELLANEOUS	
RS-1195		Earphone receptacle and nut	.90
RS-1367 (Assemb.)		Battery Tube Support, Battery Tube, Contact Spring, Retainer, Spring Contact, Cover, Battery Contact, Washer, Plain, Screws, (2) #4 x 3/8, type 25	.85

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS (CONT'D.)	
RS-1368	Battery Contact Spring & Retainer Pkg.2	.30
RS-1369	Cover, Battery Contact.....Pkg.2	.30
RS-1377	Speaker, 2 3/4"	7.45
RS-1675	Screw #2-56 x 1/8.....Pkg.5	.25
	CABINET AND APPEARANCE ITEMS	
RB-1058 (Assemb.)	Cabinet Front, (Ebony), P745A, Cabinet Back, (Ebony), Insert, Decorative, Strip, Decorative, Plate, Grille	3.75
RB-1062 (Assemb.)	Cabinet Front (Ant. White), P746A, Cabinet Back (Turquoise), Insert, Decorative, Strip, Decorative, Plate, Grille	3.75
RB-1088	Cabinet Back, (Ebony),P745A,B	1.50
RB-1089	Cabinet Back, (Turq.),P746A,B	1.50
RB-1106 (Assemb.)	Cabinet Front,(Ebony),P745B, Insert, Strip, Grille Assem., Detent Pad	2.90
RB-1107 (Assemb.)	Cabinet Front,(Ant. White), P746B, Insert, Strip, Grille Assem., Detent Pad	2.90
RS-1362	Knob (Tuning)"A" Version	.50
RS-1363	Thumbscrew (Tuning Knob)	.40
RS-1364	Insert, Decorative P745A, P746A	.55 .30
RS-1365	Strip, Decorative.....Pkg.2	.30
RS-1366	Knob, Volume, (Ebony), P745A,B	.30
RS-1398	Knob, Volume, (Turq.),P746A,B	.30
RS-2030	Knob, Tuning w/insert and Detent Arm "B"	1.25
RS-2032	Insert, Detent P745B, P746B	.25
RS-2033	Spring, (Under Tuning Knob)"B"	.40
RS-2036	Insert, Tuning Knob P745B, P746B	.40

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

Prices Are Suggested List Prices And Subject To Change Without Notice.

GENERAL ELECTRIC COMPANY

PRODUCT SERVICE, RADIO RECEIVER DEPARTMENT
869 BROAD ST., UTICA, NEW YORK

PRELIMINARY SERVICE DATA

S-P780A
RADIO
MODEL
P780A

SPECIFICATIONS	
CABINET:	Ginger with Chrome grille
BATTERIES:	(6)1 1/2 volt "D" size cells Eveready #950, A100, E95; Burgess #2R, or equivalent
POWER OUTPUT:	Undistorted: 500 MW Maximum: 750 MW

GENERAL INFORMATION

The P780A is an eight transistor portable radio. The circuit includes a tuned R.F. stage for extra sensitivity and selectivity.

TO REMOVE CHASSIS

1. Remove screws from cabinet back and lift off back.
2. Remove antenna bracket screws.
3. Label and unsolder wires to gang and speaker ground.
4. Remove wire wrap clamps.
5. Lift out component board carefully to extent of lead lengths.

TO REMOVE DIAL POINTER

1. Remove cabinet back.
2. Remove screw, string clamp, and string from dial pointer.
3. Unscrew dial pointer slide rail and slide it out from under dial pointer.
4. Grasp dial pointer, turn it slightly and lift out.

IMPORTANT

After replacing the dial pointer, the following procedure must be followed in order to properly calibrate dial pointer on the scale:

1. Mount antenna and antenna bracket securely on chassis.
2. Repeak gang trimmers.
3. Radiate a 1000KC signal from a signal generator to the receiver.
4. Tune receiver to the 1000KC signal.
5. With a 3/16" spintite, loosen dial pointer hex-head screw and adjust dial pointer directly over the 1000KC mark on dial scale. Do not adjust tuning gang.
6. After pointer is directly over 1000KC mark, tighten dial pointer screw firmly into place.

The above procedure must be checked after each time the receiver is aligned to insure accuracy of dial pointer position on the dial scale.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. To measure the total battery current, unsolder the lead from the + terminal on the chassis side of the battery compartment and insert a milli-ammeter in series with the lead and + terminal. The total current drain should be between 10-20 mils. All current measurements must be made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions.

An excessive current reading may mean a shorted transistor, no current will indicate that a transistor, associated circuit component, or a battery is defective. Current readings should be taken only with frest batteries.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 9 volts.
2. Check battery current.
3. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

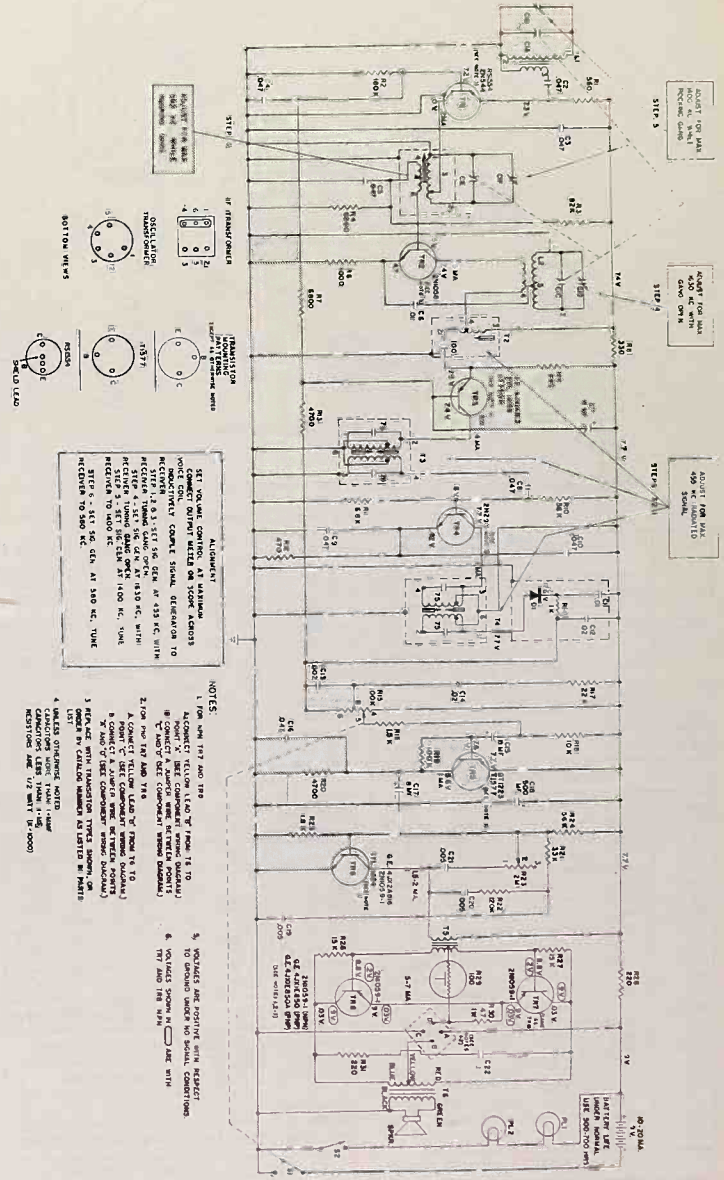
Intermittent, weak, distorted audio or motorboating are frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

Oxidation may occur on the contacts of the batteries. This will tend to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

Receivers are manufactured with either identical NPN transistors in the TR7 and TR8 stages or identical PNP transistors in these stages. When replacing a TR7 or TR8 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

If an identical transistor is not obtainable, TR7 and TR8 must be converted to either PNPs or NPNs as per notes 1 or 2 on the schematic.

REPLACEMENT PARTS LIST -P780A			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C6,11	.01mf., 450V.	.30
RS-1023	C9, 20,21	.005mf.,450V.	.25
RS-1592	C7	8mf., 10V.	1.10
RS-1640	C13	.002mf.,450V.	.25
*-RS-2228	C1	Tuning Cap.	6.00
*-RS-2231	C12,14	.02mf., 450V.	.70
*-RS-2232	C18	500mf., 12V.	1.90
*-RS-2233	C15,17	8mf., 15V.	2.40
	C2,3,4,5 8,9,10,16	.047mf., 50V.	
	C22	.1mf., 50V.	
RESISTOR			
RS-1995	R29	100ohms, thermistor.	.70
POTENTIOMETER			
*-RS-2229	R15,13,S1	Vol. (100K) and Tone (2M) with switch.	3.20
COILS AND TRANSFORMERS			
RS-1424	T2	1st I.F.	2.00



REPLACEMENT PARTS LIST (CONT'D.) - P780A			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
COILS AND TRANSFORMERS (CONT'D.)			
*-RS-2222	T6	Output Transformer.....	3.35
*-RS-2223	T5	Driver Transformer.....	4.20
*-RS-2224	T3	2nd I.F.....	2.40
*-RS-2225	T4	3rd I.F.....	2.40
*-RS-2226	T1	R.F. Transformer.....	1.90
*-RS-2227	L2	Oscillator Coil.....	.85
*-RS-2230	L1	Antenna.....	4.30
TRANSISTORS AND DIODE			
*-RS-1554	TR1	R.F.....	4.85
RS-1531	TR2	1st I.F.....	3.55
*-RS-1550	TR3	2nd I.F.....	3.30
RS-1537	TR4	3rd I.F.....	3.15
RS-1540	TR5	1st Audio.....	2.80
RS-1549	TR6	Driver.....	1.65
RS-1549	TR7-8	Audio Output (use when TR7 and TR8 are NPN)..	1.65
RS-1542	TR7-8	Audio Output (use when TR7 and TR8 are PNP)..	3.20
RS-1811	D1	Diode.....	1.90
MISCELLANEOUS			
*-RB-1128		Speaker, 5 1/4", 3.2ohms.....	8.40
RS-1427		Pulley, 1/4 Dia.....Pkg.5	.25
RS-1323		Pilot Light, #12.....	.25
RS-1781		Dial Cord.....	2.50
RS-1809		Tubular Clip (Spkr.to Cab. Front) Pkg.3	.30
RS-1821		"C" Ring (Tuning Shaft).....Pkg.5	.25
RS-4954		Battery Clip (Neg.).....	.25
RS-4955		Battery Clip (Pos.).....	.25
RS-2082		Compression Ring (Tuning Knob) Pkg.5	.25
*-RS-2209		Stud, Slide.....Pkg.2	.30
*-RS-2210		Slide, Lock.....Pkg.5	.25

*-Denotes New Items Not Previously Cataloged.

REPLACEMENT PARTS LIST (CONT'D.) - P780A		
CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS (CONT'D.)		
*-RS-2211	Slide, Pointer.....Pkg.2	.30
*-RS-2212	Clamp, Dial String.....Pkg.5	.25
*-RS-2213	Tuning Shaft Assem. w/windlass, bushing, and "C" Ring.....	.75
*-RS-2214	Battery Clip (Neg.).....	.40
*-RS-2215	Switch Contact (Pilot Light)Pkg.5	.25
*-RS-2216	Spring (p.l.Sw.).....Pkg.5	.25
*-RS-2217	Insulator,(p.l.Sw.).....Pkg.5	.25
*-RS-2218	Pilot Light Socket Assem.....	1.00
*-RS-2219	Spacer ,Handle.....Pkg.5	.25
*-RS-2220	End Cap, Handle.....	.90
*-RS-2221	Handle Assem.....	1.90
*-RS-2234	Pulley, 5/16 Dia.....Pkg.2	.30
*-RS-2235	Spring, Dial Cord.....Pkg.5	.25
*-RS-2236	Screw, #6 x 1/4.....Pkg.3	.30
*-RS-2237	Screw, #6-32 x .420.....Pkg.5	.25
*-RS-2238	Compression Ring (Vol. Knob)Pkg.5	.25
*-RS-2239	Wire Clamp (Ant. to bracket).....	.25
*-RS-2240	Speed Clip, (Grille to Cab.).....	.25
*-RS-2241	Grommet (gang).....Pkg.3	.30
*-RS-2242	Eyelet (gang).....Pkg.3	.30
*-RS-2323	Handle Support Plate.....	.95
CABINET AND APPEARANCE ITEMS		
*-RB-1125	Cabinet Front.....	10.20
*-RB-1126	Cabinet Back.....	5.50
*-RB-1127	Grille.....	4.00
*-RS-2197	Grille Cloth Assem.....	.45
*-RS-2198	Rear Grille Cloth.....	.40
*-RS-2201	Bracket, (dial background).....	.60
*-RS-2202	Crystal, Dial.....	1.25
*-RS-2203	Knob, Volume.....	.25
*-RS-2204	Knob, Tuning.....	.25
*-RS-2205	Knob, Tone.....	.55
*-RS-2206	Pilot Light Button.....Pkg.3	.30
*-RS-2207	Battery Compartment Door w/stud-slide and slide lock.....	.25
*-RS-2208	Pointer Assem. with slide.....	.40

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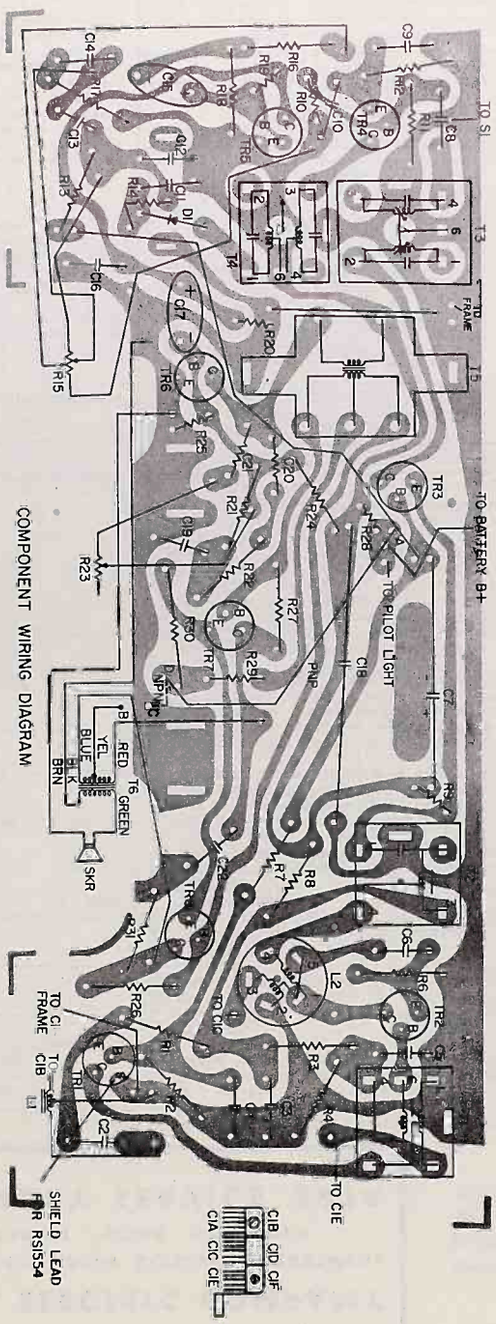
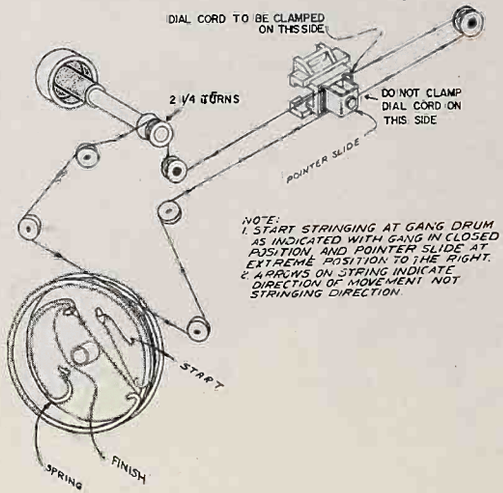


COMPONENT WIRING DIAGRAM

R1	560Ω	R11	6.8K	R21	33K
R2	180K	R12	470Ω	R22	120K
R3	82K	R13	4.7K	R23	2M
R4	6.8K	R14	1K	R24	56K
R5	------	R15	100K	R25	1.8K
R6	1K	R16	1.5K	R26	15K
R7	6.8K	R17	22K	R27	15K
R8	330Ω	R18	10K	R28	220Ω
R9	390Ω	R19	100K	R29	100Ω
R10	56K	R20	4.7K	R30	4.7Ω
				R31	220Ω

C1	Tuning Cap.	C12	.02		
C2	.047	C13	.002		
C3	.047	C14	.02		
C4	.047	C15	8mf.		
C5	.047	C16	.047		
C6	.01	C17	8mf.		
C7	8mf.	C18	500mf.		
C8	.047	C19	.005		
C9	.047	C20	.005		
C10	.047	C21	.005		
C11	.01	C22	.1		



NOTE:
1. START STRINGING AT GANG DRUM AS INDICATED WITH GANG IN CLOSED POSITION, AND POINTER SLIDE AT EXTREME POSITION TO THE RIGHT.
2. ARROWS ON STRING INDICATE DIRECTION OF MOVEMENT NOT STRINGING DIRECTION.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)

SUPERSEDES SERVICE NOTES S-P770A and S-P776A

ER-S-P770A
RADIO
MODELS
P770A
P771A
P776A,B

P770A, P771A

P776A ,P776B

SPECIFICATIONS		
CABINET:	Plastic - P770A, Ant. White P771A, Green Top Grain Leather - P776A,B	
ELECTRICAL RATING:	3 "D" size carbon batteries: Eveready #950, A100, or E95, Burgess #2R or equivalent	
POWER OUTPUT:	Undistorted Maximum	250 MW 400 MW

GENERAL INFORMATION

The Models P770A, P771A, P776A, and B are transistor battery operated portable radios.

The 4.5 volts B+ is supplied by three 1 1/2 volt "D" size carbon batteries.

A dial light control push botton is located on top of the radio above the tuning knob. When this push button is depressed after the radio is turned "on" the dial indicator mark will become illuminated. Light goes off automatically when pressure is released.

CHASSIS REMOVAL - P770A, P771A

1. Remove tuning knob.
2. Open battery compartment door and remove batteries.
3. Remove screw located in center of battery compartment.
4. Separate front and back from bottom only.
5. Unsolder two leads from speaker.
6. Remove hex-head screws holding chassis board and volume control bracket to cabinet bosses.
7. Pull handle up and move chassis slightly out and unsolder lead to dial light button lug: then remove chassis.

CHASSIS REMOVAL - P776A,B

1. Remove volume and tuning knobs.
2. Open cabinet flap and remove batteries.
3. "A" version - Remove screw located in center of battery compartment. "B" version - Push back spring clip in battery compartment.
4. Pull cabinet apart.
5. Unsolder two leads from speaker.
6. Remove hex-head screws holding chassis board and volume control bracket to cabinet bosses.
7. Move chassis slightly out and unsolder lead to dial light button lug; then remove chassis.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. To measure the total battery current, unsolder the lead from the + terminal on the chassis side of the battery compartment and insert a milliammeter in series with the lead and + terminal. (The total battery current can also be measured by means of a "battery current quiescent checker." Construction of this current checker is outlined on the schematic. Merely insert this checker between the + and - of two batteries in the battery compartment and attach a milliammeter to the alligator clips on the checker.) The total current drain should be between 12-25 mils. All current measurements must be made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions.

An excessive current reading may mean a shorted transistor; no current will indicate that a transistor, associated circuit component, or a battery is defective. Current readings should be taken only with fresh batteries.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 4.5 volts.
2. Check battery current.
3. Check alignment.

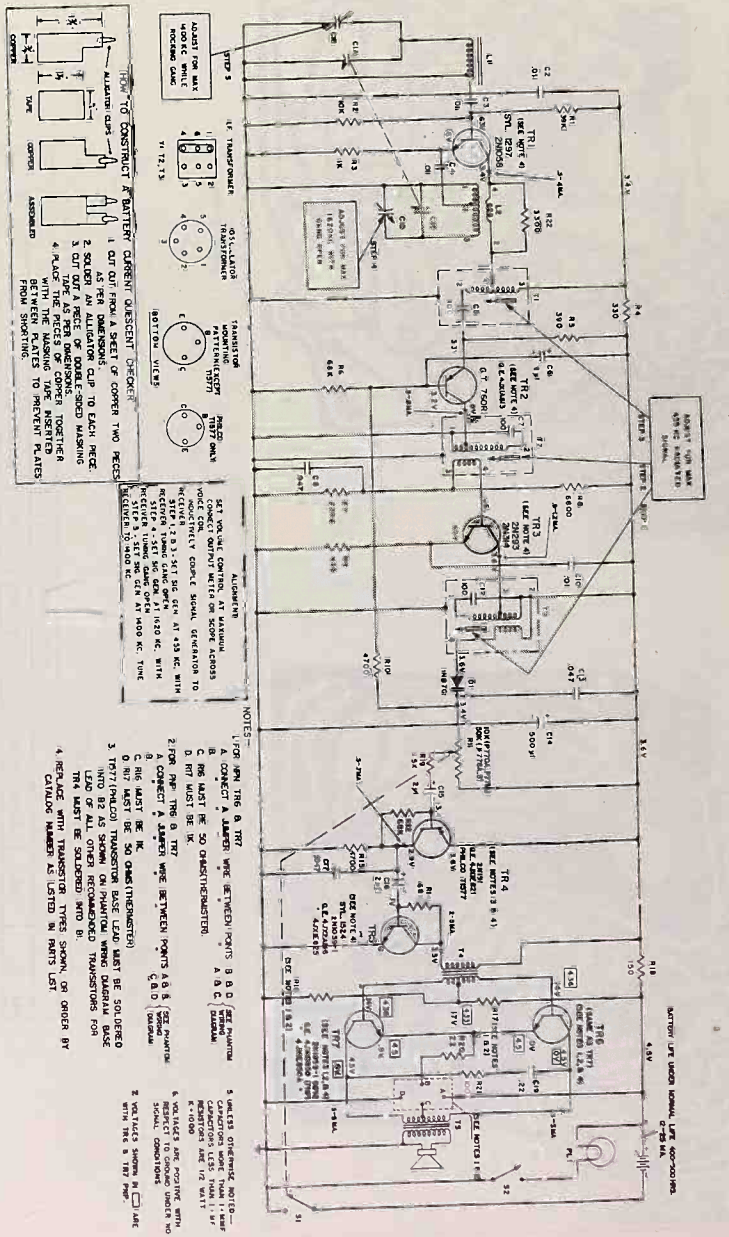
INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

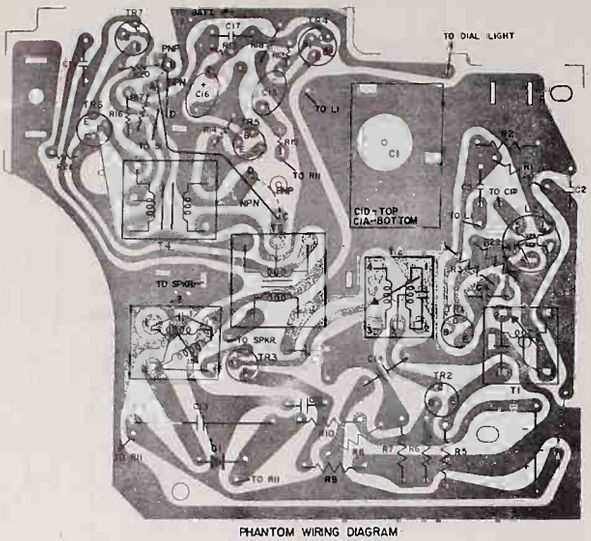
Intermittent, weak, distorted audio or motorboating is frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

Receivers are manufactured with either identical NPN transistors in the TR6 and TR7 stages or identical PNP transistors in these stages. When replacing a TR6 or TR7 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

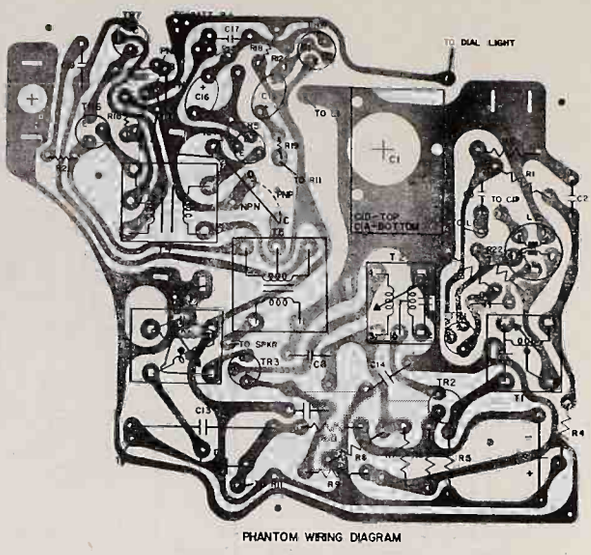
If an identical transistor is not obtainable, TR6 and TR7 must be converted to either PNPs or NPNs as per notes 1 or 2 on the schematic.





PHANTOM WIRING DIAGRAM

MODELS P770A, P771A, P776A



PHANTOM WIRING DIAGRAM

MODEL P776B

REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
RS-1022	C2,3 4,10	.01mf., 450V.....	.30
RS-1592	C6	8mf., 15V.....	1.10
RS-1958	C1	Cap.,Tuning,P776A.....	3.70
RS-1959	C15,16	2mf., 10V.....	1.20
RS-1960	C14	500mf., 6V.....	1.75
	C8,17	.047mf.,50V	
	C13	.047mf.,200V., paper	
	C19	.22mf., 50V	
RS-2029	C1	Cap.,Tuning,P770A,P771A	3.60
*-RS-2336	C1	Cap.,Tuning,P776B.....	3.90
		RESISTOR	
RS-1581	See Notes 1 & 2	50 ohms, thermistor....	.50
		POTENTIOMETERS	
RS-1494	R11,S1	Cont. Vol., 50K and Sw. P776A,B ...	1.55
RS-2028	R11,S1	Cont. Vol., 10K and Sw.P770A,P771A	2.15
		COILS AND TRANSFORMERS	
RS-1424	T1	Transformer, 1st I.F...	2.00
RS-1961	T4	Transformer, Driver....	3.65
RS-1962	T5	Transformer, Output....	2.30
RS-1963	L1	Antenna.....	2.50
RS-1964	L2	Coil, Oscillator.....	1.35
RS-1965	T2	Transformer, 2nd I.F...	2.30
RS-1966	T3	Transformer, 3rd I.F...	2.30
		TRANSISTORS AND DIODES	
RS-1531	TR1	Osc. Conv.....	3.55
RS-1539	TR2	1st I.F.....	4.30
RS-1537	TR3	2nd I.F.....	4.00
RS-1540	TR4	1st Audio.....	3.70
RS-1549	TR5	Driver.....	1.65
RS-1549	TR6-7	Audio Output (use when TR6 and TR7 are NPN)..	1.65
RS-1542	TR6-7	Audio Output (use when TR6 and TR7 are PNP)..	4.00
RS-1811	D1	Diode (1N87G) was RED-001)...	1.90
		MISCELLANEOUS	
RB-1057		Speaker, 4".....	5.45
RS-1188		Clamp, Antenna, P776A,B....Pkg.2	.30
RS-1323		Light, Pilot, #12.....	.25
RS-1809		Clip, Speaker Mounting.....Pkg.3	.30
RS-1810		Fastener, Speaker Mounting.Pkg.5	.25
RS-1950		Contact, Pilot Light, P776A, B Pkg.5	.25
RS-2082		Ring, Compression, (Knob)..Pkg.5	.25

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS (CONT'D.)	
RS-1951	Spring, Push Button.....Pkg.5	.25
RS-1952	Screw, Cabinet, P776A.....	.25
RS-1953	Socket, Pilot Light.....	.65
RS-1954	Battery Contact, (Neg.).....	.25
RS-1955	Battery Contact, (Pos.).....	.25
RS-1956	Screw, Cabinet Lock.....Pkg.5	.25
RS-2019	Contact, Pilot Light, P770A,P771A	.05
RS-2020	Guide Rod, P770A, P771A.....	.30
RS-2021	Slide Catch (compartment door) P770A, P771A.....Pkg.5	.25
RS-2022	Retainer, Handle Spring, P770A, P771A.....Pkg.5	.25
RS-2023	Spring Handle, P770A, P771A.....	.05
RS-2024	Washer, Handle,P770A, P771A.....	.05
RS-2025	Screw, Cabinet,P770A, P771A.....	.20
RS-2026	Screw, 4-40 x 1/4 (Volume Knob) P770A, P771A.Pkg.5	.25
RS-2027	Washer, (Volume Knob) P770A,P771A	.05
	CABINET AND APPEARANCE ITEMS	
RB-1097	Cabinet, (with mounting Board and Pilot Light well, P776A,B	20.00
RB-1102 (Assemb.)	Cabinet Front, (Ant. White),P770A Dial Window..... Insert..... Grille Assem.....	4.90
RB-1103 (Assemb.)	Cabinet Front, (Green), P771A.... Dial Window..... Insert..... Grille Assem.....	4.90
RB-1104 (Assemb.)	Cabinet Back, (Ant. White), P770A Stud Slide Catch..... Slide Catch.....	2.45
RB-1105 (Assemb.)	Cabinet Back (Green), P771A..... Stud Slide Catch..... Slide Catch.....	2.45
RS-1945	Grille, P776A,B	4.80
RS-1946	Knob, Tuning, P776A,B	1.65
RS-1947	Knob, Volume, P776A,B.....	.50
RS-1948	Button, Pilot Light, P776A,B.....	.10
RS-1949	Insert, Pilot Light, P776A,B.....	.80
RS-2003	Handle, (with insert) P770A.....	1.70
RS-2004	Handle, (with insert) P771A.....	1.70
RS-2005	Handle Insert, P770A, P771A.....	.25
RS-2006	Knob, Tuning, P770A, P771A.....	1.65
RS-2007	Knob, Volume, (Brown), P770A.....	.40
RS-2008	Knob, Volume, (White), P771A.....	.40
RS-2009	Insert,(Cab. Front), P770A.....	.65
RS-2010	Insert,(Cab. Front), P771A.....	.65
RS-2011	Door, Battery Compartment, P770A	.35
RS-2012	Door, Battery Compartment, P771A	.35
RS-2013	Grille Assembly, P770A.....	1.30
RS-2014	Grille Assembly, P771A.....	1.30
RS-2015	Window, Dial Light, P770A, P771A	.15
RS-2016	Stud Slide Catch, P770A, P771A..	.25
RS-2017	Dial Light Push Button, P770A...	.10
RS-2018	Dial Light Push Button, P771A...	.10
*-RS-2325	Cabinet Catch, P776B.....Pkg.3	.30

*- Denotes New Items Not Previously Cataloged.

Prices Are Suggested List Prices Subject To Change Without Notice.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P785A

ER-S-P785A
RADIO
MODELS
P785A
P786A
P787A

SPECIFICATIONS	
CABINET:	P785A Black and White P786A Ant. White P787A Blue and White
ELECTRICAL RATING:	3 Volts DC
BATTERIES:	(a) Carbon Pen-light cells: 2 Eveready 915,1015 or 2 Burgess Z or Mallory M15 (b) Mercury cells: 2 Eveready E9 or 2 Mallory ZM9 (c) Nickel Cadmium cells: RECHARGEABLE CELLS 2 Gould AA
POWER OUTPUT:	Undistorted: 100 MW Maximum: 140 MW

TO REMOVE CHASSIS

1. Remove volume control knob.
2. Remove battery compartment cover.
3. Remove hexhead screw located in battery compartment.
4. Separate cabinet halves at bottom approximately 1/4 inch, raise bottom slightly to release locking tabs at top of cabinet.
5. Remove 4 screws holding board to plastic cabinet bosses.
6. Remove 1 nut holding board to mounting lug in plastic boss.
7. Swing speaker end of board up and toward volume control end.
8. It is not necessary to remove volume control to repair circuit board.

TO REMOVE TUNING GANG

1. Remove chassis.
2. Remove stud and 2 screws holding pointer slide and gang mounting plate to cabinet front.
3. Tip board and gang mounting plate out from bottom of cabinet and slide down to slide dial pointer out of slot in top of cabinet.
4. Remove screw holding tuning knob.
5. Remove 2 screws holding tuning gang.

TROUBLESHOOTING

A check of battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no-signal conditions.

The total receiver current drain is 13 to 20 mils. This is measured by inserting a milliammeter in series with the batteries.

If an excessive total current drain is recorded, the individual collector currents of each transistor should be checked. An excessive current reading may mean a shorted transistor; no current will indicate that a transistor or associated circuit component is defective.

A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring so that a milliammeter can be inserted in series with the break to measure the current flow. After each current check is completed, solder the cut carefully to complete the circuit again.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 3 volts.
2. Check battery current.
3. Check transistor collector currents.
4. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

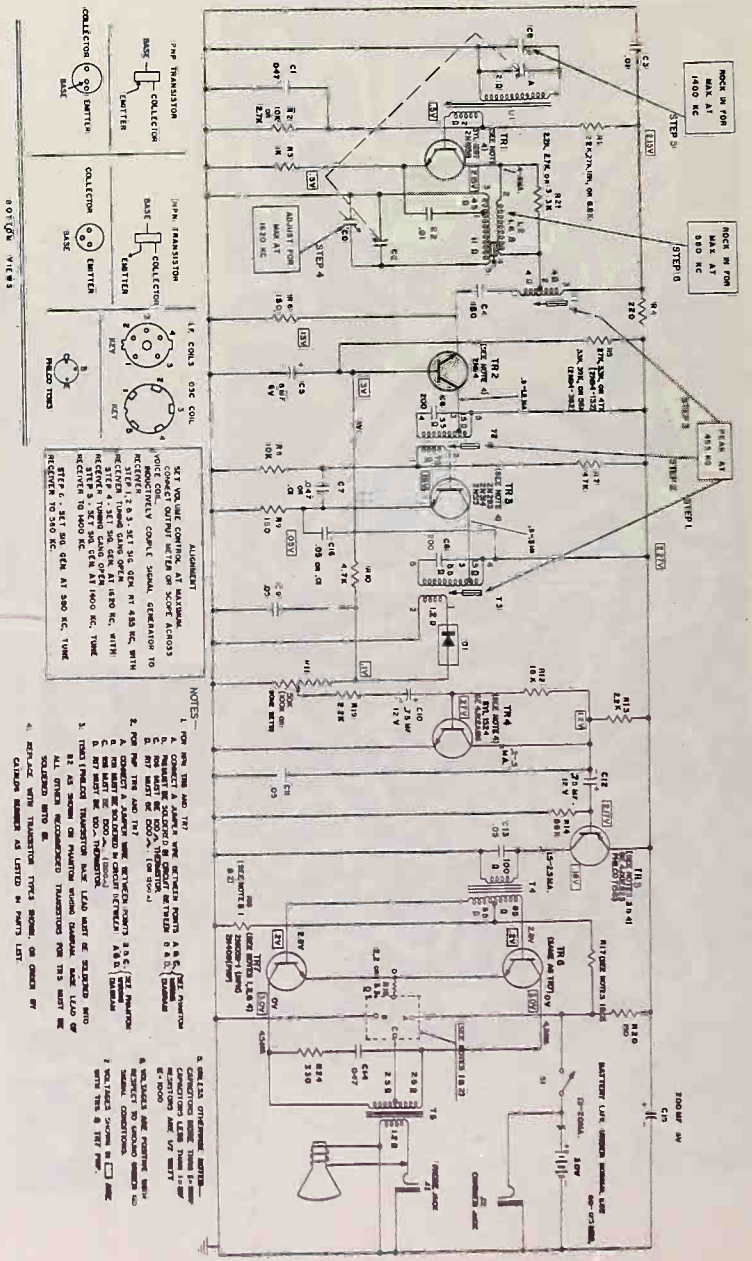
Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. Remove batteries and bend both the contact springs and holding springs inward to increase their tension. Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs, and increase electrical resistance. The terminals on the batteries should be cleaned with emery cloth to insure positive electrical contact.

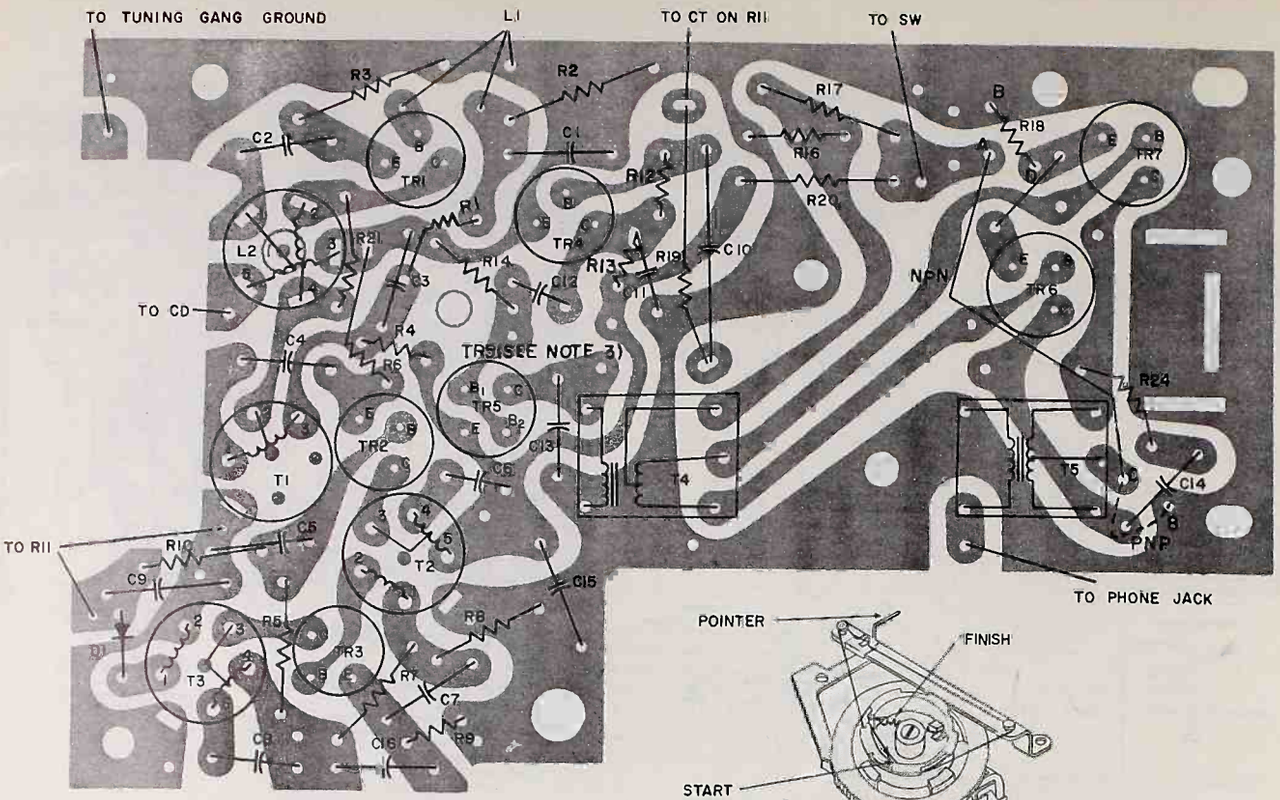
REPLACEMENT OF COMPONENTS

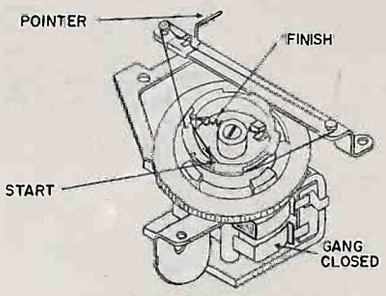
After removing a defective part, clean the mounting holes of all solder; the replacement part can be inserted more easily and a better solder connection can be accomplished. Apply a soldering iron just long enough to heat the terminal to remove the component. Since too much heat may damage a component, a soldering iron of approximately 35 watts is recommended.

Receivers are manufactured with either identical NPN transistors in the TR6 and TR7 stages or identical PNP transistors in these stages. When replacing a TR6 or TR7 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

If an identical transistor is not obtainable, TR6 and TR7 must be converted to either PNPs or NPNs as per notes 1 or 2 on the schematic.







DIAL STRINGING

REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C3,7	.01mf. Disc. Cap.	.30
RS-1024	C9,11 13,16	.05mf. Disc. Cap.	.50
RS-1225	C6,8	200mmf., Mica Cap.	.40
RS-1462	C5	8mf., 6V., Elect.	1.65
RS-1992	CA,B, C,D	Capacitor, Tuning.	4.10
RS-1996	C4	150mmf., Mica Cap.	.35
RS-1997	C15	200mf., 6 V., Elect.	1.30
RS-2083	C10,12 C1,14 C2	.75mf., 6 V., Elect. .047mf., mylar .01mf.,	1.10
POTENTIOMETER			
RS-1993	R11,S1	Vol. Cont. and Switch	2.40
COILS AND TRANSFORMERS			
RS-1985	T5	Output Transformer	4.25
RS-1986	T4	Driver Transformer	3.30
RS-1987	T1	I.F. Trans., 1st	2.45
RS-1988	T2	I.F. Trans., 2nd	2.45
RS-1989	T3	I.F. Trans., 3rd	2.50
RS-1990	L2	Osc. Coil	1.25
RS-1994	L1	Antenna	1.90
TRANSISTORS AND DIODE			
RS-1531	TR1	Osc. Conv.	3.55
RS-1547	TR2	1st I.F.	3.15
RS-1537	TR3	2nd I.F.	3.15
RS-1549	TR4	1st Audio	1.65
RS-1551	TR5	Driver	2.40
RS-1548	TR6,7	(PNP) Audio Outputs	2.40
RS-1549	TR6,7	(NPN) Audio Outputs	1.65
RS-1811	D1	Diode	1.90
RESISTOR			
RS-1993		(See Notes 1 & 2) Thermistor 100	.70
MISCELLANEOUS			
RS-1019		Earphone Assembly	4.95
RS-1052		Ring, Compression (Knob) Pkg.5	.25
RS-1057		Earphone Cordset	2.50
RS-1135		Phone Jack	.90

CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS (CONT'D)		
RS-1781	Dial Cord	2.50
RS-1981	Bracket Assem. w/charging jack	.30
RS-1982	Clip, Battery, (Upper) Pkg.3	.30
RS-1983	Clip, Battery, (Lower) Pkg.3	.30
RS-1984	Contact, Battery, (Double) Pkg.3	.30
RS-1991	Speaker	7.25
RS-1998	Spring, Dial Pkg.3	.30
RS-1999	Screw, (tuning knob) Pkg.5	.25
RS-2000	Stud, gang Mtg. (Bracket to cabinet front)	.25
RS-2001	Screw, Cab. (front to board)	.25
RS-2002	Hex nut, Ckt. board to self tapping screw Pkg.3	.30
RS-2080	Screw, 6-32 x 3/16 Pkg.5	.25
CABINET AND APPEARANCE ITEMS		
RB-1098	Cabinet Front Assem. w/grille,pad, insert dial L.H., insert dial R.H., cover plate	4.05
RB-1099	Cabinet Back, P785A, Assem. w/ribbon, batt. clip upper, batt. clip lower, batt. contact	1.90
RB-1100	Cabinet Back, P786A, Assem. w/ribbon, batt. clip upper, batt. clip lower, batt. contact	1.90
RB-1101	Cabinet back, P787A, Assem. w/ribbon, batt. clip upper, batt. clip lower, batt. contact	1.90
RS-1967	Grille	1.65
RS-1968	Knob, tuning	.30
RS-1969	Knob, volume, Black, P785A Pkg.2	.30
RS-1970	Knob, volume, White, P786A Pkg.2	.30
RS-1971	Knob, volume, Blue, P787A Pkg.2	.30
RS-1972	Insert, Dial L.H. Pkg.2	.30
RS-1973	Insert, Dial R.H. Pkg.2	.30
RS-1974	Cover, Battery Compartment w/slide stud and lock, P785A, Black	.75
RS-1975	Cover, Battery Compartment w/slide stud and lock, P786A, White	.75
RS-1976	Cover, Battery Compartment w/slide stud and lock, P787A, Blue	.75
RS-1977	Pointer	.25
RS-1978	Slide Stud	.25
RS-1979	Slide Lock Pkg.5	.25
RS-1980	Cover Plate Pkg.2	.30

PRICES ARE SUGGESTED LIST PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

GENERAL ELECTRIC COMPANY

PRODUCT SERVICE, RADIO RECEIVER DEPARTMENT
869 BROAD ST., UTICA, NEW YORK

PRELIMINARY SERVICE DATA

S-P830A
RADIO
MODELS
P830A
P831A

SPECIFICATIONS	
CABINETS:	Plastic: P830A, Charcoal P831A, Blue
ELECTRICAL RATING:	9 Volts DC (Battery)
BATTERIES:	(1) Eveready #226, Mallory #M-1600, Burgess #P6M, P6, or equivalent
POWER OUTPUT:	10% distortion: 80 MW Maximum: 140 MW
OPERATING FREQUENCIES:	Tuning Range: 540-1600 KC I.F. Frequency: 455 KC

GENERAL INFORMATION

The Models P830A and P831A are 6 transistor subminiature pocket radios.

An earphone jack for private listening is provided on the side of the radio. When the earphone (G. E. #50-296) is plugged in, the speaker is automatically silenced.

An easel stand is built into the cabinet back. The radio may be used as a table radio by pulling out the easel stand and setting radio on a table.

TO REMOVE CIRCUIT BOARD

1. Remove cabinet back.
2. Remove screw that is mounted next to volume control.
3. Carefully slide chassis slightly in direction of cabinet bottom, then lift gently out.

When replacing chassis, carefully tilt chassis so that tuning knob fits into knob opening, then slide chassis up towards cabinet top. Chassis mounting screw hole must line up with hole in mounting boss on cabinet.

TO REMOVE VOLUME CONTROL

1. Remove tuning knob.
2. Remove two screws mounted under tuning knob.
3. Remove control.

IMPORTANT: After installing volume control, be sure there is continuity between mounting screw head and conductor pattern for each screw.

TO REMOVE TUNING CAPACITOR

1. Remove pulley from gang shaft.
2. Remove two mounting screws.
3. Unsolder the three gang connection lugs on dip-solder side of board.

TROUBLESHOOTING

A check of battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions.

The total receiver current drain is 6 to 9 mils. This is measured by disconnecting one of the leads to the battery and inserting a milliammeter in series with the lead and battery.

If an excessive total current drain is recorded, the individual collector currents of each transistor should be checked. An excessive current reading may mean a shorted transistor; no current will indicate that a transistor or associated circuit component is defective.

A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring so that a milliammeter can be inserted in series with the break to measure the current flow. After each current check is completed, solder the cut carefully to complete the circuit again.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

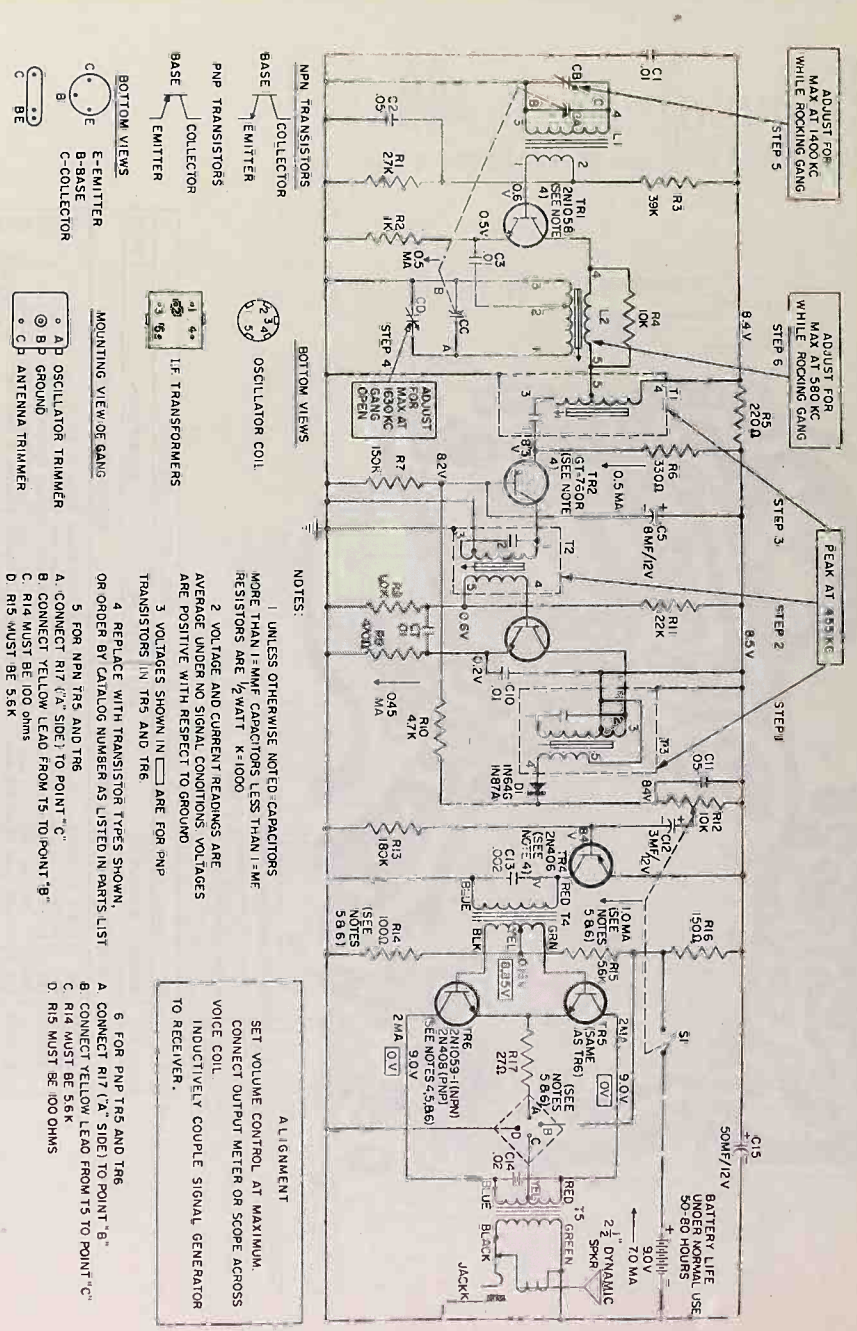
WEAK AUDIO:
1. Check battery voltage for 9 volts.
2. Check receiver current.
3. Check transistor collector currents.
4. Check alignment.

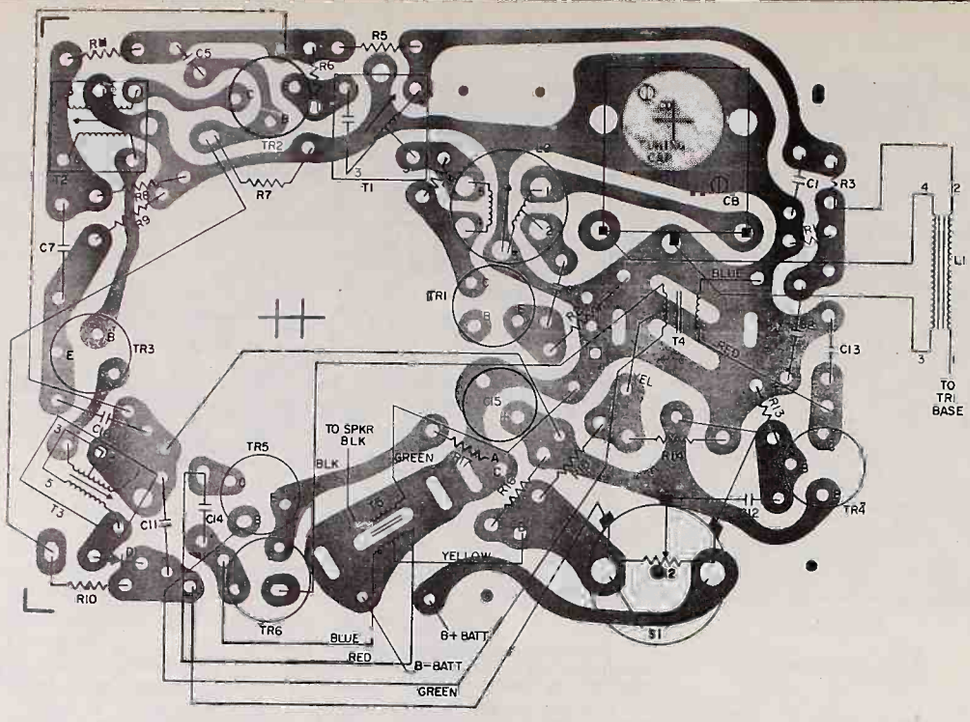
INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

Receivers are manufactured with either identical NPN transistors in the TR5 and TR6 stages or identical PNP transistors in these stages. When replacing a TR5 or TR6 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

If an identical transistor is not obtainable TR5 and TR6 must be converted to either PNPs or NPNs as per notes 5 or 6 on the schematic.

REPLACEMENT PARTS LIST - P830A, P831A			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1024	C2,11	.05mf., 50V.....	.50
RS-1025	C13	.002mf., 450V.....	.25
*-RS-2279	CA,B,C,D	Tuning Capacitor.....	4.50
*-RS-2282	C1,3,7,10	.01mf., 50V.....	.25
*-RS-2283	C14	.02mf., 50V.....	.30
*-RS-2284	C12	3mf., 12V.....	1.20
*-RS-2285	C5	8mf., 12V.....	1.30
*-RS-2286	C15	50mf.,12V.....	1.30
POTENTIOMETER			
*-RS-2280	R12,S1	Vol. Cont. 10K, & Sw....	3.65
COILS AND TRANSFORMERS			
*-RS-2272	T5	Output Transformer.....	2.60
*-RS-2273	T4	Driver Transformer.....	2.10
*-RS-2274	T1	1st I.F. Transformer....	1.40
*-RS-2275	T2	2nd I.F. Transformer....	1.40
*-RS-2276	T3	3rd I.F. Transformer....	1.40
*-RS-2277	L2	Oscillator Coil.....	1.30
*-RS-2281	L1	Antenna.....	1.70
TRANSISTORS AND DIODE			
RS-1531	TR1	Osc. Conv.....	3.35
RS-1550	TR2	1st I.F. Trans.....	2.75





CAPACITOR VALUES

C1	.01 mf
C2	.05 mf
C3	.01 mf
C5	8 mf
C7	.01 mf
C10	.01 mf
C11	.05 mf
C12	3 mf
C13	.002 mf
C14	.02 mf
C15	50 mf

RESISTOR VALUES

R1	2.7 K
R2	1 K
R3	56 K
R4	10 K
R5	220
R6	330
R7	150 K
R8	1 K
R9	470
R10	4.7 K
R11	22 K
R12	10 K
R13	180 K
R14	100 (NPN) 5.6 K (PNP)
R15	5.6 K (NPN) 100 (PNP)
R16	150
R17	27

REPLACEMENT PARTS LIST - P830A, P831A (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		TRANSISTORS AND DIODE (CONT'D.)	
RS-1536	TR3	2nd I.F. Trans.	3.15
RS-1543	TR4	Driver	2.35
RS-1545	TR5,6 (NPN)	Output (use when TR5 and TR6 are NPN)	1.65
RS-1544	TR5,6 (PNP)	Output (use when TR5 and TR6 are PNP)	2.40
RS-1811	D1	Diode	1.90
		MISCELLANEOUS	
*-RB-1133		Speaker 2 1/2"	3.80
*-RS-2559		Earphone Jack	.90
RS-1675		Screw (Jack brkt. to bd.) Pkg.5	.25
*-RS-2267		Tuning Shaft	.30
RS-1781		Dial Cord	2.50
*-RS-2264		Drum	.25
*-RS-2266		Stud (Slide Rail) Pkg.3	.30
*-RS-2268		Spring (Dial Cord) Pkg.5	.25
*-RS-2269		Plate (Dial Cord Spring) Pkg.5	.25
*-RS-2270		Detent Spring Pkg.5	.25
*-RS-2271		Grille Pad Pkg.3	.30
*-RS-2278		Shield, I.F. Transformer Pkg.5	.25
*-RS-2287		Contact, (Battery Pos.) Pkg.2	.30
*-RS-2288		Contact, (Battery Neg.) Pkg.2	.30
*-RS-2289		Screw (Vol. Cont. to Cir. bd.) Pkg.5	.25
*-RS-2290		Screw (Vol. Knob to Vol.Cont.) Pkg.5	.25

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS (CONT'D.)	
*-RS-2291	Screw (Gang to bd.) Pkg.5	.25
*-RS-2292	Screw (Drum to gang) Pkg.5	.25
*-RS-2293	Nut, Volume Control Pkg.5	.25
*-RS-2294	Screw (Tuning Knob to shaft) Pkg.5	.25
*-RS-2514	Screw, (Sleeve & Jack brkt. to bd.) Pkg.3	.25
*-RS-2515	Sleeve Pkg.3	.30
*-RS-2516	Pulley Pkg.3	.30
	CABINET AND APPEARANCE ITEMS	
*-RB-1129	Cabinet Front, Charcoal, P830A	1.00
*-RB-1130	Cabinet Front, Blue, P831A	1.00
*-RS-1131 (Assem.)	Cabinet Back, Charcoal, P830A; Cabinet Stand; Detent Spring; Rivet, Washer, Plate	1.25
*-RS-1132 (Assem.)	Cabinet Back, Blue, P831A; Cabinet Stand; Detent Spring; Rivet, Washer, Plate	1.25
*-RS-2259	Grille	1.15
*-RS-2260	Tuning Knob	.30
*-RS-2261	Volume Knob	.40
*-RS-2262	Pointer Slide	.25
*-RS-2263	Cabinet Stand	.40
*-RS-2265	Pointer	.25
*-RS-2322	Crystal, Dial	1.30

*-Denotes Items Not Previously Cataloged.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

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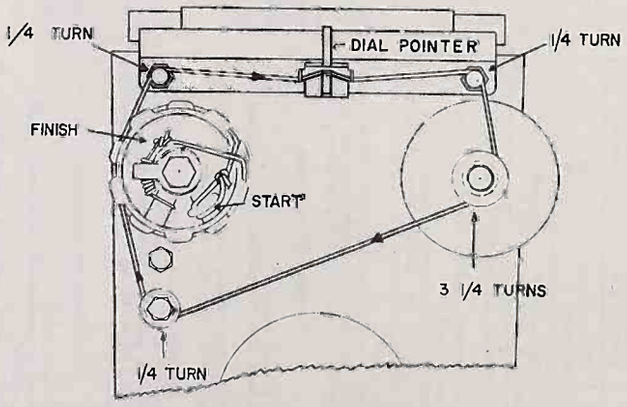


1. START STRINGING AT GANG DRUM AS INDICATED WITH GANG IN CLOSED POSITION & POINTER AT EXTREME LEFT.

2. ARROWS ON STRING INDICATE DIRECTION OF MOVEMENT, NOT STRINGING.

DIAL STRINGING

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)

T145A
RADIO
MODELS
T145A
T146A

SPECIFICATIONS	
CABINET:	Plastic - T145A Gray and White T146A Cocoa and White
ELECTRICAL RATING:	3 "D" size carbon batteries: Eveready #950, A100, or E95, Burgess #2R or equivalent
POWER OUTPUT:	Undistorted 250 MW Maximum 400 MW

GENERAL INFORMATION

The Models T145A and T146A are all- transistor cordless table radios.

The power is supplied by three 1 1/2 volt "D" size carbon batteries.

A dial light control push button is located at the left end of the dial. When this push button is depressed after the radio is turned "on," the dial indicator mark will become illuminated. Light goes off automatically when pressure is released.

CHASSIS REMOVAL

1. Remove knobs.
2. Remove screw located in recessed hand grip in top of cabinet back and two screws located on cabinet bottom.
3. Separate cabinet back and front.
4. Unsolder speaker leads.
5. Remove screws holding metal chassis mounting plate to cabinet front.

Most solder points are accessible through openings in mounting plate and around the edges of circuit board without removing circuit board from mounting plate.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. Measure the total battery current by placing milliammeter leads across the "on-off"switch terminals (S1) with switch in the "off" position.The total current drain should be between 12-25 mils. All other current measurements must be made at quiescence with the receiver turned on, volume control at minimum, tuning gang closed, and with no signal conditions.

An excessive current reading may mean a shorted transistor; no current will indicate that a transistor, associated circuit component, or a battery is defective. Current readings should be taken only with fresh batteries.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 4.5 volts with receiver turned on and volume set at normal signal level.
2. Check battery current.
3. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

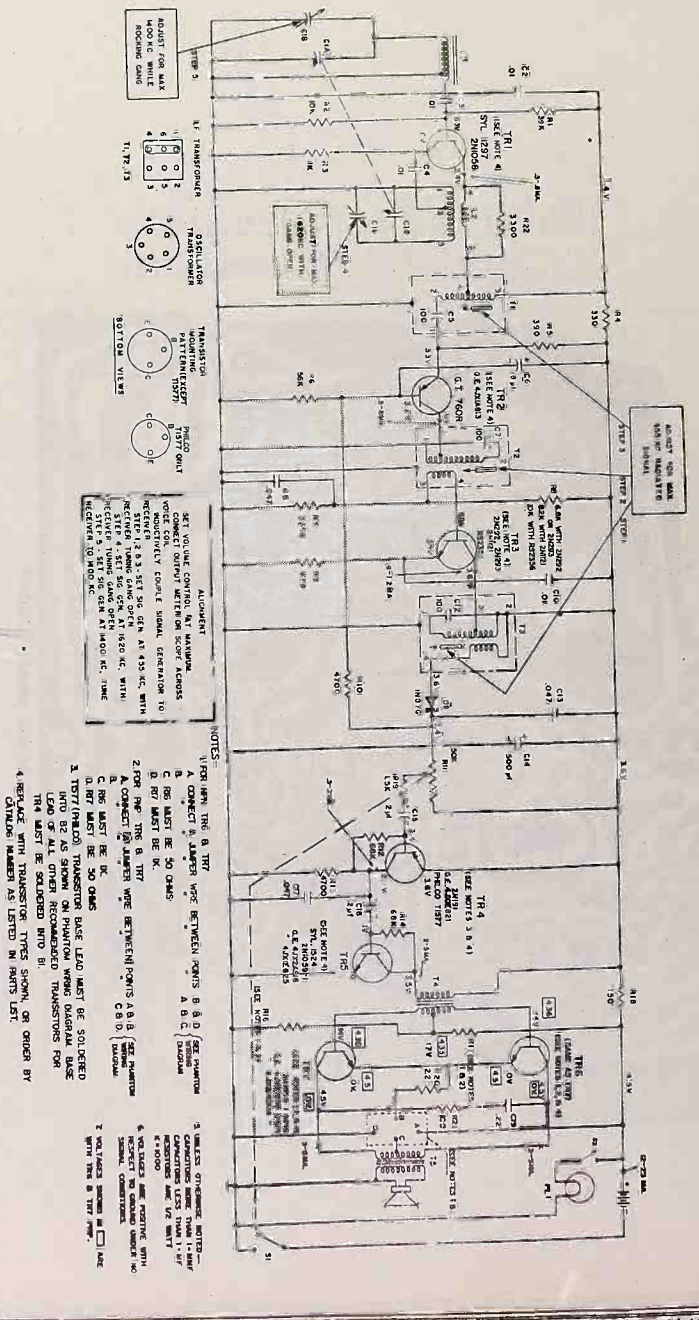
Intermittent, weak, distorted audio or motorboating is frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

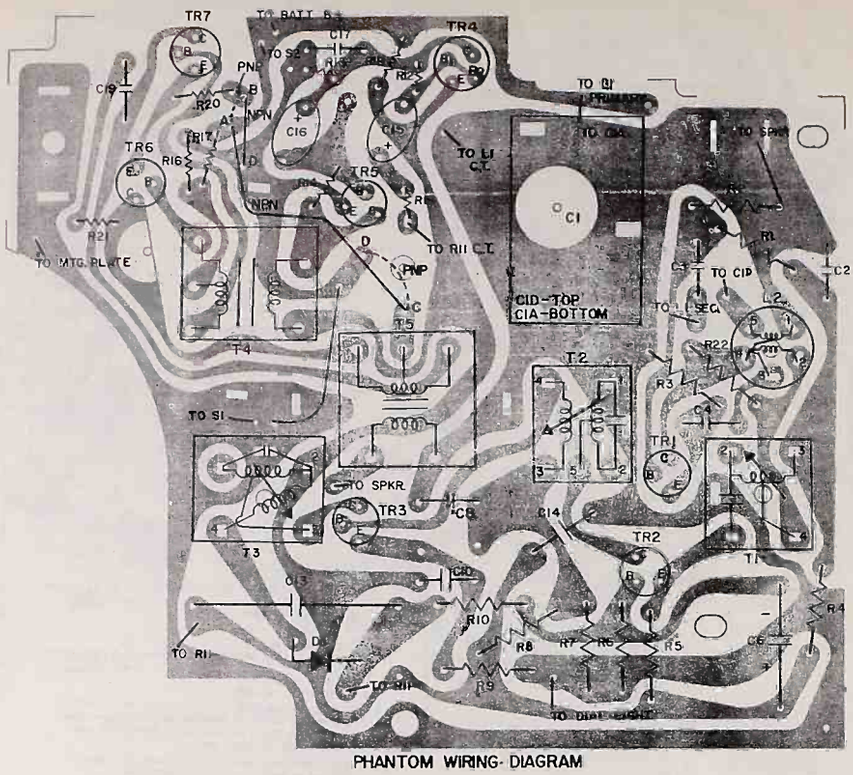
Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

Receivers are manufactured with either identical NPN transistors in the TR6 and TR7 stages or identical PNP transistors in these stages. When replacing a TR6 or TR7 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

If an identical transistor is not obtainable,TR6 and TR7 must be converted to either PNPs or NPNs as per notes 1 or 2 on the schematic.

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2,3,4,10	.01mf., 450V	.30
RS-1592	C6	8mf., 10V	1.10
RS-1959	C15,16	2mf., 10V	1.20
RS-1960	C14	500mf.,6V	1.75
*-RS-2465	C1	Tuning Gang	4.10
	C8,17	.047mf., 50V (mylar)	
	C13	.047mf.,200V	
	C19	.22mf., 50V	
RESISTORS			
RS-1355	See Notes 1 & 2	50 n thermistor	.50
POTENTIOMETER			
*-RS-2464	R11,S1	Volume Control, 50K w/sw.	2.00
COILS AND TRANSFORMERS			
RS-1424	T1	1st I.F.	2.00
RS-1961	T4	Driver	3.65
RS-1962	T5	Output	2.30
RS-1964	L2	Oscillator Coil	1.35
RS-1965	T2	2nd I.F.	2.30
RS-1966	T3	3rd I.F.	2.30
*-RS-2467	L1	Antenna	4.50
TRANSISTORS AND DIODE			
RS-1531	TR1	Osc, Conv	3.55
RS-1550	TR2	1st I.F	3.30





PHANTOM WIRING DIAGRAM

CAPACITORS

C1 -- Tuning Cap.
C2 -- .01mf.
C3 -- .01mf.
C4 -- .01mf.
C6 -- 8mf.
C8 -- .047mf.
C10-- .01mf.
C13-- .047mf.
C14-- 500mf.
C15-- 2mf.
C16-- 2mf.
C17-- .047mf.
C19-- .22mf.

RESISTORS

R1 -- 39K
R2 -- 10K
R3 -- 1K
R4 -- 330
R5 -- 390
R6 -- 56K
R7 -- 2.2K
R8 - 6.8K, 8.2K, or 10K
R9 -- 470
R10-- 4.7K
R11-- 50K
R12-- 68K
R13-- 4.7K
R14-- 68K
R16-- (See Notes)
R17-- (See Notes)
R18-- 150
R19-- 1.5K
R20-- 2.2
R21-- 100
R22-- 3.3K

REPLACEMENT PARTS LIST (CONT'D.)

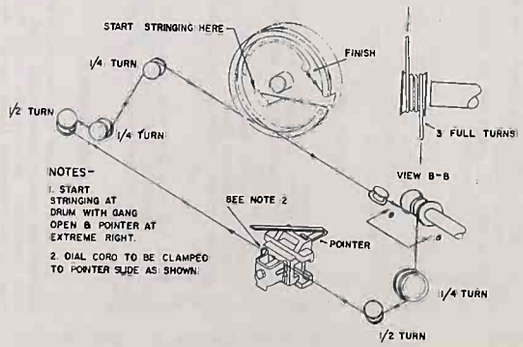
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
TRANSISTORS AND DIODE (CONT'D.)			
RS-1537	TR3	2nd I.F.	4.00
RS-1540	TR4	1st Audio	3.70
RS-1549	TR5	Driver	1.65
RS-1549	TR6,7 (NPN)	Audio Output (use when TR6 and TR7 are NPN)	1.65
RS-1542	TR6,7 (PNP)	Audio Output (use when TR6 and TR7 are PNP)	4.00
RS-1811	D1	Diode	1.90
MISCELLANEOUS			
RB-1046		Speaker 5 1/4"	6.25
RS-1127		Pulley....Pkg.5	.25
RS-1323		Pilot Light (#12)	.25
RS-1781		Dial Cord	2.50
RS-1809		Clip Tubular (Spkr. to Cab.) Pkg.3	.30
RS-1951		Spring (Pilot Light)....Pkg.5	.25
RS-1954		Battery Contact (Neg.)	.25
RS-1955		Battery Contact (Pos.)	.25
RS-1999		Screw, Drum to Shaft....Pkg.5	.25
RS-2016		Slide Stud	.25
RS-2021		Slide Lock....Pkg.5	.25
RS-2082		Ring, Compression (Knob to Shaft)Pkg.5	.25
RS-2153		Pulley....Pkg.5	.25
RS-2211		Slider, Pointer....Pkg.3	.30
RS-2235		Spring, Gang Drum....Pkg.5	.25
*-RS-2455		Tapped Bushing (bd.mtg.)...Pkg.3	.30
*-RS-2456		Tapped Bushing (slide rail)Pkg.3	.30
*-RS-2457		Slide Rail....Pkg.2	.30
*-RS-2458		Drum, Gang	.40

CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS (CONT'D.)		
*-RS-2459	Tuning Shaft Assembly	.85
*-RS-2460	Switch Bracket, Switch Contact, Switch Insulator	.30
*-RS-2463	Pilot Light Socket Assem.	.50
*-RS-2466	Rivet, (Pulley to chassis)..Pkg.5	.25
*-RS-2555	Rivet, (String pulley).....Pkg.5	.25
CABINET AND APPEARANCE ITEMS		
*-RB-1144 (Assem.)	Cabinet Front (w/o grille), Crystal and insert	6.50
*-RB-1145 (Assem.)	Cabinet Back, Cocoa T146A, Grille Cloth, Slide Stud and Lock	5.90
*-RB-1146 (Assem.)	Cabinet Back, Gray T145A, Grille Cloth, Slide Stud and Lock	5.90
RS-2018	Button, Pilot Light....Pkg.3	.30
*-RS-2444	Crystal	2.55
*-RS-2445	Grille Cloth Assembly	.50
*-RS-2446	Grille Assem. (T146A)	2.20
*-RS-2447	Grille Assem. (T145A)	2.20
*-RS-2448	Battery Compart. Cover (T146A)	.25
*-RS-2449	Battery Compart. Cover (T145A)	.25
*-RS-2450	Tuning Knob, Cocoa (T146A)	.50
*-RS-2451	Volume Knob, Cocoa (T146A)	.50
*-RS-2452	Insert, decorative	.50
*-RS-2453	Pointer	.40
*-RS-2454	Dial Plate	.25
*-RS-2468	Tuning Knob, Gray (T145A)	.50
*-RS-2469	Volume Knob, Gray (T145A)	.50

*- Denotes New Items Not Previously Cataloged.

Prices Are Suggested List Prices Subject To Change Without Notice.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.



DIAL STRINGING DIAGRAM

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P795

S-P795-1
RADIO
MODELS
P795A,B
P796A,B
P797A,B

SPECIFICATIONS	
CABINET:	P795A,B Black P796A,B Pastel Blue P797A,B Light Beige
BATTERIES:	4 Batteries; Eveready #950, Burgess #2R or equivalent
POWER OUTPUT:	Undistorted: 80 Milliwatts Maximum: 150 Milliwatts

GENERAL INFORMATION

The models P795A,B,P796A,B, P797A and B are all transistor battery operated portable radios.

The B+ is supplied by four 1 1/2 volt flashlight type batteries producing the total B+ of 6 volts.

CHASSIS REMOVAL

1. Remove both knobs.
2. Remove the 4 batteries.
3. Remove cabinet retainer strap.
4. Unsolder the two leads on the speaker.
5. Unscrew the 5 screws holding chassis to cabinet. When replacing the circuit board slide the antenna edge of the board under the circuit board holder and replace the screws.

TROUBLESHOOTING

A check of battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, and with no-signal conditions.

The total receiver current drain is 58 to 67 mils. This is measured by inserting a milliammeter in series with the batteries.

If an excessive total current drain is recorded, the individual collector currents of each transistor should be checked. An excessive current reading may mean a shorted transistor; no current will indicate that a transistor or associated circuit component is defective.

A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring so that a milliammeter can be inserted in series with the break to measure the current flow. After each current check is completed, solder the cut carefully to complete the circuit again.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 6 volts.
2. Check battery current.
3. Check transistor collector currents.
4. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. Remove batteries and bend both the contact springs and holding springs inward to increase their tension. Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs, and increase electrical resistance. The terminals on the batteries should always be clean to insure positive electrical contact.

After the set has been aligned and placed in the cabinet, recheck the antenna trimmer at 1500 KC. Due to the inductance effect caused by the proximity of the speaker when the cabinet is closed, a change in the peak operating condition will be noticed. Open the cabinet and slightly adjust the trimmer, then close the cabinet and recheck again, continue the procedure until the proper operating performance is attained.

TRANSISTOR REPLACEMENT

When measuring voltages at the transistor lead terminals, be sure to observe correct voltage polarities as shown on the schematic.

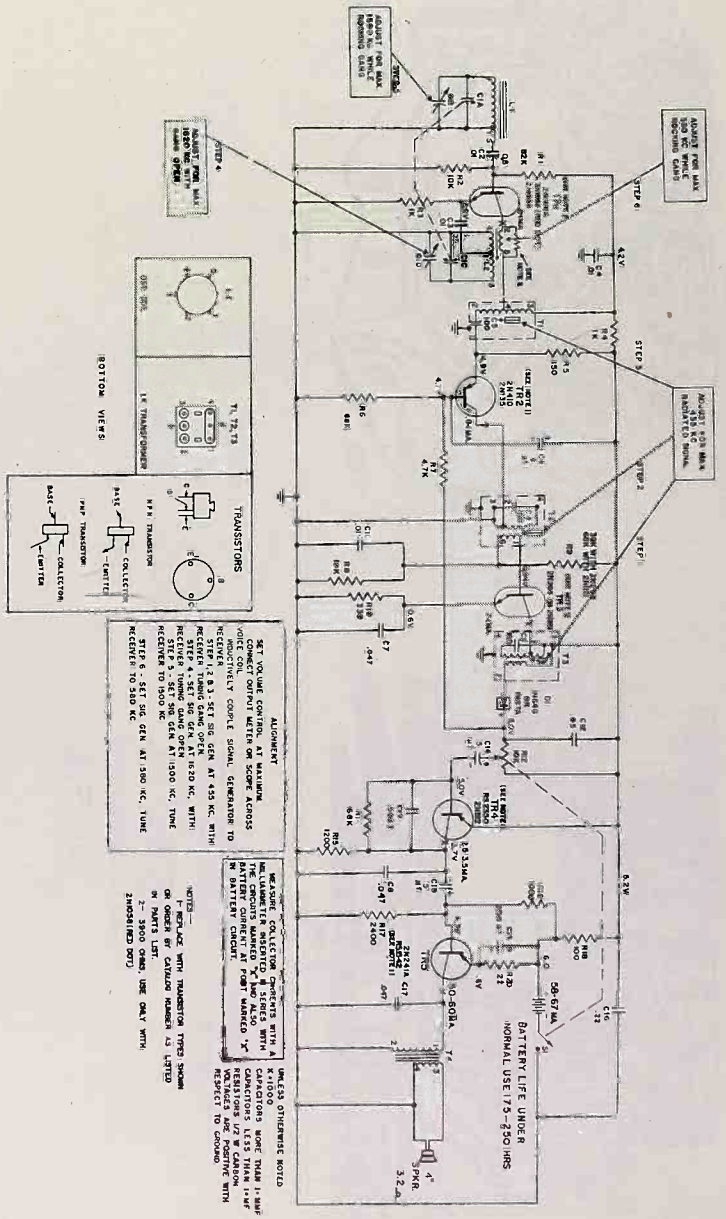
When replacing a defective transistor, be sure to observe correct lead positions, as shown on the schematic diagram in outline form. When replacing TR2, mount carefully so that the transistor casing does not touch other circuit components.

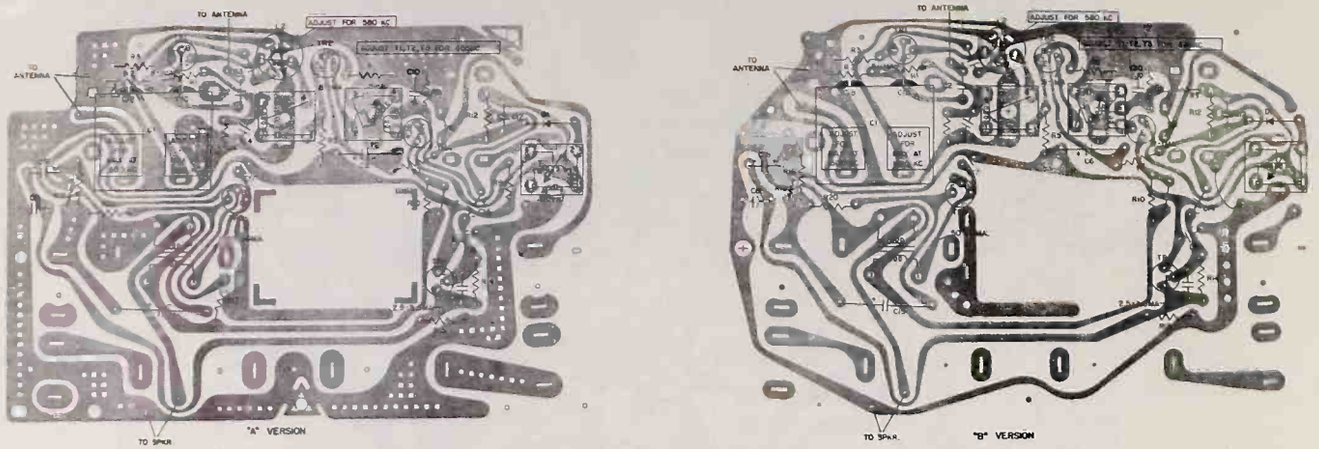
REPLACEMENT OF COMPONENTS

After removing a defective part, clean the mounting holes of all solder; the replacement part can be inserted more easily and a better solder connection can be accomplished. Apply a soldering iron just long enough to heat the terminal to remove the component. Since too much heat may damage a component, a soldering iron of approximately 35 watts is recommended.

After replacing C12, "dress" capacitor so that it is parallel to the chassis board.

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
RS-1592	C6	8mf., @10V., Elect.....	1.10
RS-1612	C14,18	5mf., @10V., Elect.....	1.20
RS-1813	C16	.22mf., 100V.....	.45
RS-1814	C15	200mf., 4.5V., Elect....	1.20
RS-1832	C1,A,B,C,D	Tuning Capacitor "A"....	3.55
*-RS-2564	C1,A,B,C,D	Tuning Capacitor "B"....	3.55





COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS (cont'd.)	
RS-1022	C2,3,4,10	.01mf., 450V.....	.30
	C7,8,17	.047mf.,450V.	
RS-1024	C12	.05mf., 50V.....	.50
RS-1514	C19	.003mf.,450V.....	.25
		POTENTIOMETER	
RS-1834	R12,S1	Vol. Cont. 10K & Sw....	1.85
		COILS & TRANSFORMERS	
RS-1424	T1	1st I.F. Transformer...	2.00
RS-1425	T2	2nd I.F. Transformer...	1.95
RS-1426	T3	3rd I.F. Transformer...	2.10
RS-1427	L2	Oscillator Coil.....	1.20
RS-1428	T4	Output Transformer.....	2.85
RS-1831	L1	Antenna "A"version.....	2.15
*-RS-2563	L1	Antenna "B"version.....	2.15
		TRANSISTORS AND DIODE	
RS-1531	TR1	Oscillator Converter...	3.55
RS-1539	TR2	1st I.F.....	4.00
RS-1537	TR3	2nd I.F.....	4.00
RS-1541	TR4	Audio Amplifier.....	4.00
RS-1542	TR5	Audio Output.....	4.00
RS-1811	D1	Crystal Diode,.....	1.90

"*" Denotes Items Not Previously Cataloged.

All resistors and capacitors not cataloged are common types obtainable from radio parts jobbers. Refer to schematic for symbols and values.

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS	
RB-1057	Speaker, 4".....	5.45
RS-1188	Clamp, Antenna.....Pkg.2	.30
RS-1320	I.F. Clip Strap,.....Pkg.5	.25
RS-1341	Battery Clip & Clamp (Pos) (Right Cent. Battery).....	.30
RS-1342	Battery Clip & Clamp (Neg) (Left Cent. Battery).....	.30
RS-1344	Bracket, Antenna, (R.H.).....	.90
RS-1345	Bracket, Antenna, (L.H.).....	.70
RS-1393	Battery Clip,(Pos), (Left Battery)	.25
RS-1394	Battery Clip & Clamp,(Pos),(Right Battery).....	.30
RS-1395	Battery Clip,(Neg),(Right Battery)	.15
RS-1396	Battery Clip & Clamp,(Neg),(Left Battery).....	.30
RS-1397	Heat Sink.....	.25
RS-2082	Ring, Compression,.....Pkg.5	.25
RS-1809	Ring, Tubular, Speaker,.....Pkg.3	.30
	CABINET & APPEARANCE ITEMS	
RB-1091	Cabinet, P795A,B Black.....	8.80
RB-1092	Cabinet, P796A, B Blue.....	8.80
RB-1093	Cabinet, P797A, B Beige.....	8.80
RS-1382	Nameplate.....	.25
RS-1802	Grille, P795A,B P796A,B w/nameplate and medallion.....	1.65
RS-1803	Grille, P797A,B w/nameplate and medallion.....	1.65
RS-1804	Knob, Tuning, P795A,B P796A,B...	.80
RS-1805	Knob, Tuning, P797A,B.....	.80
RS-1806	Knob, Volume, P795A,B P796A,B...	.80
RS-1807	Knob, Volume, P797A,B.....	.80
RS-1383	Medallion.....	.25

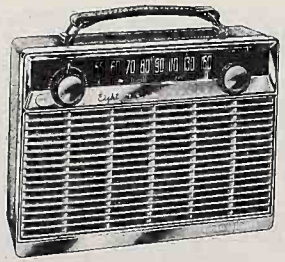
Prices Are Suggested List Prices And Are Subject To Change Without Notice.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P780A

S-P780 -1
RADIO
MODEL
P780A,B

SPECIFICATIONS	
CABINET:	Ginger with Chrome grille
BATTERIES:	(6) 1 1/2 volt "D" size cells Eveready #950, A100, E95; Burgess #2R, or equivalent
POWER OUTPUT:	Undistorted: 500 MW Maximum: 750 MW



GENERAL INFORMATION

The P780A and B are eight transistor portable radios. The circuit includes a tuned R.F. stage for extra sensitivity and selectivity.

TO REMOVE CHASSIS

1. Remove screws from cabinet back and lift off back.
2. Remove antenna bracket screws.
3. Label and unsolder wires to gang and speaker ground.
4. Remove wire wrap clamps.
5. Lift out component board carefully to extent of lead lengths.

TO REMOVE DIAL POINTER

1. Remove cabinet back.
2. Remove screw, string clamp, and string from dial pointer.
3. Unscrew dial pointer slide rail and slide it out from under dial pointer.
4. Grasp dial pointer, turn it slightly and lift out.

IMPORTANT

After replacing the dial pointer, the following procedure must be followed in order to properly calibrate dial pointer on the scale:

1. Mount antenna and antenna bracket securely on chassis.
2. Repeak gang trimmers.
3. Radiate a 1000KC signal from a signal generator to the receiver.
4. Tune receiver to the 1000KC signal.
5. With a 3/16" spintite, loosen dial pointer hex-head screw and adjust dial pointer directly over the 1000KC mark on dial scale. Do not adjust tuning gang.
6. After pointer is directly over 1000KC mark, tighten dial pointer screw firmly into place.

The above procedure must be checked after each time the receiver is aligned to insure accuracy of dial pointer position on the dial scale.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. Measure the total battery current by placing milliammeter leads across the "on-off" switch terminals (S1) with switch in the "off" position. The total current drain should be between 10-20 mils. All other current measurements must be made at quiescence with the receiver turned on, volume control at minimum, tuning gang closed, and with no signal conditions.

An excessive current reading may mean a shorted transistor; no current will indicate that a transistor, associated circuit components or a battery is defective. Current readings should be taken only with fresh batteries.

NO RECEPTION:
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:
1. Check battery voltage for 9 volts.
2. Check battery current.
3. Check alignment.

INTERMITTENT:
1. Check battery contacts for corrosion.
2. Check solder connections on dip-soldered side of circuit board.

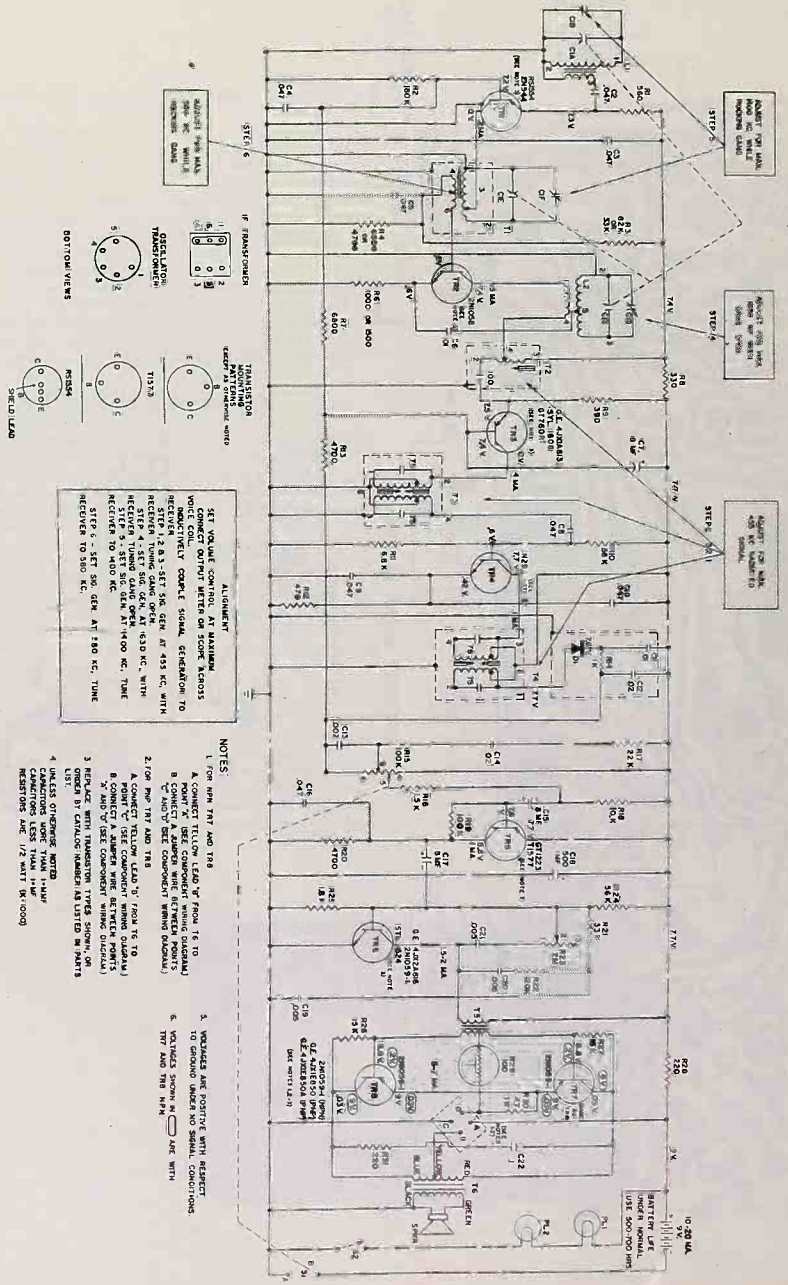
Intermittent, weak, distorted audio or motorboating are frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

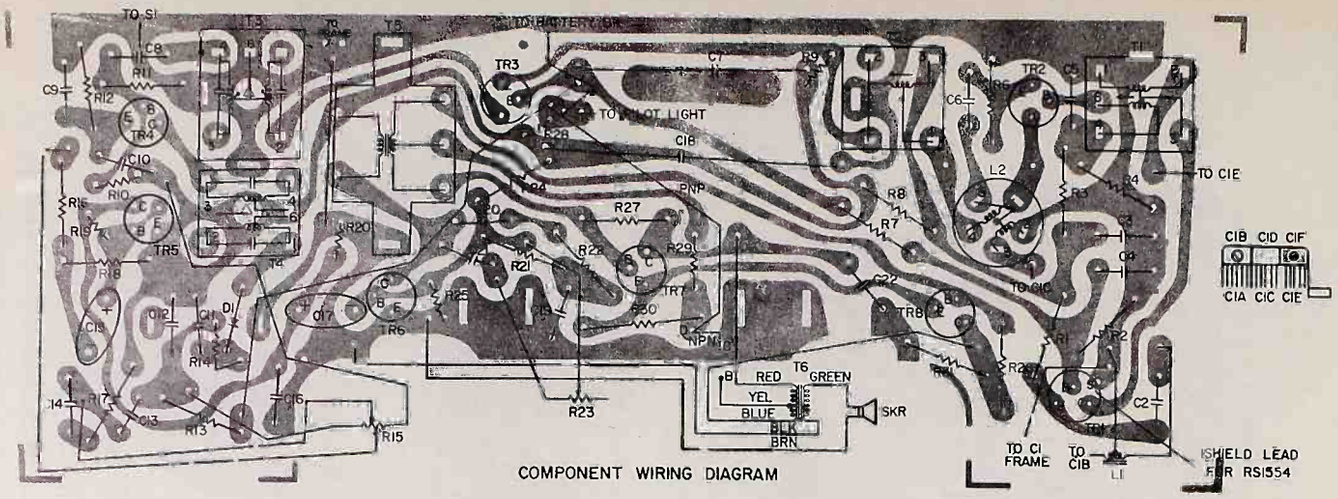
Oxidation may occur on the contacts of the batteries. This will tend to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

Receivers are manufactured with either identical NPN transistors in the TR7 and TR8 stages or identical PNP transistors in these stages. When replacing a TR7 or TR8 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output stages must have two NPN transistors or two PNP transistors.

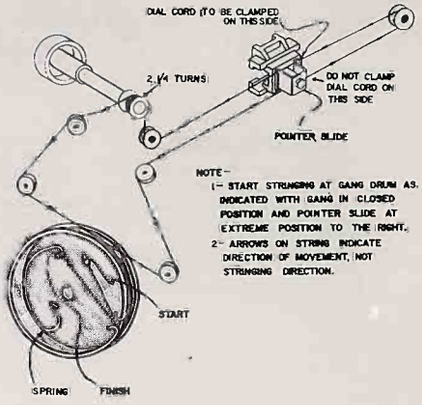
If an identical transistor is not obtainable, TR7 and TR8 must be converted to either PNPs or NPNs as per notes 1 or 2 on the schematic.

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
RS-1022	C6,11	.01mf., 450V.....	.30
RS-1023	C 20,21	.005mf.,450V.....	.25
RS-1592	C7	8mf., 10V.....	1.10





COMPONENT WIRING DIAGRAM



REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS (CONT'D.)	
RS-1640	C13	.002mf., 450V	.25
RS-2228	C1	Tuning Cap	6.00
RS-2231	C12,14	.02mf., 450V	.70
RS-2232	C18	500mf., 12V	1.90
RS-2233	C15,17	8mf., 15V	2.40
	C2,3,4,5 8,9,10, 16	.047mf., 50V	
	C22	.1mf., 50V	
		RESISTOR	
RS-1995	R29	100ohms, thermistor	.70
		POTENTIOMETER	
RS-2229	R15, S1	Vol. (100K) and Tone (2M) with switch	3.20
		COILS AND TRANSFORMERS	
RS-1424	T2	1st I.F.	2.00
RS-2222	T6	Output Transformer	3.35
RS-2223	T5	Driver Transformer	4.20
RS-2224	T3	2nd I.F.	2.40
RS-2225	T4	3rd I.F.	2.40
RS-2226	T1	R.F. Transformer	1.90
RS-2227	L2	Oscillator Coil	.85
RS-2230	L1	Antenna	4.30
		TRANSISTORS AND DIODE	
RS-1554	TR1	R.F.	4.85
RS-1531	TR2	1st I.F.	3.55
RS-1550	TR3	2nd I.F.	3.30
RS-1537	TR4	3rd I.F.	3.15
RS-1540	TR5	1st Audio	2.80
RS-1549	TR6	Driver	1.65
RS-1549	TR7-8	Audio Output (use when TR7 and TR8 are NPN)	1.65
RS-1542	TR7-8	Audio Output (use when TR7 and TR8 are PNP)	3.20
RS-1811	D1	Diode	1.90
		MISCELLANEOUS	
RB-1128	Speaker, 5 1/4", 3.2ohms		8.40
RS-1127	Pulley, 1/4 Dia. Pkg.5		.25
RS-1328	Pilot Light, #12		.25

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS (CONT'D.)	
RS-1781	Dial Cord (25yds. Bulk)	2.50
RS-1821	"C" Ring (Tuning Shaft) Pkg.5	.25
RS-1954	Battery Clip (Neg.)	.25
RS-1955	Battery Clip (Pos.)	.25
RS-2082	Compression Ring (Tuning Knob) Pkg.5	.25
RS-2209	Stud, Slide Pkg.2	.30
RS-2210	Slide, Lock Pkg.5	.25
RS-2211	Slide, Pointer Pkg.2	.30
RS-2212	Clamp, Dial String Pkg.5	.25
RS-2213	Tuning Shaft Assem. w/windlass, bushing, and "C" Ring	.75
RS-2214	Battery Clip (Neg.)	.40
RS-2215	Switch Contact (Pilot Light) Pkg.5	.25
RS-2216	Spring (p.l. Sw.) Pkg.5	.25
RS-2217	Insulator, (p.l.Sw.) Pkg.5	.25
RS-2218	Pilot Light Socket Assem.	1.00
RS-2219	Spacer, Handle Pkg.5	.25
RS-2220	End Cap, Handle	.90
RS-2221	Handle Assem.	1.90
RS-2234	Pulley, 5/16 Dia. Pkg.2	.30
RS-2235	Spring, Dial Cord Pkg.5	.25
RS-2236	Screw, #6 x 1/4 Pkg.3	.30
RS-2237	Screw, #6-32 x .420 Pkg.5	.25
RS-2238	Compression Ring (Vol.Knob) Pkg.5	.25
RS-2239	Wire Clamp (Ant. to bracket)	.25
RS-2240	Speed Clip, (Grille to Cab.)	.25
RS-2241	Grommet (gang) Pkg.3	.30
RS-2242	Eyelet (gang) Pkg.3	.30
RS-2323	Handle Support Plate	.95
	CABINET AND APPEARANCE ITEMS	
RB-1125	Cabinet Front "A" version	10.20
RB-1126	Cabinet Back	5.50
RB-1127	Grille "A" version	4.00
*-RB-1154	Cabinet Front "B"version	10.20
*-RB-1155	Grille "B" version	4.00
RS-2197	Grille Cloth Assem. "A" version	.45
RS-2198	Rear Grille Cloth	.40
RS-2201	Bracket, (dial background)	.60
RS-2202	Crystal, Dial	1.25
RS-2203	Knob, Volume	.25
RS-2204	Knob, Tuning	.25
RS-2205	Knob, Tone	.55
RS-2206	Pilot Light Button Pkg.3	.30
RS-2207	Battery Compartment Door w/stud-slide and slide lock	.25
RS-2208	Pointer Assem. with slide	.40
*-RS-2587	Grille Cloth Assem, "B" version	.45

*-Denotes New Items Not Previously Cataloged.

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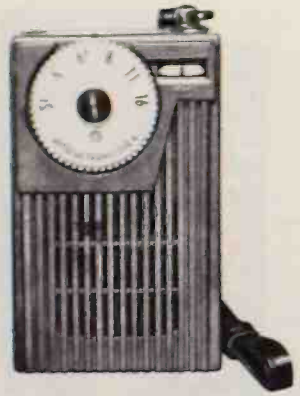


Hitachi, Ltd.
Tokyo Japan

model TH-621
6 TRANSISTOR RADIO
SERVICE MANUAL

No. 2/1959

DESCRIPTION

The new model TH-621 is a highly efficient six-transistor super-heterodyne receiver, using 6 Hitachi transistors, one germanium diode and one thermistor, designed and manufactured with modern equipment through the application of the technique at Hitachi's command. In this service book, are described the operation of the set, the circuit system, and several simplified repairing methods.

FEATURES

1. The use of the high efficiency Hitachi transistor with an almost endless life assures that this radio will be operating at optimum reception for many years.
2. The cabinet, carefully molded from shock-resistant plastics, is not only beautiful in appearance but years of use will neither discolor it nor cause deformation.
3. The highly sensistive ferrite antenna designed to catch faint signals assures sensitive reception.
4. Uniformly excellent reception is assured by the temperature compensating thermistor which provides for variations in ambient temperature.
5. The all printed circuit and the new dip-soldering method adopted for parts attachment, eliminate all risks of failure and assure an almost endless life for this radio.
6. The set can be used as a remotely controlled home radio by using the ES 20H type home speaker.
7. Private listening can be enjoyed by using an ear-phone.

SPECIFICATIONS

Circuit system	6-transistor superheterodyne
Tuning range	535–1605 KC
Intermediate frequency	455 KC
Transistor components	HJ28 Frequency converter
	HJ22 Intermediate frequency amplifier 1st stage
	HJ22 Intermediate frequency amplifier 2nd stage
	HJ15 Audio frequency amplifier
	HJ17, HJ17 Power amplifier
Germanium diode	IN34A Detector and automatic volume controller
Thermistor	B-2B Temperature compensation
Output	40 mW (Non distorted)
	60 mW (Maximum)
Power source	9V BL-006P (Japan)
	NE DA 1604
	Eveready 206
	Ray-O vac 1604
	Burgess 2U6
	G.E. 88
Speaker	2½" speaker with voice coil impedance of 8 ohms at 400 cycles
Earphone	EL-212 Hitachi magnetic earphone
Antenna	Self contained ferrite-coil antenna
Dimensions	2⅝"W × 4⅞"H × 1¼"D

HOW TO OPERATE THIS RADIO

1. Volume control

Turn the "off" knob in a clockwise direction until a "click" announces that the power has been turned on. Continue turning to the right to increase volume until the maximum is reached. Adjust it to the volume desired. For switching off the set, turn the dial in an anti-clockwise direction until a soft click is heard and the golden stripe appears on the center.

2. Station selection

Turn the turning knob to select the desired station. The 54 on the dial indicates 540 KC and 16, 1600 KC. Turn the knob slightly from right to left and back to locate the position where the volume is loudest. This is the correct tuning for the station. If static disturbance is high, turn the set slightly to change the direction.

3. Battery replacement

Under normal operating conditions, the battery will last about 30 hours, which means that the battery must be replaced if volume starts to fade at about ½ month (used 3 hours daily) after a new battery has been installed.

To replace the battery, first turn off the switch, then unsnap the back of the case by turning a coin inserted in the opening at the bottom. Connect the battery cable, plug into the battery socket and insert the battery pack into the case. Snap the back of the case closed. Care should be exercised to place the battery in the correct polarity.

HINTS FOR SERVICE-MEN

1. Extreme care should be used to avoid accidental shorting of transistor elements to the circuit ground. This is especially true of the output transistors: if the junction of R-B R-14 should be accidentally grounded for a few seconds, the output transistors would be permanently damaged.

2. It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor from its socket before making a continuity test of its circuit.

3. The first thing to check when the receiver is inoperative, is the battery with the receiver turned on. A new battery should test 9 volts although the receiver can be expected to operate with a battery which tests 5 volts or more.

4. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurement should be made. For reasons explained below, continuity measurements can be misleading.

5. The output circuit used in this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases greatly with increased signal input.

6. With no signal input, the A.G.C. source as measured at the top of the volume control, will be 0.75 volts negative in respect to the ground. Rectified signal voltage will make this point less negative in respect to chassis ground.

Don't remove any transistor from its socket (or reinsert it) when the set is turned on.

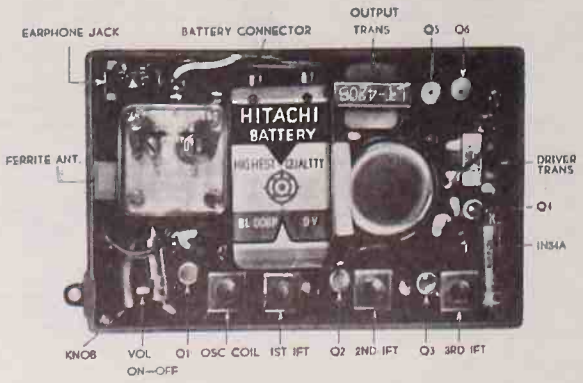
7. Oscillator performance can not be judged by measurement of a D.C. voltage developed across a resistor.

Measurement of oscillator signal strength with an A.C. voltmeter at the emitter terminal of TR_1 will give an indication of oscillator performance.

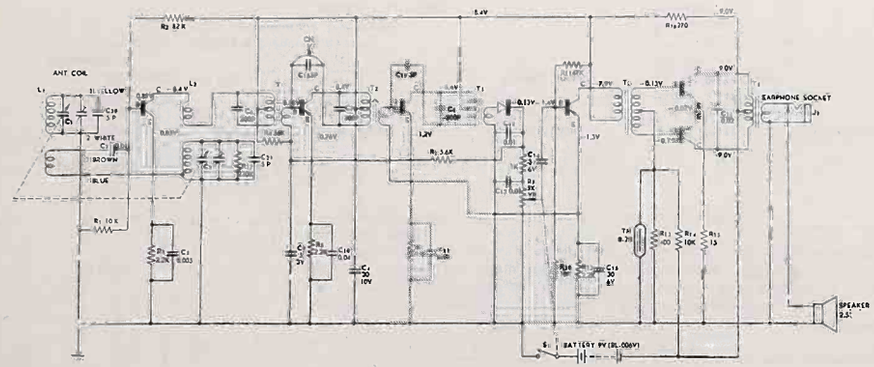
8. Voltage measurements should be made only with a sensitive voltmeter.

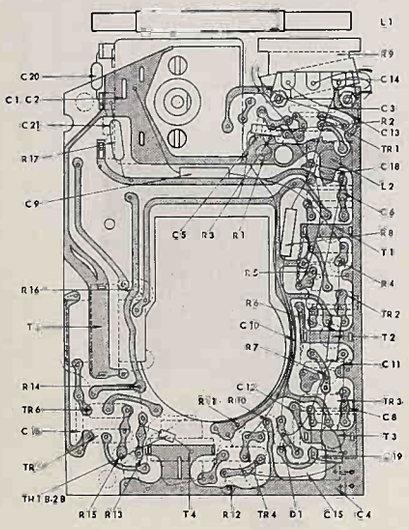
9. Interchanging transistors in the I-F stages may necessiate realignment.

10. A transistor should always be removed from its socket before using a soldering iron on the socket terminals.



CONV.	1ST. I.F.	2ND. I.F.	DETECTOR DIODE	A.F. AMP.	OUT PUT
TR_1 HJ 23	TR_2 HJ 22	TR_3 HJ 22	IN 34 A	TR_4 HJ 15	$TR_{5,6}$ HJ 17×2





ALIGNMENT PROCEDURE

Test oscillator—For all alignment operation, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid A.G.C. action.

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

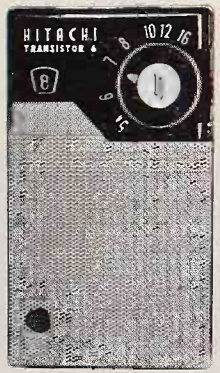
Step	Connect high side of S.G. to	S.G. Output	Dial pointer setting	Adjust for max. output
1	Variable condenser terminal of oscillator	595 KC	Quiet point near 1600 KC	IFT_3 IFT_2 IFT_1
2		Repeat step 1		
3	Short wire placed near antenna for radiated signal	595 KC	Lowest freq. of dial scale	Dust core of oscillator coil L_2
4		1620 KC	Highest freq. of dial scale	Trimmer of oscillator variable condenser
5		Repeat 3 and 4		
6		650 KC	650 KC	Move antenna coil

Item No.	Symbol No.	Stock No.	Description
1		740702~4	Cabinet
2		710717~9	Dial
3		790703	Screw, Dial Setting
4	R_9	132705~7	Volume Control, with Knob
5	T_1	632704	Earphone Jack
6		632705	Battery Cable plug
7			Sponge Cushion for Battery
8			Buffer Plate
9		620703	2½ Dynamic Speaker
10			Speaker Clamp
11			Washer, Felt
12	TH_1	560701	Thermisstor B-2B
13	L_2	370702	Oscillator Coil
14	T_1	420703	IF Transformer
15	T_2	420704	IF Transformer
16	T_3	420705	IF Transformer
17	T_4	480701	Driver Transformer
18	T_5	490702	Output Transformer
19	C_1 C_2	273701	Variable Condenser
20	R_{15}		Solid Resistor RC¼S 15 ohm
21	R_{13}		Solid Resistor RC¼S 400 ohm
22	R_8	141706	Solid Resistor RC¼S 1,000 ohm
23	R_3 R_5 R_7 R_{12}	141703	Solid Resistor RC¼S 2,200 ohm
24	R_6	141705	Solid Resistor RC¼S 5,600 ohm
25	R_4 R_{10} R_{11}	141701	Solid Resistor RC¼S 10,000 ohm
26	R_{11}	141707	Solid Resistor RC¼S 47,000 ohm
27	R_{12} R_{14}	141704	Solid Resistor RC¼S 56,000 ohm
28	R_2	141702	Solid Resistor RC¼S 82,000 ohm
29	R_{16}	141711	Solid Resistor RC¼S 270 ohm
30	R_{17}		Solid Resistor RC¼S 220,000 ohm
31	C_3 C_{12} C_{13}	255001	Seramic Capacitor ULD-12 0.01 μF
32	C_5	254003	Seramic Capacitor ULD 10 0.005 μF
33	C_{16}	255703	Seramic Capacitor ULD-15 0.02 μF
34	C_{10} C_{11}	255701	Seramic Capacitor ULD-30 0.04 μF
35	C_{21}	231004	Seramic Capacitor S-26 5 PF
36	C_6 C_7 C_8	233001	Seramic Capacitor S-32 200 PF
37	C_4	268701	Electro-Chemical Capacitor 30 μF
38	C_9	267702	Electro-Chemical Capacitor 5 μF
39	C_{14}	267703	Electro-Chemical Capacitor 3 μF
40	C_{15}	268702	Electro-Chemical Capacitor 30 μF
41	L_1		RF Transformer
42	TR_1	530704	Transistor HJ-23
43	TR_2 TR_3	530703	Transistor HJ-22
44	TR_4	530701	Transistor HJ-15
45	TR_5 TR_6	530702	Transistor HJ-17
46	D_1	550701	Germanium Diode
101			(Accessories) Leather Carrying Strap
102		632706	Earphone
103		740705	Leather Case Glove Skin Dressing Box
104			
105			Cardboad Sleeve or Dressing box
106			Polyethylene Bag for Radio Set
107			Polyethylene Bag for Poloshing Cloth
108			Polishing Cloth
109			Operating Manual

Note: 1. Ex-godown Yokohama

2. Standard Export Packing:—

For 100 Radios	300×200×240 mm	Gross Weight 5.5 kg
For 500 Radios	550×320×320 mm	12 kg
For 1,000 Radios	750×380×320 mm	18 kg



Hitachi, Ltd.
Tokyo Japan

model TH-666R
6 TRANSISTOR RADIO
SERVICE MANUAL

No. 4/1959

DESCRIPTION

This new pocket radio is the smallest of its type yet produced anywhere, and fully maintains Hitachi's consistently high standards as to sensitivity, tone and reliability.

It fits easily in a purse or shirt pocket.

This instrument contains 6 Hitachi transistors 1 germanium diode and a temperature compensating thermistor.

In this service manual are described operation of the set, the circuit system, and several simplified repairing methods.

1. The use of the high efficiency Hitachi transistor with almost endless life assures that this radio will be operating at optimum reception for many years.
2. The all-printed circuit and the new "dip-soldering" method adopted for parts attachment eliminate all risk of failure and assure almost endless life for this radio.
3. The high quality speaker with a wide sound range and push-pull output circuit reproduce undistorted tones, rich in volume.
4. Uniformly exellent reception is assured by the temperature compensating thermistor even under wide variation of ambient temperature.
5. The case is of shock-proof molded plastic and comes in three attractive colors which will not discolor even after years of use.

SPECIFICATIONS

Circuit system	6-transistor superheterodyne
Tuning range	535-1605 kc
Intermediate frequency	455 kc
Transistor components	2N219 Frequency convertor 2N218×2 Intermediate frequency amplifier 1N34A-Detector and automatic gain controller 2N217×2 Push-pull audio frequency power amplifier
Thirmistor	B-2B Temperature compensation
Output	80 mW
Power source	9 V Battery BL-006 P (Japan) N.E.D.A. 1604 Eveready 216 Ray-O-Vac 1604 Burgess 2V6 G.E. 88
Earphone	EL-213 type magnetic earphone
Speaker	2" P.M. speaker
Dimensions	2 3/8"W × 3 5/16"H × 1 1/8"D

HOW TO OPERATE THIS RADIO

1. Volume Control

The milled knob at the left is an "on and off" switch also controlling volume.

Turn the knob in a clockwise direction until a "click" announces that the power has been turned on.

Continue turning to the right through the numerals 1. 2. 3 .... the volume increasing until the maximum is reached at "10". Adjust the knob to the volume desired. When switching off the set, turn the dial in an anti-clockwise direction until a "click" is heard.

2. Station Selection

The milled knob at the right is the tuner. Turn the tuning knob to select the desired station. The numeral 54 on dial indicates 540 kc. and 16, 1,600 kc. Turn the knob slightly back and forth to locate the position where the volume is loudest.

3. Earphone:

One earphone socket will be found on the top of the set. Insert the plug of the Hitachi Magnetic Earphone EL-212 into this earphone socket. Then the speaker automatically stops and the earphone starts operating.

4. Battery Replacement

Under normal operating conditions, a battery will last about 30 hours. Therefore a battery must be replaced with new one when volume starts decreasing after approximately 1/2 month operation. (3 hours use daily).

In order to relpace the battery, first turn off the switch, then open the case by turning a coin inserted in the opening at the bottom of the case. Replace the old battery with new one, but see that the new battery snaps properly into the battery plug.

Snap the back of the case closed.

To conserve battery life, turn volume "off" when listening is finished. If the set is to be stored or put away for any long period, or when the battery is dead, remove the battery from the set, as a precaution for preventing the set from being damaged by possible battery leakage.

5. Precaution

The set contains a temperature compensator which insures consistent performance under normal weather conditions. However, as high quality transistors used in this set are quite sensitive to heat and moisture, care must be taken not to expose the set to rain, direct sunlight (particularly in summer) or any heating device.

With these simple precautions, this instrument will prove to be a handy, long lasting source of entertainment.

HINTS FOR SERVICE-MEN

1. The first thing to check when the receiver is inoperative, is the battery with the receiver turned on. A new battery should test 9 volts although the receiver can be expected to operate with a battery which tests 5 volts or more.

2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made.

For reasons explained below, continuity measurements can be misleading.

3. The output circuit used in this receiver is of the "Class B" type. It should be noted that in "Class B" output the Battery Current increases greatly with increased signal input.

4. Extreme care should be used to avoid accidental shorting of transistor elements to the circuit ground. This is especially true of the output transistors; if the junction of R_{13}-R_{14} should be accidentally grounded for a few seconds, the output transistor would be permanently damaged.

5. With no signal input, the A.G.C. source as measured at the base of the TR_2 will be 0.5 volts negative in respect to ground. Rectifier signal voltage will make this point less negative in respect to chassis ground.

6. Do not remove any transistor from its socket (or reinsert it) when the set is turned on.

7. Oscillator performance can not be judged by measurement of a D.C. voltage developed across a resistor. Measurement of oscillator signal strength with an A.C. voltmeter at the emitter terminal of TR, will give an indication of oscillator performance.

8. Voltage measurements should be made only with a sensitive voltmeter.

9. Interchanging transistors in the IF stages may necessitate realignment.

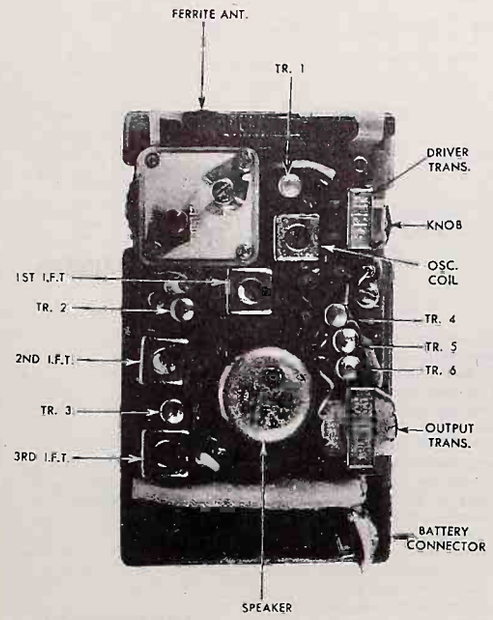
10. It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor from its socket before making continuity tests of its circuit.

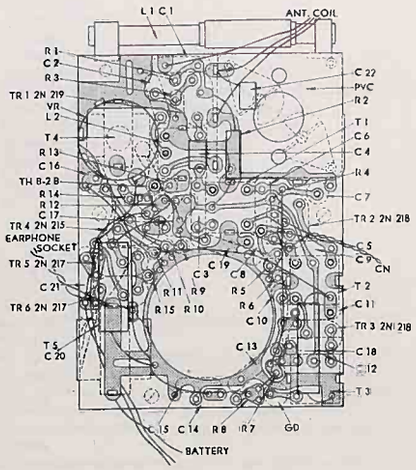
ALIGNMENT PROCEDURE

Connect an output meter across the voice coil terminals of the speaker and turn the receiver volume control to maximum.

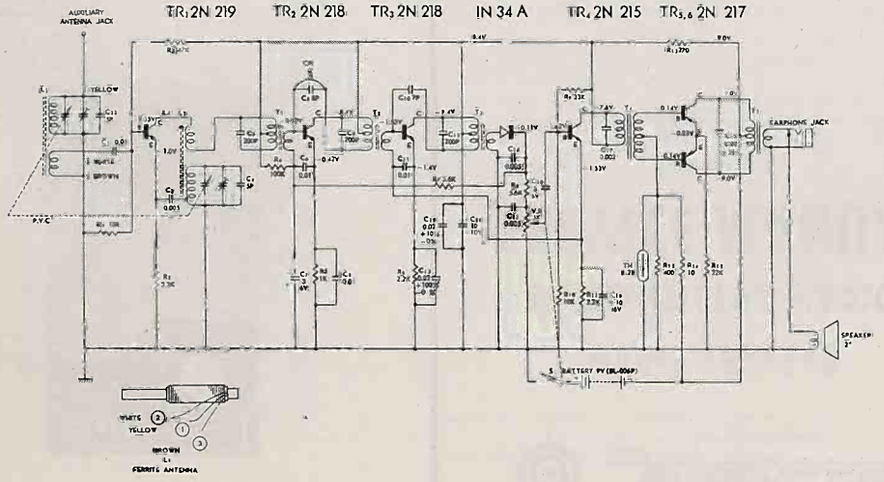
For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid A.G.C. action.

Step	Connect high side of S.G. to	S.G. output	Dial pointer setting	Adjust for Max. output
1	Variable tuning capacitor terminal of oscillator	455 kc	Quiet point near 1,600 kc	IFT3 IFT2 IFT1
2	Variable tuning capacitor terminal of oscillator	repeat	step 1	
3	Short wire placed near antenna for radiated signal	525 kc	Lowest frequency of dial scale	Dust core of oscillator coil L2
4	Short wire placed near antenna for radiated signal	1,630 kc	Highest frequency of dial scale	Trimmer of oscillator variable capacitor
5	Short wire placed near antenna for radiated signal		Repeat 3 and 4	
6	Short wire placed near antenna for radiated signal	650 kc	650 kc	Move antenna coil
7	Short wire placed near antenna for radiated signal	1,300 kc	1,300 kc	Trimmer of antenna variable capacitor





CONV.	1ST. I.F.	2ND. I.F.	DETECTOR DIODE	A.F. AMP.	POWER AMP.
TR_1 2N 219	TR_2 2N 218	TR_3 2N 218	IN 34 A	TR_4 2N 215	$TR_{5,6}$ 2N 217



Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly
2			Tuning Dial
3		710737	Volume Control Knob
4		620714	2 inch Speaker
5			Speaker Clamp
6	J_1		Earphone Jack
7			Battery Cable Plug
8	L_1	380724	Ferrite Core Antenna
9			Supporter for Antenna
10			Supporter Clamp
11	VC	273718	Variable Tuning Capacitor
12			Rubber Bushing
13	L_2	370718	Oscillator Coil
14	T_1	420715	I.F. Transformer (A)
15	T_2	420716	I.F. Transformer (B)
16	T_3	420717	I.F. Transformer (C)
17	T_4	480705	Driver Transformer
18	T_5	490709	Output Transformer
19	TR_1	530704	Transistor 2N219
20	TR_2 TR_3	530703	Transistor 2N218
21	TR_4	530701	Transistor 2N215
22	TR_5 TR_6	530702	Transistor 2N217
23	GD	550701	Germanium Diode IN34A
24	TH	560701	Thermistor B-2B
25	VR	132719	Volume Control (with Switch)
26	R_1 R_{10} R_{14}	141701	Solid Resistor 10 kΩ
27	R_2	141707	Solid Resistor 47 kΩ
28	R_9		Solid Resistor 33 kΩ
29	R_4		Solid Resistor 100 kΩ
30	R_6 R_{11}	941703	Solid Resistor 2.2 kΩ
31	R_{12}	141711	Solid Resistor 270 kΩ
32	R_7 R_8	141705	Solid Resistor 5.6 kΩ
33	R_5	141706	Solid Resistor 1 kΩ
34	R_3		Solid Resistor 3.3 kΩ
35	R_{13}		Solid Resistor 400 kΩ
36	R_{15}		Solid Resistor 22 kΩ
37	C_{13} C_{17}	254002	Ceramic Capacitor KD-10 0.002 μF
38	C_2 C_{14} C_{15}	254702	Do. ULD-10 0.005 μF
39	C_1 C_6 C_8 C_{11}	255704	Do. ULD-12 0.01 μF
40	C_{13} C_{19}	255703	Do. ULD-15 0.02 μF(+100, -0)
41	C_{21}	255705	Do. ULD-15 0.02 μF(±20)
42	C_7	267703	Electrolytic Capacitor 3 μF
43	C_{18}	268708	Do. 10 μF (A)
44	C_{13}	268709	Do. 10 μF (B)
45	C_4 C_{22}	231004	Ceramic Capacitor S-25 5 pF
46	C_3 C_9 C_{12}	233702	Do. S-32 200 pF
47	C_{10}	231005	Do. S-26 7 pF
48	C_5 C_{20}	232001	Do. S-26 10 pF
49		632729	Magnetic Earphone
50			Packaging

Hitachi, Ltd.
Tokyo Japan

model WH-822
8 TRANSISTOR RADIO
SERVICE MANUAL

No. 3 1959

DESCRIPTION

Like a fine watch, Hitachi's new BC-SW 2-band radio in its new model WH-822 is engineered throughout by the highest precision. Separate converter system using two Hitachi drift transistors and double tuning system with two stage I.F. Amplifier assure the highest selectivity. A powerful dynamic speaker and three stage A.F. Amplifier produce rich volume and undistorted tone. For short wave reception, the eight stage telescopic antenna which is contained in the bottom compartment of the leather carrying case can be attached to the radio. Combination type ferrite antenna built in this receiver has been specially developed by Hitachi's advanced radionic technique for efficiently catching even a weak signal.

Shock-proof cabinet in choice of three beautiful colors: Black, Coral and Gray. A personal earphone for private listening. A hard leather carrying case packed with the radio in a beautiful dressing box.

SPECIFICATIONS

Tuning Range	Medium wave—535~1,605 kc Short wave—3.8~12 Mc
Transistor Components:	HJ71, Local Oscillator HJ72, Mixer 2N218, I. F. Amp. 1st Stage 2N218, I. F. Amp. 2nd Stage 2N215, A. F. Amp. 1st Stage 2N215, A. F. Amp. 2nd Stage 2N217×2, Power Amp. Class B Push-pull
Germanium Diode	1N34A, Detector and Automatic Gain Controller
Thermistor	B-2B, Temperature Compensator
Output	120 mW (Undistorted), 180 mW (Maximum)
Loud Speaker	2½" Dynamic Speaker
Earphone Jack	2 (Type EL-213 Hitachi Magnetic Earphone can be plugged in)
Antenna	Self-contained Ferrite-core Antenna plus 8 Stage Telescopic Antenna
Dimensions	Width 6⅛" (155 mm)×Height 3⅝" (91 mm)×Depth 1¾" (44 mm)
Weight	1.3 lbs (600 g).....including batteries
Recommended Batteries	Japan UM-3 or UM-3A Eveready 1015 or its equivalent

HOW TO OPERATE THIS RADIO

Turn "on"

With your finger tips, turn Volume Control (1) to right to turn "off," turn it to left, until a soft click is heard.

Band Select:

Push up Band Select Switch (2) for short wave reception, and down for medium wave reception.

Tune:

Turn Tuning Dial (3) to bring in desired program. Tune carefully to bring in station with greatest clarity and volume.

Read upper Dial Scale when listening to MW broadcasting, and lower Dial Scale, SW broadcasting.

Adjust Volume:

Volume increases as Volume Control is turned to left. To conserve battery life, turn volume "off" when you finish operating receiver.

The built-in combination type ferrite antenna which is developed specially by Hitachi for higher sensitivity will give excellent performance. For SW reception, screw Rod Antenna, which is contained in the botton compartment of the leather carrying case, in Rod Antenna Socket (4). An auxiliary Antenna Wire can be plugged in Antenna Jack (5) for better reception in remote area.

Earphone:

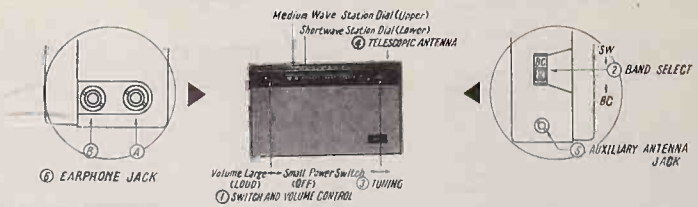
Insert the plug of Hitachi Magnetic Earphone into Earphone Socket (A), then Speaker automatically stops working and the Earphone starts operating. However, when plugged into Earphone Jack (B), both Speaker and Earphone will play. When two Earphones plugged into Earphone Jack (A) and (B) Speaker automatically stops playing, and two Earphones start operating. For this purpose, extra Earphone will be available as optional item.

Battery Replacement:

Unsnap the back of the case after loosening the fastening screw by a coin. Insert penlite batteries in plastic battery cases in a way as indicated on the plastic cases.

Insert the loaded battery cases in a Case.

Care must be taken not to install the Battery Cases in wrong polarity.



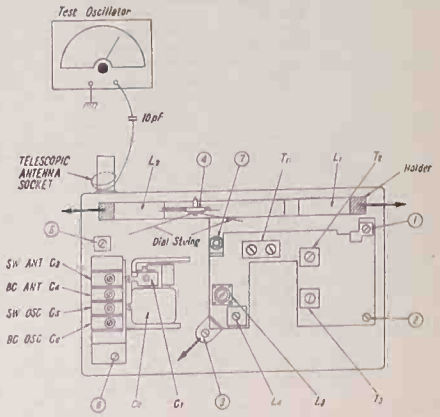
ALIGNMENT PROCEDURE

1. The first thing to be done before proceeding with any adjustments is to check battery strength. If voltage is low, replace batteries.
2. Turn volume control to maximum.
3. Modulate the test oscillator at 400 c/s or 1,000 c/s. Connect it with the rod antenna through 10 pF and connect oscillator ground wire to radio chassis.
4. Take out output from earphone jack and measure it using an AC voltmeter of the tester or V. T. V. M. at the range below 3 volts. As the output voltage increases as the adjustment proceeds, restrict the output of the oscillator so that the pointer swing is kept within 0.5 volt.

For the adjustment of intermediate and high frequencies, refer to the following:

Adjustment of the intermediate frequency circuit

Preparation	Adjust the band switch at BC.			
Adjustment Order	Division on Dial	Oscillator Frequency	Adjustment Place	Remarks
1	Max. BC Division	455 kc	T3	
2	Max. BC Division	455 kc	T2	
3	Max. BC Division	455 kc	T1 (Right)	
4	Max. BC Division	455 kc	T1 (Left)	
5	Max. BC Division	455 kc	Repeat 1-4	



Adjustment of high frequency circuit (BC)

Preparation	Adjust the band switch at BC			
Adjustment Order	Division on Dial	Oscillator Frequency	Adjustment Place	Remarks
6	Max. BC Division	1,650 kc	C6	
7	Min. BC Division	525 kc	L4	
8	Repeat 6 & 7		Repeat 6 & 7	
9	Receive 600 kc	600 kc	L2	
10	Receive 1,400 kc	1,400 kc	C4	
11	Repeat 9 & 10		Repeat 9 & 10	

Adjustment of high frequency circuit (SW)

Preparation	Adjust the band switch at SW			
Adjustment Order	Division on Dial	Oscillator Frequency	Adjustment Place	Remarks
12	Max. SW Division	12.3 Mc	C5	*1
13	Min. SW Division	3.75 Mc	L3	
14	Repeat 12 & 13		Repeat 12 & 13	
15	Receive SW 11 Mc	11 Mc	C3	*2
16	Receive SW 4 Mc	4 Mc	L1	
17	Repeat 15 & 16		Repeat 15 & 16	

*1. When you adjust 12 & 15, watch image.
When you turn oscillator at 12, it must receive another signal at 13.2 Mc. However, if you receive the signal at 11.4 Mc, you must readjust the oscillator, as it is possible that the signal is tuned with the image. The same applies to 15.

*2. When you adjust 15, the receiving frequency will slip out if you move C3. Move the frequency of the oscillator & try to adjust, keeping it always at the maximum.

INTERMEDIATE FREQUENCY TRANSFORMER

Most intermediate frequency transformers use the single tuning circuit as shown in Figs. 1a and 2. The WH-822 uses the double tuning circuit (Figs. 1b and 3). The passing band area and separation characteristics are thus improved as shown in Fig. 4.

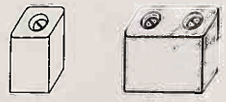


Fig. 1

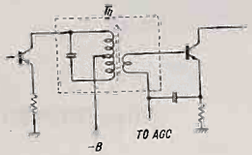


Fig. 2

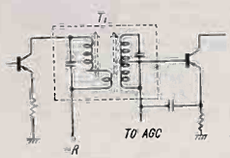


Fig. 3

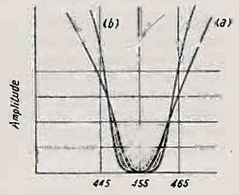


Fig. 4

COMBINATION TYPE FERRITE ANTENNA

A ferrite antenna core generally uses Q_1 material for BC band reception and M_1 material for SW band reception. Where dual band reception is to be made by the common antenna only the M_1 core is used for the reason of characteristic, so sacrificing the BC characteristics. The antenna of the WH-822 uses Q_1 core for BC band and M_1 for SW, both being combined as illustrated in Fig. 5. In this way the antenna core has been extended and its performance greatly improved.

Note:
Q_1···High μ over all range, and value of Q becomes greater around 1 Mc.
M_1···Low μ, but high Q over all range.

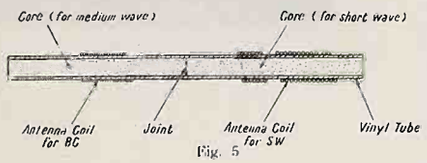
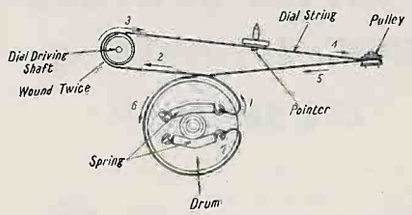


Fig. 5

How to apply dial string



DRIFT TRANSISTORS HJ71 AND HJ72

With most PNP transistors, *electrons* (negative) form at the emitter (E) as well as the collector (C), while *holes* (positive) form at the base (B), so creating a hill of potential between the two opposing electrodes. (refer to Fig. 6a)

If the positive voltage is impressed on the emitter and the negative voltage on the collector, the hill of potential will be as illustrated in Fig. 6c, and *holes* which enable current to flow in transistor tend to gather at the collector as shown by the arrow in the Figure. In this case, heights of the potential hills on both sides are the same, because of the equal density of impurity in germanium (Fig. 6b). With the drift transistor, however, if the impurity density on the emitter side is made higher than the collector side the potential hill will show an inclination as can be seen from Fig. 6e. On applying the voltage in the same manner as above, the *holes* gather at the collector at increasing speeds.

Consequently, the *holes* take lesser time in gathering and it results in the decrease in capacity between electrodes making it possible for the drift transistor to be used even for high frequencies.

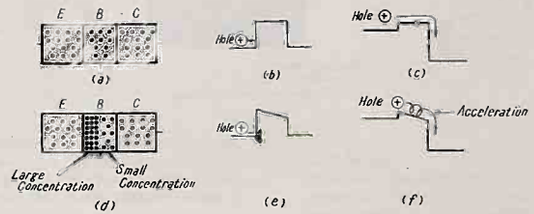
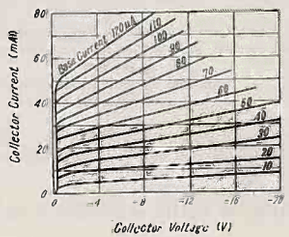
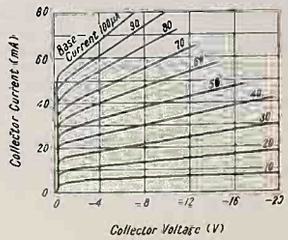
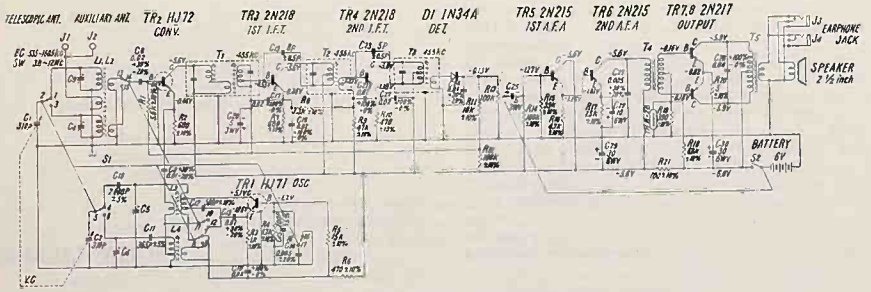
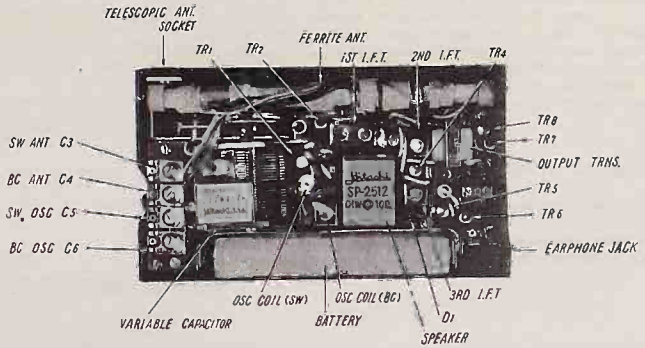


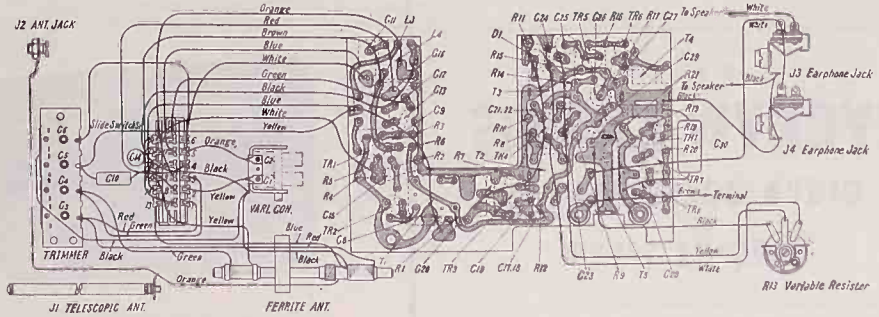
Fig. 6











Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly
2			Tuning Dial
3			Cushion A
4			Pointer
5	SP		2½ inch Speaker
6			Terminal
7			Band Indicater
8		632748	Magnetic Earphone
9			External Antenna Wire
10		740771	Battery Case
11			Battery Container
12		740775	Leather Case
13			External Leather Case
14	C_1, C_2	273743	Variable Capciter
15	C_3, C_4, C_5, C_6		Trimmer Capacitor
16			Antenna Supporter
17	R_{13}		Volume Control
18			Volume Control Knob
19			Tuning Control Knob
20	L_1, L_2	380747	Ferrite-core Antenna
21	TR_2	530715	Transistor HJ 72
22	TR_1	530716	Transistor HJ 71
23	TR_3, TR_4	530721	Transistor 2N 218
24	TR_5	530713	Transistor 2N 215 (YELLOW)
25	TR_6	530725	Transistor 2N 215 (GREEN)
26	TR_7, TR_8	530714	Transistor 2N-217
27	D_1	550701	Germanium Diode 1N34A
28	TH	560701	Thermistor B-2B
29	L_4	370739	B.C. Oscillator Coil
30	L_3	370740	S.W. Oscillator Coil
31	T_1	420741	I.F. Transfomer (A)
32	T_2	420742	I.F. Transfomer (B)
33	T_3	420743	I.F. Transfomer (C)
34	T_4	480705	Driver Transfomer
35	T_5	470712	Output Transfomer
36	R_{12}, R_{14}	141714	Composition Resistor 100 kΩ ±10%
37	R_9	141707	Composition Resistor 47 kΩ ±10%
38	R_{15}		Composition Resistor 39 kΩ ±10%
39	R_5	141730	Composition Resistor 15 kΩ ±10%
40	R_{11}	141701	Composition Resistor 10 kΩ ±10%
41	R_{18}	141728	Composition Resistor 6.8 kΩ ±10%
42	R_1	141705	Composition Resistor 5.6 kΩ ±10%
43	R_4, R_{16}		Composition Resistor 4.7 kΩ ±10%
44	R_8	141712	Composition Resistor 3.3 kΩ ±10%
45	R_{17}		Composition Resistor 1.5 kΩ ±10%
46	R_3	141706	Composition Resistor 1 kΩ ±10%
47	R_2, R_7	141725	Composition Resistor 680 Ω ±10%
48	R_6, R_{10}	141719	Composition Resistor 470 Ω ±10%
49	R_{19}	141727	Composition Resistor 390 Ω ±10%
50	R_{21}	141723	Composition Resistor 100 Ω ±10%
51	R_{20}	141726	Composition Resistor 5 Ω ±10%
52	C_{19}		Ceramic Capacitor 8 pF ±0.5 pF
53	C_{23}	231004	Ceramic Capacitor 5 pF ±0.5 pF
54	C_{18}	233702	Ceramic Capacitor 200 pF ±5%
55	C_7, C_8, C_{21}, C_{22}		Block Ceramic Capacitor 0.02 μF $\times 2$ $^{+100}_{-0}$%
56	C_{12}		Polystyrol Capacitor 500 pF ±10% 125 V
57	C_{10}		Polystyrol Capacitor 2,000 pF ±5% 125 V
58	C_{11}	143707	Mica Capacitor 365 pF 5% 300 V
59	C_{26}	270709	Electrolytic Capacitor 10 μF $^{+150}_{-10}$% 6 V
60	C_{16}, C_{28}	255701	Ceramic Capacitor 0.04 μF $^{+100}_{-0}$%
61	C_{14}, C_{27}	255702	Ceramic Capacitor 0.005 μF ±20%
62	C_{17}, C_{15}	255703	Ceramic Capacitor 0.02 μF $^{+100}_{-0}$%
63	C_9, C_{13}, C_{24}	255704	Ceramic Capacitor 0.01 μF $^{+100}_{-0}$%
64	C_{20}, C_{25}	268708	Electrolytic Capacitor 10 μF $^{+150}_{-10}$% 10 V
65	C_{29}, C_{30}	268701	Electrolytic Capacitor 30 μF $^{+150}_{-10}$% 6 V
66	S_1		Slide Switch
67	J_1		Telescopic Antenna Jack
68	J_2		External Antenna Jack
69	J_3, J_4		Earphone Jack

Hitachi, Ltd.
Tokyo Japan

model TH-862R
8 TRANSISTOR RADIO
SERVICE MANUAL

No. 6/1959

DESCRIPTION

This new pocket radio is the smallest of its type yet produced anywhere, and fully maintains Hitachi's consistently high standards as to sensitivity, tone and reliability.

It fits easily in a pocket.

This instrument contains 8 Hitachi transistors, 2 germanium diodes and 1 varistor for temperature and voltage compensation.

In this service manual are described operation of the set, the circuit system, and several simplified methods of repair.

FEATURES

1. The use of the high efficiency Hitachi transistor with almost endless life assures that this radio will be operating at optimum reception for many years.
2. The all-printed circuit and the new "dip-soldering" method adopted for parts attachment eliminate all risk of failure and assure almost endless life for this radio.
3. The high quality speaker with a wide sound range and powerful 3-stage A. F. Amplifier circuit reproduce undistorted tones, rich in volume.
4. Uniformly exellent reception is assured by the temperature and voltage compensating varistor even under wide variation of ambient temperature and battery voltage.
5. The case is of shock-proof molded plastic and comes in three attractive colors which will not discolor even after years of use.

SPECIFICATIONS

Circuit system	8-transistor superheterodyne
Tuning range	535-1605 kc
Intermediate frequency	455 kc
Transistor components	HJ 74 Frequency converter 2N219 Oscillator 2N218×2 Intermediate frequency amplifier 1N34A, 1N46 Detector and automatic gain controller 2N215×2 Audio frequency amplifier 2N217×2 Push-pull audio frequency power amplifier
Varistor	HV15 Temperature and voltage compensation
Output	80 mW (Undistorted), 100 mW (Maximum)
Power source	9 V Battery Eveready 216 N.E.D.A. 1604 Ray-O-Vac 1604 Burgess 2V6 G.E. 88 EUC. 006P
Earphone	EL-213 type magnetic earphone
Speaker	2 inch P.M. speaker
Dimensions	4⅝"W×2⅜"H×1¼"D

HOW TO OPERATE THIS RADIO

1. SWITCH AND VOLUME CONTROL

Turn this knob clockwise until you hear a clicking sound to tell you that it is switched on. Then turn further to the right and the sound volume will increase. If three white lines appear in the right and the sound volume will increase. If three white lines appear in the indication window, it means that the volume is at its maximum. Therefore, adjust the volume to your desire. Also, you must remember that the power consumption will be the greater if the volume is the larger. To switch off, turn this knob anti-clockwise until you hear the clicking sound, and the knob is turned to OFF.

2. HOW TO SELECT THE STATIONS

Turn the tuning knob around and select the desired station.

The marking 54 on the dial means 540 kc, 16 means 1,600 kc. After you have picked up the desired station, turn this knob to left and right to find the position where the sound volume is at its largest. When you find interferences from external sources, try changing the position of the radio and improve the reception condition.

3. WHEN USING THE EARPHONE

Insert the plug of the Hitachi EL-213 magnetic earphone into the earphone jack on the set. The sound will not enter the speaker, but will come through the earphone.

4. HOW TO USE THE AUXILIARY ANTENNA LINE

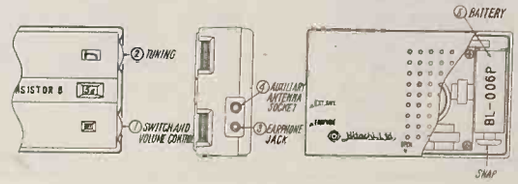
When you find the broadcasting wave weak, or when the station to which you are listening is at a distance, make use of this auxiliary antenna line. Insert the plug of the auxiliary antenna into the socket at the right of the set. Then extend the line to its maximum and hang it upon a high position.

5. HOW TO CHANGE BATTERY

At normal operation, the battery will last 90 hours, but if you find the volume dropping after use for more than one month (at an average of 3 hours per day), change for a new one.

First, turn the switch off, and open the back cover. There are two slits at the bottom of the set to open up the back cover. Insert a coin in the slit and turn, and the cover will come off.

Remove the old battery from the snap connection and after ascertaining the plus and minus termimals, connect the new battery to the snap.



HINTS FOR SERVICE-MEN

1. When demounting the circuit board, open the rear cover first, extract batteries and remove screws (1), (2), (3) and (4) in Fig. 1.
2. When applying the dial string, tie one end of the string to the spring, apply in the direction of arrow and tie other end to the hole of the dial drum.

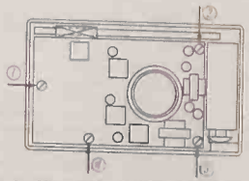


Fig. 1. How to Demount the Circuit Board

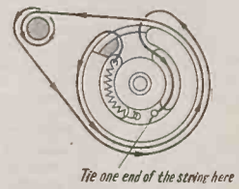


Fig. 2. How to Apply the Dial String

3. Investigate trouble by the following procedure. When a faulty item is discovered inspect L, C, R and the transistor of the relative circuit by referring to the circuit diagram, base plate diagram and parts arrangement diagram.

Inspection 1 Check battery voltage

a. The battery voltage should be 6~7 volts or more when checked by a tester.

b. Replace with new battery when no tester is available.

Inspection 2 Check for faulty connection

a. Check the continuity of the battery snap lead wires by means of a tester.

b. Check the continuity of the switch on the volume control with a tester while turning it on and off.

Inspection 3 Operation test by click noise (poke with driver tip)

a. Check whether "click" is heard when a driver tip contacts point (B) of the circuit board diagram. The audio frequency circuit is okay if a "click" is heard.

b. Check whether click is heard when a driver tip contacts point (A) of the circuit board diagram. The frequency converter circuit and all following circuits after it are okay if a "click" is heard.

Inspection 4 If a click is heard in (b) of Inspection 3, check the antenna and input circuits.

Inspection 5 If a click cannot be heard in (a) of Inspection 3, detach the circuit board and repeat the test.

a. Check the emitter voltage of $TR_{7,8}$. If it is abnormal, check the resistors, capacitors and coils. Also, check the voltage of the collector and base.

b. Check the emitter voltage of TR_6. If it is abnormal, check the resistors, capacitors and coils.

c. Check the emitter voltage of TR_5. If it is abnormal check the resistors, capacitors and coils.

Inspection 6 If a click cannot be heard in (b) of Inspection 3, detach the circuit board and check the following items.

a. Check the emitter voltage of TR_4, TR_3, TR_2 and TR_1 in this order. If the emitter voltage is abnormal, check the resistors, capacitors and coils of that circuit.

ALIGNMENT PROCEDURE

ADJUSTMENT ON IF CIRCUIT

(1) Before adjustment, check the battery voltage in operating condition. If the voltage is insufficient turn OFF the power supply switch and replace with a new battery.

(2) Make a coil of 10 cm diameter and about 2 or 3 turns and connect the test oscillator's output to this coil. Then fix the coil about 10 cm away from the receiver set with the coil surface parallel with the side surface of the set.

(3) Turn the volume control to maximum and set the test oscillator's frequency at 455 kc (modulated with 1,000 c/s). At this time, set the receiver's dial at 1,600 kc.

(4) Detach the circuit board. Switch over the tester or V. T. V. M. to the AC voltmeter range of about 3~1.5 V and connect it to both terminals of the speaker.

(5) Adjust the IF transformer so that the voltmeter reading will be maximum for T_2 (4), T_3 (3) and T_1 (2) (indicated in circuit board diagram), respectively, in this order. This adjustment must be applied with the test oscillator output made as small as possible.

(6) After completing adjustment, melt the wax on the adjusting parts by means of a heated soldering iron tip and fix the adjusting screws.

ADJUSTMENT OF RF CIRCUIT

(1) Set the test oscillator's frequency at 525 kc and set the receiver's dial at the lowest frequency. Then adjust the core ((5) in circuit board diagram) of the oscillator coil (L_2) to obtain the point where the voltmeter will give maximum indication.

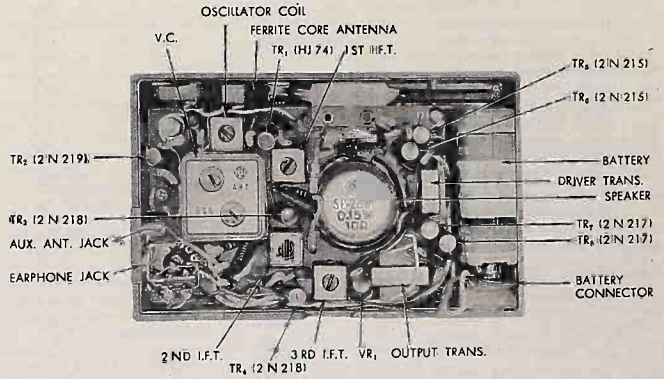
(2) Set the test oscillator's frequency at 1,650 kc and adjust the oscillator trimmer of the variable capacitor so that the signal will be received at the highest point on the receiver dial.

(3) Set the test oscillator's frequency at 600 kc and set the receiver dial at 600 kc. Then shift the bobbin of the antenna coil ((1) in circuit board diagram) to obtain the point where the voltmeter gives maximum indication.

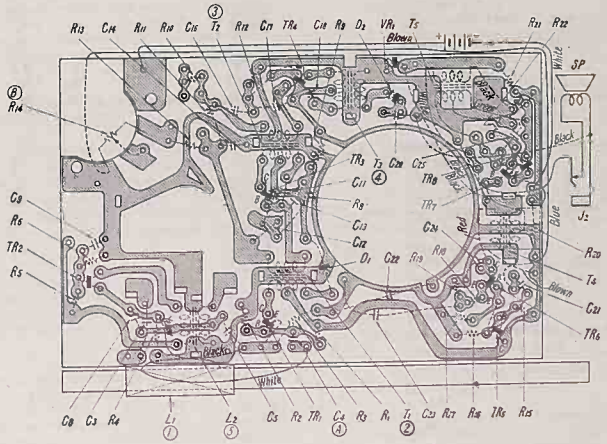
Since the antenna coil is fixed with insulation wax, this wax must be melted with a soldering iron before moving the bobbin.

(4) Set the test oscillator's frequency at 1,400 kc and also tune the receiver to 1,400 kc. Then adjust the antenna trimmer of the variable condenser so that the voltmeter will give maximum reading.

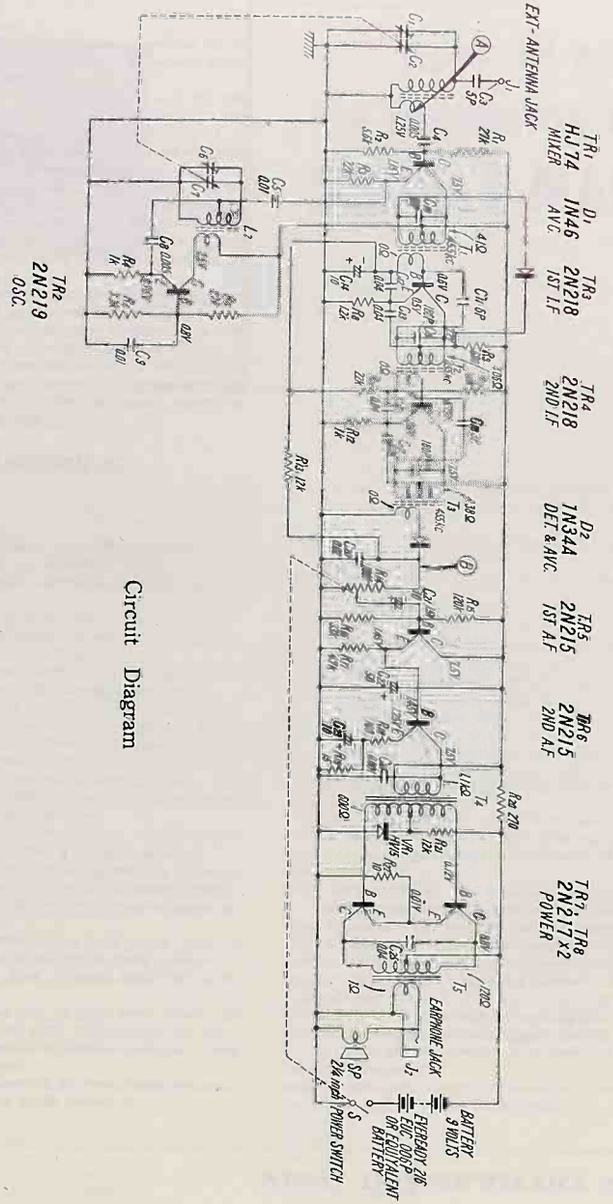
(5) Repeat the above procedure once or twice.



Internal View



Circuit Board Diagram

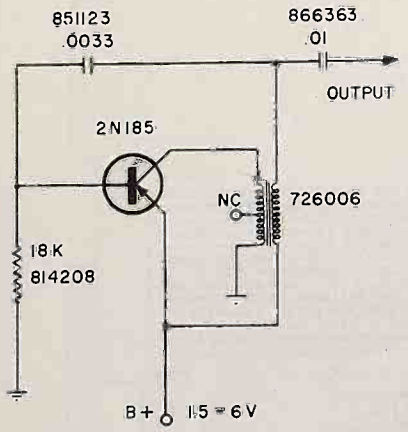


Circuit Diagram

MODEL TH-862R

Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly TH-862R
2			Dial Plate
3			Spring
4			Pulley
5			Battery Cable Plug
6		710791	Tuning Control Knob
7			External Antenna Wire
8		740795	External Antenna Bag
9			Antenna Supporter
10		740794	Leather Case
11			Dressing Box
12		632748	Magnetic Earphone (EL-213)
13	L_1	380754	Ferrite Core Antenna
14	L_2	370739	Oscillator Coil
15	T_1		I.F. Transformer (A)
16	T_2	420741	I.F. Transformer (B)
17	T_3	420742	I.F. Transformer (C)
18	T_4		Driver Transformer
19	T_5		Output Transformer
20	TR_1	530719	Transistor HJ74
21	TR_2	530711	Transistor 2N219
22	TR_3, TR_4	530712	Transistor 2N218
23	TR_5, TR_6	530713	Transistor 2N215
24	TR_7, TR_8	530714	Transistor 2N217
25	D_1	550703	Germanium Diode 1N46
26	D_2	550701	Germanium Diode 1N34A
27	VR_1	540703	Varistor HV 15
28	C_1, C_6		Adjustable Capacitor
29	C_2, C_7	273748	Variable Capacitor
30	C_3	231004	Ceramic Capacitor 5 pF ± 0.5 pF
31	C_4	254003	Ceramic Capacitor 0.005 μF $^{+100}_{-0}$%
32	C_5, C_9	255704	Ceramic Capacitor 0.01 μF $^{+100}_{-0}$%
33	C_8	254702	Ceramic Capacitor 0.005 μF $^{+100}_{-0}$%
34	C_{10}, C_{15}, C_{19}		Ceramic Capacitor 180 pF ± 5%
35	C_{11}		Ceramic Capacitor 6 pF ± 5 pF
36	C_{12}, C_{13}, C_{16}, C_{25}	255701	Ceramic Capacitor 0.04 μF $^{+100}_{-0}$%
37	C_{14}, C_{21}, C_{23}	268709	Electrolytic Capacitor 10 μF 10 WV
38	C_{18}	231704	Ceramic Capacitor 3 pF ± 5 pF
39	C_{20}	255703	Ceramic Capacitor 0.02 μF $^{+100}_{-0}$%
40	C_{22}		Electrolytic Capacitor 50 μF 10 WV
41	C_{24}	254001	Ceramic Capacitor 0.001 μF $^{+100}_{-0}$%
42	C_{25}	255701	Ceramic Capacitor 0.04 μF $^{+100}_{-0}$%
43	R_1, R_5		Composition Resistor 27 kΩ ± 10%
44	R_2	141705	Composition Resistor 5.6 kΩ ± 10%
45	R_3, R_{11}	141703	Composition Resistor 2.2 kΩ ± 10%
46	R_4, R_{12}	141706	Composition Resistor 1 kΩ ± 10%
47	R_5		Composition Resistor 27 kΩ ± 10%
48	R_6	141712	Composition Resistor 3.3 kΩ ± 10%
49	R_8		Composition Resistor 1.2 kΩ ± 10%
50	R_9	141725	Composition Resistor 680 Ω ± 20%
51	R_{10}	141714	Composition Resistor 100 kΩ ± 10%
52	R_{11}	141703	Composition Resistor 2.2 kΩ ± 10%
53	R_{13}, R_{21}		Composition Resistor 12 kΩ ± 10%
54	R_{14}	131726	Volume Control 100 kΩ ± 20%
55	R_{15}		Composition Resistor 120 kΩ ± 10%
56	R_{16}	141713	Composition Resistor 33 kΩ ± 10%
57	R_{17}	141707	Composition Resistor 4.7 kΩ ± 10%
58	R_{18}	141723	Composition Resistor 100 Ω ± 20%
59	R_{19}		Composition Resistor 1.5 kΩ ± 10%
60	R_{20}	141711	Composition Resistor 270 Ω ± 20%
61	R_{22}	141721	Composition Resistor 10 Ω ± 10%
62	J_1		External Autenna Jack
63	J_2		Earphone Jack
64	SP		2¼ inch P. M. Speaker

HOFFMAN P706 TRANS-SOLAR PORTABLE RADIO



SCHEMATIC-NOISE GENERATOR

The 2N185 output transistors are often changed as a pair in the Hoffman Model 706 Trans-Solar Transistor Radio. As a rule, one of the 2N185 transistors is still usable. A worthwhile use can be made of this 2N185 as a simple noise generator for transistor radio signal tracing.

The necessary parts are shown in the schematic. The capacitors may be anything available, but for space reasons the Hoffman part numbers listed are ceramic disc capacitors.

The audio transformer listed is the interstage transformer from the Hoffman 706 Trans-Solar Radio, and the primary center tap is not used.

It is not necessary to have a separate battery for the generator as you may use the same battery which powers the radio being repaired. However, since the generator can be used for TV audio as well as all audio devices, a self contained battery adds flexibility.

For dead radios start signal tracing from the secondary of the output transformer and work forward placing the output lead on the base connection of the audio output stages, then the base of the audio driver stage and on to the top of the volume control. If noise appears at the top of the volume control, proceed to the base of the last IF stage. With the volume control wide open, the noise signal should be heard, although weak. The sound should be louder at the base of the second IF transistor, and even louder at the grid of the converter transistor.

Touching the probe to the antenna connection will produce noise which varies as the tuning condenser is rotated, provided that the oscillator is working. The sound will not vary if the oscillator is dead.

The points marked * on the sketch of the printed board indicate the input points for the probe as explained in the text.

A quick check for distortion in the output stages may be made by touching the probe to segments #28 and #29. The sound output should be the same level at both points if the output transistors are well matched.

TROUBLE SHOOTING TIPS - 706 TRANS-SOLAR RADIO

SYMPTOM - Squealing on the lower end of the dial and excessive hiss between stations.

PROBABLE CAUSE - Open C5, AVC filter condenser. This can be readily checked by bridging a 50 mfd from segment #10 to ground.

SYMPTOM - Weak Audio, battery ok.

PROBABLE CAUSE - Open C15, emitter bypass on the driver stage. This can be readily checked by bridging a 50 mfd from segment #26 to ground.

SYMPTOM - Motorboating

PROBABLE CAUSE - Open C14 or C17, B plus filters. This will show up more readily on solar operation than on battery operation. C14 can be checked by bridging a 50 mfd from segment #6 to ground. C17 can be checked by bridging a 150 mfd from segment #21 to ground.

SYMPTOM - Weak battery operation and no solar operation.

PROBABLE CAUSE - Shorted or leaky C14 or C17, B plus filters. Leaking or shorted filters can be easily checked with an ohm meter such as the Simpson #260. Remove the battery and switch the radio to the ON position. Check directly across the battery terminals, this reading should be at least 1200 ohms. The reading may be as high as 1500 ohms depending on the individual transistors. A reading below 1200 ohms indicates a shorted filter or defective output transistor, while a reading higher than 1500 ohms indicates an open circuit.

An operating radio should be checked out with the probe to see what the normal sounds are that can be obtained at the various points. This makes it much easier to determine when the proper sound is not received on a non-operating radio.

SOLAR CELL TESTING

The solar cell should be tested for voltage and current output. Expose the cell to sunlight or hold 2" away from a 100 watt incandescent light. The voltage developed will be between 5.5 and 6 volts with no load. The current from the cell should be 20 - 25 ma.

ALIGNMENT PROCEDURE

Use a signal generator having output signals at the frequencies specified below. Loosely couple the signal to the ferrite rod antenna. Signal should be 30% AM at 400 CPS. Keep the signal at the lowest practical level during alignment. Use the radio's batteries as its power supply during alignment.

STEP	GENERATOR FREQUENCY	GENERATOR INPUT TO	RADIO DIAL SETTING	ADJUST	REMARKS
1.	5[illegible] C	Loosely coupled to ferrite rod antenna	High End of Dial	T3, T2, T1	Adjust for maximum in the order listed.
2.	Repeat Step 1 until no further improvement is indicated				
3.	535 KC	Same as Step 1.	Low End of Dial	L1	Adjust oscillator coil for maximum.
4.	1620 KC	"	High End of Dial	C2A	Adjust the oscillator trimmer for maximum.
5.	Repeat Steps 3 and 4 until both end points show maximum output at 535 and 1620 KC respectively.				
6.	400 KC	Same as Step 1.	Tune in The Signal	C1A	Adjust for maximum.
7.	Repeat Steps 6 and 7 if necessary.				

IF ALIGNMENT

1. An external speaker or 12 ohm load should be connected across the output terminals of the audio output transformer during alignment if the chassis has been removed from the cabinet.

2. Loosely couple the signal generator to the ferrite rod antenna. Several turns of wire across the signal generator output and located at such a distance as not to effect the antenna characteristics will be satisfactory.

3. Set the volume control to maximum. Adjust the tuning condenser wide open (high end of the dial).

NOTE: Use the radio batteries for the power supply during alignment. Do not use a 6 volt battery eliminator type source of power for the radio unless it is of the type approved for use with transitorized circuits. The AC component of the power supply could damage the transistors if excessive ripple is present.

4. Use a 455 KC carrier, 30% modulated at 400 CPS for IF alignment. Adjust the generator output for a low level audible signal at the speaker or for 5 milliwatts across the 12 ohm load if it is used in place of a speaker.

5. With an insulated screwdriver adjust the output, interstage, and input IF transformers (T3, T2, and T1) for maximum output. Decrease the signal generator output as required to maintain a low level output at the speaker or 5 milliwatts across the 12 ohm load.

6. Repeat step 5 until no further improvement is obtained.

RF ALIGNMENT

Use the same set-up connections and general conditions as for the IF alignment of the radio.

1. Set the signal generator for a 535 KC Signal. Turn the tuning condenser fully closed (low end of the dial).

2. Adjust the oscillator coil (L1) for maximum output.

3. Set the signal generator for a 1620 KC signal. Turn the tuning condenser wide open (high end of the dial).

4. Adjust the oscillator trimmer capacitor (C2A) for maximum output.

5. Repeat steps 2 through 4 until both settings of the tuning condenser give maximum output at 535 and 1620 KC.

TRACKING

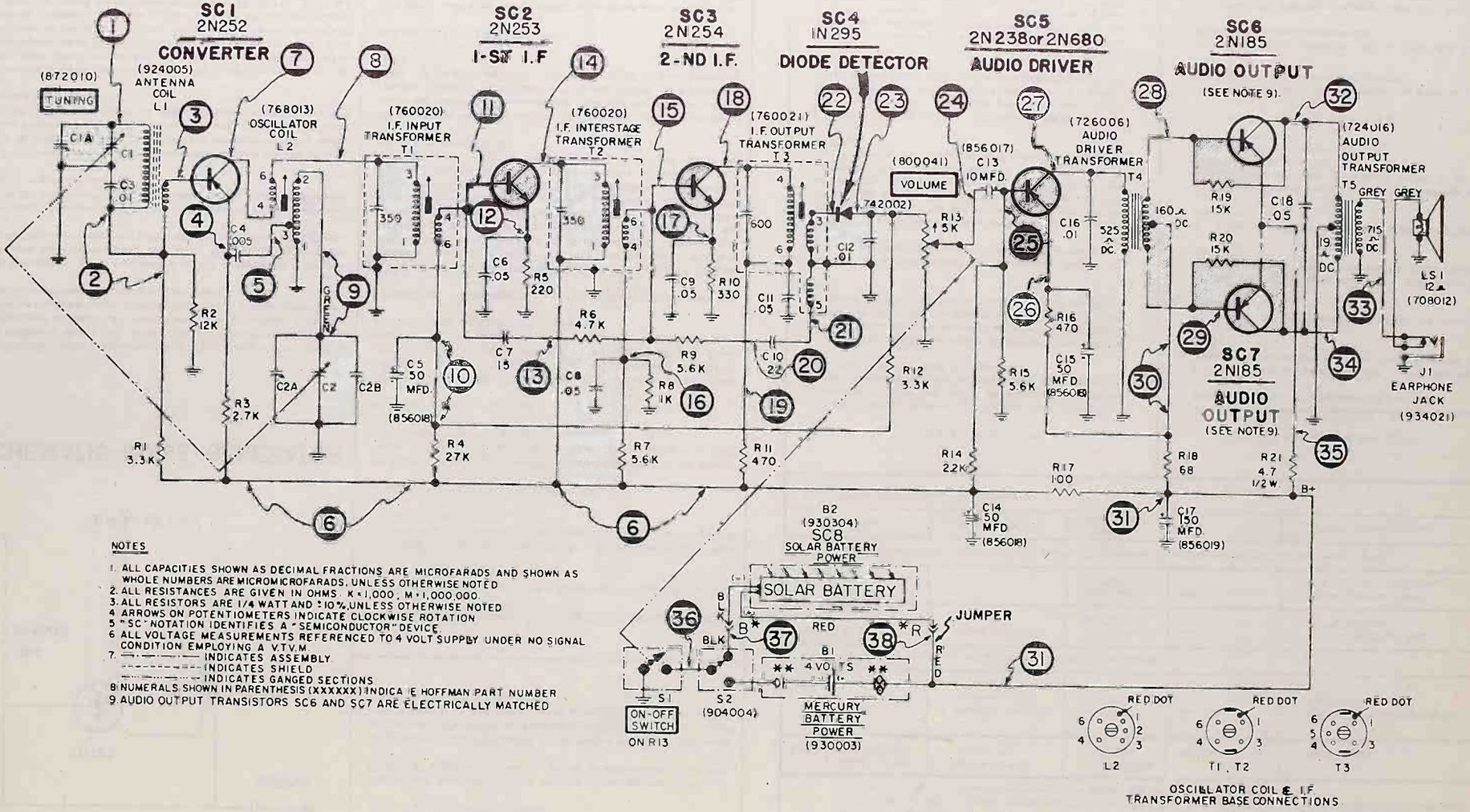
Use the same set-up connections and general conditions as for the IF and RF alignment.

1. Set the signal generator for a 1400 KC Signal. Tune in the signal on the radio.

2. Adjust the antenna trimmer (C1A) for maximum output while "rocking" the tuning condenser through the peak.

3. Repeat steps 1 through 4 until no further improvement is indicated.

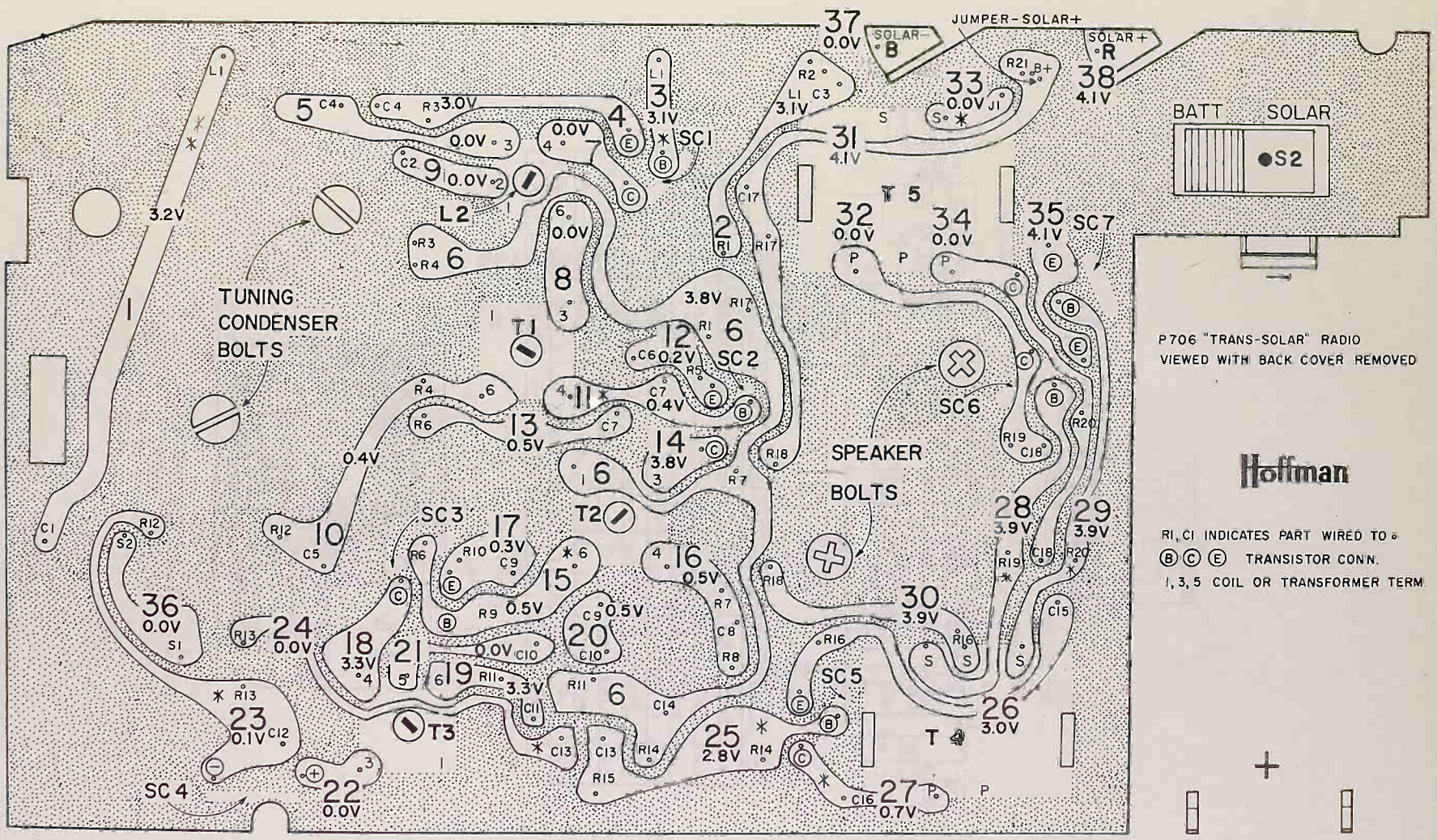
NUMBERS ENCIRCLED ON SCHEMATIC CORRESPOND TO LARGE NUMBERS ON SKETCH



NOTES

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS, UNLESS OTHERWISE NOTED
2. ALL RESISTANCES ARE GIVEN IN OHMS. K=1,000, M=1,000,000.
3. ALL RESISTORS ARE 1/4 WATT AND ±10%, UNLESS OTHERWISE NOTED
4. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION
5. "SC" NOTATION IDENTIFIES A "SEMICONDUCTOR" DEVICE.
6. ALL VOLTAGE MEASUREMENTS REFERENCED TO 4 VOLT SUPPLY UNDER NO SIGNAL CONDITION EMPLOYING A V.T.V.M.
7. —·—·—·— INDICATES ASSEMBLY.
   - - - - - - INDICATES SHIELD.
   —·—·—·— INDICATES GANGED SECTIONS.
8. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART NUMBER
9. AUDIO OUTPUT TRANSISTORS SC6 AND SC7 ARE ELECTRICALLY MATCHED

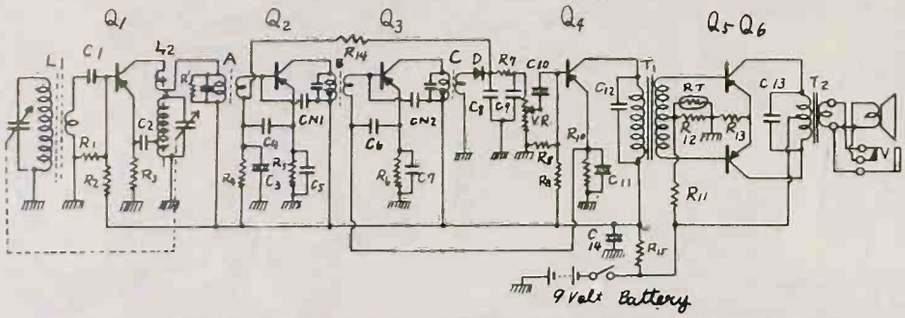
HOFFMAN CHASSIS 1123 - MODEL P 706



REAR VIEW OF PRINT BOARD - ALL GROUND AREAS DROPPED OUT

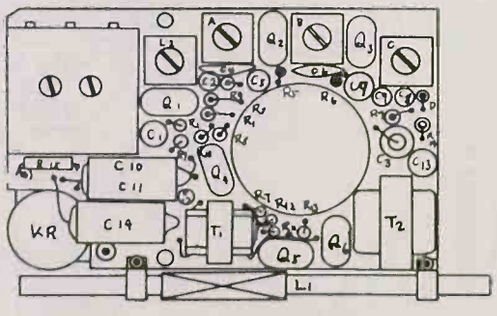
CHASSIS: 1123

LAFAYETTE FS-200

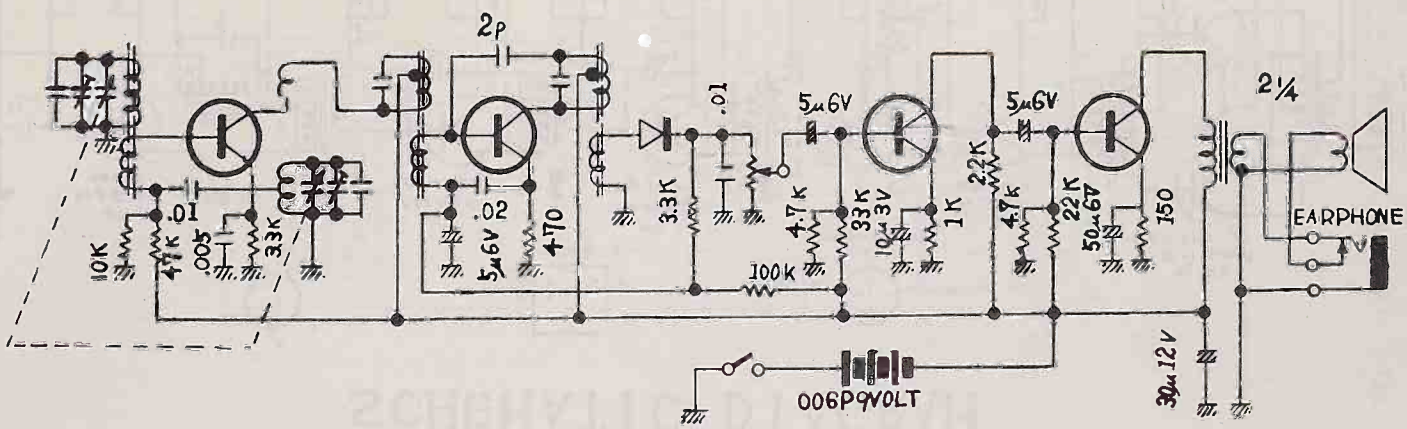


Parts NO	Constant	Parts NO	Constant	Parts NO	Constant	Parts NO	Constant	Parts NO	Constant
R1	3KΩ	R10	1 KΩ	C2	.01 MF	C11	6WV 30 MF	B	# 8503
" 2	15KΩ	" 11	10	" 3	6WV 6 "	C12	0.01 MF	C	# 8549
" 3	3 KΩ	" 12	390Ω	" 4	.02 "	" 13	.04 "	T1	TRT-13
" 4	100 KΩ	" 13	22Ω	" 5	" "	" 14	10WV 50 "	T2	" 14
" 5	1 KΩ	" 14	3.3KΩ	" 6	" "	CN1	5-12PF	D	SD-46
" 6	1.2KΩ	" 15	150Ω	" 7	.04 "	CN2	5-12PF	Q1	HJ-2N219
" 7	500Ω	VR	5KΩA	" 8	.01 "	L1	90 MW Ant	Q2,3	" -2N218
" 8	6.8KΩ	RT	B-2B	" 9	" "	L2	# 356	Q4	" -2N215
" 9	33KΩ	C1	.02 MF	" 10	6WV 30 "	A	# 8508	Q5,6	" 2N217

R1 ---- 100 KΩ

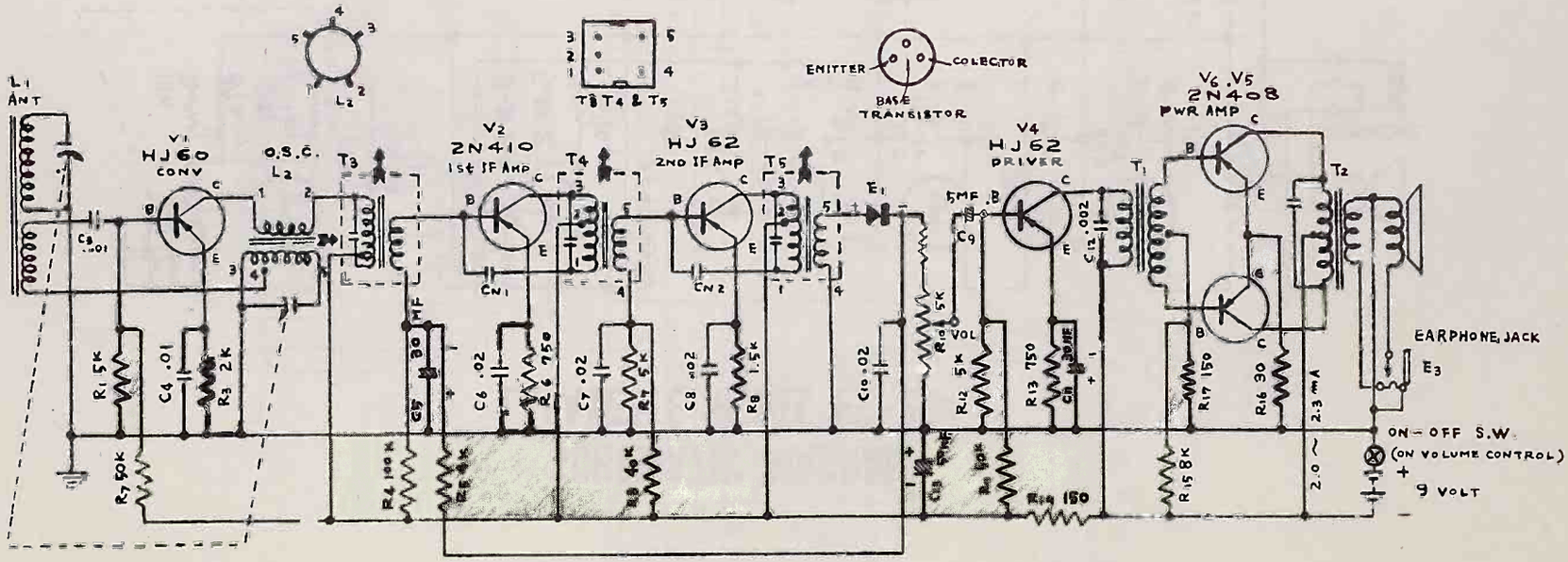


SCHEMATIC DIAGRAM
LAFAYETTE MODEL FS-204

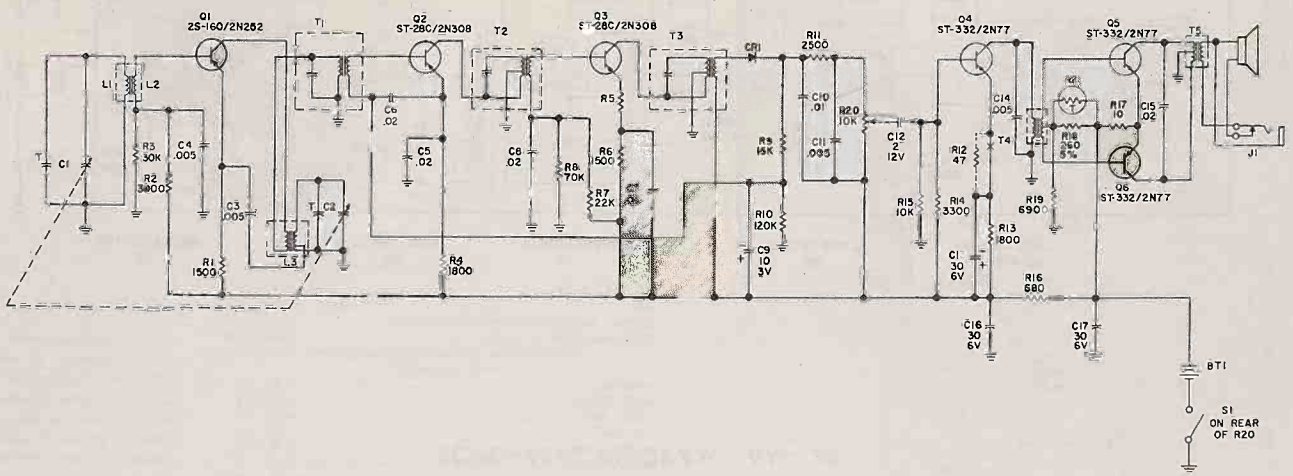


LAFAYETTE RADIO MODEL FS-206

SCHEMATIC DIAGRAM

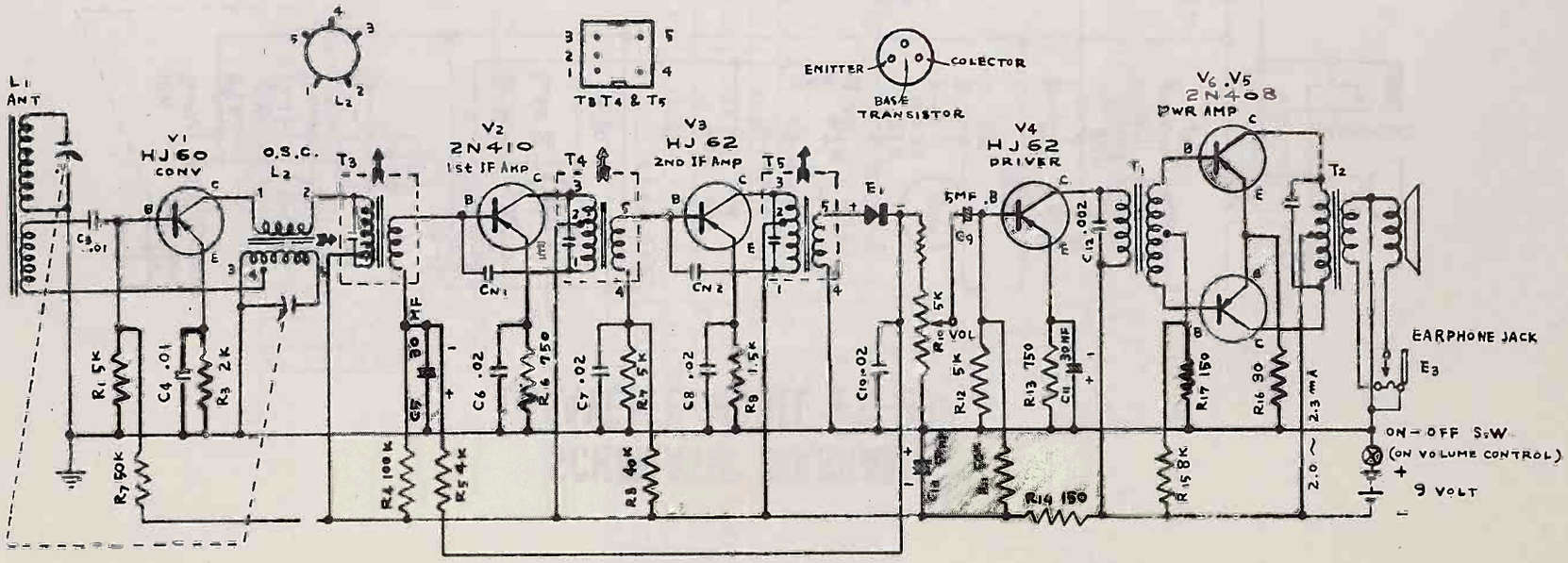


SCHEMATIC DIAGRAM AM-22

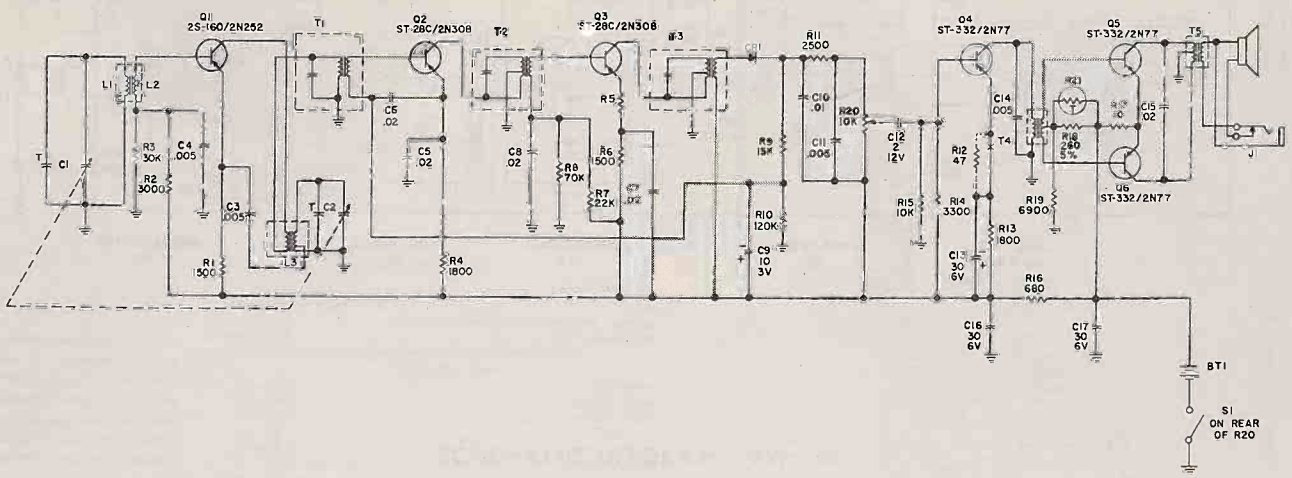


LAFAYETTE RADIO MODEL FS-206

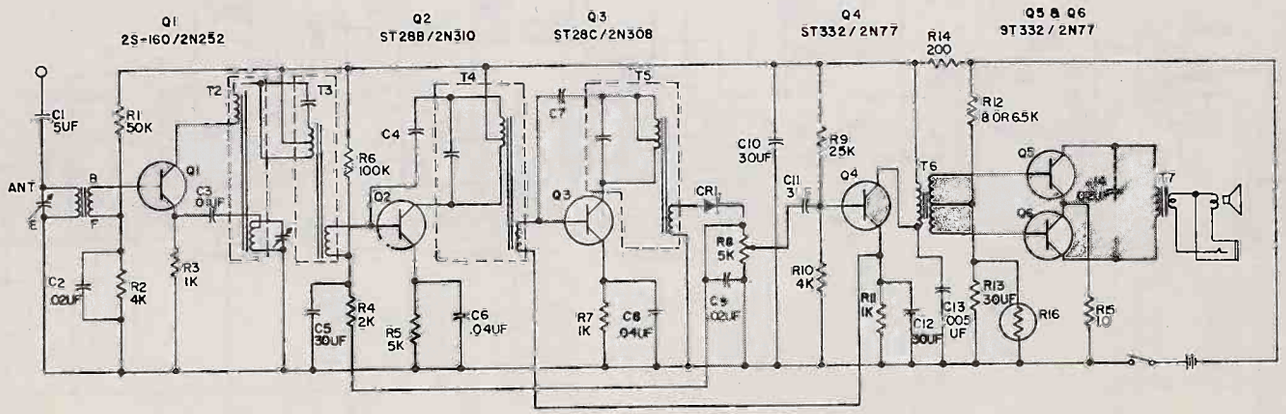
SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM AM-22



SCHEMATIC DIAGRAM AM-23



SERVICE MANUAL

AND REPAIR PARTS

FOR REPAIR SERVICE DEPARTMENT

MANUAL 610A

Airline

SEVEN TRANSISTOR RADIO

MODEL GTM 1201A

Form No. 62Z-5228B*

MODEL GTM 1201A GRAY AND WHITE

GENERAL DESCRIPTION

This Airline transistor radio is a seven transistor portable broadcast superheterodyne receiver. It incorporates new circuitry not previously used in Montgomery Ward radios including a transformerless audio output circuit and an improved transistor detector circuit having amplified AGC and DC coupling to the Audio Driver stage. These new circuits provide improved fidelity, less distortion and more uniform operation.

Continued

ELECTRICAL SPECIFICATIONS

Frequency range	540 to 1600 KC
Intermediate Frequency	455 KC
Sensitivity	125uv per meter, 50mw output approx.
Selectivity	8 KC at 6db bandwidth
Transistor Complement (see chart on schematic for alternate types)	
1 – 3435	Converter
1 – 3434	1st IF Amp.
1 – 3434	2nd IF Amp.
1 – 3504	Detector
1 – 3504	Audio Driver
2 – 3500 (Matched Pair)	Audio Output
Power Output	
Undistorted	0.090 Watts
Maximum	0.150 Watts
Loudspeaker	3½" PM
Voice Coil Impedance	45 ohms
Power Supply	

Zinc Carbon Batteries	*Mercury Batteries*
Wards #67	Wards #100
Eveready 915 or 1015	Mallory ZM-9
Burgess Z	Eveready E9

Average current Drain (no signal)	8.5ma.
Approximate Battery Life	100 hours

MONTGOMERY WARD

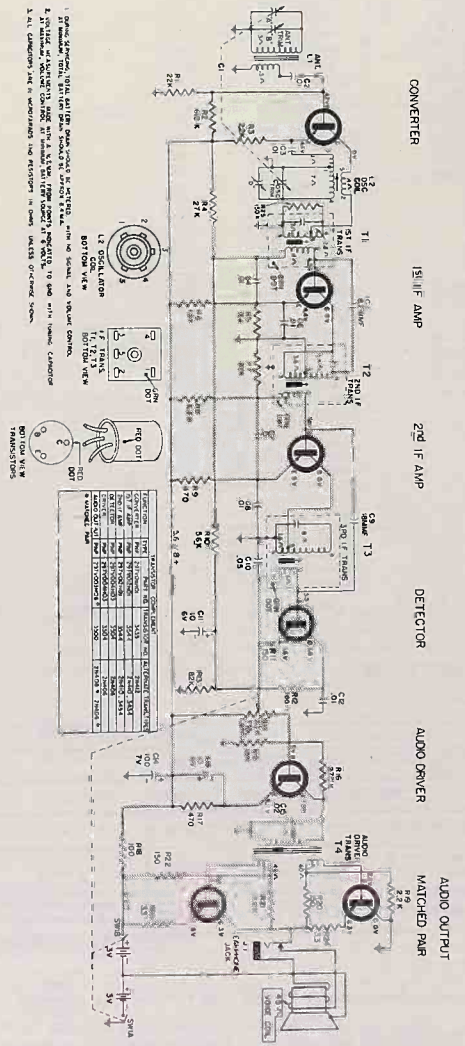


Figure 2 – Schematic Diagram.

BATTERY INFORMATION

This receiver can use either four 1½ volt flash-light or mercury type batteries. The Mercury batteries give much longer battery life and are placed in the holder with buttons in opposite direction to those of flashlight type batteries. It is important that batteries be in holder correctly before turning radio on. Refer to label on battery holder for correct battery installation.

CHASSIS REMOVAL

1. Remove the tuning knob as follows. Insert a loop of string (see figure 1) under the tuning knob and pull the knob up and out of the cabinet front.
2. Remove the back of the cabinet by loosening the two coin-slot screws on the back.
3. Remove the two 1" long hex head screws securing the chassis to the cabinet front.
4. Remove the printed circuit chassis, battery case, speaker spacers, rubber grommet and speaker.
5. To insert the printed circuit chassis back into the cabinet use the reverse procedure. *The tuning knob and cabinet back screws must be the same or identical to the original dimensions to prevent possible damage to the tuning gang.*

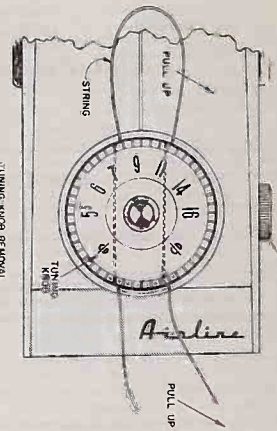


Figure 1 – Tuning knob removal.

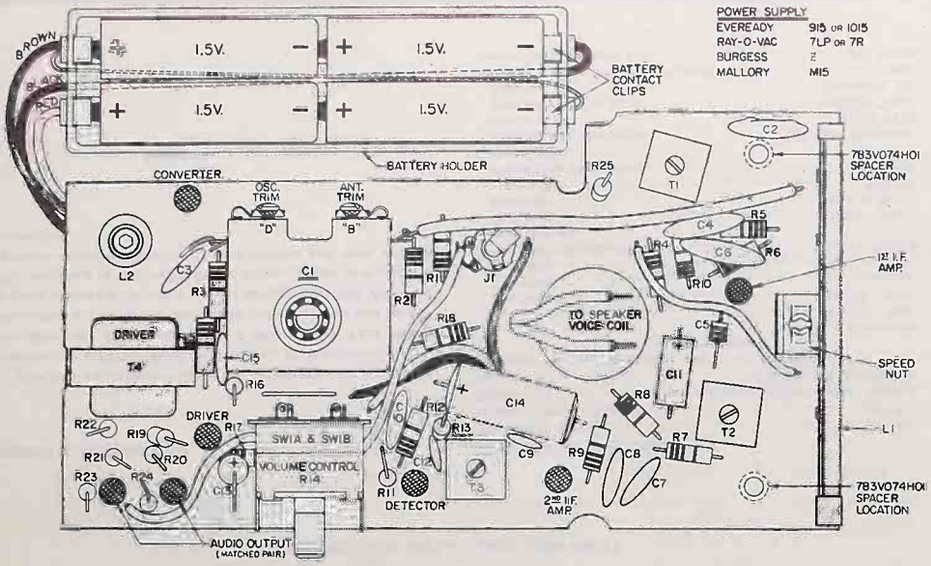


Figure 3 – Top view of chassis.

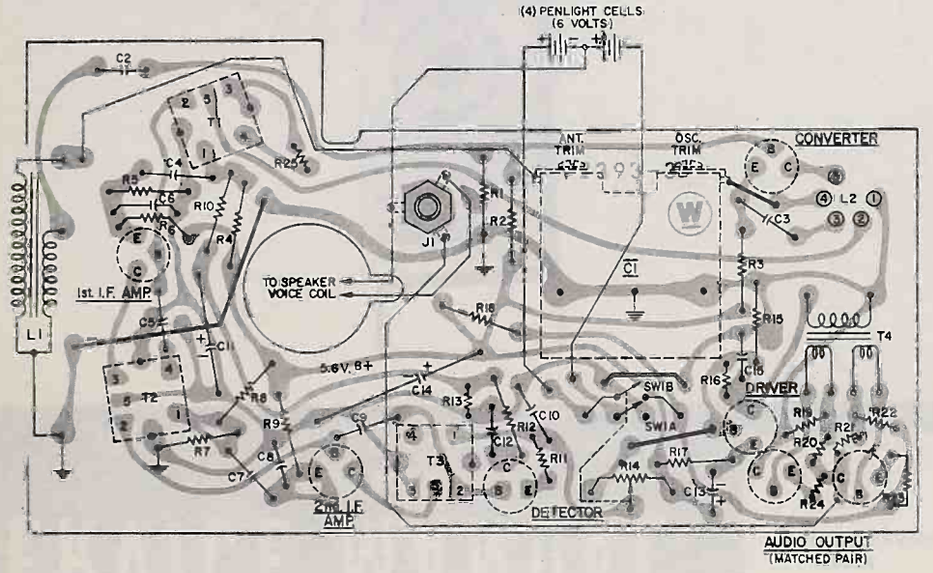


Figure 4 – Bottom view of printed circuit chassis with components shown as electrical symbols.

ALIGNMENT REQUIREMENTS

Signal Generator – Use generator providing modulated 455KC and AM broadcast frequencies. Connect a 4 or 5 turn loop of wire across output cable. Keep output of generator low enough to just give an indication on VTVM or output meter. Keep volume control at maximum to avoid AVC action.

Indicator – Connect VTVM or output meter across voice coil.

Receiver – Set volume control to maximum. Be sure during RF alignment that the hand or any metal objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.

Alignment Tool – Use a fiber aligning tool that snugly fits the slot in the ferrite core to prevent chipping of the slot.

ALIGNMENT PROCEDURE

Step	Loosely couple modulated signal to:	Generator frequency	C1 setting	Adjust for maximum:
1	Loop L1	455KC	maximum	T3, T2 and T1 in order indicated for max. output: (Reduce generator output if necessary for T2 and T1 adjustments.)
2	"	1625KC	minimum	Oscillator trimmer "D"
3	"	1400KC	1400KC	RF trimmer "B"
4	"	600KC	600KC	Oscillator coil, L2, if necessary
5	Repeat steps 2, 3 & 4			

PARTS LIST

CAPACITORS

Ref. No.	Part Number	Description
C1	330V020H02	Variable gang condenser
C2		.01 mf, 500V., ceramic
C3		.01 mf, 500V., ceramic
C4		.01 mf, 500V., ceramic
C5	217V018A29	8.2 mmf, 500V., fixed comp.
C6		.01 mf, 500V., ceramic
C7		.01 mf, 500V., ceramic
C8		.01 mf, 500V., ceramic
C9		18 mmf, 500V., ceramic
C10		.05 mf, 500V., ceramic
C11	218V012H18	10 mf, 6V., electrolytic
C12		.01 mf, 500V., ceramic
C13	218V012H18	10 mf, 6V., electrolytic
C14	218V013H15	100 mf, 7V., electrolytic
C15		.02 mf, 500V., ceramic

RESISTORS

Ref. No.	Part Number	Ohms	Watts
R1		22K	0.5 Carbon
R2		6.8K	0.5 Carbon
R3		2.2K	0.5 Carbon
R4		27K	0.5 Carbon
R5		15K	0.5 Carbon
R6		1.5K	0.5 Carbon
R7		39K	0.5 Carbon
R8		6.8K	0.5 Carbon
R9		470	0.5 Carbon
R10		56K	0.5 Carbon
R11		150	0.5 Carbon
R12		100	0.5 Carbon
R13		8.2K	0.5 Carbon
R14	270V068H01	2.5K	Volume control (inc. SW1A & SW1B)
R15		18K	0.5 Carbon
R16		270K	0.5 Carbon
R17		470	0.5 Carbon
R18		100	0.5 Carbon
R19		2.2K	0.5 Carbon
R20		150	0.5 Carbon
R21		2.2K	0.5 Carbon
R22		150	0.5 Carbon
R23	259V003H27	3.3	0.5 Carbon
R24	259V003H27	3.3	0.5 Carbon
R25		150K	0.5 Carbon

TRANSFORMERS AND COILS

Ref. No.	Part Number	Description
L1	310V029H01	Loop antenna, iron core
L2	230V057H01	Coil, oscillator
T1	235V047H03	Transformer, 1st IF
T2	235V047H01	Transformer, 2nd IF
T3	235V047H02	Transformer, 3rd IF
T4	430V076H01	Transformer, audio driver

TRANSISTORS

Part Number	Description
297V011H01	3435 Transistor-converter
297V012H01	3434 Transistor-1st IF
297V012H01	3434 Transistor-2nd IF
297V004H02	3504 Transistor-detector
297V004H03	3504 Transistor-audio driver
297V003H06	3500 Transistor-audio output (matched pair)

MISCELLANEOUS

Part Number	Description
770V608H01	Bracket, handle mtg.
513V024H02	Cabinet, back
513V045H01	Cabinet, front (inc. Escutcheon & Grille)
770V516H01	Clip, battery contact
555V042H01	Escutcheon
555V043H01	Grille
558V151H01	Handle
781V186H01	Holder, battery
558V231H01	Insignia
754V008H01	Jack, J1 earphone
550V080H04	Knob, tuning
559V052H01	Knob, assy., volume, on-off (includes compression ring)
761V812H01	Screw, cabinet back to front
570V062H01	Speaker

NOTE: USE UNIVERSAL PARTS WHERE PART NUMBERS ARE NOT LISTED. ORDER FROM (LRS).

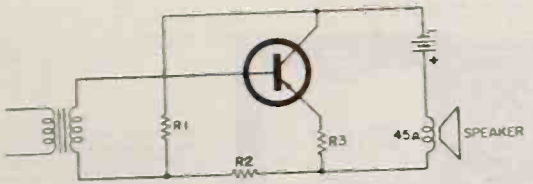


Figure 5 – A Class A, common emitter transformerless power amplifier.

AUDIO OUTPUT CIRCUIT

The use of an audio output transformer has been so traditional in audio output stages, that it is a little hard to conceive how a radio can operate without one. Transformerless audio output circuitry using vacuum tubes presents many problems. However, the transistor, being basically a current device rather than a voltage device (as the vacuum tube), lends itself very nicely to the development of a transformerless power amplifier. The transformerless circuit offers the prime advantage of low inherent audio distortion.

A single ended transformerless circuit is shown in figure 5. This circuit is a simple common emitter, Class A power amplifier. The speaker voice coil is the collector load. The transistor works directly into the low impedance of the speaker.

The low base-to-emitter current, in the transistor, controls the high collector-to-emitter current, which flows through the speaker voice coil. The transistor is biased in a forward direction (emitter more positive than base) so that it will conduct during the entire signal (Class A operation). The base-to-emitter bias is created by the current flowing from the negative side through resistors R1 and R2, through the speaker voice coil to the positive side of the battery.

Figure 6 is a variation of the circuit shown in figure 5. Here the low signal current flowing between base and collector controls the high current between collector and emitter. The speaker has been moved to the collector side of the battery.

The circuit used in the new Airline transistor radio is shown in figure 7. The circuits used in figures 5 and 6 have been combined to increase the circuit power output and efficiency. The transistors are now operating in push-pull with each conducting for approximately 60% of each cycle (Class AB). The operation of each transistor is similar to that of the circuits shown in figures 5 and 6 over the portion of the cycle that it is conducting.

Both transistors are biased close to cutoff; so that with no AC signal received, both are effectively not conducting. Out of phase audio signals are fed to the base of each transistor from the secondaries of the audio driver transformer (T4). Each transistor now conducts on alternate half cycles of the incoming signal. The collector-to-emitter AC currents of each transistor alternately flow through the speaker voice coil.

The base and emitter bias of transistor X1 is developed from current flow up from ground, through R18, R19 and the speaker voice coil to the positive side of the first battery. The base-to-emitter bias for transistor X2 is developed by current flow from the negative side of the second battery, through the speaker voice coil, resistors R21 and R22 to the positive side of the battery. A slight amount of forward bias is used to prevent crossover distortion and yet provide the efficiency of a Class B circuit. Notice that no capacitors are used, making trouble-shooting easier.

Resistors R20 and R23 provide the necessary DC stabilization. Their values were chosen to establish the transistor's DC operating point in such a way that it is less dependent on individual transistor characteristics and to changes due to fluctuations in ambient temperature or in junction temperature.

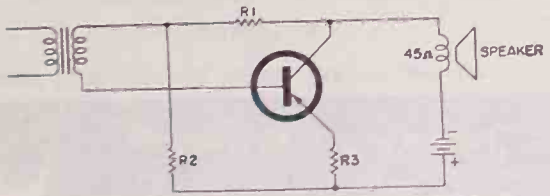


Figure 6 – A variation of the circuit shown in Figure 5.

DETECTOR & AUDIO DRIVER

The emitter of the detector transistor is DC coupled (no coupling capacitor) to the base of the audio driver transistor. In a conventional transistor detector circuit, DC conditions usually require a blocking capacitor. The circuit shown in figure 8 eliminates the need for this capacitor by locating the audio load in the emitter circuit.

The base-to-emitter bias of the detector transistor is set to hold the transistor near cutoff. The base-to-emitter circuit thus acts as a diode, rectifying the IF signal (signal detection). A DC voltage, proportional to the IF signal, appears across R13 and is used for AGC. The positive voltage appearing across R13 is filtered by C11 and coupled to the base of the 1st IF amplifier through R10. This positive voltage on the base of the 1st IF amplifier transistor causes it to be biased in a less forward direction, lowering the stage gain and preventing signal overload with increasing signal strength.

The volume control, R14, is the audio load for the detector circuit. The audio signal developed across the volume control also appears at the base of the audio driver transistor.

The base bias for the audio driver is established by current flowing up from ground through resistors R15, R14 and the B+ dropping resistor, to the positive side of the battery power supply.

Resistor R14 provides a negative feedback path that reduces audio distortion and extends frequency response. Resistor R17, the emitter resistor, develops a DC stabilizing voltage to provide the circuit with a very high degree of circuit stability. Capacitor C13 prevents signal degeneration and loss of gain across resistor R17.

SERVICING TIPS

The high impedance type speaker used in this receiver can be easily checked by connecting the output of an audio signal generator directly across the speaker voice coil. A properly operating speaker will yield a moderately loud and clean note.

The detector, audio driver and audio output stages can be checked for proper operation in the same manner as previous Airline transistor radio receivers. An audio generator signal can be injected, through a .05mf capacitor, at the base and collector of each transistor. An increase in volume from the speaker should be apparent as more and more stages are placed between the injection point and the loudspeaker. If the speaker volume drops or disappears then the circuit defect is located between this point and the last signal injection point, starting at the speaker.

The detector and IF stages should be signal traced using an IF signal (30-60% modulation).

Audio distortion can occur in the audio output circuit if the transistors are not matched. Matched transistors will provide equal current gain over a wide range of signal levels. Mismatched transistors will cause distortion.

A quick and fairly reliable check of the transistors matched characteristics can be performed as follows. Feed in an audio signal at the volume control. Increase the audio signal to a point just short of overload. Using a VTVM, set to the 1.5V scale, measure the voltage drop across the emitter resistor (3.3 ohms) of each output transistor. Matched transistors will both produce the same value. Unmatched transistors will give different values. The difference between readings indicates the amount of mismatch.

A more accurate method of detecting mismatch is to place an oscilloscope across the speaker voice coil and observe the signal. As the volume control is increased, clipping will occur at both the top and bottom of the signal (matched transistors). If clipping occurs first on one peak and then to a lesser degree on the other peak, as the volume control is increased, the transistors are not matched. These procedures can also be used to match up several known good output transistors that may have been left over from previous repair jobs.

Some of the audio output transistors used in this receiver are color coded as to their characteristics. Red, green, white and black color dots, on the top of the transistor case, identify the transistor as to its current characteristics. The matched pair of output transistors should therefore have identical color dots on their cases. Transistors not using the colored dot system are identified by pairing up units with the same type number.

Distortion level can be checked using the following procedure. Inject an audio signal at the volume control and connect the oscilloscope across the voice coil as before. Adjust the volume control to the point where the distortion of the signal just becomes apparent. With a VTVM (set to measure AC voltage) measure the voltage developed across the speaker voice coil. This voltage multiplied by itself and divided by 45 (the voice coil impedance) will give you the undistorted power output. This should be just over 100mw in a normally operating receiver. The maximum power output should be approximately 150 to 170mw (depending on input signal level).

The most common cause of a high distortion level is weak batteries. This easily overlooked point should be checked before starting any troubleshooting of the receiver.

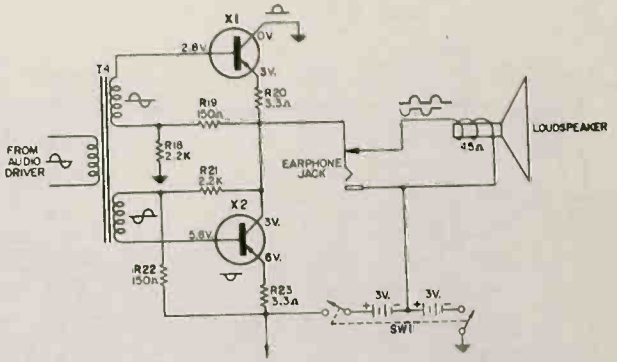


Figure 7 – The push-pull transformerless audio output circuit.

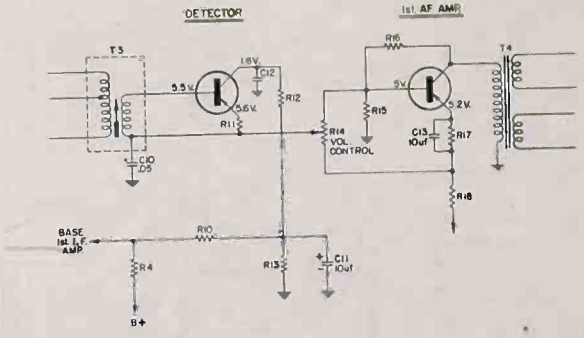


Figure 8 – The detector-audio driver circuit. The amplified AGC voltage is developed at the collector of the detector transistor.

MOTOROLA Service Manual

HOME RADIO
SUPPLEMENT NO. 1

MODELS	CHASSIS
X12 Series	HS-732
X12A-1	HS-789
X12E-1	HS-789

POWER EIGHT SERIES

SUPPLEMENT TO X12 SERVICE MANUAL PART NO. 68P644480

GENERAL INFORMATION

This supplement covers Model X12 Series production changes and releases information for Model X12-1 Series which is the same as Model X12 Series except essentially for the speaker and output stage circuitry. This supplement contains all necessary unique information for Model X12-1 series (Transistor Complement, Plated Chassis Board Wiring Diagram, Schematic Diagram, Chassis Parts Location Photograph and Replacement Parts List). For all other service information (alignment, etc.,) refer to the X12 Series Service Manual, Motorola Part No. 68P644480.

Chassis HS-789-1 and HS-789-2 (X12-1 Series) differ from each other in the transistor types used-see X12-1 Transistor Complement.

For Model X12-1 battery drain information, see X12-1 Service Notes.

X12 PRODUCTION CHANGES

Chassis Coding	Changes
HS-732-1A & 732-2A	Original chassis
HS-732-1B & 732-2B	TO IMPROVE TONE QUALITY AT HIGH VOLUME SETTINGS - R-19 (2.2K) changed to 820 ohms*
HS-732-1C & 732-2C	TO IMPROVE TONE QUALITY - C-10 (.1 mf) changed to .15 mf*

*See X12 Supplementary Replacement Parts List for Motorola Part Numbers

X12-1 SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

The output stage of this receiver functions in a manner similar to one used in the Motorola 7X25 Series. For a more detailed description of this circuit, refer to the 7X25 Series Service Manual, Motorola Part No. 68P644007.

BATTERY DRAIN

10-12 ma (max) with no input signal.

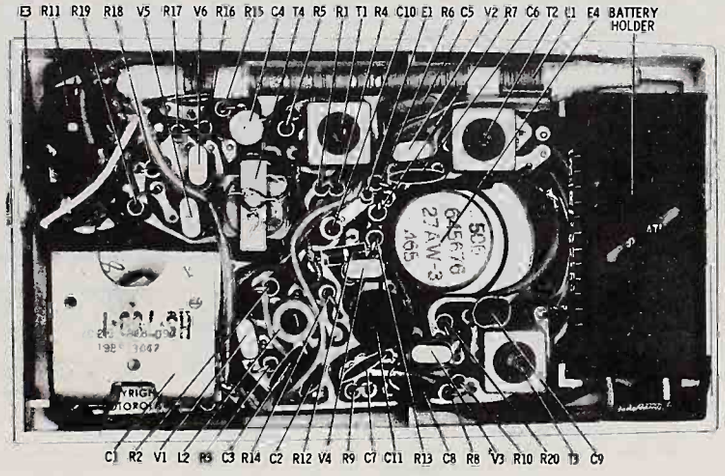
NOTE: Due to the type of circuitry involved, there are two separate battery current paths, therefore, a DPST on-off switch is used. This necessitates two current measurements.

A very simple, convenient method of measuring battery drain can be made without unsoldering any connections. The only items necessary are a low resistance DC milliammeter and a jumper wire or two milliammeters. With the receiver turned off, place a milliammeter across the open terminals of one section of the switch and the jumper across the other section of the switch; the receiver is automatically turned on at the minimum volume level. The meter should read 10-12 ma; then interchange jumper wire and milliammeter connections, the meter should read 10-12 ma. If two milliammeters are available, place one across each section of the switch, each meter should read 10-12 ma.

X12-1 TRANSISTOR COMPLEMENT

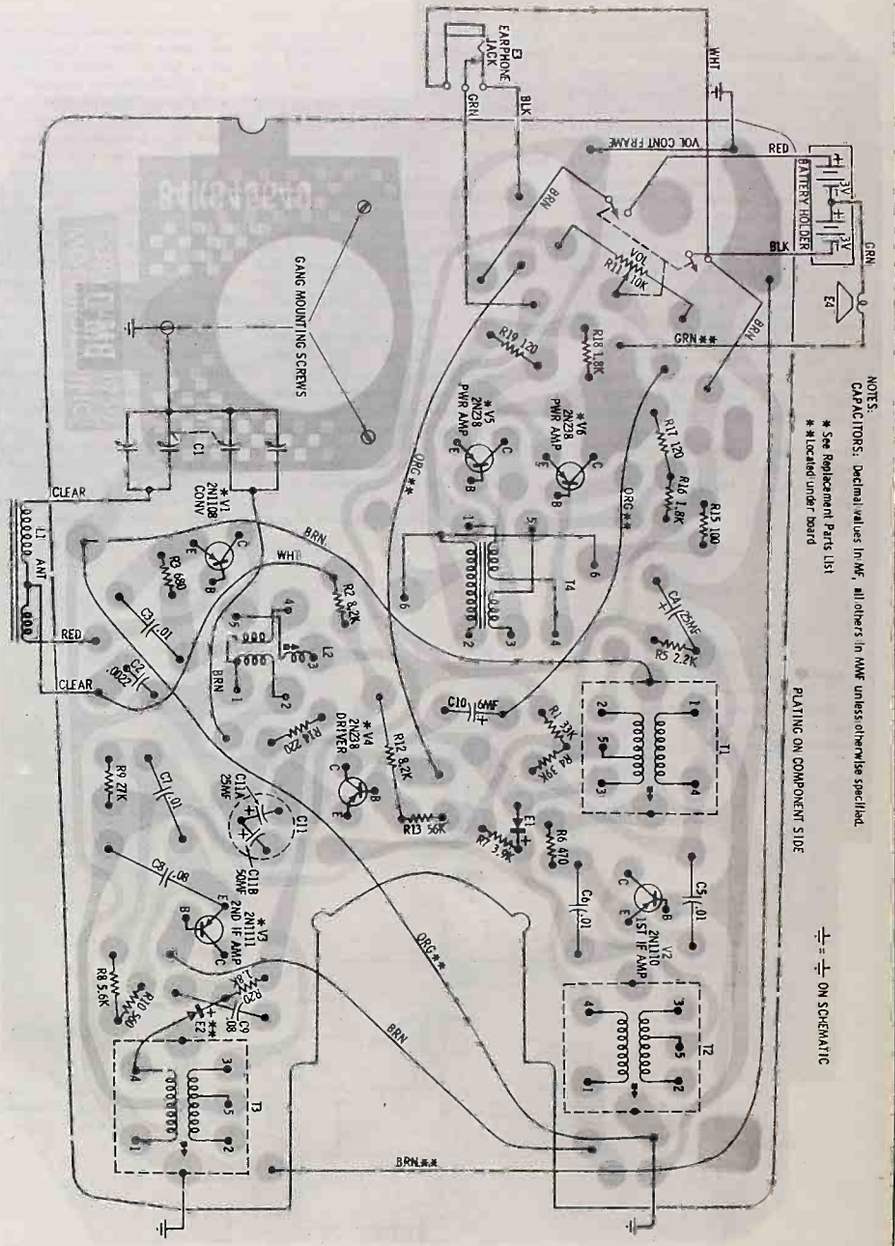
Same as Model X12 except for chassis designation - see General Information. (Note: Replace with same type originally used in set)

Ref. No.	Type (Chassis HS-789-1)	Type (Chassis HS-789-2)	Function
V-1	2N1108	2N1108 (coded red)	Converter
V-2	2N1110	2N1110	1st IF amp
V-3	2N1111	2N1111 (coded red)	2nd IF amp
V-4	2N238(D)	2N238(F)	Driver
V-5,6	2N238(E)	2N238(F)	Power amp



HS-789 PARTS LOCATION

HS-789 PLATED CHASSIS BOARD WIRING AS VIEWED FROM TOP (COMPONENT SIDE)



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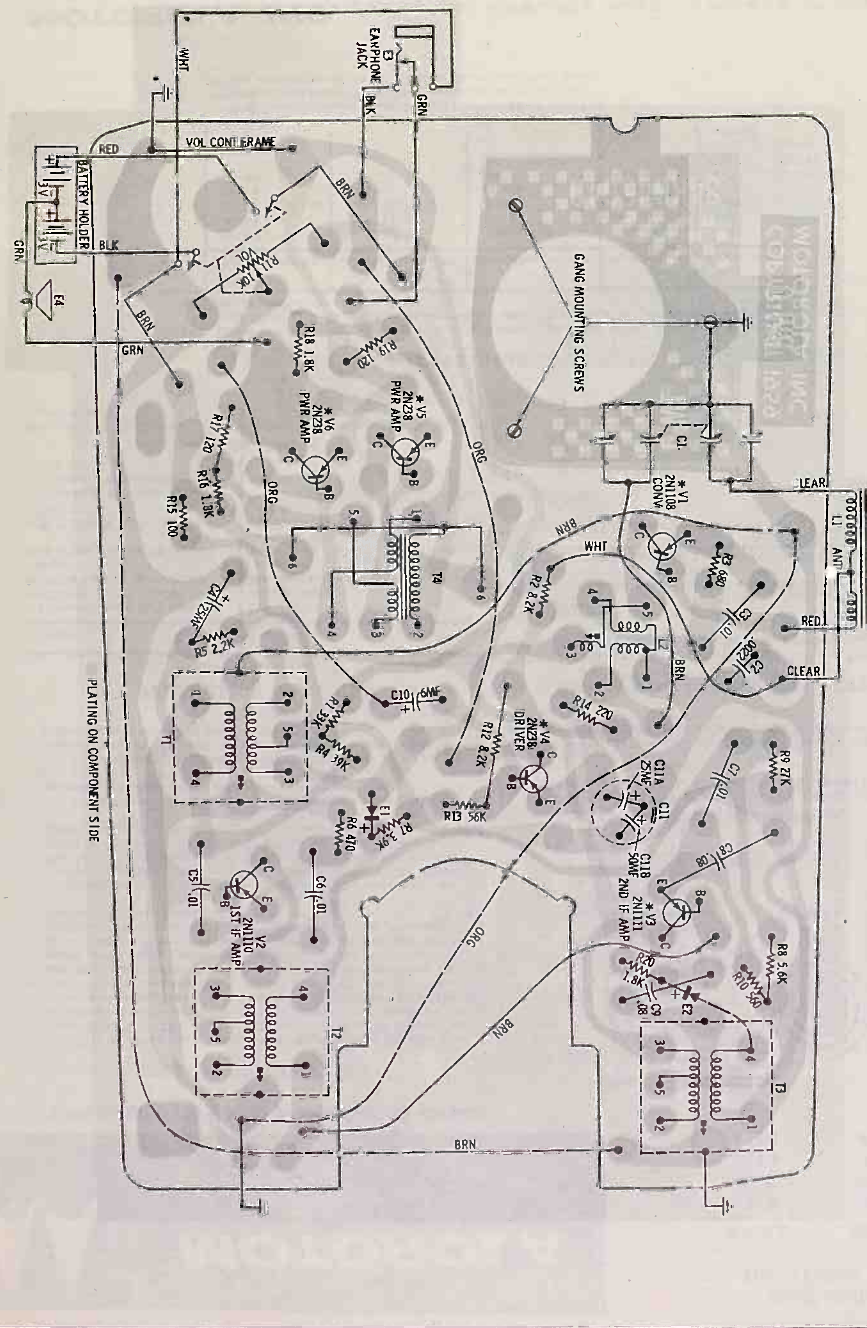
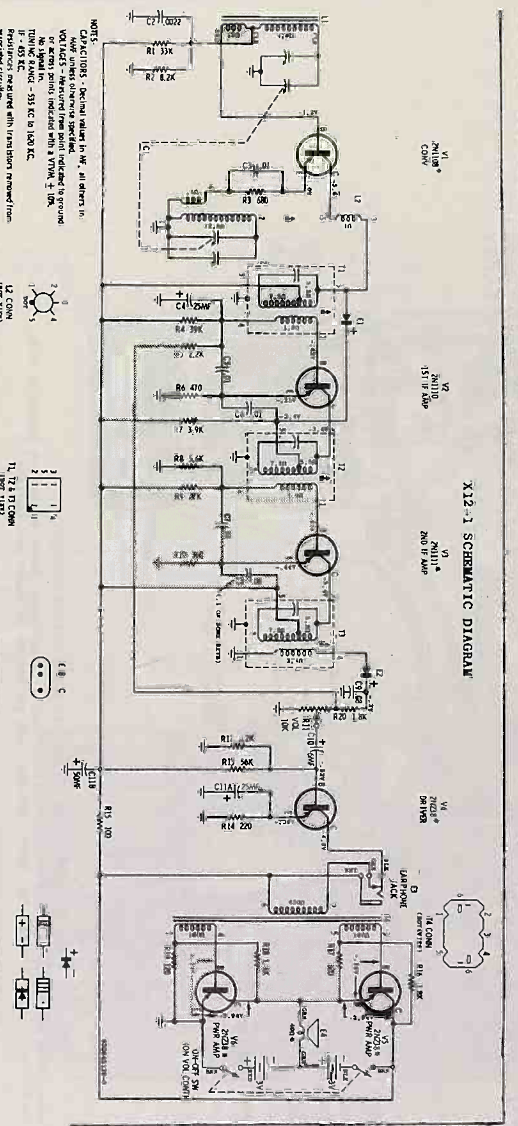


HS-789 PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM (COMPONENTS SHOWN ARE ON OPPOSITE SIDE)



X12-1 SCHEMATIC DIAGRAM

NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to ground or across points indicated with a VTVM, ± 10%. No signal in.
TUNING RANGE - 535 KC to 1620 KC.
IF - 455 KC.
Resistances measured with transistors removed from associated circuitry.
* See Replacement Parts List

REPLACEMENT PARTS LIST

Ref. No.	Part Number	Description

X12 SUPPLEMENTARY REPLACEMENT PARTS (SEE PRODUCTION CHANGES)

Ref. No.	Part Number	Description
C-10	*21K645609	Capacitor, cer disc: .15 mf 50V
R-19	6K121302	Resistor, carbon: 820 10% 1/2W

X12-1 REPLACEMENT PARTS LIST

ELECTRICAL PARTS

Ref. No.	Part Number	Description
C-1	19B643442	Capacitor, variable: 2 gang
C-2	21B129499	Capacitor, cer disc: .0022 mf 50V
C-3	21K128284	Capacitor, cer disc: .01 mf 500V
C-4	23K637758	Capacitor, electrolytic: 25 mf 3V
C-5	21K128284	Capacitor, cer disc: .01 mf 500V
C-6	21K128284	Capacitor, cer disc: .01 mf 500V
C-7	21K128284	Capacitor, cer disc: .01 mf 500V
C-8	*8R129204	Capacitor, mylar: .08 mf 50V (some sets used .1 mf here; when replacing, use the .08 mf listed)
C-9	8R129204	Capacitor, mylar: .08 mf 50V
C-10	23K642111	Capacitor, electrolytic: 6 mf 10V
C-11	23B639817	Capacitor, electrolytic: 25-50 mf/10V
E-1	48K640754	Crystal Diode
E-2	48K640754	Crystal Diode
E-3	9K643713	Jack, earphone
E-4	*50B645676	Speaker, PM: 2-3/4"; 40Ω VC
L-1	24K643975	Ferrite Ant
L-2	24K643917	Coil, osc

Resistors - Note: All resistors are insulated carbon type unless otherwise specified.

Ref. No.	Part Number	Description
R-1	6K127632	33,000 10% 1/2W
R-2	6K119931	8200 10% 1/2W
R-3	6R6040	680 10% 1/2W
R-4	6K125535	39,000 10% 1/2W
R-5	6R6069	2200 10% 1/2W
R-6	6K127633	470 10% 1/2W
R-7	6K121931	3900 10% 1/2W
R-8	6K127005	5600 10% 1/2W
R-9	6K121300	27,000 10% 1/2W
R-10	6K122802	560 10% 1/2W
R-11	*18B645670	Vol Cont & Switch: 10,000
R-12	6K119931	8200 10% 1/2W
R-13	6K127541	56,000 10% 1/2W
R-14	6K127099	220 10% 1/2W
R-15	6R6326	100 10% 1/2W
R-16	6K122445	1800 10% 1/2W
R-17	6K128226	120 10% 1/2W
R-18	6K122445	1800 10% 1/2W
R-19	6K128226	120 10% 1/2W
R-20	6K122445	1800 10% 1/2W
T-1	24C643727	Transformer, 1st IF: 455 Kc
T-2	24C643727	Transformer, 2nd IF: 455 Kc
T-3	24K643729	Transformer, 3rd IF: 455 Kc
T-4	*25B645617	Transformer, driver
V-1	48A124347	Transistor, type 2N1108: PNP (converter HS-789-1)
	48A124348	Transistor, type 2N1108 (coded red): PNP (converter - HS-789-2)
V-2	48A124350	Transistor, type 2N1110: PNP (1st IF -HS-789-1 & HS-789-2)
V-3	48A124351	Transistor, type 2N1111: PNP (2nd IF -HS-789-1)
	48A124352	Transistor, type 2N1111 (coded red): PNP (2nd IF - HS-789-2)
V-4	48A124353	Transistor, type 2N238(D): PNP (driver -HS-789-1)
	48A124354	Transistor, type 2N238(F): PNP (driver -HS-789-2)
V-5	48A124355	Transistor, type 2N238(E): PNP (pwr amp - HS-789-1)
	48A124354	Transistor, type 2N238(F): PNP (pwr amp - HS-789-2)
V-6	48A124355	Transistor, type 2N238(E): PNP (pwr amp - HS-789-1)
	48A124354	Transistor, type 2N238(F): PNP (pwr amp - HS-789-2)

MECHANICAL PARTS

Ref. No.	Part Number	Description
	42B643441	Battery Holder: less battery contacts & eyelet
	5K129601	Eyelet, battery contact
	*84K645640	Board, plated chassis: less all components
Note:		When ordering, specify part number (and letter - if any) found on original board, and mention model number of this set. If part number is different from that found in this parts list, order by complete part number found on board and mention model number of this set.
	3S129500	Screw, machine: 4-40 x 5/32 (C-1 mtg)
	9K642734	Socket, transistor
	*1V645689	Spring, battery contact (type with curve bend and rivet contact - 1 used)
	1V644557	Spring, battery contact (type with right angle bend & rivet contact - 2 used)
	41A643724	Spring, battery contact (type without rivet contact - 1 used)

CABINET PARTS

Ref. No.	Part Number	Description
	*1V645691	Cabinet Back: gray (X12A-1)
	*1V645692	Cabinet Back: smoke (X12E-1)
	*1V645693	Cabinet Front: gray; incl medallion (X12A-1)
	*1V645694	Cabinet Front: smoke; incl medallion (X12E-1)
	1V644554	Escutcheon: incl tuning lens
	36C643395	Knob, tuning
	36B643396	Knob, volume
		Lens, tuning (dial window-part of escutcheon)
	13B643394	Medallion, nameplate (use 11M128076 adhesive)
	2A640134	Nut, nickel: 1/4-32 (jack mtg)
	3S121231	Screw, machine: 4-40 x 3/16 (spkr mtg)
	4S7618	Washer, flat: 1/2 (jack mtg)

LIMITED REPLACEMENT PARTS

Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.

Ref. No.	Part Number	Description
	11M128076	Adhesive, medallion (2 oz. jar)
	*35B645675	Baffle, speaker
	*7K645780	Bracket, speaker mtg

*New Item, Appears in any List for First Time

MOTOROLA Service Manual

HOME RADIO
SUPPLEMENT NO. 1

MODEL	CHASSIS
X11B	HS-759
X11E	HS-759
X11G	HS-759
X11R	HS-759

SUPPLEMENT TO X11 SERVICE MANUAL PART NO. 68P644481

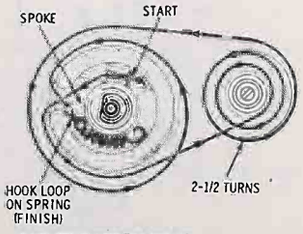
GENERAL INFORMATION

This supplement covers revisions affecting the X11 series of radios. The major revision is a physical relocation of some chassis components (see Alternate Chassis Parts Location Photograph); the Alignment Procedure and Alignment Points Location detail shown in the X11 Service Manual (Motorola Part No. 68P644481) are unaffected by this parts relocation - only the location of the oscillator coil (L-2) changes (see Alternate Chassis Parts Location Photograph). Other revisions are covered in the Production Change section of this supplement.

Along with the revisions is included the necessary associated material affected by these changes: an Alternate Printed Circuit Board Wiring Diagram, an Alternate Schematic Diagram, an Alternate Chassis Parts Location Photograph, and a Supplementary Replacement Parts List.

To aid servicing, additional troubleshooting hints are included - see Supplementary Service Notes

The Revised Dial Stringing Detail replaces Restringing Detail found in original manual and is to be used when restringing any model in this series.



REVISED DIAL STRINGING DETAIL
(Replaces Dial Stringing Detail found in X11 Service Manual - See General Information)

For all other service information, refer to the X11 Series Service Manual (Motorola Part No. 68P644481).

PRODUCTION CHANGES

Electrical Changes

Change	Reason
C5 from 5 mmf to 3 mmf	To revise IF response
R10 from 250 Ω to 220 Ω	Design change
R17 (no longer used in all sets)	See Revised Transistor Complement
R18 from 10 Ω to 50 Ω	To adjust battery current drain at high volume settings
R19 from 7K only to 7K or 27K	See Revised Transistor Complement
V1 through V6 type nos. (alternate transistors set up)	See Revised Transistor Complement

Mechanical Changes

Revised Dial Stringing (see detail)	To improve tuning action

SUPPLEMENTARY SERVICE NOTES

TROUBLESHOOTING HINTS (continued from TROUBLESHOOTING PROCEDURE section of X11 Service Manual)

Weak Sensitivity

(1) Open by-pass capacitor C-7 or C-14

Distortion & Tendency to Regenerate on Strong Input Signal

(1) Open AVC by-pass capacitor C-4

Loss of Gain

(1) Open by-pass capacitor C-14

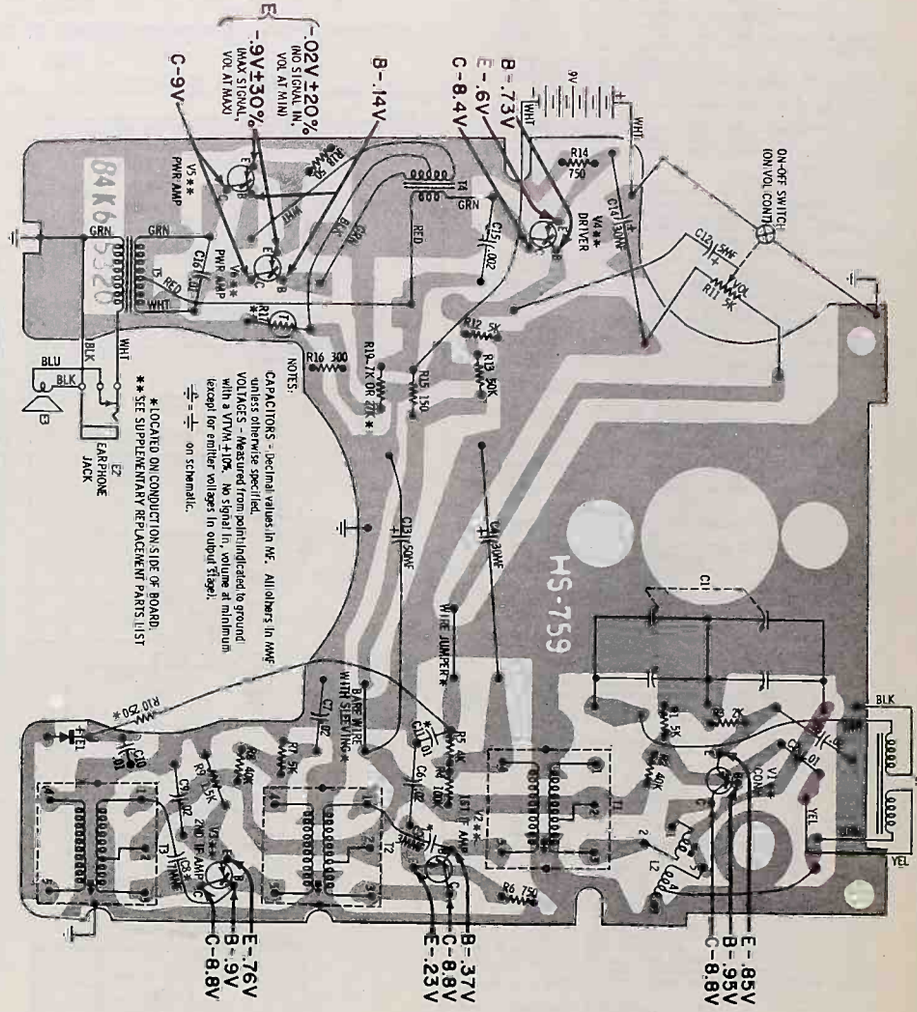
REVISED TRANSISTOR COMPLEMENT

NOTE: Three transistor type complements are used; the chart below lists the various types used along with correct replacement for each type. Circuit changes are also shown for each complement.

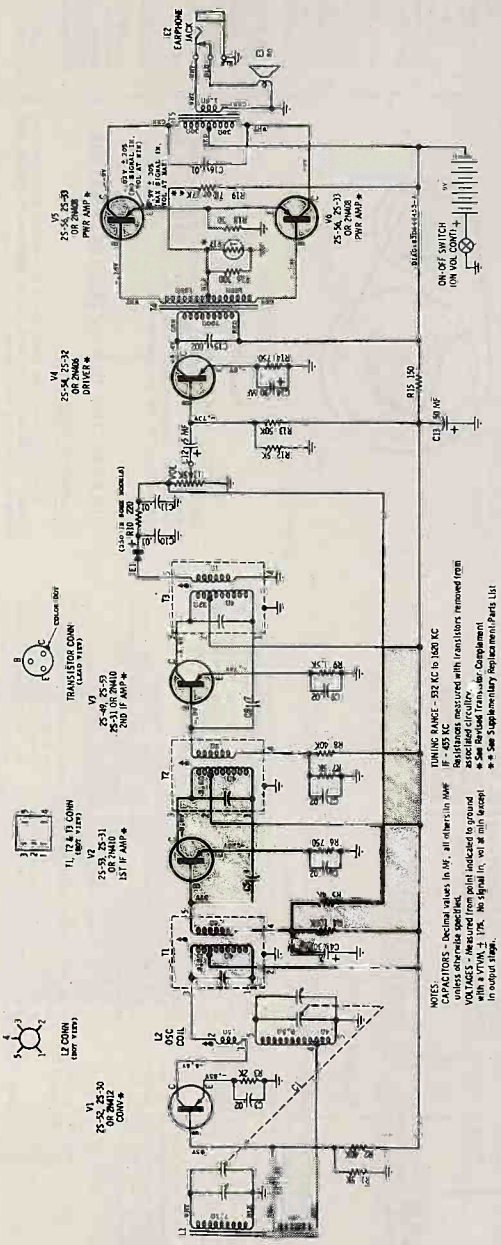
Ref. No.	Complement 1*	Complement 2*	Complement 3**	Function	Replace with***
V-1	2S-52	2S-30	2N412	Converter	2S-52
V-2	2S-53	2S-31	2N410	1st IF amp	2S-53
V-3	2S-49 or 2S-53	2S-31	2N410	2nd IF amp	2S-49
V-4	2S-54	2S-32	2N406	Driver	2S-54
V-5, 6	2S-56	2S-33	2N408	Power amp	2S-56 (replaces 2S-56 & 2S-33) 2N408 (replaces 2N408)

*With complements 1 and 2, R-17 is included, R-19 is 7K
**With complement 3, R-17 is omitted, R-19 is 27K
***See Replacement Parts List for Motorola Part Nos.

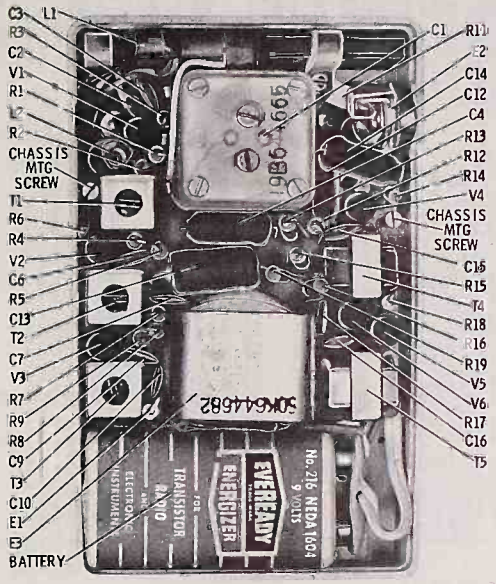
ALTERNATE PRINTED CIRCUIT BOARD WIRING DIAGRAM
(Shown from conduction side of printed circuit board. Components shown appear on opposite sides
To further aid servicing, the base, emitter, and collector voltages are included.)



CHASSIS: HS-759



ALTERNATE SCHEMATIC DIAGRAM



ALTERNATE PARTS LOCATION

SUPPLEMENTARY REPLACEMENT PARTS LIST

(SEE PRODUCTION CHANGES)

NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-5	*21K645601	Capacitor, cer disc: 3 mmf (some sets used 5 mmf; when replacing, use the 3 mmf listed)
R-10	6B127800	Resistor, carbon: 220 10% 1/4W (some sets used 250Ω; when replacing, use the 220Ω listed)
R-18	6K645513	Resistor, carbon: 50 10% 1/8W
R-19	6K644108	Resistor, carbon: 7000 10% 1/8W (in some sets)
	6K121300	Resistor, carbon: 27,000 10% 1/2W (in some sets)
V-1	48K644676	Transistor, type 2S-52: PNP (converter-also replaces type 2S-30 or 2N412 used in some sets)
V-2	48K644677	Transistor, type 2S-53: PNP (1st IF -also replaces type 2S-31, 2S-53 or 2N410 used in some sets)
V-3	*48K645867	Transistor, type 2S-49: PNP (2nd IF -also replaces type 2S-31, 2S-53 or 2N410 used in some sets)
V-4	48K644678	Transistor, type 2S-54: PNP (driver - also replaces type 2S-32 or 2N406 used in some sets)
V-5,6	48K644679	Transistor, type 2S-56: PNP (power amp -also replaces type 2S-33 used in some sets -see NOTE)
	48A124377	Transistor, type 2N408: PNP (power amp -used in some sets -see NOTE)
		NOTE: Should be replaced in matched pairs--when ordering, specify 2 of this part number
MECHANICAL PARTS		
	*84K645320	Board, printed circuit: less all components
Note:		When ordering, specify part number found on original board, and mention model number of this set. If part number is different from that found in this parts list, order by complete part number found on board and mention model number of this set.
	*43A646114	Bushing, spacer (earphone jack mtg)
	*2A646121	Nut (earphone jack mtg)

*New Item. Appears in any List for First Time

MOTOROLA Service Manual

HOME RADIO

MODEL	CHASSIS
X11B	HS-759
X11E	HS-759
X11G	HS-759
X11R	HS-759

Supersedes X11 Service Manual & Supplement Part No's 68P644481 & 68P644487

GENERAL INFORMATION

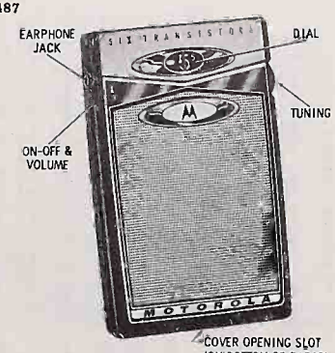
TYPE - Pocket portable superheterodyne radio using a printed circuit board, 6 transistors, 1 diode and a thermistor (in some sets). An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 16 ohm accessory earphone (Motorola Part No. 50D640709 or 50D641487) and an accessory carrying case (Motorola Part No. 15C645008) are available through Motorola Dealers or Distributors.

This manual covers two versions of the X11 series. These versions differ from each other primarily in physical location of parts and the printed circuit board.

POWER SUPPLY - Operates from one 9-volt battery; use Eveready 216 or equivalent.

Battery Drain - (see Service Notes)

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc



TRANSISTOR COMPLEMENT X11 SERIES

NOTE: Three transistor type complements are used; the chart below lists the various types used along with correct replacement for each type. Circuit changes are also shown for each complement.

Ref. No.	Complement 1*	Complement 2*	Complement 3**	Function	Replace with***
V-1	2S-52	2S-30	2N412	Converter	2S-52
V-2	2S-53	2S-31	2N410	1st IF amp	2S-53
V-3	2S-49 or 2S-53	2S-31	2N410	2nd IF amp	2S-49
V-4	2S-54	2S-32	2N406	Driver	2S-54
V-5, 6	2S-56	2S-33	2N408	Power amp	2S-56 (replaces 2S-56 & 2S-33) 2N408 (replaces 2N408)

*With complements 1 and 2, R-17 is included, R-19 is 7K
**With complement 3, R-17 is omitted, R-19 is 27K
***See Replacement Parts List for Motorola Part Nos.

SERVICE NOTES

CIRCUIT DESCRIPTION

1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are printed on one side of the chassis board, thereby replacing the usual connecting wires and making wiring more uniform.

2. Reference to the chassis photographs, printed circuit board wiring diagrams, schematic diagram and to chassis will permit the circuit to be traced easily.

NOTE: To facilitate servicing, the printed circuit board wiring diagrams are shown from the conductor side of the chassis; the components shown are actually located on the opposite side of the chassis. To further aid servicing, the base, emitter and collector voltages are included.

CHASSIS REMOVAL

1. Remove cabinet back by inserting a coin into the cover opening slot (located on bottom of radio) and twisting until cabinet back is free.

2. Remove 2 chassis mounting screws (see PARTS LOCATION photo).

3. Unscrew earphone jack mounting nut and remove spacer.
NOTE: A special tool for removing the earphone jack is available, order Motorola Part Number 66A646211.

4. Remove cardboard strip (located under battery).

5. Unsolder speaker leads.

6. Slide chassis to tuning knob side of cabinet and pull up on volume knob side.

7. When replacing chassis, make certain leads are dressed properly against chassis and are away from speaker.

COMPONENT REPLACEMENT

Component replacement for this radio is comparable to that of other transistor radios and, generally, techniques which apply to those radios are applicable to this receiver.

To facilitate replacement and to prevent damage to the printed circuit board, use a soldering iron of 35 watts or less; since some adjacent areas on the printed circuit board are physically close to each other, the diameter of the soldering iron tip should be 3/16" or less to prevent solder shorts across these areas. If possible, use miniature tools (tweezers, etc.) and a soldering brush to further facilitate removal. For component replacement, use the techniques outlined below.

NOTE: Caution must be re-emphasized on use of the soldering iron with this chassis. Do not use a soldering pot to remove components.

Resistors, Transistors and Capacitors - In assembly, the ends of the leads are bent over and placed against the conduction side of the printed board, then soldered; therefore, before attempting to remove these components, first unsolder the leads, while simultaneously straightening the ends of the leads.

Transformers - The driver and output stage transformers can be easily removed by first unsoldering all transformer leads, then unsoldering and straightening the mounting tabs prior to transformer removal. The IF transformers should first have their mounting tabs unsoldered. Then apply heat to the inner connecting lugs by "straddling" the iron across adjacent lugs while loosening the transformer (use caution with the soldering iron to prevent damage).

Oscillator Coil - Unsolder each lug using the same method outlined under Resistor, Transistor and Capacitor Replacement, then remove coil. When replacing, make certain the coil is seated flush against the chassis.

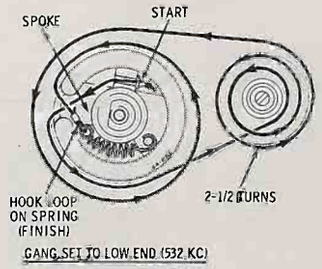
Volume Control & Gang - Remove the two mounting screws, then unsolder, individually, each connecting lug. (Also refer to Gang and Pulley Replacement Section.)

BATTERY VOLTAGE AND BATTERY DRAIN

Battery Voltage - Normally, this receiver should operate satisfactorily until the battery voltage reaches 6 volts; operation below 6 volts may be unsatisfactory due to increased distortion.

Battery Drain - 4 to 6 ma with no input signal and volume at minimum level.

A simple, convenient method of measuring battery drain can be made without unsoldering any connections. Use a low resistance DC milliameter. With the receiver turned off, place the milliameter (thru suitable test leads) across the open terminals of the on-off switch (observe polarity); the receiver is automatically turned on at the minimum volume level. The meter should read 4 to 6 ma (if set is operating normally).



DIAL STRINGING DETAIL

NOTE: Some receivers may have used a method of dial stringing which is not the same as that shown above; the one shown here however, is an improved version and should be used whenever stringing is to be performed.

TRANSISTOR SERVICING INFORMATION

EQUIPMENT REQUIRED

The equipment now being used to service tube type receivers (VOM or VTVM and signal generator) can be utilized in servicing this receiver.

To facilitate servicing, a noise generator (see May-June, 1959, issue of Motorola Service News or Motorola Part Number 68P641210 Noise Generator Information Sheet) has been devised to replace the signal generator as a signal tracing device. The advantage of using a Motorola Noise Generator in place of a standard signal generator is in the elimination of the switching and tuning operations required of a signal generator when going from audio to IF to RF, etc. In the Motorola Noise Generator, this is accomplished by having an output waveform of such characteristic that the fundamental frequency lies in the audio range, but also contains harmonics that go well into the IF and RF range.

SERVICING PROCEDURE

Transistor servicing is similar, in many respects, to vacuum tube receiver servicing. A brief synopsis of the methods used to service transistor receivers is given in the next paragraph; more detailed methods are outlined in the succeeding paragraphs.

In servicing transistor receivers, the first step is to locate the defective stage; this is accomplished by conventional signal injection methods (see Signal Injection Methods). When the defective stage is found, the next step is to determine the cause of failure. In transistor receivers, causes of failure can be divided into two categories: bias network or transistor failures and signal path failures. Refer to the sections below for methods used to service these receivers.

Signal Injection Methods - Signal Injection is accomplished by feeding in a signal from stage to stage. A signal generator (or the noise generator described in the Equipment Required section above) can be used. Signals are injected between the base electrode of each stage and ground until the defective stage is located.

Bias Network & Transistor Defects - A defective stage can be checked by comparing the voltage drops across the emitter resistors against those values shown on the schematic. These voltage drops give an indication of the current flowing through the stage when it is properly biased. A defective component in the bias network or a defective transistor will change the bias voltage causing the current to change which, in turn, will cause the emitter resistor voltage drops to change. Therefore, a voltage drop that is not in the order of that shown on the schematic will indicate a defective stage. The next step is to determine if the defect is in the bias network or the transistor. A rapid way of checking this is to substitute a known good transistor in the defective stage. If the emitter resistor voltage drop remains the same, the original transistor is OK and the defect is in the bias network. When a transistor is not available for substitution, make a resistance check of the stage. If the values are within the tolerance rating, the bias network can be eliminated as a source of defect and the transistor safely suspected. Bias network defects can be located by resistance checks with the transistor removed from the circuit.

Signal Path Defects - These types of defects are usually found after eliminating the bias network or transistor as a possible source of failure. Examples of these defects include open coupling capacitors, coil windings, or any other defects which cause loss of signal without upsetting the static bias conditions of the transistor.

TRANSISTOR CHECK

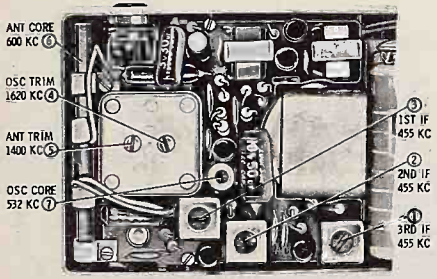
Substituting a known good transistor for a suspected one is generally a good method to use in checking transistors. However, make certain that the transistor is definitely defective before replacing (see Servicing Procedure in this section).

BY-PASS CAPACITOR CHECKS

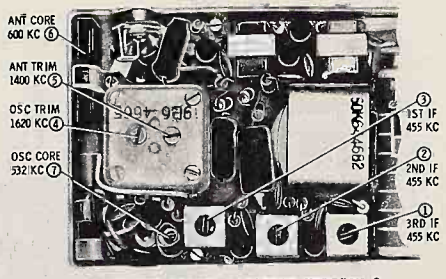
Often the cause of weak receivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase.

BY-PASS CAPACITOR CHECKER

MOTOROLA INC. 4545 WEST AUGUSTA BLVD. · CHICAGO 51, ILLINOIS



ALIGNMENT POINTS LOCATION-VERSION 1



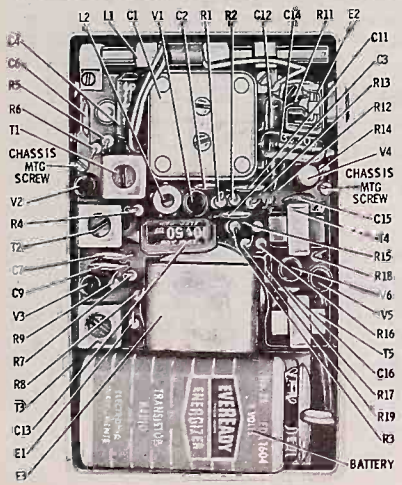
ALIGNMENT POINTS LOCATION-VERSION 2

ALIGNMENT

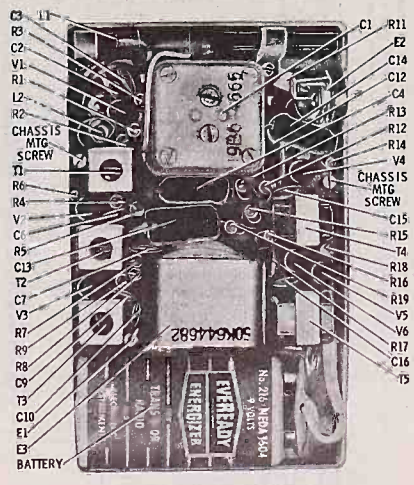
Connect an output meter across the speaker. Set volume to maximum. Attenuate signal generator output so as not to exceed .68V on output meter at all times to prevent overloading and AGC action. Alignment should be performed with the chassis in the cabinet.

STEP	GENERATOR CONNECTION	GEN. FREQ. (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Radiation loop*	455 Kc	Fully opened (1620 Kc)	1, 2, & 3	Adjust for maximum
RF ALIGNMENT					
NOTE:	Before performing RF alignment, check osc tuning range: with gang fully opened set should tune to 1620 Kc ± 15Kc; with gang fully closed 532 ± 5 Kc. If osc does not cover this range, perform steps A, B, & C at this point... otherwise skip over them and go on to step 2.				
	A. Radiation loop*	532 Kc	Fully closed (532 Kc)	7**	Adjust for maximum
	B. "	1620 Kc	Fully opened (1620 Kc)	4	Adjust for maximum
	C. Repeat steps A and B until osc covers required range; step B should be last adjustment.				
2.	Radiation loop*	1620 Kc	Fully opened (1620 Kc)	4	Adjust for maximum
3.	"	1400 Kc	Tune for max	5	Adjust for maximum
4.	"	600 Kc	"	6	Adjust for max (adj is made by sliding antenna winding along the ferrite core until maximum output is obtained).
5.	Repeat steps 3 & 4 until no further increase; step 3 should be last adjustment, then cement antenna winding to core with wax.				

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver antenna. Keep radiation loop at least 12" from receiver antenna. **In some sets, this adjustment is performed from the bottom of the chassis.



PARTS LOCATION- VERSION 1



PARTS LOCATION-VERSION 2

SERVICE HINTS

SYMPTOM	CAUSE	REMEDY
No Reception (Dead Set)	1. Low battery voltage	1. Check battery voltage & battery drain - see Service Notes
	2. Defective On-off switch (on vol cont)	2. Replace control
	3. Possible dead oscillator	3. Check to see if oscillator is functioning - measure DC voltage at emitter of V-1; then short oscillator tank circuit (Lugs 3 & 5 on L-2); if emitter voltage changes (.05 volts or more), oscillator is working; no voltage increment means a dead oscillator.
	4. Broken leads at speaker earphone jack or antenna	4. Re-connect broken lead
	5. Junction of E-1 & R-10 open or shorted	5. Repair connection
	6. R-10 broken (mounted on conduction side of board)	6. Replace with 220 ohm, 1/4 watt insulated resistor (Motorola Part Number 6B127800)
	7. C-5, C-8, or C-11 shorted to board. These are mounted on conduction side of board	7. Re-dress leads
	8. Open or shorted earphone jack	8. Adjust contacts
	9. Resin connection or solder short	9. Inspect set & touch up doubtful connections
Weak audio	1. Low battery voltage	1. Check battery voltage and battery drain - see Service Notes
	2. Alignment	2. Re-align set
	3. Open by-pass capacitor (C-14)	3. Check by bridging temporarily with good unit or use the by-pass capacitor checker - see Transistor Servicing Information; if capacitor in set is open, gain will increase by approximately three times
Weak sensitivity	1. Low battery voltage	1. Check battery voltage & battery drain - see Service Notes
	2. Alignment	2. Re-align set
	3. Open by-pass capacitor C-7 or C-14	3. Replace
Distortion & tendency to regenerate on strong input signal	Open AVC by-pass capacitor C-4	Replace
Regeneration on high end of band	Open emitter by-pass capacitor C-3	Replace
Intermittent set	1. Intermittent contacts on earphone jack	1. Adjust contacts
	2. Resin connection	2. Inspect set and touch up doubtful connections
	3. Broken lead (especially at earphone jack and speaker)	3. Repair connection
Tuning knob slippage	1. Slipping dial string	1. Check dial stringing; use revised stringing detail (if necessary)
	2. " "	2. Apply Walsco No-Slip or equivalent string dressing through slot next to tuning knob

TUNING GANG AND PULLEY REPLACEMENT INFORMATION

GENERAL INFORMATION

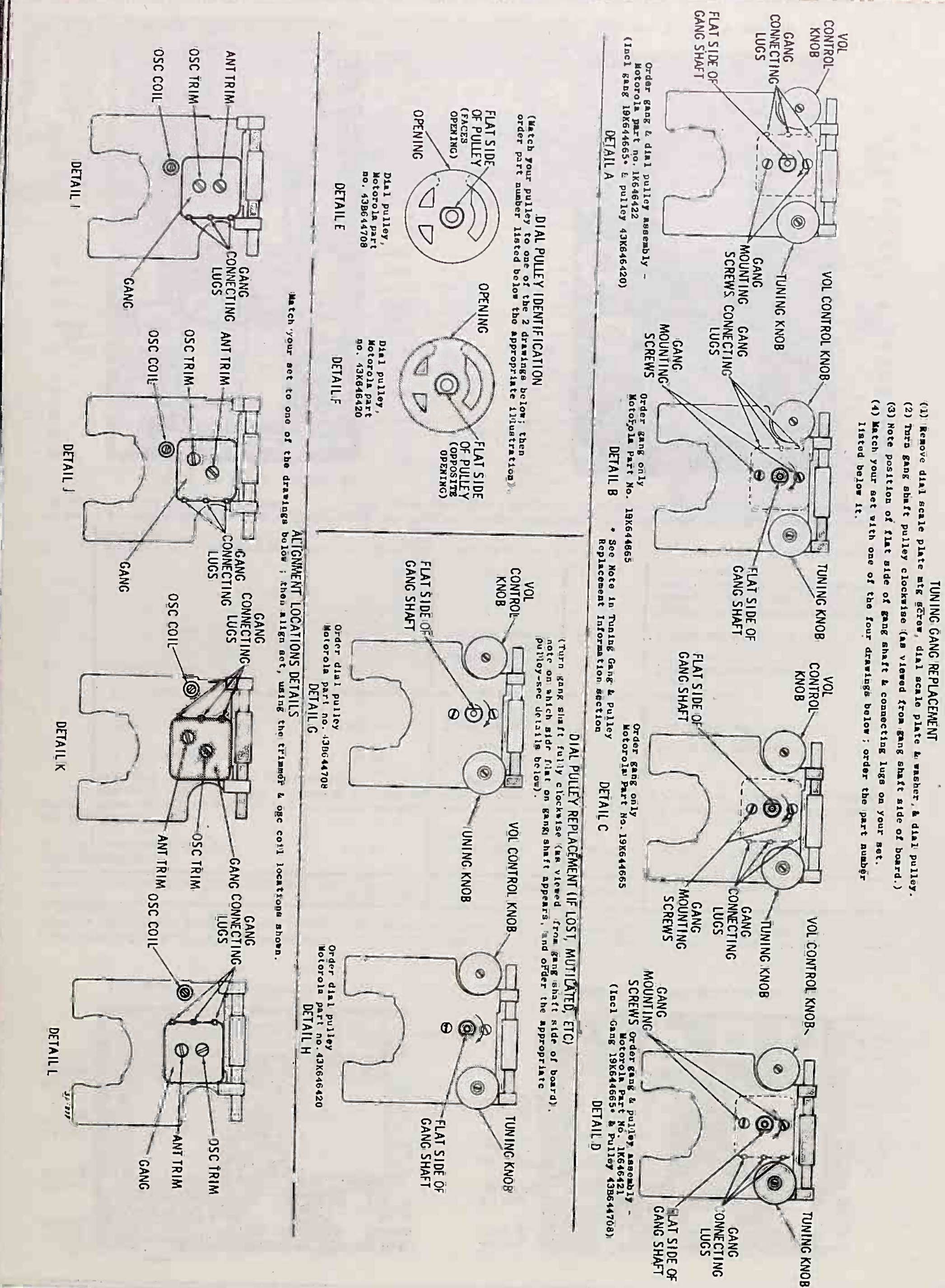
Two kinds of tuning gangs and pulleys are currently being used in X11 series radios; these gangs and pulleys differ from each other in the location of the indexing "flat" located on the gang shaft and correspondingly, on the pulley. Since the two versions of the X11 printed circuit board have the gang connecting mounting holes located on the opposite end of the board, various combinations of gangs and pulleys can occur.

The various gangs used have the same Motorola Part No.; however, Motorola Parts Department will furnish only one type of gang (the one shown in details B and C) for field replacement. This gang will replace any of the gangs currently being used; but, because of the indexing difference that might occur between the original and replacement gang, it may be necessary to use a new pulley in place of the existing one to have the correct pulley-to-gang indexing.

Shown below are gang and pulley replacement details; these are intended to simplify field identification and replacement of gangs and pulleys. The first four details (A, B, C and D) are to be used if a gang is to be replaced. To use the details, match your set against the corresponding drawing, then order the part number listed below that drawing. The Motorola Part Numbers include the pulley where necessary.

The next four details are for pulley identification and replacement purposes. The first two (E & F) are used for pulley identification; both types of pulleys are shown with the corresponding Motorola Part Number listed below. The next two details (G & H) are used when it is desired to replace a pulley in the situation where the existing pulley is lost or for some reason cannot be identified (because of mutilation, etc.). Follow the instruction given with the details; Motorola Part Numbers for the correct replacement pulley to be used are given.

The last four details (I, J, K, L) are for alignment location purposes. Match your set to one of the four details, then align set, using the trimmer and oscillator coil locations shown (also see Alignment Chart).



REPLACEMENT PARTS LIST-VERSION 1 AND 2

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	-	Capacitor, variable: 2 gang (See Limited Replacement Parts)
C-2	21K644667	Capacitor, cer disc: .01 mf 50V
C-3	21K644666	Capacitor, cer disc: .02 mf 50V
C-4	23K644668	Capacitor, electrolytic: 30 mf 3V
C-5	21K645601	Capacitor, cer disc: 3mmf 50V (some sets used 5 mmf: when replacing, use the 3 mmf listed)
C-6	21K644666	Capacitor, cer disc: .02 mf 50V
C-7	21K644666	Capacitor, cer disc: .02 mf 50V
C-8	21K644673	Capacitor, cer disc: 7 mmf 50V
C-9	21K644666	Capacitor, cer disc: .02 mf 50V
C-10	21K644667	Capacitor, cer disc: .01 mf 50V
C-11	21K644667	Capacitor, cer disc: .01 mf 50V
C-12	23K644669	Capacitor, electrolytic: 5 mf 3V
C-13	23K644671	Capacitor, electrolytic: 50 mf 10V
C-14	23K644668	Capacitor, electrolytic: 30 mf 50V
C-15	21K644670	Capacitor, cer disc: .002 mf 50V
C-16	21K644667	Capacitor, cer disc: .01 mf 50V
E-1	48K644681	Crystal Diode
E-2	9K644683	Jack, earphone (incl spacer & mtg nut)
E-3	50K644682	Speaker, PM: 2-1/4"; 8Ω VC
L-1	24K644674	Ferrite Antenna (incl plastic holders)
L-2	24K644675	Coil, oscillator
Resistors- Note:		All resistors are insulated carbon type unless otherwise specified.
R-1	6K644684	5000 10% 1/8W
R-2	6K644107	40,000 10% 1/8W
R-3	6K644690	2000 10% 1/8W
R-4	6K644687	100,000 10% 1/8W
R-5	6K644688	4000 10% 1/8W
R-6	6K644689	750 10% 1/8W
R-7	6K644684	5000 10% 1/8W
R-8	6K644107	40,000 10% 1/8W
R-9	6K644686	1500 10% 1/8W
R-10	6B127800	220 10% 1/4W (some sets used 250Ω; when replacing, use the 220Ω listed)
R-11	18K644694	Vol Cont & Switch: 5000
R-12	6K644684	5000 10% 1/8W
R-13	6K644685	50,000 10% 1/8W
R-14	6K644689	750 10% 1/8W
R-15	6K644691	150 10% 1/8W
R-16	6K644693	300 10% 1/8W
R-17	6K644680	Thermistor: 200Ω 25°C ±30Ω
R-18	6K644692	10 10% 1/8W (in some sets)
	6K645513	50 10% 1/8W (in some sets)
R-19	6K644108	7000 10% 1/8W (in some sets)
	6K121300	27,000 10% 1/2W (in some sets)
T-1	24K644697	Transformer, 1st IF: 455 Kc
T-2	24K644698	Transformer, 2nd IF: 455 Kc
T-3	24K644699	Transformer, 3rd IF: 455 Kc
T-4	25K644695	Transformer, driver
T-5	25K644696	Transformer, output
V-1	48K644676	Transistor, type 2S-52: PNP (converter-also replaces type 2S-30 or 2N412 used in some sets)
V-2	48K644677	Transistor, type 2S-53: PNP (1st IF -also replaces type 2S-31 or 2N410 used in some sets)
V-3	48K645867	Transistor, type 2S-49: PNP (2nd IF -also replaces type 2S-31, 2S-53 or 2N410 used in some sets)
V-4	48K644678	Transistor, type 2S-54: PNP (driver -also replaces type 2S-32 or 2N406 used in some sets)
V-5,6	48K644679	Transistor, type 2S-56: PNP (power amp -also replaces type 2S-33 used in some sets- See NOTE)
	48A124377	Transistor, type 2N408: PNP (power amp -used in some sets -see NOTE)
		NOTE: V5 & V6 should be replaced in matched pairs--when ordering, specify 2 of the appropriate part number.
MECHANICAL PARTS		
	39K644719	Battery Contact: incl wire
	84K644664	Board, printed circuit: less all components (version 1- in some sets)
	84K645320	Board, printed circuit: less all components (version 2- in some sets)
Note:		When ordering, specify part number on original board and mention model number of this set. If part number is different, from that found in this parts list, order by complete part number found on board and mention model number of this set.
	43K646114	Bushing, spacer (earphone jack mtg)
	43K644099	Bushing, tuning shaft
	35K644712	Dial Cord, incl eyelet stopper
	36K644710	Knob, On-off & Volume: black
	36K644709	Knob, tuning: black
	2A646121	Nut, (earphone jack mtg)
	2K644098	Nut, special hex (On-off & vol cont mtg, ant L1 mtg)
	2K644093	Nut, special hex (tuning shaft mtg)
	64K644711	Plate, dial scale
	-	Pulley, dial (See Limited Replacement Parts)
	47K644110	Shaft, tuning (under tuning knob)
	3K644718	Screw, special machine (chassis mtg & L1 mtg-tuning knob side of L1)
	3K644716	Screw, special machine (dial scale plate mtg)
	3K644715	Screw, special machine (L1 mtg-On-off knob side of L1)
	3K644717	Screw, special machine (variable capacitor C1 mtg)
	3K644714	Screw, special machine (Vol, tuning knob mtg & bot of vol cont mtg)
	41K644703	Spring, dial cord
	4K644109	Washer, metal cup (dial scale plate rest)
	4K644721	Washer, (tuning knob mtg)
	4K644720	Washer, (tuning shaft mtg)
CABINET PARTS		
	13K645006	Bezel, Motorola: gold
	7K645005	Bracket, spkr mtg
	1K645041	Cabinet Back: blue (X11B)
	1K645042	Cabinet Back: black (X11E)
	1K645043	Cabinet Back: green (X11G)
	1K645044	Cabinet Back: red (X11R)
	1K644116	Cabinet Front: blue; incl escutcheon, dial lens & lens holder (X11B)
	1K644117	Cabinet Front: black: incl escutcheon, dial lens & lens holder (X11E)
	1K644118	Cabinet Front: green; incl escutcheon, dial lens & lens holder (X11G)
	1K644119	Cabinet Front: red; incl escutcheon, dial lens & lens holder (X11R)
	-	Escutcheon, SIX TRANSISTOR (part of cab front)
	1K645003	Grille Assembly: incl plastic support, threaded studs & medallion
	-	Lens, dial (part of cab front)
	-	Medallion (part of grille assembly)
	2K645004	Nut, special hex (grille assembly mtg)
LIMITED REPLACEMENT PARTS		
Note:		The volume of replacement on the following part is small, consequently, it is suggested that ordering be done only as required.
	19K644665	Capacitor, variable: 2 gang; less pulley(see Gang & Pulley Replacement)
	*1K646421	Capacitor, variable: 2 gang; incl pulley 43B644708 (See Gang & Pulley Replacement)
	*1K646422	Capacitor, variable: 2 gang; incl pulley 43K646420 (See Gang & Pulley Replacement)
	14K644973	Insulator, speaker
	43B644708	Pulley, dial (See Gang & Pulley Replacement)
	*43K646420	Pulley, dial (See Gang & Pulley replacement)
ACCESSORY ITEMS (Not Supplied with Radio)		
	*15C645008	Case, carrying
	50D640709 or 50D641487	Earphone, 16 ohm

*New Item, appears in any List for First Time

PHILCO TRANSISTOR RADIO

SERVICE MANUAL

PHILCO Factory-Supervised Service

MODEL T-50-126

MODEL T-50-126

ALIGNMENT PROCEDURE

GENERAL—Allow the test equipment to warm up for fifteen minutes before starting the alignment procedure.

OUTPUT INDICATOR—Connect the output indicator (a 1000-ohm-per-volt, a-c voltmeter, or an oscilloscope) across the voice-coil terminals.

SIGNAL GENERATOR—Use an AM r-f signal generator. Connect the ground lead to chassis, and connect the output lead as indicated in the alignment chart.

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below 1.0 volt.

RADIO CONTROLS—Set the volume control to maximum. Set the tuning control as indicated in the alignment chart.

SPECIFICATIONS

CIRCUIT—Five transistor superheterodyne.

AUDIO OUTPUT—35 milliwatts.

BATTERY VOLTAGE AND TYPE—5.2 volts from 4 mercury cells, type P640.

FREQUENCY COVERAGE—535 to 1620 KC.

ANTENNA—Self-contained magnecor, high-impedance loop.

CABINET—Styrene cabinet.

SPEAKER—2¼ in. pm., 100 ohm voice coil. Jack provided for optional private listening attachment.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1 uf condenser to antenna section of gang. Use the least generator signal necessary to give an output indication.	455 KC	Tuning gang fully open	Adjust for maximum output in order given.	Z2—2nd IF Z1—1st IF
2	Use radiating loop (See note 1 below).	1620 KC	1620 KC (gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
3	Same as step 2.	1400 KC	1400 KC	Adjust for maximum output.	C1A—ant. trimmer
4	Same as step 2.	600 KC	600 KC	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 2.				

NOTE 1. Use a 6-to-8 turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.

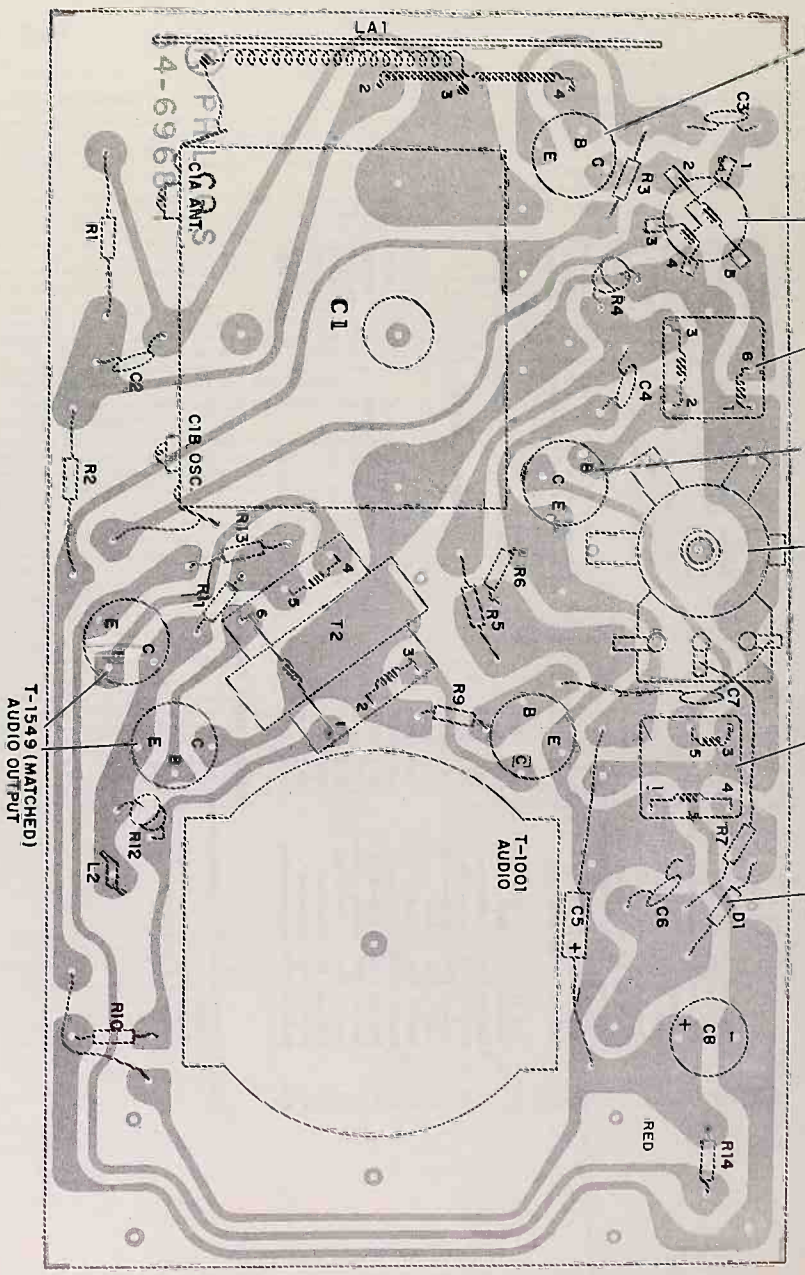


Figure 2. Printed Wiring Panel—Under Side Showing Parts Location

REPLACEMENT PARTS LIST
Model T-50, Code 126

Reference Symbol	Description	Service Part No.
C1	Capacitor, variable, tuning	31-2788-3
C2	Capacitor, .01 mfd, converter-base	30-1272-2
C3	Capacitor, .01 mfd, converter-emitter	30-1272-2
C4	Capacitor, .01 mfd, I-F base	30-1272-2
C5	Capacitor, 20 mfd, 6 volt	30-2588-1
C6	Capacitor, .01 mfd, detector-base	30-1272-2
C7	Capacitor, .2 mfd, audio coupling	30-1279-3
C8	Capacitor, 25 mfd, 6 volt, electrolytic, filter B+	30-2599-36
D1	Diode, 1N60A	34-8022-3
J1	Jack, private listening	42-1975-4 42-1975-6
LA1	Coil, antenna	76-10982
LS1	Speaker, 2¼", 100Ω	36-1684-1
R1	Resistor, 22K, converter-base	66-3228340
R2	Resistor, 3.3K, converter-base	66-2338340
R3	Resistor, 680Ω, converter-emitter	66-1688340
R4	Resistor, 22K, I-F-base	66-3228340
R5	Resistor, 15K, I-F-base	66-3158340
R6	Resistor, 820Ω, I-F-emitter	66-1828340
R7	Resistor, 330Ω, detector-filter	66-1338540
R8	Resistor, 30K variable, volume	33-5583-10
R9	Resistor, 390K, 1st audio-base	66-4398340
R10	Resistor, 1.8K, output-base	66-2188340
R11	Resistor, 1.8K, output-base	66-2188340
R12	Resistor, 100Ω, output-emitter	66-1108340
R13	Resistor, 100Ω, output-emitter	66-1108340
R14	Resistor, 100Ω, filter B+	66-1108340
S1	Switch	Part of R8
T1	Transformer, oscillator	32-4669-6
T2	Transformer, driver	32-8911-1
T1731 or T-1732	Transistor, converter	34-6000-37 34-6000-38
T-1460	Transistor, I-F	34-6000-19
T-1001	Transistor, 1st audio	34-6001-16
T-1549	Transistor, output (matched pair)	34-6012
Z1	Transformer, 1st I-F	32-4775-4
Z2	Transformer, 2nd I-F	32-4775-5
	Printed Panel	54-6968-2

CABINET PARTS

Cabinet	54-6956
Cabinet front, aqua	54-6955
Cabinet front, terra cotta	54-6955-1
Door, battery compartment	54-6957
Contact, battery, 2 used	28-12770
Contact spring, battery	28-12771
Knob, tuning	54-6959
Knob, volume	54-6958
Private listening unit	326-8006

PRODUCTION CHANGES

Run 51 — Antenna Part No. 76-10982 changed to 76-10982-1
Resistor R1, Part No. 66-3228340 (22K) changed to 66-3278340 (27K).

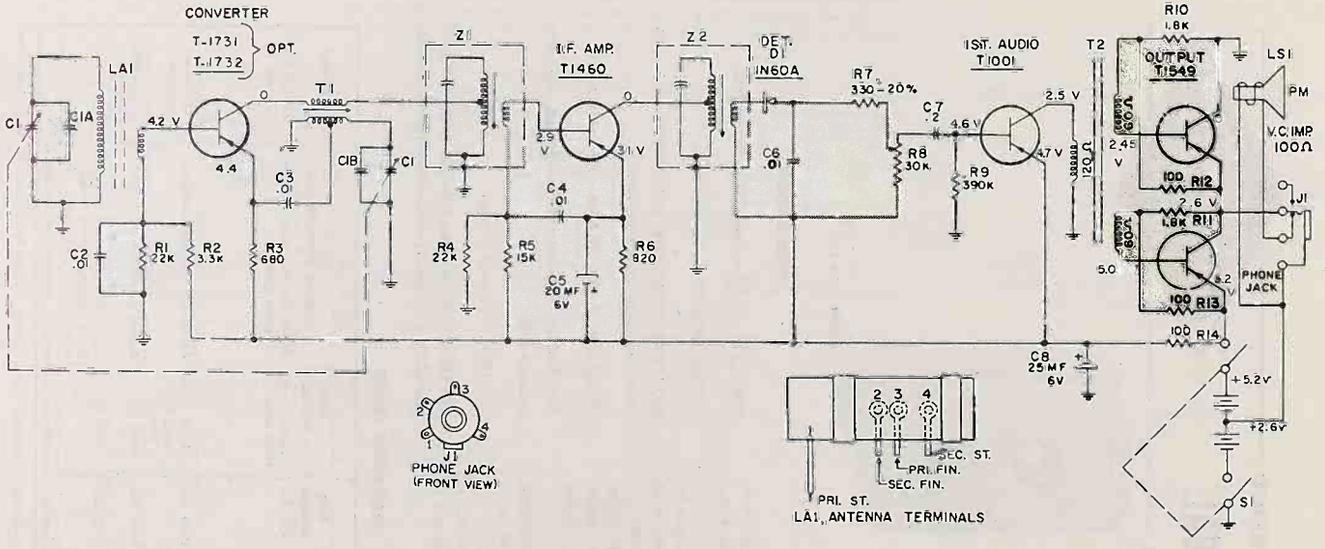


Figure 3. Schematic Diagram of Philco Transistor Portable Model T-50-126

PANEL LEAD CONNECTIONS

Black lead from negative battery contact to switch lug #7.
Bare wire from switch lug #6 to ground tab of volume control and to frame of gang.
Red lead from positive battery contact to switch lug #5.
Red lead from switch lug #4 to Panel.
White lead from voltage supply center-tap to J1, lug #1.
Blue lead from J1, lug #1, to speaker.
White lead from J1, lug #3, to speaker.
Brown lead from J1, lug #2 to panel L2.

NOTES:
ALL RESISTORS 1/2W, 10%, CARBON.
VOLTAGES MEASURED TO GROUND WITH A 20,000 Ω/VOLT METER UNDER NO SIGNAL CONDITION.
COIL RESISTANCES READ WITH COIL IN CIRCUIT.

RCA VICTOR

Transistor Dual-Speaker Radio

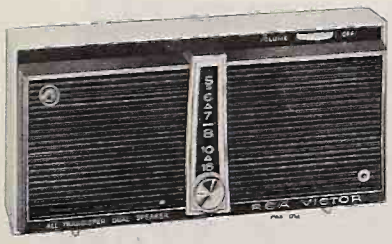
TX-1 SERIES

Chassis No. RC-1196A

SERVICE DATA

— 1959 No. 29 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



TX-1 Series—The "Scepter"
Model TX-1K—Driftwood Beige and Buff
Model TX-1HE—Turquoise and Champagne White
Model TX-1JE—Charcoal and Champagne White

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc
Conelrad frequencies marked

INTERMEDIATE FREQUENCY ..... 455 kc

TRANSISTOR COMPLEMENT

(1) RCA 2N412	Converter
(2) RCA 2N410	1st I-F Amp.
(3) RCA 2N410	2nd I-F Amp.
(4) RCA 2N408	Audio Driver
(5) RCA 2N408	Push-pull Output
(6) RCA 2N408	Push-pull Output
Type 1N60 Crystal Diode	2nd Detector
Type 1N60 Crystal Diode	Overload Diode

BATTERY
Three "C" size cells ..... Long Life RCA Type VS335 or Standard RCA Type VS035
Current consumption (no signal) ..... Approx. 9 ma.
Useful life (intermittent service—VS035) ... Approx. 100 hours

LOUDSPEAKER
Size and type ..... One 3" P.M. and one 3½" P.M.
Voice coil impedance ..... 130 ohm center-tapped
Provision is made for connection of a 2000 ohm impedance earphone. RCA accessory earphone RK-219A is recommended.

TUNING DRIVE RATIO ..... Approx. 6:1 (3 turns of knob)

POWER OUTPUT
Undistorted ..... 300 milliwatts
Maximum ..... 490 milliwatts

DIMENSIONS
Height ..... 4¾" Width ..... 9 11/16" Depth ..... 2 11/16"

WEIGHT
Approximately 2½ pounds including batteries.

DESCRIPTION

The "SCEPTER" is a deluxe personal type dual-speaker cordless radio receiver using six transistors instead of vacuum tubes. A superheterodyne circuit is used consisting of: converter, two stages of I-f amplification, crystal diode detector, audio driver and push-pull class-B output. A 3" and a 3½" speaker are used for normal listening; a jack for earphone connection is provided, which silences the speakers, when use is desired without disturbing nearby persons.

The chassis and speakers are fastened to the front of the two-piece case which fully encloses the instrument. A vertical slide-rule dial provides tuning indication.

A "Security Sealed Circuit" chassis is used to obtain light weight and compact size. The complete receiver including batteries weighs approximately 2½ pounds. The two-tone case is made of non-breakable "Impac."

The receiver is powered by three "C" size dry cells (RCA Type VS-335). The batteries are replaceable upon removal of a trap door at the bottom rear of the case. Expected useful life of the batteries is in excess of 100 hours with intermittent service.

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED. THE SERVICE HINTS GIVEN SHOULD BE CAREFULLY READ BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SUPPLEMENTARY INFORMATION

Issue	Subject
List related Supplements and Service Tips above.	

Printed in U. S. A.

SERVICE HINTS

General Information

Extreme care should be used to avoid accidental shorting of transistor elements to circuit ground. This is especially true of the output transistors; if the junction of R15, R16, R17 should be accidentally grounded for a few seconds, the output transistors would be permanently damaged.

It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor from the chassis before making continuity tests of its circuit.

1. When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be approximately 4½ volts with new batteries. The receiver can be expected to operate if the total battery voltage checks between 3 volts and 4½ volts with the proper polarity.

   Check to make sure that every cell is inserted in the right direction (top inward).
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons explained above, continuity measurements can be misleading.
3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes) and the EMITTER is the common terminal (corresponding to cathode of tubes).
4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.
5. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.
6. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).
7. D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.
8. Interchanging transistors in the I-F stages may necessitate realignment.

ALIGNMENT PROCEDURE

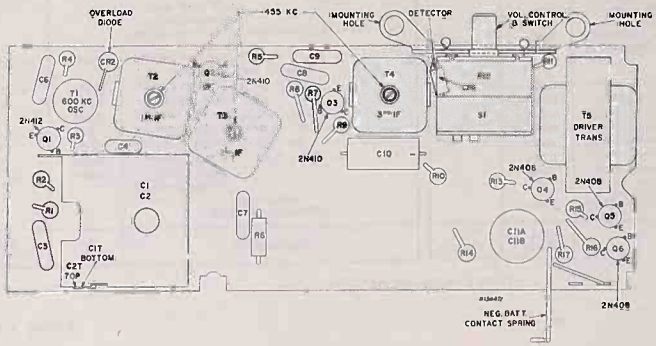
Test-Oscillator — For all alignment operations, connect the low side of the test oscillator to the "common positive" wiring and keep the oscillator output as low as possible to avoid AVC action.

Connect output meter across voice coil.

Turn volume Control to maximum.

Step	Connect High Side of Test Oscillator to	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang [illegible]	455 kc	Quiet point near 1,600 kc	[illegible]
2		Repeat Step 1		
3	Short wire placed near antenna for radiated signal	1,620 kc	Gang fully open	Oscillator trimmer C5
4		1,400 kc	Lower notch 1,400 kc rock gang	Antenna trimmer C7
5		600 kc	Upper notch 600 kc rock gang	Oscillator coil
6		Repeat Steps 3, 4 and 5		

Antenna trimmer is located on front section of gang.
Oscillator trimmer is located on rear section of gang.



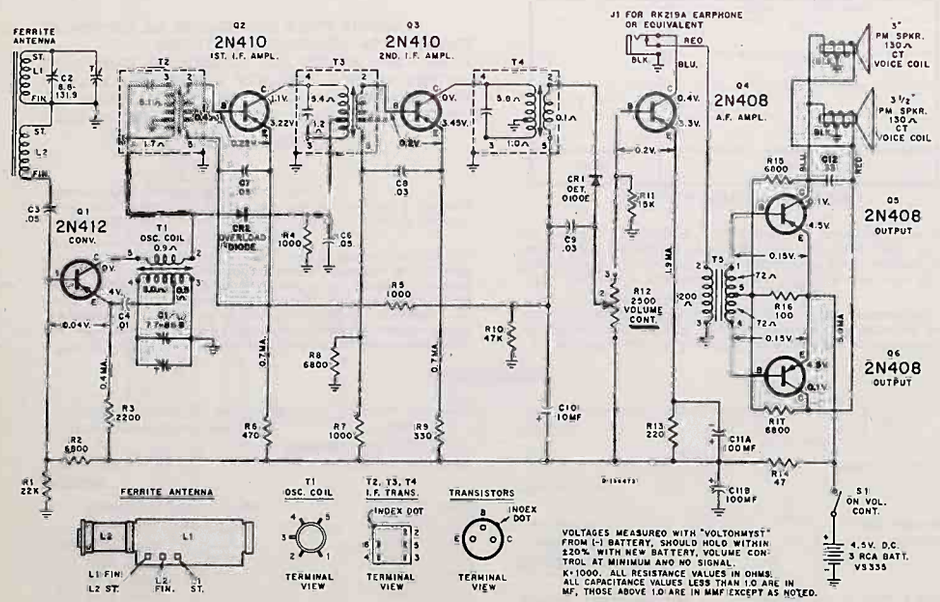
Chassis Assembly View from Component Side

EARPHONE CONNECTION

Only a high impedance earphone (approx. 2000 ohms) should be connected into the earphone jack. RCA accessory earphone Number RK-219A is recommended.

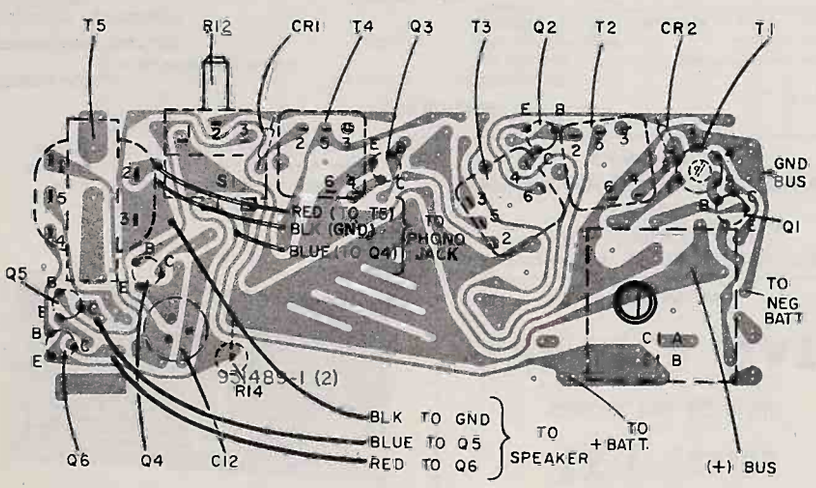
Dial Cord Arrangement

TX-1 Series



VOLTAGES MEASURED WITH "VOLTOHMYST" FROM (-) BATTERY, SHOULD HOLD WITHIN ±20% WITH NEW BATTERY, VOLUME CONTROL AT MINIMUM AND NO SIGNAL.
K=1000. ALL RESISTANCE VALUES IN OHMS. ALL CAPACITANCE VALUES LESS THAN 1.0 ARE IN MF, THOSE ABOVE 1.0 ARE IN MMF EXCEPT AS NOTED.

Schematic Diagram



Chassis Wiring and Components View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.

The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 8 — Dated August 25, 1955.

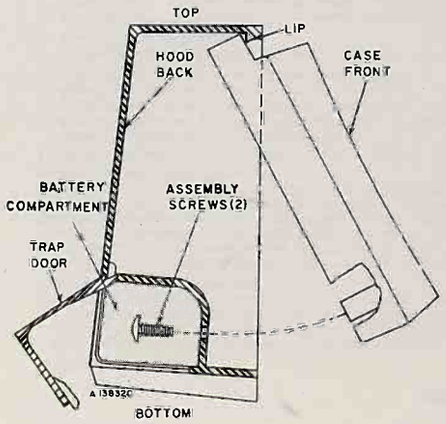
TX-1 Series

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1196A
		CAPACITORS
C1, C2	108584	variable tuning
C3	105715	ceramic, 0.05 mf, +100% −20%, 100 v
C4	105716	ceramic, 0.01 mf, ±20%, 100 v
C6 to C8	105715	ceramic, 0.05 mf, +100% −20%, 100 v
C9	108168	ceramic, 0.03 mf, ±20%, 100 v
C10	106114	electrolytic, 10 mf, 10 v
C11A/B	108151	electrolytic, 100/100 mf, 10/10 v
C12		Part of Speaker Assembly
CR1, CR2	101615	Rectifier—Crystal diode
		RESISTORS — Fixed, composition, ½ watt, unless otherwise specified
R1		22,000 ohm, ±10%
R2		6,800 ohm, ±10%
R3		2,200 ohm, ±10%
R4, R5		1,000 ohm, ±10%
R6		470 ohm, ±10%
R7		1,000 ohm, ±10%
R8		6,800 ohm, ±10%
R9		330 ohm, ±10%
R10		47,000 ohm, ±10%
R11		15,000 ohm, ±10%
R12	108581	control—volume control with "on-off" switch (S1)
R13		220 ohm, ±10%
R14		47 ohm, ±10%
R15		6,800 ohm, ±10%
R16		100 ohm, ±10%
R17		6,800 ohm, ±10%
S1		Switch—Part of volume control (R12)
		TRANSFORMERS
T1	108160	oscillator coil
T2	108157	1st IF
T3	108158	2nd IF
T4	108159	3rd IF
T5	108164	driver
	108579	bracket—Tuning drive bracket and pulley assembly

SYMBOL NO.	STOCK NO.	DESCRIPTION
	108170	Circuit—"Security sealed circuit" chassis assembly —less antenna, tuning capacitor, volume control, driver transformer and transistors
	38201	Clamp—For drive cord
	108310	Contact—Negative contact spring for radio battery
	72953	Cord—Pointer drive cord (250 ft. spool)
	108580	Pointer—Station selector
	108578	Shaft—Tuning control drive shaft
	108577	Spring—Drive cord tension spring
	108576	Spring—Retaining spring for drive shaft
		SPEAKER ASSEMBLY
C12	108307	Capacitor—Film, 0.33 mf, ±10%, 50 v
	108585	Speaker—3" PM speaker complete with cone—130 ohm C.T.V.C.
	108163	Speaker — 3½" PM speaker complete with cone — 130 ohm C.T.V.C.
		MISCELLANEOUS
J1	103635	Jack—Earphone jack
L1, L2	108318	Antenna—Ferrite rod antenna
	Y7088	Cabinet — Bermuda turquoise/champagne white — for Model TX-1HE
	Y7087	Cabinet—Charcoal/champagne white—for Model TX-1JE
	Y7086	Cabinet—Driftwood beige/buff—for Model TX-1K
	108317	Contact—Positive contact for radio battery
	108586	Dial—Tuning control dial—for Models TX-1JE and TX-1HE
	108587	Dial—Tuning control dial—for Model TX-1K
	108323	Door — Battery retainer door — for Models TX-1JE and TX-1HE
	108591	Door—Battery retainer door—for Model TX-1K
	108588	Escutcheon—Control dial escutcheon—for Models TX-1JE and TX-1HE
	108589	Escutcheon — Control dial escutcheon — for Model TX-1K
	108150	Grommet—Speaker mounting grommet
	108592	Knob—Tuning control knob
	108319	Knob — Volume control knob — for Models TX-1JE and TX-1HE
	108590	Knob—Volume control knob—for Model TX-1K
	108315	Nut—Retaining nut—for earphone jack

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



BATTERY INSTALLATION

Hold the instrument face down and with its top toward you. Remove the battery compartment cover by pressing on the indented portion, at the bottom, marked "Push Here To Open," and lifting up. Insert three "C" size cells (RCA type VS335, or equivalent) into the opening with their negative (plain) end to the right. The positive (knob) end of the third cell will be pressed against the contact at the left end of the opening.

ACCESS TO CHASSIS

The two sections of the case are held together at the bottom by two screws inside the battery compartment and at the top by a lip molded into the hood.

To open the case: Remove the two screws in the battery compartment and swing the case apart at the bottom.

To reassemble the case: Place the top of the case front behind the lip in the top of the hood. Swing the bottom of the case front into the hood, making sure that the top of the front remains in back of the lip at the top of the hood. Check that the negative contact spring has entered the battery compartment through the slot in the compartment wall. Replace the two screws in the battery compartment.

1-T-5 Series
The "New Globe Trotter"

Model 1-T-5L — Aqua and Satin Aluminum
Model 1-T-5J — Charcoal and Satin Aluminum

RCA VICTOR

Transistorized Portable Radio

MODEL 1-T-5 SERIES

Chassis No. RC-1195

Circuit Board No. 931650-1

SERVICE DATA

— 1959 No. 30 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

SPECIFICATIONS

TUNING RANGE ..... 540-1600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TRANSISTOR COMPLEMENT

(1)	RCA 2N544	R.F. Amplifier
(2)	RCA 2N412	Converter
(3)	RCA 2N410	1st I.F. Amplifier
(4)	RCA 2N410	2nd I.F. Amplifier
(5)	RCA 2N408	Audio Ampl. and AGC
(6)	RCA 2N408	Audio Driver
(7)	RCA 2N408	Push-pull Output
(8)	RCA 2N408	Push-pull Output

A crystal diode is used as second detector.

TUNING DRIVE RATIO ..... 6½:1 (3¼ turns of knob)

LOUDSPEAKER
Size and Type ..... 4" x 6" PM
Voice coil impedance ..... 130 ohms at 400 cycles

BATTERY
Four RCA Type No. VS 035 ..... 1½ volts each
Current consumption (with no signal) ..... Approx. 10 ma.
Approx. useful life ..... 100 hours at 2 hrs. per day

POWER OUTPUT
Undistorted ..... 290 milliwatts
Maximum ..... 500 milliwatts

DIMENSIONS

Height	Width	Depth
6¼"	9⅜"	2⅞"

WEIGHT ..... Approximately 3½ pounds including batteries

DESCRIPTION

Model 1-T-5 is a portable radio receiver using eight transistors and a diode detector. It is designed to operate from four self-contained "C" size (medium) flashlight cells.

The receiver circuit is a conventional superheterodyne with a tuned R.F. stage, a converter, two stages of I.F. amplification, a diode detector, a combined audio frequency amplifier and AGC, an audio driver stage and a class-B push-pull output stage.

A ferrite rod antenna provides high signal pickup and excellent image rejection. The tuned R.F. stage provides high sensitivity and additional image rejection. The I.F. transformers are of permeability tuned design for high gain and maximum stability.

The A.F. amplifier preceding the audio driver stage enables the push-pull class-B output stage to provide high audio output even on weak signals. A 4" x 6" PM speaker having a 130 ohm center-tapped voice coil provides greater output efficiency than circuits using a conventional output transformer and at the same time eliminates the need for temperature compensation for the output stage.

The cabinet is of non-breakable "Impac" material with an aluminum grille. Some of the cabinet features are a snap-out battery access cover, a dial lid-operated ON-OFF switch and a slide rule dial. The thumb-operated tuning and volume controls are located, one at each end of the slide rule dial.

To minimize weight, the controls are individually assembled to the rear portion of the plastic case along with the circuit board assembly. The speaker is secured to the front portion of the cabinet. For access to the wiring side of the circuit board, it is necessary only to unhook the dial cord at the tuning condenser and unsolder the lead from the negative battery contact.

Alignment Procedure

Output Indicator—Connect an output 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 negative battery terminal and keep the oscillator output as low as possible to avoid AGC action.

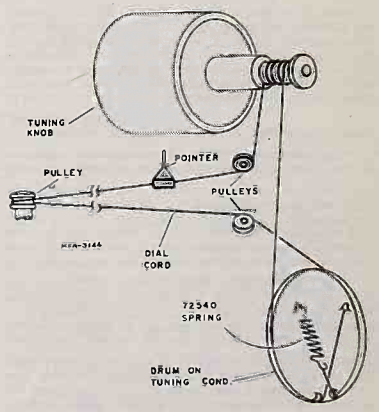
Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Connection lug of C1-C (rear section of gang) in series with .01 mfd	455 kc	Quiet point near 1600 kc	I.F. trans. T5 T4 T3
2	Mount circuit board and all dial superstructure to cabinet back. Close gang and set pointer to end calibration mark.			
3	Short wire placed near antenna for radiated signal	1620 kc	gang fully open	osc. trimmer C4 (rear section of gang)
4		1400 kc	1400 kc signal	ant. trimmer C2 (front section of gang) r.f. trimmer C3 (rear section of gang)
5		600 kc	600 kc signal (rear gang)	osc. coil T2 r.f. trans. T1
6	Repeat steps 3, 4 and 5			

LEAD DRESS

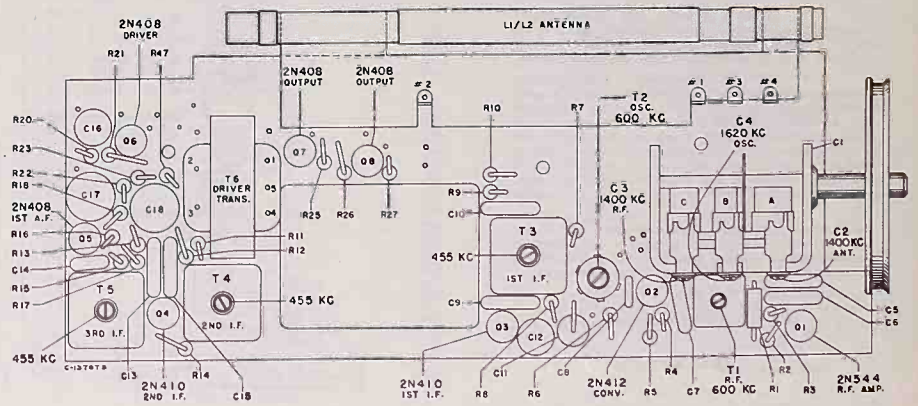
1. Dress speaker leads towards IF transformer and keep leads as short as practicable.*
2. Keep leads to earphone jack as short as practicable* and dress towards dial bracket.
3. Dress leads to arm and to top of volume control away from dial bracket and keep them as short as practicable.*

* Leads should be only of sufficient length to allow for chassis servicing. The speaker is to remain connected and other leads only long enough to allow for 180° rotation of the chassis when troubleshooting. This includes the + lead from switch.

The negative lead to the battery is the only lead that is necessary to be unsoldered for 180° chassis rotation.



Tuning Drive Cords



Transistor, Major Component and Trimmer Locations

1-T-5 Series

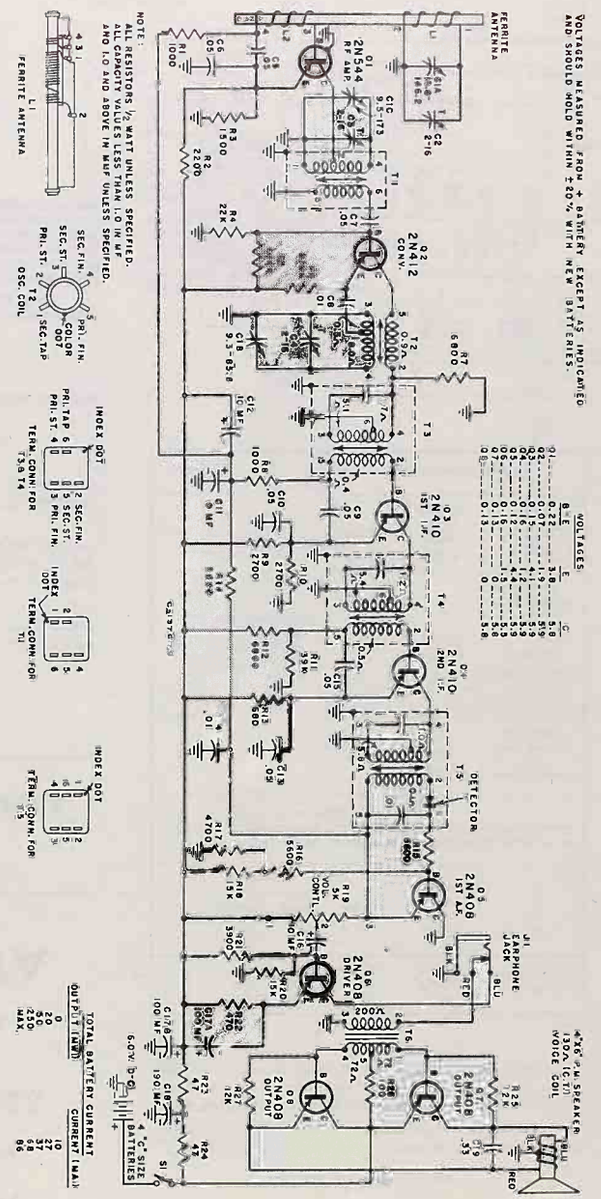
SERVICE HINTS

1. With the receiver turned on, a new battery should test 6 volts although the receiver can be expected to operate with a battery which tests 4 volts or more.
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons explained below, continuity measurements can be misleading.
3. Signal tracing by injection of a signal from a signal generator is recommended test procedure. The signal generator should be connected in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).
4. The output circuit used in this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases greatly with increased signal input to the "Class B" tubes.
5. Extreme care should be used to avoid accidental shorting of transistor elements to circuit ground. This is especially true of the output transistors; if either BASE terminal should be accidentally grounded for a few seconds, the output transistors would be permanently damaged.
6. With no signal input, the AGC source as measured at the EMITTER of Q5 will be 4.4 volts in respect to + battery terminal. Rectified signal voltage will make this point LESS NEGATIVE in respect to + battery terminal.
7. Oscillator injection voltage can be measured at the emitter terminal of Q2 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).
8. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board, use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.
9. Voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.
10. Interchanging transistors in the I-F stages may necessitate realignment.
11. It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor before making continuity tests of its circuit.

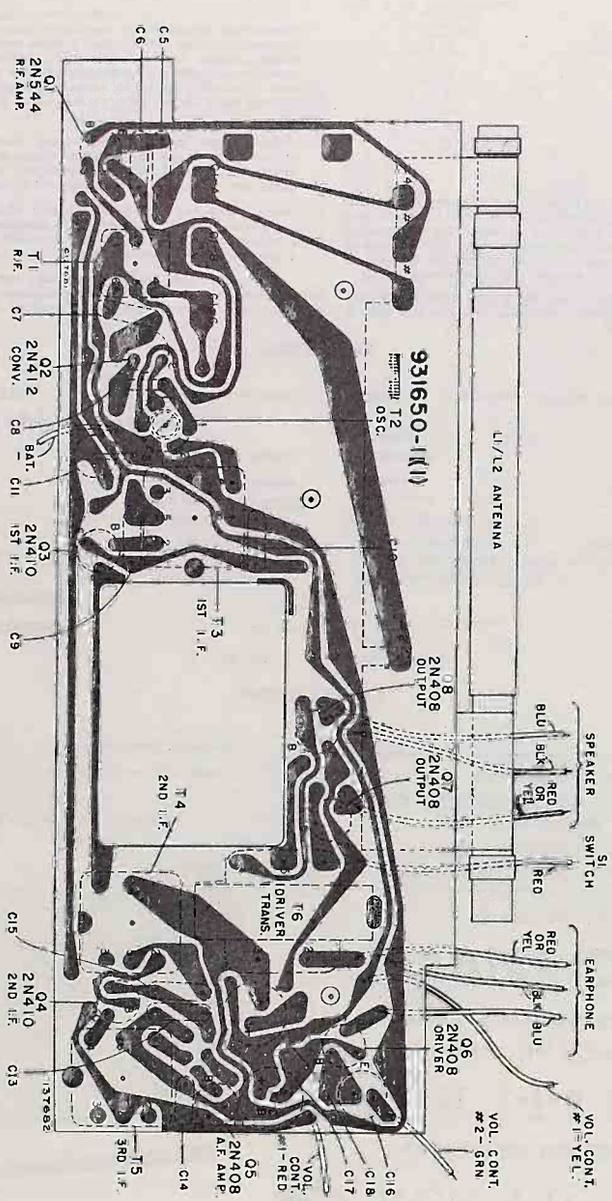
EARPHONE CONNECTION

Only a high impedance earphone (2000 ohms) should be connected into the earphone jack. RCA accessory earphone Number RK-219A is recommended.

Schematic Circuit Diagram



Circuit Board Wiring and Components View from Wiring Side



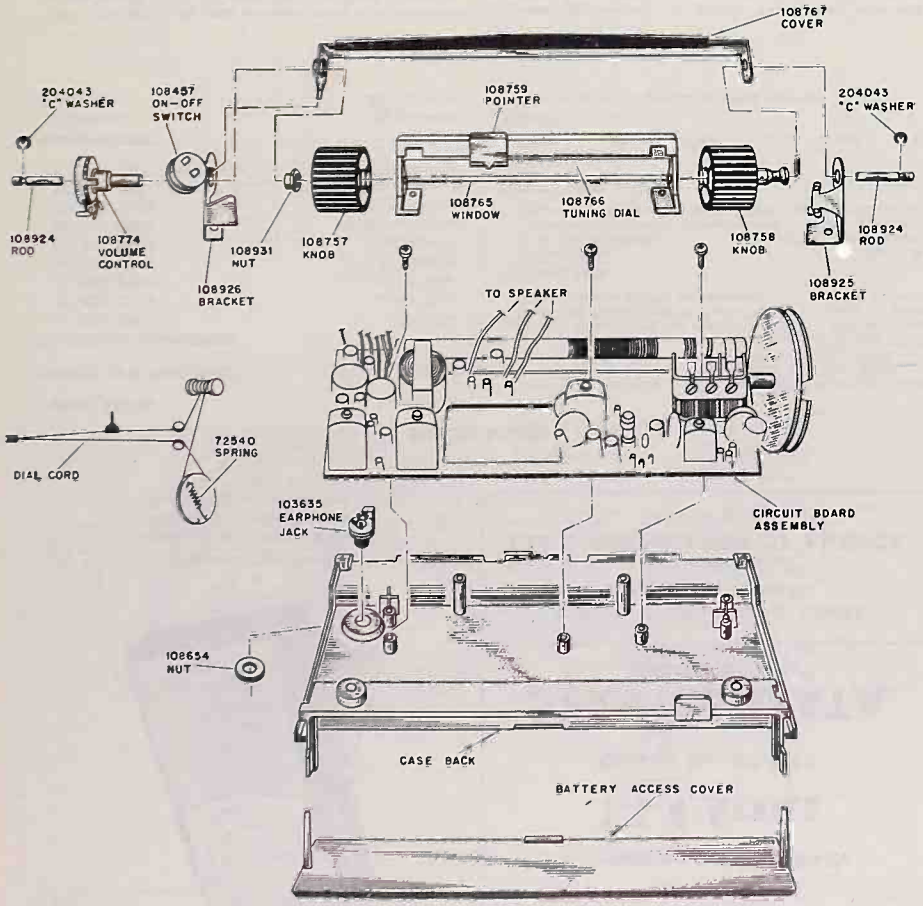
The assembly represented above is viewed from the wiring side of the board.

The printed wiring on the rear side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI—Issue 6—Dated August 25, 1955.

CHASSIS AND CASE BACK ASSEMBLY

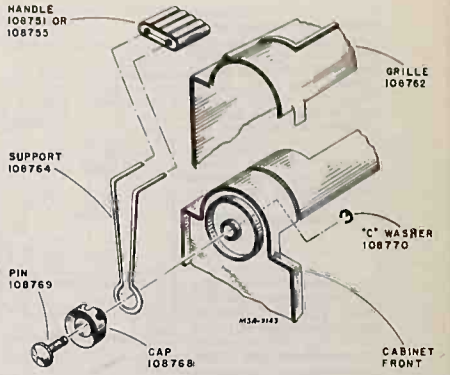
Mount board assembly with three screws.
Mount earphone jack and wire to board.
Snap dial scale into window and mount assembly with two screws.
Mount switch to vol. cont. bracket, mount vol. cont. to bracket with special nut (including one end of dial cover), attach vol. cont. knob.
Mount tuning end bracket with one screw.
Slide rod through bracket, end of cover, tuning knob, window and vol. cont. bracket assy.
Mount vol. cont. bracket with one screw.
Place "C" washers on ends of rod.
String dial cord and adjust pointer.
Lubricate pulleys—NOT POINTER TRACK.
Wire volume control and switch.
Snap in battery contacts and connect leads.
Wire leads to speaker.
Assemble case front assembly to case back assembly with two screws.
Install batteries and snap on battery cover.



Chassis and Case Back Assembly

HANDLE AND CASE FRONT ASSEMBLY

Lay screen in place—attach grille and bend tabs.
Mount speaker with two clips.
Wire in capacitor C19.
Handle—slip cap on wire, slide wire in handle (both ends), insert pins through caps and secure with two "C" washers.



Handle and Case Front Assembly

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS RC-1195 CIRCUIT BOARD 931650-1
	108818	Circuit — Circuit board assembly — less antenna, tuning capacitor, transformers and transistors
		CAPACITORS:
C1A/B/C	108772	variable, tuning
C2 to C4	—	Part of C1
C5 to C7	105715	ceramic, 0.05 mfd., +100%, −20%, 100 v.
C8	105716	ceramic, 0.01 mfd., ±20%, 100 v.
C9, C10	105715	ceramic, 0.05 mfd., +100%, −20%, 100 v.
C11	106114	electrolytic, 10 mfd., 10 v.
C12	103382	electrolytic, 10 mfd., +250%, −10%, 10 v.
C13	105715	ceramic, 0.05 mfd., 100 v.
C14	105716	ceramic, 0.01 mfd., ±20%, 100 v.
C15	105715	ceramic, 0.05 mfd., 100 v.
C16	103382	electrolytic, 10 mfd., +250%, −10%, 10 v.
C17A/B	108151	electrolytic, 100/100 mfd., 10 v.
C18	106443	electrolytic, 190 mfd., 10 v.
L1, L2	108773	Antenna—Ferrite
		RESISTORS: Fixed, composition, ½ watt
R1	—	1000 ohm, ±10%
R2	—	2200 ohm, ±5%
R3	—	1500 ohm, ±5%
R4	—	22,000 ohm, ±10%
R5	—	6800 ohm, ±10%
R6	—	3300 ohm, ±10%
R7	—	6800 ohm, ±10%
R8	—	1000 ohm, ±10%
R9, R10	—	2700 ohm, ±10%
R11	—	39,000 ohm, ±10%
R12	—	6800 ohm, ±10%
R13	—	680 ohm, ±10%
R14 to R16	—	5600 ohm, ±10%
R17	—	4700 ohm, ±5%
R18	—	15,000 ohm, ±5%
R20	—	15,000 ohm, ±10%
R21	—	3900 ohm, ±20%
R22	—	470 ohm, ±10%
R23, R24	—	47 ohm, ±5%
R25	—	12,000 ohm, ±10%
R26	—	100 ohm, ±10%
R27	—	12,000 ohm, ±10%
T1	108776	Transformer—R.F.
T2	108160	Transformer—Oscillator
T3	108157	Transformer—1st I.F.
T4	108158	Transformer—2nd I.F.
T5	108775	Transformer—3rd I.F.
T6	108164	Transformer—Driver

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS RC-1195 MISCELLANEOUS
C19	—	Capacitor—Paper, 0.33 mf, ±20%, 200 v.
J1	103635	Jack—Earphone jack
R19	108774	Control—Volume control, 5000 ohm
S1	108457	Switch—"On-Off" switch
	108925	Bracket — Dial mounting bracket — tuning control end—with two pulleys
	108926	Bracket — Dial mounting bracket — volume control end—with one pulley
	108760	Contact—Battery contact, formed metal (positive)
	108761	Contact — Battery contact, conical spring (negative)
	72953	Cord—Pointer drive cord (250 ft.)
	108767	Cover—Dial, roll cover
	108766	Dial—Tuning
	108754	Knob—Control, tuning, aqua
	108753	Knob—Control, volume, aqua
	108758	Knob—Control, tuning, charcoal
	108757	Knob—Control, volume, charcoal
	108931	Nut—Volume control mounting nut—special
	108759	Pointer—Dial pointer
	101663	Pulley—Tuning cord pulley
	108924	Rod—Dial and control knob mounting rod
	101069	Spring—Control knob
	72540	Spring—Drive cord tension
	204043	Washer—"C"—rod retaining washer
	108765	Window—Dial, clear lucite
		CABINET ASSEMBLY
	108768	Cap—Handle loop cap
	Y7095	Case—Aqua, front and rear sections for 1-T-5L—less battery cover
	Y7096	Case—Charcoal, front and rear sections for 1-T-5J—less battery cover
	108756	Cover—Battery, access, charcoal
	108752	Cover—Battery access, aqua
	108762	Grille—Speaker, aluminum
	108751	Handle—Carrying aqua—less support
	108755	Handle—Carrying, charcoal—less support
	108654	Nut—Earphone jack
	108769	Pin—Handle support mounting
	108763	Screen—Speaker grille
	108764	Support—Handle support loop
	108770	Washer—"C"—handle pin retainer
	102546	Washer—"C"—speaker mounting
		SPEAKER ASSEMBLY
	108771	Speaker—P.M. 4" x 6"

RCA VICTOR

1-T-4 Series — The "Hawaii"
Model 1-T-4E — Antique White
Model 1-T-4H — Light Turquoise
Model 1-T-4J — Charcoal Gray

8-Transistor Personal Radio

1-T-4 SERIES

Chassis No. RC-1197

SERVICE DATA

1959 No. 37

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TRANSISTOR COMPLEMENT

(1) RCA 2N412	Converter
(2) RCA 2N410	1st I-F Amp.
(3) RCA 2N410	2nd I-F Amp.
(4) RCA 2N406	A.F. Amplifier
(5) RCA 2N406	Audio Driver
(6) RCA 2N408	Push-pull Output
(7) RCA 2N408	Push-pull Output
(8) RCA 3458	Overload Limiter
Type 1N60 Crystal Diode	2nd Detector

POWER OUTPUT

Undistorted	300 milliwatts
Maximum	400 milliwatts

BATTERY

Four "A-A" size cells ..... Long Life RCA Type VS334
or Standard RCA Type VS034
or Mercury RCA Type VS313
or Rechargeable RCA Type RCB-3

Current consumption (no signal) ..... Approx. 9 ma.
Useful life (intermittent service—VS034) ... Approx. 22 hours
Use per charge (RCB-3 rechargeable) ..... Approx. 25 hours

LOUDSPEAKER

Size and type ..... 3½" P.M.
Voice coil impedance ..... 130 ohm center-tapped
Provision is made for connection of a 2000 ohm impedance earphone. RCA accessory earphone RK-219A is recommended.

TUNING DRIVE RATIO ..... 1:1 (direct)

DIMENSIONS

Height ..... 6⅞" Width ..... 4" Depth ..... 2"

WEIGHT

Approximately 1½ pounds including batteries.

DESCRIPTION

The "1-T-4 Series" are radio receivers having eight transistors and one crystal diode. The superheterodyne circuit consists of converter, two stages of i-f amplification, crystal diode detector, 1st a-f amp., audio driver and push-pull Class B output. A 3½ inch speaker is used for normal listening; a jack for earphone or external speaker connection is also provided.

The receiver is powered by either four "penlite cells" or four rechargeable cells RCA Type RCB-3. The batteries are replaceable upon removal of a plastic cap and a battery contact assembly at the bottom of the case. Four standard (RCA Type VS034) "penlite" batteries provide approximately 22 hours intermittent service. The rechargeable battery provides approximately 25 hours intermittent service from one overnight charge from RCA battery charger unit Model RK-249. A socket at the back of the case is used to connect the radio to the RK-249 charger unit.

A printed circuit type of chassis is used to obtain light weight and compact size. The complete receiver including batteries weighs approximately 1½ pounds. The "Impac" case with polished brass escutcheon and plastic handle combines durability with smart appearance.

SUPPLEMENTARY INFORMATION

Issue	Subject

List related Supplements and Service Ties above.

Printed in U. S. A.

SERVICE HINTS

General Information

Extreme care should be used to avoid accidental shorting of transistor elements to circuit ground. This is especially true of the output transistors; if the junction of R15, R16, R17 should be accidentally grounded for a few seconds, the output transistors would be permanently damaged.

It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only low voltage applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor from the chassis before making continuity tests of its circuit.

1. When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be approximately 6 volts with new batteries. The receiver can be expected to operate if the total battery voltage checks between 4 volts and 6 volts with the proper polarity.
   Check to make sure that every cell is inserted in the right direction as indicated on the label attached to the battery contact assembly and illustrated.
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons explained above, continuity measurements can be misleading.
3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).
4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.
5. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.
6. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).
7. D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.
8. Interchanging transistors in the I-F stages may necessitate realignment.

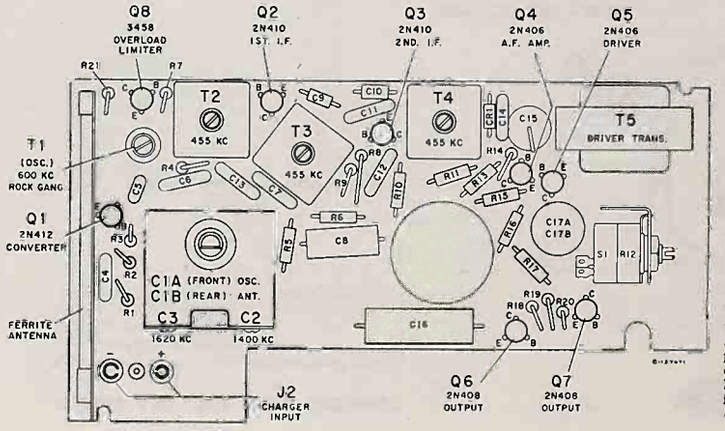
ALIGNMENT PROCEDURE

Test Oscillator—For all alignment operations, connect the low side of the test oscillator to the "common positive" wiring and keep the oscillator output as low as possible to avoid AVC action.

Connect output meter across voice coil.

Step	Connect High Side of Sig. Gen. to—	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang stator thru .01 mf	455 kc	Quiet point near 1600 kc	T4 3rd I-F T3 2nd I-F T2 1st I-F
2		Repeat Step 1		
3	Short wire placed near antenna for radiated signal	1620 kc	Gang fully open	Oscillator trimmer C3
4		1400 kc	1400 kc	Antenna trimmer C2
5		600 kc	600 kc rock gang	T1 osc. coil
6		Repeat Steps 3, 4 and 5		

Antenna trimmer is located on front section of gang.
Oscillator trimmer is located on rear section of gang.



Chassis Layout — View from Component Side

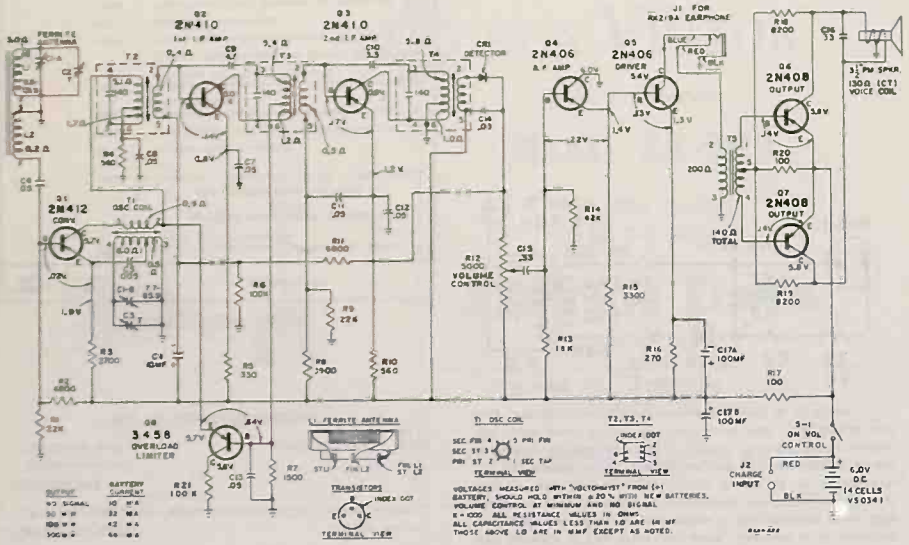
EARPHONE CONNECTION

Only a high impedance earphone (approx. 2000 ohms) should be connected into the earphone jack. RCA accessory earphone Number RK-219A is recommended.

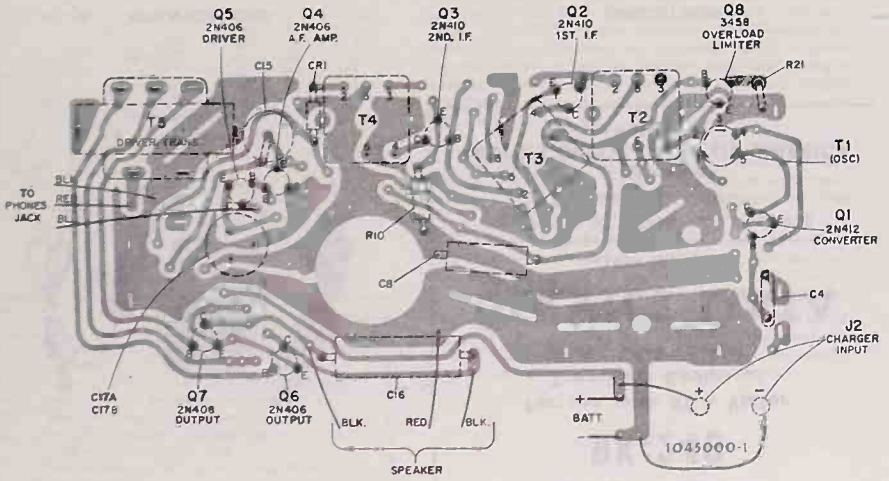
CHASSIS REMOVAL

Care must be used when removing the dial knob to prevent damage to the circuit board.

The knob can be removed only by first removing the three chassis mounting screws and then gently pulling the chassis assembly away from the case front. Rock the chassis while pulling on the case and chassis assembly.



Schematic Diagram



Chassis Wiring and Components — View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.

The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI—Issue 6—Dated August 25, 1955.

1-T-4 Series

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1197
		CAPACITORS
C1A/B	108632	variable tuning
C2	—	trimmer—Part of C1A
C3	—	trimmer—Part of C1B
C4	105715	ceramic, 0.05 mf, +100%, −20%, 100 v.
C5	108630	ceramic, 0.005 mf, ±20%, 100 v.
C6, C7	105715	ceramic, 0.05 mf, +100%, −20%, 100 v.
C8	106114	electrolytic, 10 mf, 10 v.
C9	102235	beaded lead, 4.7 mmf, ±10%, 500 v.
C10	71503	beaded lead, 3.3 mmf, ±10%, 500 v.
C11 to C13	105715	ceramic, 0.05 mf, +100%, −20%, 100 v.
C14	108168	ceramic, 0.01 mf, ±20%, 100 v.
C15, C16	108307	film, 0.33 mf, ±20%, 50 v.
C17A/B	108631	electrolytic, 100/100 mf, +250%, −10%, 10/10 v.
CR1	101615	Rectifier—Crystal diode
L1, L2	108634	Antenna—Ferrite core
		RESISTORS: Fixed, composition, ½ watt, unless otherwise specified
R1	—	22,000 ohm, ±10%
R2	—	6800 ohm, ±10%
R3	—	2700 ohm, ±10%
R4	—	560 ohm, ±10%
R5	—	330 ohm, ±10%
R6	—	100,000 ohm, ±10%
R7	—	1500 ohm, ±10%
R8	—	3900 ohm, ±10%
R9	—	22,000 ohm, ±10%
R10	—	560 ohm, ±10%
R11	—	6800 ohm, ±10%
R12	108633	control—volume (includes switch S1)
R13	—	18,000 ohm, ±10%
R14	—	82,000 ohm, ±10%
R15	—	3300 ohm, ±10%
R16	—	270 ohm, ±10%
R17	—	100 ohm, ±10%
R18, R19	—	8200 ohm, ±10%
R20	—	100 ohm, ±10%
R21	—	100,000 ohm, ±10%
S1	108633	Switch—On-off (included with R12)
T1	108160	Coil—Oscillator coil
T2	108635	Transformer—1st IF transformer
T3	108636	Transformer—2nd IF transformer
T4	108637	Transformer—3rd IF transformer
T5	108164	Transformer—Driver transformer
	108675	Circuit—"Security Sealed Circuit" chassis assembly — less antenna, tuning capacitor, volume control, driver transformer and transistors
J2	108638	Connector—Female, 2 contact charger input
		SPEAKER ASSEMBLY
	108163	Speaker—3½" PM speaker assembly
		MISCELLANEOUS
	Y7092	Cabinet—Antique white for Model 1-T-4E
	Y7093	Cabinet—Light turquoise for Model 1-T-4H
	Y7094	Cabinet—Charcoal gray for Model 1-T-4J
	108639	Cap — Battery access cap assembly for Model 1-T-4E antique white
	108640	Cap — Battery access cap assembly for Model 1-T-4H turquoise
	108641	Cap — Battery access cap assembly for Model 1-T-4J charcoal gray
	108652	Clip—For mounting battery holder to case
	108653	Contact—Battery contact assembly—under battery access cap
	108649	Escutcheon—Cabinet front escutcheon
	108655	Grille—Speaker grille for Model 1-T-4E
	108656	Grille—Speaker grille for Models 1-T-4H and 1-T-4J
	108646	Handle — Carrying handle assembly for Model 1-T-4E
	108647	Handle — Carrying handle assembly for Model 1-T-4H
	108648	Handle — Carrying handle assembly for Model 1-T-4J
	108651	Holder—Battery holder and spring contact assembly
J1	103635	Jack—Earphone jack
	108645	Knob—Tuning control knob
	108642	Knob—Volume control knob for Model 1-T-4E
	108654	Nut—For earphone jack mounting
	108650	Retainer—Speaker mounting retainer
	108657	Screw—#6 x 7/16"—cabinet back retaining
	74791	Screw—#4 x 5/16"—chassis mounting
	74734	Spring—Retaining spring for tuning knob

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

BATTERY INSTALLATION

Four types of batteries may be used with radios of the 1-T-4 Series. Four individual cells of any one type are required:

VS034 Standard penlite
VS334 Longlife penlite
VS313 Mercury cells
RCB-3 Rechargeable

The cells are held in two insulating tubes, two cells in each tube. The battery contact assembly, under the battery access cap at the bottom of the case, serves both to interconnect the two groups of cells and also to hold the cells in the insulating tubes.

To remove batteries, remove the access cap by turning its center screw one-quarter turn and then removing battery contact assembly by pulling on the tab marked "PULL". The four cells should then drop out when the radio is held upright. It may be necessary to tap the case slightly to free the batteries.

4 PENLITE CELLS—TYPE VS034 or VS334 OR RECHARGEABLE RCB-3

Battery Installation Using VS034, VS334 or RCB-3 Cells

WHEN INSTALLING NEW BATTERIES IT IS ESSENTIAL THAT THEY BE INSTALLED IN THE CORRECT DIRECTION.

NOTE THAT TWO CELLS MUST BE INSERTED WITH THE POSITIVE END INWARD AND TWO CELLS WITH THE NEGATIVE END INWARD.

Mercury cells Type VS313 have a CENTER NEGATIVE polarity and must be installed as shown below:

4 MERCURY CELLS – TYPE VS313

Battery Installation Using VS-313 Mercury Cells

CAUTION

The two insulating tubes used to hold the batteries must not have reversed contacts. The long PLASTIC LUG of the inner contacts must fit into the METAL GUIDE toward the CASE SIDE.

The NEGATIVE CONTACT LEAD (BLACK) must be toward the CASE BACK.

RCA VICTOR

Battery Charger Unit

RK-249

For use with RCA Victor Transistor Radios of the I-T-4 Series

SERVICE DATA

— 1959 No. 44 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

Model RK-249
Battery Charger Unit

SPECIFICATIONS

POWER SUPPLY RATING

Transformer/socket unit ..... 115 volts, 60 cycles; 1.5 watts
Connector unit ..... 12 volts d.c.

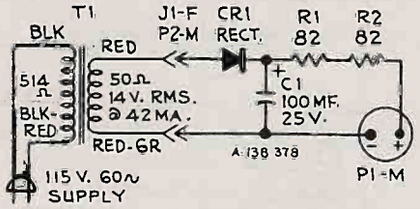
CHARGING RATE ..... Approx. 42 ma.
Will fully charge four series-connected RCB-3 cells in 12 hours.

DIMENSIONS

Transformer unit ..... 2" x 2½" x 3"
Connector unit ..... 0.800" dia. x 4.31" long with five ft. cable
Plug fits cigarette lighter socket.

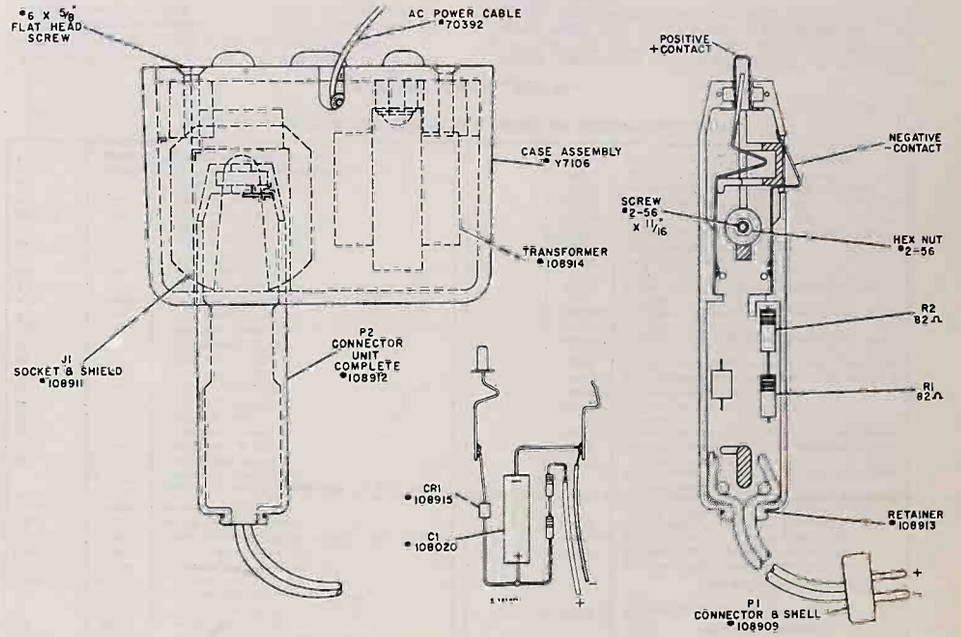
DESCRIPTION

Model RK-249 is a Battery Charger Unit designed for use with RCA Victor transistor radios of the I-T-4 Series when rechargeable batteries have been installed. The Battery Charger Unit consists of two separable units. One unit is a connector and cable assembly—for connection to the transistor radio. This connector may be inserted either into the transformer/socket unit or into the cigarette lighter socket of an automobile (12 volt system only). The second unit is a transformer/socket assembly—for connection to a 115 volt, 60 cycle power supply. The transformer/socket unit consumes very little power and may remain connected to the power supply at all times.



REPLACEMENT PARTS

SYMBOL NO	STOCK NO	DESCRIPTION
	108910	Battery — Rechargeable battery type RCB-3, 1.2 volts, 500 milliampere-hr.
		BATTERY RECHARGER ASSEMBLY RK-249
		SEE ILLUSTRATION ON PAGE 2
C1	108020	Capacitor — Electrolytic, 100 mf, −10% +250% 25 v.
CR1	108915	Rectifier—Silicon rectifier
J1	108911	Socket—Socket and shield for transformer unit
P1	108909	Connector—2-contact male connector and shell for battery cable
P2	108912	Connector—Connector unit and cable assembly—includes C1, CR1, P1, R1 and R2
R1, R2	—	Resistor—Fixed composition, 82 ohm, ±10%, ½ w.
T1	108914	Transformer—Power transformer, 115 v., 60 cy.
	70392	Cable—AC power cord
	Y7106	Case—Plastic case assembly for transformer unit
	108913	Retainer—Retaining ring for connector unit



Assembly of RK-249 Battery Charger Unit

RCA VICTOR

Auto Adaptor

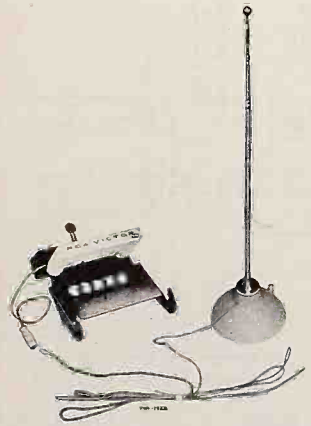
MODEL RK-260

For RCA Victor
Model T-1 Series

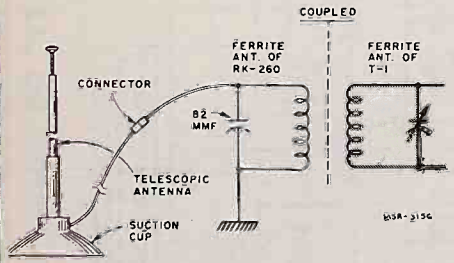
SERVICE DATA

— 1959 No. 45 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



Model RK-260
Auto Adaptor



Schematic Diagram

REPLACEMENT PARTS

STOCK NO.	DESCRIPTION
108808	Antenna — Ferrite antenna and case assembly — includes capacitor and 12" lead.
108807	Antenna—Telescopic antenna with suction cup and cable
108804	Bracket—Mounting for antenna case assembly
108803	Bracket—Dash mounting—less thumb screw
207105	Capacitor—Automobile noise suppressor—0.5 mf, 200 volts, with radial bracket and 6" lead
101836	Capacitor—Fixed ceramic, 82 mmf, ±20%, 500 volt
108947	Clip—Ground clip
77057	Eyelet—Metal eyelet for mounting grommets
108805	Grommet—Antenna case mounting grommet
108902	Lead—Antenna case lead-in 12" long with male connector
108903	Lead — Telescopic antenna lead 84" long with female connector
108806	Screw—Thumb screw (¼"-20) for mounting bracket
205815	Suppressor—Automobile distributor type spark suppressor

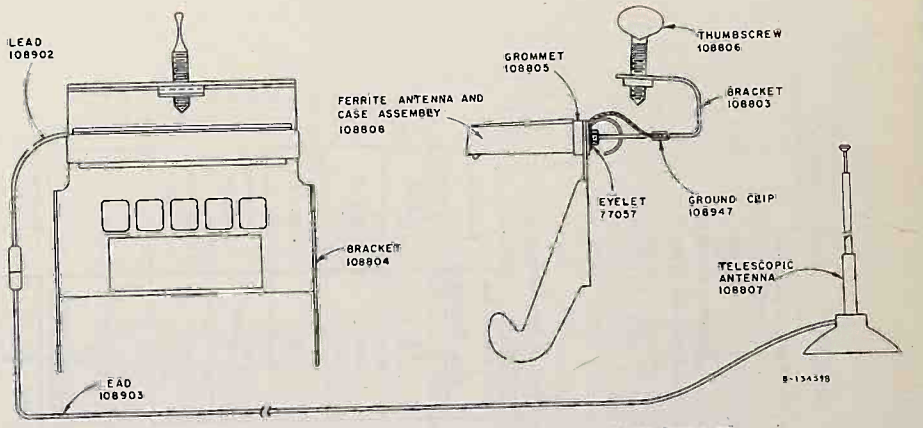
DESCRIPTION

Model RK-260 Auto Adaptor is designed for use of transistor radios of the RCA Victor Model T-1 Series inside of an automobile. Model RK-260 consists essentially of a telescopic antenna designed for suction cup mounting and a two-piece mounting bracket to hold the transistor radio. The projecting mounting bracket contains a ferrite antenna which couples signal received from the telescopic antenna to the antenna within the transistor radio.

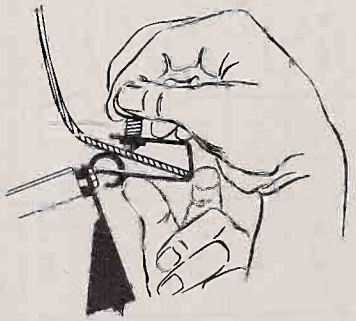
In use, the mounting bracket is clamped to the automobile dash and the radio placed in the hinged projecting bracket. The telescopic antenna is intended to be mounted on the hood or roof of the car. The flexible lead connecting the two units will be clamped by the automobile door seal.

The hinged design of the mounting bracket permits the Adaptor to be turned to any desired angle. The mounting bracket that fits against the front of the dash is vinyl coated to permit easy adjustment and to prevent marring the dash.

A molded lip on the ferrite antenna case holds the Model T-1 radio securely to the Adaptor. To release the radio from the Adaptor, it is only necessary to push up slightly on the antenna case. Rubber mounting grommets permit this flexibility.

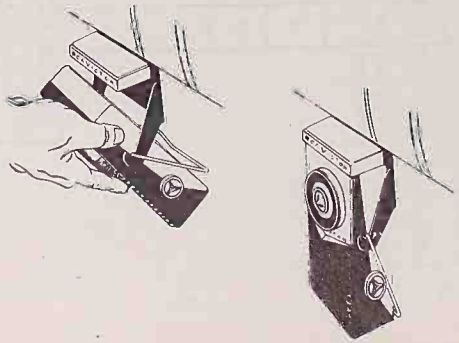


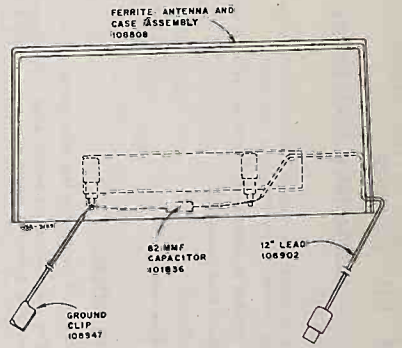
Antenna and Bracket Assembly



BRACKET INSTALLATION

Push bracket tightly against back lip of dash, as shown. Tighten thumbscrew.





Ferrite Antenna and Case Assembly

NOISE SUPPRESSION

Auto Adaptor Model RK-260 is intended for use primarily in areas of high signal strength. The high signal strength will override the noise emmanating from the ignition system of most automobiles.

A distributor suppressor and a shielded capacitor are included in the Adaptor Kit for use in noise suppression. Standard techniques for noise suppression should be employed where necessary.

ATTACHING RADIO

Push radio handle to easel position. Tilt top of radio toward yourself and insert handle into bracket holder grooves. Snap radio top under lip of antenna case.

REMOVING RADIO

Push up slightly on antenna case and tilt radio out from under lip of antenna case. Lift radio out.

(A) RADIO CHASSIS NO. 528.53620

ALIGNMENT PROCEDURE

PRELIMINARY:

NOTE: When servicing this receiver, use battery, Catalog No. 57-6420 or equivalent only, otherwise damage to the transistors may result.

Output meter reading to indicate 0.05 watt across voice coil.....0.4 volt

Generator ground lead connection.....Common ground

Generator modulation.....30%, 400 cycles

Position of volume control.....Fully on

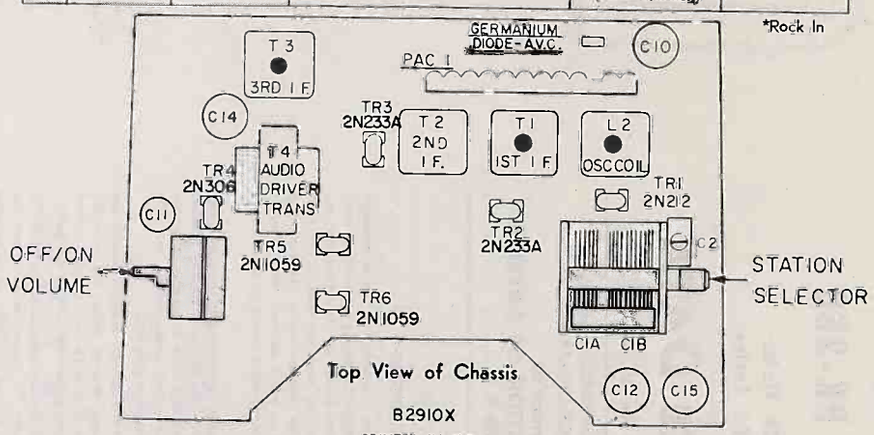
ALIGNMENT NOTES:

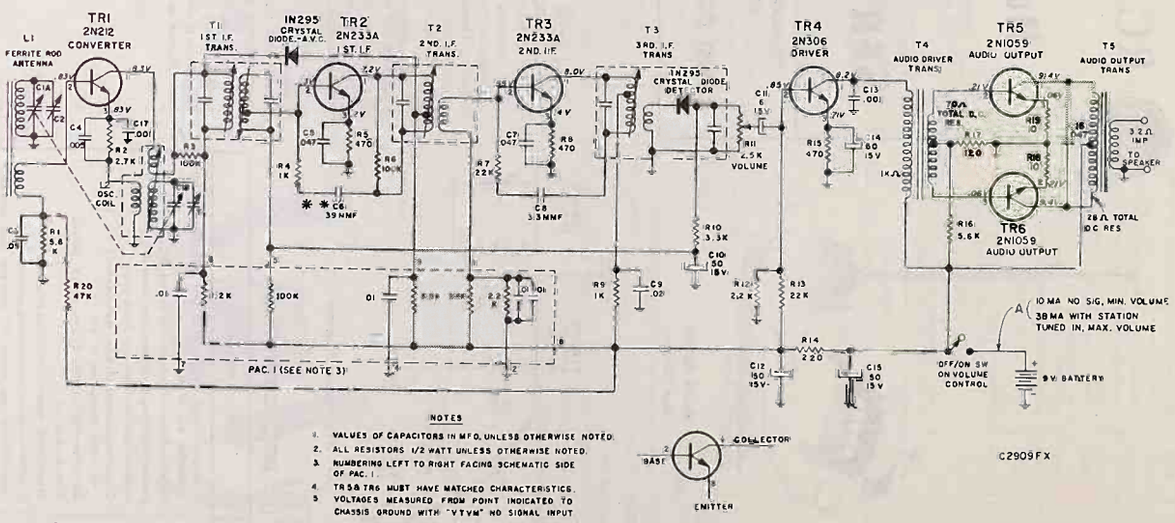
1. The alignment must be done in the order given below.

2. While making the adjustments below, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Position of Tuner	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment for Max. Output	Function
1	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T3	3rd I.F.
2	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T2	2nd I.F.
3	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T1	1st I.F.
4	open	1610 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	C1B Trimmer	Oscillator Trimmer
5	closed	532 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	L2	Oscillator Coil
6	Repeat steps 4 & 5 until no further changes occur.					
7	1400 Kc.	1400 Kc.	Hazeltine Test Loop		C2 (Ant. Trimmer)	R.F.*

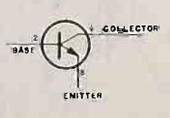
*Rock In





NOTES

1. VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE NOTED.
2. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE NOTED.
3. NUMBERING LEFT TO RIGHT FACING SCHEMATIC SIDE OF PAC. 1.
4. TR5 & TR6 MUST HAVE MATCHED CHARACTERISTICS.
5. VOLTAGES MEASURED FROM POINT INDICATED TO CHASSIS GROUND WITH "VTVM" NO SIGNAL INPUT



C2909FX

PARTS LIST — RADIO CHASSIS

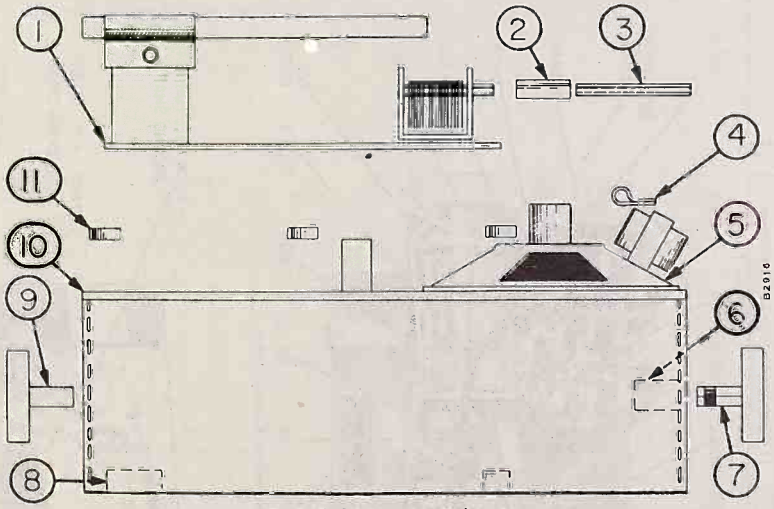
Schematic Location	Part Number	Description
	CAPACITORS	
C1 A&B	19-76-2	Variable Tuning (Inc. C2)
C2	19-187-0	Trimmer, Antenna (Part of C1)
C3	20-57-1	Tubular, .05 mfd., 12v.
C4	15-50216	Disc, .005 mfd., 500 v., GP
C5,C7,C16	20-56-1	Tubular, .047 mfd., .200 v.
* * C6	15-390114	Disc, 39 mmfd., 10%, 500 v., N750
C8	15-339141	Disc, 3.3 mmfd., ±1 mmfd., 500 v., NPO
C9	15-203i6	Disc, .02 mfd., 500 v.
C10,C12 C14,C15	18-61-5	Electrolytic, 50 mfd., 15 v.
C11	18-60-5	Electrolytic, 6 mfd., 15V
C13,C17	15-10216	Disc, .001 mfd., 500 v. GP
	RESISTORS	
	(All resistors 1/2 w., 10% unless otherwise noted)	
R1, R16	60-56201	5.6K ohm
R2	60-27201	2.7K ohm
R3	60-10401	100K ohm
R4,R9	60-10201	1K ohm
R5,R8,R15	60-47101	470 ohm
R6	60-10401	100K ohm
R7,R13	60-22301	22K ohm
R10	60-33201	3.3K ohm
R11	24-331-0	2.5K ohm
R12	60-22201	2.2K ohm
R14	60-22101	220 ohm
*R17	60-13101	120 ohm
R18,R19	60-10001	10 ohm
R20	63-47301	47K ohm
PAC 1	13-14-5	PAC Unit

Schematic Location	Part Number	Description
	TRANSFORMERS AND COILS	
T1	10-78-2	Transformer, 1st I.F.
T2	10-79-2	Transformer, 2nd I.F.
T3	10-80-2	Transformer, 3rd I. F.
T4	80-23-1	Transformer, Audio Driver
T5	80-70-1	Transformer, Audio Output (Mounted on Speaker)
L1	82-147-0	Antenna, Ferrite Rod
L2	10-48-4	Coil, Oscillator
	MISCELLANEOUS CHASSIS PARTS	
	33-377-4	Speaker (Inc. T5)
	45-16-0	Plug, Battery Connector
	11-1402	Bracket, Antenna Mounting

* * On some models C6 is 33 mmfd. (Part No. 15-3301.14)

* Value of R17 may vary from that shown. Replace with exact duplicate of part shown.

HOW TO ORDER REPLACEMENT PARTS		USED IN MODELS:
PART ORDERS MUST CONTAIN: 1. Part Number and Description. 2. Chassis Number — found on a metal plate on each chassis. 3. Model Number — found on the back, inside, or bottom of cabinet.	**WHERE TO ORDER:** Order from any Sears, Roebuck and Co., U.S.A. or Simpsons-Sears Limited, Canada, Retail or Mail Order Store. Prices are available upon application.	**9222** **9222.5**



Exploded View of Cabinet

PARTS LIST — CABINET

KEY NO.	PART NUMBER	DESCRIPTION
	38-2660-3	Owners Manual
1.	*	Chassis, Radio
2.	39-25-0	Coupling, Tuning Shaft
3.	39-153-3	Shaft, Tuning
4.	22-102-3	Retainer, Cable Clamp
5.	33-377-4	Speaker (Inc. T5)
6.	11-1380	Bracket, Shaft Support
7.	52-1117-0	Knob, Tuning
8.	28-175-1	Pad, Rubber (3)
9.	52-1118-0	Knob, Off/On - Volume
10.	42-64-1	Cabinet, Leather (9222)
	42-73-1	Cabinet, Leatherette (9222.5)
11.	77-29-0	Spacer, Chassis (3)

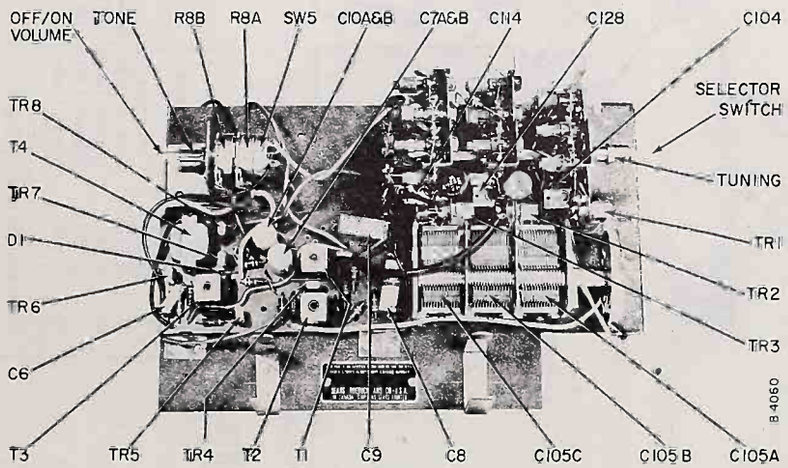
* Not supplied as a repair part

SEARS, ROEBUCK AND CO. U.S.A., and SIMPSONS-SEARS LIMITED

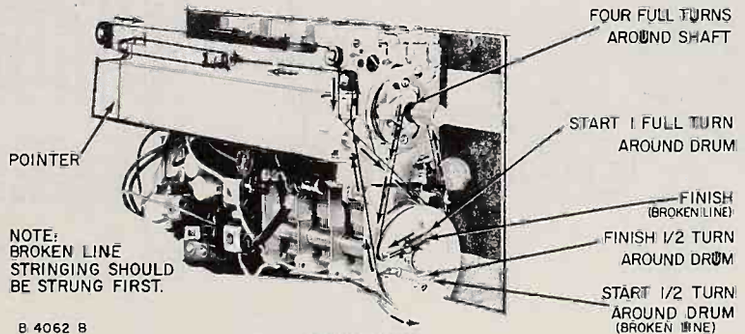
Silvertone PORTABLE RADIO

RADIO CHASSIS NO. 528.53680 (A)

HOW TO ORDER REPLACEMENT PARTS		USED IN MODEL:
PART ORDERS MUST CONTAIN: 1. Part Number and Description. 2. Chassis Number - found on a metal plate on each chassis. 3. Model Number - found on the back, inside, or bottom of cabinet.	WHERE TO ORDER: Order from any Sears Roebuck and Co., U.S.A., or Simpsons-Sears Limited, Canada, Retail or Mail Order Store. Prices are available upon application.	222

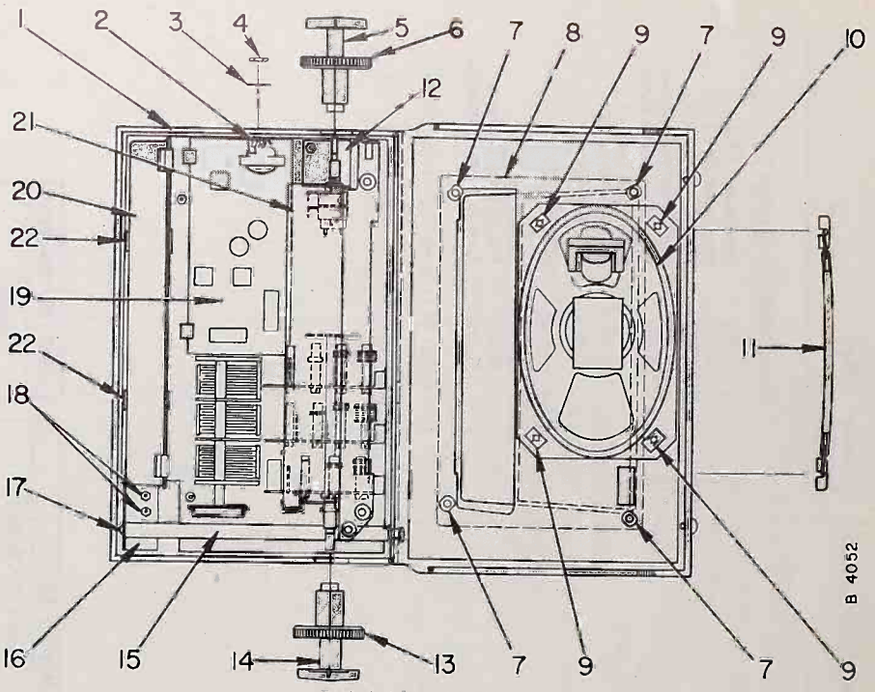


Transistor Chassis View



Dial Stringing

SEARS, ROEBUCK AND CO. U.S.A., and SIMPSONS-SEARS LIMITED



Exploded View of Cabinet

PARTS LIST – CABINET

KEY	PART NO.	DESCRIPTION
	38-3250	Owners Manual
	38-3249-1	Service Data Sheet
1.	42-96-1	Cabinet, 4 Band Portable
2.	45-8-1	Jack, Phone
3.	58-510	Washer, Flat (3/8x.265x.05)
4.	22-182-2	Nut, Knurled Ring (1/4-32x7/16)
5.	52-1308-0	Knob, Off/On Volume Control
6.	52-1307-0	Knob, Tone Control
7.	22-65-2	Speed Clip (4)
8.	40-221-0	Escutcheon
9.	22-138-2	Speed Nut (4)
10.	33-443-4 OR 33-444-4	Speaker (w/Trans.)
11.	49-559	Handle Assembly
12.	11-1592	Bracket, Volume Control
13.	52-1310-0	Knob, Tuning Control
14.	52-1309-0	Knob, Band Selector
15.	82-161-0	Antenna, Telescopic
16.	11-1596	Bracket, Antenna
17.	97-559	Screw (No. 6-32x3/16" Phil. Rnd. Hd.)
18.	22-31-2	Palnut (2)
19.	**	Chassis, Radio
20.	84-9033	Assembly, Battery Housing (Case and Cover)
	84-9006	Case, Battery Housing
	84-9008	Cover, Battery Housing
21.	84-7972	Assembly, Dial Background Bracket (Comp.)
22.	22-217-0	Retainer, Battery Case (2)

** See chassis parts list for repair parts.

CHASSIS: 528.53680

PARTS LIST — ...IO CHASSIS

CAPACITORS

Schematic Location	Part Number	Description
C1, C2, C3	20-140-0	Disc, .05 mfd., 30 V., +100 -20%
C4, C5	18-84-5	Electrolytic, 6 mfd., 15 V.
C6	18-105-5	Electrolytic, 20 mfd. 10 V. (A); 50 mfd., 10 V. (B)
C7A,B	18-94-5	Electrolytic, 50 mfd., 12 V.
C8, C9	18-104-5	Electrolytic, 50 mfd., 12 V. (A); 50 mfd., 12 V. (B)
C10A,B	15-15216	Disc, .0015 mfd., 500 V., 20%
C11	20-220-0	Disc, .05 mfd., 30 V., 20%
C12		

RESISTORS

(All Resistors 1/2 w., 10% unless otherwise noted)

R1	63-39301	39K ohm
R2	63-39101	390 ohm
R3	63-12201	1.2K ohm
R4	63-47201	4.7K ohm
R5	63-22301	22K ohm
R6	63-56101	560 ohm
R7	63-39201	3.9K ohm
R8A,B	24-368-0	(A) 5K ohm, Volume/OFF-ON Switch; (B) 50K ohm, Tone
R9	63-27301	27K ohm
R10	63-68201	6.8K ohm
R11	63-82101	820 ohm
R12, R13	63-22101	220 ohm
R14, R16	63-15201	1.5K ohm
R15, R17	63-56001	56 ohm
R18, R19, R20	60-33901	3.3 ohm

TRANSFORMERS

T1	10-128-2	Transformer, 1st IF
T2	10-129-2	Transformer, 2nd IF
T3	10-130-2	Transformer, 3rd IF
T4	80-108-1	Transformer, Audio Driver
T5	80-120-1	Transformer, Audio Output (Located on Speaker)

MISCELLANEOUS RADIO PARTS

84-9082	Assembly, Circuit Board (Comp.)
25-24-1	Etched Circuit Board
84-7978	Assembly, Ant. Section Mtg. Plate (Staking)
84-7980	Assembly, RF Section Mtg. Plate (Staked)
	Assembly, Osc. Section Mtg. Plate (Staked)
45-141-2	Socket, Subminature (3)
22-213-0	Retainer, Socket (3)
45-51-5	Contact, Test Point (3)
69-2-3	Wafer Switch (Ant. Section)
69-7-3	Wafer Switch (RF Section)
69-5-3	Wafer Switch (No. 1 Osc. Section)
69-6-3	Wafer Switch (No. 2 Osc. Section)
39-207-3	Shaft and Index
58-521	Washer, Lock (Split No. 4) (6)
57-405141	Screw, Mach. (No. 4-40x5/16" Sltd. Fill. Hd.) (4)
57-416141	Screw, Mach. (No. 4-40x1" Sltd. Fill. Hd.) (2)
57-504111	Screw, Mach. (No. 5-40x1/4" Sltd. Rnd. Hd.) (2)
77-57-0	Spacer, Switch (2)
31-583-0	Plate, Tuner Mtg.
57-604161	Screw, Mach. (No. 6-32x1/4" Sltd. Pan. Hd.) (6)
57-604111	Screw, Mach. (No. 6-32x1/4" Sltd. Rnd. Hd.) (3)
11-1594	Bracket, Chassis (2)
11-1592	Bracket, Volume Control
84-7972	Assembly, Dial Background Riveting
97-831	Screw, Mach. (No. 6-32x5/16" Phil. Bnd. Hd. Ext. T) (Tuner Mounting) (3)
22-225-0	Retainer, "O" Ring (Chassis Mounting) (2)

Schematic Location	Part Number	Description
	39-63-1	Pulley, Tuning
	44-134-1	Barrier (Dial Background)
	57-604211	Screw, Mach. (No. 6-32x1/4" Phil. Rnd. Hd.) (Dial Background Mtg.) (4)
	67-672-0	Dial Scale
	51-1112	Dial Cord 41"
	45-97-5	Terminal Ring (2)
	39-62-1	Pulley (2)
	70-401-0	Spring, Tension
	52-219-1	Pointer, Dial

84-7976 RADIO TUNER (COMPLETE)

CAPACITORS

C101, C112, C126	19-8-6	Trimmer, 4-40 mmfd.
C102, C111, C125	19-7-6	Trimmer, 7-100 mmfd.
C103, C104, C113, C114, C127, C128	19-9-6	Trimmer, 2-25 mmfd.
C105A,B,C	19-34-3	Tuning Condenser
C106, C130	20-210-0	Disc, .02 mfd., 30 V., 20%
C107, C124, C129	20-139-0	Disc, .1 mfd., 30 V., +100 -20%
C108, C109, C123	20-208-0	Disc, .05 mfd., 10 V., +80 -20%
C110	15-22111	Disc, 220 mmfd., 500 V., 10%
C115	20-26-2	Disc, 220 mmfd., 100 V., 3%
C116	15-10216	Disc, .001 mfd., 20% GP
C117	20-29-2	Disc, 430 mmfd., 100 V., 2%
C118	15-47116	Disc, 470 mmfd., 20%, GP
C119	20-28-2	Disc, .0013 mfd., 100 V., 2%
C120	15-39116	Disc, 390 mmfd., 20%, GP
C121	20-25-2	Disc, .005 mfd., 100 V., 2%
C122	15-15116	Disc, 150 mmfd., 20%, GP
C131	15-22913	Disc, 2.2 mmfd., 500 V., 15%, NPO

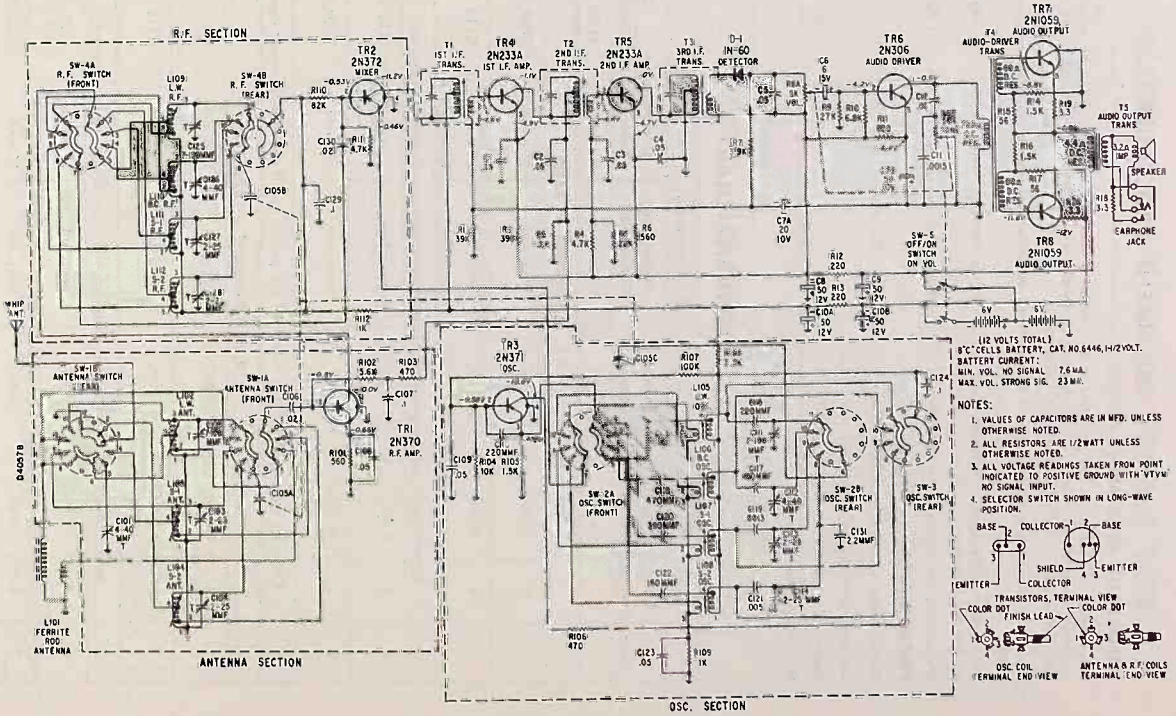
RESISTORS

(All Resistors 1/2 w., 10% unless otherwise noted)

R101	60-56101	560 ohm
R102	60-56201	5.6K ohm
R103, R106	60-47101	470 ohm
R104	60-10301	10K ohm
R105	60-15201	1.5K ohm
R107	60-10401	100K ohm
R108	60-22201	2.2K ohm
R109	60-10201	1K ohm
R110	60-82301	82K ohm
R111	60-47201	4.7K ohm

COILS

L101	82-160-0	Antenna, Ferrite Rod
L102	10-158-1	Coil, Antenna (LW)
L103	10-159-1	Coil, Antenna (S1)
L104	10-160-1	Coil, Antenna (S2)
L105	10-61-4	Coil, Oscillator (LW)
L106	10-62-4	Coil, Oscillator (BC)
L107	10-60-4	Coil, Oscillator (S1)
L108	10-63-4	Coil, Oscillator (S2)
L109	10-168-1	Coil, RF (LW)
L110	10-163-1	Coil, RF (BC)
L111	10-162-1	Coil, RF (S1)
L112	10-161-1	Coil, RF (S2)



ALIGNMENT PROCEDURE

IMPORTANT ALIGNMENT NOTES:

This receiver has been accurately aligned at the time of production and will not, under normal circumstances, require alignment except where major circuit components have been replaced. In this case it should be necessary to align only the band in which the component operates.

The entire alignment procedure should be completed separately for each band, before alignment on the next band is begun.

Alignment must be done in the order given and should be repeated, step by step, in the original order for each band, for greater accuracy.

Always keep the output of the generator at its lowest possible value to prevent the AVC of the receiver from interfering.

PRELIMINARY:

Output meter reading to indicate 0.05 watt across voice coil (3.2 ohm) . . . . . 0.4 volt

Generator ground lead connection . . . . . common ground

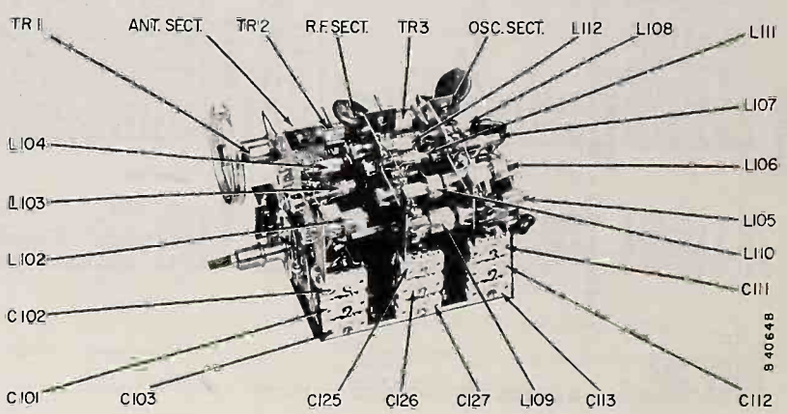
Generator modulation . . . . . 30%, 400 cycles

Position of volume control . . . . . fully on

ALIGNMENT CHART

Step	Band Switch	Tuner Position	Generator Frequency	Generator Connection	Dummy Antenna	Slug or Trimmer Adjustment	Slug or Trimmer Function
I. F. ALIGNMENT							
1	2	Open	455 KC.	C105B	.1 mfd.	T1,T2,T3	I.F.
R.F. ALIGNMENT — BAND 4							
1*	4	Closed	6.3 MC.	Whip Ant.	15 mmfd.	L108	Osc. Range (Low End)
2*	4	19 MC.	19.0 MC.	Whip Ant.	15 mmfd.	C114	Osc. Range (High End)
3*	Repeat steps 1 and 2 until simultaneous high and low end alignment is obtained.						
4	4	7 MC.	7 MC.	Whip Ant.	15 mmfd.	L112,L104	Ant. & RF Low End Tracking
5	4	17.5 MC.	17.5 MC.	Whip Ant.	15 mmfd.	C104,C128	Ant. & RF High End Tracking
6	Check for shift in alignment of Mixer and R.F. points. If shift has occured, repeat steps 4 and 5.						
R. F. ALIGNMENT — BAND 3							
1*	3	Closed	1.9 MC.	Whip Ant.	15 mmfd.	L107	Osc. Range (Low End)
2*	3	6.0 MC.	6.0 MC.	Whip Ant.	15 mmfd.	C113	Osc. Range (High End)
3*	Repeat steps 1 and 2 until simultaneous high and low end alignment is obtained.						
4	3	2.2 MC.	2.2 MC.	Whip Ant.	15 mmfd.	L103,L111	Ant. & RF Low End Tracking
5	3	5.6 MC.	5.6 MC.	Whip Ant.	15 mmfd.	C103,C127	Ant. & RF High End Tracking
6	Check for shift in alignment of Mixer and R.F. points. If shift has occured, repeat steps 4 and 5.						
R. F. ALIGNMENT — BAND 2							
1*	2	Closed	535 KC.	Hazeltine Loop		L106	Osc. Range (Low End)
2*	2	1600 KC.	1600 KC.	Hazeltine Loop		C112	Osc. Range (High End)
3*	Repeat steps 1 and 2 until simultaneous high and low end alignment is obtained.						
4	2	600 KC.	600 KC.	Hazeltine Loop		L110	Ant. & RF Low End Tracking
5	2	1400 KC.	1400 KC.	Hazeltine Loop		C126,C101	Ant. & RF High End Tracking
6	Check for shift in alignment of Mixer and R.F. points. If shift has occured, repeat steps 4 and 5.						
R. F. ALIGNMENT — BAND 1							
1*	1	Closed	190 KC.	Hazeltine Loop		L105	Osc. Range (Low End)
2*	1	400 KC.	400 KC.	Hazeltine Loop		C111	Osc. Range (High End)
3*	Repeat steps 1 and 2 until simultaneous high and low end alignment is obtained.						
4	1	225 KC.	225 KC.	Hazeltine Loop		L102,L109	Ant. & RF Low End Tracking
5	1	375 KC.	375 KC.	Hazeltine Loop		C102,C125	Ant. & RF High End Tracking
6	Check for shift in alignment of Mixer and R.F. points. If shift has occured, repeat steps 4 and 5.						

* Since alignment of all circuits depends upon the alignment of the oscillator circuit, steps 1 and 2 are critical, particularly for the long wave band. Therefore step 3 (on any band being aligned) should be executed to insure correct oscillator alignment.



Silvertone TECHNICAL MANUAL - PORTABLE RADIO

RADIO CHASSIS NOS. 528.53671& 528.53672 (†)

Ⓐ

HOW TO ORDER REPLACEMENT PARTS

PART ORDERS MUST CONTAIN:

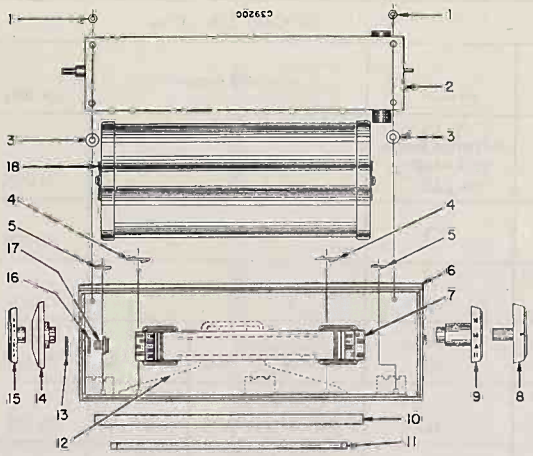
1. Part Number and Description.
2. Chassis Number → found on a metal plate on each chassis.
3. Model Number — found on the back, inside, or bottom of cabinet.

WHERE TO ORDER:

Order from any Sears, Roebuck and Co., U.S.A. or Simpsons-Sears Limited, Canada, Retail or Mail Order Store. Prices are available upon application.

USED IN MODEL:

220



PARTS LIST - CABINET

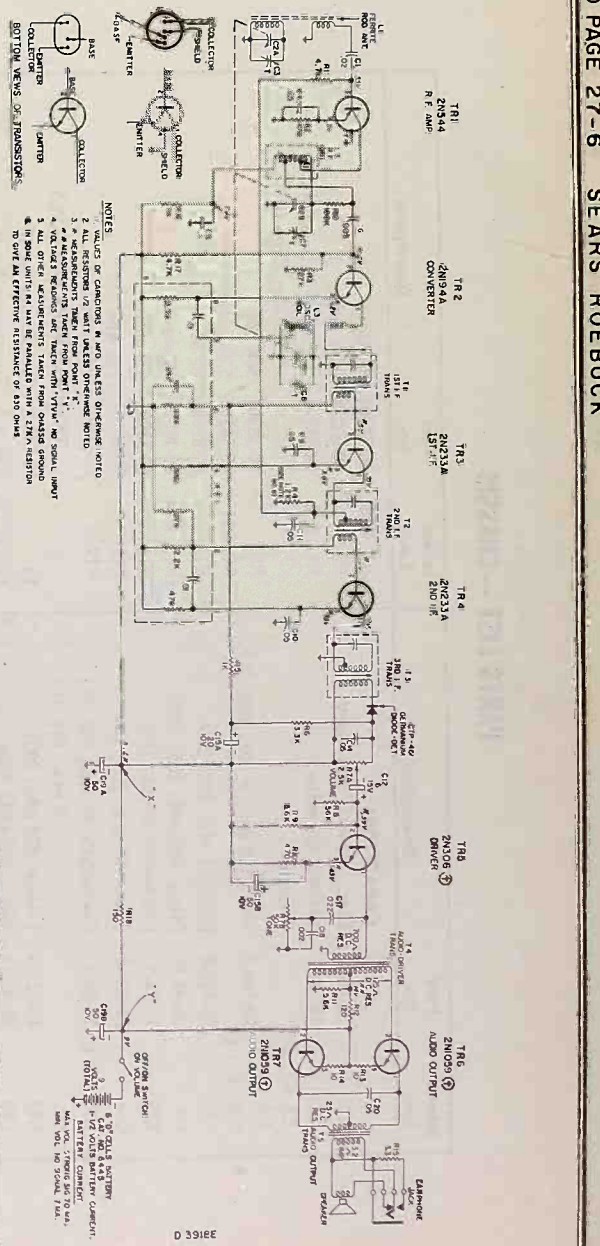
Key No.	Part No.	Description	Key No.	Part No.	Description
	38-3119	Owner's Manual	12	33-414-4	Speaker, P.M. (4 x 6 w/Trans.)
	38-3201-3	Service Data Sheet	13	22-182-2	Nut, Knurled Ring (1/4 – 32 x 7/16")
1	56-116	Nut, Hex (# 6-32 x 1/4") (2)	14	52-1262-0	Knob, Tone
2	*	Chassis	15	52-1261-0	Knob, Volume
	84-9278-2	Circuit Board (Inc. Transistors)	16	58-510	Washer, Flat (3/8 .265 x .015)
	22-204-2	Clip, Chassis Retainer	17	45-8-1*	Earphone Jack
3	77-53-0	Spacer, Chassis Mtg. (2)		84-7666	Earphone Jack and Leads (Inc. Items 13, 16 & 17)
4	22-138-2	Speednut (Speaker Mtg.) (4)		60-33901	Resistor 3.3 ohm 1/2 W. 10%
5	22-65-2	Speed Clip (Chassis Mtg.)	18	84-9148	Housing, Plastic Battery (Complete)
6	42-93-1	Cabinet, Portable (Leather)		84-9149	Case, Battery Housing (Less Cover)
7	49-543	Handle		84-9151	Cover, Battery Housing
8	52-1259-0	Knob, Tuning			
9	52-1311-0	Knob, Indicating			
10	40-207-0	Escutcheon			
11	40-61-1	Grill (Insert)			

* Not supplied as repair part.
† Alternate Chassis. See Schematic Diagram.

SEARS, ROEBUCK AND CO., U.S.A. and SIMPSONS-SEARS LIMITED

(†) Chassis No. 528.53672 is identical with Chassis No. 528.53671 except for the difference within the transistor groups used for TR5, TR6, and TR7. Chassis No. 528.53671 uses a group consisting of transistor 2N306 for TR5 and transistor 2N1059 for TR6 and TR7. Chassis No. 528.53672 uses a group consisting of transistor 2N1059 for transistor TR5 and transistor 2N1101 for TR6 and TR7.

When replacing a transistor or transistors for TR5, TR6, or TR7, look at your chassis number first. Then use the correct transistor from the group keyed to your chassis number only.



ALIGNMENT PROCEDURE

PRELIMINARY:

NOTE: When servicing this receiver, use battery, Catalog No. 6445 or equivalent only, otherwise damage to the transistors may result.

Output meter reading to indicate 0.05 watt across voice coil.....0.4 volt

Generator ground lead connection.....Common ground

Generator modulation.....30%, 400 cycles

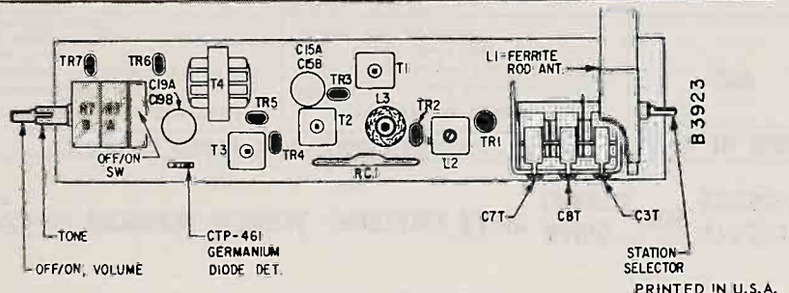
Position of volume control.....Fully on

ALIGNMENT NOTES:

1. The alignment must be done in the order given above.

2. While making the above adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Position of Tuner	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment for Max. Output	Function
1	Open	455 Kc	0.1 mfd.	Base of Converter (Pin 2 TR2)	T3	3rd I.F.
2	Open	455 Kc	0.1 mfd.	Base of Converter (Pin 2 TR2)	T2	2nd I.F.
3	Open	455 Kc	0.1 mfd.	Base of Converter (Pin 2 TR2)	T1	1st I.F.
4	Open	1610 Kc	0.1 mfd.	Base of Converter (Pin 2 TR2)	C8 Trimmer	Oscillator
5	Closed	532 Kc	Hazeltine test loop		L3	Oscillator Coil
6	600 Kc	600 Kc	Hazeltine test loop		L2	R.F. Coil
7	1400 Kc	1400 Kc	Hazeltine test loop		C7T ** (Tighten C3T before adjusting C7T)	R.F. Coil Trimmer
8	1400 Kc	1400 KC	Hazeltine test loop		C3T **	Antenna Trimmer
**DO NOT ROCK-IN						



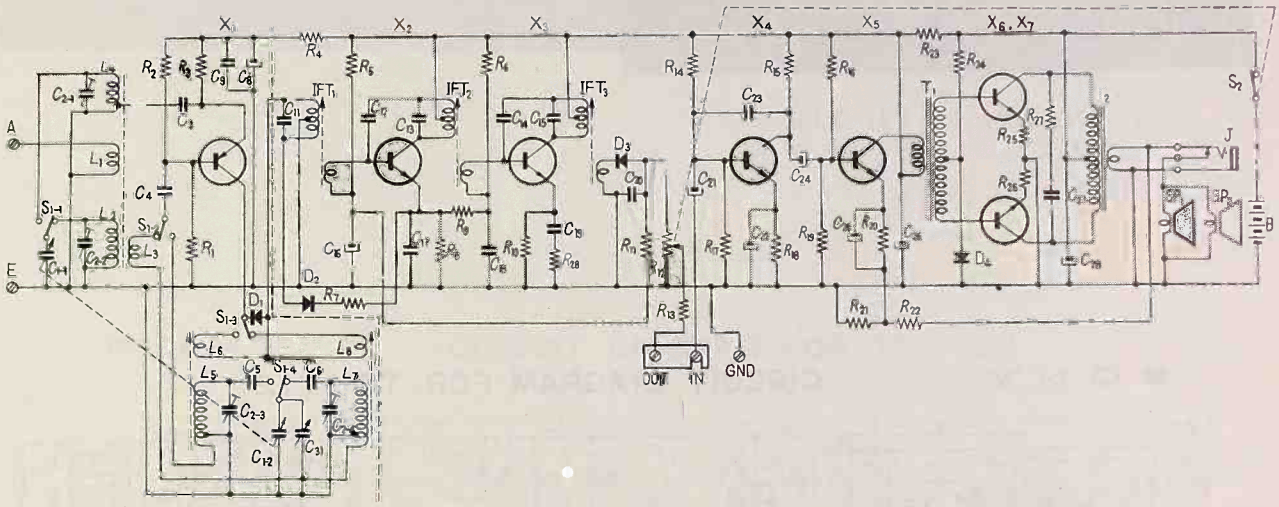
Transistor View of Chassis

PARTS LIST — CHASSIS

Schem. Loc.	Part No.	Description
	CAPACITORS	
C1	20-70-0	Disc., .02 mfd., 20%, 500V.
C2A, B, C	19-31-3	Variable Capacitor
C3, C7, C8 *		Trimmer
C4, C9, C10, C11	20-140-0	Disc., .05 mfd., + 100 - 20%, 30V.
C5	20-139-0	Disc., .1 mfd., 20%, 30V.
C6	20-91-0	Disc., .005 mfd., 20%, 500V.
C12	18-84-5	Electrolytic 6 mfd., 15V.
C14	20-136-0	Disc., .05 mfd., 20%, 30V.
C15 A & B	18-97-5	Electrolytic 20 mfd., 10V. (A) 50 mfd., 10V. (B)
C17	16-22327	Tubular .022 mfd., 200V.
C18	15-20216	Disc., .002 mfd., 200V.
C19 A & B	18-96-5	Electrolytic 50 mfd., 10V. (A) 50 mfd., 10V. (B)
C20	20-136-0	Disc., .05 mfd., 20%, 30V.
RC1	13-34-3	Couplate
	RESISTORS	
	(All Resistors 1/2 w 10% unless otherwise noted)	
R1, R17	60-47201	4.7K ohm
R2, R10	60-47101	470 ohm
R3	60-27301	27K ohm
R4	60-12201	1.2K ohm
R5, R16	60-10201	1K ohm
R6	60-332-0	3.3K ohm
R7A & B	24-357-0	2.5K ohm, Volume (A) 50K ohm, Tone (B)
R8	60-56301	56K ohm
R9, R11	60-56201	5.6K ohm
R12	60-82001	82 ohm
R13, R14	60-10001	10 ohm
R15	60-33901	3.3 ohm
R18	60-15101	150 ohm
R19	60-10401	100K ohm
	TRANSFORMERS AND COILS	
T1	10-131-2	Transformer 1st IF
T2	10-124-2	Transformer 2nd IF
T3	10-125-2	Transformer 3rd IF
T4	80-111-1	Transformer, Driver
L2	T0-32-0	Coil, R. F.
L3	**10-58-4**	Coil, Oscillator
	MISCELLANEOUS CHASSIS PARTS	
	33-414	Speaker, P.M. (4 x 6 w/Trans.)
	45-21-5	Connector, Pin
	82-154-0	Antenna, Rod
	84-9278-2	Printed Circuit Bd. (Inc. Transistors)

* Not supplied as a repair part.

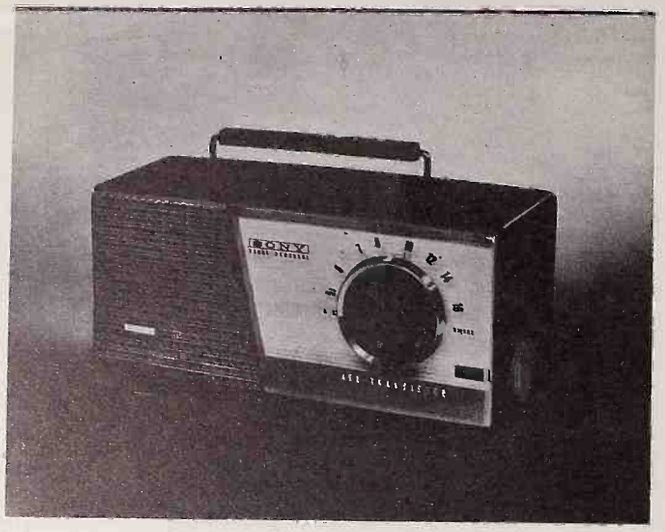
SONY CIRCUIT DIAGRAM FOR TR—711



	Ext. Ant.		J	Earphone Jack	D	AF Comp. 1T51	C_{10}	200 PF	C_{20}	100 μF 6V	R_9	3.3 KΩ ±5%	R_{20}	82 Ω ±5%
L_1, L_2	BC Band Bar Antenna		SP, SP	10×15cm. Speaker		UM-1×4 6V	C_{11}	2 PF	C_{21}	0.1 μF	R_{10}	470 Ω "	R_{21}	82 Ω "
L_3	SW "						C_{12}	200 PF	C_{22}	100 μF 6V	R_{11}	5.6 KΩ "	R_{22}	2.7 KΩ "
L_4	SW Band Oscillator Coil		X_1	Mix. 2T20	C_1	Tuning Capacitor	C_{13}	10 μF 3V	C_{23}	Midget Tuning Capacitor	R_{12}	5 KΩ VR with Switch	R_{23}	5 Ω "
L_5, L_6	BC " " "		X_2	IF1 2T76	C_2	2–15PF Gang Trimmer	C_{14}	0.05 μF			R_{13}	470 Ω ±5%	R_{24}	5 Ω "
			X_3	IF2 2T76	C_3	0.005 μF	C_{15}	0.05 μF	R_1	15 KΩ ±5%	R_{14}	33 KΩ "	R_{25}	80 Ω
OPT	LF. Trans.		X_4	AF1 2T65	C_4	0.01 μF	C_{16}	0.05 μF	R_2	2.2 KΩ "	R_{15}	1 KΩ "	R_{26}	82 Ω "
IFT1	"		X_5	AF2 2T66	C_5	3000 PF	C_{17}	0.02 μF	R_3	1.5 KΩ "	R_{16}	5.6 KΩ "		
IFT2	"		X_6	AF out 2T85	C_6	370 PF	C_{18}	10 μF 3V	R_4	82 Ω "	R_{17}	5.6 KΩ "		
S	BC, SW Switch		X_7	AF out 2T85	C_7	30 μF 6V	C_{19}	100 μF 3V	R_5	68 KΩ "	R_{18}	470 Ω "		
S_2	Power Switch		D_1	Osc. Comp. 1T23	C_8	0.01 μF	C_{20}	0.01 μF	R_6	33 KΩ "	R_{19}	3.3 KΩ "		
T_1	Input Trans. 1.1K : 3K		D_2	AGC 1T23	C_9	170 PF	C_{21}	10 μF 3V	R_7	470 Ω "	R_{20}	330 Ω "		
T_2	Output Trans. 30Ω 4Ω		D_3	Det. 1T23	C_{10}	2 PF	C_{22}	100 μF 3V	R_8	470 Ω "	R_{21}	5 Ω "		

Note: C7, 10, 29, 30 Not in use

SONY CORPORATION

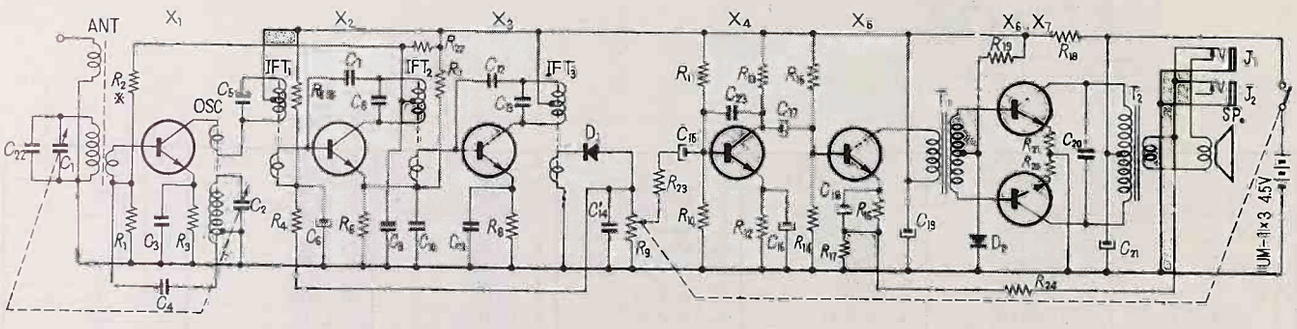


MODEL TR-712

TR-712 SPECIFICATION

Circuit	:	7 transistor superheterodyne
Frequency Range	:	535–1605 kc
Intermediate Frequency	:	455 kc
50 mW Sensitivity	:	40μV/m with built-in antenna 5μV/m with effective aerial of 5 m
Selectivity	:	More than 17 db (10 kc off-resonance at 1400 kc)
Output	:	120 mW non-distorted, Max. 200 mW
Battery	:	Three size "D" flashlight batteries (4.5 V)
Current Drain	:	11 mA (no signal)
Speaker	:	5" PM speker
Dimensions	:	290×100×145 mm (11 1/2"×4"×5 3/4")
Weight	:	about 1.5 kg. (approx. 3.3 lbs.)

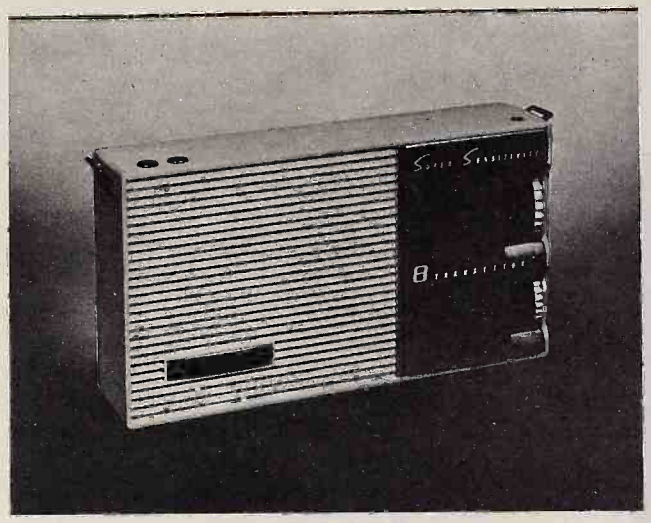
SONY CIRCUIT DIAGRAM FOR TR—712



C_1	Tuning Capacitor	C_{11}	0.05 μF	C_{21}	100 μF 6 V	R_7	5.6 KΩ	R_{17}	5 Ω	X_1	IF1 2T7	OSC	Oscillator Coil
C_2		C_{12}	2 pF	C_{22}	3 pF	R_8	330 Ω	R_{18}	60 Ω	X_2	IF2 2T7	IFT1	I.F. Trans.
C_3	0.005 μF	C_{13}	200 pF	C_{23}	0.005 μF	R_9	VR. with Switch 5 KΩ	R_{19}	2.2 KΩ	X_3	AF1 2T6	IFT2	I.F. Trans.
C_4	0.01 μF	C_{14}	0.05 μF			R_{10}	5.6 KΩ	R_{20}	5 Ω	X_4	AF2 2T6	IFT3	I.F. Trans
C_5	200 pF	C_{15}	10 μF 3 V	R_1	22 KΩ	R_{11}	22 KΩ	R_{21}	5 Ω	X_5	PA 2T8 or 2T6	T_1	Input Trans
C_6	10 μF 3 V	C_{16}	30 μF 3 V	*R_2	10 KΩ	R_{12}	560 Ω	R_{22}	5.6 KΩ	X_6	PA 2T8 or 2T6	T_2	Output Trans
C_7	3 pF	C_{17}	10 μF 3 V	R_3	3.3 KΩ	R_{13}	1 KΩ	R_{23}	1 KΩ	D	Diode 1T23C	S.P.	P. D. Speaker 12 cm 8 Ω
C_8	200 pF	C_{18}	30 μF 3 V	R_4	5.6 KΩ	R_{14}	5.6 KΩ	R_{24}	220 Ω	D_2	Varistor 1T51	J_1	Jack
C_9	10 μF 6 V	C_{19}	100 μF 6 V	*R_5	30 KΩ	R_{15}	10 KΩ					J_2	Jack
C_{10}	0.05 μF	C_{20}	0.1 μF	R_6	560 Ω	R_{16}	220 Ω	X_7	Conv. 2T7	ANT.	Antenna Coil		

Note: * Adjusting Resistors

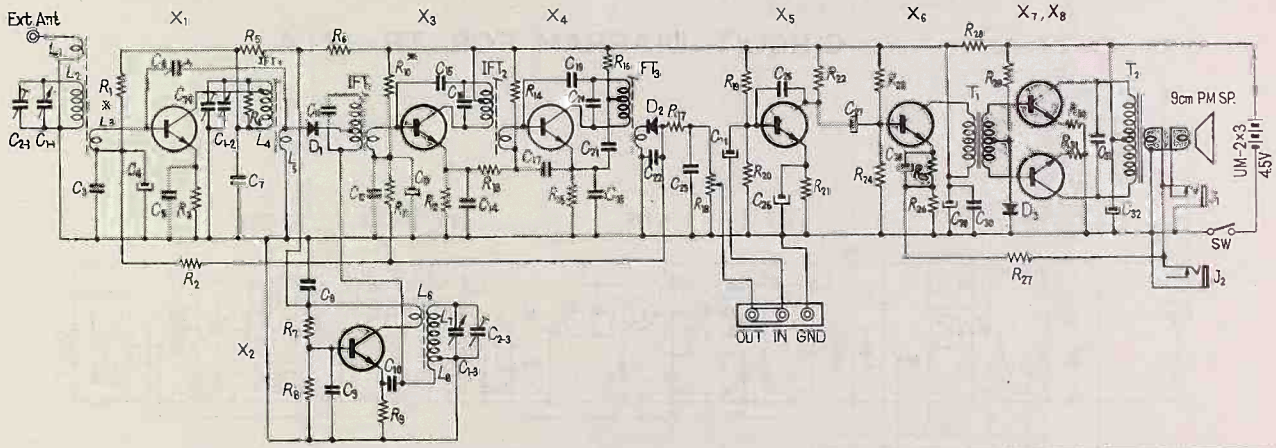
SONY CORPORATION



SONY TR-84 SPECIFICATION

Circuit :	Eight transistor super-heterodyne with one R.F. amplifier stage.
Freq. Range :	535–1605 KC (560 m–190 m)
Intermediate Freq. :	455 KC
Selectivity :	26 db at 10 KC off resonance
Sensitivity :	30 μV/m with built-in ferrite bar-antenna 5 μV/m with auxiliary antenna
Antenna System :	Built-in ferrite bar-antenna Terminal for auxiliary antenna
Output Power :	110 mW (non-clipped) 200 mW (maximum)
Speaker :	3½" PM dynamic speaker
Battery :	Three "C" size flashlight batteries (1.5 V × 3)
Battery Drain :	9 mA at no signal 55 mA at max. output
Dimensions :	187 × 103 × 43 mm (7⅜" × 4⅛" × 1⅝")
Weight :	800 gr. (1.8 lbs.)
Color :	Available in Cream, Light green and Brownish Yellow
Accessories :	Earphone (EM-10) 1 Size "C" flashlight batteries 3 Leather case 1

SONY CIRCUIT DIAGRAM FOR TR— 84



$C_{1-1,1-3}$	Tuning Capacitor	C_{16}	0.05 μF	C_{27}	10 μF 3V	R_5	56 KΩ ±5% ⅛W	R_{22}	3.3 KΩ ±5% ⅛W	X_1	RF 2T7	$L_{4-1,4-3}$	Oscillator Coil
$C_{1-2,1-4}$	Trimmer	C_{18}	2 PF	C_{28}	30 μF 3V	R_6	12 KΩ " "	R_{23}	470 Ω " "	X_2	Osc. 2T7	IFT_1	I.F. Trans.
C_4	0.05 μF	C_{19}	180 PF (inside 1FT)	C_{29}	100 μF 6V	R_7	1 KΩ " "	R_{24}	1 KΩ " "	X_3	1F. 2T7	IFT_2	"
C_5	10 μF 3V	C_{20}	0.02 μF	C_{30}	0.05 μF	R_8	56 KΩ " "	R_{25}	10 KΩ " "	X_4	1F. 2T7	IFT_3	"
C_6	0.005 μF	C_{21}	0.02 μF	C_{31}	0.1 μF	R_9	12 KΩ " "	R_{26}	3.3 KΩ " "	X_5	AF 2T6		Input Trans. 1.5 KΩ : 2 KΩ
C_7	2~20 PF Trimmer	C_{22}	2 PF	C_{32}	100 μF 6V	R_{10}	470 Ω " "	R_{27}	330 Ω " "	X_6	AF 2T6		Output Trans. 200 Ω : 8 Ω
C_8	0.05 μF	C_{23}	180 PF (inside 1FT)			R_{11}	2.2 KΩ " "	R_{28} Ω " "		X_7	PA 2T6		
C_9	0.05 μF	C_{24}	0.05 μF	R_{1*}	150 KΩ ±5% ⅛W	R_{12}	4.5 KΩ " "	R_{29}	220 Ω " "	X_8	PA 2T6		
C_{10}	0.02 μF	C_{25}	0.02 μF	R_{2*}	8.2 KΩ " "	R_{13}	470 Ω " "	R_{30}	60 Ω " "	T_1	Mix. 1T2		
C_{11}	0.002 μF	C_{26}	0.02 μF	R_3	560 Ω " "	R_{14}	470 Ω " "	R_{31}	2.2 KΩ " "	T_2	Det. 1T2		
C_{12}	180 PF (inside 1FT)	C_{27}	10 μF 3V	R_4	150 KΩ " "	R_{15}	3.3 KΩ " "	R_{32}	5 Ω " "	D_1	1T5		
C_{13}	0.02 μF	C_{28}	30 μF 3V	R_5	220 Ω " "	R_{16}	5 KΩ with Switch	R_{33}	5 Ω " "	$L_{1-1,1-2}$	Bar Antenna		
C_{14}	10 μF 3V	C_{29}	0.005 μF	R_6	2.0 Ω " "	R_{17}	15 KΩ ±5% ⅛W			L_{1-3}	RF Trans.		

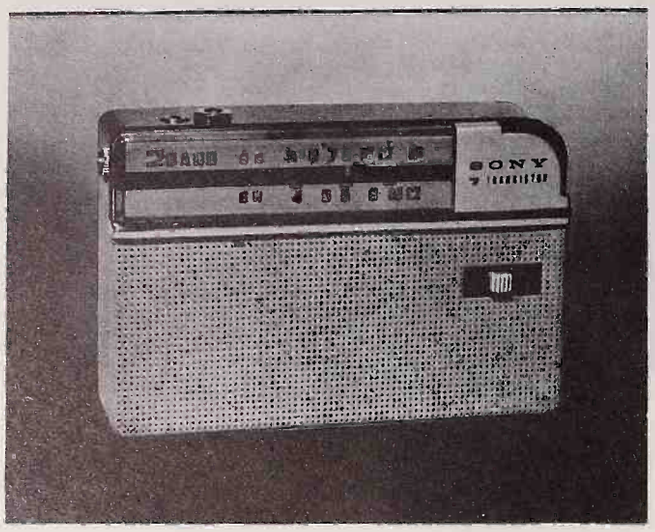
Note : * Adjusting Resistors

SONY CORPORATION

3.9-12 Mc (77-25 m), 535-1605 Kc (560-190 m)

SONY TR-714

A Finger-Flip Operation .....
Powerful Reception .....
Perfect Printed Circuitry .....

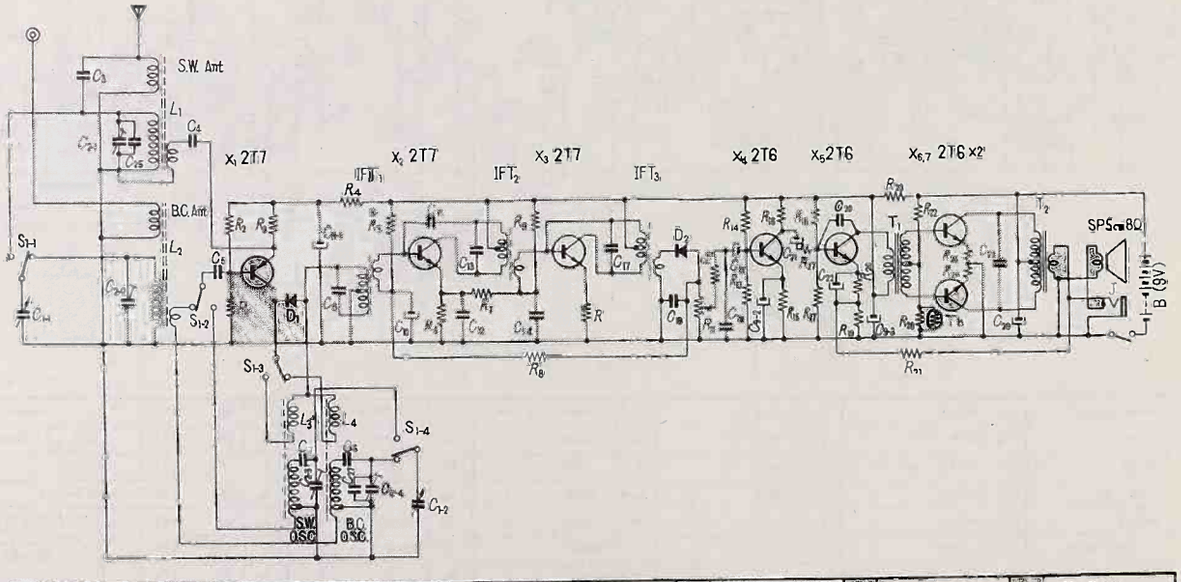


MODEL TR-714

SONY TR-714 SPECIFICATIONS

Circuit:	7 transistor super-heterodyne with 2 IF. stages and B-class push-pull output stage.
Freq. Range:	535-1605 KC (560 m-190 m) 3.9-12 MC (77-25 m)
Intermediate Freq:	455 KC
Selectivity:	17 db at 10 KC off resonance
Sensitivity:	Medium-wave: 50 μV/m with built-in bar antenna
Antenna System:	Built-in ferrite bar antenna and telescopic rod antenna
Output Power:	50 mW (non-clipped) 80 mW (maximum)
Speaker:	2¾" PM dynamic speaker
Battery:	9 V, (BL-006 P) or (Eveready 216)
Battery Drain:	7 mA at no signal 18 mA at max. output
Dimensions:	116 x 76 x 33.5 mm (4⅝" x 3" x 1¼")
Weight:	350 gr. (12.5 ozs.)
Color:	Available in Cream, Dark Green and Dark Grey
Accessories:	Earphone 1 Rod Antenna 1 Aerial 1 Battery (BL-006 P) 1 Leather case

SONY CIRCUIT DIAGRAM FOR TR-714

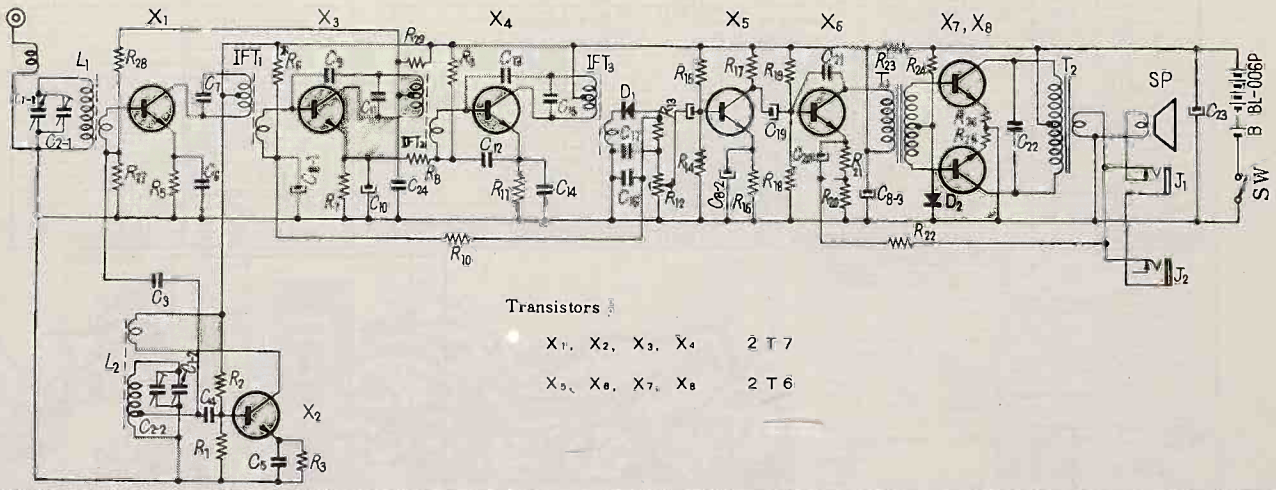


L_1	SW Antena Coil	J	Earphone Jack	R_1	7.5 KΩ ±5% ½W	R_{13}	56 KΩ ±5% ½W	C_1, C_{1-1}	Tuning Capacitor Trimmers	C_{11}	2 PF	C_{23}	30 μF 3 V
L_2	BC Antenna Coil	B	Battery with BL-006 P (9 V	R_2	22 KΩ " "	R_{14}	5 Ω " "	C_{1-2}, C_{1-3}		C_{12}	0.01 μF	C_{24}	0.05 μF
L_3	SW Oscillator Coil			R_{3a}	470 Ω " "	R_{15}	680 Ω " "	C_{1-4}		C_{13}	200 PF	C_{25}	5 PF
L_4	BC Oscill or Coil	R_3	* 27 KΩ ±5% ½W	R_4	5 KΩ VR with Switch	R_{16}	220 Ω " "	C_2	0.02 μF	C_{14}	0.01 μF	C_{26}	10 PF
L_{FT1}	IF Trans.	R_5	4.2 KΩ " "	R_{5a}	2.2 KΩ ±5% ½W	R_{17}	6.8 KΩ " "	C_3	0.01 μF	C_{15}	10 μF 3 V	C_{27}	0.02 μF
L_{FT2}	"	R_6	2.2 KΩ " "	R_{5b}	10 KΩ " "	R_{18}	220 Ω " "	C_4	370 PF	C_{16}	200 PF	C_{28}	10 μF 10 V
L_{FT3}	"	R_7	220 Ω " "	R_{5c}	56 KΩ " "	R_{19}	22 Ω " "	C_5	2000 PF	C_{17}	0.02 μF		
T_1	Input Trans.	R_8	*100 KΩ " "	R_{5d}	820 Ω " "	R_{20}	22 Ω " "	C_6	260 PF	C_{18}	5 μF 6 V		
T_2	Output Trans.	R_9	470 Ω " "	R_{5e}	820 Ω " "	R_{21}	2.2 KΩ " "	C_7, C_8	20 μF 10 V	C_{19}	0.001 μF		
SP	6 cm P. M. Speaker 8 Ω	R_{10}	820 Ω " "	R_{11}	10 KΩ " "	R_{22}	220 Ω " "	C_9	10 μF 3 V	C_{20}	5 μF 6 V		

Note: * Adjusting Resistors

SONY CORPORATION

SONY CIRCUIT DIAGRAM FOR TR-810



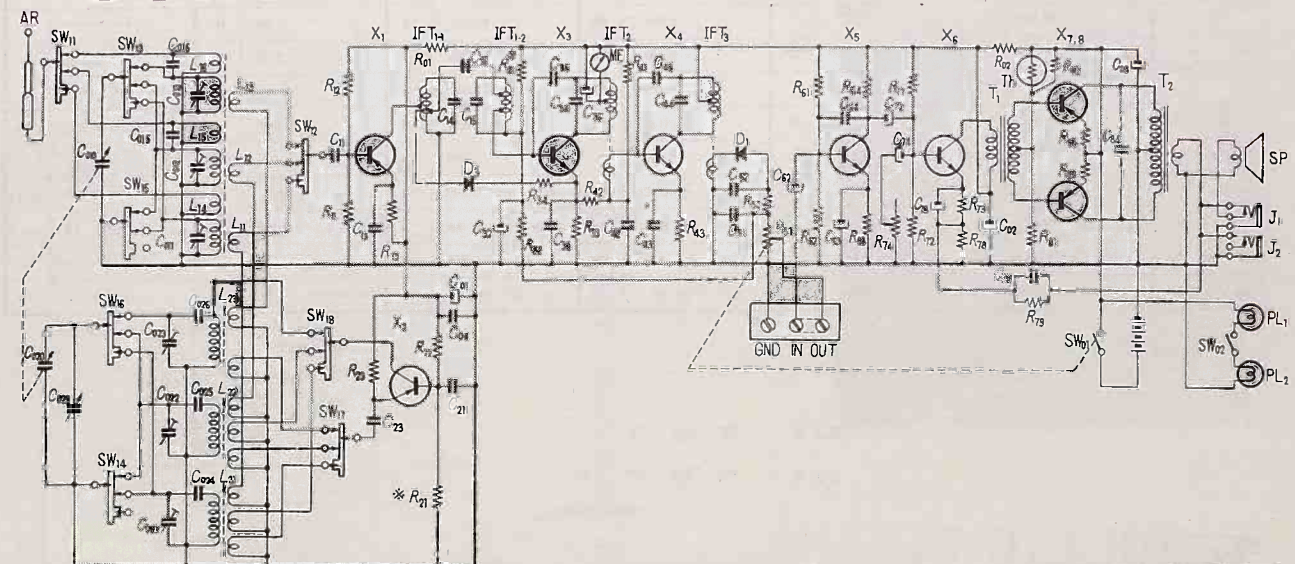
L_1	Antenna Coil	B	Battery BL-006P(9V)	R_{11}	7.5KΩ ±5% ¼W	R_{21}	5Ω ±5% ¼W	R_{29}	100Ω ±5% ¼W	C_1	2PF	C_{11}	5μF 6V		
L_2	Oscillator Coil			R_{12}	470Ω " "	R_{22}	680Ω " "			C_{10}	10μF 3V	C_{20}	30μF 3V		
IFT1	I.F. Trans.	R_1	10KΩ ±5% ¼W	R_{13}	KΩ VR with Switch	R_{23}	220Ω " "	C_{2-1} C_{2-2}	Tuning Capacitor	C_{12}	⊙ (180PF)	C_{21}	0.001μF		
IFT2	"	R_2	56Ω " "	R_{14}	2.2KΩ 5% ⅛W	R_{24}	2.0Ω " "	C_{2-3} C_{2-4}		C_{13}	0.01μF		0.05μF		
IFT3	"	R_3	2.2Ω " "	R_{15}	10KΩ " "	R_{25}	5.6KΩ " "	C_3	0.005μF	C_{14}	2PF	C_{23}	20μF 10V.		
T_1	Input Trans.	R_4	15KΩ " "	R_{16}	56KΩ " "	R_{26}	22Ω " "	C_4	0.01μF	C_{15}	0.02μF	C_{24}	0.01μF		
T_2	Output Trans.	R_5	■100KΩ " "	R_{17}	820Ω " "	R_{27}	22Ω "	C_5	0.005μF	C_{16}	⊙ (180PF)				
SP	6cm P.M. Speaker 8Ω	R_6	470Ω " "	R_{18}	820Ω " "	R_{28}	100KΩ " "	C_6	0.01μF	C_{17}	0.02μF				
J	Earphone Jack	R_7	820Ω " "	R_{19}	10KΩ " "	R_{29}	10KΩ " "	C_7	⊙ (180PF)	C_{18}	0.01μF				
"	" "	R_8	22KΩ " "	R_{20}	56KΩ " "	R_{30}	10KΩ "	C_{2-1} C_{2-2} C_{2-3} C_{2-4}	20μF 10V Block Chem. Con.	C_{19}	5μF 6V				

Note: ■ Adjusting Resistors
● Capacitors Contained Inside I.F.T.

SONY CORPORATION

SONY

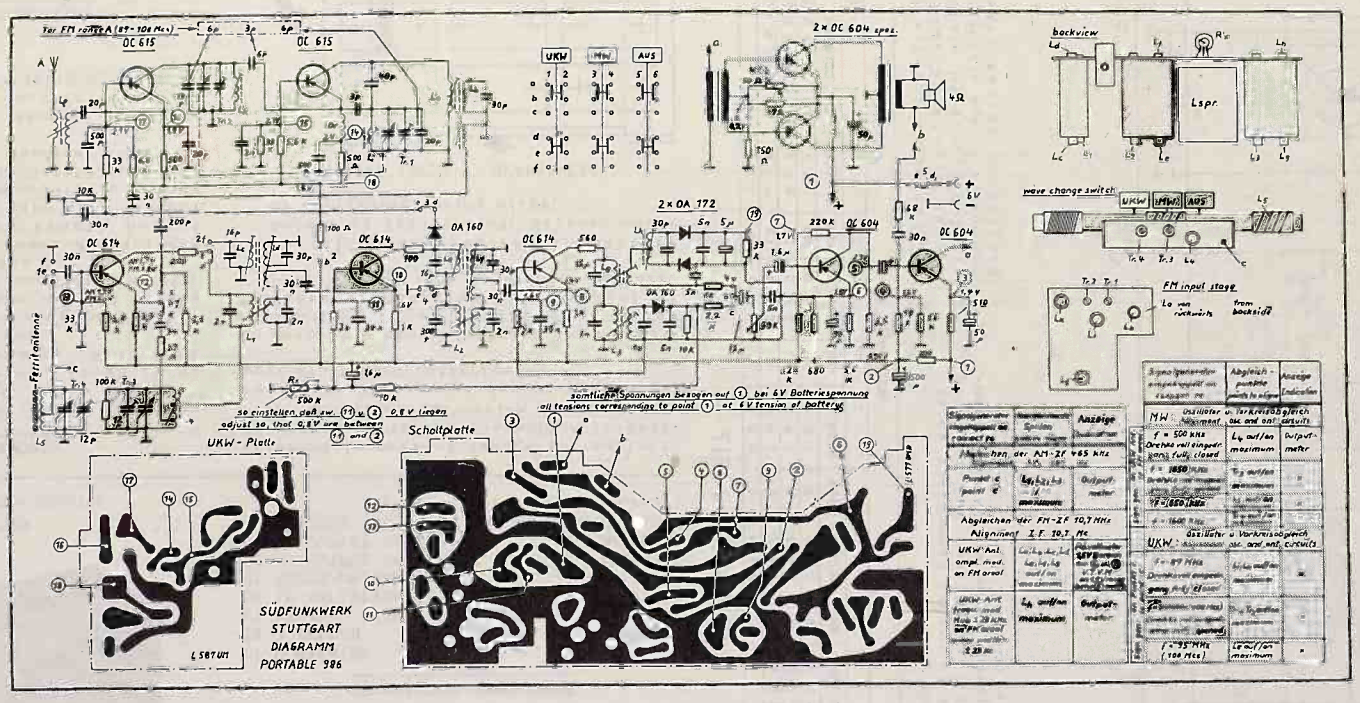
CIRCUIT DIAGRAM FOR TR-812



X1	Transistor 2T20	L	BC Band Oscillator Coil	RA	Rod Antenna	R	470 Ω RDXL ±10%	R	5.3KΩ RDXL ±10%	C	5pF	C	180pF (inside IFT1)
X2	• 2T20	L	SW • • •	ME	Tuning Meter	R	100 Ω • •	R	1KΩ • •	C	2pF	C	8pF
X3	• 2T76	L	SW • • •			R	27KΩ • ±5%	R	1KΩ • •	C	370pF	C	30μF 6V
X4	• 2T76	IFT1-1	Dual Tuning I.F. Trans.			R	8.2KΩ • •	R	6.8KΩ • •	C	1200pF	C	0.02μF
X5	• 2T6	IFT1-2	• •			R	3.3KΩ • ±10%	R	3.3KΩ • •	C	4000pF	C	0.05μF
X6	• 2T6	IFT2	I. F. Trans.			※ R	4.2KΩ • ±5%	R	470 Ω • •	C	Midget Tuning Capacitor	C	180pF (inside IFT3)
X7	• 2T2	IFT3	•			R	3.3KΩ • ±10%	R	5KΩ VR (T Curve)	C	100μF 6V	C	7pF
X8	• 2T3	T1	Input Trans.			R	2.2KΩ • ±5%	R	5 Ω RDXL ±5%	C	100μF 6V	C	0.02μF
D1	Diode 1T23G	T2	Output Trans.			※ R	7.5KΩ • •	R	100 Ω • ±10%	C	100μF 6V	C	0.07μF
Th	Thermistor S-250	SP	Speaker 10×15cm 8Ω			R	5.6KΩ • ±10%	R	5KΩ • ±5%	C	0.02μF	C	10μF 6V
D2	Diode 1T23G	SW	Band Switch			R	470 Ω • •	R	5Ω • ±5%	C	0.005μF	C	50μF 6V
L	BC Band Bar Antenna	PL1,2	Pilot Lamp 3V 50mA			R	1KΩ • •	R	5Ω • •	C	0.005μF	C	0.005μF
L	SW • • •	J1,2	Earphone Jack			R	2.7KΩ • ±5%	R	220 Ω • •	C	180pF (inside IFT1-1)	C	10μF 6V
						R	3.3KΩ • ±10%			C	• (inside IFT1-2)	C	30μF 6V
						R	470KΩ • •	C	Tuning Capacitor	C	0.005μF	C	1μF 6V
						R	5KΩ VR (T Curve)	C	} Gang Trimmer	C	0.005μF	C	0.02μF
						R	1KΩ RDXL ±10%	C		C	10μF 6V	C	0.1μF
						R	1.5KΩ • •			C	0.005μF	C	10pF

Note: ※ Adjusting Resistors.

SONY CORPORATION



Technical data: Subject to alterations

Type	Wave ranges	Transistors	Diodes	Circuits	Output	Loudspeaker Size	Batteries	Aerial
K 769	24–52 m 180–600 m 1000–2000 m	OC 614, OC 612, 3x OC 604, 2x OC 604 spec.	OA 160 OA 172	8	300 mW	18 cm ø	2x4,5 V	Ferrit
K 776	19–39 m 39–85 m 180–600 m	OC 614, OC 612, 3x OC 604, 2x OC 604 spec.	OA 160	6	600 mW	10 cm ø	4x1,5 V	Ferrit
K 986 K 986a	FM 87–100 MC AM 180–600 m or FM 87–108 MC AM 500–1600 KC	2x OC 605, 3x OC 614, 2x OC 604, 2x OC 604 spec.	2x OA 172, 2x OA 160	11 on FM, 6 on AM	600 mW	10 cm ø	4x1,5 V	Ferrit and VHF telescope aerial

Weights: K 769 gross 2,3 kg, net 1,6 kg; K 776 and K 986 gross 2,6 kg, net 1,9 kg **Dimensions of carton:** 30x15x24,5 cm

SÜDFUNKWERK DR. ING. ROBERT OTT, STUTTGART-N, LÖWENTORSTR. 18-20, GERMANY

COMPLETE SERVICE INFORMATION

for

RADIO

CHASSIS 1-617-4

CHASSIS: 1-617-4
MODELS: 7P13, 3100 and 3211

SERVICE LITERATURE
SYLVANIA RADIO & TELEVISION

SYLVANIA HOME ELECTRONICS CORP., a marketing subsidiary of Sylvania Electric Products Inc., Batavia, N. Y.

MODEL 7P13
MODELS 3100 & 3211 Similar

SPECIFICATIONS

FREQUENCY RANGE.........540 KC to 1650 KC
IF FREQUENCY.......................455 KC
SPEAKER..............................4" PM
POWER SUPPLY..........................9V
(6-1.5 V Size "C" batteries)
BIAS SUPPLY........................1.5 V
(1-1.5 V Size "C" battery)

TRANSISTOR COMPLEMENT

Q1 CONVERTER......................2N194A
Q2 OVERLOAD.......................SYL1583
Q3 IF AMPLIFIER...................2N233A
Q4 IF AMPLIFIER...................2N233A
Q5 AUDIO DRIVER....................2N306
Q6 AF OUTPUT AMPLIFIER...........2N1059-1
Q7 AF OUTPUT AMPLIFIER...........2N1059-1
DETECTOR..................CRYSTAL DIODE
(Part of 3rd IF transformer)

CHASSIS REMOVAL

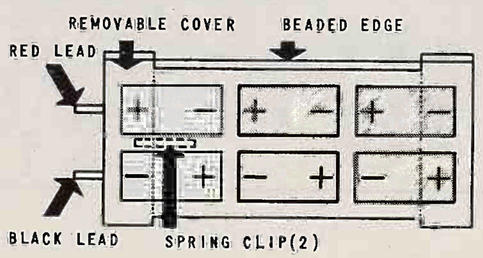
1. Remove volume and tuning knobs by pulling straight out.
2. Remove one (1) screw, slightly to right of tuning shaft. (With knob removed.)
3. Unsnap buttons securing back flap, lift flap and remove two (2) screws securing chassis to mounting brackets. (Right side of chassis.)
4. Lift chassis from case. Speaker and battery case lead length permit removal of chassis from case without unsoldering. If necessary to remove chassis from case completely, identify all leads, unsolder leads at terminals on chassis.
5. To replace chassis, reverse the above procedure, making certain all leads unsoldered are resoldered at correct terminals.

BATTERY INSTALLATION

Replace with size "C" 1½ volt flashlight batteries only. Proper polarity must be observed to prevent damage to receiver. On carbon batteries the button is positive; on mercury batteries the button is negative. To prevent damage always remove discharged batteries.

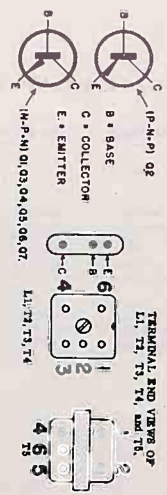
1. Install a single battery in compartment at lower left corner below chassis. Positive "+" terminal of battery must face toward "+" on case.

2. Install batteries (6) in battery holder as illustrated. Release cover by depressing spring clips.



SCHEMATIC NOTES

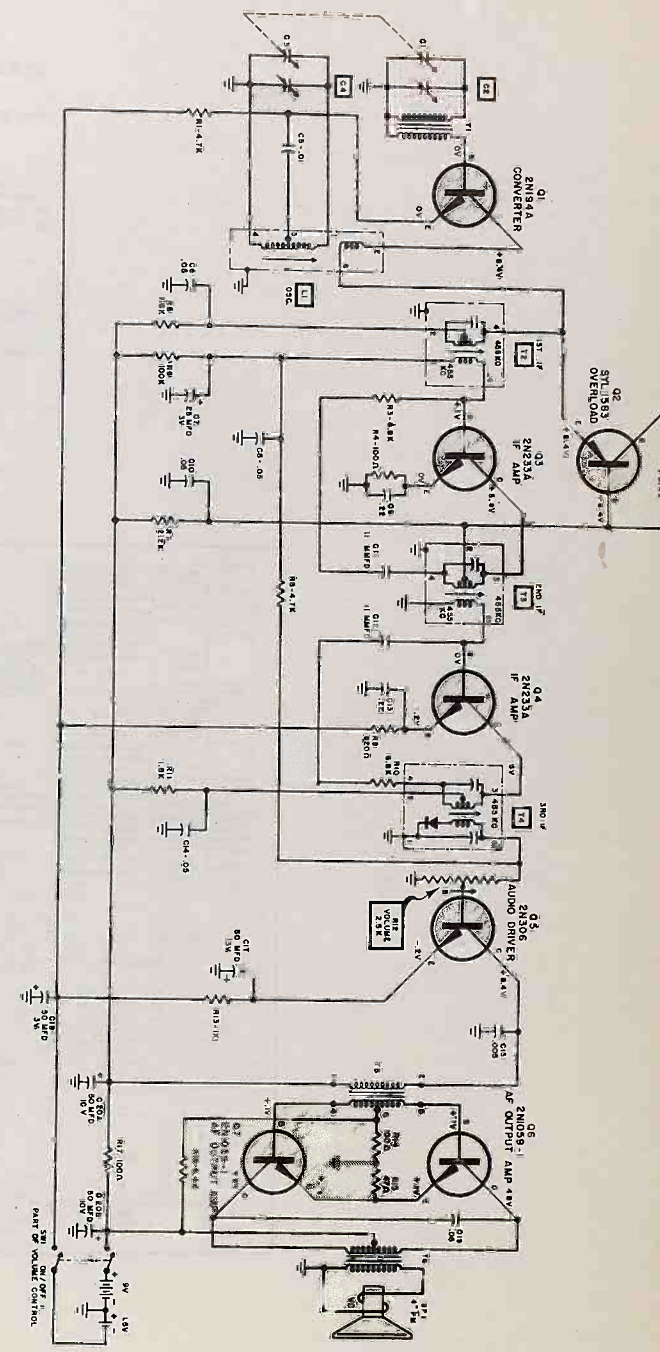
1. Voltages taken with receiver tuned to strong local station.
2. Battery voltage with receiver operating, 9V.
3. Voltages shown are average readings, variations may be noted due to normal production tolerances.
4. Resistance values taken with components in the circuit.
5. All capacitors in microfarads unless otherwise specified.
6. ⏚ Designates chassis ground.



RESISTANCE CHART

L1		T2		T3		T4		T5		T6	
BETWEEN	RES	BETWEEN	RES	BETWEEN	RES	BETWEEN	RES	BETWEEN	RES	BETWEEN	RES
1 & 4	4	1 & 6	5	1 & 6	[illegible]	1 & 6	4	1 & 2	400	BROWN & BLUE	25
[illegible] 5	[illegible]	2 [illegible]	2	2 & 3	[illegible]	2 & 3	1.5	4 & 5	80	BROWN & RED	12.5
2 & 6	1	2 & 4	2	2 & 4	2	2 & 4	1.5	4 & 6	90	BLUE & RED	12.5
		3 & 4	4	3 & 4	4	3 & 4	3	5 & 6	90		

CHASSIS 1-617-4



CHASSIS: 1-617-4

REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS		
C1,C2		See "Misc. Electrical Parts"
C3,C4		See "Misc. Electrical Parts"
C5		.01 Mfd - 0% - 500V - Ceramic
C6	169-0054	.05 Mfd - 0% - 50V - Ceramic
C7	161-1045	25 Mfd - 3V - Electrolytic
C8	169-0054	.05 Mfd - 0% - 50V - Ceramic
C9	169-0067	.22 Mfd - 0% - 3V - Ceramic
C10	169-0054	.05 Mfd - 0% - 50V - Ceramic
C11	166-0011	11 Mmfd - 10% - 500V - Ceramic
C12	166-0011	11 Mmfd - 10% - 500V - Ceramic
C13	169-0067	.22 Mfd - 0% - 3V - Ceramic
C14	169-0054	.05 Mfd - 0% - 50V - Ceramic
C15	169-0065	.005 Mfd - 20% - 50V - Ceramic
C17	161-1043	50 Mfd - 3V - Electrolytic
C18	161-1043	50 Mfd - 3V - Electrolytic
C19	169-0054	.05 Mfd - 0% - 50V - Ceramic
C20	161-2020	2 Section Electrolytic
A		50 Mfd - 10V
B		80 Mfd - 10V
RESISTORS		
R1		4,700 Ohm - 10% - ½W
R3		6,800 Ohm - 10% - ½W
R4		100 Ohm - 10% - ½W
R5		1,500 Ohm - 10% - ½W
R6		100,000 Ohm - 10% - ½W
R7		2,200 Ohm - 10% - ½W
R8		4,700 Ohm - 10% - ½W
R9		820 Ohm - 10% - ½W
R10		6,800 Ohm - 10% - ½W
R11		1,800 Ohm - 10% - ½W
R12	152-0042	2,500 Ohm - Volume Control
R13		1,000 Ohm - 20% - ½W
R14		100 Ohm - 10% - ½W
R15		47 Ohm - 10% - ½W
R16		5,600 Ohm - 10% - ½W
R17		100 Ohm - 10% - ½W

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
COILS AND TRANSFORMERS		
L1	113-0039	Coil - Oscillator
T1	581-0012	Transformer - Antenna - Ferrite Rod
T2	121-0109	Transformer - 1st IF
T3	121-0103	Transformer - 2nd IF
T4	122-0031	Transformer 3rd IF
T5	143-0063	Transformer - Driver
T6	143-0062	Transformer - Audio Output

CABINET PARTS

DESCRIPTION	MODELS 7P13	3100	3211
Cap and Lead Assembly - Battery Case	803-0018	803-0018	803-0018
Cap - Battery Case - End	803-0017	803-0017	803-0017
Case - Battery - Power Supply	803-0016	803-0016	803-0016
Case - Leather	814-0014	814-0019	814-0020
Crest	818-0161		
Handle - Carrying		818-0265	818-0266
Knob - Tuning	741-0059	741-0078	741-0079
Knob - On/Off/Volume	740-0298	740-0323	740-0324
Speaker - 4" PM	539-0425	539-0425	539-0425
Spring - Battery Jumper	496-0150	496-0150	496-0150

MISCELLANEOUS ELECTRICAL PARTS

	170-0036	Capacitor - Variable tuning
C1,C2		RF Gang, RF Trimmer
C3,C4		Osc. Gang, Osc. Trimmer

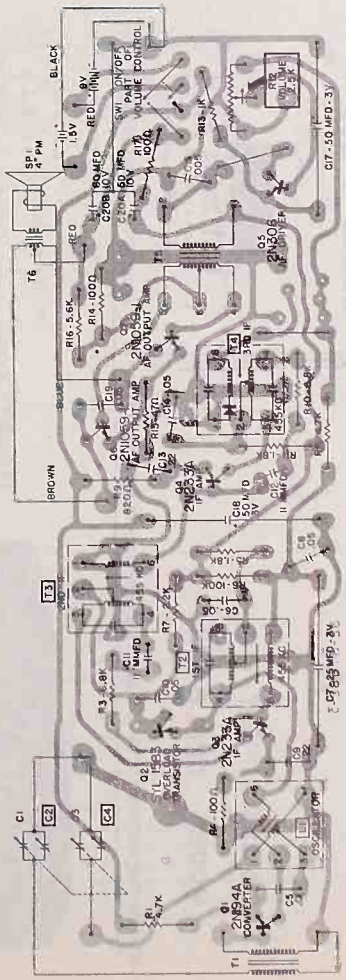
ALIGNMENT PROCEDURE

PRELIMINARY INSTRUCTIONS

1. Remove chassis from case as outlined under "chassis removal procedure".
2. Allow signal generator several minutes warm-up time.
3. Set signal generator for an amplitude modulated RF output signal.
4. Maintain signal generator output at lowest useable level.
5. Use an audible check or an output meter.
6. Adjust volume control to full volume.

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - radiate signal to receiver through a loop consisting of several turns of wire in series with a 150 ohm resistor. Set generator frequency to 455 KC. AC VOLTMETER - Across speaker voice coil.	T4 - 3rd IF transformer T3 - 2nd IF transformer T2 - 1st IF transformer For maximum meter reading.
2	Set dial to 600KC	SIGNAL GENERATOR - Same as step 1. Set generator frequency to 600 KC. AC VOLTMETER - Across speaker voice coil.	L1 - Osc. Coil For maximum meter reading while simultaneously rocking tuning capacitor through the 600 KC position.
3	Set dial to 1650 KC	SIGNAL GENERATOR - Same as step 1. Set generator frequency to 1650 KC. AC VOLTMETER - Across speaker voice coil.	C4 - Osc. Trimmer For maximum meter reading.
4	Set dial to 1450 KC	SIGNAL GENERATOR - Same as step 1. Set generator to a frequency corresponding to receiver dial (until signal is heard through receiver speaker). AC VOLTMETER - Across speaker voice coil.	C2 - RF Trimmer For maximum meter reading.

TOP VIEW - PRINTED BOARD ASSEMBLY



COMPLETE SERVICE INFORMATION

for

CHASSIS: 1-637-1

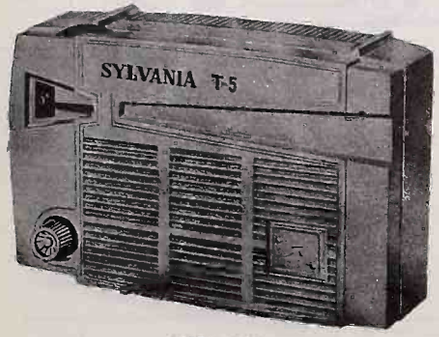
MODELS: 5P10 & 5P11

RADIO

CHASSIS 1-637-1

SERVICE LITERATURE
SYLVANIA
RADIO & TELEVISION

SYLVANIA HOME ELECTRONICS CORP., a marketing subsidiary of Sylvania Electric Products Inc., Batavia, N. Y.



MODEL 5P10
5P11 SIMILAR

SPECIFICATIONS

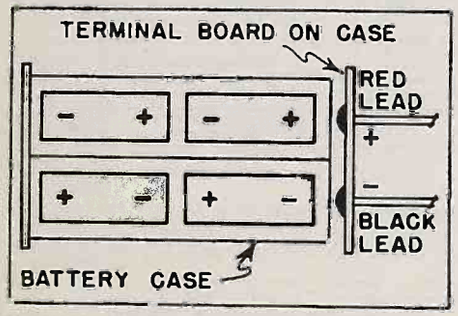
FREQUENCY RANGE.....540 KC to 1650 KC
IF FREQUENCY.....455 KC
SPEAKER.....3½" PM
POWER SUPPLY.....6V
(4-1.5 V-AA Size Batteries)

TRANSISTOR COMPLEMENT

Q1 CONVERTER.....2N374
Q2 IF AMP.....2N373
Q3 DETECTOR.....SYL 1583
Q4 AUDIO DRIVER.....1396
Q5 AUDIO OUTPUT.....1329

BATTERY INSTALLATION

Remove cover, install four (4) standard penlight cell 1½ volt batteries as illustrated. Proper polarity must be observed to prevent damage to receiver. On all carbon batteries the button is positive; on all mercury batteries the button is negative.



CAUTION: The positive end of batteries must contact terminal with red lead. To prevent damage always remove discharged batteries.

COVER AND CHASSIS REMOVAL

1. Using a coin or screwdriver, remove the one (1) screw which secures the back cover to the front of the case. Remove cover as far as speaker leads permit.
2. Remove screw securing tuning knob and remove knob.
3. Remove the three (3) screws securing chassis to case. (Two screws bottom of chassis, one screw near tuning capacitor.)
4. To replace chassis reverse the above procedure.

ALIGNMENT PROCEDURE

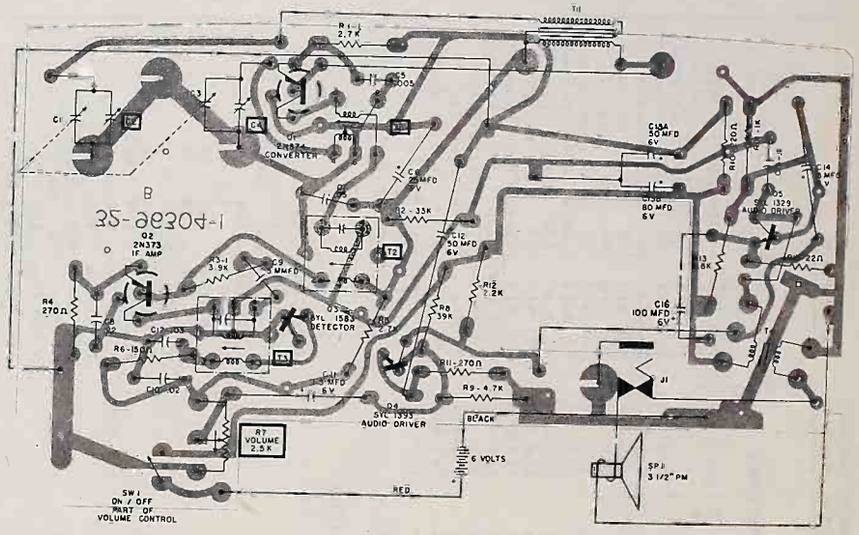
PRELIMINARY INSTRUCTIONS

1. Remove cover from case.
2. Allow signal generator several minutes warm-up time.
3. Set signal generator for an amplitude modulated (AM) RF output signal.
4. Maintain signal generator output at lowest useable level.
5. Use an audible check or AC voltmeter to indicate output.
6. Adjust volume control to full volume.

CHASSIS 1-637-1

ALIGNMENT PROCEDURE

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - radiate signal to receiver through a loop consisting of several turns of wire in series with a 150 ohm resistor. Set generator frequency to 455 KC. AC VOLTMETER - Across speaker voice coil.	T3 and T2 In order shown for maximum meter reading.
2	Set dial to 600 KC.	SIGNAL GENERATOR - Same as step 1. Set generator frequency to 600 KC. AC VOLTMETER - Across speaker voice coil.	L1 For maximum meter reading.
3	Set dial to 1650 KC.	SIGNAL GENERATOR - Same as step 1. Set generator frequency to 1650 KC. AC VOLTMETER - Across speaker voice coil.	C4 (oscillator trimmer) For maximum meter reading.
4	Set dial to 1450 KC.	SIGNAL GENERATOR - Same as step 1. Set generator to a frequency corresponding to receiver dial (until signal is heard through receiver speaker). AC VOLTMETER - Across speaker voice coil.	C2 (Antenna trimmer) For maximum meter reading.



TOP VIEW - PRINTED BOARD ASSEMBLY

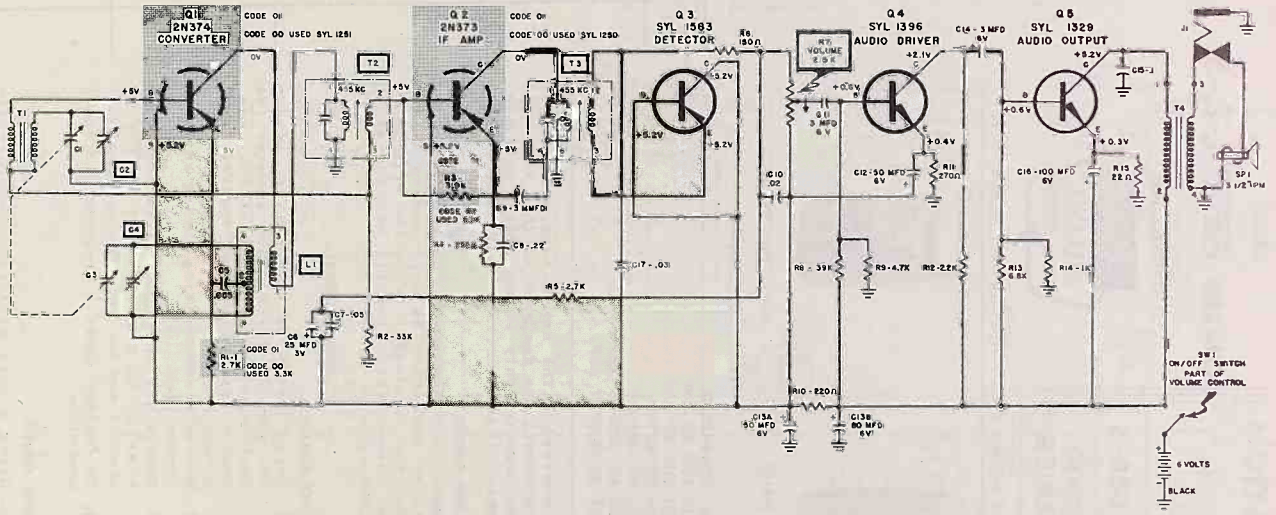
SYLVANIA RADIO PAGE 27-3

CHASSIS: 1-637-1

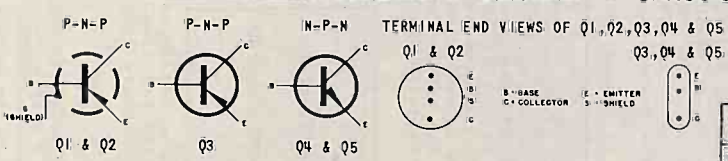
REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS		
C1, C2		See "Misc. Electrical Parts"
C3, C4		See "Misc. Electrical Parts"
C5		.005 Mfd - 5% - 30V Ceramic
C6	161-1049	25 Mfd - 3V - Electrolytic
C7	169-0054	.05 Mfd - 0% - 50V Ceramic
C8		.22 Mfd - 0% - 50V Ceramic
C9		3 Mmfd - 10% - 50V Ceramic
C10		.02 Mfd - 0% - 50V Ceramic
C11	161-1037	3 Mfd - 6V - Electrolytic
C12	161-1063	50 Mfd - 6V - Electrolytic
C13	161-2023	2 Section Electrolytic
A		50 Mfd - 6V
B		80 Mfd - 6V
C14	161-1037	3 Mfd - 6V - Electrolytic
C15		.1 Mfd - 0% - 50V Ceramic
C16	161-1064	100 Mfd - 6V - Electrolytic
C17		.03 Mfd - 0% - 50V Ceramic
RESISTORS		
R1		2,700 Ohms - 10% - ½W
R2		33,000 Ohms - 10% - ½W
R3		3,300 Ohm - 10% - ½W
R4		270 Ohm - 10% - ½W
R5		2,700 Ohm - 10% - ½W
R6		150 Ohm - 10% - ½W
R7	152-0062	2,500 Ohm - Vol/On/Off
R8		39,000 Ohm - 10% - ½W
R9		4,700 Ohm - 10% - ½W
R10		220 Ohm - 10% - ½W
R11		270 Ohm - 10% - ½W
R12		2,200 Ohm - 10% - ½W
R13		6,800 Ohm - 10% - ½W
R14		1,000 Ohm - 10% - ½W
R15		22 Ohm - 10% - ½W
COILS AND TRANSFORMERS		
L1	113-0047	Coil - Oscillator
T1	581-0019	Transformer - Antenna - Ferrite Rod
T2	121-0030	Transformer - IF #1
T3	122-0033	Transformer - IF #2
T4	143-0073	Transformer - Audio Output
MISCELLANEOUS ELECTRICAL PARTS		
	170-0025	Capacitor - Variable Tuning
C1, C2		RF Gang, RF Trimmer
C3, C4		Osc. Gang, Osc. Trimmer
J1	419-0026	Jack - Earphone
SW1	Part of Volume Control	Switch - On/Off

CABINET PARTS		MODELS	
DESCRIPTION	5P10B	5P11R	5P11T
Battery Case Assembly	803-0022	803-0022	803-0022
Case - Back	822-0041	822-0041	822-0042
Case - Front	822-0045	822-0047	822-0046
Crest	818-0279	818-0279	818-0279
Dial - Window	489-0035	489-0035	489-0035
Knob - On/Off/Volume	742-0037	742-0036	742-0035
Knob - Tuning	741-0049	741-0049	741-0049
Ring - Compression - On/Off/Volume	554-0048	554-0048	554-0048
Speaker - 3¼" PM	539-0353	539-0353	539-0353



SCHEMATIC DIAGRAM - CHASSIS 1-637-1



RESISTANCE CHART

L1		T2		T3		T4	
TERM	RES	TERM	RES	TERM	RES	TERM	RES
1 & 3	1	1 & 4	5	1 & 4	7	1 & 2	10
2 & 4	5	2 & 3	1	1 & 6	8.5	3 & 4	
6				4 & 6	3.5		
4 & 6	5			2 & 3	1		

NOTES:

1. VOLTAGES TAKEN WITH RECEIVER TUNED TO STRONG LOCAL STATION.
2. BATTERY VOLTAGE WITH RECEIVER OPERATING 6V.
3. VOLTAGES SHOWN ARE AVERAGE READINGS. VARIATIONS MAY BE NOTED DUE TO NORMAL PRODUCTION TOLERANCES.
4. RESISTANCE VALUES TAKEN WITH COMPONENTS IN THE CIRCUIT.
5. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
6. SHADED AREAS DESIGNATE CODE CHANGES.
7. ⏚ DESIGNATES CHASSIS GROUND.

COMPLETE SERVICE INFORMATION

for

CHASSIS	1-638-1	1-638-2	1-638-3
MODELS	7P12 SERIES	2800 SERIES	2900 SERIES

RADIO

CHASSIS: 1-638-1,-2,-3

SEPTEMBER 1959

SERVICE LITERATURE
SYLVANIA
RADIO & TELEVISION

SYLVANIA HOME ELECTRONICS CORP., a marketing subsidiary of Sylvania Electric Products Inc., Batavia, N. Y.

MODEL 7P12 SERIES

MODEL 2800 SERIES

MODEL 2900 SERIES

SPECIFICATIONS

FREQUENCY RANGE.....540KC to 1650KC
IF FREQUENCY.....455KC
SPEAKER.....3½" PM
POWER SUPPLY.....6V
7P12 (4 - 1.5V - AA Size Batteries)
2800 and 2900 series
Eveready 2713 or equivalent

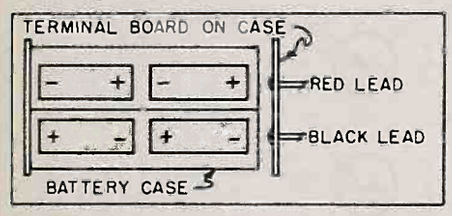
TRANSISTOR COMPLEMENT

Q1 CONVERTER.....2N194A
Q2 1ST IF AMP.....2N233A
Q3 2ND IF AMP.....2N233A
Q4 DETECTOR.....SYL 1583
Q5 AF DRIVER.....2N306
Q6 AF OUTPUT AMP.....2N1059
Q7 AF OUTPUT AMP.....2N1059

BATTERY INSTALLATION

7P12 SERIES:

Remove cover, install four (4) standard penlight cell 1½ volt batteries as illustrated. Proper polarity must be observed to prevent damage to receiver. On all carbon batteries the button is positive: on all mercury batteries the button is negative.



CAUTION: The positive end of batteries must contact terminal with red lead. To prevent damage always remove discharged batteries.

2800 SERIES:

Remove cover - with ON/OFF switch in OFF position install a single 6 volt battery (Eveready 2713 or equivalent) by attaching the snap-on connectors to the battery terminals. The connectors and battery terminals are designed so that they will go together only in the proper relationship. Insert battery into compartment.

2900 SERIES:

Open snap buttons on back of case and raise backcover to gain access to the battery terminals (two wires with snap-on connectors). Install battery as in 2800 series.

CHASSIS REMOVAL

7P12 SERIES:

1. Using a coin or screwdriver, loosen the one (1) screw which secures the backcover to the front of the case. Remove cover as far as speaker leads permit.
2. Remove screw securing tuning knob and remove knob.
3. Remove the three (3) screws securing chassis to case, two at bottom of chassis and one near tuning capacitor.
4. To replace chassis, reverse the above procedure.

2800 SERIES:

1. Using a coin or screwdriver, loosen the one (1) screw which secures the backcover to the front of the case. Remove cover as far as speaker leads permit.
2. Using a fine knife blade lift up and remove dial plate from tuning knob. Note that there are three tabs which secure plate to knob. Remove knob by unscrewing screw which secures it to shaft of tuning capacitor.
3. Remove the three (3) screws securing chassis to case, two at bottom of chassis and one near tuning capacitor,
4. To replace chassis reverse the above procedure. Make certain that the dial is positioned properly for correct station identification, then secure by bending the tabs on the plate toward the center. This can be done by pushing them in from the side with a thin knife blade.

2900 SERIES:

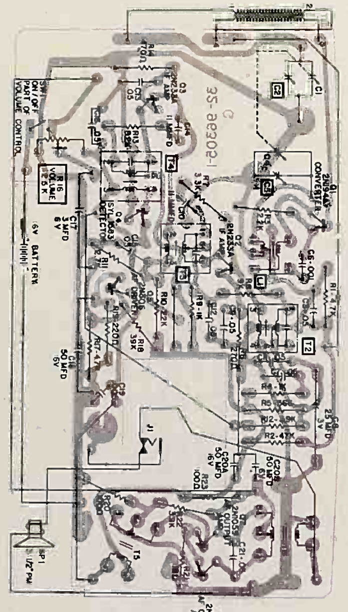
1. Remove volume and tuning knob by pulling straight up.
2. Remove one (1) screw made visible when tuning knob is removed.
3. Open snap buttons on back of case and raise backcover. Lift armite protector and remove one (1) screw securing chassis to speaker.
4. Lift chassis out of case as far as speaker leads permit.
5. To replace chassis reverse the above procedure.

ALIGNMENT PROCEDURE

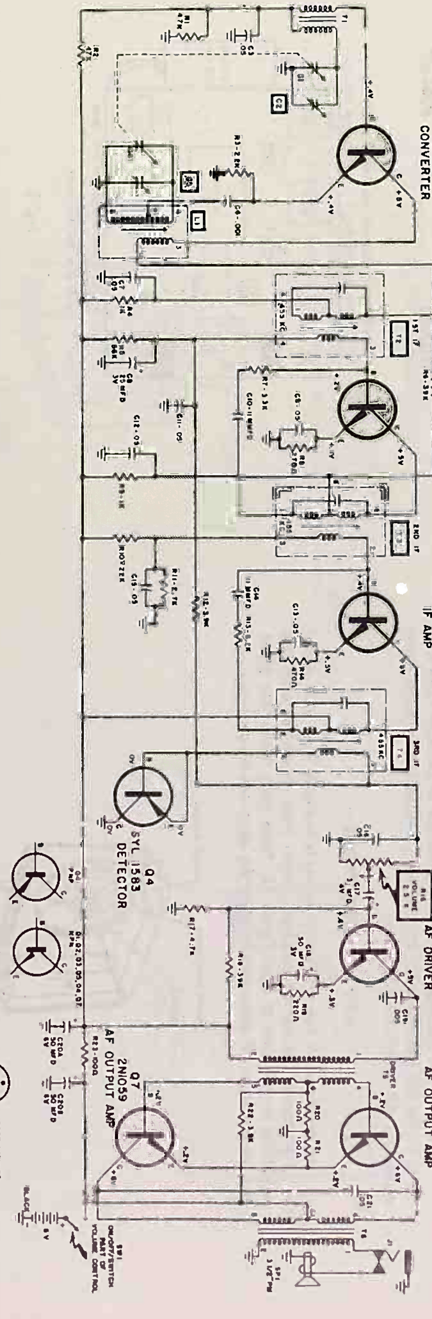
PRELIMINARY INSTRUCTIONS

1. Remove cover and chassis as described under "Chassis Removal Procedure".
2. Allow signal generator several minutes warm-up time.
3. Set signal generator for an amplitude modulated (AM) RF output signal.
4. Maintain signal generator output at lowest useable level.
5. Use an audible check or an AC voltmeter to indicate output.
6. Adjust volume control to full volume.

STEP	ALIGNMENT SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - radiate signal to receiver through a loop consisting of several turns of wire in series with a 150 ohm resistor. Set generator frequency to 455 KC. AC VOLTMETER - Across speaker voice coil.	T4,T3,T2 In order shown for maximum meter reading.
2	Set dial to 600KC.	SIGNAL GENERATOR - same as step 1. Set generator frequency to 600KC. AC VOLTMETER - Across speaker voice coil.	L1 (osc. coil) while simultaneously rocking tuning capacitor through the 600KC position. For maximum meter reading.
3.	Set dial to 1650 KC.	SIGNAL GENERATOR - same as step 1. Set generator frequency to 1650 KC. AC VOLTMETER - Across speaker voice coil.	C5 (osc. trimmer) For maximum meter reading.
4	Set dial to 1450 KC.	SIGNAL GENERATOR - Same as step 1. Set generator to a frequency corresponding to receiver dial (until signal is heard through receiver speaker). AC VOLTMETER - Across speaker voice coil.	C2 (RF trimmer) For maximum meter reading.



TOP VIEW - PRINTED BOARD ASSEMBLY



SCHEMATIC NOTES

1. VOLTAGES TAKEN WITH RECEIVER TUNED TO STRONG LOCAL STATION.
2. BATTERY VOLTAGE WITH RECEIVER OPERATING 6V.
3. VOLTAGES SHOWN ARE AVERAGE READINGS. VARIATIONS MAY BE NOTED DUE TO NORMAL PRODUCTION TOLERANCES.
4. RESISTANCE VALUES TAKEN WITH COMPONENTS IN THE CIRCUIT.
5. ALL CAPACITORS IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
6. ⏚ DESIGNATES CHASSIS GROUND.

REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS		
C1, C2		See "Misc. Electrical Parts"
C3	169-0054	.05 Mfd - 0% - 50V - Ceramic
C4, C5		See "Misc. Electrical Parts"
C6	169-0084	.001 Mfd - 0% - 30V - Ceramic
C7	169-0054	.05 Mfd - 0% - 50V - Ceramic
C8	161-1049	25 Mfd - 3V - Electrolytic
C9	169-0054	.05 Mfd - 0% - 50V - Ceramic
C10	166-0011	11 Mmfd - 10% - 50V - Ceramic
C11	169-0054	.05 Mfd - 0% - 50V - Ceramic
C12	169-0054	.05 Mfd - 0% - 50V - Ceramic
C13	169-0054	.05 Mfd - 0% - 50V - Ceramic
C14	166-0011	11 Mmfd - 10% - 50V - Ceramic
C15	169-0054	.05 Mfd - 0% - 50V - Ceramic
C16	169-0054	.05 Mfd - 0% - 50V - Ceramic
C17	161-1037	3 Mfd - 6V - Electrolytic
C18	161-1050	50 Mfd - 3V - Electrolytic
C19	169-0083	.005 Mfd - 0% - 30V - Ceramic
C20	161-2023	2 Section Electrolytic
A		50 Mfd - 6V
B		80 Mfd - 6V
C21	169-0054	.05 Mfd - 0% - 50V - Ceramic
RESISTORS		
R1		4,700 Ohm - 10% - ½W
R2		47,000 Ohm - 10% - ½W
R3		2,200 Ohm - 10% - ½W
R4		1,000 Ohm - 10% - ½W
R5		56,000 Ohm - 10% - ½W
R6		39,000 Ohm - 10% - ½W
R7		3,300 Ohm - 10% - ½W
R8		270 Ohm - 10% - ½W
R9		1,000 Ohm - 10% - ½W
R10		22,000 Ohm - 10% - ½W
R11		2,700 Ohm - 10% - ½W

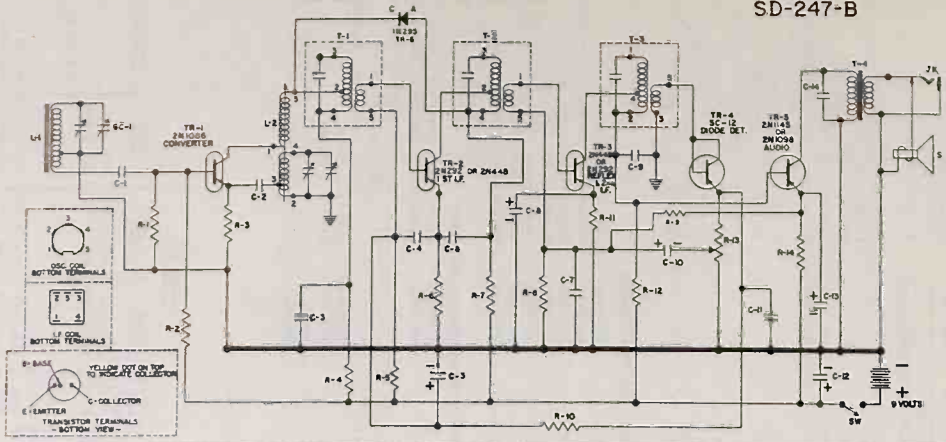
SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
RESISTORS (Continued)		
R12		3,900 Ohm - 10% - ½W
R13		8,200 Ohm - 10% - ½W
R14		470 Ohm - 10% - ½W
R16	152-0062	2,500 Ohm - Volume/On/Off control
R16	152-0065	2,500 Ohm - Volume/On/Off control (chassis 1-638-3 only)
R17		4,700 Ohm - 10% - ½W
R18		39,000 Ohm - 10% - ½W
R19		220 Ohm - 10% - ½W
R20		100 Ohm - 10% - ½W
R21		18 Ohm - 10% - ½W
R22		3,900 Ohm - 10% - ½W
R23		100 Ohm - 10% - ½W
COILS AND TRANSFORMERS		
L1	113-0047	Coil - Oscillator
T1	581-0017	Transformer - Antenna - Ferrite Rod
T2	121-0031	Transformer - 1st IF
T3	122-0034	Transformer - 2nd IF
T4	122-0035	Transformer - 3rd IF
T5	143-0078	Transformer - Driver
T6	143-0079	Transformer - Audio Output
MISCELLANEOUS ELECTRICAL PARTS		
	170-0025	Capacitor - Variable Tuning
	170-0040	Capacitor - Variable Tuning - (Chassis 1-638-3 only)
C1, C2		RF Gang, RF trimmer
C4, C5		Osc. Gang, Osc. Trimmer
J1	419-0026	Socket - Phone
SW1	Part of Volume Control	Switch . ON/OFF

CABINET PARTS

DESCRIPTION	*7P12E*	*7P12T*	*2800*	*2808*	*2809*	*2901*
Battery Case Assembly	803-0022	803-0022				
Case - Back	822-0043	822-0044	822-0062	822-0066	822-0064	
Case - Front	822-0048	822-0049	822-0063	822-0067	822-0065	
Case - Leather						814-0018
Crest	818-0169	818-0169				
Dial - Window	489-0035	489-0035				
Handle - Carrying	818-0201	818-0201	818-0263	818-0263	818-0263	818-0267
Knob - ON/OFF/Volume	742-0032	742-0037	740-0319	740-0321	740-0320	740-0322
Knob - Tuning	741-0050	741-0050	741-0076	741-0086	741-0085	741-0084
Lead and Battery Clip Assm. (+) Terminal			193-0021	193-0021	193-0021	193-0021
Lead and Battery Clip Assm. (−) Terminal			193-0022	193-0022	193 0022	193-0022
Panel - Nameplate			774-0026	774-0026	774-0026	
Ring - Compression - On/Off Volume Knob	554-0048	554-0048				554-0048
Ring - Compression - Tuning Knob						554-0096
Speaker - 3½" PM	539-0353	539-0353	539-0353	539-0353	539-0353	539-0353

MODELS-TR-280-B SERIES

SD-247-B



PART NO.	SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION
CC-63	C-1	.02 MFD. CERAMIC DISC	IR-64	R-1	10 K OHMS 1/2W 10% CARBON RESISTOR	LI-22	T-1	1st STAGE I.F. TRANSFORMER	J-1	JK	EARPHONE JACK
CC-35	C-2	.01 MFD. " "	IR-158	R-2	33K " " " " "	LI-22	T-2	2nd " " "			
CC-64	C-3	.01 MFD. " "	IR-29	R-3	1500 " " " " "	LI-23	T-3	3rd " " "			
CC-66	C-4	.05 " " "	IR-199	R-4	470 " " " " "	AT-33	T-4	OUTPUT TRANSFORMER			
EC-83	C-5	10 " 12V D.C. ELECTROLYTIC COND.	IR-31	R-5	82K " " " " "	SC-24	TR-1	2N1086 CONVERTER TRANSISTOR			
CC-65	C-6	.02 " CERAMIC DISC	IR-183	R-6	330 " " " " "	SC-23	TR-2	2N 292 or 2N448 1st. I.F. "			
CC-64	C-7	.01 " " "	IR-156	R-7	4700 " " " " "	SC-27	TR-3	2N448 or 2N292 2nd I.F. REFLEX			
EC-84	C-8	40 " 12V D.C. ELECTROLYTIC COND.	IR-156	R-8	4700 " " " " "	SC-12	TR-4	SC-12 OR 2N107 DIODE			
CC-65	C-9	.02 " " CERAMIC DISC	IR-158	R-9	33K " " " " "	SC-26	TR-5	2N1145 or 2N1098 AUDIO OUTPUT TRANS.			
EC-83	C-10	10 " 12V D.C. ELECTROLYTIC COND.	IR-78	R-10	6800 " " " " "	SC-7	TR-6	1N295 CERAMIC-GERMANIUM DIODE			
CC-66	C-11	.05 " CERAMIC DISC	IR-199	R-11	470 " " " " "		SW	SWITCH ON VOLUME CONTROL			
EC-84	C-12	40 " 12V D.C. ELECTROLYTIC COND.	IR-29	R-12	1500 " " " " "	SPK-32	S	PM. SPEAKER			
EC-82	C-13	100 MFD. 12V D.C. ELECTROLYTIC COND.	VC-127	R-13	10 K OHMS VOLUME CONTROL WITH SPST SW.	LL-46	L-1	ANT. ASSEMBLY			
CC-63	C-14	.02 MFD. CERAMIC DISC	IR-404	R-14	100 OHM 1/2W 10% CARBON RESISTOR	LO-23-A	L-2	OSCILLATOR COIL			
						SC-22	SC-1	GANG CONDENSER 2 SECTION ANTENNA & OSC.			

OPERATING INSTRUCTIONS

1. Turn On-Off Volume Control (figure 1) clockwise about half a turn.
2. Rotate Tuning Knob to select desired station and adjust Volume Control for desired loudness.

To turn set off, turn On-Off Volume knob counter-clockwise until it clicks off.

Conelrad Civil Defense Symbols are provided at 640 and 1240 kilocycles on the dial (see figure 1). To tune in a Conelrad station, align either symbol on dial with Tuning Indicator.

— TO INSTALL EARPHONE —

An earphone for use with your receiver is available from your dealer as an accessory. To connect earphone, insert plug on end of cord into receptacle on left side of case (figure 1). Press plug firmly into place. The speaker shuts off automatically when the earphone is connected.

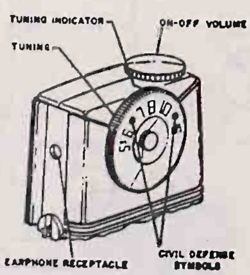


Fig. 1

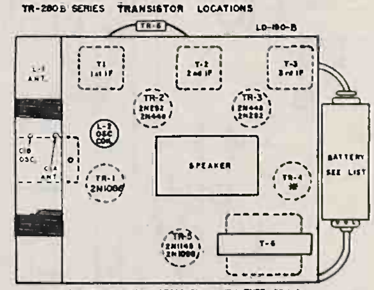
— TO INSTALL BATTERY —

Hold the receiver against your breast with the top upward and the front of the receiver in the palm of your left hand and the back in your right hand. Place all four fingers of each hand along the edge of the back cover (in the areas indicated on the removable label) and exert pressure inward and at the same time in the direction of the right hand. Lift the back off of the receiver. Remove the connectors from the old battery and install a new battery. Replace the back cover in the same direction as it was removed and snap it into place.

— BATTERY REPLACEMENT —

Battery Mfgrs.	Type No.
EVEREADY	#226
BURGESS	#P6-M
RCA	#VS-300
RAY-O-VAC	#1600
WIZARD	#3B6467

TR-280B SERIES TRANSISTOR LOCATIONS

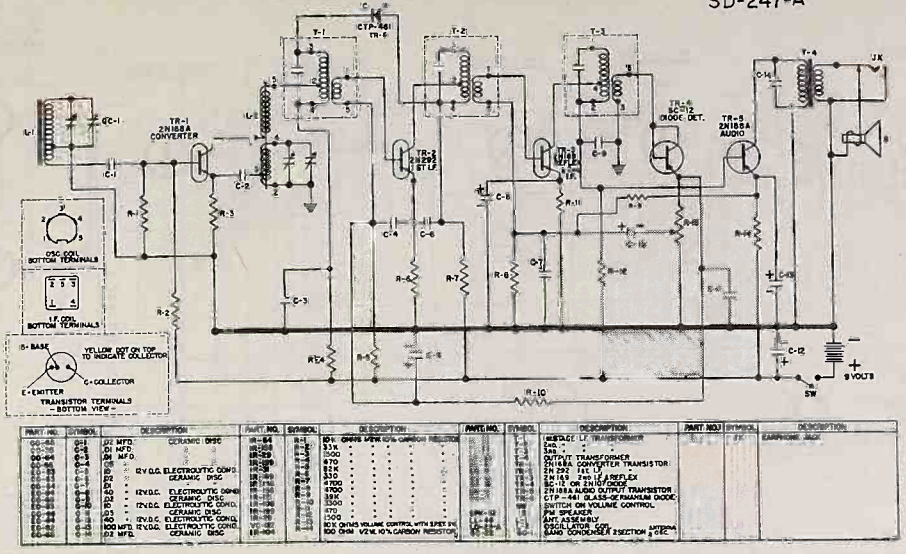


NOTE: REPLACE TRANSISTORS ONLY WITH TYPE FOUND IN RECEIVER.
* TRANSISTOR PART NUMBER NO. SC-12 OR GEN. ELEC. 2N107

Fig. 2

MODELS-TR-280-A, 281-A, 282-A, 283-A

SD-247-A



OPERATING INSTRUCTIONS

1. Turn On-Off Volume Control (figure 1) clockwise about half a turn.
2. Rotate Tuning Knob to select desired station and adjust Volume Control for desired loudness.

To turn set off, turn On-Off Volume knob counter-clockwise until it click off.

Conelrad Civil Defense Symbols are provided at 640 and 1240 kilocycles on the dial (see figure 1). To tune in a Conelrad station, align either symbol on dial with Tuning Indicator.

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An earphone for use with your receiver is available from your dealer as an accessory. To connect earphone, insert plug on end of cord into receptacle on left side of case (figure 1). Press plug firmly into place. The speaker shuts off automatically when the earphone is connected.

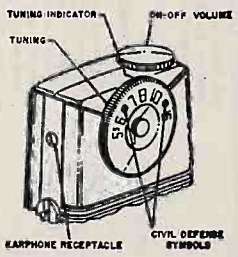


Fig. 1

— TO INSTALL BATTERY —

Hold the receiver against your breast with the top upward and the front of the receiver in the palm of your left hand and the back in your right hand. Place all four fingers of each hand along the edge of the back cover (in the areas indicated on the removable label) and exert pressure inward and at the same time in the direction of the right hand. Lift the back off of the receiver. Remove the connectors from the old battery and install a new battery. Replace the back cover in the same direction as it was removed and snap it into place.

— BATTERY REPLACEMENT —

Battery Mfgrs.	Type No.
EVEREADY	#226
BURGESS	#P6-M
RCA	#VS-300
RAY-O-VAC	#1600
WIZARD	#3B6467

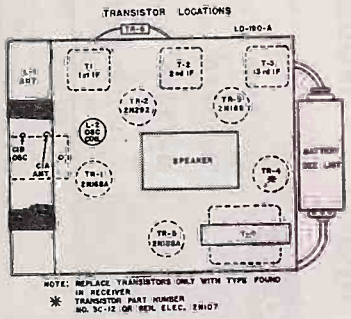


Fig. 2

Westinghouse RADIO SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

A Tech-Lit Publication

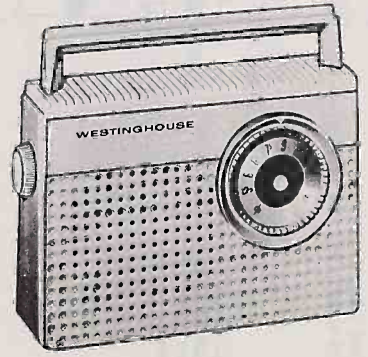
MODELS

H-725P6 *(White/Flame)*
H-726P6 *(White/Aqua)*
H-727P6 *(Mist Green/White)*
H-728P6 *(Charcoal/White)*

V-2397-3 CHASSIS

SPECIFICATIONS

Frequency Range .... 540 to 1600 KC
Intermediate Frequency .... 455 KC
Transistor Complement
1 - 297V011H01 .... Converter
1 - 297V012H05 .... 1st IF Amp.
1 - 297V012H06 .... 2nd IF Amp.
1 - 1N87G or 1N295 .... Diode Detector
1 - 297V004H03 .... Audio Driver
2 - 297V003H06 (matched pair) .... Audio Output
Power Output
Undistorted .... 0.110 Watts
Maximum .... 0.200 Watts
Speaker .... 4" PM
Power Supply - 6 volts (four 1.5 volt "C" batteries)
Eveready 635
Ray-O-Vac 1LP
Burgess 130
Mallory M14R
No-Signal Current Drain .... 8 ma



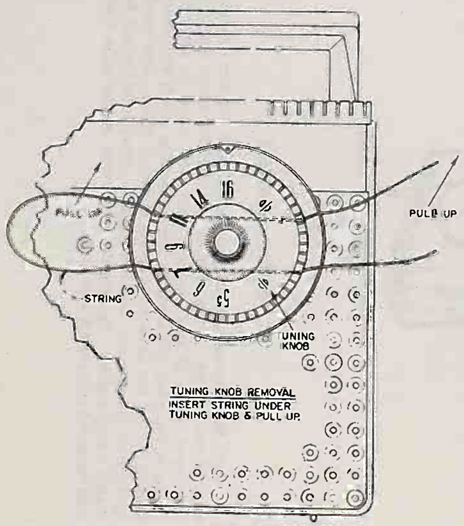


Figure 1 – Tuning knob removal

BATTERY INFORMATION

This receiver uses four 1½ volt "C" size, flash-light type batteries. It is important that batteries are in holder correctly before turning radio on. Refer to figures 3 and 4 and label in the receiver for correct battery installation. Caution: Reversing the batteries in the holder can damage components in the receiver.

CHASSIS REMOVAL

1. Remove the volume control knob.
2. Remove the tuning control knob as shown in figure 1. Insert a loop of string under the tuning knob and pull the knob out of the cabinet front.
3. Remove the phillips head screw in the tuning control-knob well.
4. Remove the back cover (loosen the two coin-slot screws).
5. Remove the two hex head screws securing the chassis to the cabinet.
6. Remove the chassis, with its battery holder, from the cabinet. The receiver can now be serviced. If it is necessary to also remove the speaker, then remove the two hex head screws securing the speaker and lift it out of its slot.
7. Use the reverse of the above steps to replace the chassis into the cabinet. If replaced, the mounting screw that is used in the tuning control-knob well must be the same length as the original, so as to not damage the tuning capacitor.

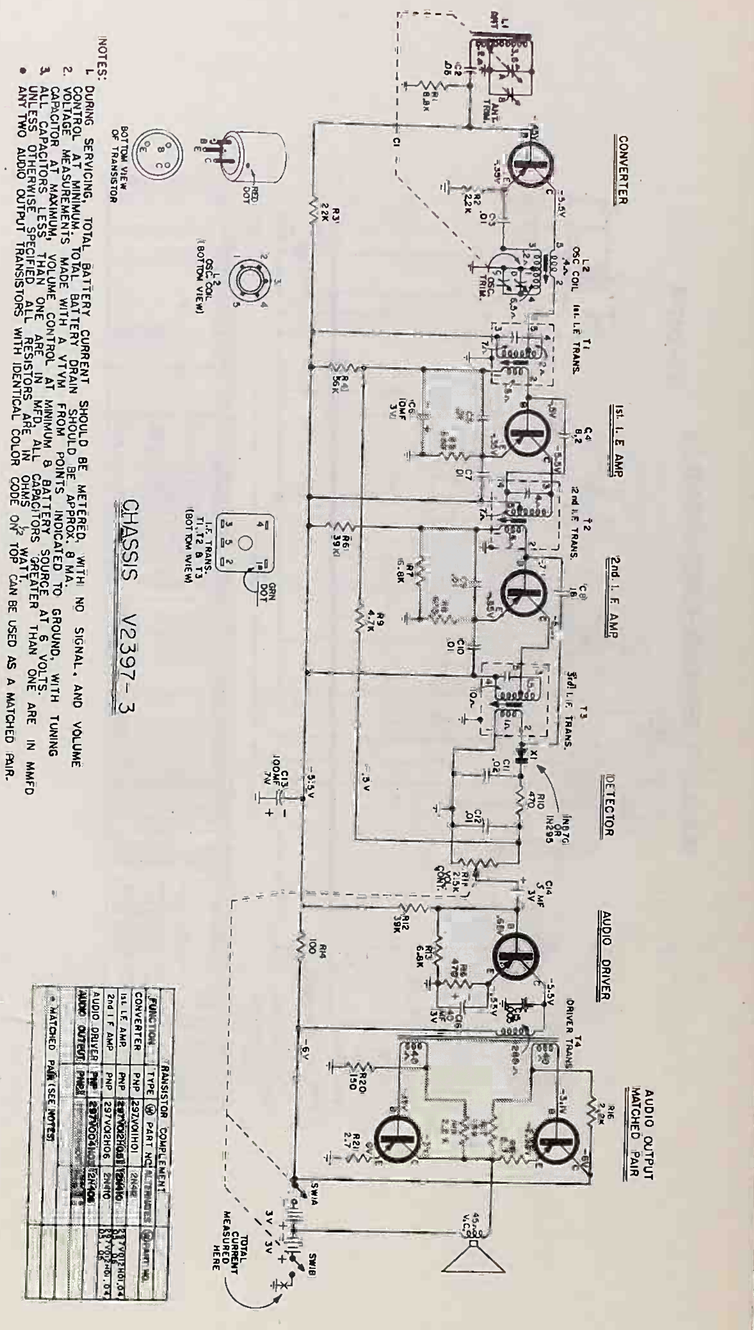


Figure 2 – Schematic diagram

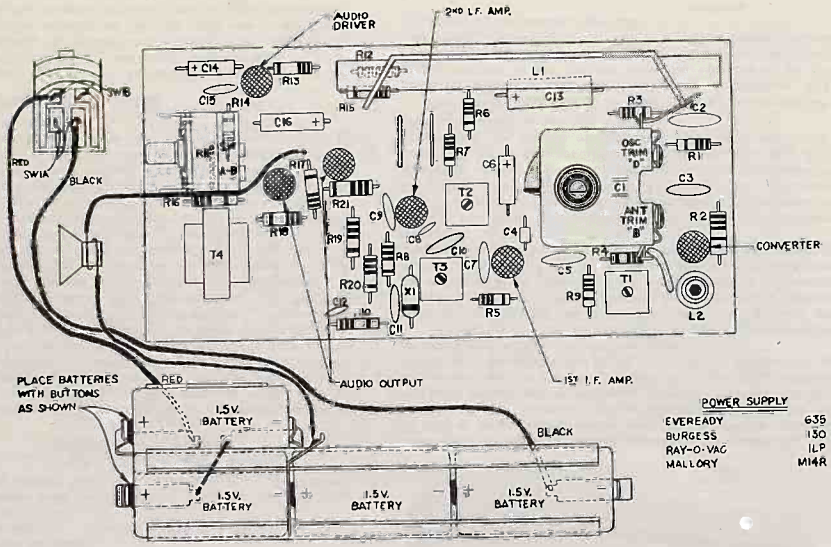


Figure 3 – Top view of chassis

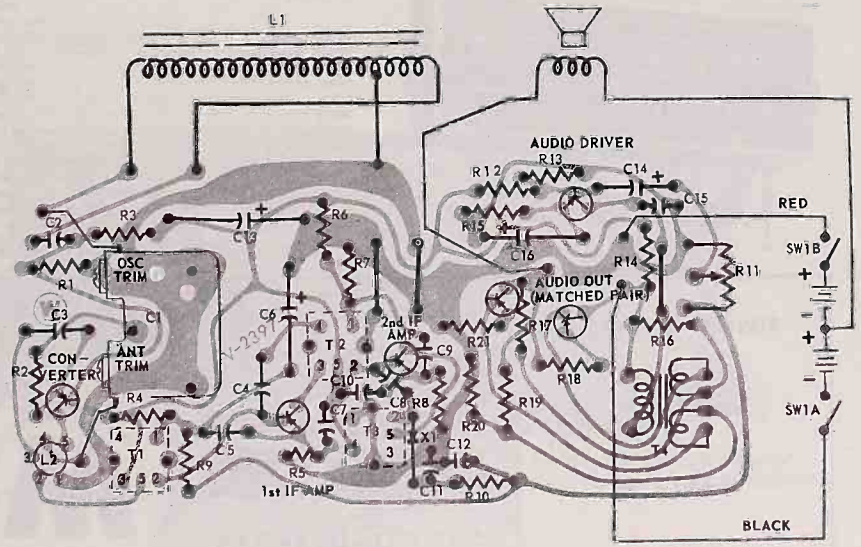


Figure 4 – Bottom view of chassis

ALIGNMENT REQUIREMENTS

SIGNAL GENERATOR – Use a generator providing modulated 455KC and AM broadcast frequencies. Connect a 4 or 5 turn loop of wire across output cable. Place the loop near the ferrite core antenna of the receiver. To increase or decrease the amount of signal coupled to the receiver move the loop closer or further from the antenna. Keep the output of the generator low enough to just give an indication on the VTVM or output meter to avoid AVC action. Keep the volume control set at maximum.

INDICATOR – Connect a VTVM or output meter across the voice coil.

RECEIVER – Set the volume control to maximum. During the last three steps be sure that the hand or any objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.

ALIGNMENT TOOL – Use a fiber aligning tool that snugly fits the slot in the cores of the IF transformers to prevent chipping of the slot.

ALIGNMENT PROCEDURE CHART

Step	*Loosely couple modulated signal to:*	*Generator Frequency*	*C1 Setting*	*Adjust for maximum*
1.	Loop L1	455KC	Minimum	T3, T2 and T1 in order. Reduce generator output if necessary for T2 and T1 adjustments.
2.	Loop L1	1625KC	Minimum	Oscillator trimmer "D"
3.	Loop L1	1400KC	1400KC	RF trimmer "B"
4.	Loop L1	600KC	600KC	Oscillator coil, L2, if necessary.
5.	Repeat steps 2, 3 & 4			

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*
Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.
Resistors are ½ watt, 10% unless otherwise specified.
†New part listed for the first time in Westinghouse Television or Radio service information.
*Price furnished on request.

Ref. No.	*Part No.*	*Description*	*List Price*	*Ref. No.*	*Part No.*	*Description*	*List Price*
†	513V039H03	Cabinet front, white, H-725P6 H-726P6	2.85	†L1	310V048H02	Loop, antenna	1.95
				†L2	230V057H02	Coil, oscillator	1.20
†	513V039H04	Cabinet back, red, H-725P6	1.85	R1	250V216A82	6.8K ohms	.45
†	513V039H05	Cabinet back, white, H-727P6 H-728P6	1.85	R2	RC20AE222K	2.2K ohms	.05
				R3	250V222A23	22K ohms	.06
†	513V039H06	Cabinet back, turquoise, H-726P6	1.85	R4	RC20AE563K	56K ohms	.10
†	513V039H07	Cabinet front, mist green, H-727P6	2.85	R5	250V226A81	680 ohm	.17
†	513V039H08	Cabinet front, charcoal, H-728P6	2.85	R6	RC20AE393K	39K ohms	.05
†	558V217H01	Handle, white, H-725P6 H-726P6	.45	R7	250V216A82	6.8K ohms	.45
†	558V217H02	Handle, mist green, H-727P6	.50	R8	250V224A71	470 ohms	.12
†	558V217H03	Handle, charcoal, H-728P6	.50	R9	250V224A72	4.7K ohms	.12
†	778V141H02	Holder, battery	1.25	R10	250V224A71	470 ohms	.12
†	550V080H05	Knob, dial, H-725P6	1.35	†R11	270V084H01	Control, volume (Incl SW1A & SW1B)	2.00
†	550V080H06	Knob, dial, H-726P6	1.35	R12	RC20AE393K	39K ohms	.05
†	550V080H07	Knob, dial, H-727P6	1.35	R13	250V216A82	6.8K ohms	.45
†	550V080H08	Knob, dial, H-728P6	1.35	R14	RC20AE101K	100 ohms	.05
†	550V098H03	Knob, volume	.30	R15	250V224A71	470 ohms	.12
	761V812H01	Screw, #6, back cover	.10	R16	RC20AE222K	2.2K ohms	.05
†	570V073H01	Speaker, 4" PM, 45 ohm	4.25	R17	250V221A51	150 ohms	.06
C1	330V027H01	Variable	3.10	†R18	259V003H30	2.7 ohms	.20
†C2	215V309H03	.05mf, cer	.30	R19	RC20AE222K	2.2K ohms	.05
C3	215V101A03	.01mf, cer	.35	R20	250V221A51	150 ohms	.06
C4	217V018H29	8.2mmf, FC	.15	R21	259V003H30	2.7 ohms	.20
C5	R2CC63Z5Z103P	.01mf, cer	.22	†SW1A } SW1B }	270V084H01	On-off switch (see R11)	
C6	218V012H16	Elec, 10mf, 3V	.95				
C7	R2CC63Z5Z103P	.01mf, cer	.22	T1	235V047H03	Transformer, 1st IF	2.45
C8	215V011A80	18mmf, FC	.20	T2	235V047H01	Transformer, 2nd IF	2.35
C9	R2CC63Z5Z103P	.01mf, cer	.22	†T3	235V062H01	Transformer, 3rd IF	2.25
C10	R2CC63Z5Z103P	.01mf, cer	.22	T4	430V076H01	Transformer, audio driver	2.80
C11	215V303H04	.02mf, cer	.22	X1	296V002H01	Diode, crystal, 1N87G or 1N295	1.25
C12	215V310H01	.01mf, cer	.20		297V003H06	Transistor, matched audio out pair	3.60
C13	218V012H15	Elec, 100mf, 7V	.95		297V004H03	Transistor, audio driver	1.80
C14	218V012H09	Elec, 5mf, 3V	1.17		297V011H01	Transistor, converter	2.70
C15	215V308H04	.005mf, cer	.20	†	297V012H05	Transistor, 1st IF amp	*
C16	218V012H02	Elec, 40mf, 3V	1.35	†	297V012H06	Transistor, 2nd IF amp	2.60

Westinghouse

RADIO

SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

A Tech-Lit Publication

MODELS

H-712P9
(Charcoal & White)

H-713P9
(Dove Gray & White)

V-2399-1 CHASSIS

ELECTRICAL SPECIFICATIONS

Frequency Range
- Broadcast .... 540 to 1600KC
- Short Wave .... 2.4 to 6.5MC

Intermidiate Frequency 455KC

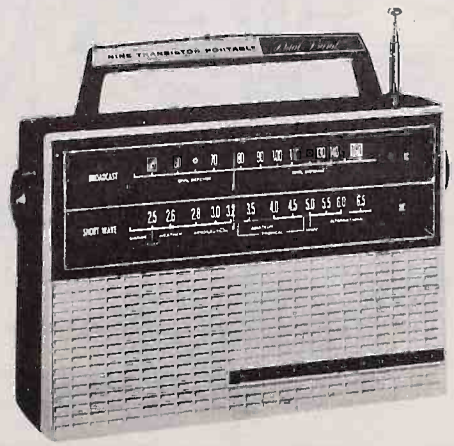
Transistor Complement
- 1-S065 .... BC-RF Amp.
- 1-R244 .... Oscillator
- 1-2N1108 .... Mixer
- 1-2N1110 .... 1st IF Amp.
- 1-2N1111 .... 2nd IF Amp.
- 1-R255 .... 1st Audio Driver
- 1-2N402 .... 2nd Audio Driver
- 2-10036, 10037, 10038 or 10039 .... Audio Output (matched pair)

Power Output
- Undistorted .... 0.300 Watts
- Maximum .... 0.550 Watts

Speaker .... 4" PM
- Voice Coil Impedance .... 25 ohms

Power Supply
- Zinc Carbon Batteries
  - Burgess #2R Eveready #950 or A100
  - Ray-O-Vac #2LP

Average current drain (no signal) .... 11.5ma.
Approximate Battery Life .... 400 hours



DESCRIPTION

This Westinghouse transistor radio contains nine transistors and one crystal diode. New circuitry makes this an extremely sensitive broadcast band receiver with superior tonal reproduction. In addition to the Standard Broadcast band, the receiver has a short wave band covering 2.4 to 6.5mc. This band of frequencies includes marine weather transmissions, ship-to-ship, ship-to-shore, aeronautical communications, station WWV, International and Tropical short wave stations and one of the amateur radio bands.

The receiver features a broadcast band tuned RF amplifier, separate oscillator and mixer, two IF amplifiers, a diode detector, AGC with three stage control, two audio drivers and a transformerless push-pull audio output circuit. A telescoping whip antenna or external antenna can be used on the short wave band for better reception of weak signals. An external antenna clip and wire are provided to improve reception on both bands for extremely weak signal reception. Easily replaceable standard "D" size batteries are used to power the receiver.

FRONT END OPERATION

Broadcast operation — In broadcast operation an RF amplifier with tuned input and tuned output is used for maximum sensitivity and selectivity. A ferrite core type antenna is built into the receiver so that the radio can be used with the telescoping antenna recessed and no external antenna connected. Sensitivity can be increased by connecting the 15 foot or longer antenna wire (enclosed inside the cabinet) to the external antenna clip and extending the wire to its maximum length and to maximum convenient height. On the Broadcast band the external antenna and telescoping antenna inputs are capacity-coupled to the built-in antenna by a length of wire mounted on the ferrite loop.

The output of the RF amplifier is transformer-coupled (L3) to the base of the mixer transistor. The primary of transformer L3 is tapped to provide an impedance match for maximum signal transfer. AGC control voltage is present at the base of both the RF amplifier and mixer transistors. The oscillator signal is injected at the emitter of the mixer transistor.

The oscillator is a tickler-feedback type. The oscillator signal in the collector circuit is inductively coupled back to the emitter to sustain oscillation. The base of the oscillator transistor is at AC ground by virtue of the low impedance of capacitor C4 at the oscillator frequencies. Resistor R15 determines the amount of oscillator power and hence the oscillator injection voltage.

Short Wave operation — In short-wave operation the RF amplifier circuit is bypassed and made inoperative. The signal present at the antenna (built-in, telescoping or external) is now inductively coupled directly to the mixer transistor. The antenna is tuned to the incoming signal frequency by the tuning capacitor.

continued

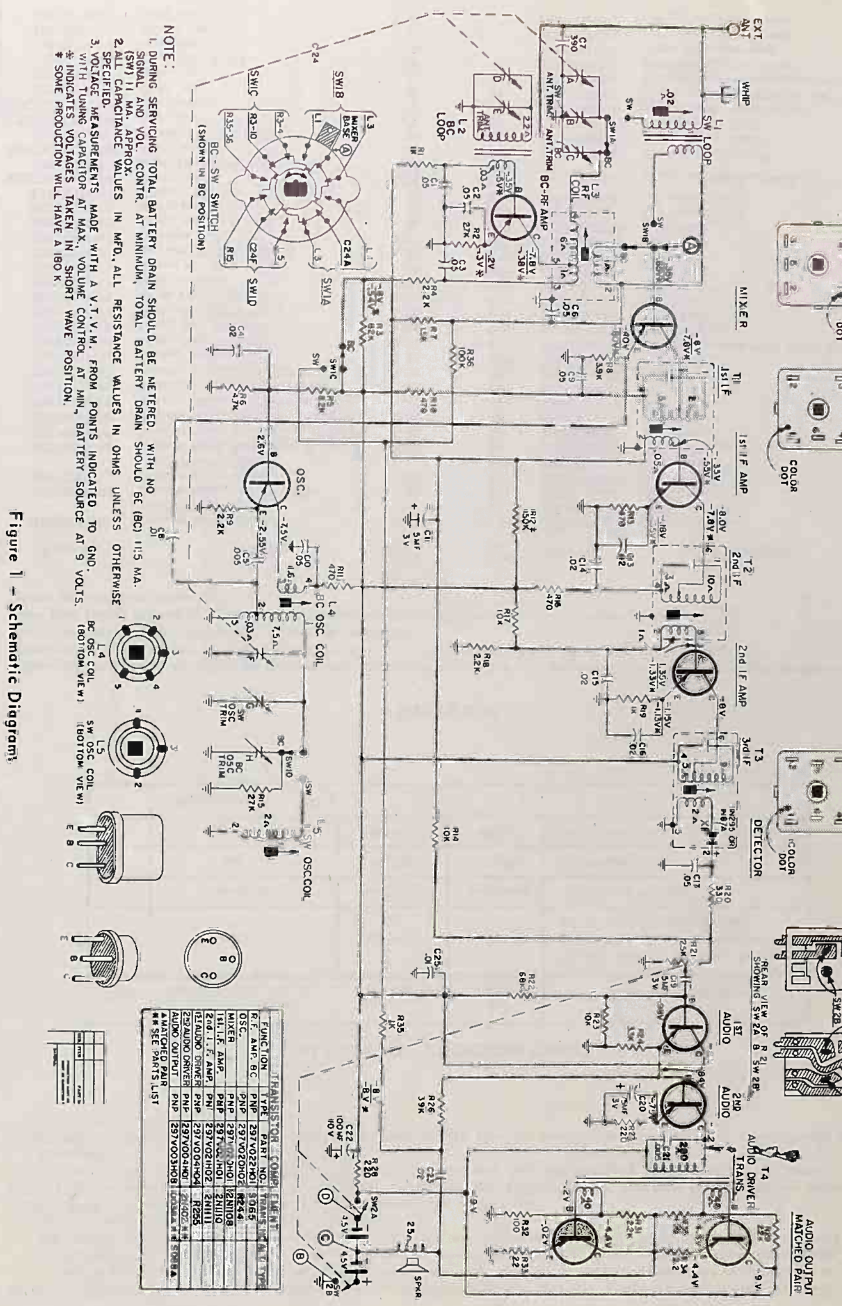


Figure 1 – Schematic Diagram

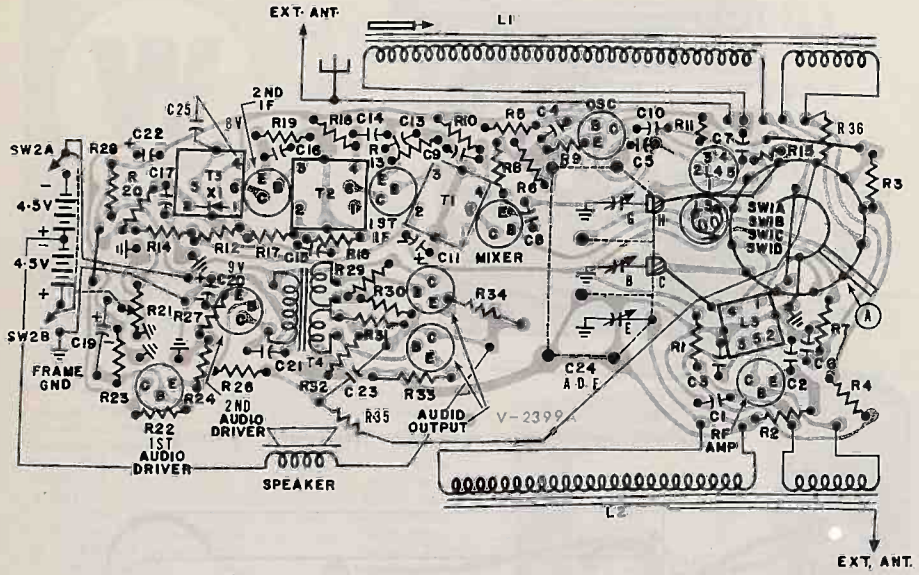


Figure 2 – Bottom view of printed circuit chassis, showing components symbolically.

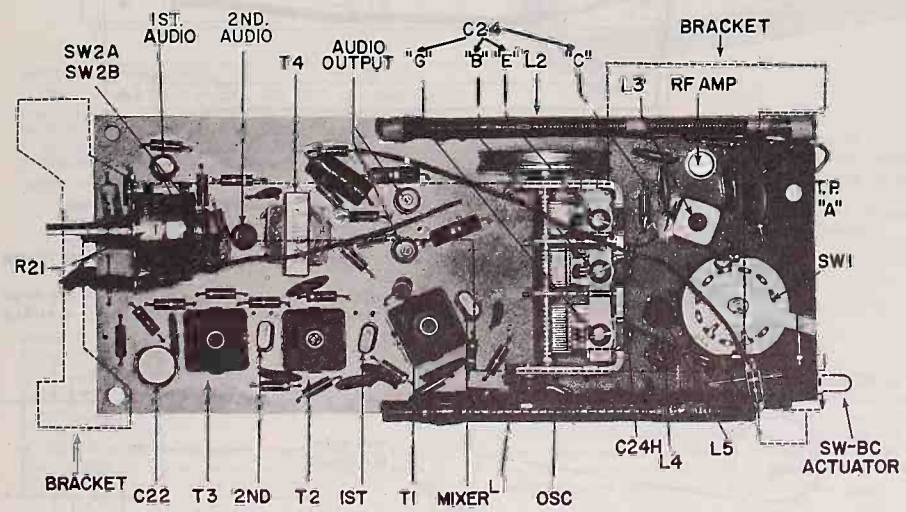


Figure 3 – Top view of chassis.

ALIGNMENT

ALIGNMENT REQUIREMENTS

SIGNAL GENERATOR – Use generator which provides modulated 455KC, 530-1600KC and 2.4-7.5MC frequencies. Signal output should be modulated 30%. Keep output low enough to just give an indication to avoid AVC action.

INDICATOR – Connect VTVM across speaker voice coil.

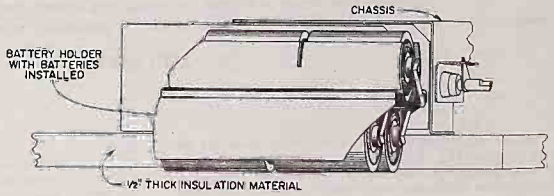
RECEIVER – Remove chassis, speaker and battery holder from cabinet. The dial background must be removed from chassis. Place chassis on insulated material so that it is raised ½" above bench. Locate battery holder (with batteries installed) in same position, with respect to L1, as will be used in cabinet (refer to figure 4). Locate speaker close to chassis and L1. Be sure batteries are at rated voltage (under load). Set volume control to maximum. The oscillator adjustments are critical and therefore screws and slugs should be rotated very slowly to exact alignment point. Be sure during RF alignment that hand or any metal objects on bench do not come in close contact with antenna loops or detuning will occur and alignment will be incorrect.

ALIGNMENT TOOLS – Use insulated aligning tool that snugly fits slots in ferrite cores to prevent chipping of ferrite. A square tool (see figure 5) is required for all slug adjustments except L2.

ALIGNMENT PROCEDURE

Step	Connect Signal Generator To	Generator Frequency	C24 Setting	SW1 Setting	Adjust For Maximum:
1.	test point "A" (T.P. "A")	455KC	open	BC	Top slugs of T3, T2 & T1 in order. (Reduce generator output if necessary for T2 & T1 adjustments)
2.	"	6.5MC	"	S	Rotate C24G maximum clockwise then back-off 1/2 turn. Adjust L5.
3.	"	7.4MC	"	"	Increase generator output until image signal is heard. If not heard, oscillator is tuned to low side of incoming signal and L5 must be rotated counter-clockwise until image signal is heard.
4.	"	6.5MC	"	"	C24G
5.	"	2.4MC	closed	"	L5
6.	Repeat steps 4 and 5 until no further change is noted.				
7.	test point "A"	1625KC	open	B	C24H
8.	"	530KC	closed	"	L4
9.	Repeat steps 7 and 8 until no further change is noted.				
10.	Lead from L1 through 15 mmf capacitor.	5.8MC	tune until signal is heard.	SW	C24B
11.	"	2.6MC	"	"	L1. If no peak is obtained, check to be sure chassis and batteries are positioned as shown in figure 4.
12.	Repeat steps 10 and 11 until no further change is noted.				
13.	Lead from L2 through 200 mmf capacitor	1400KC	tune until signal is heard.	BC	C24E and C24C
14.	"	600KC	"	"	L3
15.	"	1400KC	"	"	C24C

Figure 4 – Positioning of radio chassis and batteries during alignment.



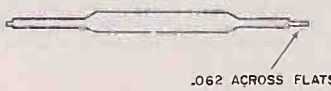


Figure 5 – Alignment tool.

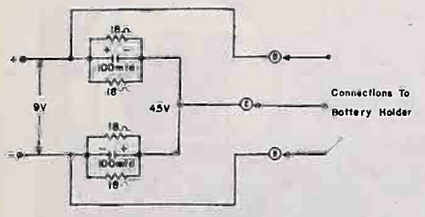


Figure 6 – Filter-divider network to be used when operating radio with a battery eliminator.

NOTE: Battery eliminator should not be used when aligning radio. Operate with batteries, placed as shown in Figure 4, during alignment procedures.

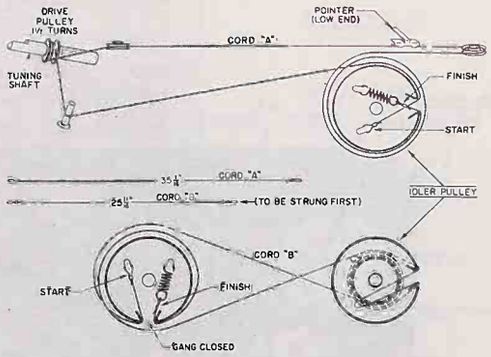


Figure 7 – Dial stringing procedure.

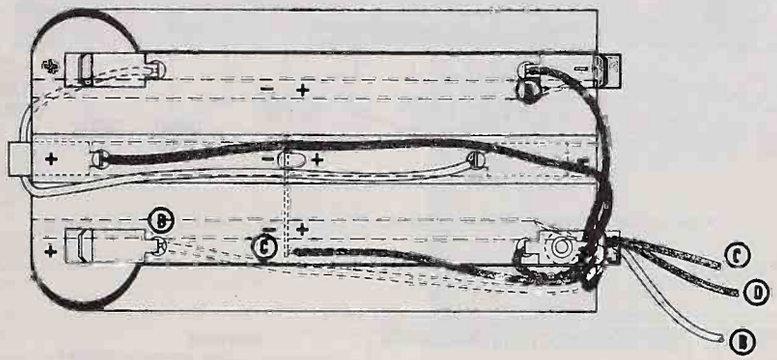
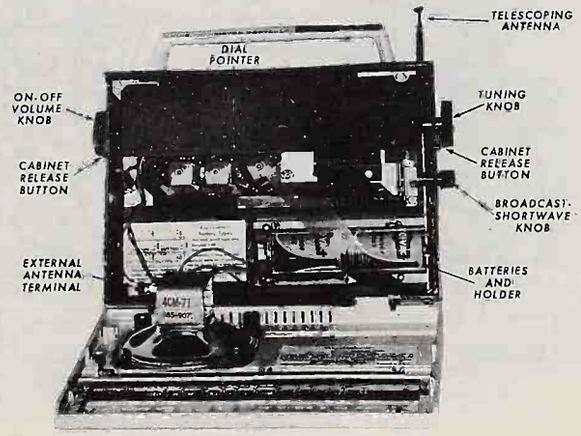


Figure 8 – Battery holder showing battery eliminator connections.

Figure 9 – View of receiver with case open.



The oscillator operation is basically the same as in the broadcast position. However the oscillator coil is now shunted by coil L5 to decrease the circuit inductance. One of the trimmer capacitors is removed to decrease the circuit capacity. The circuit is thus set to tune between approximately 3 to 7mc. (455KC above the incoming signal). Coil L5 is tuned to adjust the oscillator at the low frequency end of the band while the trimmer capacitor is adjusted to set the oscillator frequency at the high end of the band. Resistor R15 is removed from the circuit to increase the amount of oscillator injection voltage.

Audio Driver Section

Two stages of audio amplification are employed prior to the power amplifier circuit. The first stage is an emitter follower circuit. The signal developed across the emitter resistor, R24, is DC coupled to the base of the second stage. Since the input impedance of the emitter follower is high, a much better impedance match is obtained between the detector and audio driver reducing signal distortion. In addition, a negative feedback signal from the audio output stage is fed back to the emitter of the first audio amplifier stage, through C23-R26, to reduce distortion. The value of C23 has been selected to produce bass boost below 200 cycles.

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*

Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.

Resistors are ½ watt, 10% unless otherwise specified.

† New part listed for the first time in Westinghouse Television or Radio service information.

* Price furnished on request.

Ref. No.	*Part No.*	*Description*	*List Price*
†	318V005H01	Antenna, telescoping	2.50
†	690V011H07	Alignment tool, .062" across flats	1.00
†	770V690H02	Background, dial	.90
†	778V156H01	Battery holder assy.	1.50
†	770V687H01	Bracket, handle	.20
†	513V050H01	Cabinet back assy., H-712P9	4.35
†	513V050H02	Cabinet back assy., H-713P9	4.35
†	513V047H01	Cabinet front assy.	3.00
	559V027H03	Catch assy., H-712P9	1.00
†	559V027H08	Catch assy., H-713P9	.35
†	768V116H01	Clip, ext., ant.	.35
	V-3219	Cord, dial (100 ft. spool)	1.57
†	765V011H01	Grommet, telescoping ant.	.05
†	558V159H03	Handle (less nameplate)	.65
†	550V096H04	Knob, volume	.65
†	550V096H05	Knob, tuning	.65
†	550V115H01	Knob, band selector	.20
†	558V162H04	Nameplate, handle	.50
†	558V233H01	Nameplate, insignia	.35
	783V079H01	Nut, telescoping ant. sleeve	.10
†	558V232H01	Pointer	.50
†	787V166H01	Shaft assy., idler (incl pulleys)	.50
†	787V173H01	Shaft assy., actuator (incl actuator)	.60
†	787V167H01	Shaft assy., dial (incl pulley)	.50
	781V011H01	Spacer, rubber, speaker mtg.	.10
†	570V065H01	Speaker, 4" PM	5.50
†	770V250H08	Spring, dial drive	.10
†	778V168H01	Strap assy., battery	.85
C1	215V303H03	.05 mf, cer	.40
C2	"	.05 mf, cer	.40
C3	"	.05 mf, cer	.40
C4	215V303H04	.02 mf, cer	.22
C5	215V308H04	.005 mf, cer	.20
C6	215V303H03	.05 mf, cer	.40
†C7	213V180H04	390 mmf, mica	.50
C8	215V310H02	.01 mf, cer	.25
C9	215V303H03	.05 mf, cer	.40
C10	"	.05 mf, cer	.40
†C11	218V012H19	5 mf, 3V, elec	1.00
C13	215V303H04	.02 mf, cer	.22
C14	"	.02 mf, cer	.22
C15	"	.02 mf, cer	.22
C16	"	.02 mf, cer	.22
C17	215V303H03	.05 mf, cer	.40
†C19	218V012H19	5 mf, 3V, elec	1.00
†C20	218V012H17	75 mf, 3V, elec	.95
C21	215V308H04	.005 mf, cer	.20
†C22	218V012H20	100 mf, 10V, elec	1.25
C23	210V111H12	.02 mf, 200V	.25
†C24	330V028H01	Tuning capacitor	6.00
C25	R2CC63Z5Z103P	.01mf, cer	.20
†L1	310V052H01	Antenna, broadcast loop	2.25
†L2	310V053H01	Antenna, short wave loop	2.25
†L3	235V050H01	Transformer, RF amp.	2.00
†L4	230V077H01	Coil, broadcast osc.	1.00
†L5	230V078H01	Coil, short wave osc.	.60
R1	250V221A02	1K ohms	.12
R2	RC20AE272K	2.7K ohms	.05
R3	RC20AE823K	82K ohms	.05
R4	RC20AE222K	2.2K ohms	.05
R5	RC20AE822K	8.2K ohms	.05
R6	250V224A72	4.7K ohms	.12
R7	RC20AE152K	1.5K ohms	.05
R8	RC20AE392K	3.9K ohm	.04
R9	RC20AE222K	2.2K ohms	.05
R10	250V234A71	470 ohms	.12
R11	250V224A71	470 ohms	.12
R12	RC20AE154K	150K ohms	.07
R13	250V224A71	470 ohms	.12
R14	RC20AE103K	10K ohms	.05
R15	RC20AE273K	27K ohms	.06
R16	250V234A71	470 ohms	.12
R17	RC20AE103K	10K ohms	.05
R18	RC20AE222K	2.2K ohms	.05
R19	250V221A02	1K ohms	.12
R20	250V223A31	330 ohms	.15
†R21	270V027H15	2.5K volume cont (incl SW2A & B)	2.00
R22	RC20AE683K	68K ohms	.05
R23	RC20AE103K	10K ohms	.05
R24	RC20AE332K	3.3K ohms	.05
R26	RC20AE393K	39K ohms	.05
R27	RC20AE221K	220 ohms	.05
R28	RC20AE221M	220 ohms	.05
R29	RC20AE222K	2.2K ohms	.05
R30	250V221A01	100 ohms	.12
R31	RC20AE222K	2.2K ohms	.05
R32	250V221A01	100 ohms	.12
R33	251V002A29	2.2 ohms	.17
R34	"	2.2 ohms	.17
R35	250V221A02	1K ohms	.12
R36	RC20AE104K	100K ohms	.05
†SW1A, B,C,D	756V038H01	Switch, band selector	2.25
†SW2A, B	270V027H15	Switch, off-on (part of R21)	2.00
†T1	235V051H02	Transformer, 1st IF	1.75
†T2	235V051H01	Transformer, 2nd IF	1.75
†T3	235V052H01	Transformer, 3rd IF	2.00
†T4	430V076H01	Transformer, audio driver	2.80
X1	296V002H01	Diode, detector, 1N295 or 1N87A	1.25
†	297V022H01	Transistor, RF amp, S065	4.75
†	297V020H02	Transistor, osc, R-244	3.25
†	297V020H01	Transistor, mixer, 2N1108	4.00
†	297V021H01	Transistor, 1st IF, 2N1110	4.00
†	297V021H02	Transistor, 2nd IF, 2N1111	4.00
†	297V004H04	Transistor, 1st audio driver, R-255	3.25
	297V004H01	Transistor, 2nd audio driver, 2N238 or 2N402	2.40
	297V003H08	Transistor, Audio out., matched pair, 10036, 10037, 10038 or 10039	4.50

Westinghouse

RADIO

SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

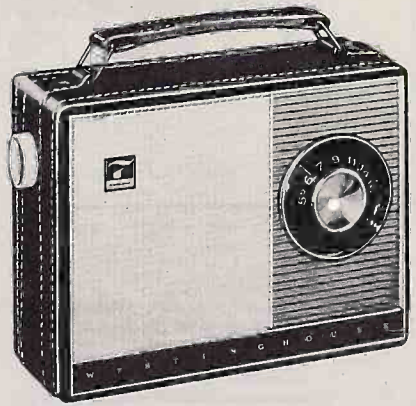
A Tech-Lit Publication

MODELS

H-729P7
(Suntan)

H-730P7
(Gray)

CHASSIS V-2402-1



SPECIFICATIONS

Frequency Range	540 to 1600KC
Intermediate Frequency	455KC
Transistor Complement 1-2N1107	RF
1 2N1108	Converter
1 2N1110	1st IF Amp.
1 2N1111	2nd IF Amp.
1 1N87A or 1N295	Diode Detector
1 2N1273 to W Specifications	Audio Driver
2 2N1273 to W Specifications (Matched Pair)	Audio Output

BATTERY INFORMATION

This receiver uses four 1½ volt "D" size flash-light type batteries. It is important that batteries be in holder correctly before turning radio on. Refer to figure 5 and label in the receiver for correct battery installation.

CAUTION: Reversing the batteries in the halder can damage components in the receiver.

CHASSIS REMOVAL

1. Pull off knobs.
2. Open back of set and remove battery holder.
3. Remove four screws holding chassis. NOTE: One of these screws is used to ground the chassis to the frame.
4. Remove chassis.

Speaker is held to cabinet front by four screws. Cabinet front is held to cabinet by six screws. Earphone jack is held to cabinet by sleeve nut with coin slot.

GENERAL

The diode detector is included in the can of T5.

To increase sensitivity and selectivity, this receiver has a tuned RF stage and, therefore, a 3 gang variable capacitor.

Two thermistors are provided to compensate the audio output transistors for ambient temperature variations.

TRANSISTOR REPLACEMENT

2N1273 transistors vary greatly, both in gain and in operating point. The Westinghouse 2N1273 transistors used in the audio output and driver stages of this receiver are carefully selected and matched for optimum performance. If these transistors are replaced by ordinary 2N1273 transistors, the receiver may possibly oscillate, deliver below normal output, or produce excessive distortion.

ALIGNMENT

Set the volume control of the receiver at maximum. Keep signal generator output low to avoid AVC action. Be careful not to bring hands or any other objects close to the antenna loop or the alignment will not be correct. Use a snugly fitting fiber alignment tool to prevent chipping the IF transformer slots.

Step	Connect Signal Generator	Signal Generator Frequency	Set Radio	With VTVM Across Voice Coil, Adjust for Maximum Output
1.	Thru .05 capacitor to Converter transistor base.	455KC Modulated	Minimum Capacity	T5, T4, top & bottom
2.	Thru .05 capacitor to converter transistor base.	530KC Modulated	Maximum Capacity	Osc slug T2
3.	Thru .05 capacitor to converter transistor base.	1625KC Modulated	Minimum	Osc trimmer "F"
4.	Repeat steps 2 & 3 until no further interaction is noted.			
5.	Thru .05 capacitor to RF transistor base.	600KC Modulated	600KC (Tune in)	RF slug T1
6.	Thru .05 capacitor to RF transistor base.	1400KC Modulated	1400KC	RF trimmer "C"
7.	Repeat steps 5 & 6 until no further interaction is noted.			
8.	Loosely couple to L1	1400 KC Modulated	1400KC	Ant trimmer "A"

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*
Where applicable, prices include Federal Excise tax. Prices are subject to change without notice.
†New part listed for the first time in Westinghouse Television or Radio Service information.
*Price furnished on request.

MISCELLANEOUS

Ref. No.	Part No.	Description	List Price
†	513V058H01	Cabinet, front (does not inc escutcheon, crystal, name-plate or insignia)	3.50
†	513V060H01	Cabinet assy, H-729P7 (suntan)	12.50
†	513V060H02	Cabinet assy, H-730P7 (gray)	12.50
	558V266H01	Crystal	.20
†	550V132H02	Dial	.60
†	558V314H01	Escutcheon (will cement to right half of cabinet front)	.75
	778V198H01	Housing rivet assy (battery holder)	
†	558V294H01	Insignia	.40
	754V036H01	Jack, earpiece	
†	550V144H01	Knob, tuning, H-729P7	.50
†	550V144H03	Knob, tuning, H-730P7	.50
†	550V144H02	Knob, volume, H-729P7	.40
†	550V144H04	Knob, volume, H-730P7	.40
†	558V295H01	Nameplate	.40
†	570V079H01	Speaker, 4" PM, 25 ohm voice coil	4.75

CHASSIS PARTS

Ref. No.	Part No.	Description	List Price
†C1	330V034H01	Capacitor, variable, 3 gang	5.95
C2	215V303H04	.03mf, cer	.22
†C3	215V309H53	.05mf, cer	.30
†C5	215V309H53	.05mf, cer	.30
C6	215V303H04	.02mf, cer	.22
C7	215V310H02	.01mf, cer	.25
C9	215V303H04	.02mf, cer	.22
C10	218V012H16	10mf, 3V, elec	.95
†C11	215V309H53	.05mf, cer	.30
C12	215V303H04	.02mf, cer	.22
C13	215V303H04	.02mf, cer	.22
C14	215V303H04	.02mf, cer	.22
C15	215V303H04	.02mf, cer	.22
C16	215V310H02	.01mf, cer	.25
C17	218V012H19	5mf, 3V, elec	1.00
C18	215V310H02	.01mf, cer	.25
†C19	215V310H05	.02mf, cer disc, 50V	.25
†C20	218V012H22	100mf, 3V, elec	1.00
C21	218V012H15	100mf, 7V, elec	.95
†L1	310V057H01	Loop antenna, iron core	2.10
R1	RC20AE152K	1.5K ohms	.05
R2	RC20AE222K	2.2K ohms	.05
R3	RC20AE123K	12K ohms	.05
R4	RC20AE272K	2.7K ohms	.05
R5	RC20AE272K	2.7K ohms	.05
R6	250V224A71	470 ohms	.12
R7	RC20AE102K	1K ohms	.05
R8	RC20AE102K	1K ohms	.05
R9	250V234A71	470 ohms	.12
R10	RC20AE222K	2.2K ohms	.05
R11	RC20AE153K	15K ohms	
R12	250V224A71	470 ohms	.12
R13	RC20AE473K	47K ohms	.05
R14	RC20AE393K	39K ohms	.05
R15	250V224A72	4.7K ohms	.12
R16	RC20AE221K	220 ohms	.05
†R17	270V027H17	5K, volume control (incl SW1A & B)	1.75
R18	RC20AE123K	12K ohms	.05
R19	RC20AE471K	470 ohms	.06
R20	RC20AE101M	100 ohms	.05
R21	RC20AE152K	1.5K ohms	.05
R22	RC20AE271K	270 ohms	.10
R23	RC20AE152K	1.5K ohms	.05
R24	RC20AE221K	220 ohms	.05
†R25	251V001A59	1.5 ohms	.25
†R26	251V001A59	1.5 ohms	.25
R27	RC20AE102K	1K ohms	.05
SW1A	270V027H17	Switch (part of R17)	
SW1B	270V027H17	Switch (part of R17)	
†T1	235V064H01	Transformer, RF	2.15
†T2	230V088H01	Coil, osc, adjustable	1.00
†T3	235V063H01	Transformer, 1st IF	2.25
T4	235V051H01	Transformer, 2nd IF	1.75
T5	235V052H01	Transformer, 3rd IF (incl diode X1)	2.00
T6	430V076H01	Transformer, audio driver	
†TH1	259V010H01	Thermistor, 220 ohms (75°F cold)	.50
†TH2	259V010H01	Thermistor, 220 ohms (75°F cold)	.50
†	297V025H02	Transistor, audio out (matched pair of 2N1273 to W Specifications	3.60
†	297V024H01	Transistor, RF (2N1107)	2.50
	297V020H01	Transistor, converter (2N1108)	4.00
	297V021H01	Transistor, 1st IF (2N1110)	4.00
	297V021H02	Transistor, 2nd IF (2N1111)	4.00
	297V004H06	Transistor, audio driver 2N1273 to W specifications)	1.80

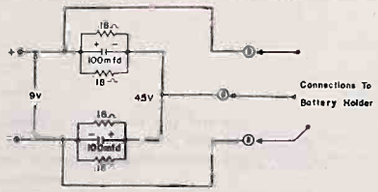


Figure 1 – Filter-divider network to be used when operating radio with a battery eliminator.

NOTE: Battery eliminator should not be used when aligning radio. Operate with batteries, placed as shown in Figure 5 during alignment procedures.

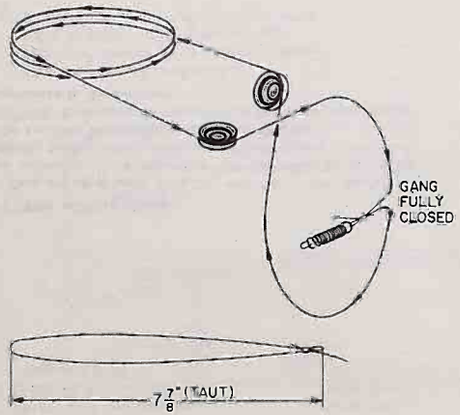


Figure 2 – Dial cord stringing.

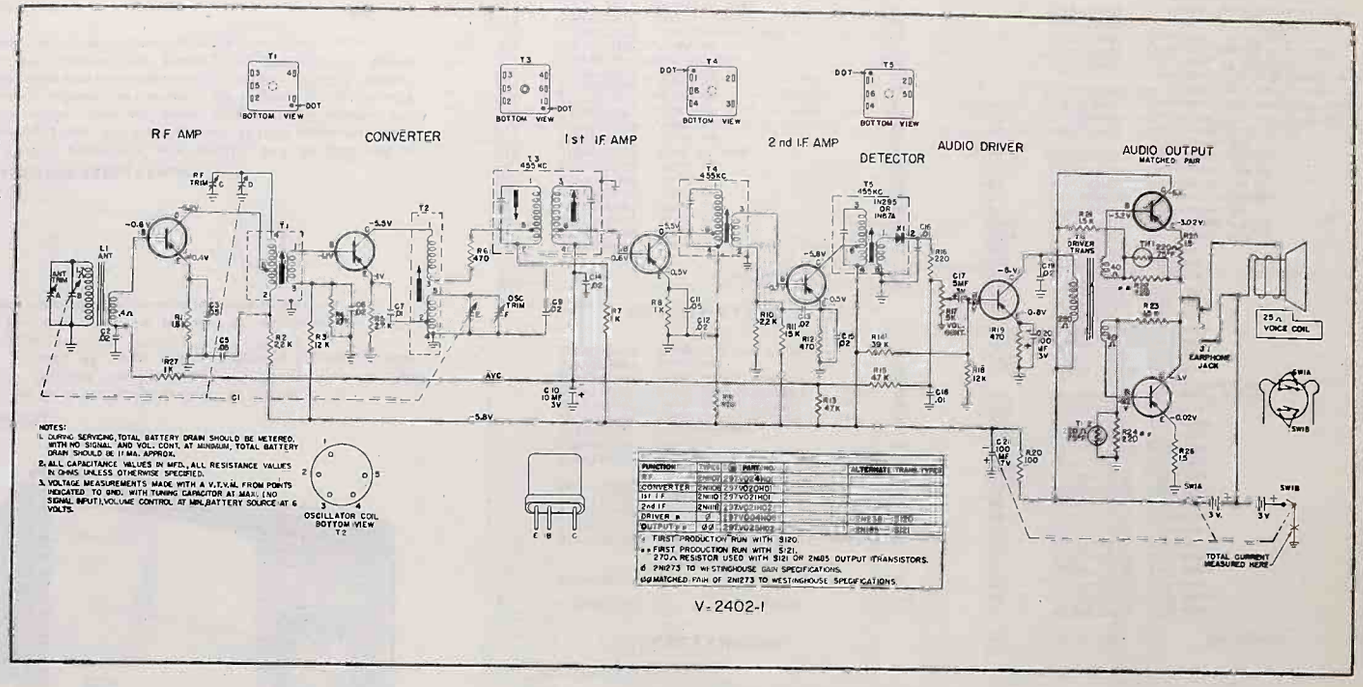


Figure 3 – Schematic Diagram.

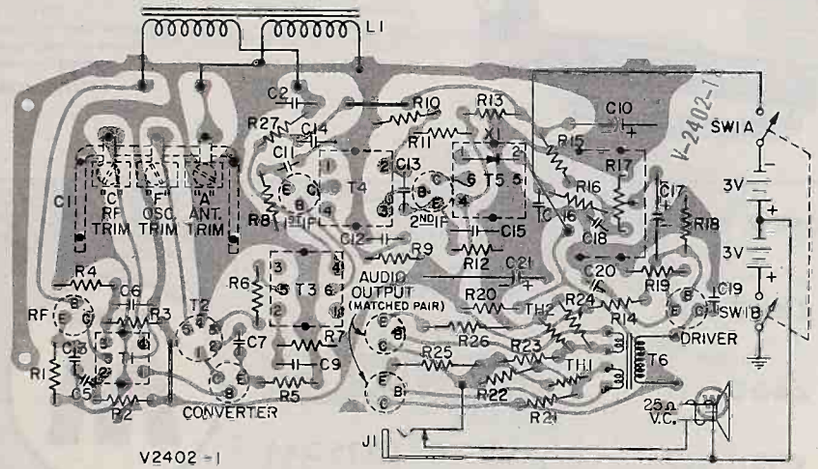


Figure 4 – Bottom view of chassis.

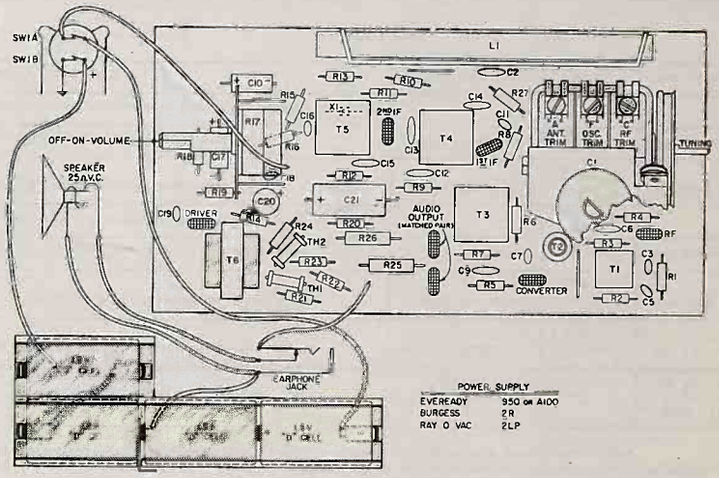


Figure 5 – Top view of chassis.

SERVICE MANUAL

MODEL "ROYAL 500E" TRANSISTOR PORTABLE RADIO

CHASSIS 8CT40 & 8CT40Z2

GENERAL

These transistor portable chassis are conventional superheterodyne receivers. They use an untuned R.F. stage with an individual mixer and oscillator to produce the 455 Kc intermediate frequency. Chassis 8CT40 and 8CT40Z2 are virtually identical except for different transistors and a few other parts. The parts marked by astericks on the chassis wiring and component drawing apply only to chassis 8CT40Z2. The first and second intermediate frequency amplifiers are conventional. A (103-19) is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis use a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

Power Supply	Four Zenith type Z-8 or Z-9 1 1/2 volt batteries or four 1 1/2 volt penlite batteries
Frequency Range	540 to 1600 KC
Intermediate Frequency	455 KC
Sensitivity	Approximately 70 microvolts/meter for 50 milliwatts output
Power Output Undistorted	100 milliwatts
Power Output Maximum	180 milliwatts
Speaker	2 3/4 inch P.M. Alnico V Voice Coil Impedance 15 ohms at 1000 cycles
Accessory Earphone	B39-24 Impedance 15 ohms at 1000 cycles

PRINTED CIRCUIT SERVICING

Servicing printed circuit sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

WARNING: Excessive heat may damage the printed circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

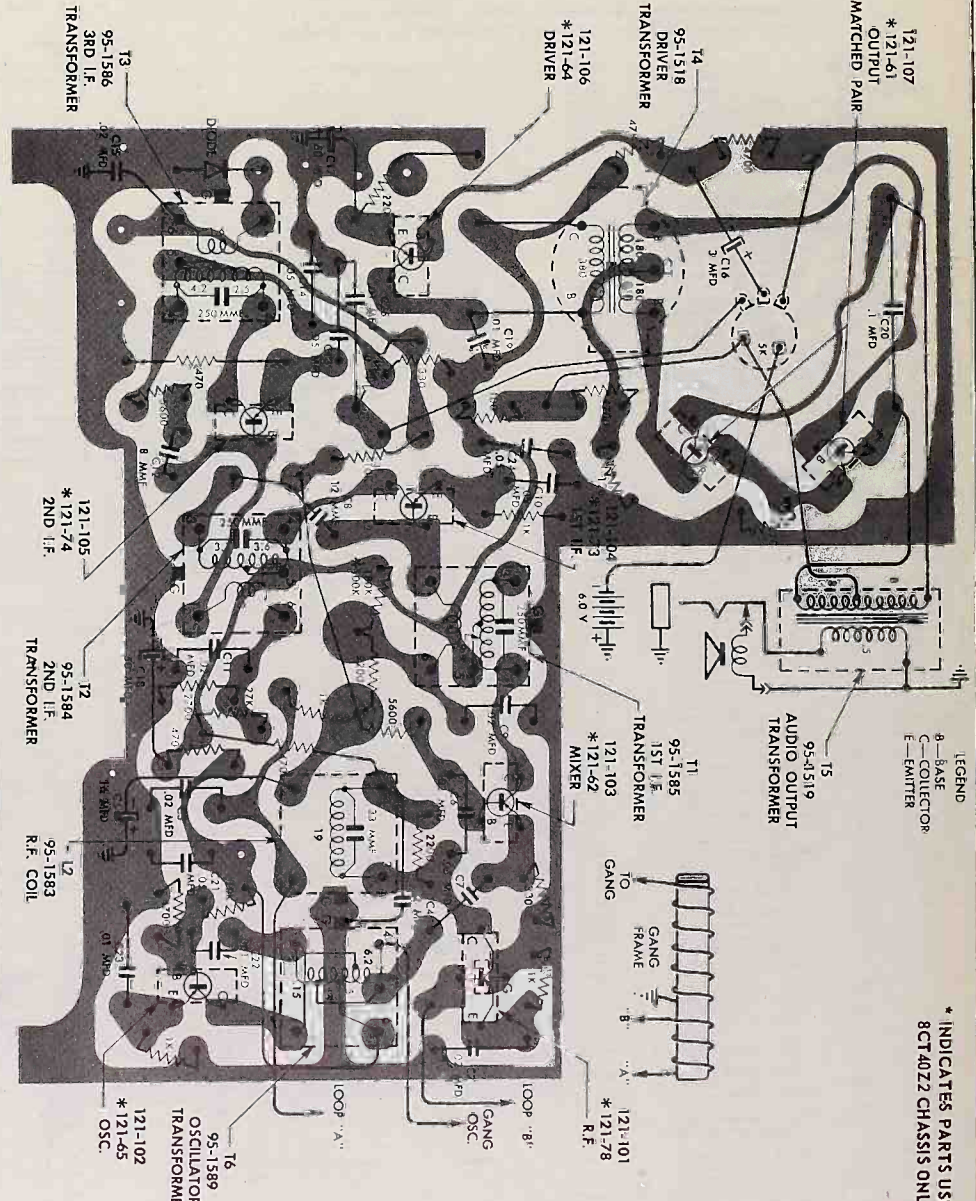
5. Tin leads on component before soldering.
6. Use only solder with a 63% tin 37% lead mixture which has an extremely low melting point.
6. Metal pick (soldering aid).

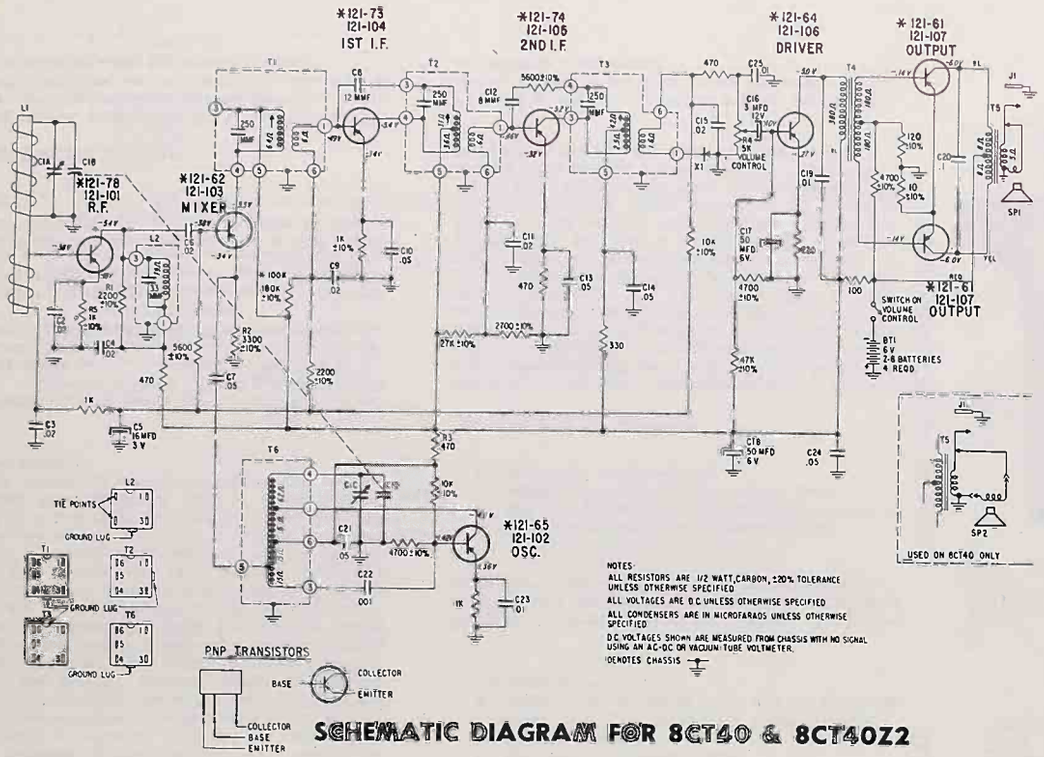
COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the printed wiring. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of printed circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.

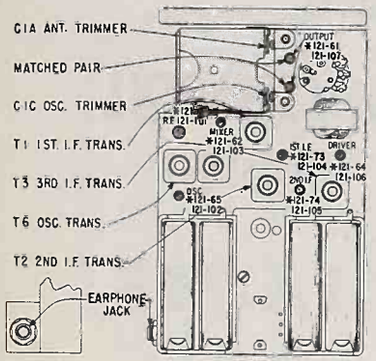
CHASSIS, WIRING AND COMPONENTS VIEWED FROM WIRING SIDE





NOTES:
ALL RESISTORS ARE 1/2 WATT, CARBON, ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
DC VOLTAGES SHOWN ARE MEASURED FROM CHASSIS WITH NO SIGNAL USING AN AC-DC OR VACUUM TUBE VOLTMETER.
DENOTES CHASSIS

SCHEMATIC DIAGRAM FOR 8CT40 & 8CT40Z2



TRANSISTOR & TRIMMER LAYOUT

ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2 T3 for maximum output.	For I.F. Alignment
2	1620 KC		—	Gang wide open	C3C	Set oscillator to dial limit
3	600 KC			[illegible]	Adjust slug in T6	Adjust T6 for maximum output while rocking gang. Tune T6 for maximum output regardless of dial accuracy.
4	REPEAT STEPS 2 & 3			—	—	—
5	1260 KC			1260 KC	C1A	Align loop ant.

CHASSIS INFORMATION CHART

Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	R.F.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
8CT40	Black	Black 103-8283	Zenith S.T.A. Type	121-101 2N544 PNP	121-103 2N411 PNP	121-102 2N409 PNP	121-104 2N409 PNP	121-105 2N409 PNP	103-19 1N870	121-106 2N407 PNP	121-107 2N407 Matched Pair PNP PNP	Sylvania
8CT40Z2	Red	Red 103-8279	Zenith S.T.A. Type	121-78 2N544 PNP	121-62 2N411 PNP	121-65 2N409 PNP	121-73 2N409 PNP	121-74 2N409 PNP	103-19 1N87G	121-64 2N407 PNP	121-61 2N407 Matched Pair PNP PNP	R.C.A.

CHASSIS PARTS
Chassis 8CT40 & 8CT40Z2

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2364		Variable capacitor mtg. brkt.	.10
22-2726		50 mfd. electrolytic - 6V (2 used)	1.50
22-2728 or 22-3034		.05 mfd. ceramic disc - 25V	.60 .45
22-2729		.001 mfd. ceramic disc - 25V	.25
22-2871		16 mfd. electrolytic - 3V	1.50
22-2884		3 mfd. electrolytic - 12V	1.50
22-2885		.02 mfd. ceramic disc - 25V (3 used)	.25
22-2998		.01 mfd. mylar - 50V	.35
22-3010		.01 mfd. ceramic disc - 25V (3 used)	.45
22-3033		.02 mfd. ceramic disc - 25V (4 used)	.30
22-3036		.05 mfd. ceramic disc - 25V (2 used)	.45
22-3156		8 mmfd. ceramic disc - 500V	.25
22-3157		12 mmfd. ceramic disc - 500V	.25
22-3185		.05 mfd. ceramic disc - 25V (3 used)	.35
22-3209		2 section variable capacitor	4.25
44-34		Miniature jack	.90
54-74		2-56 x 3/16 hex. nut (1 used on ea. 112-1048)	.03
54-417		1/4 - 32 x 3/8 hex. nut (1 used on ea. 44-34 & 63-3693)	.10
63-1701		10 ohm 1/2W ins. 10%	.17
63-1744		100 ohm 1/2W ins. 20%	.17
63-1747		120 ohm 1/2W ins. 10%	.17
63-1758		220 ohm 1/2W ins. 20%	.17
63-1765		330 ohm 1/2W ins. 20%	.17
63-1785		1000 ohm 1/2W ins. 10%	.17
63-1788		1000 ohm 1/2W ins. 20% (2 used)	.17
63-1799		2200 ohm 1/2W ins. 10%	.17
63-1803		2700 ohm 1/2W ins. 10%	.17
63-1813		4700 ohm 1/2W ins. 10% (3 used)	.17
63-1817		5600 ohm 1/2W ins. 10% (2 used)	.17
63-1827		10 K ohm 1/2W ins. 10% (2 used)	.17
63-1845		27 K ohm 1/2W ins. 10%	.17
63-1855		47 K ohm 1/2W ins. 10%	.17
63-3693		Volume control & sw.	2.05
63-4172		470 ohm 1/4W ins. 20%	.17
63-4185		1000 ohm 1/4W ins. 10%	.17
63-4199		2200 ohm 1/4W ins. 10%	.17
63-4208		3300 ohm 1/4W ins. 10%	.17
78-1067		3 contact socket (7 used)	.30
78-1103		4 contact socket	.50
80-1075		Battery contact spring (2 pt. of S-47430)	.15
80-1091		Drive cord tension spring	.08
80-1247		Battery contact spring (2 used)	.10
80-1317		Dual contact spring (pt. of S-47430)	.25
83-3025		Cushion strip	.03
83-3178		Polyethylene strip (battery pull out)	.05
86-302		Insertion terminal (2 used)	.03
86-327		Connector terminal (2 used)	
93-1270		.095 I.D. x 1/4 O.D. x 1/2 Thk. bakelite washer (1 used on ea. 112-1048)	.03
95-1518		Driver transformer	5.00
95-1519		Audio output transformer	3.50
95-1583		R.F. transformer	3.50
95-1584		2nd I.F. transformer	3.50
95-1585		1st I.F. transformer	3.50
95-1586		3rd I.F. transformer	3.50
95-1589		Oscillator transformer	3.00
103-19		Crystal diode	.75
112-1048		2-56 x 1/4 binding hd. mach. screw (2 join S-47430 & 80-1247)	.03
113-6		4-40 x 3/16 rd. hd. mach. screw - lockwasher (used on S-46794)	.03
113-69		4-40 x 5/32 hex. hd. mach. screw - lockwasher alt. (2 used on 22-3209)	.03
S-46794		Antenna	1.75
S-47430		Housing & spring assem.	1.75

CABINET PARTS
Models Royal 500E, R, W & Y

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-8 or Z-9		1 1/2 volt battery (use 4) Mercury cell (use 4)	
14-2763		Plastic cabinet - front - R500YE	3.00
14-2764		Plastic cabinet - front - R500RE	3.00
14-2765		Plastic cabinet - front - R500WE	3.00
14-2784		Plastic cabinet - rear - R500YE	3.00
14-2785		Plastic cabinet - rear - R500RE	3.00
14-2786		Plastic cabinet - rear - R500WE	3.00
18-1628		Packing carton	
24-885		Battery cover - R500YE	.60
24-886		Battery cover - R500RE	.60
24-986		Battery cover - R500WE	
36-208		Cabinet handle	1.00
49-892		2 3/4" PM speaker	6.00
57-2781		Emblem plate	.50
57-2782		Escutcheon - R500YE	3.75
57-2825		Escutcheon - R500RE	3.75
57-2826		Escutcheon - R500WE	3.75
71-130		6-32 x 5/16 Phils. flat hd. mach. screw (used on 14-2784, 5 & 6)	.03
80-1323		Clamp spring (2 used on 49-892)	.10
80-1325		Knob ret. spring (pt. of S-47780)	.05
86-326		Connector terminal (2 used)	.02
97-525		Chassis mtg. stud	.40
102-2286		Gold label	.15
112-773		6-20 x 3/8 Phils. pan hd. self-tap screw (2 used on chassis)	.03
112-1126		6-32 x 1/4 mach. screw (mtg. cover)	.20
112-1247		4-24 x 7/32 Phils. pan hd. self-tap screw (1 used on ea. 80-1323)	.03
114-49		6-32 x 5/8 x 1/4 hex. hd. mach. screw (used on 97-525)	.03
114-700		4-40 x 7/32 x 3/16 hex. hd. self-tap screw (3 used on escutcheon)	.05
138-279		Cabinet grille	.90
188-204		Knob clamping ring (pt. of S-47440)	.03
188-209		Knob clamping ring (pt. of S-46811)	.03
188-243		Trim ring	
197-47		Suction cup	
202-1518		Instruction book	.15
S-46811		Dial scale & bushing assem.	.75
S-47440		Vol. control knob	
S-47780		Tuning control knob	

CHASSIS PARTS
Chassis 8CT40 ONLY

PART NO.	DIA. NO.	DESCRIPTION	PRICE
63-1772		470 ohm 1/2W ins. 20% (3 used)	.17
63-1870		100 K ohm 1/2W ins. 20%	.17
63-1880		180 K ohm 1/2W ins. 10%	.17
121-101		Transistor (R.F.)	3.75
121-102		Transistor (OSC)	2.50
121-103		Transistor (mixer)	2.65
121-104		Transistor (1st I.F.)	2.50
121-105		Transistor (2nd I.F.)	2.50
121-106		Transistor (driver)	1.75
121-107		Transistor - output (2 used)	2.15

CHASSIS PARTS
Chassis 8CT40Z2 ONLY

PART NO.	DIA. NO.	DESCRIPTION	PRICE
63-1869		100 K ohm resistor 1/2W ins. 10%	.17
83-2488		Armite strip	
121-61		Transistor - output (2 used)	4.30
121-62		Transistor (mixer)	2.65
121-64		Transistor (driver)	2.15
121-65		Transistor (oscillator)	2.50
121-73		Transistor (1st I.F.)	2.50
121-74		Transistor (2nd I.F.)	2.50
121-78		Transistor (R.F.)	3.80

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

SERVICE MANUAL

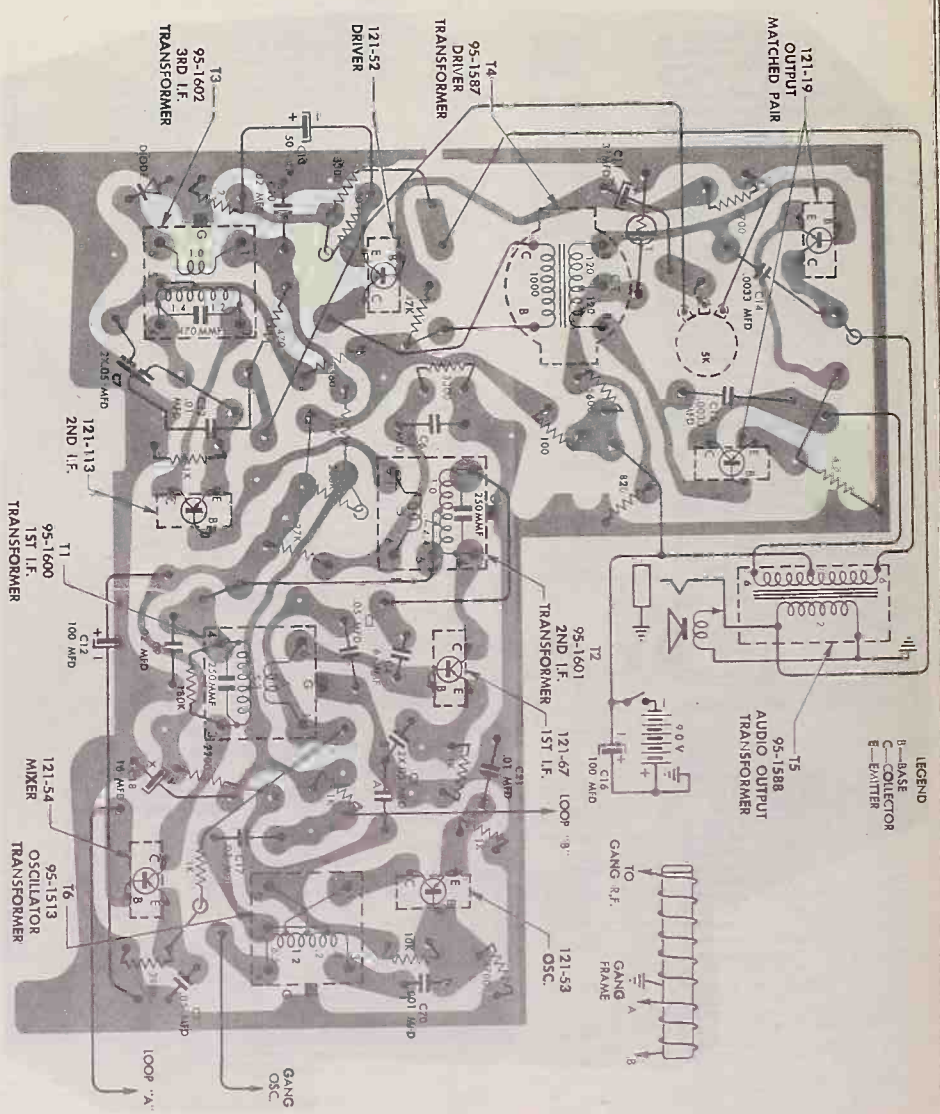
MODEL "ROYAL 710"

TRANSISTOR PORTABLE RADIO

CHASSIS 7CT43Z1

CHASSIS, WIRING AND COMPONENTS

VIEWED FROM WIRING SIDE



GENERAL

This transistor portable chassis is a conventional super heterodyne receiver. It has an individual mixer and oscillator to produce the 455 Kc intermediate frequency. The first and second intermediate frequency amplifiers are conventional. A 103-19 is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis uses a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

121-54 mixer was used on earlier chassis, however, later in production runs 121-128 mixer was used. These two transistors are directly interchangeable.

Power Supply	Six Zenith type Z-7 1 1/2 volt batteries or six type "C" 1 1/2 volt dry cells
Frequency Range	540 to 1600 KC
Intermediate Frequency	455 KC
Sensitivity	Approximately 125 microvolts/meter for 50 milliwatts output
Power Output Undistorted	275 milliwatts
Power Output Maximum	400 milliwatts
Speaker	4 inch P.M. Alnico V Voice Coil Impedance 3.2 ohms at 400 cycles
Accessory Earphone	B39-24 impedance 15 ohms at 1000 cycles

PRINTED CIRCUIT SERVICING

Servicing printed circuit sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

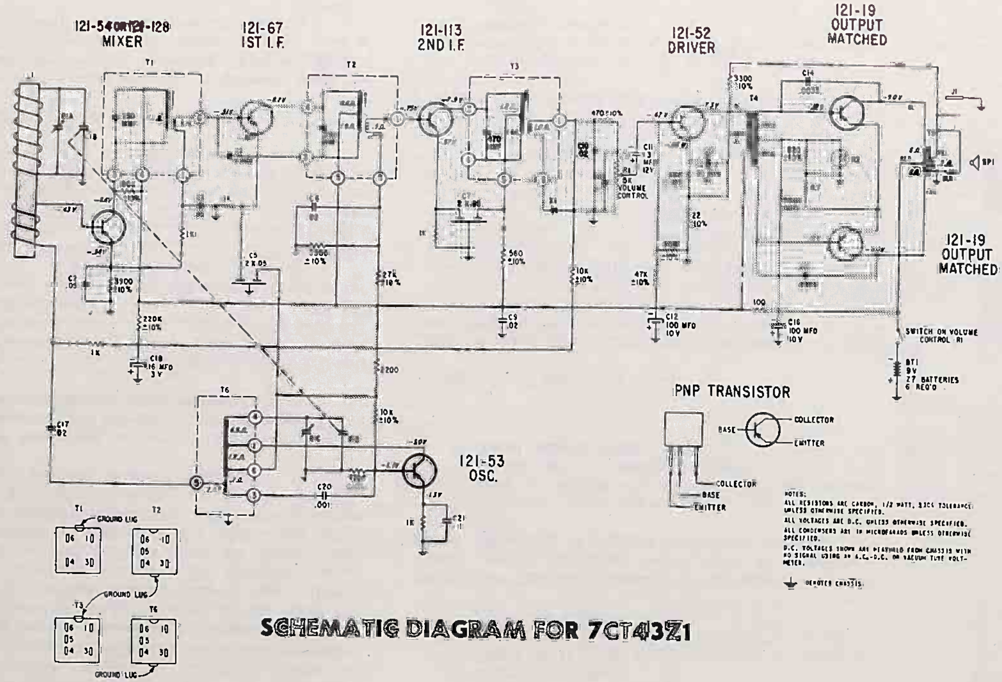
WARNING: Excessive heat may damage the printed circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

5. Tin leads on component before soldering.
6. Use only solder with a 63% tin 37% lead mixture which has an extremely low melting point.
7. Metal pick (soldering aid).

COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the printed wiring. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of printed circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.



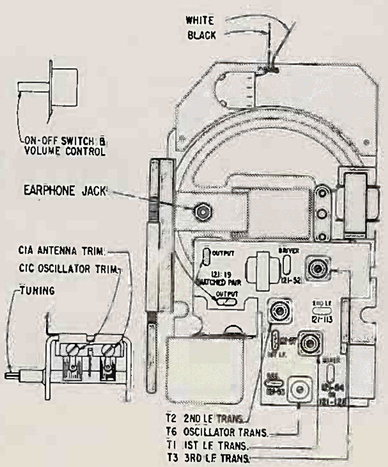
SCHEMATIC DIAGRAM FOR 7CT43Z1

ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	[illegible]	600 KC	Adj. T1, T2, T3 [illegible] output.	[illegible] I.F. Alignment
2	1620 KC		—	[illegible]	C1C	Set oscillator to dial scale.
3	600 KC		—	Set dial near 600 KC	Adjust slug in T6	Adjust T6 [illegible] adjust for [illegible] dial accuracy.
4	REPEAT STEPS 2 & 3		—	—	—	—
5	1260 KC			1260 KC	C1A	Align loop ant.

CHASSIS INFORMATION CHART

[illegible]	[illegible]	Transistor Layout Label Color	[illegible]	Conv.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	[illegible]pplier
		Black 102-57[illegible]	Zenith E.I.A. Type	[illegible]	121-67 [illegible]	121-113 [illegible] PNP	103-19 1N87G	121-52 R120 PNP	121-19 R16 Matched Pair PNP PNP	Texas Instrument
7CT43Z1	Red	Red 102-6599	Zenith E.I.A. Type	121-128 2N1108 PNP	121-67 2N308 PNP	121-113 2N309 PNP	103-19 1N87G	121-52 R120 PNP	121-19 R16 Matched Pair PNP PNP	Texas Instrument



TRANSISTOR & TRIMMER LAYOUT

CHASSIS PARTS
Chassis 7CT43Z1

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2506 or		Chassis support bracket	.10
12-2864		Chassis support bracket	
12-2507		Transformer mtg. bracket	.10
12-2827		Ant. shield bracket	.20
22-3	C21	.01 mfd. ceramic disc - 500V	.30
22-11	C14,15	.0033 mfd. ceramic disc - 1KV (2 used)	.25
22-2381	C4	6 mmf. ceramic disc - 500V	.25
22-2726	C13	50 mfd. electrolytic - 6V	1.50
22-2729	C20	.001 mfd. ceramic disc - 25V	.25
22-2871	C18	16 mfd. electrolytic - 3V	1.50
22-2884	C11	3 mfd. electrolytic - 12V	1.50
22-2885	C6,9, 10,17	.02 mfd. ceramic disc - 25V (4 used)	
22-3010	C22	.01 mfd. ceramic disc - 25V	.45
22-3023	C12,16	100 mfd. electrolytic - 10V (2 used)	1.50
22-3034	C2	.05 mfd. ceramic disc - 25V	.35
22-3165	C3	.05 mfd. ceramic disc - 25V	.35
22-3198	C5,7	2 x .05 mfd. ceramic disc - 25V (2 used)	.50
22-3199	C1A,B C,D	2 section variable	4.00
24-890		Battery cover	.25
44-34	J1	Miniature jack	.90
49-908	SP1	4" PM speaker	
54-347		6-32 "KEPS" nut (used on 114-49)	.05
54-417		1/4 - 32 x 3/8 hex. nut (2 used)	.10
63-1715		22 ohm 1/2W ins. 10%	.17
63-1744		100 ohm 1/2W ins. 20%	.17
63-1771		470 ohm 1/2W ins. 10%	.17
63-1775		560 ohm 1/2W ins. 10%	.17
63-1778		680 ohm 1/2W ins. 10%	.17
63-1782		820 ohm 1/2W ins. 10%	.17
63-1786		1000 ohm 1/2W ins. 20%	.17
63-1800		2200 ohm 1/2W ins. 20%	.17
63-1806		3300 ohm 1/2W ins. 10% (2 used)	.17
63-1810		3900 ohm 1/2W ins. 10%	.17
63-1813		4700 ohm 1/2W ins. 10% (2 used)	.17
63-1817		5600 ohm 1/2W ins. 10%	.17
63-1827		10 K ohm 1/2W ins. 10% (2 used)	.17
63-1845		27 K ohm 1/2W ins. 10%	.17
63-1855		47 K ohm 1/2W ins. 10%	.17
63-1880		180 K ohm 1/2W ins. 10% (2 used)	.17
63-1883		220 K ohm 1/2W ins. 10%	.17
63-3663	R2	Thermistor	1.10
63-4530		4.7 ohm 1/2W ins. 20%	.17
63-4633 or	R1	Vol. control & sw.	2.05
63-4634	R1	Vol. control & sw.	2.05
78-1067		3 contact socket	.30
94-295		Spacer bushing (used on 114-49)	.05
95-1513	T6	Osc. transformer	2.00
95-1587	T4	Driver transformer	5.00
95-1588	T5	Audio output transformer	4.25
95-1600	T1	1st I.F. transformer	3.50
95-1601	T2	2nd I.F. transformer	3.50
95-1602	T3	3rd I.F. transformer	3.50
103-19	X1	Crystal diode	
113-10		6-32 x 3/16 x 1/4 hex. hd. mach. screw - lockwasher att. (2 used on 22-3199)	.03
114-28		8-18 x 1/4 x 1/4 hex. hd. self tap screw (1 joins 12-2506 & S-47636 & 4 mt. 49-908)	.03
114-49		6-32 x 5/8 x 1/4 hex. hd. mach screw (used on 49-908)	
114-180		6-20 x 1/4 x 1/4 hex. hd. self-tap screw (2 join 12-2827 & S-48114)	.03
114-614		8-18 x 1/4 hex. washer hd. self - tap screw (2 used on S-47636)	.04
121-19		Transistor - output (matched pair)	5.30
121-52		Transistor - driver	3.15
121-53		Transistor - oscillator	3.05
121-67		Transistor - 1st I.F.	3.85
121-113		Transistor - 2nd I.F.	3.85
121-128		Transistor - mixer	
125-47		Rubber grommet (used on 114-49)	.03
S-42777		Vol. control mtg. bracket	
S-43010		Contact spring & strip assem.	.75
S-47636		Chassis mtg. bracket	
S-48114		Antenna	

CABINET PARTS

Model Royal 710L

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-7		Type C dry cell - 1 1/2V (use 6)	
14-2848		Portable cabinet (leather)	
24-890		Battery cover (pt. of S-42991)	.25
54-345		1/4 - 32 x 3/8 hex. nut brass (used on 83-2889)	.03
54-450		Thread forming palnut (7 used on S-47648)	.03
57-2445		Emblem plate (pt. of S-47648)	.40
80-1093		Retaining spring (2 pt. of S-42785)	.10
80-1325		Knob ret. spring (pt. of S-47698)	.05
83-2489		Rubber strip (chassis)	.03
83-2889		Chassis cover strip	.15
83-2919		Vol. control cover strip	.10
83-2955		Battery case pull out strip	.05
110-365		Grille cloth (pt. of S-47648)	
112-1165		6-20 x 5/16 phils. pan hd. self-tap screw (4 used on 7CT43Z1)	.03
114-248		6-20 x 5/16 x 1/4 hex. hd. self-tap screw (2 join S-42785 & 42991)	.03
166-109		Rubber bumper (battery hsg.) 2 used	.10
188-204		Knob clamping ring (pt. of S-47647)	.03
188-209		Knob clamping ring (pt. of S-47646)	.03
202-1528		Instruction book	.15
S-42785		Battery housing	1.50
S-42991		Battery cover & spring assem.	.50
S-47646		Dial scale, bushing & ring assem.	
S-47647		Knob, disc & ring assem. (Vol.)	
S-47648		Escutcheon	
S-47698		Knob & spring (tuning)	

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

ZENITH

SERVICE MANUAL

MODEL "ROYAL 755"
TRANSISTOR PORTABLE RADIO

CHASSIS 8CT41 & 8CT41Z2

GENERAL

These transistor portable chassis are conventional superheterodyne receivers with a tuned R.F. amplifier. They use an individual mixer and oscillator to produce the 455 Kc intermediate frequency. Chassis 8CT41 and 8CT41Z2 are virtually identical except for different transistors and a few other parts. The parts marked by astericks on the chassis wiring and component drawing apply only to chassis 8CT41. The first and second intermediate frequency amplifiers are conventional. A (103-19) is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis uses a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

Power Supply....	Six Zenith type Z-7 1 1/2 volt batteries or six type "C" 1 1/2 volt dry cells
Frequency Range	540 to 1600 KC
Intermediate Frequency	455 KC
Sensitivity	Approximately 60 microvolts/meter for 50 milliwatts output
Power Output Undistorted	275 milliwatts
Power Output Maximum	400 milliwatts
Speaker	4 inch P.M.
Alnico V Voice Coil Impedance	3.2 ohms at 400 cycles
Accessory Earphone	B39-24 impedance 15 ohms at 1000 cycles

PRINTED CIRCUIT SERVICING

Servicing printed circuit sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

WARNING: Excessive heat may damage the printed circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

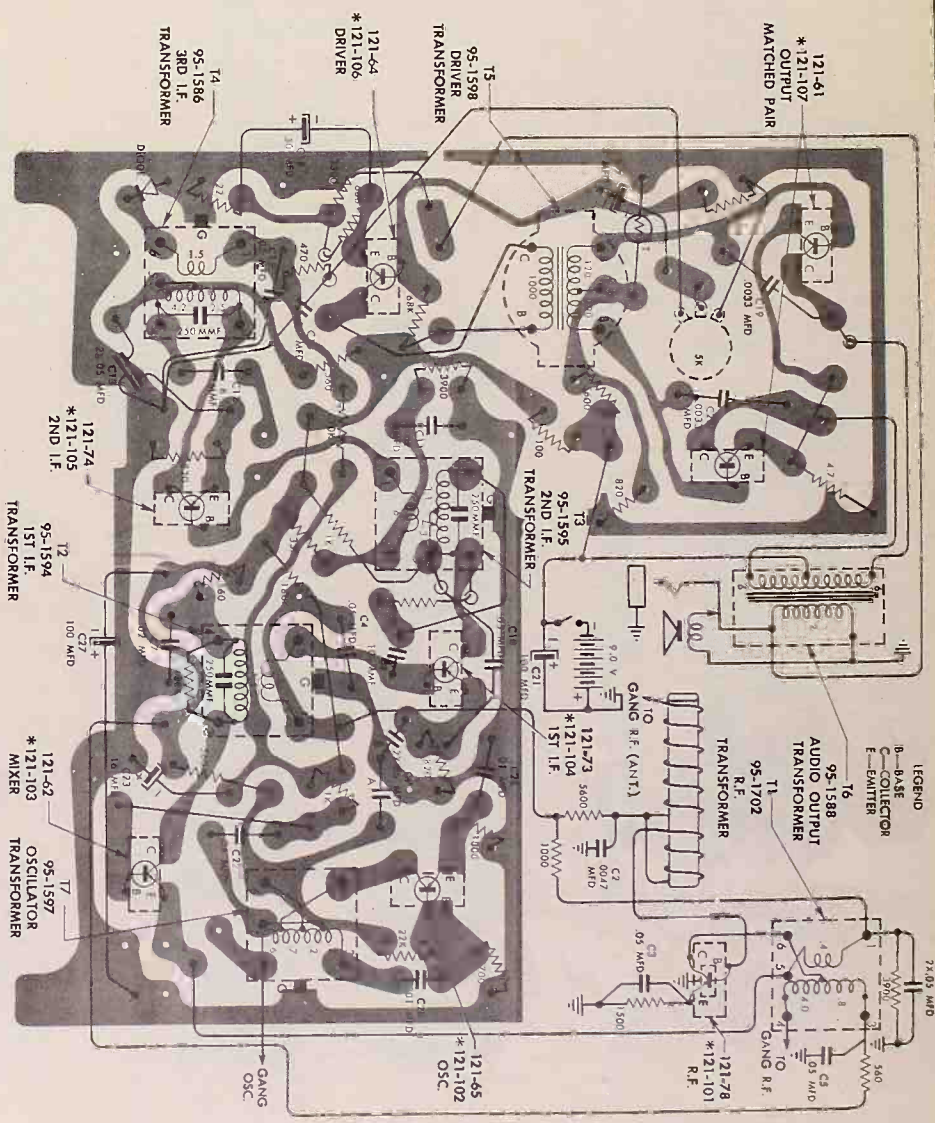
5. Tin leads on component before soldering.
6. Use only solder with a 63% tin 37% lead mixture, which has an extremely low melting point.
7. Metal pick (soldering aid).

COMPONENT REPLACEMENT

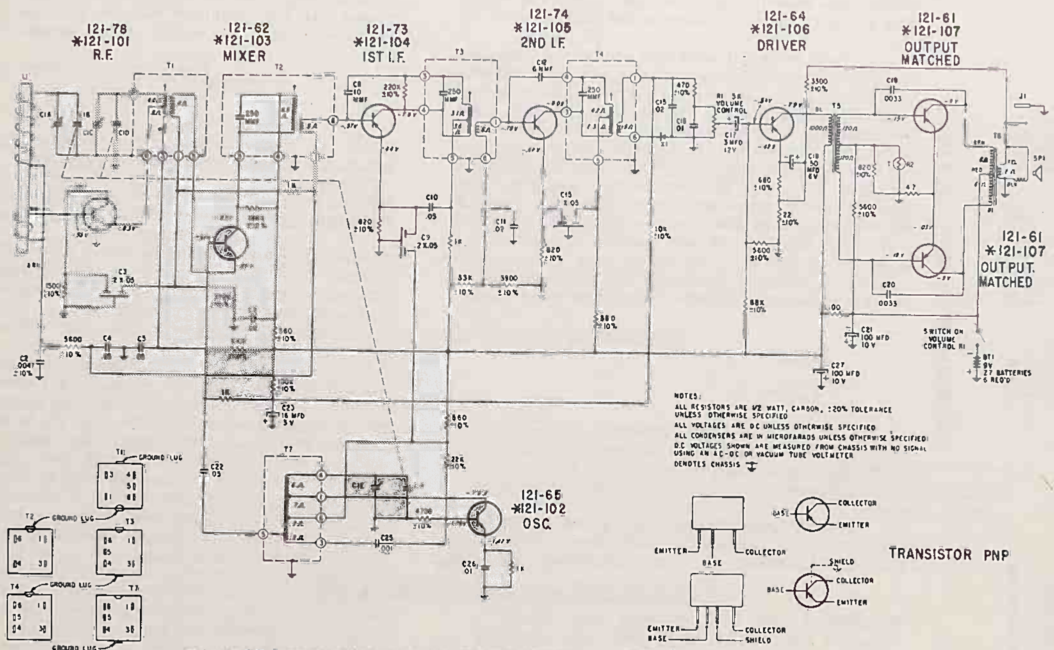
Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the printed wiring. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of printed circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.

CHASSIS, WIRING AND COMPONENTS — VIEWED FROM WIRING SIDE



CHASSIS: 8CT41, 8CT41Z2



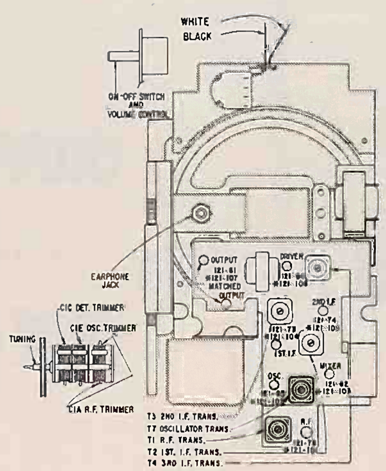
SCHEMATIC DIAGRAM FOR 8CT41 & 8CT41Z2

ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	[illegible]	[illegible]	[illegible]	[illegible]
2	1620 KC		[illegible]	Gang wide open	C1E	Set oscillator to dial scale.
[illegible]	600 KC		[illegible]	Set dial near 600 KC	Adjust slug in T7	[illegible]
[illegible]	[illegible]		—	[illegible]	—	[illegible]
5	1260 KC		—	1260 KC	C1A, C1E	Align loop ant.

CHASSIS INFORMATION CHART

Chassis	Chassis Color Dot	Transistor Layout Label Color	[illegible]	R.F.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output	[illegible]
8CT41	Red	Black [illegible]	Zenith E.I.A. Type	121-101 2N544 PNP	121-103 2N411 PNP	121-102 2N409 PNP	121-104 2N409 PNP	121-105 2N409 PNP	103-19 1N87G	121-106 2N407 PNP	[illegible] Matched Pair PNP PNP	[illegible]
8CT41Z2	Black	Red [illegible]	Zenith E.I.A. Type	121-78 2N544 PNP	121-62 2N411 PNP	[illegible]	121-73 [illegible] PNP	121-74 2N409 PNP	103-19 1N87G	121-64 2N407 PNP	121-61 [illegible] Matched Pair PNP PNP	[illegible]



TRANSISTOR & TRIMMER LAYOUT

CHASSIS PARTS
Chassis 8CT41 & 8CT41Z2

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2506 or 12-2864		Chassis support bracket	.10
12-2507		Transformer mtg. bracket (pt. of 49-910)	.10
22-3		.01 mfd. ceramic disc - 500V	.30
22-11		.0033 mfd. ceramic disc - 1KV (2 used)	.25
22-14		.0047 mfd. ceramic disc - 500V	.25
22-2381		6 mmf. ceramic disc - 500V	.25
22-2726		50 mfd. electrolytic - 6V	1.50
22-2729		.001 mfd. ceramic disc - 25V	.25
22-2731		10 mmf. ceramic disc - 500V	.25
22-2871		16 mfd. electrolytic - 3V	1.50
22-2884		3 mfd. electrolytic - 12V	1.50
22-2885		.02 mfd. ceramic disc - 25V (3 used)	
22-3010		.01 mfd. ceramic disc - 25V	.45
22-3023		100 mfd. electrolytic - 10V (2 used)	1.50
22-3034		.05 mfd. ceramic disc - 25V (4 used)	
22-3198		2 x .05 mfd. ceramic disc - 25V (3 used)	.50
22-3208		3 section variable	6.00
24-890		Battery cover	.25
44-34		Miniature jack	.90
49-910		4" PM speaker	
54-347		6 - 32 "KEPS" nut (used on 114-49)	.05
54-417		1/4 - 32 x 3/8 hex. nut (2 used)	.10
54-421		Socket retaining nut	.03
59-356		Dial pointer	.60
61-216		Pointer guide pulley	.15
63-1715		22 ohm 1/2W ins. 10%	.17
63-1744		100 ohm 1/2W ins. 20%	.17
63-1771		470 ohm 1/2W ins. 10%	.17
63-1775		560 ohm 1/2W ins. 10% (4 used)	.17
63-1778		680 ohm 1/2W ins. 10%	.17
63-1782		820 ohm 1/2W ins. 10% (3 used)	.17
63-1786		1000 ohm 1/2W ins. 20% (4 used)	.17
63-1792		1500 ohm 1/2W ins. 10%	.17
63-1806		3300 ohm 1/2W ins. 10%	.17
63-1810		3900 ohm 1/2W ins. 10% (2 used)	.17
63-1813		4700 ohm 1/2W ins. 10%	.17
63-1817		5600 ohm 1/2W ins. 10% (4 used)	.17
63-1827		10 K ohm 1/2W ins. 10%	.17
63-1841		22 K ohm 1/2W ins. 10%	.17
63-1848		33 K ohm 1/2W ins. 10%	.17
63-1862		68 K ohm 1/2W ins. 10%	.17
63-1869		100 K ohm 1/2W ins. 10%	.17
63-1880		180 K ohm 1/2W ins. 10%	.17
63-1883		220 K ohm 1/2W ins. 10%	.17
63-3663		Thermistor	1.10
63-4530		4 - 7 ohm 1/2W ins. 20%	.17
63-4645		Vol. control & sw.	2.05
63-4646		Vol. control & sw.	
78-1067		3 contact socket (7 used)	.30
78-1096		4 contact socket	.35
80-1332		Drive cord tension spring	
80-1339		Tension spring	
94-295		Spacer bushing (use on 114-49)	.05
95-1586		3rd I.F. transformer	3.50
95-1588		Audio output transformer	4.25
95-1594		1st I.F. transformer	3.50
95-1595		2nd I.F. transformer	3.50
95-1597		Osc. transformer	2.00
95-1598		Driver transformer	5.00
95-1702		R.F. transformer	
103-19		Crystal Diode	
113-10		6 - 32 x 3/16 x 1/4 hex. hd. mach. screw - lockwasher att. (2 used on 22-3208)	.03
114-26		8 - 16 x 1/4 x 1/4 hex. hd. self tap screw (2 used)	.03
114-78		8-18 x 5/16 x 1/4 hex. hd. self tap screw (3 used)	.03
114-49		6-32 x 5/8 x 1/4 hex. hd. mach. screw	
114-180		6-20 x 1/4 x 1/4 hex. hd. self tap screw	.03
114-614		8-18 x 1/4 hex. washer hd. self tap screw (2 used on S-47735)	.04
114-710		6-20 x 1/2 x 1/4 hex. hd. self tap screw (used on S-47737)	

CHASSIS PARTS
Chassis 8CT41 & 8CT41Z2

PART NO.	DIA. NO.	DESCRIPTION	PRICE
125-47		Rubber grommet (used on 114-49)	.03
S-43010		Contact spring & strip assem.	.75
S-47699		Antenna	
S-47733		Vol. control mtg. bracket	
S-47735		Chassis mounting bracket	
S-47737		Strip & pulley assem.	
S-47742		Drive cord & eyelet assem.	

CABINET PARTS

Model Royal 755 L

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-7		Type C dry cell - 1 1/2V (use 6)	
14-2851		Portable cabinet (leather)	
16-1661		Packing carton	
19-332		"U" clip	.05
19-356		Clip (6 used)	.05
26-655		Dial scale	1.50
54-345		1/4 - 32 x 3/8 hex. nut	.03
54-450		Thread forming palnut (6 used)	.03
57-2445		Emblem plate	.40
57-2586		Reinforcing plate	.05
57-2818		Escutcheon	
80-1304		Knob ret. spring (pt. of S-47709)	.05
80-1325		Knob ret. spring (pt. of S-47708)	.05
83-2892		Chassis cover strip	.15
83-2919		Vol. control cover strip	.10
83-2955		Battery case pull out strip	.05
83-3241		Grille background strip	
83-3231		Trim strip (all transistor)	
83-3281		Grille background strip	.20
93-862		Steel washer	
112-1156		4-24 x 1/4 Phils. flat hd. self tap screw	.05
112-1165		6-20 x 5/16 Phils. pan hd. self tap screw (4 used)	.03
114-248		6-20 x 5/16 x 1/4 hex. hd. self tap screw (2 used)	.03
138-295		Cabinet grille	2.00
166-109		Rubber bumper (2 used)	.10
196-340		Speaker gasket	
202-1531		Instruction book	.15
S-42785		Battery housing	1.50
S-42991		Battery cover & spring assem.	.50
S-47708		Knob & spring assem. - tuning	
S-47709		Knob & spring assem. - Vol.	

CHASSIS PARTS
Chassis 8CT41 ONLY

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2835		Ant. shield bracket	.20
121-101		Transistor - R.F.	3.75
121-102		Transistor - Osc.	2.50
121-103		Transistor - Mixer	2.65
121-104		Transistor - 1st I.F.	2.50
121-105		Transistor - 2nd I.F.	2.50
121-106		Transistor - Driver	1.75
121-107		Transistor - Output	215

CHASSIS PARTS
Chassis 8CT41Z2 ONLY

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2836		Ant. shield bracket	.20
121-61		Transistor - Output (2 used)	4.30
121-62		Transistor - Mixer	2.65
121-64		Transistor - Driver	2.15
121-65		Transistor - Osc.	2.50
121-73		Transistor - 1st I.F.	2.50
121-74		Transistor - 2nd I.F.	2.50
121-78		Transistor - R.F.	3.80

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

HOME RADIO SECTION

Admiral

SERVICE DATA No. S855

for

DUAL CHANNEL *Stereophonic*

HIGH-FIDELITY FM-AM—PHONOGRAPH

12D1, 12D1A CHASSIS

MODEL IDENTIFICATION CHART

MODEL NUMBER	MODEL NAME	FM-AM TUNER CHASSIS	RECORD CHANGER
Y1012	DEAUVILLE	12D1	RC6E9J-16Y, RC6E9K-16Y, or RC6E9M-16Y
Y1019	DEAUVILLE	12D1	
Y1031	NOCTURNE	12D1	
Y1032	NOCTURNE	12D1	
Y1033	NOCTURNE	12D1	
Y1051	CARILLON	12D1A	RC6E9J-18Q, RC6E9K-18Q, or RC6E9M-18Q
Y1052	CARILLON	12D1A	
Y1053	CARILLON	12D1A	
Y1079	POMPEIAN	12D1A	
SS1041	Auxiliary Stereo Cabinet, with speakers, used with Model Y1051.		
SS1042	Auxiliary Stereo Cabinet, with speakers, used with Model Y1052.		
SS1043	Auxiliary Stereo Cabinet, with speakers, used with Model Y1053.		
SS1069	Auxiliary Stereo Cabinet, with speakers, used with Model Y1079.		

SPECIFICATIONS

FREQUENCY RESPONSE—50 cps to 18KC at ± 1 db (Bass and Treble control at 50% rotation).

CONTROLS—Off-On-Treble (dual), Bass (dual), Function, Loudness & Balance, and Tuning.

HARMONIC DISTORTION — 1% at 1 watt output each channel.

POWER CONSUMPTION—115 watts.

POWER SUPPLY—117 volts AC, 60 cycles only.

POWER OUTPUT—Up to 10 watts per channel.

SPEAKER SYSTEMS—

Models Y1012, Y1019, Y1031, Y1032 and Y1033: Two 8" PM, Woofers and two 3½" PM, Tweeters.

Models Y1051, Y1052, Y1053 and Y1079: One 8" PM, Woofer and one 3½" PM Tweeter.

Models SS1041, SS1042, SS1043 and SS1069: One 8" PM, Woofer and one 3½" PM Tweeter.

Note: For voice coil impedance values for each speaker, refer to applicable cabinet parts list.

12D1, 12D1A CHASSIS DIFFERENCES

Chassis 12D1 is mounted in the horizontal position and chassis 12D1A is mounted in the vertical position. Chassis 12D1 uses a different Dial Scale and Dial Pointer than chassis 12D1A (see Parts List).

TUBE REPLACEMENT

All tubes are accessible for replacement. Be sure to disconnect AC line cord when replacing tubes.

12D1, 12D1A TUBE COMPLEMENT

V1A, V1B	6DT8	FM RF Amp. and Mixer
V2	6BA6	FM 1st IF; AM 1st IF
V3	6AU6	2nd FM IF; AM Detector
V4	6AU6	FM Limiter
V5	6AL5	FM Discriminator
V6A, V6B	12AT7	FM Oscillator; FM Oscillator Control
V7	6BE6	AM Osc-Mixer
V8A, V8B	12AX7	Right Channel Audio Amp.; Left Channel Audio Amp.
V9A, V9B	12AX7	Left Channel Audio Amp.; Right Channel Audio Amp.
V10	EL84/6BQ5	Right Channel Audio Output
V11	EL84/6BQ5	Left Channel Audio Output
V12	5U4GB	Rectifier

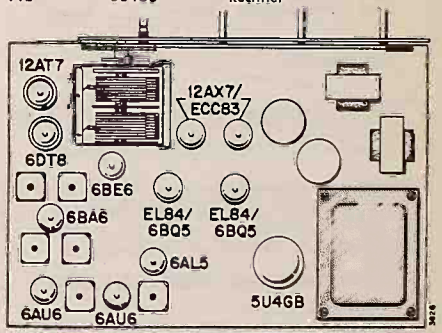


Figure 1. Top View of Chassis 12D1 and 12D1A Showing Tube Locations.

SERVICE HINTS

BALANCING THE SOUND

Before operating the set, the loudness of the two sound channels must be balanced or equalized. If one channel tends to overpower the other, the Stereo feeling created by the set may be seriously reduced or nearly eliminated.

The Loudness & Balance control consists of two concentric knobs. The outer knob (nearer cabinet) controls the loudness of the left channel; the center knob (farther from cabinet) controls the loudness of the right channel. Normally both knobs will turn together, simultaneously varying the volume of both channels by the same amount. However, when balancing the sound, the knobs must be turned individually. To turn the knobs one at a time, hold one knob firmly and, with a little pressure, turn the other knob.

Balance the sound of your set with the following procedure:

1. Place the Function switch in "PHONO" position.
2. Play a regular single-channel record. Adjust Loudness & Balance knobs together for a low volume listening level. As the record is playing, step back and listen to determine if one channel is louder than the other.
3. If the sound from one set of speakers seems louder than the sound from the other, turn the knobs of the Loudness & Balance control individually until the out-

NEEDLE REPLACEMENT

The ceramic pickup-cartridge in your record changer is equipped with sapphire needles; one for Stereo and standard microgroove records (16⅔, 33⅓ and 45 RPM) and one for 78 RPM records. Replace needles at the first indication of wear.

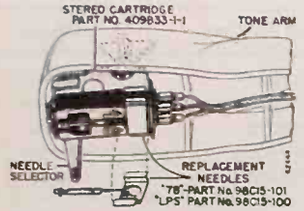


Figure 6. Needle Replacement.

For changers using the cartridge shown in figure 6, each needle must be replaced separately. When changing the 78 RPM needle, make sure the number "78" is facing up on the **Needle Selector** handle. When changing the microgroove needle, the letters "LPS" should be facing up. With the **Needle Selector** handle in the proper position, the corresponding needle will be pointing down.

Remove the worn-out needle by pulling the clip at the base of the worn needle shaft straight away from cartridge. Position new needle in same position and press its clip in until it snaps onto cartridge. Be sure that the new needles are mounted to the correct sides of the cartridge. (The microgroove side of the cartridge can be further identified by the letters "L" and "R" on that side of the cartridge.)

Order the sapphire-tipped "78" needle by part number 98C15-101; the sapphire-tipped microgroove (LPS) needle by 98C15-100. A diamond-tipped microgroove needle is available by part number 98C15-102.

To replace this entire cartridge (sapphire needles included), order part number 409B33-1-1.

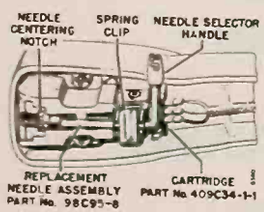


Figure 7. Needle Replacement.

For changers using the cartridge shown in figure 7, both needles are mounted to a common shaft which is connected to the **Needle Selector** handle. To replace worn needle assembly, move **Needle Selector** handle halfway until it is pointing down. Gently pull spring clip slightly open with finger. Holding needle assembly by its **Needle Selector** handle, slip entire needle assembly out of spring clip making certain needle shaft clears needle centering notch. Keeping handle of replacement needle pointing down, slip new needle assembly beneath spring clip in exact same position making certain needle shaft centers in needle center notch.

The needle assembly (including both sapphire needles and Selector handle) can be ordered by part number 98C95-8. A needle assembly with a diamond microgroove needle and a sapphire 78 needle can be ordered by part number 98C95-9. The entire cartridge (sapphire needles included) can be replaced by part number 409C34-1-1.

RECORD CHANGER SERVICING

For complete Record Changer servicing, refer to Service Manual No. S859.

SERVICING RUBBER SHOCK MOUNTS

After an extended period of time, the rubber shock mounts used on the chassis may become somewhat stiff. If this occurs, soak the rubber shock mounts in a solution of warm soapy water to return softness to the rubber.

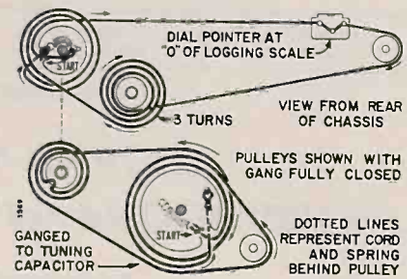


Figure 8. Dial Stringing. View of Pulleys from Rear of Chassis.

DIAL STRINGING AND POINTER SETTING

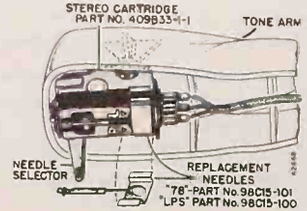
Remove chassis from cabinet and refer to figure 8 for dial stringing diagram. Rotate drums until they are positioned as shown in figure 8.

String front or rear pulley system or both according to figure 8. See instructions on the figure when setting dial pointer.

Check dial pointer setting at several points on the dial by tuning to known stations.

NEEDLE REPLACEMENT

The ceramic pickup-cartridge in your record changer is equipped with sapphire needles; one for Stereo and standard microgroove records (16⅔, 33⅓ and 45 RPM) and one for 78 RPM records. Replace needles at the first indication of wear.



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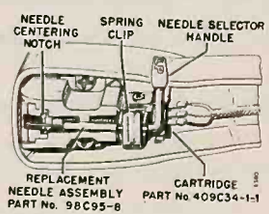
To replace this entire cartridge (sapphire needles included), order part number 409B33-1-1.



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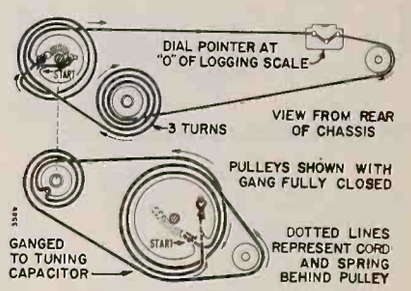

Figure 8. Dial Stringing. View of Pulleys from Rear of Chassis.

DIAL STRINGING AND POINTER SETTING

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String front or rear pulley system or both according to figure 8. See instructions on the figure when setting dial pointer.

Check dial pointer setting at several points on the dial by tuning to known stations.

AMPLIFICATION AND RESPONSE CHECK

Both channels of the audio system of chassis 12D1 and 12D1A may be checked for gain and frequency response by performing the tests outlined below and referring to the "AMPLIFIER CHECKS" table.

TEST EQUIPMENT:

Audio Oscillator, with flat frequency response across the audio range.

Vacuum Tube Voltmeter, preferably with decibel (db) scale.

Oscilloscope.

PROCEDURE:

Connect a 3.2 ohms, 10 watts, resistive load across the secondary of each audio output transformer (T8 and T9). Connect audio generator "hot" lead to high side of R41A (Right Channel Loudness & Balance) and common lead to chassis. Connect oscilloscope across resistive load on the channel to be checked to see that generator does not overdrive the amplifier during this procedure.

TO CHECK AMPLIFICATION, set controls as shown in "AMPLIFICATION CHECK" table. Perform check as shown in table. When checking Left Channel, change generator connection to high side of R41B (Left Channel Loudness & Balance).

TO CHECK FREQUENCY RESPONSE, set controls as shown in "FREQUENCY RESPONSE CHECK" table. See the table for generator frequency and output voltages. Vary the applicable control (Bass at 100 cycle setting and Treble at 10,000 cycle setting) to check for the swing of output voltage from minimum to maximum control setting.

AMPLIFIER CHECKS

AMPLIFICATION CHECK	Set Loudness, Treble, and Bass controls to maximum clockwise rotation. Set Function switch to "PHONO" position.			
	FREQUENCY		VOLTS	
AUDIO GENERATOR OUTPUT	TO RIGHT CHANNEL: 1,000 cycles	TO LEFT CHANNEL: 1,000 cycles	TO RIGHT CHANNEL: 0.33	TO LEFT CHANNEL: 0.33
	VOLTS OUT		WATTS OUT	
AMPLIFIER OUTPUT	RIGHT CHANNEL: 3.85	LEFT CHANNEL: 3.85	RIGHT CHANNEL: 5	LEFT CHANNEL: 5

FREQUENCY RESPONSE CHECK	Set Loudness control at tap (40% rotation). Set Bass to 50% rotation; set Treble to 10% (from full counterclockwise) rotation. At 100 cps, vary Bass from min. to max. At 10,000 cps, vary Treble from min. to max.					
SIGNAL GENERATOR OUTPUT	OUTPUT VOLTAGE				DB CHANGE "From MAX. to MIN. position of Bass or Treble control:"	
	RIGHT CHANNEL		LEFT CHANNEL			
Volts	Max.	Min.	Max.	Min.	RIGHT CHANNEL	LEFT CHANNEL
1 volts	0.78 volts	0.003 volts		0.052 volts	±2	22.5
100 cycles	0.11 volts	0.11 volts	0.11 volts	0.11 volts	0	0
10,000 cycles	3.1 volts	0.024 volts	3.1 volts	0.024 volts	28 ±2	28 ±2

PRODUCTION CHANGES

Production changes are coded RUN 10, RUN 11, etc., as given in the headings below. Run number (stamped on chassis) indicates that this chassis has the change(s) incorporated which are explained under that particular run number heading below, as well as changes (lower run numbers) made prior to that time. At the start of production, all chassis were stamped RUN 10.

FRINGE AREA RECEPTION IMPROVED

12D1, 12D1A Chassis Stamped Run 11

To improve fringe area reception, R6 (18K, 1W) removed from between pin 1 on V6A and B+; C23 (.047 mf), C36 (.02 mf), C74 (.27 mmf) and C75 (.27 mmf) added.

AM IF AND RF ALIGNMENT

- Turn radio on and allow 15 minutes warm up.
- Set Loudness control fully clockwise, Bass and Treble controls at mid-rotation. Set Function switch to AM position.
- Connect output meter across secondary of T8 or T9. If speakers are not to be used during alignment, connect a 3.2 ohm 15 watt resistive load across each Audio Output Transformer secondary winding (see schematic diagram).
- Use 400 or 1000 cps modulation for alignment.
- Use lowest setting of signal generator output that produces adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool with tip 3/32" wide for IF transformer adjustments (Admiral part no. 98A30-10). For adjustment locations, see figures 10 and 11.
- Repeat adjustments to insure best results.

Step	Generator Connection	Gen. Freq.	Receiver Gang Setting	Adjustment
1	"Hot" generator lead to stator plates of antenna section of tuning gang capacitor; generator common lead to ground.	455 KC	Fully open.	"L", "M",* "N" and "P"* for maximum.
2	Radiated signal. Feed "hot" generator lead to antenna through several loops of wire or place lead close to receiver for signal pickup. Connect generator common lead to chassis.	1620 KC	Fully open.	"R" for maximum.
3		535 KC	Fully closed.	"S" for maximum.
4		1400 KC	Tune in generator signal	"T" for maximum.

*Adjustment "M" and "P" made from beneath chassis.

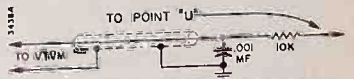
FM IF AND RF ALIGNMENT (using VTVM and Signal Generator)

NOTE: For FM alignment, a signal generator with facilities for crystal calibration should be used. Signal generator frequency settings are critical for FM alignment.

- Turn radio and alignment equipment on and allow 15 minutes for warm up.
- Set Loudness control to minimum, Bass and Treble controls at mid-rotation and Function switch to "FM" position.
- Use DC VTVM as output indicator. Set generator output so that indication, on VTVM, is approximately 1½ volts above noise level during alignment (except "Step 2").
- Use a non-metallic alignment tool with tip 3/32" wide for transformer slug adjustments (Admiral part no. 98A30-10).
- Refer to figures 10 and 11 for physical location of alignment points.
- Use an unmodulated signal during alignment.
- Adjustment "A", "B", "D" and "G" made from under side of chassis. Remove chassis bottom cover to reach adjustments and to make VTVM connections.

Step	Signal Generator and VTVM Connections	Gen. Freq.	Receiver Gang Setting	Adjustment
1	Connect generator to antenna terminals with a 150 ohm resistor in series with each lead. Connect VTVM and decoupling network between "U" and ground (see figs. 9 and 12). Voltage reading will be negative. Adjust generator so that indication on VTVM is 1½ volts above noise level.	10.7 MC	Set Tuning gang fully open.	"A", "B", "C", "D", "E", "F" and "G" for maximum.
Increase signal generator output until VTVM reads −5 volts.				
2	No change in generator connection. Connect VTVM between alignment point "V" and ground (see schematic diagram). A center zero reading scale is recommended for "ADJUSTMENT" in this step.	10.7 MC	Same as "Step 1".	"H" for zero reading.
	Same as "STEP 1".	98 MC	98 MC	*Alternately adjust "J" and "K", several times, for maximum.

*Each slug adjustment ("J" and "K") is secured with a drop of wax on the FM tuning yoke. After making slug adjustments, use a soldering iron to remelt wax and secure adjustments "J" and "K" to yoke.



KEEP LEADS OF RESISTOR AND CAPACITOR SHORT AS POSSIBLE. USE SHIELDED LEAD FROM VTVM.

Figure 9. Decoupling Network.

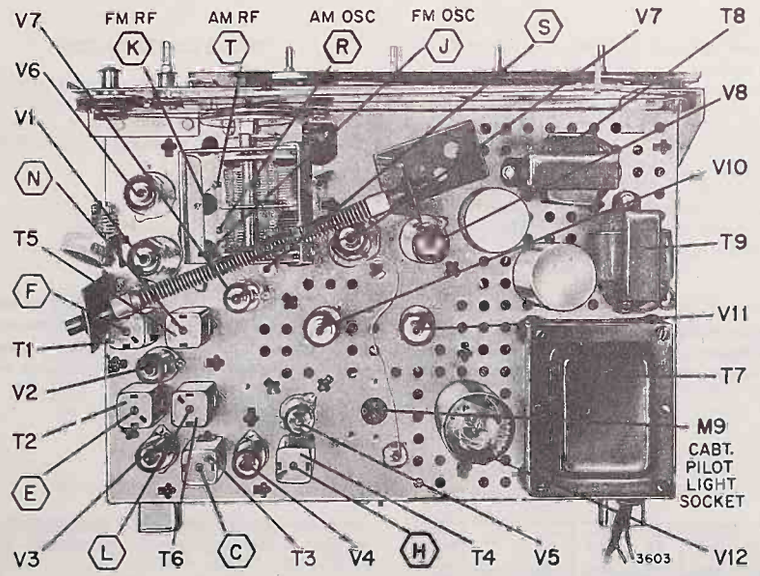


Figure 10. Top View of 12D1 and 12D1A Chassis. Input Connections, Output Connections, and Alignment Points Shown.

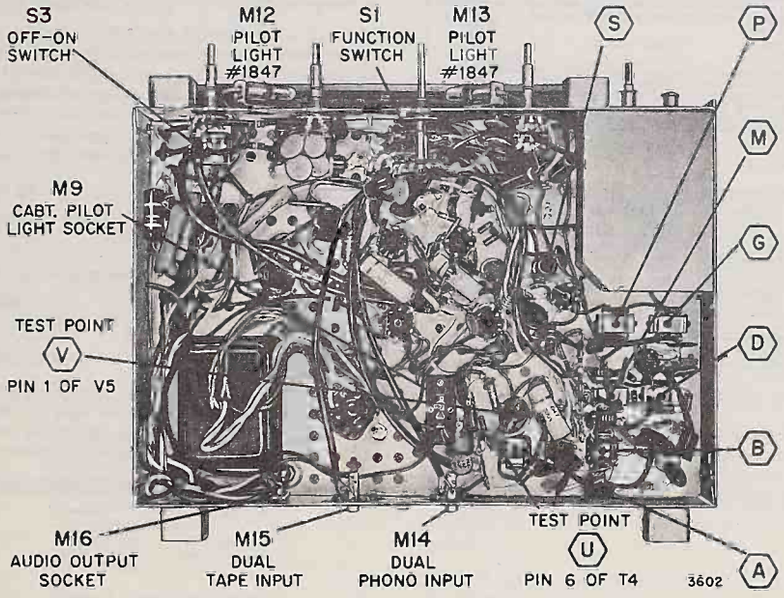


Figure 11. Bottom View of 12D1 and 12D1A Chassis. Input Connections, Output Connections, and Alignment Points Shown.

PARTS LIST

RECORD CHANGERS

	Description	RC6E9J-16Y	RC6E9K-16Y	RC6E9M-16Y	RC6E9J-18Q	RC6E9K-18Q	RC6E9M-18Q
M4	Changer Output Plug and Cable						
	30"	———	———	———	413C 11-6	413C 11-6	413C 11-6
	42"	413C 11-11	413C 11-11	413C 11-11	———	———	———
M5	Cartridge, Stereo Pick-up (incl. .0007" (.7 mil) sapphire micro-groove and .003" (3 mil) sapphire standard needles	409B 33-1-1	409B 33-1-1	409B 33-1-1	409C 34-1-1	409C 34-1-1	409C 34-1-1
M6	Motor, Record Changer (4-speed, balanced 2 pole)	407C 28	407C 28	407C 28	407C 28	407C 28	407C 28
M7	Changer Power Plug (without contacts)	33B 287-2	33B 287-2	33B 287-2	33B 287-2	33B 287-2	33B 287-2
M29	Changer Output Plug and Cable						
	30"	———	———	———	413C 11-6-1	413C 11-6-1	413C 11-6-1
	42"	413C 11-11-1	413C 11-11-1	413C 11-11-1	———	———	———
S2	Switch, Rej-On-Off (incl. cover)	408A 1	408A 1	408A 1	408A 1	408A 1	408A 1
	Adapter, 45 RPM (envelope of 3)	48A 8-2	48A 8-2	48A 8-2	48A 8-2	48A 8-2	48A 8-2
	Cable, Tone Arm (two wires and shield)	413A 17-2	413A 17-2	413A 17-2	413A 17-3	413A 17-3	413A 17-3
	Centerpost Assembly	400B 681	400B 681	400B 681	400B 681	400B 681	400B 681
	Contact, Plug (for M7)	9B 35-12	9B 35-12	9B 35-12	9B 35-12	9B 35-12	9B 35-12
	Control Knob (Black)	403C 86-4	403A 63-4	403C 86-4	403C 86-4	403A 63-4	403A 63-4
	Escutcheon, Phono (fits around turntable)						
	Chrome	———	———	403D 64-8	———	———	403D 64-8
	Silver	———	403D 64-6	———	———	403D 64-6	———
	Grommet, Rubber (motor mtg.)	98C 15-104	98C 15-104	98C 15-104	98C 15-104	98C 15-104	98C 15-104
	Mat, Turntable, Rubber, Black	406C 34	406C 34	406C 34	406C 34	406C 34	406C 34
	Kit, 50 Cycle Conversion (407C28 motor)	98C 15-99	98C 15-99	98C 15-99	98C 15-99	98C 15-99	98C 15-99
	Needle, .003" (3 mil) sapphire standard	98C 15-101	98C 15-101	98C 15-101	———	———	———
	Needle, .0007" (.7 mil)						
	Sapphire LPS	98C 15-100	98C 15-100	98C 15-100	———	———	———
	Diamond LPS	98C 15-102	98C 15-102	98C 15-102	———	———	———
	Needle Assembly, .0007" (.7 mil) and .003" (3 mil) sapphire needles and handle	———	———	———	98C 95-8	98C 95-8	98C 95-8
	Needle Assembly, .0007" (.7 mil) diamond microgroove and .003" (3 mil) sapphire standard needles and handle	———	———	———	98C 95-9	98C 95-9	98C 95-9
	Replacement Parts for Record Changer Motor 407C28						
	Idler Wheel, Molded (incl. tire)	98B 15-57	98B 15-57	98B 15-57	98B 15-57	98B 15-57	98B 15-57
	Idler Spring	98C 102-1	98C 102-1	98C 102-1	98C 102-1	98C 102-1	98C 102-1
	Drive Belt, 16 and 33 RPM	98B 15-59	98B 15-59	98B 15-59	98B 15-59	98B 15-59	98B 15-59
	Spindle, 45 RPM Adapter	400C 686-1	400C 686-1	400C 686-1	400C 686-1	400C 686-1	400C 686-1
	Spring, Float	405A 139-2	405A 139-2	405A 139-2	405A 139-2	405A 139-2	405A 139-2
	Tone Arm Rest (Black)	403A 65-6	403A 65-6	403A 65-6	403A 65-6	403A 65-6	403A 65-6

RESISTORS

Sym.	Description	Part No.
R1	68 ohms, ½ watt	60B 8-680
R2	10 ohms, ½ watt	60B 8-100
R3	68,000 ohms, ½ watt	60B 8-683
R4	1,500 ohms, ½ watt	60B 8-152
R5	10,000 ohms, ½ watt	60B 8-103
R6	18,000 ohms, 1 watt (Run 10 only)	60B 14-183
R7	1 megohm, ½ watt	Part of L5
R8	560 ohms, ½ watt	60B 8-561
R9	1 megohm, ½ watt	Part of L6
R10	100 ohms, ½ watt	60B 8-101
R11	470,000 ohms, ½ watt	60B 8-474
R12	1,000 ohms, ½ watt	60B 8-102
R13	68 ohms, ½ watt	60B 8-680
R14	33,000 ohms, 1 watt	60B 14-333
R15	75,000 ohms, ½ watt, 5%	60B 7-753
R16	1,000 ohms, ½ watt	60B 8-102
R17	75,000 ohms, ½ watt, 5%	60B 7-753
R18	68 ohms, ½ watt	60B 8-680
R19	33,000 ohms, 1 watt	60B 14-333
R20	100,000 ohms, ½ watt	Part of M3
R21	2.2 megohms, ½ watt	60B 8-225
R22	390,000 ohms, ½ watt	60B 8-394
R23	3,500 ohms, 5 watts	61B 1-52
R24	1,500 ohms, 2 watts	60B 20-152
R25	75,000 ohms, ½ watt, 5%	60B 7-753
R26	1,000 ohms, ½ watt	60B 8-102
R27	1 megohm, ½ watt	60B 8-105
R28	100,000 ohms, ½ watt	60B 8-104

RESISTORS (Cont'd)

Sym.	Description	Part No.
R29	75,000 ohms, ½ watt, 5%	60B 7-753
R30	22,000 ohms, ½ watt	60B 8-223
R31	27,000 ohms, 1 watt	60B 14-273
R32	100,000 ohms, ½ watt, 5%	60B 7-104
R33	100,000 ohms, ½ watt, 5%	60B 7-104
R34	150,000 ohms, ½ watt	60B 8-154
R35	1 megohm, ½ watt	60B 8-105
R36	1 megohm, ½ watt	60B 8-105
R37	100,000 ohms, ½ watt	60B 8-104
R38	22,000 ohms, ½ watt	60B 8-223
R39	12,000 ohms, 1 watt	60B 14-123
R40	1,000 ohms, ½ watt	60B 8-102
R41A	3 megohms, **Loudness & Balance** { dual	
R41B	3 megohms, **Loudness & Balance** { control	75D 46-15
R42	120,000 ohms, ½ watt	60B 8-124
R43	1 megohm, ½ watt	60B 8-105
R44	1,800 ohms, ½ watt	60B 8-182
R45	100,000 ohms, ½ watt	60B 8-104
R46	10,000 ohms, ½ watt	60B 8-103
R47A	1 megohm, **Bass** { dual control	
R47B	1 megohm. **Bass** {	75D 46-10
R48	100,000 ohms, ½ watt	60B 8-104
R49	100,000 ohms, ½ watt	60B 8-104
R50A	1 megohm, **Treble** { dual control,	
R50B	1 megohm. **Treble** {	
	(includes **Off-On** switch S3)	75D 46-9
R51	1 megohm, ½ watt	60B 8-105

RESISTORS (Cont'd)

Sym.	Description	Part No.
R52	2,200 ohms, ½ watt	60B 8-222
R53	100,000 ohms, ½ watt	60B 8-104
R54	22,000 ohms, ½ watt	60B 8-223
R55	470,000 ohms, ½ watt	60B 8-474
R56	3.3 ohms, 1 watt	60B 28-10
R57	100 ohms, 5 watts	61B 1-38
R58	1,000 ohms, 1 watt	60B 14-102
R59	10,000 ohms, ½ watt	60B 8-103
R60	1 megohm	Part of L13
R61	120,000 ohms, ½ watt	60B 8-124
R62	1 megohm, ½ watt	60B 8-105
R63	1,800 ohms, ½ watt	60B 8-182
R64	100,000 ohms, ½ watt	60B 8-104
R65	100,000 ohms, ½ watt	60B 8-104
R66	10,000 ohms, ½ watt	60B 8-103
R67	100,000 ohms, ½ watt	60B 8-104
R68	1 megohm, ½ watt	60B 8-105
R69	2,200 ohms, ½ watt	60B 8-222
R70	100,000 ohms, ½ watt	60B 8-104
R71	22,000 ohms, ½ watt	60B 8-223
R72	470,000 ohms, ½ watt	60B 8-474
R73	130 ohms, 1 watt, 5%	60B 13-131
R74	130 ohms, 1 watt, 5%	60B 13-131

CAPACITORS

C1	10 mmf, 500 volts, cer. disc, NPO temp. coeff.	65D 10-87
C2	.01 mf, 500 volts, cer. disc	65D 10-3
C3	47 mmf, 500 volts, ceramic	65D 6-79
C4	220 mmf, 500 volts, ceramic	65D 6-80
C5	17 mmf, 500 volts, ceramic, NPO temp. coeff.	Part of L3
C6	.001 mf, 500 volts, cer. disc	65D 10-6
C7	17 mmf, 500 volts, ceramic NPO temp. coeff.	Part of L4
C8	2 mmf, 500 volts, 12%, ceramic	65D 6-53
C9	47 mmf, 500 volts, cer. disc, N750 temp. coeff.	65D 10-177
C10	10 mmf, 500 volts, cer. disc, NPO temp. coeff.	65D 10-87
C11	.01 mf, 500 volts, cer. disc	65D 10-3
C12	10 mmf, 500 volts, cer. disc, NPO temp. coeff.	65D 10-87
C13	.001 mf, 500 volts, cer. disc	65D 10-6
C14	.001 mf, 500 volts, cer. disc	65D 10-6
C15	.01 mf, 500 volts, cer. disc	65D 10-3
C16	.01 mf, 500 volts, cer. disc	65D 10-3
C17	.01 mf, 500 volts, cer. disc	65D 10-3
C18	.01 mf, 500 volts, cer. disc	65D 10-3
C19	.01 mf, 500 volts, cer. disc	65D 10-3
C20	.01 mf, 500 volts, cer. disc	65D 10-3
C21	.01 mf, 500 volts, cer. disc	65D 10-3
C22A	100 mmf	Part of M3
C22B	100 mmf	Part of M3
C23	.047 mf, 200 volts, tubular	64B 8-41
C24	.0033 mf, 500 volts, cer. disc	65D 10-35
C25A	30 mf, 350 volts	
C25B	30 mf, 350 volts electrolytic	67D 7-101
C25C	50 mf. 25 volts	
C26	.01 mf, 500 volts, cer. disc	65D 10-3
C27	.01 mf, 500 volts, cer. disc	65D 10-3
C28	47 mmf, 500 volts, ceramic	65D 6-79
C29	.01 mf, 500 volts, cer. disc	65D 10-3
C30	100 mmf, 500 volts, ceramic	65D 6-19
C31	800 mmf, 500 volts, 10%, cer. disc	65D 10-197
C32	.005 mf, 500 volts, cer. disc	65D 10-188
C33	.01 mf, 500 volts, cer. disc	65D 10-3
C34A	355.4 mmf, max. ant.	
C34B	104.7 mmf, max. osc.	
C34C	Antenna trimmer gang	68C 71-2
C34D	Oscillator trimmer	
C35	.001 mf, 500 volts, Feed-through	65B 26-5
C36	.02 mf, 500 volts, cer. disc	65D 10-28
C37	47 mmf, 500 volts, cer. disc, N750 temp coeff.	65D 10-177
C38	.01 mf, 500 volts, cer. disc	65D 10-3
C39	.01 mf, 500 volts, cer. disc	65D 10-3
C40	.01 mf, 500 volts, cer. disc	65D 10-3
C41	.01 mf, 500 volts, cer. disc	65D 10-41
C42	.01 mf, 400 volts, tubular	64B 8-32

CAPACITORS (Cont'd)

Sym.	Description	Part No.
C43	.047 mf, 400 volts, tubular	64B 8-28
C44	.002 mf, 1KV, cer. disc	65D 10-39
C45	.02 mf, 500 volts, cer. disc	65D 10-28
C46	220 mmf, 500 volts, ceramic	65D 6-80
C47	1,500 mmf, 500 volts, cer. disc	65D 10-103
C48	.022 mf, 400 volts, tubular	64B 8-30
C49	.02 mf, 500 volts, cer. disc	65D 10-28
C50	.0022 mf, 500 volts, cer. disc	65D 10-111
C51	4 mf, 10 volts, cross-over	64B 13-5
C52	.047 mf, 400 volts, tubular	64B 8-28
C53	.047 mf, 600 volts	63B 12-1
C54A	40 mf, 400 volts	
C54B	80 mf, 400 volts electrolytic	67D 7-102
C54C	40 mf, 400 volts	
C55	30 mf, 350 volts, electrolytic	See C25B
C56	.01 mf, 500 volts, cer. disc	65D 10-41
C57	.01 mf, 400 volts, tubular	64B 8-32
C58	.047 mf, 400 volts, tubular	64B 8-28
C59	.002 mf, 1KV, cer. disc	65D 10-39
C60	.02 mf, 500 volts, cer. disc	65D 10-28
C61	220 mmf, 500 volts, ceramic	65D 6-80
C62	1,500 mmf, 500 volts, cer. disc	65D 10-103
C63	.022 mf, 400 volts, tubular	64B 8-30
C64	.02 mf, 500 volts, cer. disc	65D 10-28
C65	50 mf, 25 volts, electrolytic	See C25C
C66	.0022 mf, 500 volts, cer. disc	65D 10-111
C67	4 mf, 10 volts, cross-over	64B 13-5
C68	.01 mf, 500 volts, cer. disc	65D 10-3
C69	.01 mf, 500 volts, cer. disc	65D 10-3
C70	.01 mf, 500 volts, cer. disc	65D 10-3
C71	.01 mf, 500 volts, cer. disc	65D 10-3
C72	.01 mf, 500 volts, cer. disc	65D 10-3
C73	.01 mf, 500 volts, cer. disc	65D 10-3
C74	.27 mmf, 10%, composition (Run 11)	65B 28-0027
C75	.27 mmf, 10%, composition (Run 11)	65B 28-0027

COILS AND TRANSFORMERS

L1	Coil, FM RF Input	73D 20-71
L2	Coil, RF Choke (12 μh-Orange color dot)	73B 31-4
L3	Coil, FM Mixer (incl. C5, 17 mmf)	69B 233-2
L4	Coil, FM Oscillator (incl. C8, 17 mmf)	69B 233-2
L5	Coil, RF Choke (1 μh-Green color dot; wound on 1 megohm resistor)	73B 31-5
L6	Coil, RF Choke (1 μh-Green color dot; wound on 1 megohm resistor)	73B 31-5
L7	Coil, RF Choke (12 μh-Orange color dot)	73B 31-4
L8	Coil, RF Choke (12 μh-Orange color dot)	73B 31-4
L9	AM Antenna	69B 229-2
L10	Coil, AM Oscillator	69B 243-1
L11	Choke, Filament	73A 2-14
L12	Choke, Filament	73A 2-14
L13	Choke, Filament (1 μh-Green color dot; wound on 1 megohm resistor)	73B 31-5
T1	Transformer, 1st FM IF	72D 28-72
T2	Transformer, 2nd FM IF	72D 28-68
T3	Transformer, 3rd FM IF	72D 28-68
T4	Transformer, FM Discriminator	72D 28-73
T5	Transformer, 1st AM IF	72D 28-70
T6	Transformer, 2nd AM IF	72D 28-71
T7	Transformer, Power	80D 35-19
T8	Transformer, Right Channel Audio Output	79D 56-16
T9	Transformer, Left Channel Audio Output	79D 56-16

MISCELLANEOUS CHASSIS PARTS

M3	Couplate (incl. R20, C22A and C22B)	63A 3-2
M9	Socket, Pilot Light (2 pin)	88B 5-6
M12	Pilot Light, #1847	81A 1-19
M13	Pilot Light, #1847	81A 1-19
M14	Socket, Phono Input, Dual (incl. 2 sockets and board)	88B 1-2
M15	Socket, Tape Input, Dual (incl. 2 sockets and board)	88B 1-2
M16	Socket, Audio Output (4 pin)	88B 5-3
S1	Switch, Function (wafer)	77B 97-1
S2	Switch, Off-On	Part of R50
	Bearing, Ball (used on tuning gang)	30A 1-1
	Cam and Drum Assembly (incl. 2" dia. drum, cam and shaft)	700B 209-1
	Clip, Dial Retaining	18A 253-1
	Clamp, Plastic, Black (line cord retaining)	11B 27-3
	Clamp, Plastic (holds AM antenna)	11B 12-4
	Cup, Shock Mounting	15A 2048-1

MISCELLANEOUS CHASSIS PARTS (Cont'd)

Sym.	Description	Part No.
	Dial Scale (with lettering; chassis 12D1)	21C 126-1
	Dial Scale (with lettering; chassis 12D1A)	21C 126-2
	Drum, Tuning, 11/16" dia. (mounts on 27A315-1)	17A 57-1
	Grommet, Rubber, Black (for mtg. L3 and L4)	12B 1-4
	Grommet, Rubber, Black (for mtg. L9)	12B 1-22
	Line Cord and Plug (8 ft.)	89B 1-1
	Palnut, ⅜-32 (control mtg.)	2B 6-43-71
	Pointer, Dial (Red) Chassis 12D1	25A 72-2
	Pointer, Dial (Red) Chassis 12D1A	25A 72-1
	Plug, Changer, Power, Assembly (incl. plug, contacts and leads)	700B 137-7
	Pulley, Dial Stringing, Brass (⅝" dia.)	17C 1-46
	Rail, Guide, Dial Pointer	15B 2045-1
	Screw, Set, 6-32 x 3/16" (for mtg. Cam and Drum Assembly)	1A 43-8
	Shaft, Tuning	27A 315-1
	Shield, Tube, Metal	87C 7-20
	Shock Mount (gum rubber)	12A 98-1
	Slug, Iron Core (for L3 or L4)	71D 1-25
	Socket, Pilot Light (with 7" lead)	82A 6-17
	Socket, Pilot Light (with 18" lead)	82A 6-18
	Socket, Tube, 7 Pin Miniature (for V2, V3, V4, V5 or V7)	87A 39-1
	Socket, Tube, Octal (for V12)	87A 5-1
	Socket, Tube, 9 Pin Miniature (for V10 or V11)	87B 25-3
	Socket, Tube, 9 Pin Miniature (for V1 or V6)	87B 23-3
	Socket, Tube, 9 Pin Miniature (for V8 or V9)	87B 23-2
	Spring, Cam Arm	19D 1-51
	Spring, Dial String	19D 1-5
	Tuning Drum Assembly (incl 11/16" and 1¾" dia. drums and shaft)	700B 210-1

CABINET PARTS
MODELS Y1012, Y1019, Y1031, Y1032, and Y1033

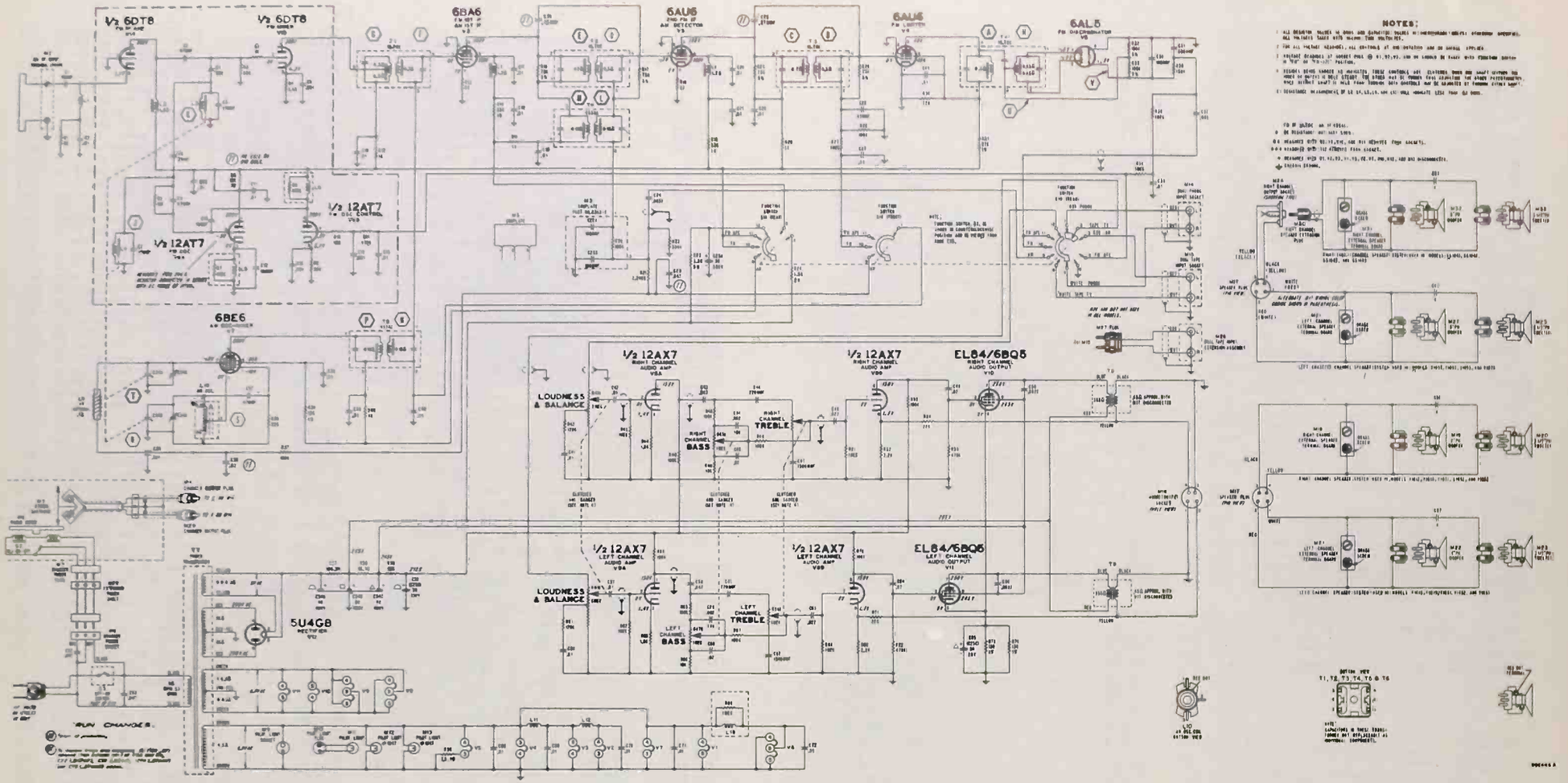
Sym.	Description	Part No.
M1	Antenna Assembly, FM	700B 205-1
M2	Terminal Board, FM Antenna (2 lug)	10B 13-10
M10	Plug, Pilot Light (incl. leads and socket)	89B 82-3
M11	Pilot Light, #1847	81B 1-19
M17	Plug, Speaker (4 pin)	88B 5-2
	Cover (for M17)	88B 5-18
M18	Terminal Board (2 lug)	10B 13-10
M19	Speaker, 8" PM, Woofer, 3.2 ohms voice coil impedance	78C 151-3
M20	Speaker, 3½" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1
M21	Terminal Board (2 lug)	10B 13-10
M22	Speaker, 8" PM, Woofer, 3.2 ohms voice coil impedance	78C 151-3
M23	Speaker, 3½" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1
M28	Plug and Socket Assembly, Record Changer Power	700B 158-2
	Back, Cabinet (Model Y1012 or Y1019)	43D 324-1
	Back, Cabinet (Model Y1031, Y1032 or Y1033)	43D 324-2
	Bracket, Shock Mounting (for mtg. chassis)	15A 2074-1
	Bullet Catch and Strike Plate, Statuary Bronze (Models Y1012, Y1019, Y1031 or Y1032)	37B 176-2
	Bullet Catch and Strike Plate, Brass (Model Y1033)	37B 176-1
*	Cabinet, Mahogany (Model Y1012)	*35E 557-2
*	Cabinet, Fruitwood (Model Y1019)	*35E 557-9
*	Cabinet, Walnut (Model Y1031)	*35E 565-1
*	Cabinet, Mahogany (Model Y1032)	*35E 565-2
*	Cabinet, Blond (Model Y1033)	*35E 565-3
	Channel, Shock Mounting (with 2 mtg. slots; for mtg. chassis)	15B 2073-1
	Clip, Escutcheon Mounting	18A 257-1-71
	Compression Ring (for Tuning knob)	18B 5-12
	Crystal, Dial (fits over dial escutcheon)	24C 30-1
	Door Pull	
	Models Y1012 and Y1019	37A 61-3
	Models Y1031, Y1032 and Y1033	37A 210-1
	Drawer, Metal, Record Changer Base Assembly	400D 708-1
	includes Drawer, Metal	401D 463-1
	includes Handle	404B 50-1
	includes Mounting Bracket	401B 464
	includes Speed Nut	401A 466
	includes Screw, #6-32 x ¼" (handle mtg.)	402A 373
	Escutcheon, Dial (with lettering; for 12D1 chassis)	23E 369-2

Sym.	Description	Part No.
	Grille Cloth	
	Model Y1012	36C 105-46
	Model Y1019	36C 105-47
	Model Y1031	36C 105-55
	Model Y1032	36C 105-56
	Model Y1033	36C 105-57
	Hinge, Knife Type, Statuary Bronze (Models Y1012, Y1019, Y1031 and Y1032)	37A 212-2
	Hinge, Knife Type, Brass (Model Y1033)	37A 212-1
	Holder, Spindle, 45 RPM Adapter	11A 20
	Knob, Control	
	Function (Chrome and Gray)	700A 208-1
	Off-On-Treble, Bass or Loudness	
	Inner (Chrome)	20D 34-1
	Outer (Slate Gray)	33C 359-2
	Tuning (Chrome)	20D 34-2
	Monogram, Die Cast (crest)	23B 376-3
	Slide Rail, Record Changer Drawer	87C 183-1
	Socket, Speaker (2 hole; center of holes ½" apart)	87A 86-1
	Socket, Speaker (2 hole; center of holes ⅝" apart)	87A 86-2

CABINET PARTS
MODELS Y1051, Y1052, Y1053, and Y1079

Sym.	Description	Part No.
M1	Antenna Assembly, FM	700B 205-1
M2	Terminal Board, FM Antenna (2 lug)	10B 13-10
M10	Plug, Pilot Light (incl. leads and socket)	89B 82-3
M11	Pilot Light, #1847	81B 1-19
M17	Plug, Speaker (4 pin)	88B 5-2
	Cover (for M17)	88B 5-18
M21	Terminal Board (2 lug)	10B 13-10
M22	Speaker, 8" PM, Woofer, 3.2 ohms voice coil impedance	78C 151-3
M23	Speaker, 3½" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1
M24	Socket, Shorting Type	88B 11-1
	Back, Cabinet	43D 321-3
	Bracket, Phono Input	15B 2098-1
	Bracket, Shock Mounting, Bottom (for mtg. chassis)	15B 2073-1
*	Cabinet, Walnut (Model Y1051)	*35E 566-1
*	Cabinet, Mahogany (Model Y1052)	*35E 566-2
*	Cabinet, Blond (Model Y1053)	*35E 566-3
*	Cabinet, Fruitwood (Model Y1079)	*35E 561-9
	Channel, Shock Mounting (with 2 mtg. slots; for mtg. chassis)	15B 2074-1
	Clip, Escutcheon Mounting	18A 257-1-71
	Compression Ring (for Tuning knob)	18A 244-1
	Crystal, Dial (fits over dial escutcheon)	24C 30-1
	Escutcheon, Dial (with lettering; for chassis 12D1A)	23E 369-1
	Grille Cloth	
	Model Y1051	36C 105-38
	Model Y1052	36C 105-39
	Model Y1053	36C 105-40
	Model Y1079	36C 105-68
	Hinge, Lid, Statuary Bronze (Y1051, Y1052 or Y1079)	37A 106-1
	Hinge, Lid, Brass (Y1053)	37A 106-2
	Holder, Spindle, 45 RPM Adapter	11A 20
	Knob, Control	
	Function (Chrome and Gray)	700A 208-1
	Off-On-Treble, Bass or Loudness	
	Inner (Chrome)	20D 34-1
	Outer (Slate Gray)	33C 359-2
	Tuning (Chrome)	20D 34-2
	Leg, Walnut (Model Y1051)	37D 168-79
	Leg, Mahogany (Model Y1052)	37D 168-52
	Leg, Blond (Model Y1053)	37D 168-53
	Lid Support, Statuary Bronze (Y1051, Y1052 or Y1079)	37D 170-4
	Lid Support, Brass (Y1053)	37D 170-6
	Monogram, Die Cast (crest)	23B 376-3
	Socket, Speaker (2 hole; center of holes ½" apart)	87A 86-1
	Socket, Speaker (2 hole; center of holes ⅝" apart)	87A 86-2
	Tee Nut, 5/16-18 (leg mtg.)	2A 17-8-71

Figure 12. Schematic of 12D1 and 12D1A Radio Chassis Stamped Run 11.



CABINET PARTS

MODELS SS1041, SS1042, SS1043, and SS1069

Sym.	Description	Part No.
M30	Plug, Phono (with extension cable)	89C 85-4
M31	Terminal Board (2 lug)	10B 13-10
M32	Speaker, 8" PM, Woofer, 3.2 ohms voice coil impedance	78C 151-3
M33	Speaker, 3½" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1
	Back, Cabinet (incl. acoustical lining)	
	Models SS1041, SS1042 and SS1043	43D 308-15
	Model SS1069	43D 308-14
	*Cabinet	
	Walnut, Model SS1041	*35E 548-1
	Mahogany, Model SS1042	*35E 548-2
	Blond, Model SS1043	*35E 548-3
	Fruitwood, Model SS1069	*35E 576-9
	Grille Cloth	
	Model SS1041	36C 105-41
	Model SS1042	36C 105-42
	Model SS1043	36C 105-43
	Model SS1069	36C 105-69
	Leg, Molded	
	Walnut, Model SS1041	37D 168-79
	Mahogany, Model SS1042	37D 168-52
	Blond, Model SS1043	37D 168-53
	Plug, Phono (part of M30)	88A 2-1
	Socket, Speaker (2 hole; center of holes ½" apart)	87A 86-1
	Socket, Speaker (2 hole; center of holes ¾" apart)	87A 86-2

*Orders for cabinets and certain matching parts will not be filled unless full details are given with the order and the damaged parts cannot be repaired economically.

SCHEMATIC NOTES

(2), (3), . . etc. indicate production changes covered by a Run Number. Run numbers are stamped at rear of chassis. Brief description of Run changes given on schematic.

(A1), (A2), . . (Y), (Z), indicate alignment points and connections.

Important: Before making voltage measurements, see instructions below.

Fixed resistor values in ohms ± 10% tolerance, ½ watt; capacitor values shown in microforads ± 20% tolerance unless otherwise specified.

Note: K= x 1,000; MEG= x 1,000,000; MMF= micromicrofarad.

VOLTAGE DATA

- All voltages measured on 117 volts AC, 60 cycle line with a vacuum-tube voltmeter.
- All voltages measured with respect to chassis ground except V12 filament voltage, primary winding voltage on T7 and heater voltages of V8, V9, V10 and V11.
- Set controls as shown on schematic diagram.
- All voltages measured with FM antenna terminals shorted together and tuning dial set at low frequency end.
- For further notes regarding voltage readings, refer to schematic diagram.

Admiral Radio

5D5 CHASSIS

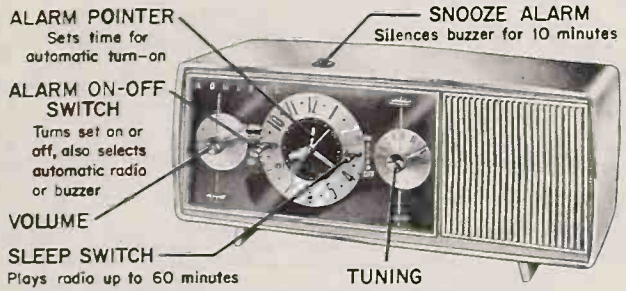


Figure 1. Front View of Set Showing Controls.

SPECIFICATIONS

ANTENNA: Ferrite rod.

CIRCUIT: Superheterodyne using 5 miniature tubes.

CLOCK: Westclox timer, with "Snooze Alarm".

FREQUENCY RANGE: Standard broadcast band, 535 to 1620 KC.

INTERMEDIATE FREQUENCY: 455 KC.

POWER SUPPLY: Power line of 117 volts, 60 cycles AC only.

POWER CONSUMPTION: Radio, 30 watts. Appliance outlet, 1100 watts.

SPEAKER: 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

GENERAL

This group of radios has been designed for use with the latest type, precision electric clock, known as the clock radio with the "Snooze Alarm". The snooze alarm button (see figure 1) when pressed, will silence the buzzer, but it will start again after approximately 10 minutes. The Snooze Alarm may be repeated 5 times.

The complete chassis wiring is incorporated into an etched circuit board, with all component symbols screened on the top. Therefore, these radios are compact, efficient and easy to service.

NOTE: Refer to Admiral Service Manual No. S559 for service information on etched circuit wiring.

CLOCK RADIO

MODEL	COLOR	CHASSIS
Y873	White	5D5
Y875	Melon	
Y878	Turquoise	

TO REMOVE CHASSIS FOR SERVICING

Figure 2. Rear View of Cabinet Showing Chassis Mounting Screws.

REMOVING THE CHASSIS

1. Disconnect line cord plug, then tilt cabinet forward and remove two screws located on the bottom near the front. See figure 2.
2. Loosen the two screws located on the back, until they are held only by the last threads. Apply pressure to these loosened screws with the thumbs to break the AC interlock connection inside cabinet.
3. Remove screws loosened and pull chassis, with front panel attached, out of cabinet. Make sure Time Set knob, on clock, clears opening provided in cabinet back.

REMOVING THE CLOCK

1. Remove the cabinet as illustrated in figure 2.
2. Remove the four knobs and the screws holding the chassis and extrusion assembly brackets to the rear of the cabinet front.
3. Remove the clock crystal by pressing down on the three top tabs and upward on the three bottom tabs.
4. Remove the metal discs under the radio knobs. Remove two screws mounting the chassis assembly. One is located at the rear in the volume control bracket, the other at the front that goes into the frame of the gang.
5. Remove black back-ground insert. NOTE: The clock is held in position by two nuts at opposite corners and by the clock face tabs at the four sides. Remove the two nuts and lift tabs straight out. The clock is removed from the front. Lift bottom out first to clear snooze alarm shaft.

SERVICE HINTS

The compact etched circuit will make servicing easier if the suggestions given here and in Service Manual No. S559 are followed. With the aid of the bottom view of the board (figure 4) it is possible to "see" through the board and make voltage and resistance measurements as desired. When taking voltage or resistance readings, use meter probes with needle point prods to make a good connection without shorting out adjacent circuits.

Replace resistors and capacitors by cutting into the defective part and leaving the pig tail leads as long as possible. Then, solder the replacement part onto the pig tail leads.

Remove components such as coils, IF transformers and tube sockets by alternately heating and loosening each pin. Brush away melted solder as each pin is heated.

Use a low wattage soldering iron or gun of 35 watts or less. Overheating may break the bond between the foil and the board.

PARTS AND SERVICE FOR CLOCK

Consult your Admiral distributor for the address of the nearest parts and service station for clocks used in Admiral radios.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	2.2 megohms, ½ watt	60B 8-225
R2	22,000 ohms, ½ watt	60B 8-223
R3	68 ohms, ½ watt	60B 8-680
R4	1,500 ohms, ½ watt	60B 8-152
R5	1 megohm, ½ watt	60B 8-105
R6	1 megohm, Volume control	75D 56-3
R7	10 megohms, ½ watt	Part of M3
R8	470,000 ohms, ½ watt	Part of M3
R9	470,000 ohms, ½ watt	Part of M3
R10	150 ohms, ½ watt	60B 8-151
R11	1,200 ohms, 1 watt	60B 14-122

CAPACITORS

C1	220 mmf, 500 volts, ceramic disc	65D 10-83
C2	.1 mf, 400 volts, tubular	64C 25-32
C3	.01 mf, 600 volts, ceramic disc	65D 10-41
C4	.01 mf, 600 volts, ceramic disc	65D 10-41
C5	47 mmf, 500 volts, ceramic disc, NPO temp. coeff.	65D 10-198
C6	.002 mf, 600 volts, ceramic disc	65D 10-125
C7	220 mmf, 500 volts	Part of M3
C8	.005 mf, 600 volts	Part of M3
C9	250 mmf, 500 volts	Part of M3
C10	.005 mf, 600 volts	Part of M3
C11	.005 mf, 600 volts, ceramic disc	65D 10-152
C12	.047 mf, 400 volts, molded	64B 17-28

CAPACITORS

Sym.	Description	Part No.
C13A	30 mf, 150 volts } electrolytic	67C 39-1
C13B	50 mf, 150 volts }	
C14A	272 mmf, max. ant. } gang	68C 76-3
C14B	102 mmf, max. osc. }	

COILS AND TRANSFORMERS

L1	Antenna, Ferrite Rod	69B 228-3
L2	Oscillator Coil	69A 217-1
T1	1st IF Transformer	72C 170-5
T2	2nd IF Transformer	72C 170-4
T3	Output Transformer	Part of M4

MISCELLANEOUS PARTS

M1	Line Cord with Interlock Socket and AC Plug	89B 62-5
M2	Interlock Plug (mtd on plastic extrusion assembly)	88A 36-1
M3	Couplate, AF coupling (includes R7, R8, R9, C7, C8, C9, C10)	63C 6-20
M4	Speaker, 4" PM (includes T3)	78B 94-2
M5	Clock (Westclox)	See Clock Parts
M6	AC Socket (1100 watts) Appliance Outlet	87A 77-3
	Bracket, Extrusion Assembly Mtg	15B 1865
	Extrusion Assembly Antenna Mtg with M2 (AC Interlock Plug) and M6 (Appliance Outlet)	A5077
	Shield, Tube (12AV6)	87C 7-19
	Socket, Tube (12AV6)	87D 35-14
	Socket, Tube (50C5, 35W4, 12BA6 and 12BE6)	87D 35-13

CABINET PARTS

Description	Part No.
Cabinet, Model Y873, White	34D 125-25
Cabinet, Model Y875, Melon	34D 125-26
Cabinet, Model Y878, Turquoise	34D 125-27
Cabinet, Front Panel, (All Models)	34D 180-1
Escutcheon, for Snooze Alarm Knob	33B 367-1
Knob, Disc, Tuning	21C 127-1
Knob, Disc, Volume	21C 127-2
Knob, Snooze Alarm	33B 368-1
Knob, Tuning and Volume	33B 364-1
Speaker, 4" PM (includes T3)	78B 94-2

CLOCK PARTS

Description	Part No.
Clock (Westclox), less Face, Time Set Shaft and Knobs	91C 40-1
Clock Face	23C 368-1
Crystal, Clock Front (Cabinet Mtd)	24C 33-1
Insert, Clock Trim	23B 372-1
Knob, Clock	33B 365-1
Shaft, Extension and Time Set Knob	91C 40-11

SERVICE MANUAL S850

VOLTAGE PRECAUTION

DO NOT CONNECT AN EARTH GROUND TO THIS RECEIVER.

The chassis is connected directly to one side of the power line. To avoid possibility of damage to test equipment or to the etched circuit board, do not place the chassis directly on a metal service bench, tools or other metal objects.

When taking voltage readings or making resistance measurements, use test leads with needle point prods to avoid possibility of short circuits between sections of the etched wiring.

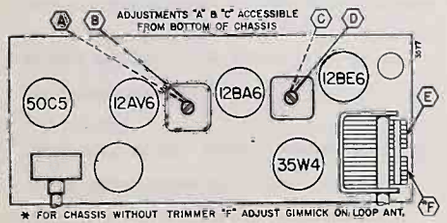
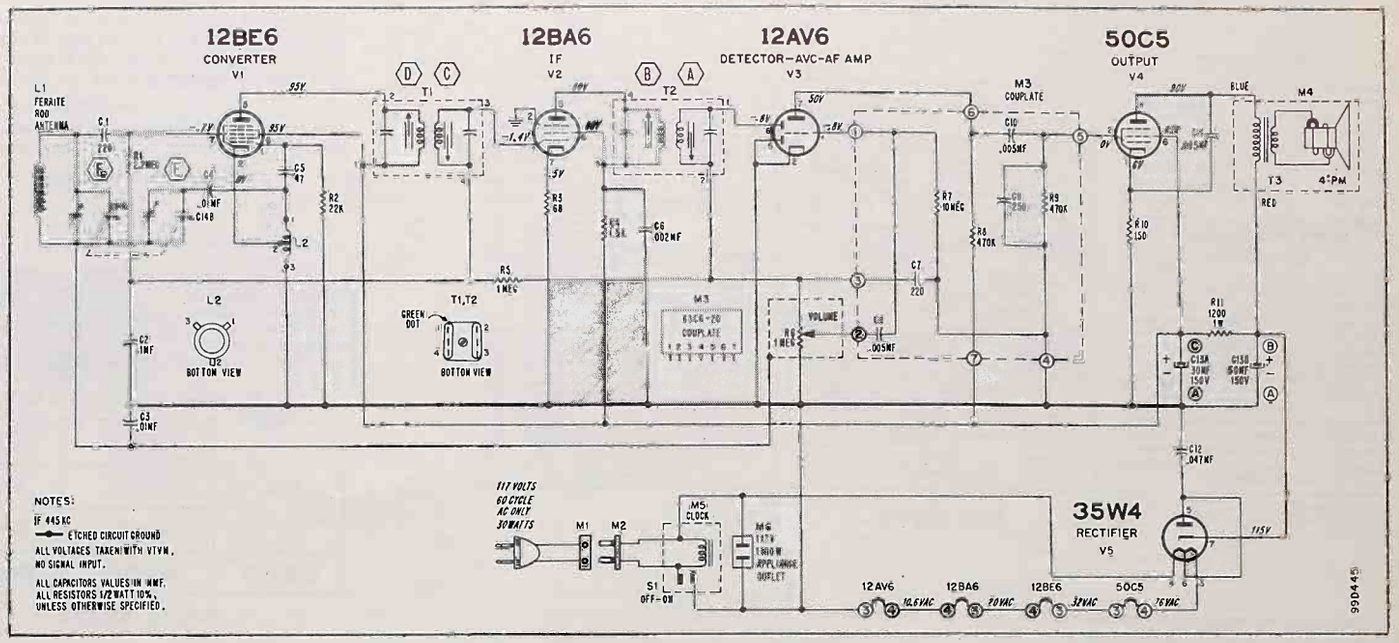


Figure 3. Tube And Alignment Point Locations.



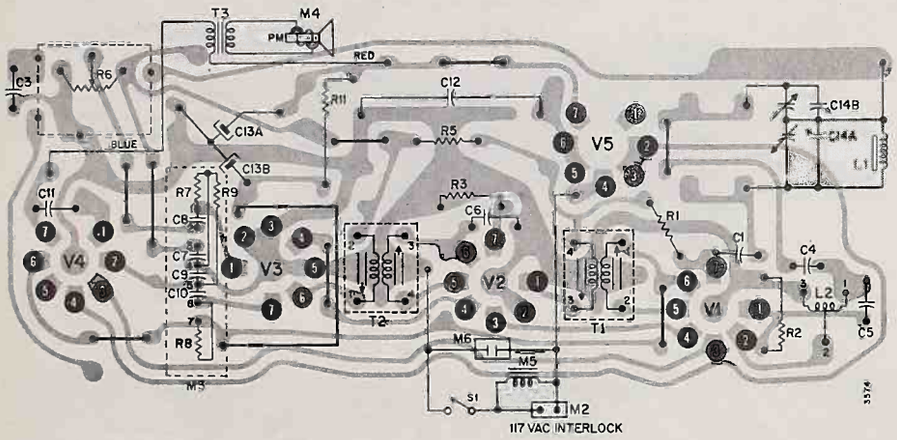


Figure 4. Rear View of Etched Circuit Board. Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

VOLTAGE DATA

- All readings made between tube socket terminals and etched circuit ground.
- Dial turned to low frequency end; Volume control at minimum.
- Measured on 117 Volts AC line.
- All voltages measured with vacuum-tube voltmeter.

ALIGNMENT PROCEDURE

- Use an isolation transformer if available; otherwise, connect a .1 mfd. capacitor in series with low side of signal generator and connect to common ground.
- Set volume control full on.
- Disconnect voice coil leads and connect output meter across output secondary. Use a 3.2 ohm load.
- Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool with a blade 3/32" wide for aligning IF transformers.
- Repeat adjustments to insure good results.

STEP	CONNECTION OF SIGNAL GENERATOR	SIGNAL GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENTS
1	Through a .1 mf capacitor to stator, Antenna section of gang tuning capacitor	455 KC	Gang fully open	"A", "B", "C" and "D" for maximum output
2	Same as "STEP 1"	1620 KC	Gang fully open	"E" for maximum output
3	Use a radiated signal! Loop of several turns of wire, or place generator lead close to ferrite antenna for adequate signal pickup.	1400 KC	Tune in on generator signal	"F" for maximum output

Adjustments "A" and "C" made from underside of chassis; see figure 3

Admiral Radio

5B5 CHASSIS

Note: Refer to Admiral Service Manual No. S559 for service information on etched circuit wiring.

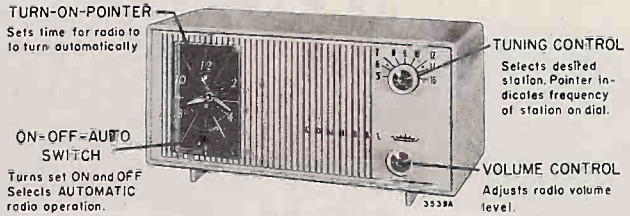


Figure 1. Front View of Y853 and Y858 Models, Showing Controls.

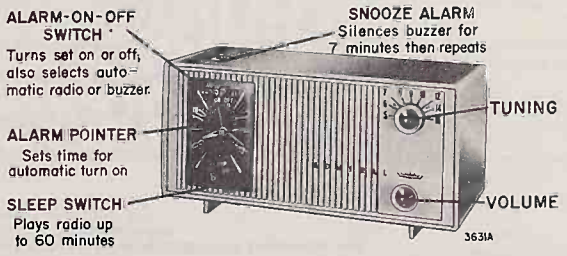


Figure 2. Front View of Y865 and Y866 Models, Showing Controls and Snooze Alarm Button.

SPECIFICATIONS

ANTENNA: Ferrite rod.

CIRCUIT: Superheterodyne using 5 miniature tubes.

CLOCK: Telechron Timer.

FREQUENCY RANGE: Standard broadcast band: 535 to 1620 KC.

INTERMEDIATE FREQUENCY: 455 KC.

POWER CONSUMPTION: 30 watts.

POWER SUPPLY: 117 volts, 60 cycles, AC only.

SPEAKER: 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

GENERAL

All components, except the speaker (with output transformer) and the antenna rod, are mounted on an etched circuit board. The use of etched circuitry provides an efficient, compact and practically trouble free receiver.

The two groups of models listed in the chart, differ only in the type clock used and the cabinet color.

The cabinets of the Y853 and Y858 models are a single color.

The Y865 and Y866 models have two-tone cabinets and the clock is provided with an entirely new feature called "The Snooze Alarm." The Snooze Alarm button, when pressed, will silence the buzzer. See figure 2. The buzzer will start again after approximately seven minutes. The snooze alarm may be repeated up to 5 times.

CLOCK RADIO

MODEL	COLOR	CHASSIS
Y853	White	5B5
Y858	Turquoise	
Y865	Melon and White	
Y866	Yellow and White	

TO REMOVE CHASSIS FOR SERVICING

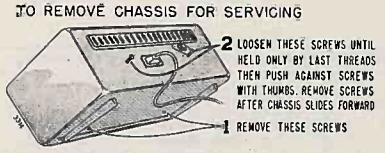


Figure 3. Rear View of Cabinet Showing Chassis Mounting Screws.

CLOCK REMOVAL

To remove clock, first remove cabinet rear from chassis and front panel as shown in figure 3.

Remove clock knobs. If knobs are snug, they may be more easily removed after clock has been loosened. The clock is held in position by four Phillips head, self tapping screws made especially for plastic. A small spacer washer is used under each screw. The clock face and trim plate are held in position only by the clock.

COMPONENT REPLACEMENT

Defective resistors and capacitors should be removed by clipping leads as close to the unit as possible then the new part neatly soldered to the old leads. If any resistor or capacitor is found inconvenient to replace on the top side of board, it is permissible to solder component on the rear of the board.

If a unit such as the oscillator coil or IF transformer is to be replaced, first remove old part by heating the mounting lugs with a pencil type soldering tool (35 watts or less) and straighten with pick and long nose pliers. Brush away any loose solder with a stiff glue type brush. Before inserting new unit make certain all lug holes are free of solder, to prevent damage to wiring or component or both.

It is seldom necessary to replace complete tube sockets. Tube socket lugs may be replaced individually. Tube socket lugs may be ordered under part number 87D35-2. NOTE: If a complete socket is replaced, make certain that the center "shield" connection is securely soldered to the etched board, to prevent possibility of hum or oscillation developing.

SERVICE HINTS

Except at the terminal points where components are soldered to the foil, the etched circuit board is coated with a lacquer to prevent dust and humidity from creating leakage paths between adjacent wiring. Therefore, when making voltage, or resistance checks, connect the meter probe only at the soldered points of the foil to assure continuity between the wiring and the probe. It is not recommended that the lacquer coating be broken along other portions of the foil when making these measurements.

The etched circuit wiring is permanently bonded to the chassis board, but can be destroyed by excessive heat from soldering. Soldering irons with low (35 watts or less) ratings are well suited for etched circuit servicing.

When taking voltage readings or making resistance measurements, use test leads with needle point prods to avoid possibility of a short circuit between sections of the wiring.

An open or damaged section of the etched wiring may be repaired by soldering a short jumper wire across the break.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	22,000 ohms, ½ watt	60B 8-223
R2	2.2 megohms, ½ watt	60B 8-225
R3	180 ohms, ½ watt	60B 8-181
R4	1 meghom, VOLUME Control	75C 25-13
R5	6.8 megohms	Part of M3
R6	470,000 ohms	Part of M3
R7	470,000 ohms	Part of M3
R8	150 ohms, ½ watt	60B 8-151
R9	1,200 ohms, 1 watt	60B 14-122

CAPACITORS

Sym.	Description	Part No.
C1A	272 mmf, max. ant. } gang	68C 78-1
C1B	102 mmf, max. osc. } gang	68C 78-1
C2	.047 mf, 400 volts, upright, mylar dielectric	64C 16-32
C3	.05 mf, 200 volts, upright	64A 12-1
C4	.01 mf, 500 volts, ceramic disc	65D 10-3
C5	47 mmf, 5%, 500 volts, ceramic disc, N1500 temp. coeff	65D 10-73
C6	5 mmf, 5%, 500 volts, ceramic, N3300 temp. coeff	65D 6-146
C7	.01 mf, 500 volts, ceramic disc	65D 10-3
C8	.005 mf	Part of M3
C9	220 mmf	Part of M3
C10	.005 mf	Part of M3
C11A } C11B	250 mmf (total)	Part of M3
C12	.01 mf, 500 volts, ceramic disc	65D 10-3
C13A	70 mf, 150 volts } electrolytic	67D 30-2
C13B	30 mf, 150 volts } electrolytic	67D 30-2
C14	.047, 400 volts, molded tubular	64B 17-28

COILS AND TRANSFORMERS

Sym.	Description	Part No.
L1	Antenna, Ferrite Rod	69B 228-4
L2	Oscillator Coil (includes C5, C6 and R1)	69A 190-7
T1	1st IF Transformer (with Green dot)	72D 28-65
T2	2nd IF Transformer (with Green dot)	72D 28-65
T3	Output Transformer	Part of M4

MISCELLANEOUS PARTS

M1	Line Cord with Interlock Socket and Plug	89B 62-4
M2	AC Interlock Plug (part of Extrusion Assembly)	88A 36
M3	Coupiate, AF Coupling (includes R5, R6, R7, C8, C9, C10 and C11)	63C 6-7
M4	Speaker (includes T3)	78B 94-2
M5	Clock Timer	See Clock Parts
S1	ON-OFF-AUTO Switch	Part of M5
	Extrusion Assembly Plastic Antenna mtg. (includes M2, interlock plug)	A5940
	Shield, Tube (for 12AV6 and 12BE6)	87C 7-19
	Socket, Tube (for 12AV6 and 12BE6)	87A 35-14
	Socket, Tube (for 50C5, 35W4 and 12BA6)	87A 35-13

CLOCK PARTS

M5	Clock, Models Y853 and Y858	91C 38-1
M5	Clock, with Snooze Alarm, Models Y865 and Y866	91C 39-1
	Crystal, Clock Face Cabinet Mtd. Models Y853 and Y858	24C 32-1
	Models Y865 and Y866	24C 32-2
	Knob, Clock Clear Models Y853 and Y858	91C 38-10
	Models Y865 and Y866	91C 39-10

CABINET PARTS

Cabinet (rear) Model Y853 White	34D 129-29
Model Y858 Turquoise	34D 129-27
Model Y865 Melon	34D 129-31
Model Y866 Yellow	34D 129-32
Cabinet (front panel) all Models except Y858 (White)	34D 151-1
for Model Y858 (Turquoise)	34D 151-2
Crystal Clock Face (cabinet snap-in mtg.) Models Y853 and Y858	24C 32-1
Models Y865 and Y866	24C 32-2
Insert, Clock Trim Models Y853 and Y858	23C 373-1
Models Y865 and Y866	23C 373-2
Knob, Tuning	33C 353-4
Knob, Volume	33C 353-5
Push-Button Assembly, for Snooze Alarm (models Y865 and Y866 only)	
Escutcheon Cup	33B 362-1
Nut, Tinnerman, Speed Type	2C 10-60
Push-Button	33B 361-1
Spring, Coil	19D-1-60
Speaker, 4" PM (includes T3)	78B 94-2

PARTS AND SERVICE FOR CLOCK

Consult your Admiral distributor for the address of the nearest parts and service station for clocks used in Admiral radios.

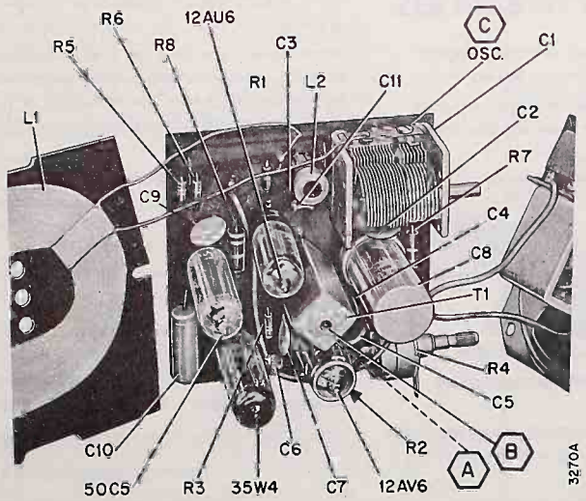
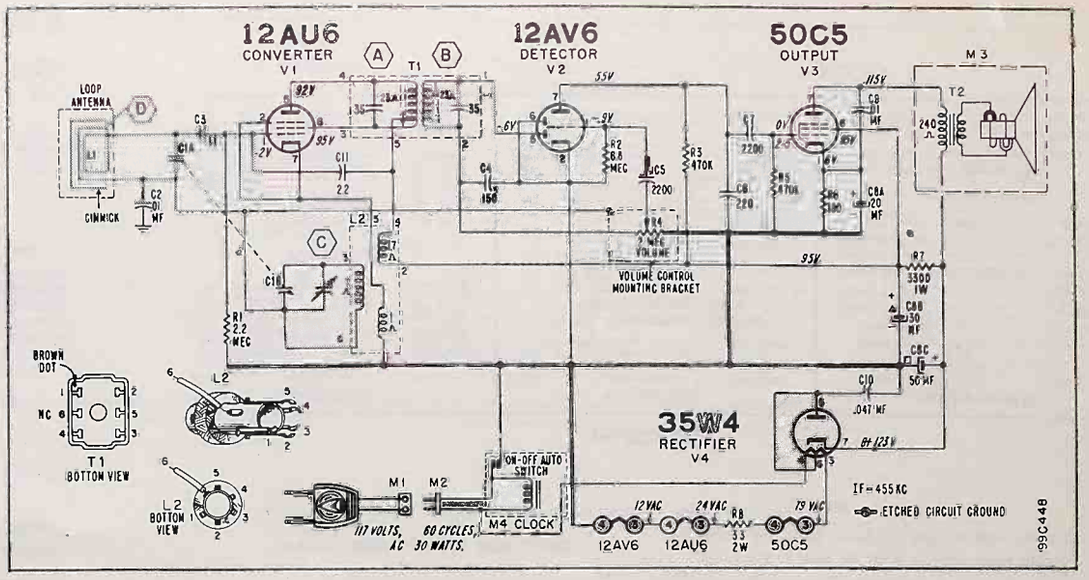


Figure 3. Top View of Chassis Showing Location of Components and Alignment Points.
Note: Alignment Point "D" is a Gimmick on Antenna Loop.



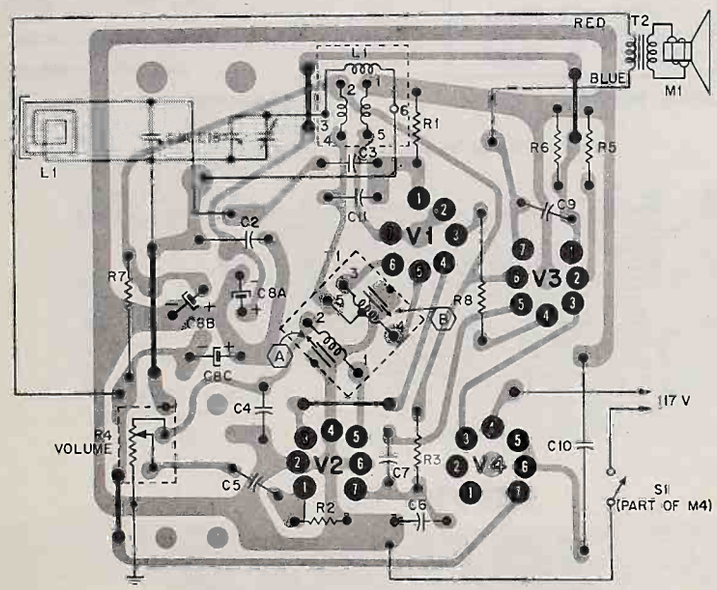


Figure 4. Rear View of Etched Circuit Board. Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

VOLTAGE DATA

- All readings made between tube socket terminals and etched circuit ground
- Dial turned to low frequency end; volume control at minimum.
- All voltages measured with vacuum-tube voltmeter, on 117 Volts AC line.
- Do not try to operate on direct current.
- Do not connect a ground wire to the set.

ALIGNMENT PROCEDURE

a. Use an isolation transformer or connect a .1 mf. capacitor in series with low side of signal generator.
CAUTION: DO NOT CONNECT AN EARTH GROUND WIRE DIRECTLY TO CHASSIS.

b. Set Volume control full on.

c. Connect output meter across output secondary. Disconnect speaker, use 3.2 ohm load.

d. Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.

e. By using alignment tool (Part No. 98A30-7) both IF transformer slugs can be aligned from front or rear.

f. Repeat adjustments to insure good results.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Through a .1 mf capacitor to pin 1 of the 12AU6 (Converter) tube.	455 KC	Gang fully open	IF Primary, IF Secondary	(A) and (B) for maximum output
2	Same as "STEP 1".	1620 KC	Gang fully open	Oscillator Trimmer	(C) for maximum output
3	Radiated Signal, Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal pickup.	1400 KC	Tune in generator signal	Antenna Trimmer	(D) for maximum output (Rock gang for optimum results)

SERVICE NOTES

STEREO MODELS:

CPR-A2S "Danube" Radio-Phono Console

CP-A1S "Verdi" Phonograph Console

Andrea BALANCED HIGH FIDELITY

TUBE COMPLEMENT

RADIO SECTION

V1	6CB6	F.M., R.F.
V2	6U8	F.M. Mixer, Osc.
V3	6AB4	A.F.C.
V4	6BH6	A.M., R.F.
V5	6BE6	A.M. Converter
V6	6BH6	1st F.M. I.F.
V7	6BH6	2nd F.M. I.F.
V8	6BH6	3rd F.M. I.F.
V9	6AL5	F.M. Ratio Det.
V10	EM81/6DA5	Tuning Indicator
V11	6AL5	A.M. Det.
V12 A & B	12AX7	A.F. Amplifier
V13 A & B	12AU7	Cathode Follower

TUBE COMPLEMENT

AMPLIFIER-MODEL A2S

2 - 7199 - A.F. Amplifier & Phase Splitter
4 - 6BQ5 - Push Pull Audio Output

BUILT-IN ANTENNAS

Ferrite Core Antenna for A.M.
Folded Dipole for F.M.
Also provision for external antennas on A.M. & F.M.

TUBE COMPLEMENT

AMPLIFIER-MODEL A1S

1 - 12AX7 - Tone Amplifier
2 - 7199 - A.F. Amplifier and Phase Splitter
4 - 6BQ5 - Push-Pull Audio Output

POWER SUPPLY

117 Volts A.C.

Model CP-A1S 135 Watts
Model CPR-A2S 180 Watts

ALIGNMENT INSTRUCTIONS

STEP	SET DIAL TO	BAND SWITCH	ALIGN.	SIGNAL GENERATOR FREQ.	SIGNAL GENERATOR CONNECT TO	V.T.V.M. CONNECT TO	ADJUST	PROCEDURE
1	55	AM	AM-I.F.	455KC	Pin 7 V5	Junction of R36 - C42 (A)	Pri. & Sec. of T8 &	Adjust for maximum output.
2	170			1	AM Antenna Terminal	Junction of R36 - C42 (A)	Osc. - Mixer & R.F. Trimmers on Gang Cap.	Adjust for maximum output.
3	60	AM	Osc. Low end	600	AM Antenna Terminal	Junction of R36 - C42 (A)	L4	Adjust for maximum output.
4	150		B.Cr R.F.	1	AM Antenna Terminal	Junction of R36 - C42 (A)	Mixer & R.F. Trimmer on Gang Cap.	Adjust for maximum output.
							Repeat 3 & 4 if necessary.	
NOTE: Before aligning FM - Disconnect R32 from R31 and connect R32 to chassis. Apply -4.5 bias across C39. Be sure to restore original connection after FM alignment.								
5	88		FM-I.F.	10.7MC 18000uv unmodulated	Pin 1 V7 Through .01uf	Neg. side of C32 (B)	L5 & Top Slugs)	Adjust for maximum output.
6	88		FM Ratio Det.	10.7MC 18000uv unmodulated	Pin 1 V7 Through .01uf	Junction of R32 - L10 (C)	T7 (Bottom Slug)	Adjust for 0 reading.
							Repeat 5 & 6	
		FM	FM-I.F.	10.7MC 6000uv unmodulated	Pin 1 V6 Through .01uf	Neg. side of C32 (B)	T6(Top & Bottom Slugs	Adjust for maximum output.
8		FM	FM-I.F.	10.7MC 150uv unmodulated	Pin 2 V2A	Neg. side of C32 (B)	T5 (Top & Bottom Slugs	Adjust for maximum output.
							ses 7 & 8	
9	108	FM	FM Osc.	108MC	FM Antenna Terminals Through 270 Ohm Resistor	Neg. side of C32 (B)	C14	Adjust for maximum output.
11	108	FM AFC	FM - R.F. & Ant.	106MC	FM Antenna Terminals Through 270 Ohm Resistor	Neg. side of C32 (B)	C2 & C8	Adjust for maximum output.

PARTS LIST

SRQ12T-1 AM-FM TUNER

CAPACITORS

Ref. No.	Part No.	Description
C1A,B,C D,E,F,	HCV-2128	3 Gang Variable Capacitor
C2	HCV-2130	1-4mmf Trimmer
C3	HCC-1966-1	220uuf ± 10% Ceramic
C4	HCC-1904	10uuf ± 5%, Ceramic N750
C5	HCC-1966-1	220uuf ± 10% Ceramic
C6	HCC-1966-1	220uuf ± 10% Ceramic
C7	HCC-1966-1	220uuf ± 10% Ceramic
C8	HCV-2129	.5-3mmf Trimmer
C9	HCC-1966-1	220uuf ± 10% Ceramic
C10	HCC-1964	1.5uuf ± .25uuf, 500V Disc, N1400
C11	HCC-1926	.005mfd 500V, Disc
C12	HCC-1966-1	220uuf ± 10% Ceramic
C13	HCC-1981	15uuf ± 5%
C14	HCV-2130	1-4mmf Trimmer
C15	HCC-1983	22uuf ± 5% Ceramic N330 ± 60
C16	HCC-1922-1	100uuf ± 10% Ceramic N750
C17	HCC-1966-1	220uuf ± 10%, Ceramic
C18	HCC-1948	470uuf ± 10% Ceramic
C19	HCC-1970	.01mfd 500V, Disc
C20	HCC-1904	10uuf ± 5%, Ceramic N750
C21	HCC-1972	40uuf ± 5%, Ceramic N470
C22	HCC-1970	.01mfd 500V, Disc
C23	HCC-1943	.01mfd 100V, Disc
C24	HCC-1943	.01mfd 100V, Disc
C25	HCC-1970	.01mfd 500V, Disc
C26	HCC-1970	.01mfd 500V, Disc
C27	HCC-1970	.01mfd 500V, Disc
C28	HCC-1970	.01mfd 500V, Disc
C29	HCC-1937	330uuf ± 10%, Ceramic
C30	HCC-1937	330uuf ± 10%, Ceramic
C31	HCC-1937	330uuf ± 10%, Ceramic
C32	HCE-1357	10mfd 50V, Tubular Electrolytic
C33	HCC-1970	.01mfd 500V, Disc
C34	HCC-1943	.01mfd 100V, Disc
C35	HCC-1970	.01mfd 500V, Disc
C36	HCC-1943	.01mfd 100V, Disc
C37	HCC-1922-1	100uuf ± 10%, Ceramic N750
C38	HCC-1943	.01mfd 100V, Disc
C39	HCE-1358	1mfd 25V Tubular Electrolytic
C40	HCC-1954	.002mfd ± 10%, Disc
C41	HCC-1956	.001mfd ± 10%, Disc
C42	HCC-1922-1	100uuf ± 10%, Ceramic N750
C43	HCC-1951	.05mfd 100V, Disc
C44	HCC-1961	47uuf Ceramic
C45	HCC-1956	.001uf Ceramic
C46	HCC-1956	.001uf Ceramic
C47	HCC-1956	.001uf Ceramic
C48	HCC-1943	.01uf 100V Ceramic
C49	HCC-1962	33uuf Ceramic
C50	HCC-1954	.002uf Ceramic
C51	HCC-1961	47uuf Ceramic
C52	HCC-1943	.01uf 100V Ceramic
C53	HCC-1961	47uuf Ceramic
C54	HCC-1962	33uuf Ceramic
C55	HCC-1954	.002uf Ceramic
C56	HCC-1970	.01 500V Ceramic
C57		
C58	HCC-1976	150uuf Ceramic
C59	HCC-1954	.002uf, Ceramic
C60A,B, C	HCE-1356	20-10-10/450V Electrolytic
C61	HCC-1970	.01 500V Ceramic
C62		
C63	HCC-1976	150uuf, Ceramic
C64	HCC-1954	.002uf, Ceramic
C65	HCC-1954	.002uf, Ceramic
C66	HCT-1042	.01 100V, Tubular
C67	HCC-1954	.002ufd, Ceramic
C68	HCT-1042	.01 100V, Tubular
C69	HCC-1943	.01 100V, Ceramic
C70	HCC-1943	.01 100V, Ceramic
C71	HCC-1970	.01 500V, Ceramic
C72	HCC-1970	.01 500V, Ceramic
C73	HCC-1943	.01 100V, Ceramic
C74	HCC-1943	.01 100V, Ceramic
C75	HCC-1943	.01 100V, Ceramic
C76	HCC-1966-1	220uuf 10% Ceramic N470
C77	HCC-1943	.01 100V, Ceramic

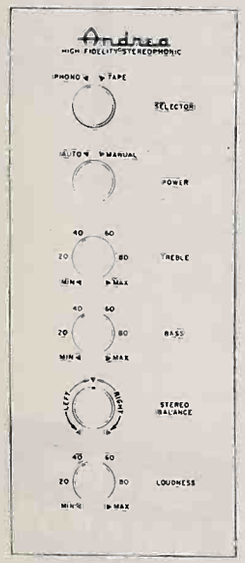
RESISTORS

Ref. No.	Part No.	Description
R1	GRC-280	120K ½W 10%
R2	GRC-211	47Ohms ½W 10%
R3	GRC-210	1000 Ohm ½W 10%
R4	GRC-305	560K ½W 10%
R5	GRC-220	3.3K ½W 10%
R6	GRC-272	12K ½W 10%
R7	GRC-214	68 Ohm ½W 10%
R8	GRC-228	470K ½W 10%
R9	GRC-369	270 Ohm ½W 10%
R10	GRC-210	1000 Ohm ½W 10%
R11	GRC-234	27K 1W 10%
R12	GRC-258	100K ½W 10%
R13	GRC-336	180K ½W 10%
R14	GRC-220	3.3K ½W 10%
R15	GRC-201	22K ½W 10%
R16	GRC-367	18K 1W 10%
R17	GRC-216	100 Ohm ½W 10%
R18	GRC-336	180K ½W 10%
R19	GRC-305	560K ½W 10%
R20	GRC-216	100 Ohm ½W 10%
R21	GRC-210	1K ½W 10%
R22	GRC-336	180K ½W 10%
R23	GRC-211	47 Ohm ½W 10%
R24	GRC-210	1K ½W 10%
R25	GRC-214	68 Ohm ½W 10%
R26	GRC-247	39K ½W 10%
R27	GRC-370	1.2K ½W 10%
R28	GRC-221	6.8K ½W 10%
R29	GRC-221	6.8K ½W 10%
R30	GRC-213	470 Ohm ½W 10%
R31	GRC-301	330K ½W 10%
R32	GRC-258	100K ½W 10%
R33	GRC-346	1.8K ½W 10%
R34	GRC-270	220K ½W 10%
R35	GRC-210	1000 Ohm ½W 10%
R36	GRC-247	39K ½W 10%
R37	GRC-228	470K ½W 10%
R38	GRC-274	1 Meg ½W 10%
R39	GRW-558	4K 10W 10% W.W.
R40	GRC-274	1 Meg ½W 10%
R41	GRC-274	1 Meg ½W 10%
R42	GRC-274	1 Meg ½W 10%
R43	GRC-203	33K ½W 10%
R44	GRC-203	33K ½W 10%
R45A, B,	GRV-884	2 Meg Control, Loudness
R46A, B	GRV-886	500K Control, Balance
R47	GRC-259	1500 ½W 10%
R48	GRC-259	1500 ½W 10%
R49	GRC-349	100K 1W 10%
R50	GRC-349	100K 1W 10%
R51A, B,	GRV-885	1 Meg Control, Treble
R52	GRC-270	220K ½W 10%
R53	GRC-270	220K ½W 10%
R54	GRC-338	270K ½W 10%
R55	GRC-338	270K ½W 10%
R56	GRC-203	33K ½W 10%
R57A, B	GRV-885	1 Meg Control, Bass
R58	GRC-203	33K ½W 10%
R59	GRC-322	56K ½W 10%
R60	GRC-322	56K ½W 10%
R61	GRC-228	470K ½W 10%
R62	GRC-304	10K ½W 10%
R63	GRC-219	2200 ½W 10%
R64	GRV-856	500 Control, Hum Balance
R65	GRC-228	470K ½W 10%
R66	GRC-304	10K ½W 10%
R67	GRC-219	2200 ½W 10%

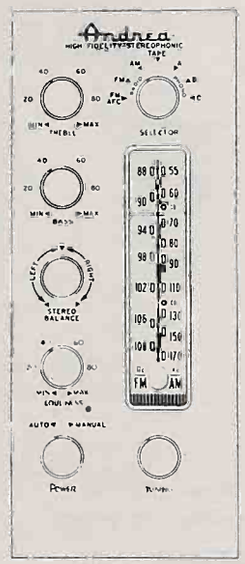
PARTS LIST (Continued) SRQ12T-1

MISCELLANEOUS

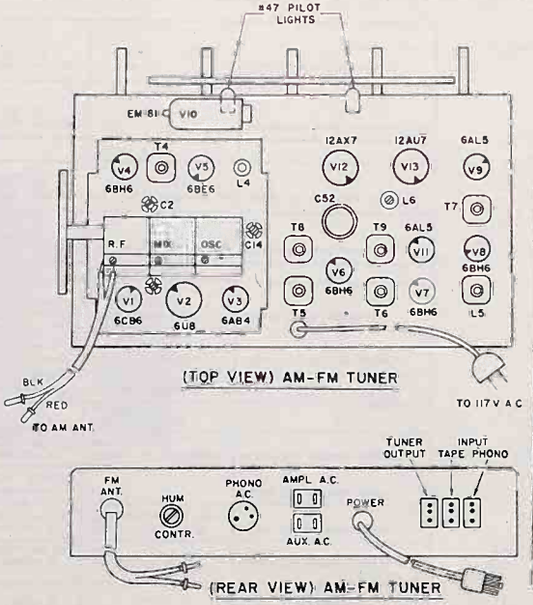
Ref. No.	Part No.	Description
J1, J2, J3	FM-5397	Tape, Phono Input & Tuner Output Socket
J4	FM-5162	A.C. Receptacle
J5	FM-5162	A.C. Receptacle
T1	SA-412	F.M. Antenna Coil
T2	SA-414	F.M. Osc. Coil
T3	SA-402	A.M. Ferrite Ant.
T4	SA-403	A.M. R.F. Trans.
T5	SA-408	F.M. 1st I.F. Transformer
T6	SA-409	F.M. 2nd I.F. Transformer
T7	SA-411	Ratio Detector
T8	SA-405	A.M. 1st I.F. Transformer
T9	SA-406	A.M. 2nd I.F. Transformer
L1	SA-415	R.F. Choke 3.3uh
L2	SA-413	F.M. R.F. Coil
L3	SA-415	R.F. Choke 3.3uh
L4	SA-404	A.M. Osc. Coil
L5	SA-410	F.M. 3rd I.F. Coil
L6	SA-407	10 K.C Filter Coil
L7	SA-416	Filament Choke 2.0uh
L8	SA-416	Filament Choke 2.0uh
L9	SA-416	Filament Choke 2.0uh
S1	FM-5615	Selector Switch
S3	FM-5616	Power Switch Auto-Manual
S6	FM-5584	Phono Motor Socket
	FM-696	#47 Pilot Lamp
	FM-5502	Dial Pointer
	FM-5503	Dial Glass
	EP-975	Speed Clip For Mounting Dial Glass
	FM-5515	Dial Light Socket Assembly
	FM-5523	Power Cable Assembly
	FM-5624	Knobs



"VERDI" CONTROL KNOBS

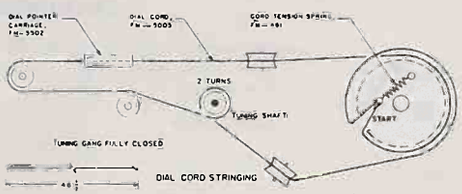


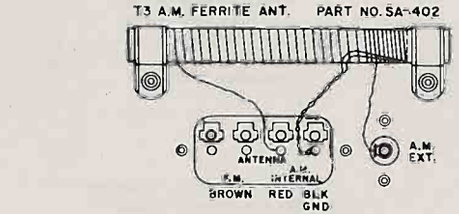
"DANUBE" CONTROL KNOBS.



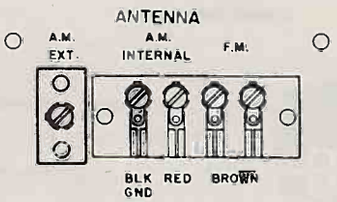
(TOP VIEW) AM-FM TUNER

(REAR VIEW) AM-FM TUNER



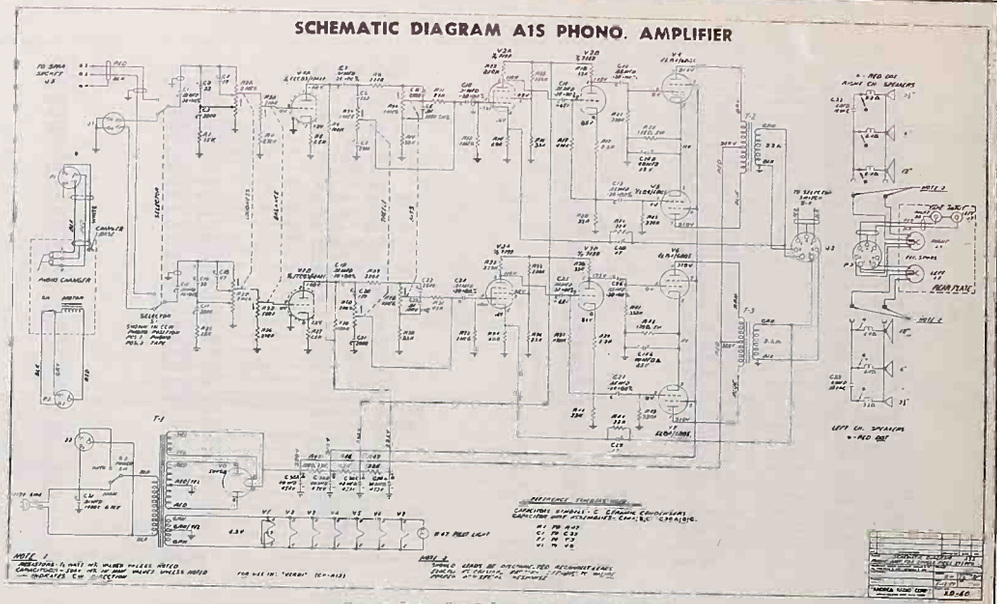


REAR VIEW OF BACK PANEL



FRONT VIEW OF BACK PANEL

SCHEMATIC DIAGRAM A1S PHONO. AMPLIFIER



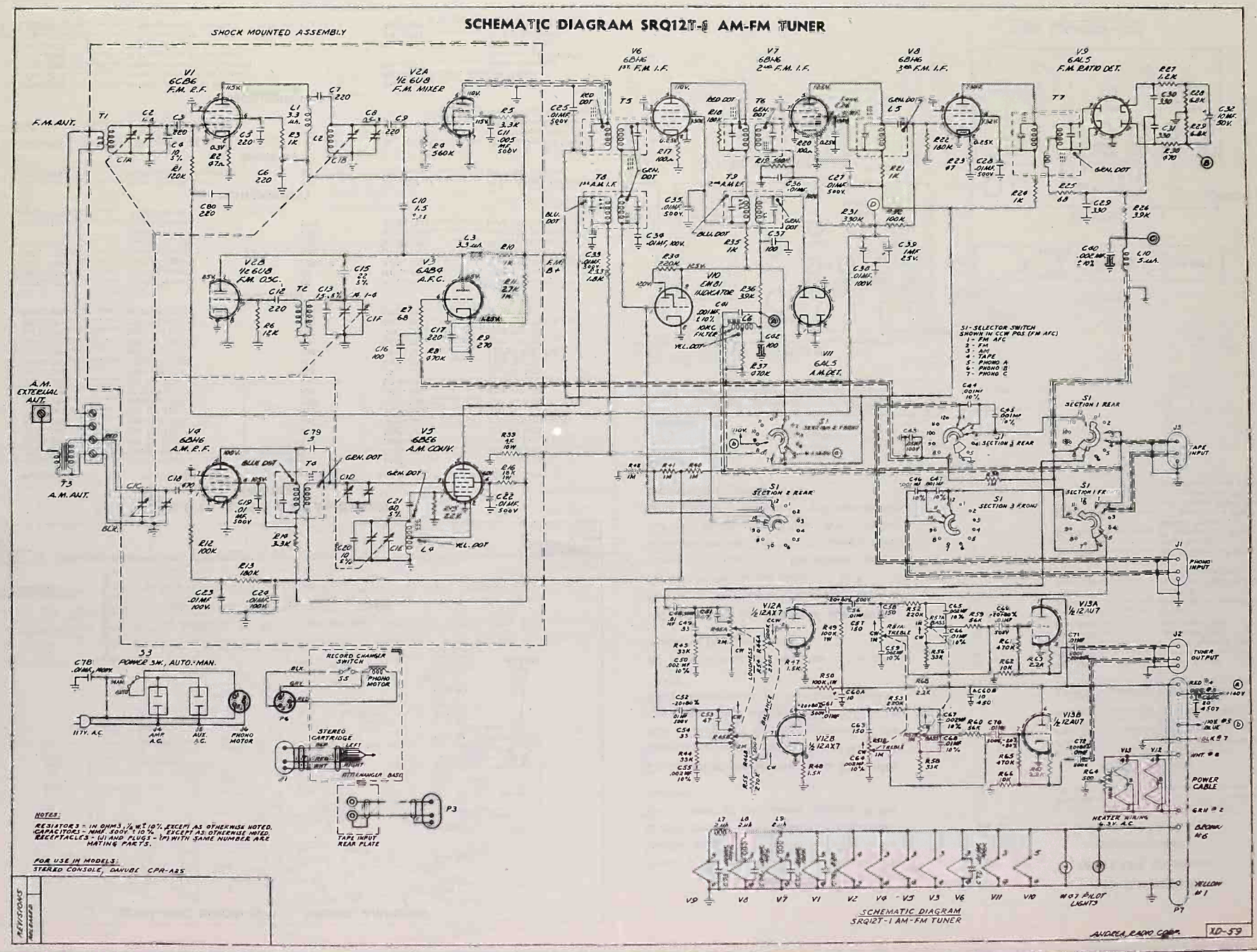
PARTS LIST A1S AMPLIFIER

RESISTORS

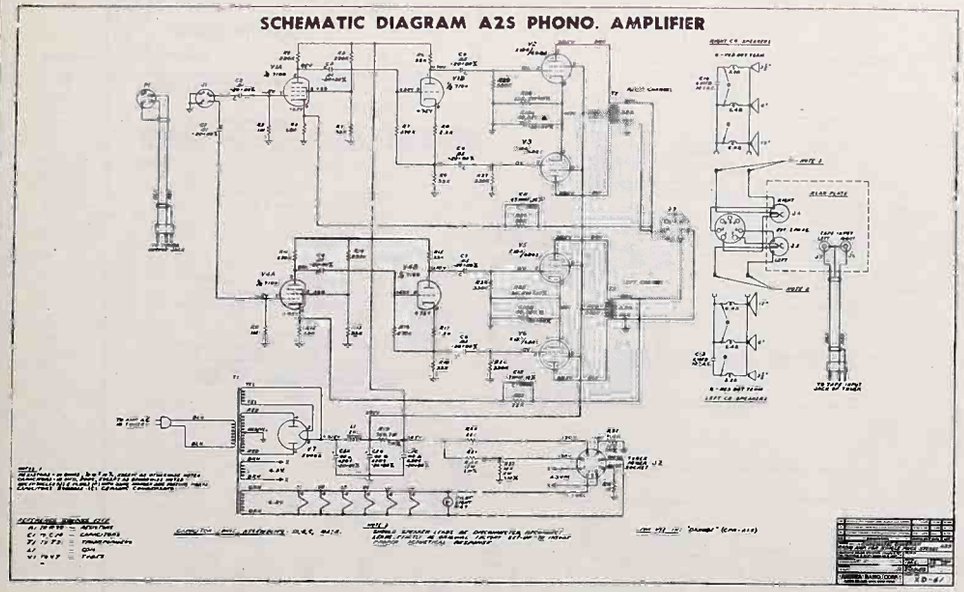
Ref. No.	Part No.	Description
R1	GRC-290	15K ½W 10%
R2A, B	GRV-882	2 Meg. Tandem Control, Loudness
R3A, B	GRV-883	500K, Tandem Control, Balance
R4	GRC-338	270K ½W 10%
R5	GRC-259	1500 ½W 10%
R6	GRC-258	100K ½W 10%
R7A, B	GRV-881	1 Meg. Tandem Control Treble
R8	GRC-270	220K ½W 10%
R9A, B	GRV-881	1 Meg. Tandem Control, Bass
R10	GRC-203	33K ½W 10%
R11	GRC-207	47K ½W 10%
R12	GRC-274	1 Meg. ½W 10%
R13	GRC-270	220K ½W 10%
R14	GRC-297	680 ½W 10%
R15	GRC-270	220K ½W 10%
R16	GRC-203	33K ½W 10%
R17	GRC-228	470K ½W 10%
R18	GRC-203	33K ½W 10%
R19	GRC-219	2200 ½W 10%
R20	GRC-203	33K ½W 10%
R21	GRC-301	330K ½W 10%
R22	GRW-567	135 5W 10%
R23	GRC-301	330K ½W 10%
R24	GRC-201	22K ½W 10%
R25	GRC-290	15K ½W 10%
R26	GRC-338	270K ½W 10%
R27	GRC-229	1500 ½W 10%
R28	GRC-258	100K ½W 10%
R29	GRC-270	220K ½W 10%
R30	GRC-203	33K ½W 10%
R31	GRC-207	47K ½W 10%
R32	GRC-274	1 Meg. ½W 10%
R33	GRC-270	220K ½W 10%
R34	GRC-297	680 ½W 10%
R35	GRC-270	220K ½W 10%
R36	GRC-203	33K ½W 10%
R37	GRC-228	470K ½W 10%
R38	GRC-203	33K ½W 10%
R39	GRC-259	2200 ½W 10%
R40	GRC-203	33K ½W 10%
R41	GRC-301	330K ½W 10%
R42	GRW-567	135 5W 10%
R43	GRC-301	330K ½W 10%
R44	GRC-201	22K ½W 10%
R45	GRC-283	100 1W 10%
R46	GRC-205	4700 ½W 10%
R47	GRC-201	22K ½W 10%

CAPACITORS

Ref. No.	Part No.	Description
C1	HCC-1970	.01mfd Ceramic
C2	HCC-1962	33mmfd Ceramic
C3	HCC-1954	2000mmfd Ceramic
C4	HCC-1961	47mmfd Ceramic
C5	HCC-1970	.01mfd Ceramic
C6	HCC-1976	150mmfd Ceramic
C7	HCC-1954	2000mmfd Ceramic
C8	HCC-1954	2000mmfd Ceramic
C9	HCT-1042	.01mfd Tubular
C10	HCC-1970	.01mfd Ceramic
C11	HCC-1970	.01mfd Ceramic
C12	HCC-1974	.05mfd Ceramic
C13	HCC-1974	.05mfd Ceramic
C14A, B, C	HCE-1365	30, 450V 40-40, 25V Electrolytic
C15	HCC-1970	.01mfd Ceramic
C16	HCC-1962	33mmfd Ceramic
C17	HCC-1954	2000mmfd Ceramic
C18	HCC-1961	47mmfd Ceramic
C19	HCC-1970	.01mfd Ceramic
C20	HCC-1976	150mmfd Ceramic
C21	HCC-1954	2000mmfd Ceramic
C22	HCC-1954	2000mmfd Ceramic
C23	HCT-1042	.01mfd 100V Tubular
C24	HCC-1970	.01mfd Ceramic
C25	HCC-1970	.01mfd Ceramic
C26	HCC-1974	.05mfd Ceramic
C27	HCC-1974	.05mfd Ceramic
C28	HCC-1961	41mmfd Ceramic
C29	HCC-1961	41mmfd Ceramic
C30A, B, C	HCE-1364	40-40-40, 450V Electrolytic
C31	HCC-1963	.01mfd GMV 1400V
C32	HCE-1343	6mfd 10V Electrolytic
C33	HCE-1343	6mfd 10V Electrolytic


SCHEMATIC DIAGRAM SRQ12T-1 AM-FM TUNER
SHOCK MOUNTED ASSEMBLY
F.M. ANT.
A.M. EXTERNAL ANT.
A.M. ANT.
V1 6CB6 F.M. R.F.
V2A 1/2 6U8 F.M. MIXER
V2B 1/2 6U8 F.M. OSC.
V3 6AB4 A.F.C.
V4 6BH6 A.M. R.F.
V5 6BE6 A.M. CONV.
V6 6BH6 1ST F.M. I.F.
V7 6BH6 2ND F.M. I.F.
V8 6BH6 3RD F.M. I.F.
V9 6AL5 F.M. RATIO DET.
V10 6N8 INDICATOR
VII 6AL5 A.M. DET.
V12A 1/2 12AX7
V12B 1/2 12AX7
V13A 1/2 12AU7
V13B 1/2 12AU7
S1 SELECTOR SWITCH SHOWN IN CCW POS. (FM AFC)
1 - FM AFC
2 - FM
3 - AM
4 - TAPE
5 - PHONO A
6 - PHONO B
7 - PHONO C
S1 SECTION 1 REAR
S1 SECTION 2 REAR
S1 SECTION 3 REAR
S1 SECTION 3 FRONT
S1 SECTION 1 FRONT
S3 POWER SW., AUTO.-MAN.
RECORD CHANGER SWITCH S5
PHONO MOTOR
STEREO CARTRIDGE
TAPE INPUT REAR PLATE
TAPE INPUT
PHONO INPUT
TUNER OUTPUT
POWER CABLE
HEATER WIRING 6.3V. A.C.
W97 PILOT LIGHTS
SCHEMATIC DIAGRAM SRQ12T-1 AM-FM TUNER
ANDREA RADIO CORP.
XD-59
NOTES:
RESISTORS - IN OHMS, 1/2 W ± 10% EXCEPT AS OTHERWISE NOTED.
CAPACITORS - MMF, 500V ± 10% EXCEPT AS OTHERWISE NOTED.
RECEPTACLES - (J) AND PLUGS - (P) WITH SAME NUMBER ARE MATING PARTS.
FOR USE IN MODELS:
STEREO CONSOLE, DANUBE CPR-A2S
REVISIONS

SCHEMATIC DIAGRAM A2S PHONO. AMPLIFIER



PARTS LIST A2S AMPLIFIER

RESISTORS

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
R1	GRC-270	220K ½W 10%	R17	GRC-219	2.2K ½W 10%
R2	GRC-274	1 Meg. ½W 10%	R18	GRC-203	33K ½W 10%
R3	GRC-297	680 ½W 10%	R19	GRW-561	750 7W 10% W.W.
R4	GRC-203	33K ½W 10%	R20	GRC-201	22K ½W 10%
R5	GRC-270	220K ½W 10%	R21	GRW-562	2.4K 15W 10% W.W.
P6	GRC-203	33K ½W 10%	R22	GRW-563	10K 5W 10% W.W.
R7	GRC-228	470K ½W 10%	R23	GRC-201	22K ½W 10%
R8	GRC-219	2.2K ½W 10%	R24	GRC-301	330K ½W 10%
R9	GRC-203	33K ½W 10%	R25	GRW-567	135 5W 10% W.W.
R10	GRC-270	220K ½W 10%	R26	GRC-201	22K ½W 10%
R11	GRC-274	1 Meg. ½W 10%	R27	GRC-301	330K ½W 10%
R12	GRC-297	680 ½W 10%	R28	GRW-567	135 5W 10% W.W.
R13	GRC-203	33K ½W 10%	R29	GRC-301	330K ½W 10%
R14	GRC-270	220K ½W 10%	R30	GRC-301	330K ½W 10%
R15	GRC-203	33K ½W 10%	R31	GRW-562	2.4K 15W 10% W.W.
R16	GRC-228	470K ½W 10%	R32	GRC-379	12 ½W 10%

CAPACITORS

C1	HCC-1970	.01mfd Ceramic	C8	HCC-1974	.05mfd Ceramic
C2	HCC-1970	.01mfd Ceramic	C9	HCC-1974	.05mfd Ceramic
C3	HCC-1970	.01mfd Ceramic	C10A, B	HCE-1366	40-40, 25V Electrolytic
C4	HCC-1970	.01mfd Ceramic	C11	HCC-1961	47mmfd Ceramic
C5A, B, C	HCE-1364	40-40-40, 450V Electrolytic	C12	HCC-1961	47mmfd Ceramic
C6	HCC-1974	.05mfd Ceramic	C13	HCE-1343	6mfd 10V Electrolytic
C7	HCC-1974	.05mfd Ceramic	C14	HCE-1343	6mfd 10V Electrolytic

TRANSFORMERS

T1	ST-3114	Power Transformer	T3	ST-3076-2	Audio Output Transformer
T2	ST-3076-2	Audio Output Transformer	L1	ST-3078-1	2H Filter Reactor

SPEAKERS

ST-4033	3½" Speaker 3.2 ohm (High Range)	SL-4035-1	12" Speaker 6.4 Ohm (Low Range, Right Channel)
SL-4034-1	6" Speaker 6.4 Ohm (Middle Range)	SL-4049	12" Speaker 6.4 Ohm (Low Range, Left Channel)

MISCELLANEOUS

FM-5621	Pilot Light Socket Assembly	FM-5554-1	78 R.P.M. Stylus
FM-5360	Phono Socket (Tape Input)	FM-5554-2	L.P. Stylus
FM-5628	Phono Socket (Ext. Speaker)	FM-5554	Stereo Cartridge Electrovoice #0126DS
FM-5398	3 Prong Plug (Tape Input)	FM-696	#47 Pilot Lamp
FM-5629	7 Prong Plug (Speaker)	FM-5602	45 R.P.M. Spindle
FM-502-10-3	3 Ft. Line Cord	FM-5399	4 Prong Socket (Audio Input)
FM-5612	7 Prong Socket (Speaker)		

Speakers:

Should it become necessary to remove any speaker be sure to reconnect the wires to the original position when replacing the speakers. This is important for proper phasing of the speakers.

Connection for Stereo Tape Recorder

Connect the output of each channel of the stereo tape recorder into the jacks provided on the rear of the cabinet marked "TAPE INPUTS". Set the Selector switch to the position marked "TAPE".

All other controls are operated in the same manner as for stereo records.

Connection for External Speakers

External speakers may be used in place of either the right or left channel speaker or both.

Connect the voice coil of the external speaker to the jack marked "EXT. SPKRS." using a standard long tip phonograph plug. When the external speaker is plugged in it will automatically disconnect the internal speakers.

A1S AMPLIFIER

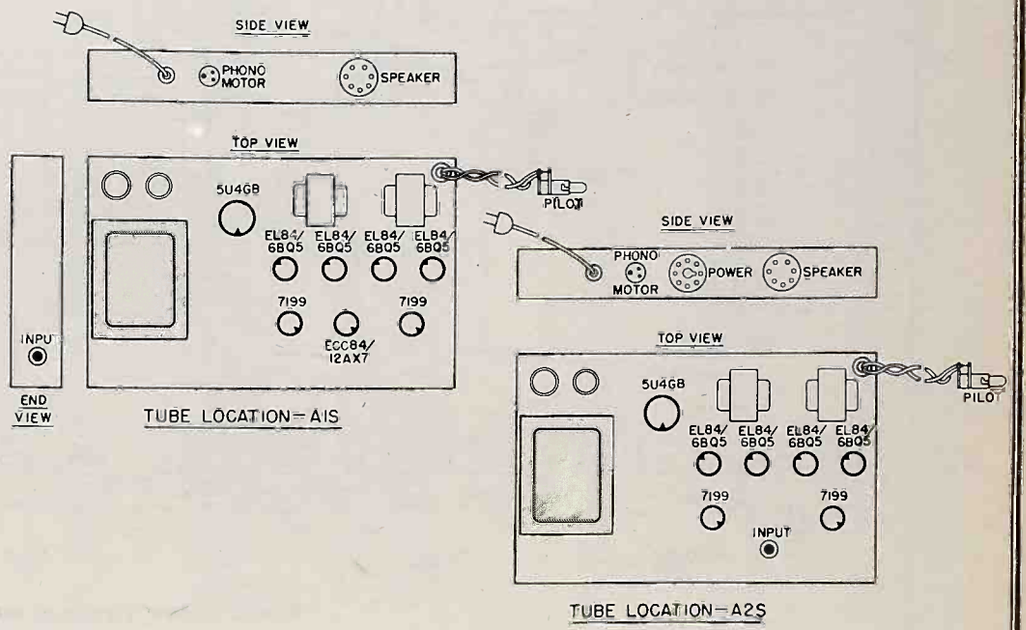
PARTS LIST (Continued)

TRANSFORMERS

Ref. No.	Part No.	Description
T1	ST-3113	Power Transformer
T2	ST-3076-2	Audio Output Transformer
T3	ST-3076-2	Audio Output Transformer

MISCELLANEOUS

Ref. No.	Part No.	Description
	FM-502-8-10	10 Ft. Line Cord
	FM-5621	Pilot Light Socket Assembly
	FM-5613	Selector Switch
	FM-5614	Power Switch Auto-Manual
	FM-5602	45 R.P.M. Spindle
J1	FM-5399	4 Prong Socket, Cartridge Input
J2	FM-5584	3 Prong Socket, Phono Motor Input
J3	FM-5612	7 Prong Socket
J4	FM-5628	External Speaker Jack
J5	FM-5628	External Speaker Jack
J6	FM-5360	Tape Input Jack
J7	FM-5360	Tape Input Jack
	FM-5624	Knobs
	FM-5554	Electrovoice Stereo Cartridge #0126DS
	FM-5554-1	78 R.P.M. Sapphire Stylus
	FM-5554-2	L.P. Diamond Stylus
	SL-4033	3½" Speaker 3.2 Ohm (High Range)
	SL-4034-1	6" Speaker 6.4 Ohm (Middle Range)
	SL-4035-1	12" Speaker 6.4 Ohm (Low Range, Right Channel)
	SL-4049	12" Speaker 6.4 Ohm (Low Range, Left Channel)



MODEL 59 SPECIFICATIONS CHASSIS 1.50000

FREQUENCY RANGE
- Broadcast ..... 540 - 1670 Kc
- IF ..... 455 Kc

TUBES AND FUNCTIONS
- 12BE6 ..... Mixer-oscillator
- 12BA6 ..... IF Amp.
- 12AV6 ..... DET-AVC AF Amp.
- 50C5 ..... Output
- 35W4 ..... Rectifier

SPEAKER
- Type: Permanent magnet
- Size: 4 inch
- Voice coil impedance 3.2 Ohms

POWER SUPPLY
- 105-125 Volts, AC 35 Watts

POWER OUTPUT
- Undistorted ..... 8 Watt
- Maximum ..... 1.5 Watts

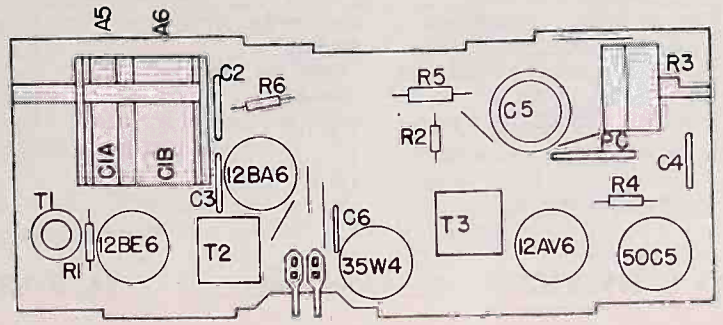
ALIGNMENT PROCEDURE

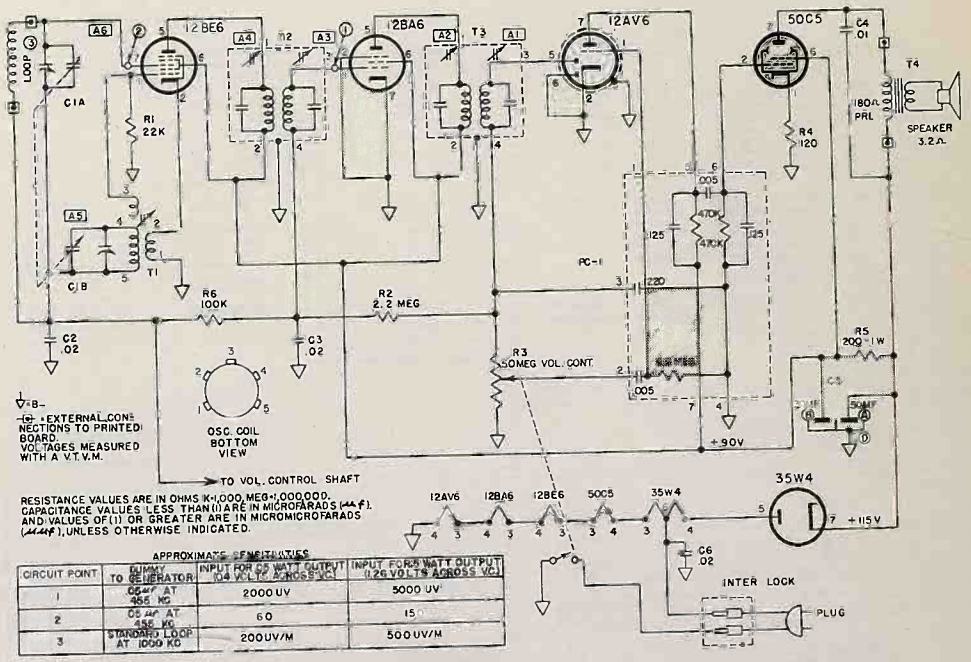
PRELIMINARY:
- Output meter connection ..... Across speaker voice coil
- Output meter reading to indicate 500 milliwatts (standard output) ... 1.26 volts
- Connection of generator ground lead ..... Floating ground
- Generator modulation ..... 30% 400 cycles
- Position of Volume Control ..... Fully clockwise

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455 Kc	.05 μfd	Pin 7 12BE6	A1, A2, A3, A4	I.F. Oscillator Antenna
Open	1670 Kc		* Test Loop	A5	
1400	1400 Kc		* Test Loop	A6	
1000	1000 Kc		* Test Loop	Fan C1A Plates	
600	600 Kc		* Test Loop	Fan C1A Plates	

* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





-B- ⊕ +EXTERNAL CONNECTIONS TO PRINTED BOARD. VOLTAGES MEASURED WITH A V.T.V.M.

RESISTANCE VALUES ARE IN OHMS K=1,000, MEG=1,000,000. CAPACITANCE VALUES LESS THAN (1) ARE IN MICROFARADS (μf). AND VALUES OF (1) OR GREATER ARE IN MICROMICROFARADS (μμf), UNLESS OTHERWISE INDICATED.

APPROXIMATE SENSITIVITIES

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR .05 WATT OUTPUT (.04 VOLTS ACROSS VC)	INPUT FOR .5 WATT OUTPUT (1.26 VOLTS ACROSS VC)
1	.05 μf AT 455 KC	2000 UV	5000 UV
2	.05 μf AT 455 KC	60	150
3	STANDARD LOOP AT 1000 KC	200 UV/M	500 UV/M

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	45252-1	Variable	2.75
C2, 3, 6		.02 μf., Disc.	
C4		.01 μf., Disc.	1.75
C5	44328-4	50-30/150V., Elect.	
		RESISTORS	
R1		22K., 1/2W., 20%	
R2		2.2 meg., 1/2W., 20%	
R3	45250-1	Control, Volume & Switch, 500K	1.50
R4		120 ohm, 1/2W., 10%	
R5		1200 ohm, 1W., 10%	
R6		100K., 1/2W., 20%	

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		COILS & TRANSFORMERS	
L1	45192-2	Antenna Loop & Rear Cover Assembly	2.00
L2	43644-1	Coil, Oscillator	1.00
T1, 2	44282-1	Transformer, I.F.	2.00
T3	42700-21	Transformer, Output	2.00
		MISCELLANEOUS	
	47099-86	Cabinet, Green	5.75
	45246-17	Knob, Tuning	.40
	45247-17	Knob, Volume-On-Off	.40
SPK	45600-1	Speaker, 4" P.M., 3.2 ohm	3.75
	43606-6	Socket, 7 Pin	.25
	43724	Line Cord	.70
	47402-1	Audio Coupling Unit	1.00

MODE. 5591 SPECIFICATIONS CHASSIS 1.46700

FREQUENCY RANGE
- Broadcast ..... 540 - 1670 Kc
- IF ..... 455 Kc

TUBES AND FUNCTIONS
- 18FX6 ..... Mixer-oscillator
- 18FW6 ..... IF Amp.
- 18FY6 ..... DET-AVC AF Amp.
- 32ET5 ..... Output
- 36AM3 ..... Rectifier

SPEAKER
- Type: Permanent magnet
- Size: 3 1/2 "
- Voice coil impedance 3.2 Ohms

POWER SUPPLY
- 105-125 Volts, AC 35 Watts

POWER OUTPUT
- Undistorted ..... .7 Watt
- Maximum ..... 1.3 Watts

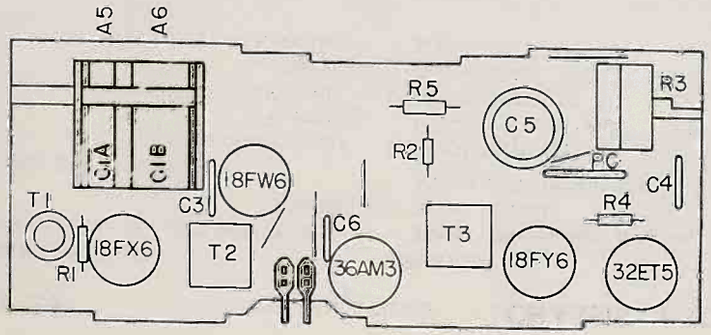
ALIGNMENT PROCEDURE

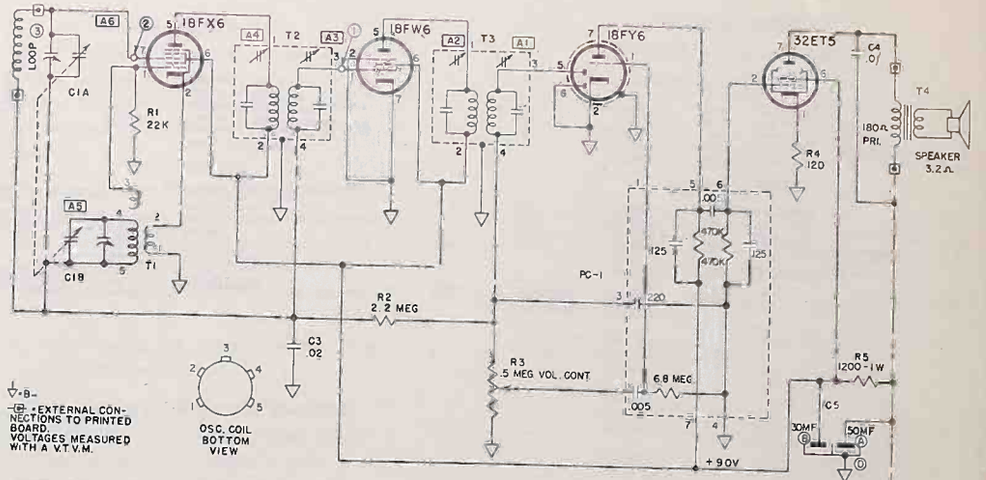
PRELIMINARY:
- Output meter connection ..... Across speaker voice coil
- Output meter reading to indicate 500 milliwatts (standard output)... 1.26 volts
- Connection of generator ground lead ..... Floating ground
- Generator modulation ..... 30% 400 cycles
- Position of Volume Control ..... Fully clockwise

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455 Kc	.05 μ fd	Pin 7 18FX6	A1, A2, A3, A4	I.F. Oscillator Antenna
Open	1670 Kc		* Test Loop	A5	
1400	1400 Kc		* Test Loop	A6	
1000	1000 Kc		* Test Loop	Fan C1A Plates	
600	600 Kc		* Test Loop	Fan C1A Plates	

* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.

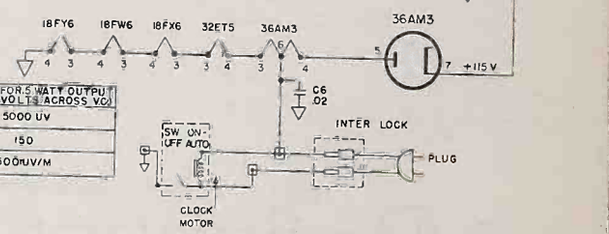




RESISTANCE VALUES ARE IN OHMS K=1,000, MEG=1,000,000. CAPACITANCE VALUES LESS THAN (1) ARE IN MICROFARADS (mf), AND VALUES OF (1) OR GREATER ARE IN MICROMICROFARADS (mmf), UNLESS OTHERWISE INDICATED.

APPROXIMATE SENSITIVITIES

CIRCUIT POINT	TO	DUMMY GENERATOR	INPUT FOR 50 MW. OUTPUT (.84 VOLTS ACROSS VC)	INPUT FOR 5 WATT OUTPUT (26 VOLTS ACROSS VC)
1		25 MF AT 455 KC	2000 UV	5000 UV
2		25 MF AT 455 KC	60	150
3		STANDARD LOOP AT 1000 KC	200 UV/M	500 UV/M



Model 5591 46535 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	45252-1	Variable	2.75
C3, 6		.02 μf., Disc.	
C4		.01 μf., Disc.	
C5A, B	44328-4	50-30/150V., Elect.	1.50
		RESISTORS	
R1		22K., 1/2W., 20%	
R2		2.2 meg., 1/2W., 20%	
R3	45250-15	Control, Volume, 500K	1.25
R4		120 ohm, 1/2W., 10%	
R5		1200 ohm, 1W., 10%	
		COILS & TRANSFORMERS	
L1	46519-1	Antenna Loop & Rear Cover Assembly	2.50
T1	43644-1	Coil, Oscillator	1.00
T2, 3	44282-1	Transformer, I.F.	2.00
T4	42700-21	Transformer, Output	2.00

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		MISCELLANEOUS	
	46516-86	Cabinet, Green	5.00
	46516-19	Cabinet, Charcoal	5.00
	46517-67	Knob, Tuning, White	.50
	46518-67	Knob, Volume, White	.50
	46526-671	Knob, Clock, White	.25
SPK	46523-1	Speaker, 3 1/2" P.M., 3.2 ohm v.c.	4.25
	46524-061	Clock	10.00
	46527	Clock Crystal	.25
	46540-67	Clock Hand, Hour	.10
	46541-67	Clock Hand, Minute	.10
	46542-33	Clock Hand, Second	.10
	46543-33	Clock Hand, Alarm Set	.10
	43724-1	Line Cord, Gray	.70
	43606-6	Tube Socket	.25
PC1	43743-2	Audio Coupling Unit	1.00

MODEL 5592 SPECIFICATIONS CHASSIS 1.46800

FREQUENCY RANGE
- Broadcast ..... 540 - 1670 Kc
- IF ..... 455 Kc

TUBES AND FUNCTIONS
- 18FX6 ..... Mixer-oscillator
- 18FW6 ..... IF Amp.
- 18FY6 ..... DET-AVC AF Amp.
- 32ET5 ..... Output
- 36AM3 ..... Rectifier

SPEAKER
- Type: Permanent magnet
- Size: 4 inch
- Voice coil impedance 3.2 Ohms

POWER SUPPLY
- 105-125 Volts, AC 35 Watts

POWER OUTPUT
- Undistorted ..... .7 Watt
- Maximum ..... 1.3 Watts

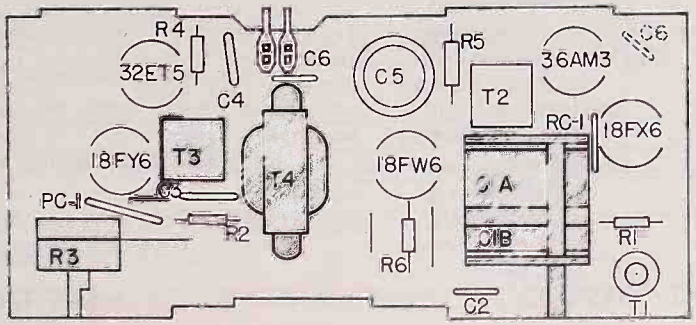
ALIGNMENT PROCEDURE

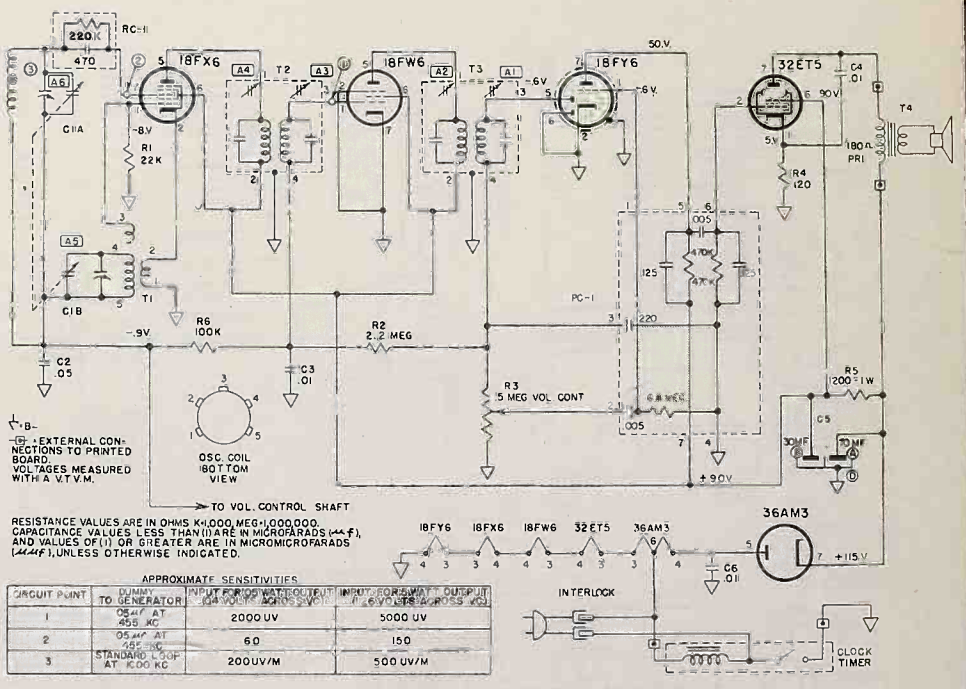
PRELIMINARY:
- Output meter connection ..... Across speaker voice coil
- Output meter reading to indicate 500 milliwatts (standard output)... 1.26 volts
- Connection of generator ground lead ..... Floating ground
- Generator modulation ..... 30% 400 cycles
- Position of Volume Control ..... Fully clockwise

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455 Kc	.05 μ fd	Pin 7 18FX6	A1, A2, A3, A4	I.F.
Open	1670 Kc		* Test Loop	A5	Oscillator
1400	1400 Kc		* Test Loop	A6	Antenna
1000	1000 Kc		* Test Loop	Fan C1A Plates	
600	600 Kc		* Test Loop	Fan C1A Plates	

* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





APPROXIMATE SENSITIVITIES

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR 50 MW OUTPUT (.64 VOLTS ACROSS 5 VC)	INPUT FOR 5 MW OUTPUT (.16 VOLTS ACROSS VC)
1	.05 μf AT 455 KC	2000 UV	5000 UV
2	.05 μf AT 455 KC	60	150
3	STANDARD LOOP AT 600 KC	200 UV/M	500 UV/M

Model 5592 46567 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	46175	Variable	2.75
C2		.05 μf., Disc.	
C3, 4, 6		.01 μf., Disc.	
C5A, B	44328-5	70-30/150V., Elect.	1.50
		RESISTORS	
R1		22K., 1/2W., 20%	
R2		2.2 meg., 1/2W., 20%	
R3	45250-5	Control, Volume, 500K	1.25
R4		120 ohm, 1/2W., 10%	
R5		1200 ohm, 1W., 10%	
R6		100K., 1/2W., 20%	
		COILS & TRANSFORMERS	
L1	46568-1	Rod Antenna	2.00
T1	43641-8	Coil, Oscillator	1.00
T2, 3	41282-1	Transformer, I.F.	2.00
T4	46700-2	Transformer, Output	2.00

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		MISCELLANEOUS	
	46552-861	Cabinet Back, Green	5.00
	46552-671	Cabinet Back, Ivory	5.00
	46548-67	Cabinet Front, Ivory	4.75
	45965-67	Knob, Volume, White	.25
	46550-67	Knob, Tuning, White	.50
	44646	Knob, Clock, Clear	.25
	46527	Clock Crystal	.25
	46551-061	Clock	13.25
SPK	46834-1	Speaker, 4" P.M., 3.2 ohm v.c.	4.00
	46540-11	Clock Hand, Hour	.10
	46541-11	Clock Hand, Minute	.10
	46542-33	Clock Hand, Second	.10
	46543-29	Clock Hand, Alarm Set	.10
PC1	43743-2	Audio Coupling Unit	1.00
	43724-1	Line Cord	.70
	47796-1	RC Network, 470 μμf., 2-1 meg.	.25

MODEL 5594 SPECIFICATIONS CHASSIS 1.46900

FREQUENCY RANGE
- Broadcast ..... 540-1670 Kc
- IF ..... 455 Kc

TUBES AND FUNCTIONS
- 18FX6 ..... Mixer-oscillator
- 18FW6 ..... IF Amp.
- 18FY6 ..... DET-AVC AF Amp.
- 32ET5 ..... Output
- 36AM3 ..... Rectifier

SPEAKER
- Type: Permanent magnet
- Size: 4 inch
- Voice coil impedance 3.2 Ohms

POWER SUPPLY
- 105-125 Volts, AC 35 Watts

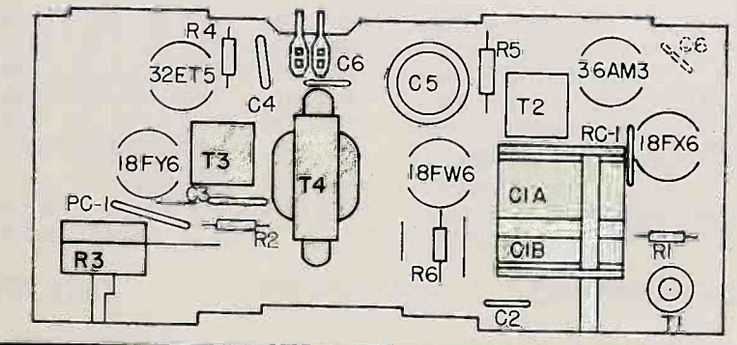
POWER OUTPUT
- Undistorted ..... .7 Watt
- Maximum ..... 1.3 Watts

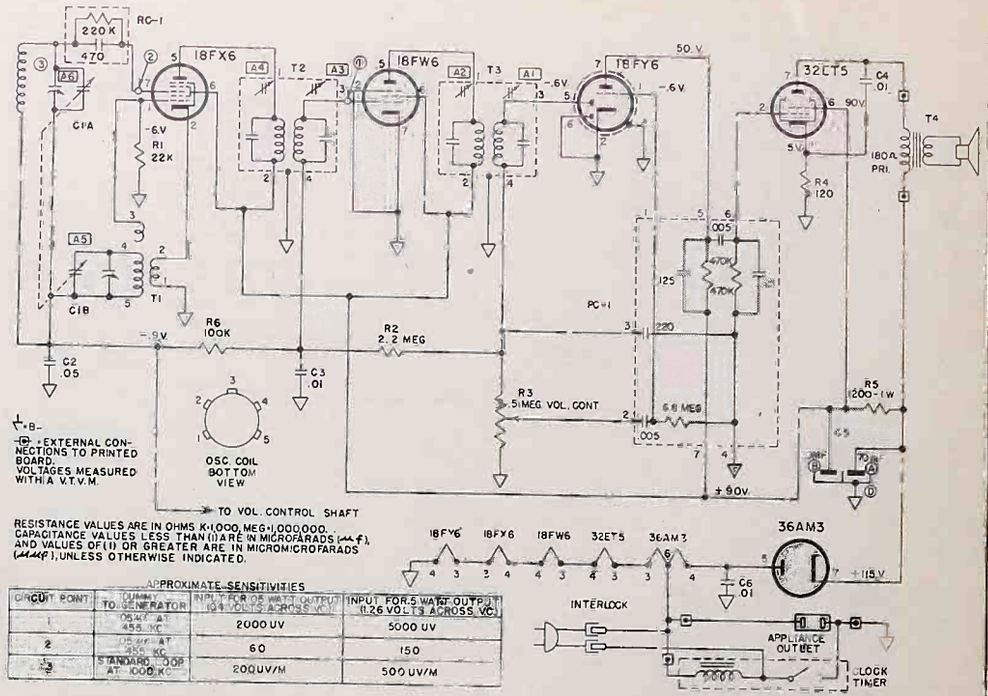
ALIGNMENT PROCEDURE

PRELIMINARY:
- Output meter connection ..... Across speaker voice coil
- Output meter reading to indicate 500 milliwatts (standard output)... 1.26 volts
- Connection of generator ground lead ..... Floating ground
- Generator modulation ..... 30% 400 cycles
- Position of Volume Control ..... Fully clockwise

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455 Kc	.05 μfd	Pin 7 18FX6	A1, A2, A3, A4	I.F. Oscillator Antenna
Open	1670 Kc		* Test Loop	A5	
1400	1400 Kc		* Test Loop	A6	
1000	1000 Kc		* Test Loop	Fan C1A Plates	
600	600 Kc		* Test Loop	Fan C1A Plates	

* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.
The alignment procedure should be repeated in the original order for greatest accuracy. Always keep the output from the signal generator at its lowest possible value to make the AVC action of the receiver ineffective.





APPROXIMATE SENSITIVITIES

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR .05 WATT OUTPUT (.04 VOLTS ACROSS VC)	INPUT FOR 5 WATT OUTPUT (1.26 VOLTS ACROSS VC)
1	.05 μf AT 455 KC	2000 UV	5000 UV
2	.05 μf AT 455 KC	60	150
3	STANDARD LOOP AT 1000 KC	20 UV/M	500 UV/M

Model 5594 46567 859

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		CAPACITORS	
C1A, B	46885	Variable	2.75
C2		.05 μf., Disc.	
C3, 4, 6		.01 μf., Disc.	
C5A, B	46328-5	70-30/150V., Elect.	1.50
		RESISTORS	
R1		22K., 1/2W., 20%	
R2		2.2 meg., 1/2W., 20%	
R3	45250-5	Control, Volume, 500K	1.25
R4		120 ohm, 1/2W., 10%	
R5		1200 ohm, 1W., 10%	
R6		100K., 1/2W., 20%	
		COILS & TRANSFORMERS	
L1	46568-1	Antenna Rod	2.00
T1	43644-1	Coil, Oscillator	1.00
T2, 3	44282-1	Transformer, I.F.	2.00
T4	46700-2	Transformer, Output	2.00

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
		MISCELLANEOUS	
	46837-673	Cabinet Front, Pink	6.25
	46837-675	Cabinet Front, Blue	6.25
	46552-132	Cabinet Back, Pink	5.00
	46552-852	Cabinet Back, Blue	5.00
	43724-2	Line Cord, Gray	.70
	46844	Knob, Volume	.40
	46843	Knob, Tuning	.40
	44646	Knob, Clock	.25
	46862	Crystal	1.00
	46551-061	Clock	13.25
SPK	46834-1	Speaker, 4" P.M., 3.2 ohm v.c.	4.00
	46845	Pointer	.40
	47109-11	Clock Hand, Hour	.20
	47108-11	Clock Hand, Minute	.20
	47111-99	Clock Hand, Second	.10
	47110-99	Clock Hand, Alarm Set	.10
PC1	43743-2	Audio Coupling Unit	1.00
	47796-1	R-C Network, 470 μμf., 2-11 meg.	.25

GENERAL ELECTRIC

ER-S-P671A
RADIO
MODELS
P671A,B
P672A,B
P673A,B
P674B

SERVICE MANUAL
FOR
PORTABLE RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P671-2

SPECIFICATIONS	
CABINETS:	Models P671A,B - Black and White P672A,B - White and Terra Cotta P673A,B - Turquoise and White P674B - Green
ELECTRICAL RATING:	105 - 120 Volts AC (50 to 60 cycles) or DC 1 "A" battery - 7 1/2 volt Eveready No. 717 or equivalent 1 "B" battery - 90 volt Eveready No. 479 or equivalent
OPERATING FREQUENCIES:	Tuning range 540-1600 KC I.F. 455 KC
AUDIO POWER OUTPUT:	150 Milliwatts at 10% distortion 250 - 300 Milliwatts - maximum
TUBE COMPLEMENT:	V1 Oscillator-Converter 1R5 V2 I.F. Amplifier 1U4 V3 Detector - Audio Amplifier 1U5 V4 Power Amplifier 3V4

GENERAL INFORMATION

The Models P671A,B, P672A,B, P673A,B, and P674B are four-tube superheterodyne portable radio receivers which operate either on self-contained batteries or from a power line source of 105 to 120 volts AC and DC.

The receivers are very compactly designed and incorporate two plated circuit chassis. The smaller chassis contains the power supply components. The front of the cabinet swings down and open, providing easy accessibility to tubes and batteries.

CHASSIS REMOVAL

The chassis is easily removed by means of the following procedure:

1. Raise up handle and grasp edge of top cabinet front with one hand and cabinet with other hand. Pull firmly to open cabinet.
2. Pull tuning and volume control knobs straight off control shafts.
3. Remove the two small Phillips-head screws from the top rear edge of the metal chassis mounting bracket.
4. Slide chassis and bracket out of cabinet.
5. Remove bracket from chassis by unscrewing the 1/4" mounting screw from the bracket.

The power supply chassis is removable from cabinet by removing the four small hex-head mounting screws.

The speaker is mounted on the cabinet front and may be removed by taking off the four speaker mounting clips which secure the speaker to the four bosses on the inside of the cabinet front.

IMPORTANT: Use care when replacing defective parts. Apply as little heat to terminals and connections as possible to remove parts, as excessive heat will damage the plated wiring on the chassis boards.

When replacing knobs, do not force them on; too much pressure may cause circuit board to bend and crack.

VOLUME CONTROL REPLACEMENT

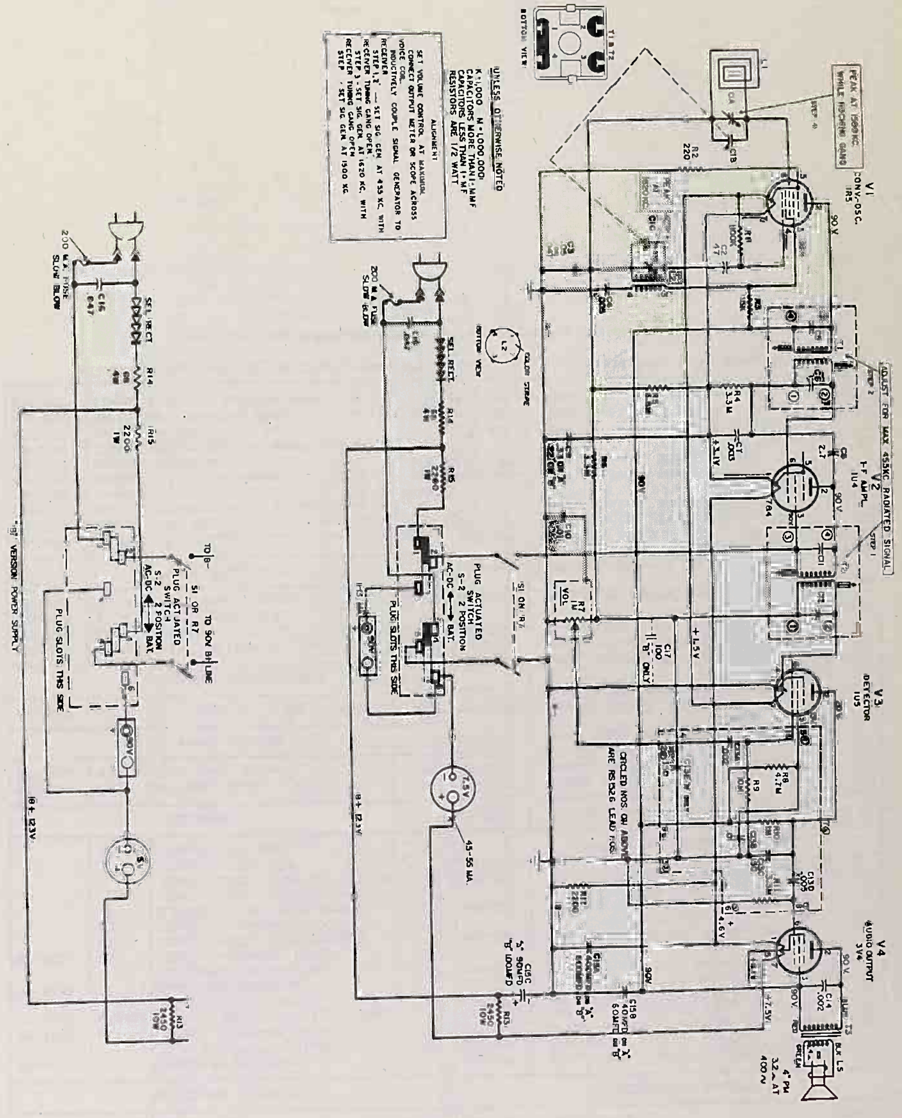
The chassis must first be removed from the cabinet as described under CHASSIS REMOVAL, then replace volume control as follows:

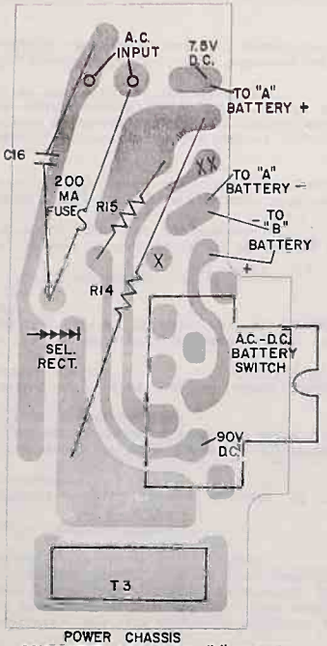
1. Cut off the three control lugs and the four on-off lugs.
2. Heat the remaining part of the lugs on the circuit board and pull out with long-nose pliers.
3. Clean all mounting holes of all excess solder.
4. Insert new control; then solder all lugs securely in place.

BATTERY INSTALLATION

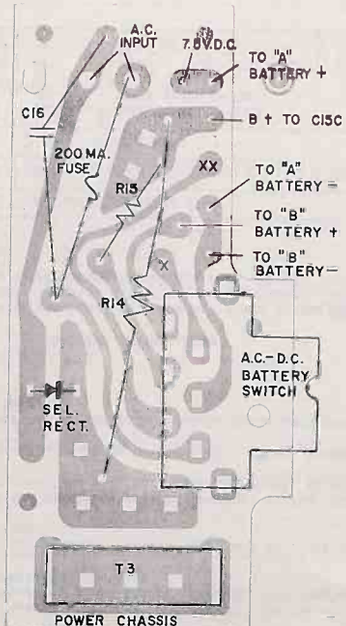
Insert batteries in place as shown in the Tube and Battery location illustration on cabinet. Make sure the battery connections are well seated.

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
[illegible]	[illegible]	400mf., 40mf., 90mf., P671A,P672A,P673A.......	2.95
[illegible]	[illegible]	Tuning Capacitor.........	3.50
[illegible]	[illegible]	.003mf., ±20%, 100V.....	1.25
[illegible]	[illegible]	.002mf., +100-0%, 450V...	1.25

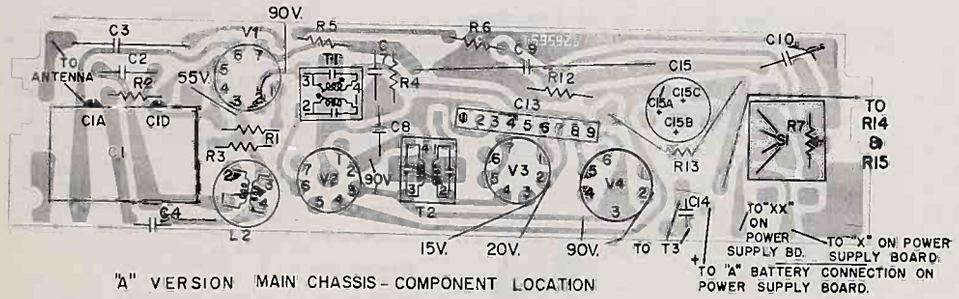




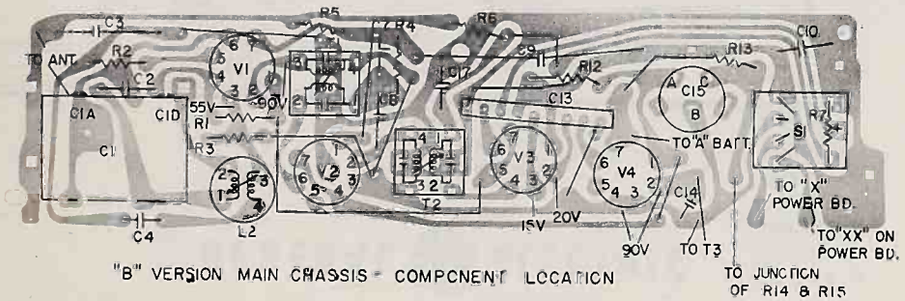
POWER CHASSIS COMPONENT LOCATION "A" VERSION



POWER CHASSIS COMPONENT LOCATION "B" VERSION



"A" VERSION MAIN CHASSIS - COMPONENT LOCATION



"B" VERSION MAIN CHASSIS - COMPONENT LOCATION

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS (CONT'D.)			
REK-010		Capacitor-Resistor Network, "A" version	1.40
RS-1023	C4	.005mf., +150-0%, 450V	.25
RS-1525	C15A, B,C	600mf., 60mf., 100mf., P671B, P672B, P673B, P674B	3.45
RS-1526		Capacitor-Resistor Network, "B" version	1.35
RS-2056	C10	.01mf., +150-0%, 1000V	.25
	C2	47mmf., ±20%, 500V ceramic	
	C3	.05mf. or .047mf., 400V	
	C8	2.7mmf., ±10%, 500V ceramic	
	C9	.33mf., ±20%, 100V "A" ver. .22mf., ±20%, 100V "B" ver.	
	C16	.047mf.,±20%, 600V	
	C17	100mmf., "B" ver.	
RESISTORS			
RRW-143	R14	68 ohms, 4 watt, w.w.	.40
RRW-144	R15	2450 ohms, 10 watt, w.w.	1.05
POTENTIOMETER			
RRC-367	R7	Vol. Control, 1 meg. and sw.	1.75
COILS AND TRANSFORMERS			
RLC-139	L2	Coil, Oscillator	.75
RLL-069	L1	Antenna	1.60
RTL-193	T1, 2	Transformer, I.F.	1.70
RTO-186	T3	Transformer, Output	2.40
MISCELLANEOUS			
RB-1057		Speaker, 4" PM	5.45
RS-1183		Clamp, I.F. Can.....Pkg.3	.30
RS-1193		Gasket, Speaker.....Pkg.5	.25
RS-1246		Insulator.....Pkg.3	.30
RS-1791		Socket 7 Pin Tube Socket.....Pkg.2	.30
RS-1792		Center Shield	.25
RS-1809		Clip, Tubular Speaker Mounting.Pkg.3	.30
REF-026		Fuse, Slo-blo, 2/10 amp	.60
RER-020		Rectifier, Selenium 65ma	2.60
RHC-110		Clamp, Plastic, Antenna Mount.,Pkg.3	.30

CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS (CONT'D.)		
RHC-089	Clip, Handle Bail.....Pkg.5	.25
RHG-018	Grommet.....Pkg.5	.25
RHI-017	Strain Relief, Power Cord.....Pkg.2	.30
RHJ-007	Spacer, Power Cord.....Pkg.5	.25
RJC-035	Connector, "B" Battery	.50
RJP-033	Connector, "A" Battery.....Pkg.2	.30
RMC-070	Catch, Power Cord Compartment Door Pkg.5	.25
RMS-272	Ring, Compression, Tuning and Volume Knobs.....Pkg.5	.25
RSW-114	Switch, AC-DC Battery, w/Mounting Bracket	1.40
RWL-027	Cord, Power Cord and Plug, Brown	1.20
CABINET AND APPEARANCE ITEMS		
RB-1010	Cabinet, Turquoise, P673A,B	6.25
RB-1090	Cabinet, Green, P674B	6.25
RS-1029	Frame, Grille, Upper	.95
RS-1030	Frame, Grille, w/Monogram	1.10
RS-1106	Handle, Turquoise, P673A,B	.50
RS-1107	Door, Cord Compartment, Turquoise, P673A,B	.30
RS-1798	Handle, Green, P674B	.50
RS-1799	Door, Cord Compartment, Green, P674B	.30
RS-1800	Knob, Tuning, Green, P674B	.85
RS-1801	Knob, Volume, Green, P674B	.85
RAD-202	Door, Cord Compartment, Terra Cotta P672A,B	.30
RAD-204	Door, Cord Compartment, Black P671A,B	.30
RAU-465	Cabinet, White & Terra Cotta, P672A,B	6.25
RAU-468	Cabinet, Black & White, P671A,B	6.25
RDK-579	Knob, Tuning, Terra Cotta, P672A,B	.85
RDK-580	Knob, Tuning, Black, P671A,B, P673A,B	.85
RDK-582	Knob, Volume, Terra Cotta, P672A,B	.85
RDK-583	Knob, Volume, Black, P671A,B, P673A,B	.85
RHY-081	Handle, Terra Cotta, P672A,B	.50
RHY-083	Handle, Black, P671A,B	.50
RYN-033	Medallion	.30

All parts Not Listed By Catalog Numbers Are Common Items, Obtainable From Radio Parts Jobbers.

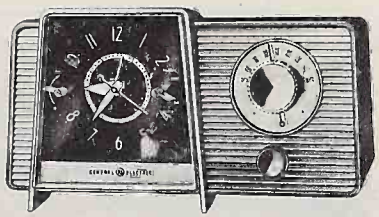
Prices Are Suggested List Prices Subject To Change Without Notice.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
CLOCK-RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-C405-1

ER-S-C405
RADIO
MODELS
C405A,B,C,D
C406A,B
C407C,D

SPECIFICATIONS		
CABINET:	Model C405A,B,C,D Model C406A,B, Model C407C,D	Gray and White Pink Rose Beige and White
ELECTRICAL RATING:	105-120 volts AC 30 Watts @117 Volts AC	
OUTPUT:	Undistorted .9 Watts Maximum 1.5 Watts	
TUBE COMPLEMENT:	V1 Osc. Conv. ("A" version) V1 Osc. Conv. ("B" "C and D" version) V2 I.F. Amplifier V3 Detector-1st Audio V4 Audio Output V5 Rectifier	12AU6 12BE6 12BA6 12AV6 50C5 35W4



GENERAL INFORMATION

The A, B, C, and D versions are identical, except for the following changes:

"A" - 12AU6 oscillator-converter stage, clock crystal #RS-1094, clock lever knobs #RS-1096.
"B" - 12BE6 oscillator-converter stage, clock crystal #RS-1094, clock lever knobs #RS-1096.
"C" - 12BE6 oscillator-converter stage, clock crystal #RS-2315, clock lever knobs #RS-2200.
"D" - 12BE6 oscillator-converter stage, clock crystal #RS-2316, clock lever knobs #RS-2200. Clock face and hands are stocked as separate items. The clock hands and clock face are not part of the clock assembly and should be ordered individually.

The suffix letter following the model number on the tube label identifies the production version as listed above.

The A,B, and C version clock catalog number is Telechron #C103-51. D version clock catalog number is Telechron #J3G4. Service on defective clock units should be referred to the nearest G.E. Servicenter or G.E. Service Station.

The tuning knob is held to the cabinet and cannot be removed without first removing the chassis.

TO REMOVE CABINET FRONT

Remove the two screws located on each side of the cabinet back; unscrew the clock set knob; separate the cabinet front from the back. When separating the cabinet, the speaker leads must be unsoldered before complete separation of the cabinet can be accomplished. The speaker is mounted on the cabinet back with the radio chassis and clock mounted on the cabinet front.

TO REMOVE CHASSIS

Remove the volume control knob. Take out the four hexhead screws, one on each corner of the chassis board and one hexhead screw below the tuning condenser. Unsolder the one wire to switch on the clock and one to the clock motor.

Close the tuning condenser C1, and with the thumb and forefinger grasp the condenser and pull. The chassis will separate from the tuning knob which is left attached to the cabinet front.

TROUBLESHOOTING

Excessive loudness when adjusting the volume level to minimum is caused by excessive capacity between terminals 2 and 3 of RCW-3207. The excessive capacity can be eliminated without replacing the couplate or by removing the circuit board in the following manner:

1. Clip off couplate lead #3.
2. Solder a 220mmf. capacitor (Catalog No.RS-1203) across the two outside terminals of the volume control located on the component side of the chassis board.

SERVICE NOTE

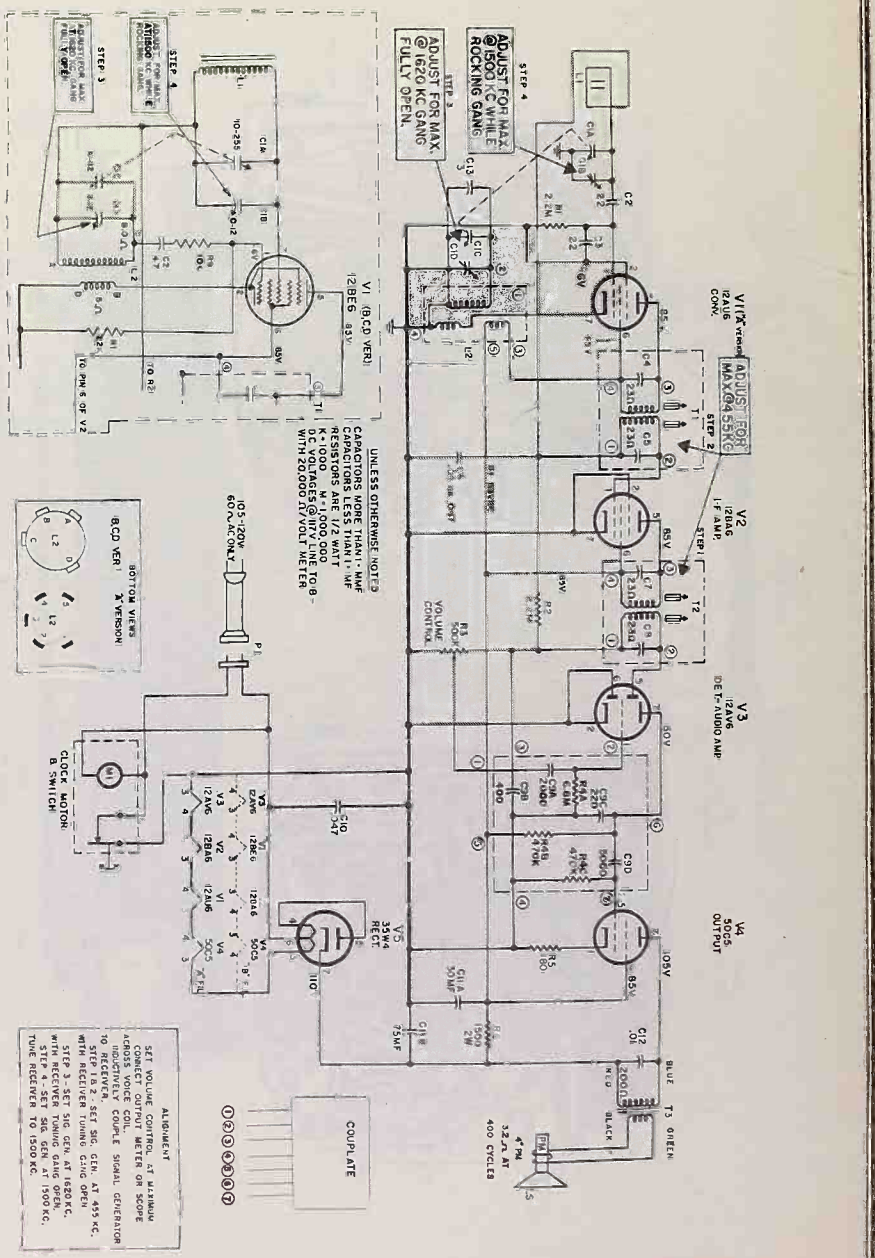
Always use an isolation transformer when servicing or aligning this receiver to protect personnel and test equipment.

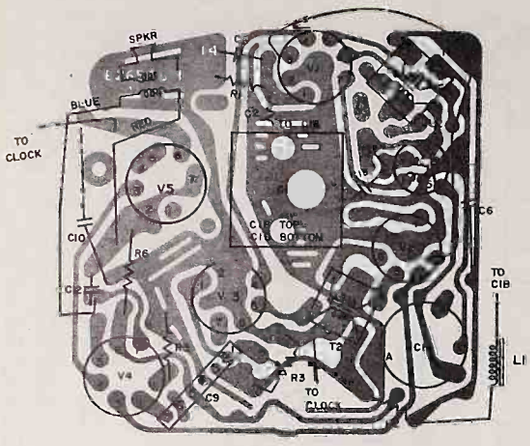
When aligning, keep the signal input low so the AVC will not affect the output.

TO REMOVE THE CLOCK

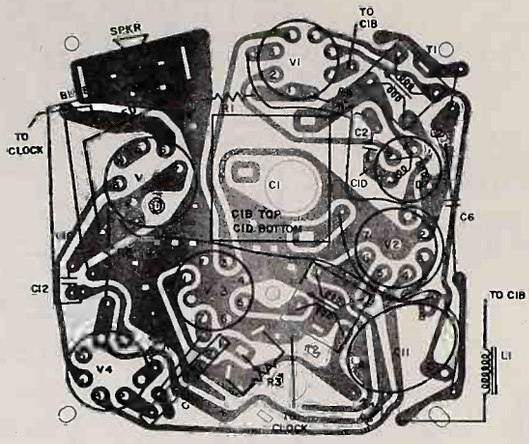
Separate the cabinet as described above. Unsolder the two leads, one from the switch to the circuit board and one from the clock motor to the circuit board. Remove the two screws holding the AC interlock to the cabinet. Remove the two clock knobs. Snap out the clock crystal starting from the left side. Then, remove the two nuts holding the clock to the cabinet and remove the clock.

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		CAPACITORS	
RCN-109	C10	.047mf.,600V.....	.40
RCT-093	C1A,B,C,D	Cap.,Tuning "A" version.	3.40
RCW-3207	C9A,B,C,D R4A,B,C	Couplate.....	1.25
RCW-3216	C13	3mmf., 500V.,"A"version.	1.25
RCW-3266	C2,3	22mmf.,500V.,"A"version.	1.25
RS-1022	C12	.01mf.,450V.....	.30
RS-1524	C1A,B,C,D	Cap.,Tuning (B, C, D)..	3.60
RS-1785	C2	47mmf., (B, C, D).....	.25
RS-2060	C11 A,B C6	30mf., 75mf., 150V..... .05mf.,600V. or .047mf., 600V.	1.75





COMPONENT WIRING DIAGRAM
A VERSION



COMPONENT WIRING DIAGRAM
B,C,D VERSION

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
		POTENTIOMETER	
RRC-525	R3	Control, Volume 500K....	1.00
		COILS AND TRANSFORMERS	
RLC-135	L2	Coil, Osc., "A" ver....	1.00
RS-1156	L1	Antenna, "A" ver.....	1.25
RS-1415	T1,2	Trans., I.F. (B, C, D)..	4.55
RS-1491	L1	Antenna, (B, C, D).....	1.25
RS-1523	L2	Coil, Oscillator, (B, C, D)..	1.0
RS-2149	T1,2	Trans., I.F., "A" ver...	1.4
RTO-176	T3	Transformer, Output.....	2.05
		MISCELLANEOUS ITEMS	
RB-1057		Speaker, 4".....	5.45
RMS-161		Eyelet, Shield.....Pkg.3	.30
RMS-374		Strap, Ground (Tube Socket)..Pkg.5	.25
RS-1100		Clip, U nut.....Pkg.5	.25
RS-1101		Screw (Panhead) 6 x 3/16....Pkg.5	.25
RS-1158		Shield, Tube.....Pkg.5	.30
RS-1167		Shield, Chassis.....Pkg.3	.30
RS-1168		Rivet (Power Cord).....Pkg.5	.25
RS-1183		Terminal.....Pkg.3	.30
RS-1193		Gasket, Speaker.....Pkg.5	.25
RS-1331		Clip, Knob.....Pkg.5	.25
RS-1791		Socket, Tube w/o Center Shield Pkg.2	.30
RS-1792		Socket, Tube w/Center Shield.....	.25
RS-1809		Clip, (Speaker).....Pkg.3	.30

CAT. NO.	DESCRIPTION	PRICE
	MISCELLANEOUS ITEMS (CONT'D.)	
RS-2065	Interlock.....	.30
RWL-035	Cord, Power.....	1.20
RS-1594	Clip, Speed, D Version.....Pkg.5	.25
	CABINET AND APPEARANCE ITEMS	
RB-1004	Cabinet Front (Ant. White) and Dial, C405A,B,C,D; C407C,D.....	3.50
RB-1005	Cabinet Back (Gray), C405A,B,C,D.	4.10
RB-1006	Cabinet Back (Pink), C406A,B,...	4.10
RB-1022	Cabinet Front (Pink) and Dial, C406A,B,...	3.50
*-RB-1034	Cabinet Back (Rose Beige) C407C,D	4.10
RS-1094	Crystal, A and B version.....	.65
RS-1095	Knob, Tuning, Clear.....	.85
RS-1096	Knob, Clock, (Lever Type) A and B version.....Pkg.3	.30
RS-1166	Dial, Calibrated.....	.70
RS-2040	Knob, Volume, Clear and Gold....	.35
RS-2067	Knob, Clock, Time Set.....Pkg.5	.25
*-RS-2120	Time Set Knob, D version....Pkg.2	.30
RS-2200	Knob, Clock, (Lever Type) C and D version.Pkg.2	.30
*-RS-2311	Second Hand, Clock, D ver..Pkg.2	.30
*-RS-2312	Alarm Hand, Clock, D ver..Pkg.2	.30
*-RS-2313	Minute Hand, Clock, D ver..Pkg.2	.30
*-RS-2314	Hour Hand, Clock, D ver.....Pkg.2	.30
*-RS-2315	Crystal, C version.....	.65
*-RS-2316	Crystal, D version.....	.65
*-RS-2317	Clock Face, D version.....	.90
*-RS-2318	Ext. Shaft, D version.....Pkg.2	.30

*- Denotes Parts Not Previously Cataloged

Prices Are Suggested List Prices and Subject To Change Without Notice.

Items Not Listed By Catalog Numbers Are Common Items, Obtainable From Radio Parts Jobbers.

GENERAL ELECTRIC COMPANY

PRODUCT SERVICE, RADIO RECEIVER DEPARTMENT

869 BROAD ST., UTICA, NEW YORK

S-TU10
TUNER
MODEL
TU10

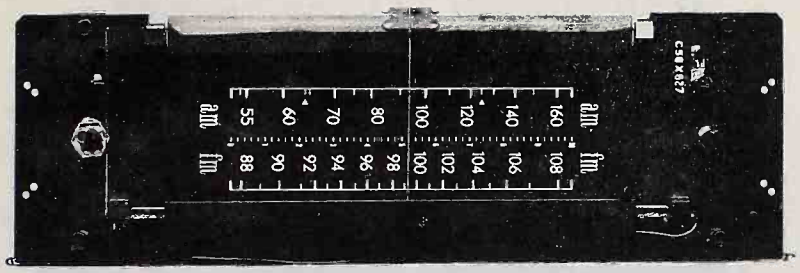


Figure 1

SPECIFICATIONS			
ELECTRICAL RATING:	105 - 120 volts AC 50/60 cycles 35 Watts	TUBE COMPLEMENT:	V11 6CB6 FM-RF Amplifier V12 12AT7 A & B FM Converter & FM Automatic Frequency Control V13 6AU6 FM-IF V14 6BA6 FM-AM IF V15 6AU6 FM Limiter & AM Diode V16 6AL5 A & B FM Diodes V17 6AB4 FM Oscillator V19 6BA6 AM-RF Amplifier V20 6BE6 AM Converter
FREQUENCY RANGES:	AM 535 - 1620KC FM 88 - 108MC		
INTERMEDIATE FREQUENCIES:	AM 455KC FM 10.7MC		

GENERAL INFORMATION

Model TU10 is a nine (9) tube hi-fidelity tuner. There are two controls on the front; a tuning control for the selection of AM or FM stations and a three position selector switch with AM, FM, FMAFC positions. Special features include an Armstrong FM circuit with Seeley Foster discriminator, automatic frequency control for drift free reception on FM, tuned R-F stages on both AM and FM, and built in ferrite rod antenna for AM.

AM ALIGNMENT

The AM alignment of this tuner can be accomplished with a VTVM or an oscilloscope as the output monitor. All VTVM output readings will be observed on an AC volt scale. See the alignment chart for the proper sequence of measurements.

FM OSCILLATOR

To test the FM oscillator, check the grid bias voltage. A voltage of -1.5VDC will indicate that the oscillator is operating. With the oscillator operating properly, the RF and mixer stage can be checked by attaching the signal generator to the to the antenna terminals and checking the output of the RF stage for a deflection on the -3VDC scale of a VTVM connected to pin 1 of V13.

Correcting trouble in the RF section requires care due to the critical values of coils and lead dressings.

FM ALIGNMENT

The proper method for FM alignment of this set requires the use of an oscilloscope, a signal sweep generator, and a marker generator (crystals may be used for the necessary marker pips.) The crystals can be inserted into the crystal marker receptacles on most signal sweep generators.

1. Set hand switch to FM positions.
2. In sweep alignment, set the sweep generator sweep controls to 1MC.
3. The marker generator output, when used, may be inductively coupled as near to the sweep input point as possible or inserted into the marker input jack on the signal sweep generator.
4. The frequency setting of the marker generator is the same as the sweep generator setting for each step as shown in the FM alignment chart.

Marker pips should always be kept at minimum amplitude to prevent distortion of the response curve.

5. In aligning the tuner, a 470K resistor is used in series with the positive test lead of the oscilloscope or VTVM. (Note: Wire length from resistor to end of lead should not exceed one-half inch.)
6. In peak aligning the FM, IF, and RF sections, the signal input should be reduced so that the VTVM reads approximately -1VDC.
7. In aligning the discriminator, adjust cores of T107 for maximum DC, keepting the output level from 3 to 4 volts.

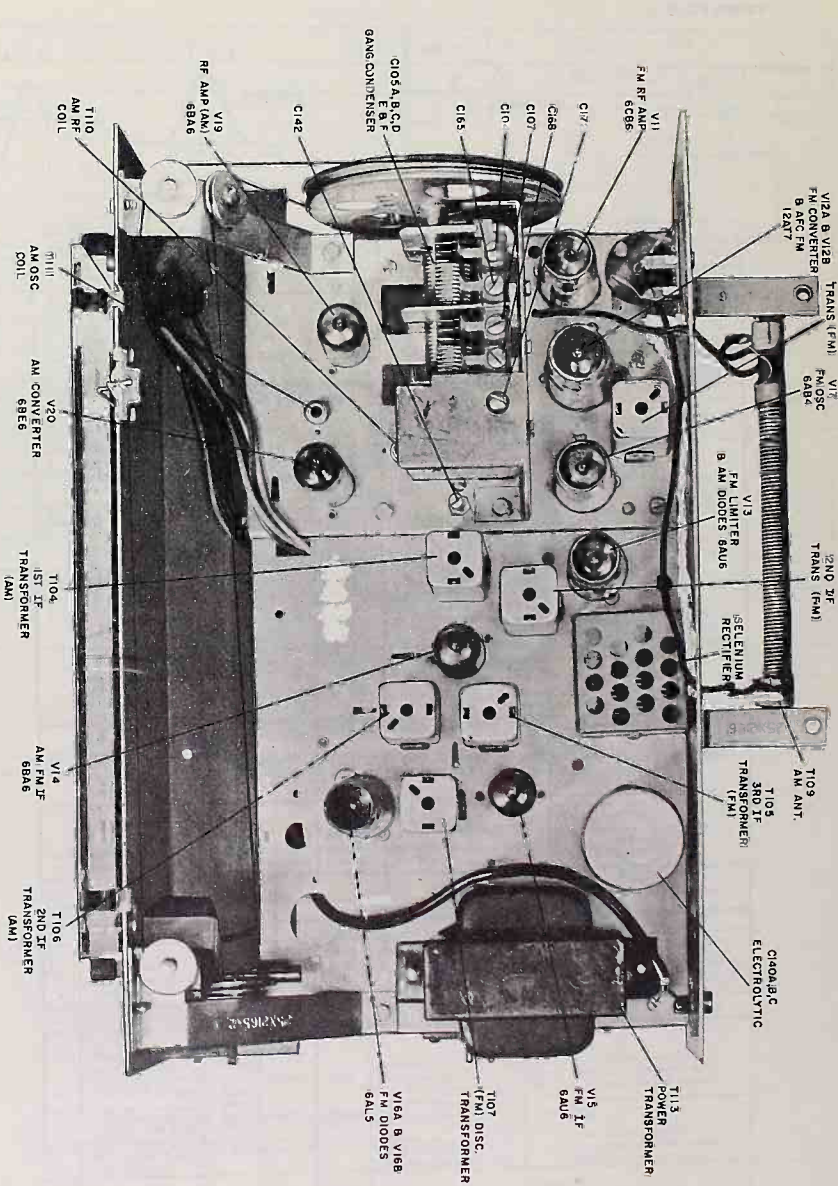


Figure 2

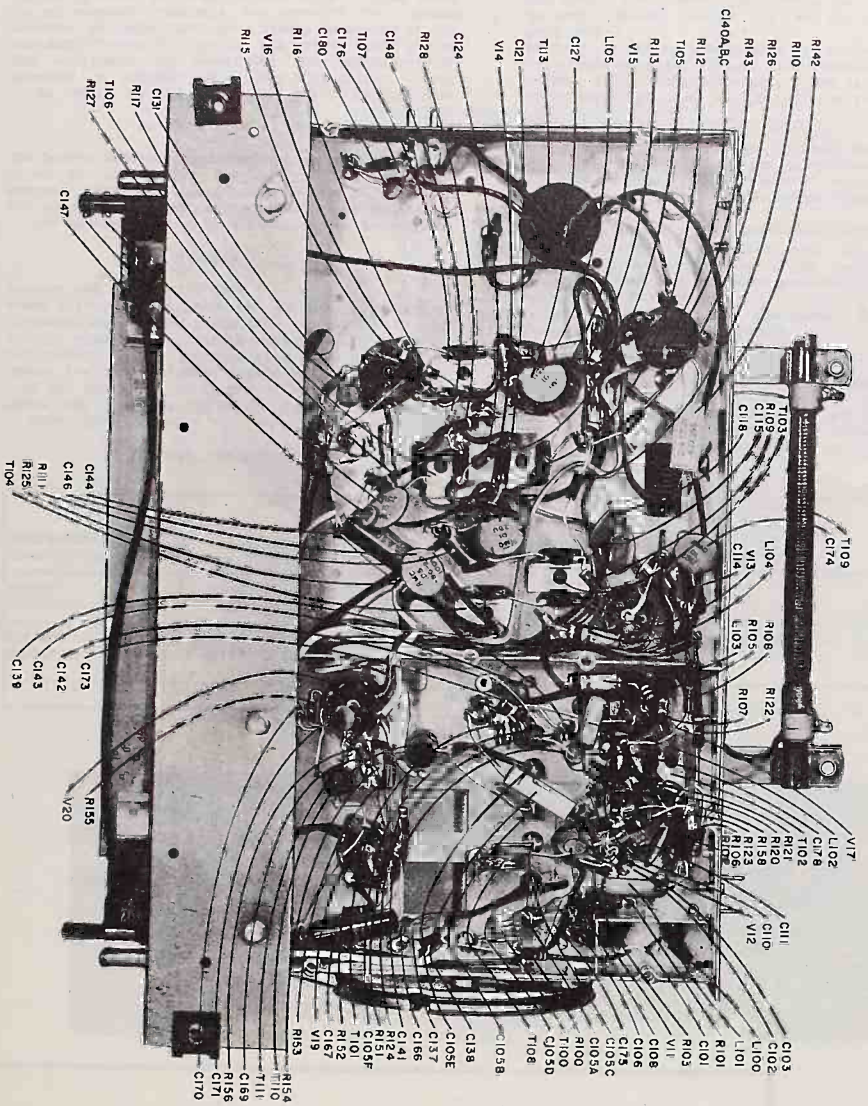


Figure 3

AM ALIGNMENT CHART							
				VTVM OUTPUT		OSCILLOSCOPE OUTPUT	
Step	Signal Generator Input Point	Gen. Setting	Receiver Tuning	Connect VTVM Across	Adjust the following	Connect Scope Across	Adjust the following
1	High Side to Test Point 3 in series with a .01mf., low side to chassis	455 KC 30% Mod. with 400 cycles	Gang Closed	Output Jack	Top and bottom cores of T106 for max. output	Output Jack	Top and bottom cores of T106 for max. ampl. of curve. See Fig. 4
2	High side to Test Point 2 in series with a .01mf., low side to chassis				Top and bottom cores of T104 for max. output		Top and bottom cores of T104 for max. ampl. of curve. See Fig. 4
3	Repeat steps 1 and 2						
4	Inductively coupled to AM Antenna	1620KC	1620KC	Output Jack	AM osc (C172) for max. output	Output Jack	AM osc (C172) for max. ampl.
5		1400KC	1400KC		AM ant (C165 & C168) for max. output		AM ant (C165 & C168) for max. ampl.
6	Repeat steps 1, 2, 3, 4, 5						

FM ALIGNMENT							
				SWEEP ALIGNMENT		PEAK ALIGNMENT	
Step	Sweep Generator Input Point [illegible]	Sweep Generator And Marker Setting	Tuning Condenser Setting	Connect Scope To Following In Series with 470K	Adjust	Connect VTVM To Following Test Points In Series with 470K Res.	Adjust
1	TP3 in series with .01mf. Low side to chassis	10.7 MC unmodulated	Closed	TP4	T105 for max. (See Fig. 5)	TP4	T105 for max. DC volts
2	TP3 in series with .01mf. Low side to chassis	10.7 MC unmodulated	Closed	TP5	T107 Top core for crossover (Fig. 6)	TP5	T107 Top core for 0 DC volts
					T107 Bottom core for max. amp. & Symmetry (Fig. 6)	TP6	T107 Bottom core for max. DC volts
3	TP2 in series with .01mf. Low side to chassis	10.7 MC unmodulated	Closed	TP4	T103 for max. amp & Symmetry (Fig. 5)	TP4	T103 for max. DC volts
4	TP1 in series with .01mf. [illegible] to FM [illegible] (see Fig. [illegible])	10.7 MC unmodulated	Closed	TP4	T102-103-105 for max. amp. (Fig. 7)	TP4	T102-103-105 for max. DC volts
5	TP1 in series with .01mf. [illegible] to FM [illegible]	10.7 MC unmodulated	Closed	TP5	Same as Step 2	Same as Step 2	Same as Step 2
6	Recheck	Steps [illegible] - 5					
7	Antenna Terminals high side through a 270 ohm resistor, low side direct to the grounded side of the antenna.	108 MC unmodulated	Open	TP4	FM osc (C142) for centering of marker on peak (Fig. 5)	TP4	FM osc (C142)
		[illegible] MC unmodulated	[illegible] 105 MC	TP4	FMRF Trimmer (C104 & C107) for max. (See Fig. 5)	TP4	FMRF Trimmer (C104 & C107) for max. DC volts

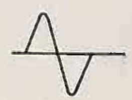


FIG. 4

FIG. 5

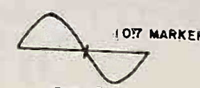


FIG. 6

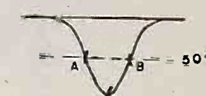
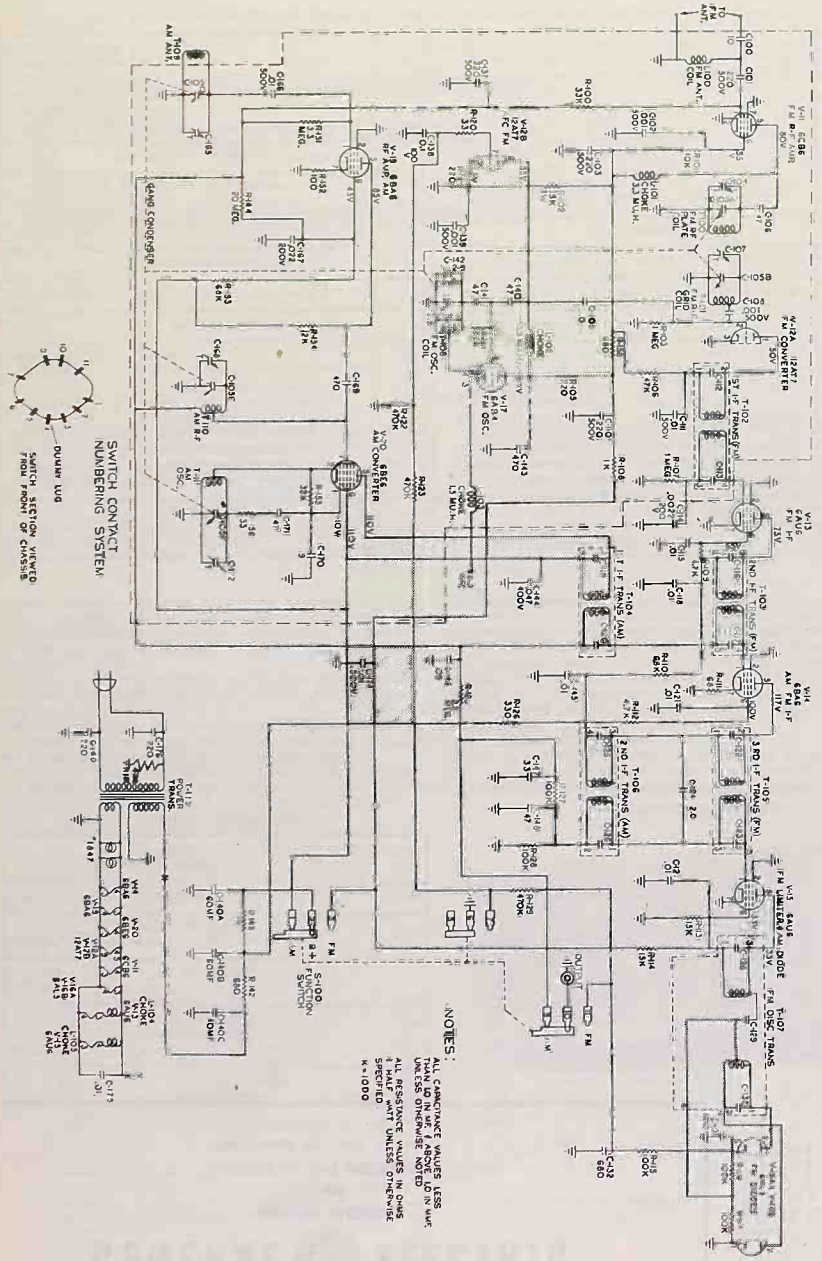


FIG. 7

A - 10.625 MARKER
B - 10.775 MARKER



REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C111,166, 175	.01mf.,+ 80-20% Disc. Cer.	.30
RS-1051	C102,108, 139	.001mf.,GMV Disc.Cer.	.25
RS-1203	C103,137, 176,180	220mmf.,20% Disc.Cer.	.25
RS-1303	C131	100mmf.,20%	.25
RS-1512	C106,141, 148,171	47mmf.,10% N 750	.25
RS-1516	C100	10mmf.,10% NPO (Antenna)	.25
RS-1638	C143,169	470mmf.,20% Disc. Cer.	.25
RS-1661	C147	33mmf.,	.25
*-RS-2521	C105A,B, C,D,E,F	Tuning Capacitor	9.80
*-RS-2528	C142	4-5mmf., Steatite Trimmer	.25
*-RS-2529	C170	9mmf., ± .05mmf.,N4700 (A.M. Osc.)	.40
Δ-RS-2530	C109	1mmf., 20% (was RCN-001)	.25
*-RS-2531	C173	2.5mmf., ± .25mmf.,N2200	.45
*-RS-2536	C132	680mmf., GMV	.25
*-RS-2537	C124	2mmf., ± .25mmf.	.30
*-RS-2538	C140A,B,C	Electrolytic 60-60-40 @ 200V.	3.50
RESISTOR			
±*-RS-2535	R142	680 ohms 5 W	.35
COILS AND TRANSFORMERS			
*-RS-2522	T111	Coil, A.M. Osc.	1.00
*-RS-2523	T110	Coil, A.M. R.F.	1.00
*-RS-2524	T102,103, 105	Transformer, 1st,2nd,3rd F.M. I.F.	1.80

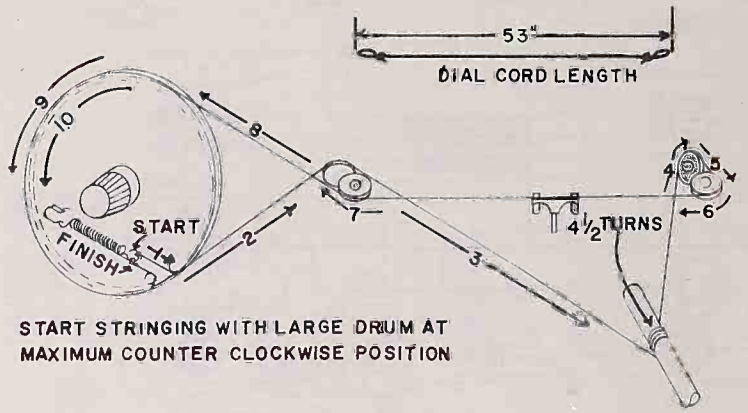
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
COILS AND TRANSFORMERS (CONT'D.)			
*-RS-2526	L102	Coil, 3.3uh choke	.45
*-RS-2527	L103,104 105	Coil, 1.5uh choke	.45
*-RS-2532	T107	Transformer, F.M. Discriminator	2.10
*-RS-2533	T104,106	Transformer,1st,2nd, A.M. I.F.	1.75
*-RS-2534	T113	Transformer, Power	9.25
*-RS-2540	T109	Coil, Antenna Pkg.5	.25
APPEARANCE ITEMS			
*-RS-2438		Escutcheon	4.25
*-RS-2440		Knob Assem. w/spring	.40
*-RS-2519		Glass, Dial	1.85
MISCELLANEOUS			
RS-1058		Shield, 7 Pin Tube Pkg.3	.30
RS-1286		Socket, 9 Pin Wafer	.35
RS-1287		Socket, 7 Pin Wafer	.30
RS-1310		Shield, 9 Pin Tube Pkg.3	.30
RS-1319		Rectifier, Selenium	3.65
RS-1781		Cord, Dial (25 yds)	2.50
RS-1823		Connector, Phono Pkg.2	.30
RS-2065		Interlock Pkg.2	.30
RS-2076		Pulley, Idler Pkg.2	.30
*-RS-2517		Light, Pilot	.30
*-RS-2518		Pointer, Dial	.65
*-RS-2520		Clip, Dial Glass Pkg.5	.25
Δ-RS-2525		Spring, I.F. Mtg. (was RMC-034) Pkg.5	.25
*-RS-2539		Switch, Band	2.65

*- Denotes New Items Not Previously Cataloged.

Prices Are Suggested List Prices Subject To Change Without Notice.

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

Δ- Denotes part used in former radio/phono models. You may have it stocked under number shown in parenthesis. Please change your records to the new number with two-letter prefix.

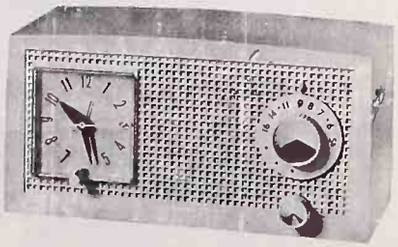


GENERAL ELECTRIC

SERVICE MANUAL
FOR
CLOCK-RADIO RECEIVERS
(540-1600 KC., 455 KC., I-F.)
SUPERSEDES S-C400-1

S-C400-2
RADIO
MODELS
C-400
C-401
C-402

SPECIFICATIONS			
CABINET:	C400 Pink C401 Antique White C402 Black and White		
ELECTRICAL RATING:	105-120 V. A. C., 60 cycle, 30 Watts		
OUTPUT:	.8 Watts Undistorted 1.5 Watts Maximum		
TUBE COMPLEMENT:	V1	Oscillator-Converter.....	12AU6
	V2	Detector.....	12AV6
	V3	Audio Output.....	50C5
	V4	Rectifier.....	35W4



GENERAL INFORMATION

Service on defective clock units (Telechron Catalog number J2-G1) should be referred to the nearest G. E. Servicenter or G. E. Service Station.

Always use an isolation transformer when servicing or aligning this receiver to protect personnel and test equipment.

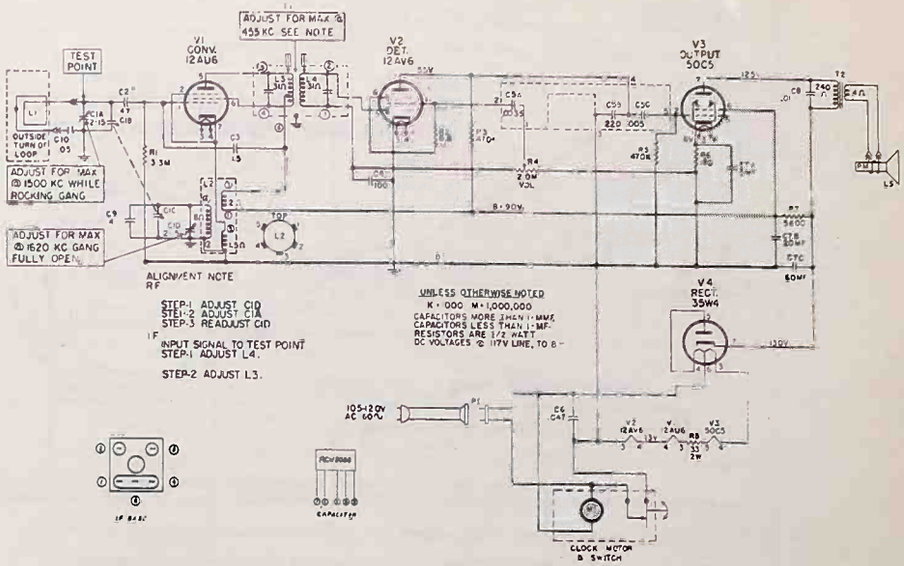
When aligning, keep the signal input low and volume control set at maximum so the AVC will not affect the output.

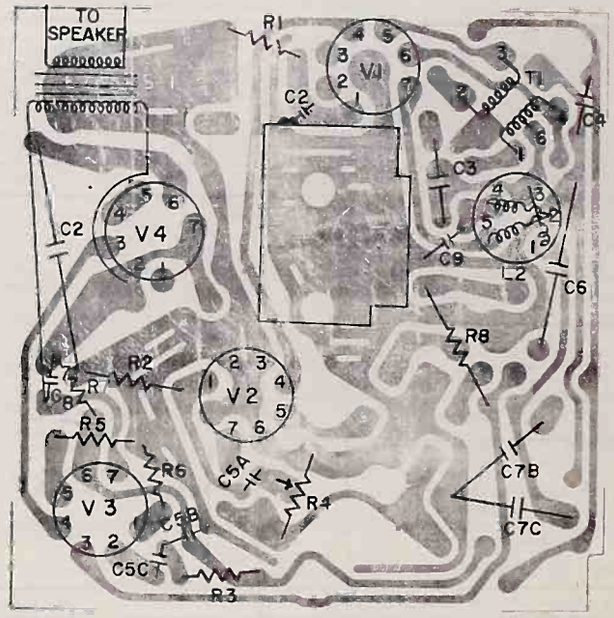
CAUTION: It is important to use extreme care while replacing parts and/or soldering on this chassis. Too much heat on the chassis will cause the copper conductor pattern to become unbonded.

TO REMOVE CHASSIS

Remove cabinet back and interlock. Remove the five self-tapping screws (hex-heads), one on each corner of the chassis, and the single hex screw just below the tuning gang capacitor. Pull off the volume control knob.

The tuning control knob is a captive knob which remains with the cabinet. The chassis must be pulled out of the cabinet and separated from the tuning knob simultaneously. To pull out the chassis, first close the tuning capacitor. Then grasp the tuning capacitor with the thumb and forefinger of one hand, the tuning knob with the other, and pull the chassis back out of the cabinet.





REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-2552	C2	47mmf., 500V.....	.25
RS-2553	C3	1.5mmf.,500V.....	.25
RS-1303	C4	100mmf.,500V.....	.25
RS-2551	C5A,B,C	.0035mf.,220mf.,.005mf.Coup.	1.25
	C6	.047mf.,600V	
RS-2550	C7A,B,C	5mf., 25V; 20mf., 60mf., 150V. Electrolytic.....	2.35
RS-1022	C8	.01mf., 400V.....	.30
RS-2554	C9	4mmf., 500V.....	.25
POTENTIOMETERS			
RS-1028	R4	Volume Control, 2 meg.....	1.15
COILS AND TRANSFORMERS			
RLC-135	L2	Osc. Coil, C400.....	1.00
RS-1414	L2	Osc. Coil, C401,C402.....	1.00
RS-1027	T1	I.F. Transformer.....	1.90
RS-2548	T2	Output Transformer.....	2.75
CABINET AND APPEARANCE ITEMS			
RS-1049		Cabinet, C400.....	4.25
RS-1067		Cabinet, C401.....	4.25
*-RS-1147		Cabinet, C402.....	4.25
RS-1257		Clock Face, C400.....	.90
RS-1262		Clock Face, C401.....	.90
*-RS-2543		Clock Face, C402.....	.25

CAT. NO.	DESCRIPTION	PRICE
CABINET AND APPEARANCE ITEMS (CONT'D.)		
RS-1258	Hand,Second, C400.....Pkg.3	.30
RS-1563	Hand,Second, C401,C402.....Pkg.3	.30
RS-1259	Hand,Minute, C400.....Pkg.3	.30
RS-1664	Hand,Minute, C401,C402.....Pkg.3	.30
RS-1260	Hand,Hour, C400.....Pkg.3	.30
RS-1665	Hand,Hour, C401,C402.....Pkg.3	.30
RS-1261	Hand, Alarm, C400.....Pkg.3	.30
RS-1666	Hand, Alarm, C401,C402.....Pkg.3	.30
RS-2542	Clock Knob.....Pkg.3	.30
RS-1263	Tuning Knob w/insert C400.....	.85
RS-1667	Tuning Knob w/insert C401.....	.85
*-RS-2543	Tuning Knob w/insert C402.....	.65
*-RS-2120	Time Set Knob.....Pkg.2	.30
RS-2544	Clock Crystal.....	.75
RS-2562	Cabinet Back w/Loop.....	1.60
MISCELLANEOUS		
RB-1110	4" P.M. Speaker.....	3.25
RS-1791	Tube Socket.....Pkg.2	.30
RS-1792	Tube Socket w/Center Pin.....	.25
RS-1809	Clip, Tubular.....Pkg.3	.30
RS-2065	Power Cord Receptacle.....Pkg.2	.30
RS-2546	Power Cord.....	1.20
RS-1006	Chip Board.....Pkg.5	.25
RS-1007	Gasket.....Pkg.5	.25
RS-1093	Shaft Extension.....Pkg.3	.30
RS-1164	Fiber Washer.....Pkg.5	.25
*-RS-254	Clip, Captive Tuning Knob....Pkg.5	.25

All Parts Not Listed By Catalog Number Are Common Items, Obtainable From Radio Parts Jobbers.

*-Denotes New Items Not Previously Cataloged.

Magnavox SERVICE MANUAL

SUPPLEMENT NO. 1

1329

THE MAGNAVOX COMPANY • SERVICE DEPARTMENT
FORT WAYNE, INDIANA

54 SERIES RADIO CHASSIS

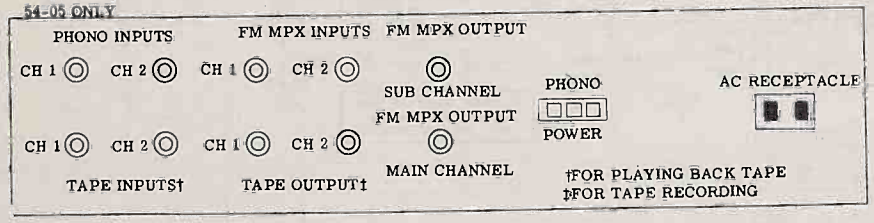
GENERAL

The service information contained in this manual supplements that information contained in Maintenance Manual 1329. A new schematic diagram is shown for the 54-03 and 54-05 chassis. The schematic diagram for the 54-03 supersedes the one in M. M. 1329. The 54-05 schematic is for the new 54 series chassis which have connections for an FM Multiplex Adapter after standards for such an adapter has been established.

The parts listed cover the parts which are common only to the 54-05 chassis and the parts which were changed in the 54-03 chassis during production runs. These parts listed supplements or replaces, as may be the case, those parts shown in M. M. 1329.

Also, in M. M. 1329 the chassis layout should be corrected by reversing the locations of T202 and T203.

CHASSIS REAR PANEL



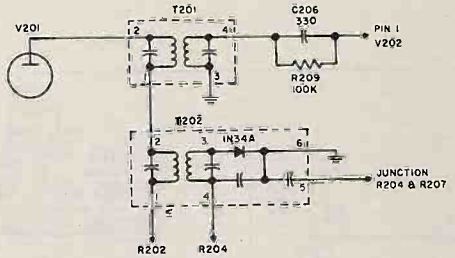
REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NO.
	CAPACITORS	
C128*	Cer., 6 mmf, 5% (N2200)	250088-180
C207	Cer., 5000 mmf, 20%, 500V	250175-30
C208*	Cer., 5 mmf, 5%, 500V	250088-138
C304	Cer., 5000 mmf, 20%, 500V	250175-30
C311	Cer., 5000 mmf, 20%, 500V	250175-30
C314	Cer., 3300 mmf, 20%, 500V	250218-24
C319	Cer., 5000 mmf, 20%, 500V	250175-30
C324	Cer., 5000 mmf, 20%, 500V	250175-30
C327	Cer., 3300 mmf, 20%, 500V	250218-24
C331	Paper, .022mf, (54-05)	250202-15
C332	Paper, .022 mf, (54-05)	250202-15
	RESISTORS	
R109*	820, 10%, 1/2W	230104-81

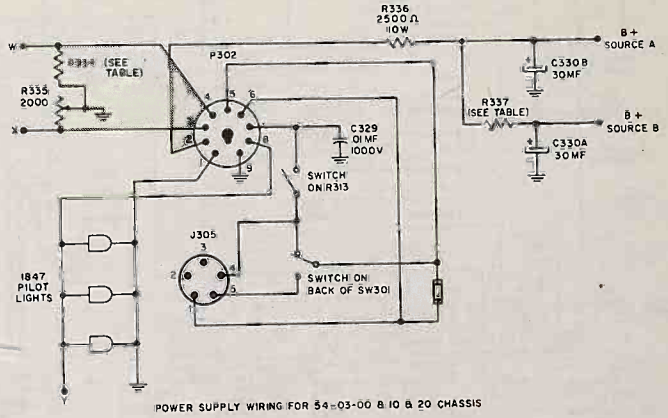
* When installing 360781-2 transformer in place of original transformer, change R109 to 820 ohm, delete R325 and C208 (if used). Change 6BZ6 to 6BA6.

SYMBOL	DESCRIPTION	PART NO.
R331*	27K, 10%, 2W	230106-1079
R334	330, 10%, 1/2W	230104-56
R337	1000, 10%, 2W	230106-62
R351	470, 10%, 1W	230105-58
R435	2.2 meg, 10%, 1W	230104-102
	MISCELLANEOUS	
SW301	Band Switch (54-05)	160313-5
T202*	2nd AM IF Transformer	360781-2
T103	Rod Antenna Assembly (54-03-31 & 54-05)	360746-2
PC201	FM Driver Printed Circuit	250330-1
J301	Input Socket Assembly (10 Inputs)	180655-1
	Tuner Power Connectors (54-03-31 & 54-05)	180639-1
	Phono Power Connectors (54-03-31 & 54-05)	180626-1
	Contacts for Connectors	180628-1
	Dial Glass (54-05)	150534-2

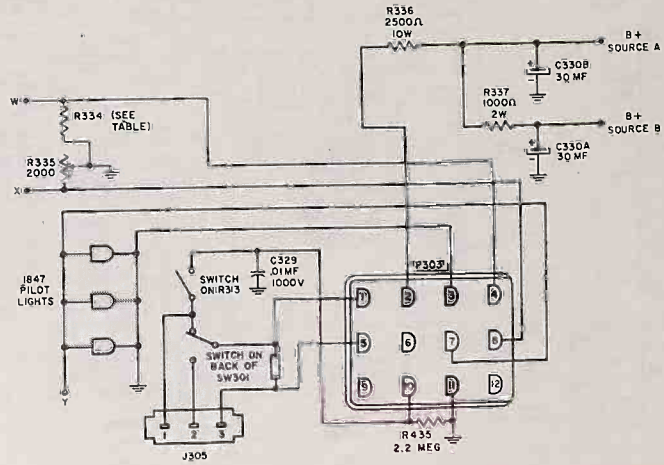
* Added on later chassis to reduce AM drift.



I-F WIRING FOR 54-03-00 CHASSIS

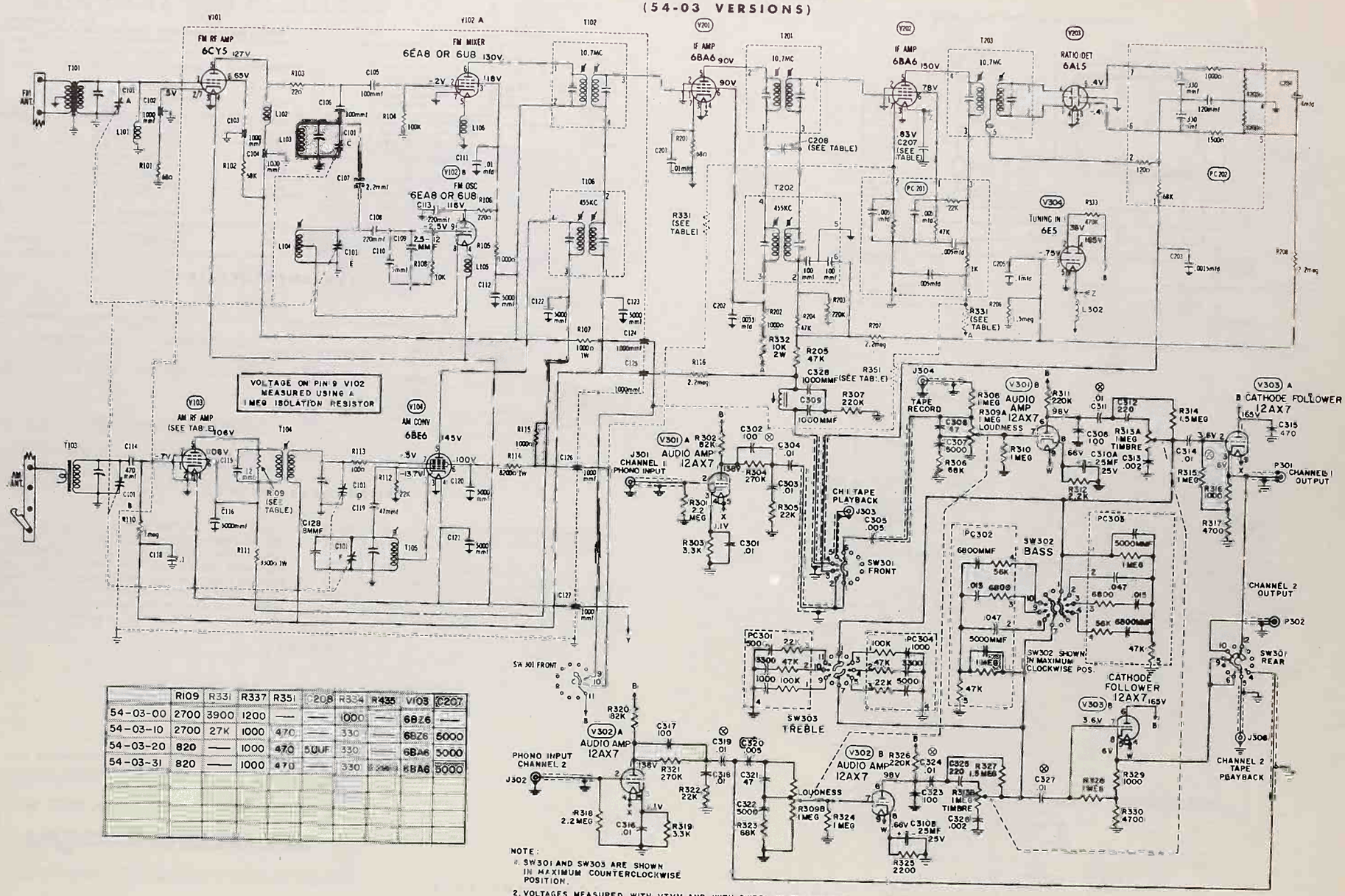


POWER SUPPLY WIRING FOR 54-03-00 & 10 & 20 CHASSIS



POWER SUPPLY WIRING FOR 54-03-31 CHASSIS

SCHEMATIC DIAGRAM
(54-03 VERSIONS)

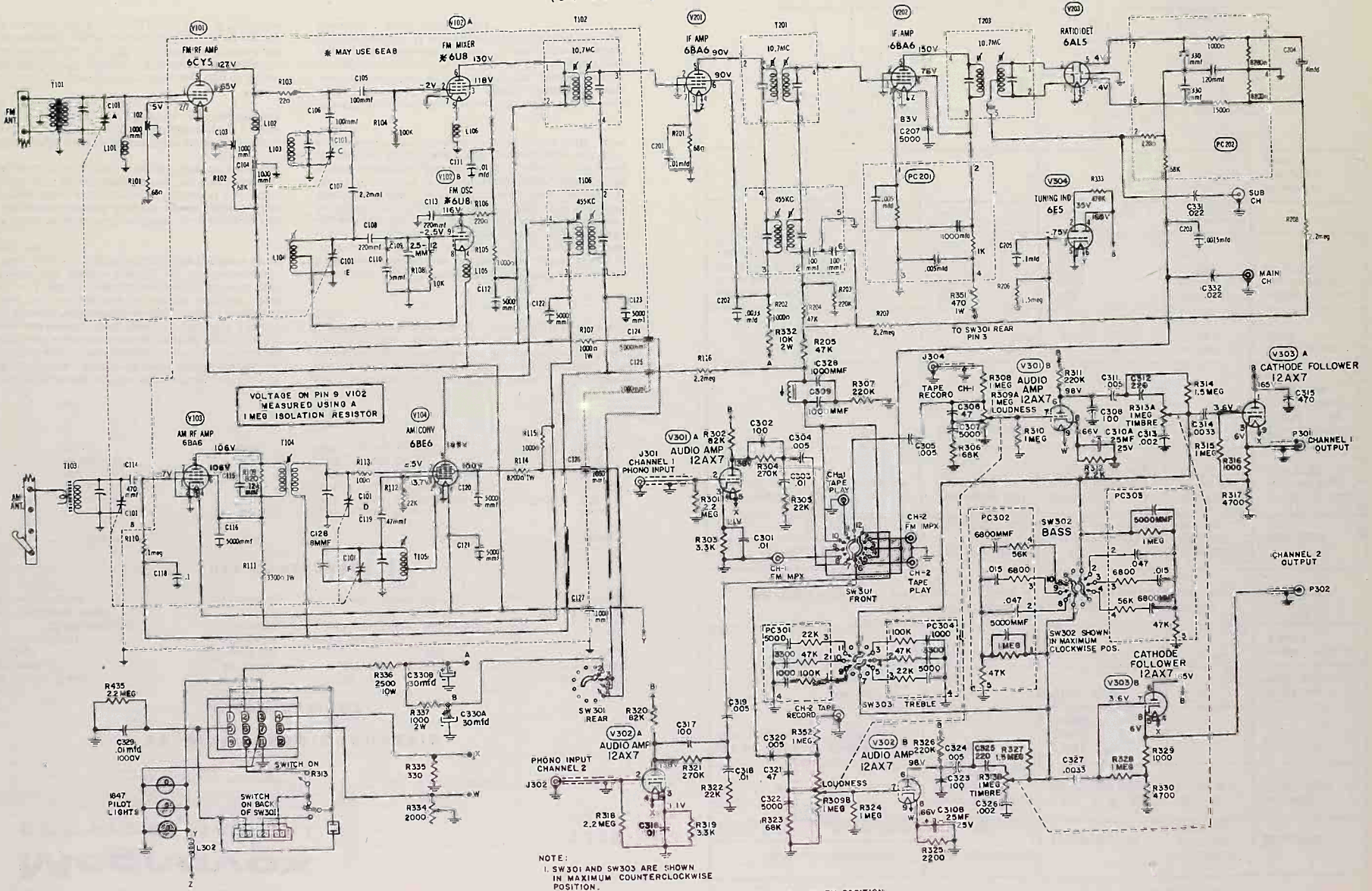


	R109	R331	R337	R351	C208	R334	R435	V103	C207
54-03-00	2700	3900	1200	—	—	1000	—	6BZ6	—
54-03-10	2700	27K	1000	470	—	330	—	6BZ6	5000
54-03-20	820	—	1000	470	5UUF	330	—	6BA6	5000
54-03-31	820	—	1000	470	—	330	—	6BA6	5000

NOTE:

1. SW301 AND SW305 ARE SHOWN IN MAXIMUM COUNTERCLOCKWISE POSITION.
2. VOLTAGES MEASURED WITH VTVM AND WITH SW301 IN FM POSITION EXCEPT FOR V103 & V104. THESE ARE MEASURED IN AM POSITION, VOLUME CONTROL SET AT MINIMUM, OTHERS SET AT MAXIMUM. LINE VOLTAGE 117V NORMAL VOLTAGE TOLERANCE 20%.
3. ⊗ SEE PARTS LIST FOR ALTERNATE VALUES.

SCHEMATIC DIAGRAM
(54-05 VERSIONS)



NOTE:
1. SW301 AND SW303 ARE SHOWN IN MAXIMUM COUNTERCLOCKWISE POSITION.
2. VOLTAGES MEASURED WITH VTVM AND WITH SW301 IN FM POSITION EXCEPT FOR V103 & V104. THESE ARE MEASURED IN AM POSITION, VOLUME CONTROL SET AT MINIMUM, OTHERS SET AT MAXIMUM. LINE VOLTAGE 117V NORMAL VOLTAGE TOLERANCE 20%.

Magnavox SERVICE MANUAL ... 1328

THE MAGNAVOX COMPANY - SERVICE DEPARTMENT
FORT WAYNE, INDIANA

55 SERIES RADIO CHASSIS

SPECIFICATIONS

Power Source Rating		FM Band	88-108MC
Frequency	60 cycles	IF Frequency (AM)	455KC
Voltage	117 volts AC	(FM)	10.7MC
Wattage (55-01)	100 watts	Audio System	
(55-02) with AMP 175	175 watts	Output Trans. Impedance (55-01)	
Tuning Frequency Range		Pri - 8000 ohms	Sec. - 3.2 ohms
Broadcast Band	540-1620KC	Power Output (55-01)	6 watts

TUBE COMPLEMENT

Ref.	Function	Type	Ref.	Function	Type
V101	FM RF Amplifier	6CY5	V203	Ratio Detector	6AL5
V102	FM Mixer	6U8	V301	Audio Amp & Phase Inverter (55-01)	6U8
V103	AM RF Amplifier	6BZ6	V301	Audio Amplifier (55-02)	12AX7
V104	AM Converter	6BE6	V302	Audio Output (55-01)	6AQ5
V201	IF Amplifier	6BA6	V303	Audio Output (55-01)	6AQ5
V202	Driver	6BA6	V304	Rectifier (55-01)	5Y3GT

GENERAL

This manual contains service information on the 55-01 and 55-02 chassis. The 55-01 is an AM-FM unit having a self-contained 6 watt amplifier and the 55-02 is an AM-FM tuner which requires an external amplifier for voltages and output. Both chassis, however, are designed for use with record changers which have been designed for reproduction of stereo records. Dual Treble and Loudness controls are used which will vary the Treble and Volume equally and simultaneously. The Bass control will only vary Bass response from channel one.

On the 55-01 an additional amplifier is required which will reproduce channel 2 of the stereo system. The built-in amplifier will reproduce the channel 1 portion. On the 55-02 a stereo amplifier or two single channel amplifiers are required to reproduce the two channels.

Additional input sockets are available on the rear apron of the chassis which will permit the operation of a monaural tape recorder in conjunction with instruments using either of these chassis.

Provisions are provided for the connection of an external AM or FM antenna. A terminal board having two connections marked FM, a connection marked AM and three other connections marked G, 1 and 2 are located on a fibre board fastened to the rear of the chassis. To connect an external FM antenna to these chassis merely connect it to the designated terminals. To connect an AM antenna use the designated terminal for the connection, however, the antenna should also be grounded to the chassis by connecting it to terminal "G".

Terminals 1 and 2 are used for speaker connections. External speakers can be connected across G and 1, whereas the internal speakers are connected across G and 2. When the link is closed, both sets of speakers will play and when the link is open only the external speakers will play. This only applies to speakers which have been connected as extension speakers on the 55-01 and not those which have been connected as stereo speakers. Neither does it apply to the 55-02 chassis nor to those instruments which have an extension speaker switch used in conjunction with these chassis.

Two different methods of identification markings were employed in these Chassis. Early production units were marked 51-01AA, 51-01BA, etc. Later production units were marked 51-01-00, 51-01-10, etc. Those chassis identified with the "00" markings are identical to those marked "AA" and the chassis marked "10" are identical to those marked "BA".

ALIGNMENT

AM ALIGNMENT

Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	T105, T104	"	Adjust for max. output.
"	-----	-----	-----	"	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)

Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From (pin 5) to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with: 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	C109 C 01A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coil)	"	"
"	-----	-----	-----	-----	Repeat two preceding steps.

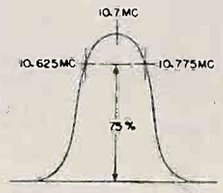


FIG 1
F.M. IF SELECTIVITY CURVE

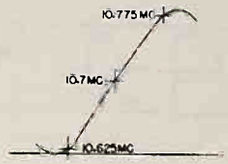


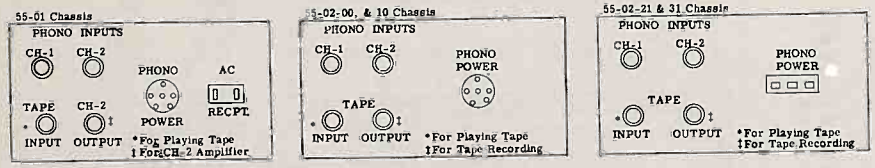
FIG 2
RATIO DETECTOR RESPONSE CURVE

ALIGNMENT

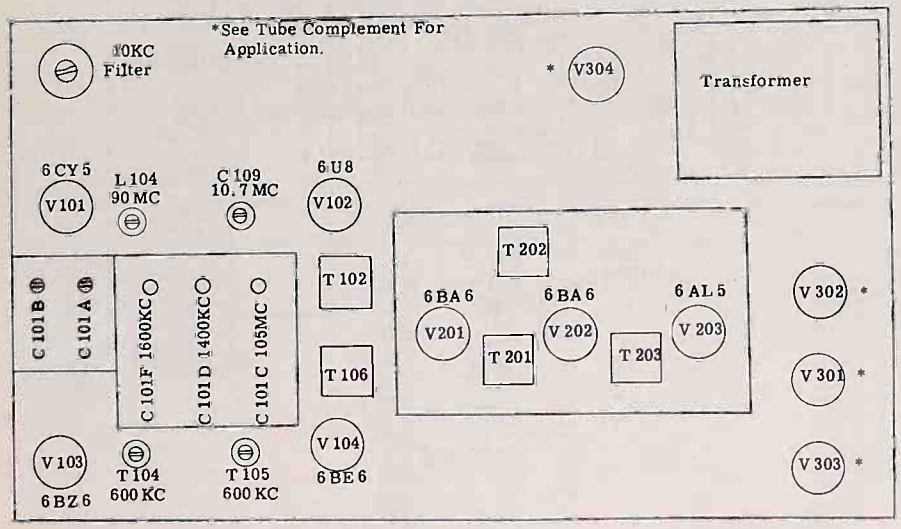
FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO	
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5 pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1
"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	-----	-----	-----	Repeat steps 1, 2 and 3.

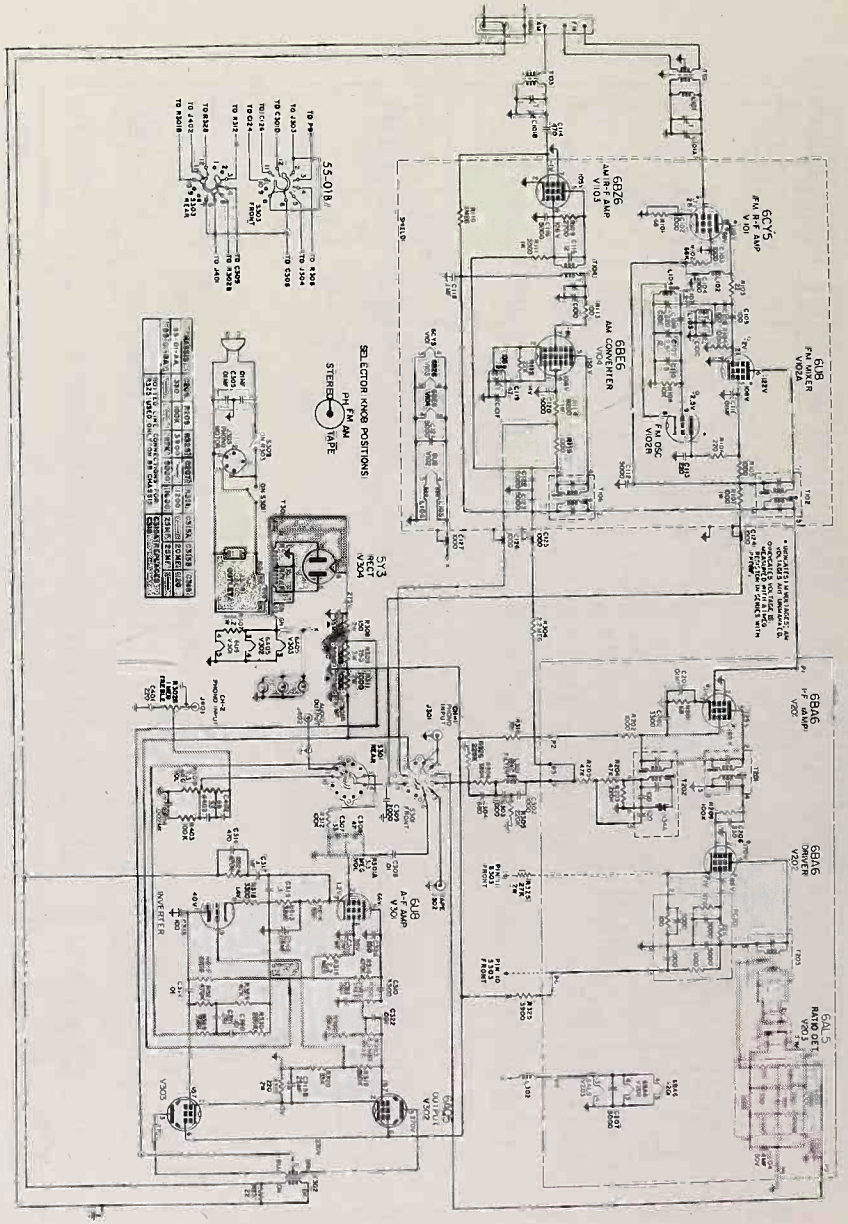
CHASSIS REAR PANEL



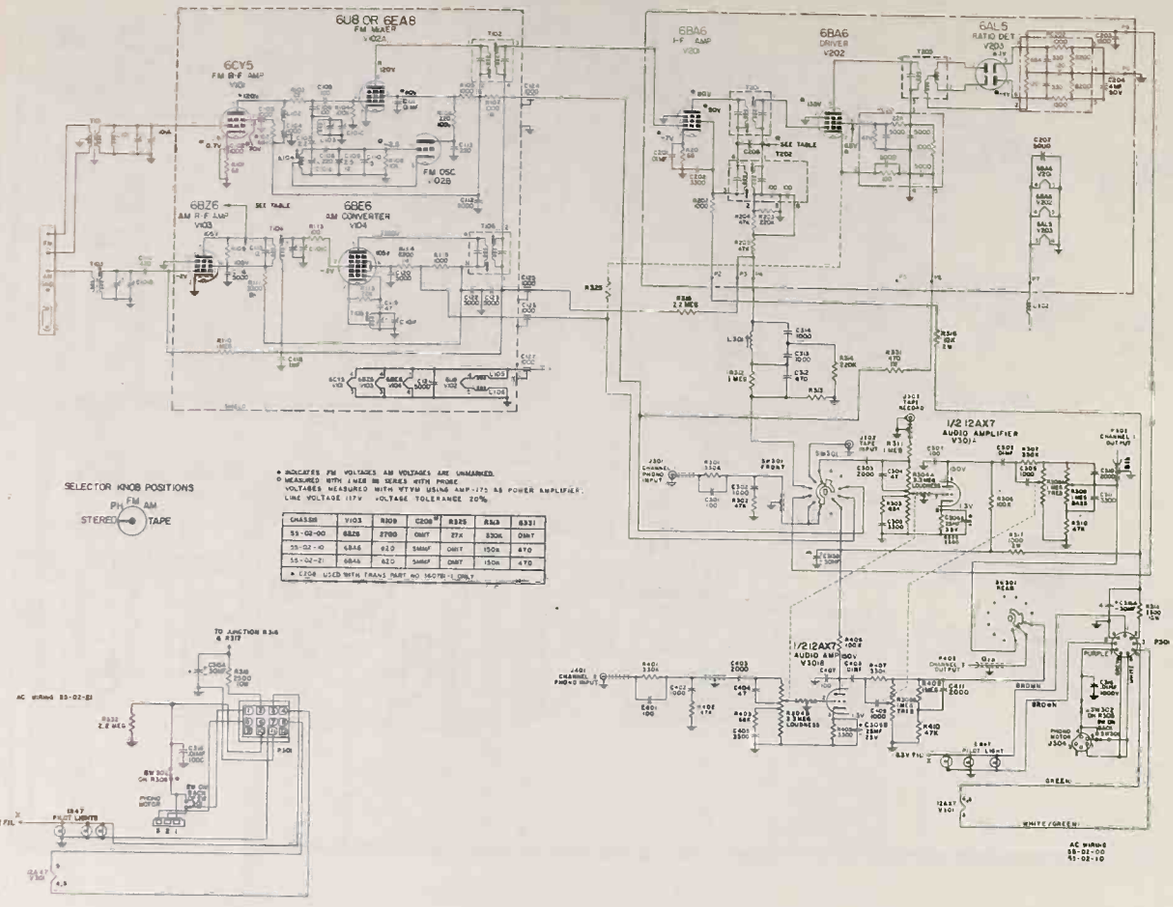
CHASSIS LAYOUT



SCHEMATIC DIAGRAM (55-01-00 & 10)



SCHEMATIC DIAGRAM
(55-02-00 & 10 & 21)

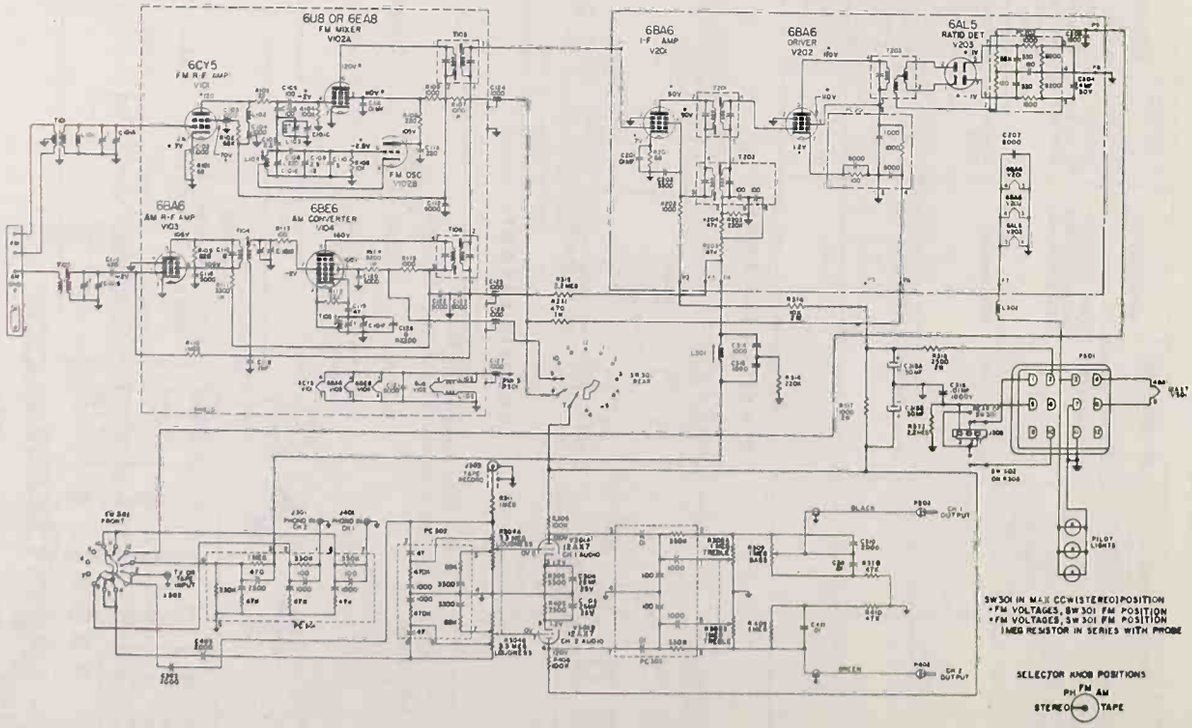


* INDICATES FM VOLTAGES AM VOLTAGES ARE UNMARKED.
@ MEASURED WITH 1 MEG IN SERIES WITH PROBE.
VOLTAGES MEASURED WITH VTVM USING AMP-175 AS POWER AMPLIFIER.
LINE VOLTAGE 117V +VOLTAGE TOLERANCE 20%.

CHASSIS	V103	R309	C208	R325	R343	R331
55-02-00	6BZ6	2700	OMIT	27K	330K	OMIT
55-02-10	6BA6	820	5MMF	OMIT	150K	47Ω
55-02-21	6BA6	820	5MMF	OMIT	150K	47Ω

* C208 USED WITH TRANS PART NO 140781-1 ONLY

SCHEMATIC DIAGRAM
(55-02-31)



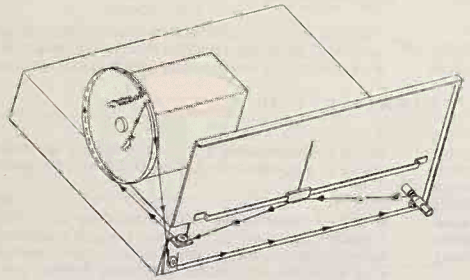
DIAL STRINGING INSTRUCTIONS

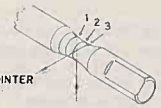
DIAL CORD PLACEMENT

Select a 46-inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.

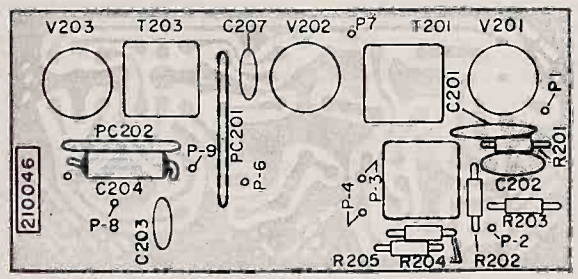
DIAL POINTER PLACEMENT

Place the dial pointer onto the pointer slide and turn the tuning gang completely in mesh. Lace the dial cord around the three hooks on the front of the pointer and with the tuning condenser still fully in mesh, slide the pointer over until it lines up with the last dial calibration mark at the low frequency end of the broadcast band. This completes the assembly.





PRINTED WIRING CIRCUIT



REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NO.
	TRANSFORMERS - COILS - CHOKES	
(All Chassis)		
T101	FM Input Transformer	360491-4
T102	1st FM IF Transformer	360826-1
T103	Rod Antenna Assembly	360746-1
T103	Rod Antenna Assembly (55-02-21 & 31)	360746-2
T104	AM RF Transformer	360753-1
T105	AM Oscillator Coil	360752-1
T106	1st AM IF Transformer	360611-1
T201	2nd FM IF Transformer	360747-1
T202	2nd AM IF Transformer (55-01-00 only)	360749-1
T202*	2nd AM IF Transformer	360781-2
T203	Ratio Detector	360748-1
T301	Power Transformer (55-01)	300165-1
T302	Output Transformer (55-01)	320077-1
L101	FM Antenna Coil	360750-1
L102	RF Choke	360522-8
L103	FM RF Coil	360751-1
L104	FM Oscillator Coil	360828-1
L105	RF Choke	360522-9
L106	RF Choke	360522-9
L301	10 KC Filter Coil	360621-1
L302	RF Choke	360522-9

SYMBOL	DESCRIPTION	PART NO.
	RESISTORS	
RF & IF Section (Common)		
R101	68	230104-48
R102	68K	230104-84
R103	22	230104-42
R104	100K	230104-86
R105	1000	230104-62
R106	220	230104-54
R107	1000 - 1W	230105-62
R108	10K	230104-74
R109	2700	230104-67
R109*	820	230104-61
R110	1 meg	230104-98
R111	3300 - 1W	230105-88
R112	22K	230104-78
R113	100	230104-50
R114	8200 - 1W	230105-73
R115	1000	230104-62
R201	68	230104-48
R202	1000	230104-62
R203	220K	230104-90
R204	47K	230104-82
R205	47K	230104-82

SYMBOL	DESCRIPTION	PART NO.
	Audio & Power Supply Section (55-01)	
R301	Dual 3.3 meg. Volume	220151-3
R302	Dual 1 meg, Treble	220150-1
R303	1 meg, Bass	220072-39
R304	2.2 meg.	230104-102
R305	220K	230104-90
R306	300K	230104-92
R307	2.2 - 1W W.W.	230109-2
R308	150 - 2W	230106-1052
R309	750 - 3W, Glass	230150-315
R310	10K - 2W	230108-1074
R311	1000 - 2W	230108-1062
R312	100K	230104-86
R313	3300	230104-68
R314	330	230104-56
R315	2.2 meg.	230104-102
R316	470K	230104-94
R317	470K	230104-94
R318	3300	230104-68
R319	560K	230104-95
R320	33K	230104-80
R321	470K	230104-94
R322	220 - 2W	230108-54
R323	150K	230104-88
R324	4700	230104-70
R325	27K - 2W	230108-1079
R326	220K	230104-90
R328	390K	230104-93
R329	47K	230104-82
R330	220K	230104-90
R331	22	230104-48
R403	100K	230104-86
	Audio & Power Supply (55-02)	
R301‡	330K	230104-92
R302‡	47K	230104-82
R303‡	68K	230104-84
R304	Dual 3.3 meg, Loudness	220151-3
R304	Dual 3.3 meg, Loudness (55-02-31)	220151-21
R305	3300	230104-68
R306	100K	230104-86
R307‡	330K	230104-92
R308‡	Dual 1 meg, Treble	220150-1
R309	1 meg, Bass	220072-40
R310	47K	230104-82
R311	1 meg	230104-98
R312	1 meg	230104-98
R313	330K (55-02-00)	230104-92
R313	150K (55-02-10 & 21)	230104-88
R314	220K	230104-90
R315	2.2 meg	230104-102
R316	10K - 2W	230108-1074
R317	1200 - 2W	230106-1063
R318	2500 - 10W, W.W.	240076-26
R325*	27K - 2W	230108-1079
R331	470 - 1W	230105-58
R332	2.2 meg	230104-102
R401‡	330K	230104-92
R402‡	47K	230104-82
R403‡	68K	230104-84
R405	3300	230104-67
R406	100K	230104-86
R407‡	330K	230104-98
R409	1 meg	230104-98
R410	47K	230104-82
	CAPACITORS	
RF & IF Section (Common)		
C101	Tuning Capacitor	260147-1
C102	Feed Thru, 1000 mmf.	250276-2
C103	Feed Thru, 1000 mmf.	250276-2
C104	Feed Thru, 1000 mmf.	250276-1
C105	Mica, 100 mmf. - 10%	250187-53
C106	Mica, 100 mmf. - 10%	250187-53
C107	Mica, 2.2 mmf.	250221-118
C108	Mica, 220 mmf. - 10%	250187-57
C109	Cer., 2.5 - 12.0 mmf. (Trimmer)	250188-9
C110	Cer., 5 mmf. - 5% (N470)	250088-138
C111	Paper .01 mf. - 400V	250211-7
C112	Cer., 5000 mmf.	250175-30
C113	Mica, 220 mmf. - 10%	250187-57
C114	Mica, 470 mmf.	250159-102
C115	Cer., 12 mmf. - 5% (N330)	250088-179
C116	Cer., 5000 mmf.	250175-30
C118	Mylar, .1 mf - 100V	250261-125
C119	Cer., 47 mmf.	250218-17
C120	Cer., 5000 mmf.	250175-30
C121	Cer., 5000 mmf.	250175-30

SYMBOL	DESCRIPTION	PART NO.
C122	Cer., 5000 mmf.	250175-30
C123	Cer., 5000 mmf.	250175-30
C124	Feed Thru, 1000 mmf.	250276-1
C125	Feed Thru, 1000 mmf.	250276-1
C126	Feed Thru, 1000 mmf.	250276-1
C127	Feed Thru, 1000 mmf.	250276-1
C128 *	Mica, 8 mmf. - 5% (N2200)	250088-180
C201	Cer., .01 mfd	250234-66
C202	Cer., 3300 mmf.	250234-154
C203	Cer., 1500 mmf.	250234-146
C204	Elect. 4 mfd, 50V	270021-71
C206	Cer., 330 mmf.	250234-30
C207	Cer., 5000 mmf.	250236-1
C208 *	Cer., 5mmf - 5% (N470)	250088-138
	Audio & Power Supply Section (55-01)	
C301	Elect., 35, 30, 20, 10 mf. - 350V	270021-71
C302	Mica, 1000 mmf. - 5% - 300V	250228-354
C303	Mica, 1000 mmf. - 5% - 300V	250228-354
C304	Cer., 680 mmf.	250218-4
C305	Cer., 2 X .01 mf. - 1000V	250219-3
C306	Cer., 47 mmf.	250218-17
C307	Cer., 33 mmf.	250218-21
C308	Cer., .01 mf.	250218-19
C309	Cer., 2000 mmf.	250218-20
C310	Cer., 330 mmf.	250218-24
C311	Paper, .047 mf. - 200V	250202-11
C312	Cer., 1000 mmf.	250218-28
C313	Cer., 100 mmf.	250218-22
C314	Cer., .01 mf.	250218-19
C315	Elect., 25, 25 mf. - 25V	270043-1
C316	Cer., 470 mmf.	250218-6
C317	Mylar, .1 mf. - 100V	250261-125
C319	Mylar, .1 mf. - 100V	250281-125
C320	Cer., .01 mf.	250218-19
C321	Cer., 1000 mmf.	250218-28
C322	Cer., 1000 mmf.	250218-28
C323	Cer., 330 mmf.	250218-26
C401	Cer., 220 mmf.	250218-5
C402	Cer., 68 mmf.	250218-7
C403	Cer., 33 mmf.	250218-21
C404	Cer., 2000 mmf.	250218-20
	Audio & Power Supply Section (55-02)	
C301‡	Cer., 100 mmf.	250218-22
C302‡	Cer., 1000 mmf.	250218-8
C303	Cer., 2000 mmf.	250218-20
C304‡	Cer., 47 mmf.	250218-17
C305‡	Cer., 3300 mmf. - 10%	250175-28
C306	Elect., 25, 25 mf. - 25V	270043-1
C307‡	Cer., 100 mmf.	250218-22
C308‡	Cer., .01 mf.	250218-19
C309‡	Cer., 1000 mmf.	250218-8
C310	Cer., 2000 mmf.	250218-20
C311	Cer., .01 mf.	250218-19
C312	Cer., 470 mmf.	250218-6
C313	Mica, 1000 mmf. - 5% - 300V	250228-354
C314	Mica, 1000 mmf. - 5% - 300V	250228-354
C315	Elect., 30, 30 mf. - 450V	270021-58
C316	Cer., .01 mf. - 1000V	250219-2
C401‡	Cer., 100 mmf.	250218-22
C402‡	Cer., 1000 mmf.	250218-8
C403	Cer., 2000 mmf.	250218-20
C404‡	Cer., 47 mmf.	250218-17
C405‡	Cer., 3300 mmf. - 10%	250175-28
C407‡	Cer., 100 mmf.	250218-22
C408‡	Cer., .01 mf.	250218-19
C409‡	Cer., 1000 mmf.	250218-8
C411	Cer., .01 mf.	250218-19
	MISCELLANEOUS	
SW301	Band Switch (55-01-10)	160293-4
SW301	Band Switch (55-02-00 & 10 & 21)	160293-5
SW301	Band Switch (55-02-31)	160310-3
J301	CH-1 Phono Input	180631-2
J302	Tape Play	180631-2
J303	Tape Record (55-02)	180631-2
J304	AC Receptacle (55-01)	180555-1
J305	Phono Power	180520-4
J305**	Phono Power (55-02-21 & 31)	180626-1
J401	CH-2 Phono Input	180631#2
J402	CH-2 Audio Output (55-01)	180631-2
P301	Power Connector	180511-15
P301**	Power Connector (55-02-21 & 31)	180639-3
P302	CH-1 Output (55-02)	180559-1
P402	CH-2 Output (55-02)	180559-1
**	Contacts for Connectors	180628-1
	Dial Pointer	102448-2

* When installing 360781-2 transformer in place of original transformer, change R109 to 820 ohm, delete R325 and C208 (if used). Change 6BZ6 to 6BA6.

• Added on later chassis to reduce AM drift.

‡ Included in printed circuit pacs on 55-02-31 chassis.

Magnavox SERVICE MANUAL ... 1331

THE MAGNAVOX COMPANY • SERVICE DEPARTMENT
FORT WAYNE, INDIANA

57 SERIES RADIO CHASSIS

SPECIFICATIONS

Power Source Rating		Tuning Frequency Range	
Frequency	60 cycles	Broadcast Band	540-1620KC
Voltage	117 volts AC	FM Band	88-108MC
Wattage (with AMP 175)	175 watts	IF Frequency (AM)	455KC
		(FM)	10.7MC

TUBE COMPLEMENT

Ref.	Function	Type	Ref.	Function	Type
V101	FM RF Amplifier	6CY5	V201	IF Amplifier	6BA6
V102	FM Mixer	6U8	V202	Driver	6BA6
V103	AM RF Amplifier	6BZ6	V203	Ratio Detector	6AL5
V104	AM Converter	6BE6	V301	Audio Amplifier	12AX7

GENERAL

This manual contains service information on the 57 series radio chassis. These chassis are AM-FM tuners which requires an external amplifier for voltages and output. All chassis are designed for use with record changers which have been designed for reproduction of stereo records. Dual controls are used throughout.

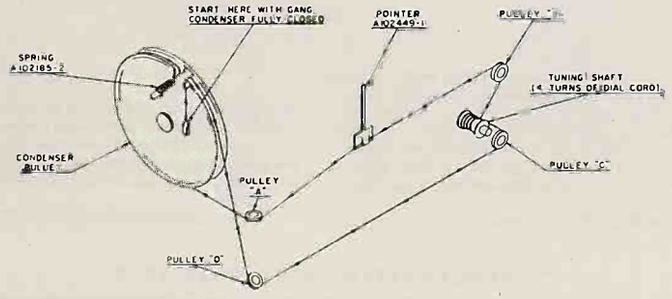
Additional input sockets are available on the rear apron of the chassis which will permit the operation of a monaural tape recorder in conjunction with instruments using either of these chassis. On the 57-03 chassis a stereo tape recorder can be used to either record or play.

Provisions are provided for the connection of an external AM or FM antenna. A terminal board having two connections marked FM, a connection marked AM and three other connections marked G, 1 and 2 are located on a fibre board fastened to the rear of the chassis. To connect an external FM antenna to these chassis merely connect it to the designated terminals. To connect an AM antenna use the designated terminal for the connection, however, the antenna should also be grounded to the chassis by connecting it to terminal "G".

Two different methods of identification markings were employed in these Chassis. Early production units were marked 57-01AA, 57-01BA, etc. Later production units were marked 57-01-00, 57-01-10, etc. Those chassis identified with the "00" markings are identical to those marked "AA" and the chassis marked "10" are identical to those marked "BA".

DIAL STRINGING GUIDE

Select a 64 inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.



ALIGNMENT

AM ALIGNMENT

Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	T105, T104	"	Adjust for max. output.
"	-----	-----	-----	"	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)

Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From (pin 5) to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with: 120 ohms (hig side) 0 ohms (low side)	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coil)	"	"
"	-----	-----	-----	-----	Repeat two preceding steps.

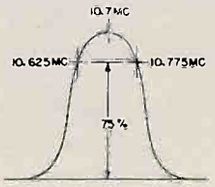


FIG 1
F.M. IF SELECTIVITY CURVE

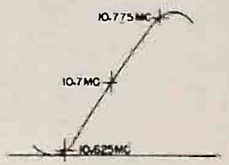


FIG 2
RATIO DETECTOR RESPONSE CURVE

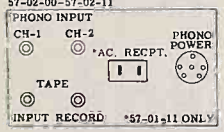
ALIGNMENT

F M I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
Note: Place 1 megohm resistor in series with hot scope lead.

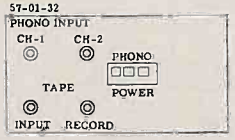
SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO	
6CY5(pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1
"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug		Adjust for best symmetry about 10.7 mc. See fig. 3.
"	"	-----	-----	---	Repeat steps 1, 2 and 3.

CHASSIS REAR PANEL

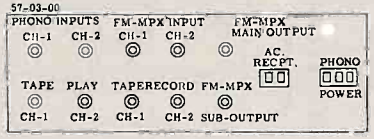
57-01-00 - 57-01-11 - 57-01-21
57-02-00-57-02-11



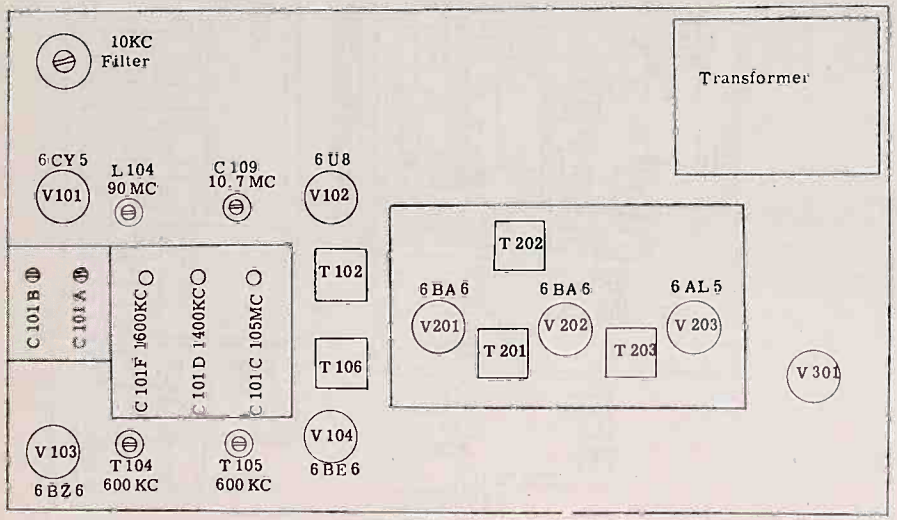
57-01-32



57-03-00

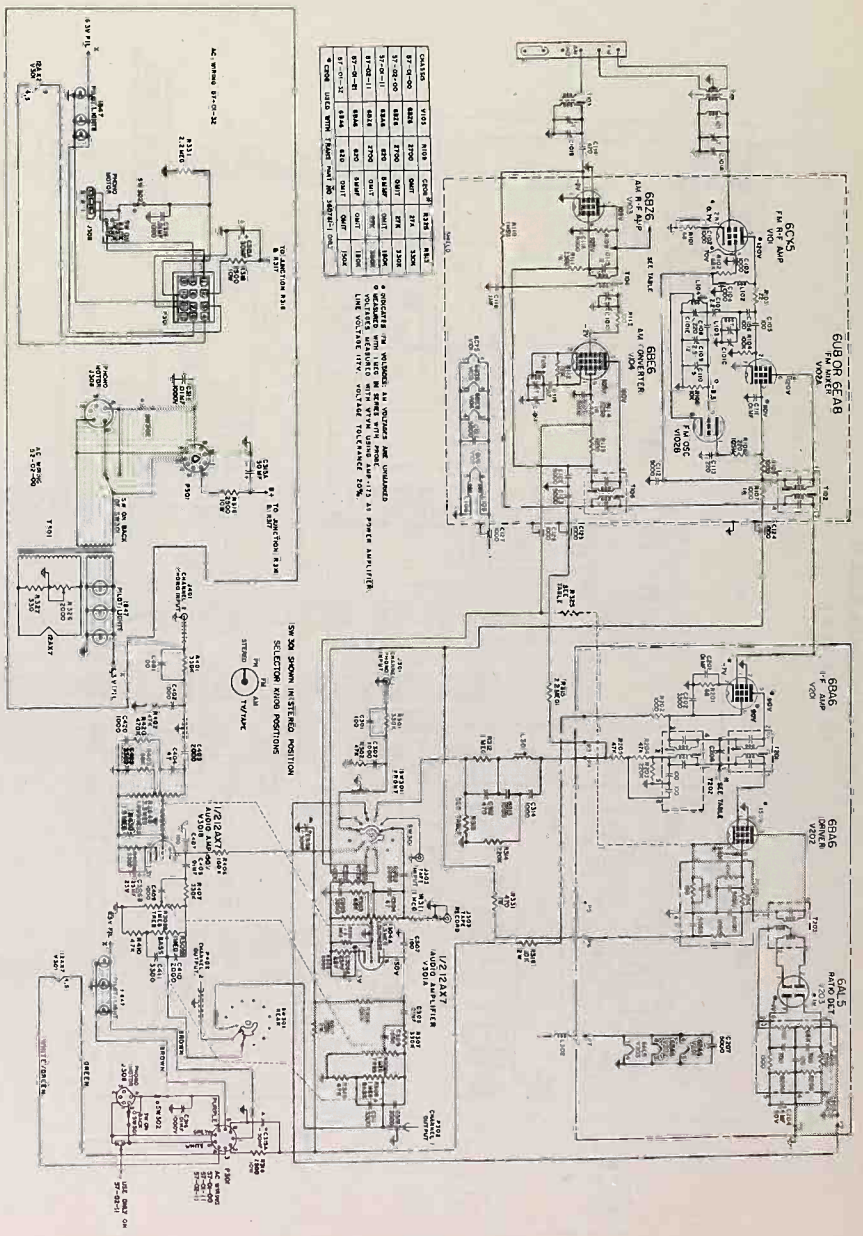


CHASSIS LAYOUT

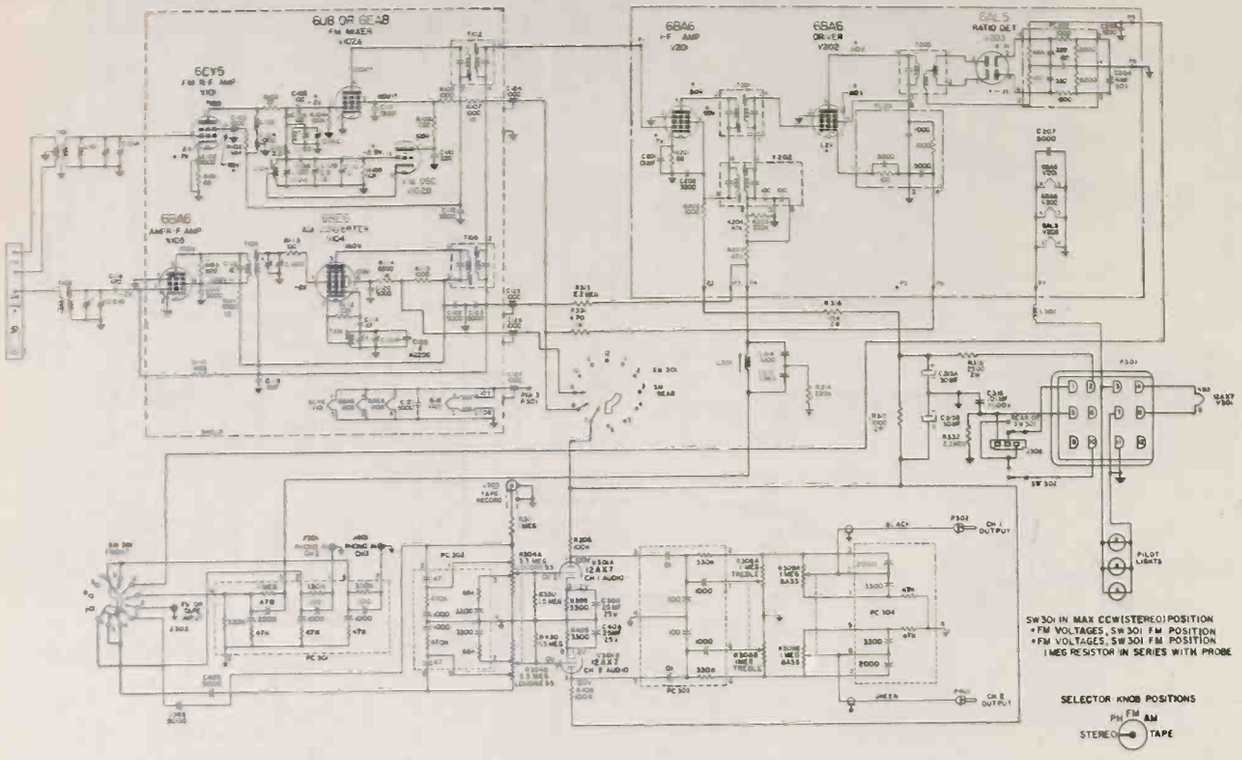


SCHEMATIC DIAGRAM

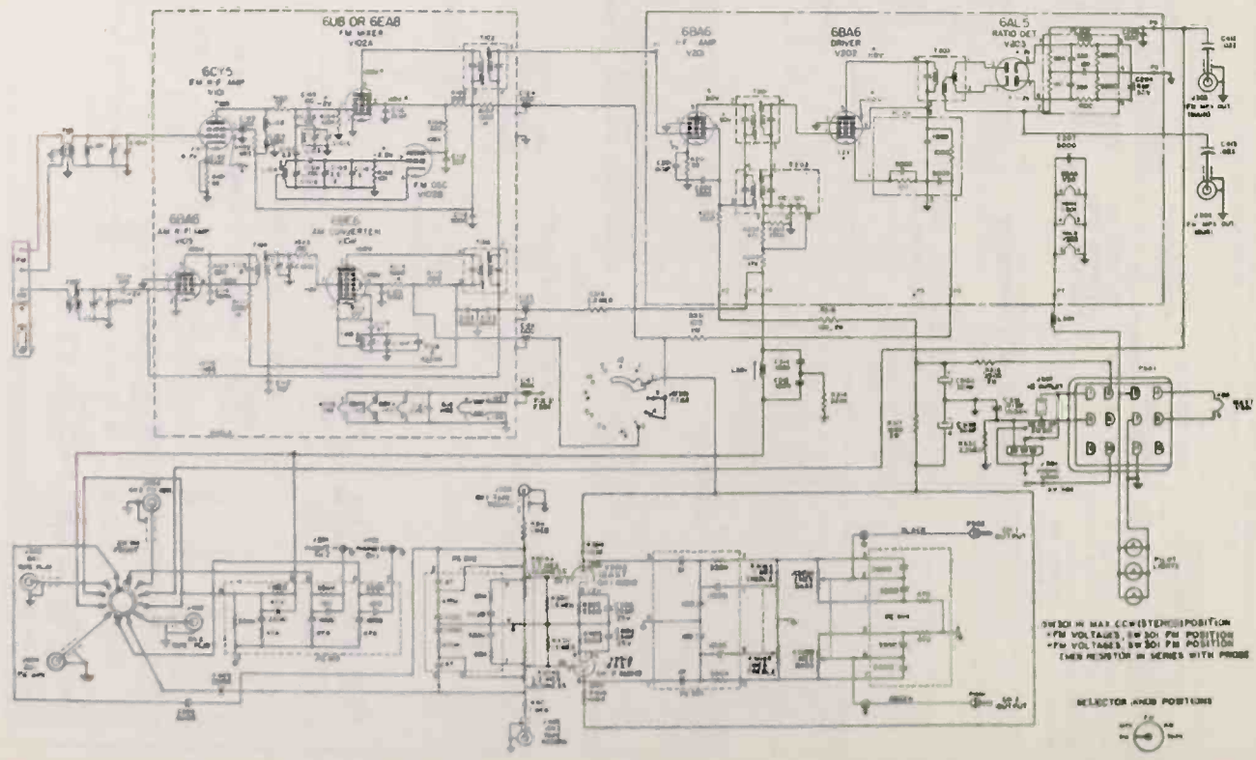
(57-01-00, 57-01-11, 57-01-21, 57-01-32, 57-02-00, 57-02-11)



SCHEMATIC DIAGRAM
(57-01-42)



SCHEMATIC DIAGRAM
(57-03-00)



REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NO.
	TRANSFORMERS & COILS	
T101	FM Input Transformer	360491-4
T102	1st FM I-F Transformer	360626-1
T103	Rod Antenna Assembly	360746-1
T103	Rod Antenna Assembly (57-03-00 & 57-01-32 & 42)	360746-2
T104	AM RF Transformer	360753-1
T105	AM Oscillator Transformer	360752-1
T106	1st AM IF Transformer	360611-1
T201	2nd FM IF Transformer	360747-1
T202	2nd AM IF Transformer	360781-1
T202*	2nd AM IF Transformer	360781-2
T203	Ratio Detector Transformer	360748-1
T301	Filament Transformer (57-02)	320076-1
L101	FM Antenna Coil	360750-1
L102	RF Choke	360522-9
L103	FM RF Coil	360751-1
L104	FM Oscillator Coil	360628-1
L105	RF Choke	360522-9
L106	RF Choke	360522-9
L301	10KC Filter	360621-1
L302	RF Choke	360522-9
	RESISTORS All resistors are 10%, ½ W unless specified otherwise	
R101	68	230104-48
R102	68K	230104-84
R103	22	230104-42
R104	100K	230104-86
R105	1000	230104-62
R106	220	230104-54
R107	1000, 1W	230105-62
R108	10K	230104-74
R109	2700	230104-67
R109*	820	230104-61
R110	1 meg	230104-98
R111	3300, 1W	230105-68
R112	22K	230104-78
R113	100	230104-50
R114	8200, 1W	230105-73
R115	1000	230104-62
R201	68	230104-48
R202	1000	230104-62
R203	220K	230104-90
R204	47K	230104-82
R205	47K	230104-82
R301‡	330K	230104-92
R302‡	47K	230104-82
R303‡	68K	230104-84
R304	3.3 meg Dual Loudness	220151-10
R305	3300	230104-68
R306	100K	230104-86
R307‡	330K	230104-92
R308	1 meg Dual Treble	220151-11
R309	1 meg Dual Bass	220151-11
R310‡	47K	230104-82
R311	1 meg	230104-98
R312	1 meg	230104-98
R313	330K	230104-92
R313	150K	230104-88
R314	220K	230104-90
R315	2.2 meg	230104-102
R316	10K, 2W	230106-1074
R317	1000, 2W	230106-1062
R318	2500, 10W	240076-26
R320‡	470K	230104-94
R325	27K, 2W	230106-79
R326	2000 Hum Balance (57-02)	220120-4
R327	330 (57-02)	230104-56
R330	1.5 meg	230104-100
R331	470 1W	230105-58
R332	22 meg	230104-102
R401‡	330K	230104-92
R402‡	47K	230104-82
R403‡	68K	230104-84
R405	3300	230104-68
R406	100K	230104-86
R407‡	330K	230104-92
R410‡	47K	230104-82
R411	1 meg	230104-98
R420‡	470K	230104-82
R430	1.5 meg	230104-100
	CAPACITORS All capacitors are 20%, 500V unless specified otherwise	
C101	Tuning Capacitor	260147-1
C102	Feed Thru, 1000 mmf	250276-2
C103	Feed Thru, 1000 mmf	250276-2
C104	Feed Thru, 1000 mmf	250276-1

SYMBOL	DESCRIPTION	PART NO.
C105	Mica, 100 mmf	250187-53
C106	Mica, 100 mmf	250187-53
C107	Mica, 2.2 mmf	250211-118
C108	Mica, 220 mmf	250187-57
C109	Cer., 2.5 - 42mmf (Trimmer)	250188-9
C110	Cer., 5 mmf, 5%	250088-138
C111	Paper, .01 mfd, 400V	250211-7
C112	Cer., 5000 mmf	250175-30
C113	Mica, 220 mmf	250187-57
C114	Mica, 470 mmf	250159-102
C115	Cer., 12 mmf, 5%	250088-179
C116	Cer., 5000 mmf	250175-30
C118	Mylar, .1 mfd, 100V	250261-125
C119	Cer., 47 mmf	250218-17
C120	Cer., 5000 mmf	250175-30
C121	Cer., 5000 mmf	250175-30
C122	Cer., 5000 mmf	250175-30
C123	Cer., 5000 mmf	250175-30
C124	Feed Thru, 1000 mmf	250276-1
C125	Feed Thru, 1000 mmf	250276-1
C126	Feed Thru, 1000 mmf	250276-1
C127	Feed Thru, 1000 mmf	250276-1
C128	Mica, 8 mmf - 5% (N2200)	250088-180
C201	Cer., .01 mfd	250234-66
C202	Cer., 3300 mmf	250234-154
C203	Cer., 1500 mmf	250234-146
C204	Elect. 4 mfd, 50V	270021-71
C207	Cer., 5000 mmf	250236-1
C208*	Cer., 5 mmf - 5% (N470)	250088-135
C301‡	Cer., 100 mmf	250218-22
C302‡	Cer., 1000 mmf	250218-8
C303	Cer., 2000 mmf	250218-20
C304‡	Cer., 47 mmf	250218-17
C305‡	Cer., 3300 mmf, 10%	250175-28
C306	Electro. 25-25 mfd, 25V	270043-1
C307‡	Cer., 100 mmf	250218-22
C308‡	Cer., .01 mfd	220218-19
C309‡	Cer., 1000 mmf	250218-8
C310‡	Cer., 2000 mmf	250218-20
C311‡	Cer., 3300 mmf, 10%	250175-28
C312	Cer., 470 mmf	250218-6
C313	Cer., 1000 mmf, 5%	250228-354
C314	Cer., 1000 mmf, 5%	250228-354
C315	Electro., 30-30 mfd, 450V	270021-58
C316	Cer., .01 mfd, 1000V	250219-2
C320‡	Cer., 1000 mmf	250218-8
C401‡	Cer., 100 mmf	250218-22
C402‡	Cer., 1000 mmf	250218-8
C403	Cer., 2000 mmf	250218-20
C404‡	Cer., 47 mmf	250218-17
C405	Cer., 3300 mmf, 10%	250175-28
C407‡	Cer., 100 mmf	250218-22
C408‡	Cer., .01 mfd	250218-19
C409‡	Cer., 1000 mmf	250218-8
C410‡	Cer., 2000 mmf	250218-20
C411‡	Cer., 3300 mmf, 10%	250175-28
C420‡	Cer., 1000 mmf	250175-28
	MISCELLANEOUS	
SW301	Band Switch	160293-1
SW301	Band Switch (57-01-42)	160310-1
SW301	Band Switch (57-03-00)	160306-5
J301	CH-1 Phono Input	180631-2
J301	CH-1 Phono Input (57-03-00)	180655-1
J302	CH-2 Phono Input	180631-2
J302	CH-2 Phono Input (57-03-00)	Part of J301
J303	CH-1 Tape Record	180631-2
J303	CH-1 Tape Record (57-03-00)	Part of J301
J304	CH-1 FM-MPX (57-03-00)	Part of J301
J305	Main FM-MPX Output (57-03-00)	Part of J301
J306	Sub FM-MPX Output (57-03-00)	Part of J301
J307	AC Outlet (57-03-00 & 57-02-11)	180555-1
J308	Phono Power	180520-4
J308†	Phono Power (57-01-32 & 42 & 57-03-00)	180626-1
J401	CH-2 Phono Input	180631-2
J401	CH-2 Phono Input (57-03-00)	Part of J301
J402	CH-2 Tape Play (57-03-00)	Part of J301
J403	CH-2 Tape Record (57-03-00)	Part of J301
J404	CH-2 FM-MPX (57-03-00)	Part of J301
P301	Tuner Power	180511-15
P301†	Tuner Power (57-01-32 & 42 & 57-03-00)	180639-3
†	Contact for J308 & P301 (12 used)	180628-1
P302	CH-1 Output	180559-1
P402	CH-2 Output	180559-1
PC201	Printed Circuit	250255-2
PC201	Printed Circuit (57-01-42 & 57-03-00)	250330-1
PC202	Printed Circuit	250254-2
PC301	Printed Circuit (57-01-42 & 57-03-00)	250315-1
PC302	Printed Circuit (57-01-42 & 57-03-00)	250316-1
PC303	Printed Circuit (57-01-42 & 57-03-00)	250318-1
PC304	Printed Circuit (57-01-42 & 57-03-00)	250317-1
	Dial Glass	835321-1
	Dial Pointer	150534-1

Magnavox SERVICE MANUAL ... 1330

THE MAGNAVOX COMPANY · SERVICE DEPARTMENT
FORT WAYNE, INDIANA

59 SERIES RADIO CHASSIS

GENERAL

The 59 Series Radio Tuner is an AM-FM tuner designed to work in conjunction with an external amplifier such as the Amp-196. All voltages are obtained from the external amplifier.

Provisions are provided for the connection of an external AM and FM antenna. A terminal board located on a fibre board mounted to the rear of the chassis has the necessary terminals for making these connections. Before connecting an external FM antenna, however, make sure the built-in FM antenna is disconnected.

The chassis is used with record changers and amplifiers which have been designed for reproduction of stereo records. Dual controls are used through-out which vary the output and the response of each channel simultaneously.

The chassis are identified by a production code which is stenciled on the chassis pan. The first two digits of this code identify the basic chassis series number (59). Following this are the two digits which identify the different versions within the series. The last two digits of the code are used to identify production changes, 00 being the original production code. A change in the first number will indicate an electrical change and a change in the second number will indicate a mechanical change. Minor changes are not identified.

SPECIFICATIONS

Power Supply	
Frequency	60 cps
Voltage	117 volts
Tuning Frequency Range	
Broadcast Band	540-1620KC
FM Band	88-108MC
IF Frequency	10.7MC/455KC

TUBE COMPLEMENT

Ref.	Function	Type
V1	FM RF Amplifier	6DT8
V2	AM Converter	6BE6
V3	CH-1 & CH-2 Audio Amp.	12AX7
V201	IF Amplifier	6BA6
V202	IF Amplifier	6BA6
V203	Ratio Detector	6AL5

ALIGNMENT INSTRUCTIONS

1. Before proceeding with the alignment, loosen the two set screws on the tuning shaft collar. Set the AM tuning gang wide open and rotate this collar counter-clockwise until the cord from the FM tuner is snug but no extra tension is applied. Tighten the set screws on the collar.
2. Use an isolation transformer when aligning the set.
3. Allow 10-20 minute warm-up time.
4. Place a 9-pin tube shield over the 6DT8. Check this shield to make sure it isn't grounded.

AM ALIGNMENT
Set band switch to AM position.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		VTVM	
6BE6 (pin 7 thru .01 mfd	455KC (modulated)	Near 1000 KC (free of interference)	T202, T4, top and bottom slugs	Across voice coil	Adjust for max. output.
AM ant. term. thru 10 mmf	1400KC (modulated)	1400KC	C12A C12C	"	"
"	600KC (modulated)	600KC	L6	"	Adjust for max. output.
"	-----	-----	-----	"	Repeat steps 2 and 3.

ALIGNMENT INSTRUCTIONS (CONT.)

FM ALIGNMENT (Using AM Signal Generator and VTVM)
Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		VTVM	
6DT8 Tube Shield	10.7MC unmodulated	High end of dial	T201, T2 top and bottom slugs and T203 bottom slug	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	High end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos or neg.)
"	"	High end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with 120 ohms (high side 150 ohms (low side)	106MC	106MC	C9	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	90MC	90MC	C3	"	"
"	-----	-----	-----	-----	Repeat two preceding steps.

FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO:	
6DT8 Tube Shield	10.7MC (.3MC sweep) couple a marker sig. to 6DT8 tube shield	High end of dial	T201, T2 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See Fig. 1
"	"	High end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See Fig. 2.
"	"	High end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 MC See Fig. 2.
"	"	-----	-----	-----	Repeat steps 1, 2 & 3.

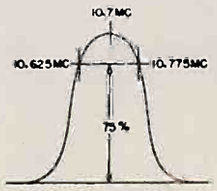


FIG 1
F.M. IF SELECTIVITY CURVE

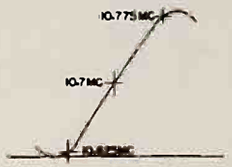
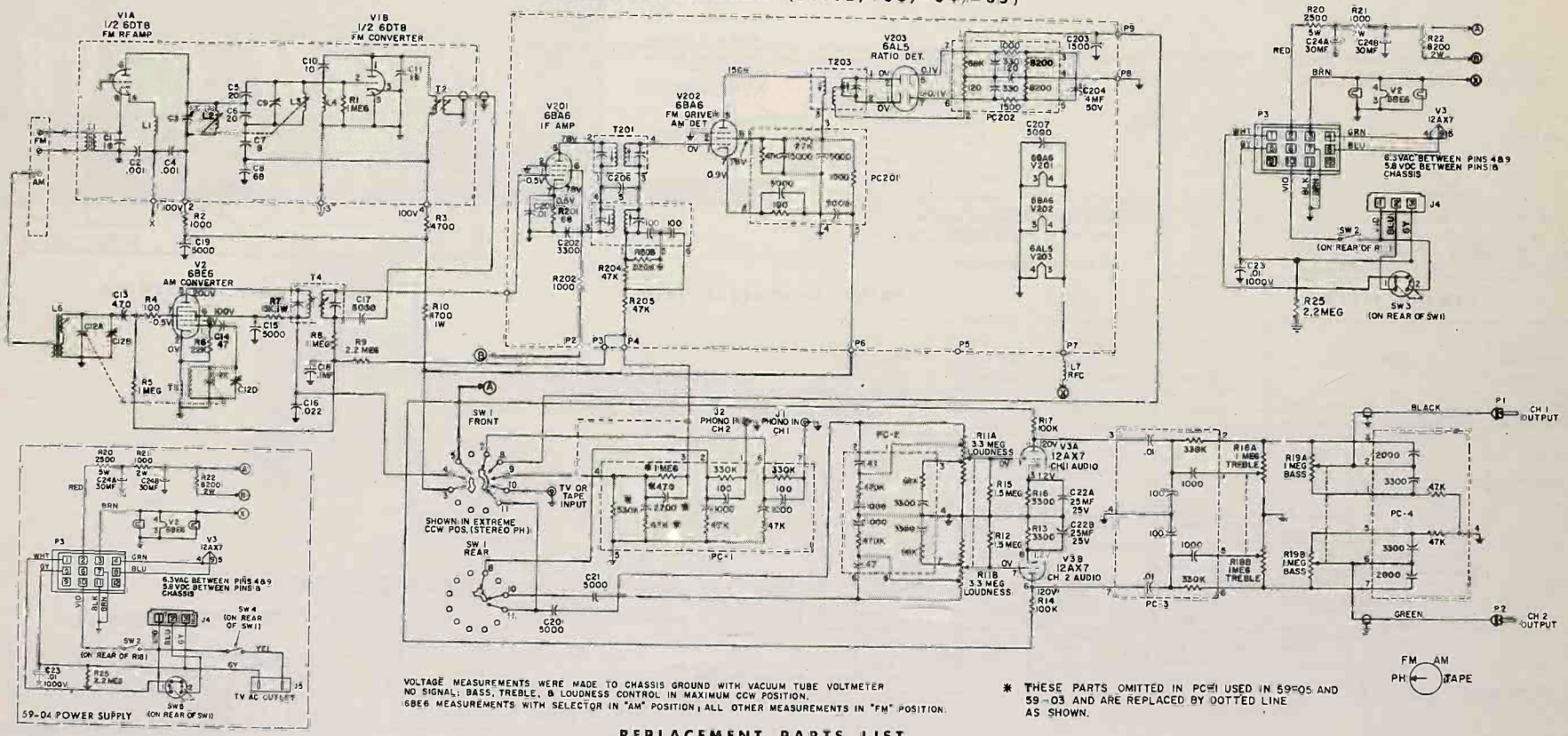


FIG 2
RATIO DETECTOR RESPONSE CURVE

SCHEMATIC DIAGRAM (59-02,-03,-04,-05)



VOLTAGE MEASUREMENTS WERE MADE TO CHASSIS GROUND WITH VACUUM TUBE VOLTMETER NO SIGNAL; BASS, TREBLE, & LOUDNESS CONTROL IN MAXIMUM CCW POSITION. 6BE6 MEASUREMENTS WITH SELECTOR IN "AM" POSITION; ALL OTHER MEASUREMENTS IN "FM" POSITION.

* THESE PARTS OMITTED IN PC#1 USED IN 59-05 AND 59-03 AND ARE REPLACED BY DOTTED LINE AS SHOWN.

REPLACEMENT PARTS LIST

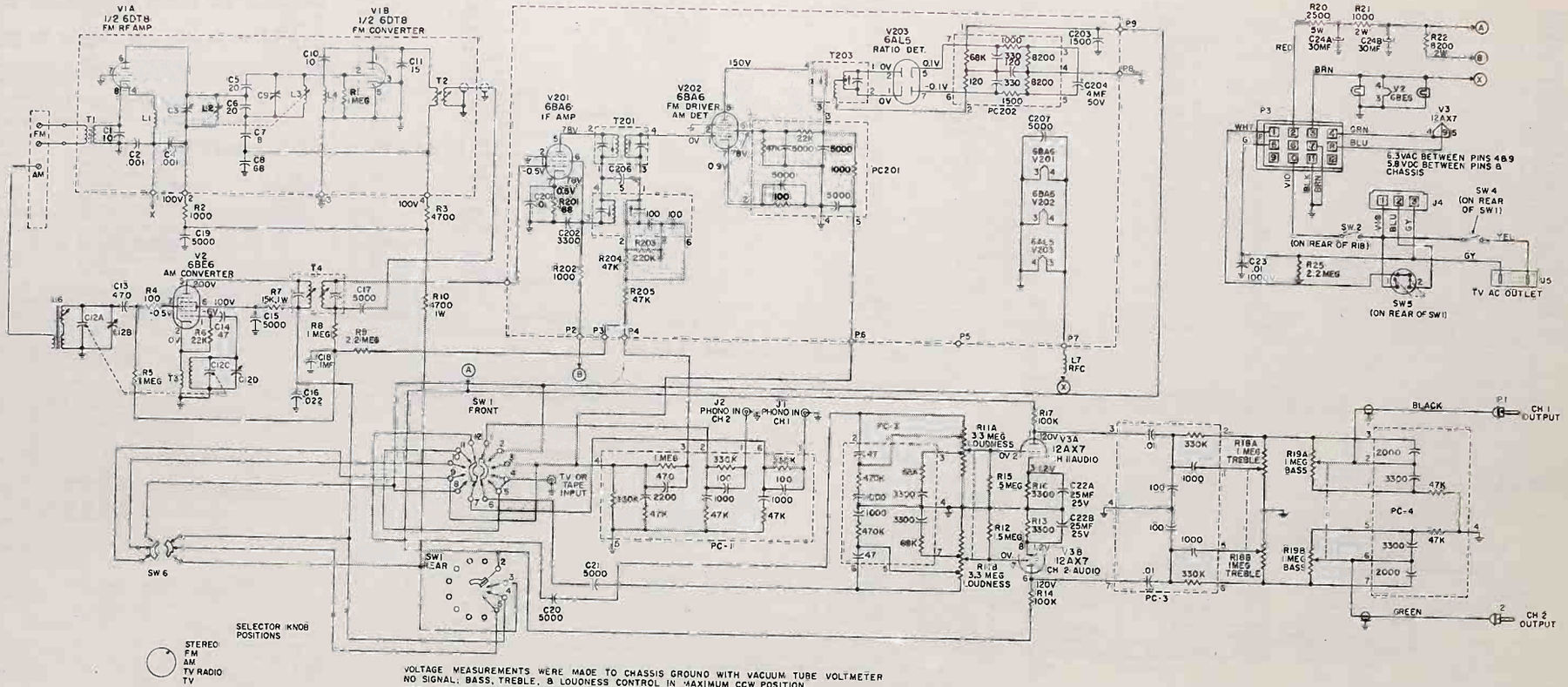
SYMBOL	DESCRIPTION	PART NO.
	TRANSFORMERS-COILS-CHOKES	
L1*	RF Choke	
L2*	FM RF Coil Assembly	360791-1
L3*	Part of L2 Assembly	-----
L4*	Part of L2 Assembly	-----
L5	Rod Antenna Assembly	360782-2
L7	RF Choke	360522-9
T1*	FM Input Transformer	360789-1
T2*	FM IF Transformer	360790-1
T3	AM Oscillator Transformer	360702-1
T4	AM IF Transformer	360611-1
T201	2nd FM IF Transformer	360747-1
T202	2nd AM IF Transformer	360781-1
T203	Ratio Detector Transformer	360748-1
	* The lead inductance plus a small Ferrite Bead forms this choke.	
	RESISTORS	
R1*	1 meg	250153-1
R2	1000	230104-62
R3	4700	230104-70
R4	100	230104-50
R5	1 meg	230104-98
R6	22K	230104-78
R7	15K, 1W	230145-20
R8	1 meg	230104-98
R9	2.2 meg	230104-102
R10	4700, 1W	230145-17
R11	3.3 meg, Loudness (59-01-00 & 59-04-00)	220151-17
R11	3.3 meg, Loudness (59-01-11 & 59-02-00)	220151-19

SYMBOL	DESCRIPTION	PART NO.
R11	3.3 meg, Loudness (59-03-00 & 59-05-00)	220151-24
R12	1.5 meg	230104-100
R13	3300	230104-88
R14	100K	230104-86
R15	1.5 meg	230104-100
R16	3300	230104-88
R17	100K	230104-86
R18	1 meg, Treble & Switch (59-01-00 & 59-04-00)	220150-6
R18	1 meg, Treble & Switch (59-01-11 & 59-03-00 & 59-05-00)	220150-7
R18	1 meg, Treble & Switch (59-02-00)	220150-8
R19	1 meg, Bass (59-01-00 & 59-04-00)	220151-16
R19	1 meg, Bass (59-01-11 & 59-03-00 & 59-05-00)	220151-23
R19	1 meg, Bass (59-02-00)	220151-18
R20	2500, 5W, W.W.	240071-43
R21	1000, 2W	230146-13
R22	8200, 2W	230146-73
R25	2.2 meg	230104-102
R201	68	230104-48
R202	1000	230104-62
R203	220K	230104-90
R204	47K	230104-82
R205	47K	230104-82
R206	1.5 meg	230104-100
	CAPACITORS	
C1*	10 mmf, 10%, N750	250313-1
C2*	1000 mmf	250314-1

SYMBOL	DESCRIPTION	PART NO.
C3*	Trimmer 2-10 mmf	250306-1
C4*	1000 mmf	250314-1
C5*	20 mmf, 5%, NPO	250309-1
C6*	20 mmf, 5%, NPO	250309-1
C7*	8.2 mmf, 0%, P100	250310-1
C8*	68 mmf, 5%, N750	250308-1
C9*	Trimmer 2-6 mmf	250307-1
C10*	10 mmf, 10%, N470	250312-1
C11*	15 mmf, 10%, NPO	250311-1
C12	AM Tuning Gang (59-01 & 03)	260154-1
C12	AM Tuning Gang (59-02)	260139-3
C13	Cer., 470 mmf	250218-6
C14	Cer., 47 mmf	250218-17
C15	Cer., 5000 mmf	250175-30
C16	Paper, .022 mfd, 400V	250211-9
C17	Cer., 5000 mmf	250175-30
C18	Mylar, .1 mfd, 100V	250261-125
C19	Cer., 5000 mmf	250175-30
C20	Cer., 5000 mmf	250175-30
C21	Cer., 5000 mmf	250175-30
C22	Elect. 25-25 mfd, 25V	270043-1
C23	Cer., .01 mfd, 1000V	250219-2
C24	Elect. 30-30 mfd, 450V	270021-58
C201	Cer., .01 mfd.	250234-66
C202	Cer., 3300 mmf	250234-154
C203	Cer., 1500 mmf	250234-146
C204	Elect. 4 mfd, 50V	270559-9
C205	Paper, .1 mfd, 200V	250240-13
C207	Cer., 5000 mmf	250236-1
	MISCELLANEOUS	
PC1	Printed Circuit (59-03-00 & 59-05-00)	250315-2

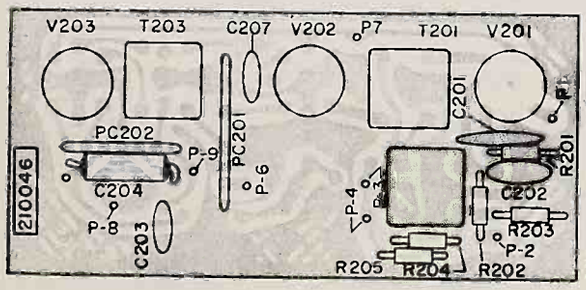
SYMBOL	DESCRIPTION	PART NO.
PC1	Printed Circuit (All Others)	250315-1
PC2	Printed Circuit	250316-1
PC3	Printed Circuit	250318-1
PC4	Printed Circuit	250317-1
PC201	Printed Circuit	250255-2
PC202	Printed Circuit	250254-2
SW1	Band Switch (59-01-00)	160307-1
SW1	Band Switch (59-01-11)	160307-3
SW1	Band Switch (59-02-00)	160306-2
SW1	Band Switch (59-03-00 & 59-05-00)	160306-7
SW1	Band Switch (59-04-00)	160312-1
SW6	AM-TV & FM-TV Switch (59-01)	160169-11
J1	Channel 1 Phono Input	180566-3
J2	Channel 2 Phono Input	Part of J1
J3	TV or Tape Input	Part of J1
J4	Phono Power	180628-1
J5	AC Receptacle (59-01)	180555-1
P1	CH-1 Output	180559-1
P2	CH-2 Output	180559-1
P3	Tuner Power	180639-3
	Dial Pointer	636180-2
	FM Tuner Assembly	700771-2
	Dial Glass (59-01-00)	150582-2
	Dial Glass (59-01-11)	150582-4
	Dial Glass (59-03-00)	150586-3
	Dial Glass (59-04-00)	150586-2
	Dial Glass (59-05-00)	150603-1
	Dial Scale (59-02-00)	140320-1
	Contacts (J4 & P3)	180628-1
	*Part of Assembly 700771-2	

SCHEMATIC DIAGRAM (59-01-00 & 11)

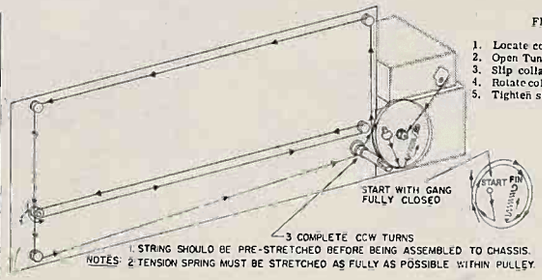


VOLTAGE MEASUREMENTS WERE MADE TO CHASSIS GROUND WITH VACUUM TUBE VOLTMETER NO SIGNAL; BASS, TREBLE, & LOUDNESS CONTROL IN MAXIMUM CCW POSITION.
6BE6 MEASUREMENTS WITH SELECTOR IN "AM" POSITION; ALL OTHER MEASUREMENTS IN "FM" POSITION.
SW-1 B, SW-6 SHOWN IN CCW POSITION. SWITCHES VIEWED FROM KNOB END.
SW-1 STEREO POSITION, SW-6 AM-TV POSITION.

PRINTED WIRING CIRCUIT



DIAL STRINGING GUIDE

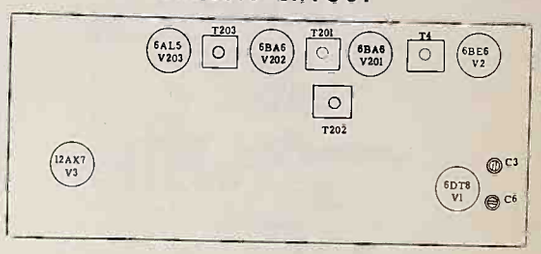


FM STRINGING INSTRUCTIONS

1. Locate collar on string.
2. Open Tuning Capacitor full C. C. W.
3. Slip collar with string shaft as far as possible.
4. Rotate collar C. W. to take up free slack in string.
5. Tighten set screws.

NOTES: 1. STRING SHOULD BE PRE-STRETCHED BEFORE BEING ASSEMBLED TO CHASSIS.
2. TENSION SPRING MUST BE STRETCHED AS FULLY AS POSSIBLE WITHIN PULLEY.

CHASSIS LAYOUT



SERVICE MANUAL

AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 605A

Airline

AUTOMATIC RADIO PHONOGRAPH

MODEL GAA-2657A

FORM NO. 62Z-52178*

MODEL GAA-2657A MAHOGANY

ELECTRICAL SPECIFICATIONS

POWER SUPPLY - 105 to 125 volts A.C. 60 cycles, 50 watts with record changer operating

FREQUENCY RANGE - 535 to 1620 KC

INTERMEDIATE FREQUENCY - 455 KC

SELECTIVITY - 40 KC broad at 1000 times signal, 1000 KC.

SENSITIVITY - (.05 watt output with Hazeltine test loop) 250 Microvolts per meter over-all.

POWER OUTPUT - .7 watts maximum, 1% distortion
1.1 watts maximum, 10% distortion

RECORD CHANGER - Wm 1210 (Supersedes 5124A and 5131A)

TUBE COMPLEMENT

1 - 12BE6 Mixer
1 - 12BA6 I.F. Amplifier
1 - 12AT6 Detector, AVC, Audio
1 - 50C5 Audio Output
1 - 35W4 Rectifier

NOTE: The Wm-1210 changer uses Universal Part Number 60-48 Crystal Cartridge. The needles on this cartridge are not replaceable, as the cartridge and needles are in one unit. It will be necessary, therefore, when a needle is worn, to replace the complete cartridge.

M O N T G O M E R Y W A R D

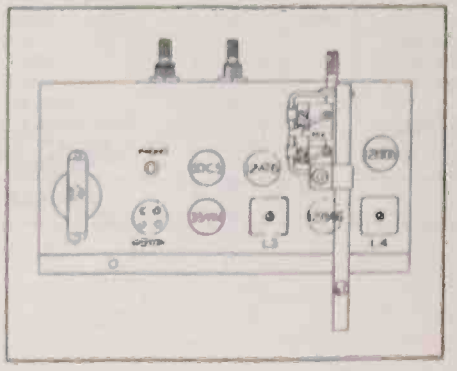
ALIGNMENT PROCEDURE

The following equipment is required for aligning: A Signal generator which will provide an accurately calibrated signal at the indicated test frequencies, an output indicating meter, a non-metallic screwdriver.

Radiation Loop: 2-turn loop, 6 inches in diameter.
Conditions for Alignment:
Tone - Treble
Volume - Maximum
Selector Switch - 'Radio' position
Test loop coupled loosely to receiver by spacing - receiver loop in same position as it will be with chassis in cabinet.

SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	REMARKS	ADJUST FOR MAXIMUM OUTPUT
LOOP	455 KC	Low End of Band	Across Voice Coil	Short out osc. tuning gang section A5, compress A6	L3, L4, top & bottom screws
LOOP	1620 KC	High End of Band	"	Remove short across A5	A4 Full Open
LOOP	1400 KC		"	Set pointer to 140 on dial	A5
LOOP	600 KC		"	Check for tracking on low end of band	
LOOP	1400 KC	1400	"	Recheck Alignment	A6 if necessary

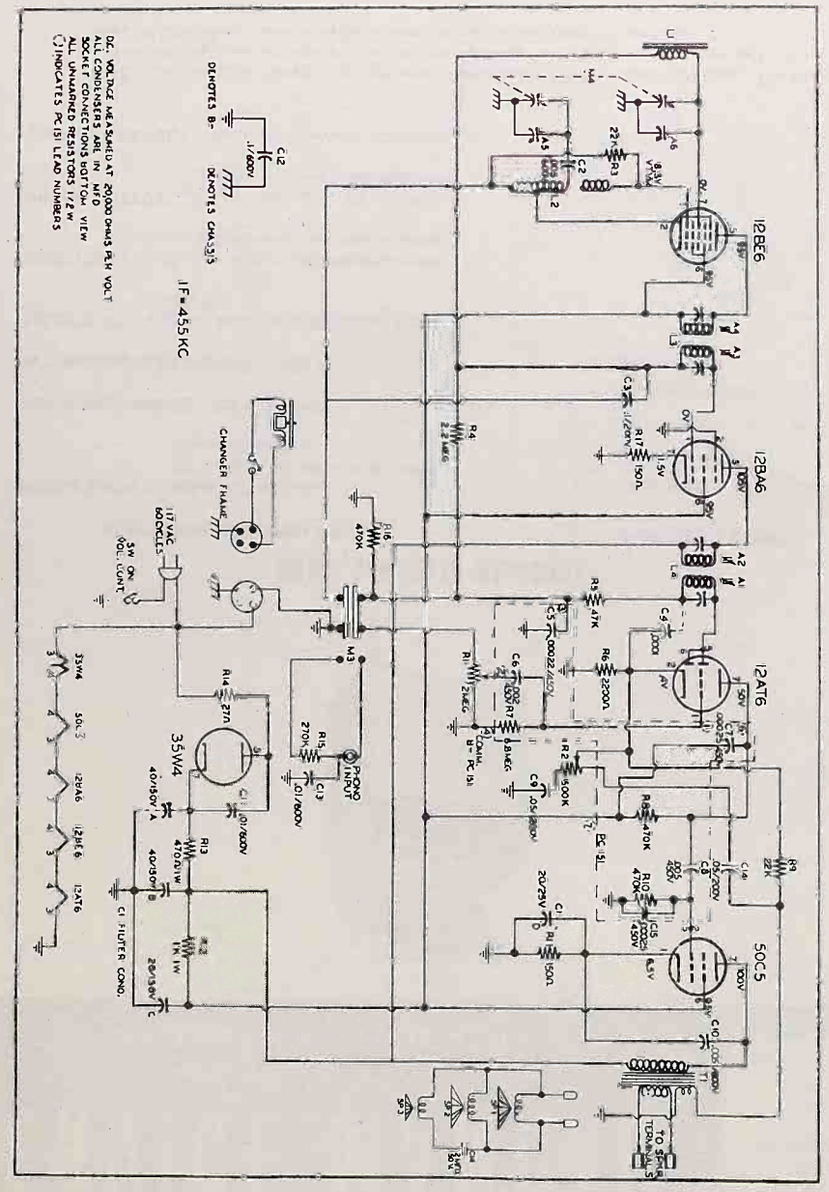
TUBE LAYOUT



MONTGOMERY WARD RADIO PAGE 27-1

MODEL GAA-2657A

SCHEMATIC DIAGRAM



PARTS LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
		RESISTORS			CONDENSERS (CONT.)
R1, SW	412A	Volume Control & Switch (2 Meg)	C5, C6, C7, C8 C15	827	Couplate (Centralab PC-151)
R2, M3	411A	Tone Control & Radio-Phono Switch (500K Ohm)			
R3, R9		22K Ohm, 1/2 Watt	C9, C14		.05 MFD 200 Volt
R4		2.2 Meg, 1/2 Watt	C11, C13		.01 MFD 600 Volt
R5		47K Ohm, 1/2 Watt	C12		.1 MFD 600 Volt
R6		2.2K Ohm, 1/2 Watt	C14	830A	2 MFD 50 Volt
R7, R8, R10	827	Couplate (Centralab PC-151)			
R11, R17		150 Ohm, 1/2 Watt			COILS & TRANSFORMERS
R12		1K Ohm, 2 Watt	L1	1509	Ferrite-Core Antenna
R13		470 Ohm, 2 Watt	L2	1408A	Oscillator Coil
R14	542	27 Ohm, Fuse Type	L3	1405	First I.F. Transformer
R15		270K Ohm, 1/2 Watt	L4	1406A	Second I.F. Transformer
R16		470K Ohm, 1/2 Watt	T1	1209C	Output Transformer
		CONDENSERS			MISCELLANEOUS
M4, A5, A6	1017	Tuning Gang and Trimmers	SP1, SP2	2642	6" P.M. Speaker - 6.4 Ohm Voice Coil
C1A, B, C, D	1019	40/40/20 MFD-150 Volts, 20 MFD-25 Volt Electrolytic	SP3	2633	3½" P.M. Speaker
C2, C10		.005 MFD 600 Volt		2466	Knob (Tuning)
C3		.1 MFD 200 Volt		2467	Knob (Loudness-Off-On Radio-Phono)
C4		Contained in L4		1659	Dial Panel
					Cartridge-Electro Voice Power Point #56 (use 60-48)

NOTE: USE UNIVERSAL PARTS WHERE PART NUMBERS ARE NOT SHOWN. ORDER FROM (LRS).

SERVICE MANUAL

AND REPAIR PARTS

FOR REPAIR SERVICE DEPARTMENT

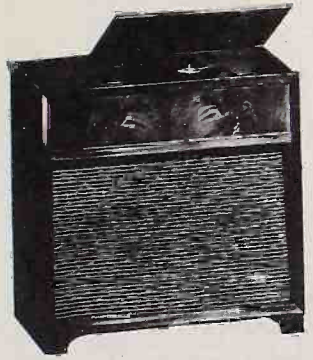
MANUAL 574A

HI-FI CONSOLE AM-FM RADIO-PHONO. MODELS GAA-2620A, GAA-2621A

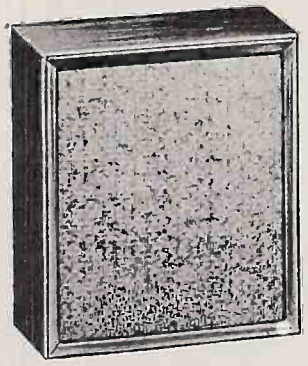
EXTENSION SPEAKER MODELS GAA-301, GAA-302

SERIAL NO. 75K

FORM NO. 62Z-5154B



MODEL GAA-2620A MAHOGANY GAA-2621A BLOND



MODEL GAA-301 MAHOGANY GAA-302 BLOND

ELECTRICAL SPECIFICATIONS

POWER SUPPLY—105-125 volts AC 60 cycles, 120 watts with record changer.

FREQUENCY RANGES—AM—540—1600KC
FM—88—108 MC

I.F. FREQUENCY—AM—455 KC
FM—10.7 KC

AMPLIFIER FREQUENCY RESPONSE—30 to 15,000 CPS

POWER OUTPUT—18 watts maximum. 10 watts at less than 1% distortion.

LOUDSPEAKERS—2-12" Alnico V P.M. 2-5" Alnico V P.M.

RECORD CHANGER—VM 1200 (covered in Manual 5124A)

CARTRIDGE—Electro-Voice Power-Point 56 DS (use 60-51)

NOTE: The needles on this cartridge are not replaceable, as the cartridge and needle are on one unit. It will be necessary, therefore, to replace the complete cartridge when a needle is worn.

Two types of cartridge pivot mechanisms have been used. The "turn-over" type (with gears) may be ordered from the source under Part No. 25898. The "turn-under" type may be ordered as Universal Part No. 60-52 from (LRS).

TUBE, DIODE, AND DIAL LAMP COMPLEMENT—1—6CB6 FM R.F. Amplifier
1—12AT7 FM Osc. and Mixer
3—6AU6 FM IF Amplifiers
1—6AL5 FM Detector
1—6BE6 AM Osc. and Mixer
1—6BA6 AM IF Amplifier
1—1N64 AM Detector
1—12AU7 Audio Amplifier
1—6SN7GTB Audio Amp. & Phase Inverter
2—6V6GT Audio Output
1—5U4GB Rectifier
2—#47 Dial Lamps
1—#47 Indicator Lamp

SERVICE LETTER REMINDER

Record number of Service Letters below that apply to models listed in this manual.

M O N T G O M E R Y W A R D

ALIGNMENT PROCEDURE

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as Listed.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antenna—.1 mf.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for 15 Minutes.

SIGNAL GENERATOR			GANG SETTING	ADJUST	ADJUST FOR	NOTES
FREQUENCY SETTING	CONNECT TO	DUMMY ANTENNA				
455KC	PIN 7 (CONTROL GRID) OF V-8	.1 MFD	OPEN	A-4 A-5 A-6-A-7	MAXIMUM OUTPUT	
1620KC	YELLOW WIRE ON L10	1. MMF*	OPEN	A-10	MAXIMUM OUTPUT	*2 TURNS INSULATED WIRE MAY BE USED.
1400KC	YELLOW WIRE ON L10	1. MMF*	MAX. OUTPUT—1400KC	A-12	MAXIMUM OUTPUT	

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below.

Non-metallic screwdriver.

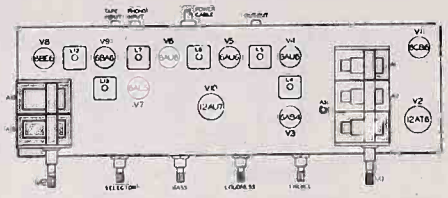
Dummy Antennas and I-F Loading Resistor—5000 mmf, 300 ohms.

Zero center scale DC vacuum tube voltmeter having a range of approximately 3 volts.

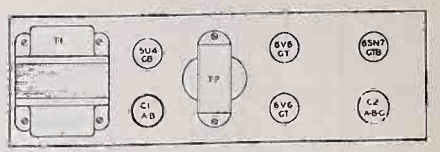
Allow chassis and signal generator to "Heat Up" for 15 minutes.

SIGNAL GENERATOR			GANG SETTING	CONNECT VTVM TO	ADJUST	ADJUST FOR	NOTE
FREQ.	CONNECT TO	THROUGH DUMMY					
10.7 MC.	PIN 7 V-8	5000 MMF.	OPEN	JUNCTION OF R19 & R20	A-10 (TOP L7)	MAX. + OR -	L1 SHOULD BE DETUNED WHILE MAKING THIS ADJUSTMENT
10.7 MC.	PIN 7 V-8	5000 MMF.	OPEN	JUNCTION OF R19 & R20	A-11 (BOTTOM L7)	0. VOLTS (BALANCE)	
10.7 MC.	PIN 7 V-8	5000 MMF.	OPEN	JUNCTION OF R15 & C20	A-9, A-8, A-7 A-6 A-5, A-4	MAXIMUM VOLTAGE	ADJUST INPUT SIGNAL FOR 1.5 TO 3. VOLTS DEFLECTION
10.5 MC.	ANT. TERMINAL	300 OHM	OPEN	JUNCTION OF R15 & C20	A-3	MAXIMUM VOLTAGE	
105 MC.	ANT. TERMINAL	300 OHM	TUNE FOR 105. MC.	JUNCTION OF R15 & C20	A-2	MAXIMUM VOLTAGE	ROCK GANG WHILE MAKING THIS ADJUSTMENT.
103. MC.	ANT. TERMINAL	300 OHM	TUNE FOR 105. MC.	JUNCTION OF R15 & C20	A-1	MAXIMUM VOLTAGE	

R.F. CHASSIS
TUBE AND TRIMMER LOCATION

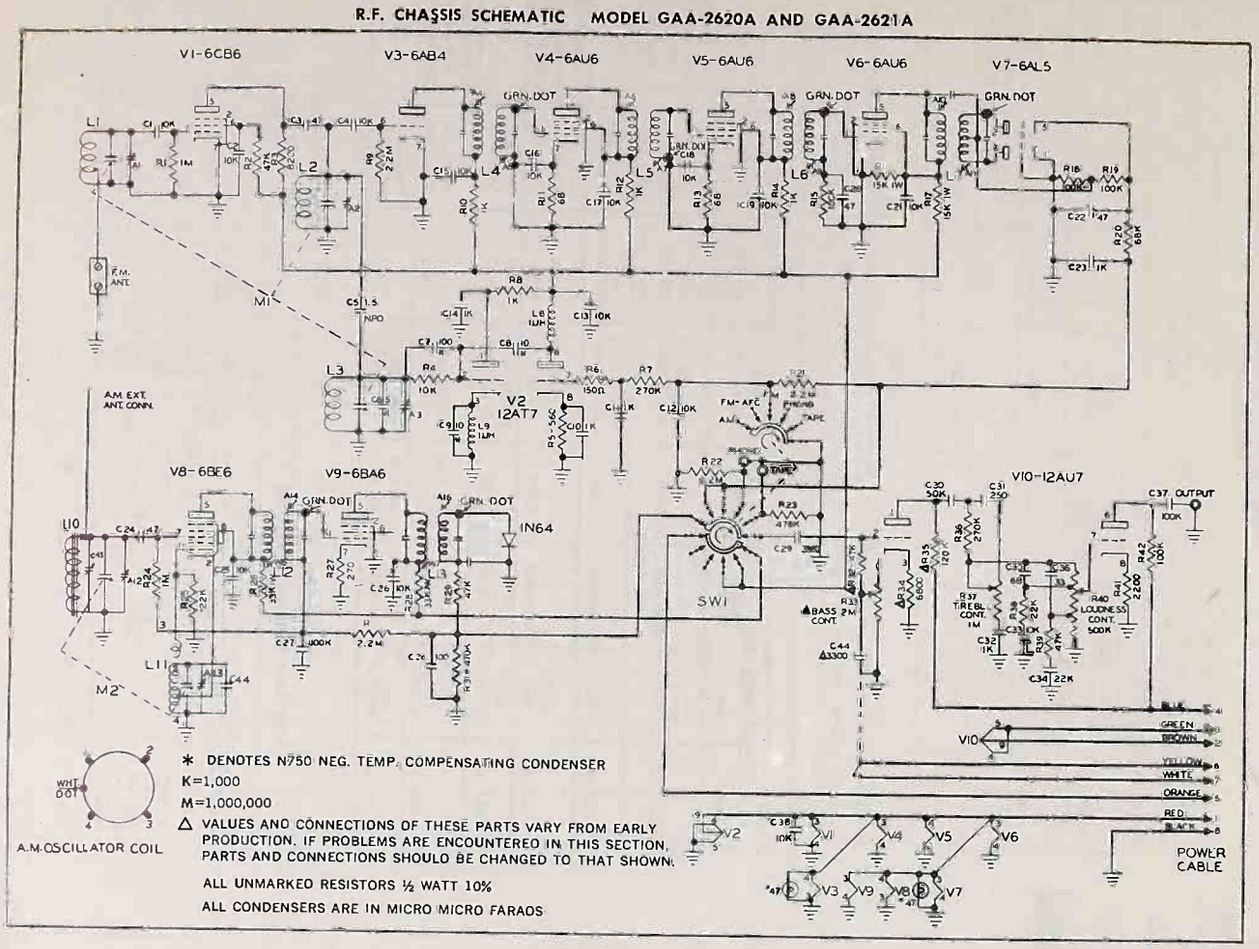


AUDIO CHASSIS
TUBE LOCATION



MONTGOMERY WARD RADIO PAGE 27-3

R.F. CHASSIS SCHEMATIC MODEL GAA-2620A AND GAA-2621A



* DENOTES N750 NEG. TEMP. COMPENSATING CONDENSER

K=1,000

M=1,000,000

△ VALUES AND CONNECTIONS OF THESE PARTS VARY FROM EARLY PRODUCTION. IF PROBLEMS ARE ENCOUNTERED IN THIS SECTION, PARTS AND CONNECTIONS SHOULD BE CHANGED TO THAT SHOWN.

ALL UNMARKED RESISTORS ½ WATT 10%

ALL CONDENSERS ARE IN MICRO MICRO FARADS

VOLTAGE CHART

	ITEM	TUBE	PIN							PIN 8	PIN 9
*	V	6CB6			0	6.3 AC	0	+85			
*	V2	12AT7	+120	−2	0	0	0		20	0	+1.5	6.3 AC
*	V3	AB4	+120	0			6.3 AC	0		0		
*	V4	6AU6	0	0	6.3 AC	0		30	130	+8		
*	5	6AU6		0			6.3 AC		130	+6		
*	V6	6AU6	−6				6.3 AC	+50	+50	0		
*	V7	6AL5	0		6.3 AC		0	0				
△	V8	6BE6					6.3 AC	+70	0			
△	V9	6BA6					6.3 AC	+80				
□	V10	12AU7	+200	0			3.1 AC			0	+4	
□	V11	6SN7		0			70 +	190		3.1 AC		
□	V12	6V6		3.1 AC				4		3.1 AC		
□	V13	6	0	3.1 AC					+350	3.1 AC	+20	
□	V14	5U4GB	0	+330	0	310 AC	0	310 AC		0	+330	

* MEASURED IN FM-AFC POSTION

△ MEASURED IN AM POSITION

□ MEASURED IN PHONO POSITION

ALL MEASUREMENTS MADE WITH V.T.V.M.

ALL MEASUREMENTS WITH NO SIGNAL

REPAIR PARTS

REF. NO.	PART NO.	DESCRIPTION
		RESISTORS
R1, R24		1 Meg. ½ Watt
R2, R29, R32, R39		47K Ohm ½ Watt
R3		8.2K Ohm ½ Watt
R4, R54		10K Ohm ½ Watt
R5		560 Ohm ½ Watt
R6		150 Ohm ½ Watt
R7, R36		270K Ohm ½ Watt
R8		1K Ohm 1 Watt
R9, R21, R22, R30		2.2 Meg. ½ Watt
R10, R12, R14		1K Ohm ½ Watt
R11, R13		68 Ohm ½ Watt
R15, R18, R19, R42		100K Ohm ½ Watt
R16, R17		15K Ohm 1 Watt
R20		68K Ohm ½ Watt
R23, R31, R43, R48, R49		470K Ohm ½ Watt
R25, R38		22K Ohm ½ Watt
R33	412A	2 Meg. Control with Switch
R34		6.8K Ohm ½ Watt
R35		120K Ohm ½ Watt
R37	421	1 Meg. Control
R40	422	500K Control with dual tap
R41		2.2K Ohm ½ Watt
R44		3.9K Ohm ½ Watt
R45		220K Ohm ½ Watt
R46, R47		47K Ohm 1 Watt
R50		250 Ohm 5 Watt
R51		2.7K Ohm 2 Watt
R52		10K Ohm 1 Watt
R53	635	4K Ohm 14 Watt
		CONDENSERS
C1, C4		.01 Mfd 600 Volt Tubular
C1A, B	1002	60/40 Mfd 400 Volt Electrolytic
C2		.01 Mfd. Discap.
C2A, B, C	1003	80/20/50 Mfd. 400/400/50 Volt Electrolytic
C3		47 mmf. 600 Volt Tubular Ceramic
C5	836	1.5 mmf. NPO 600 Volt

REF. NO.	PART NO.	DESCRIPTION
C6		5 mmf. N750 600 Volt
C7		100 mmf. N750 600 Volt
C8, C9		10 mmf. N750 5% Discap.
C10, C11, C14, C23, C32		.001 Mfd. 20% Discap.
C12, C13, C15, C16, C17, C18, C19, C21, C25, C26, C33, C38		.01 Mfd. Z250 Discap.
C20, C22, C24		47 mmf. NPO 10% Discap.
C27		.1 Mfd. 200 Volt
C28		100 mmf. 20% Discap.
C29, C44		3300 mmf. 20% Discap.
C30, C39, C40		.05 Mfd. 400 Volt Molded
C31		250 mmf. 20% Discap.
C34		.022 Mfd. 400 Volt Paper
C35		68 mmf. 20% Discap.
C36	908	33 mmf. 20% Discap.
C37		.1 Mfd. 600 Volt Paper
C41, C42		.01 Mfd. Heavy Duty Discap.
C43	830	2 Mfd. 50 Volt Electrolytic
		TRANSFORMERS & COILS
T1	1107	Power Transformer
T2	1212	Output Transformer
L1	1411B	Antenna Coil
L2	1411A	Mixer Coil
L3	1411	Oscillator Coil
L4, L5, L6	1409	10.7 MC IF Transformer
L7	1410	10.7 MC Discriminator Transformer
L8, L9	1303	1 micro henry choke
L10	1512E	Rod Antenna with lugs
L10	1512F	Rod Antenna with lugs & trimmer
L11	1401A	Oscillator Coil
L12	1405	455 KC IF Transformer
L13	1406A	455 KC Output IF Transformer
		MISCELLANEOUS
SW1	420A	4 Pole, 5 Position Switch
SP1	2635	Speaker, 12" P.M. 6.8 oz. Magnet
SP2	2636	Speaker, 12" P.M. 4.64 oz. Magnet
SP3, SP4	2637	Speaker, 5" P.M. 1.47 oz. Magnet
	107A	4 prong socket with ring

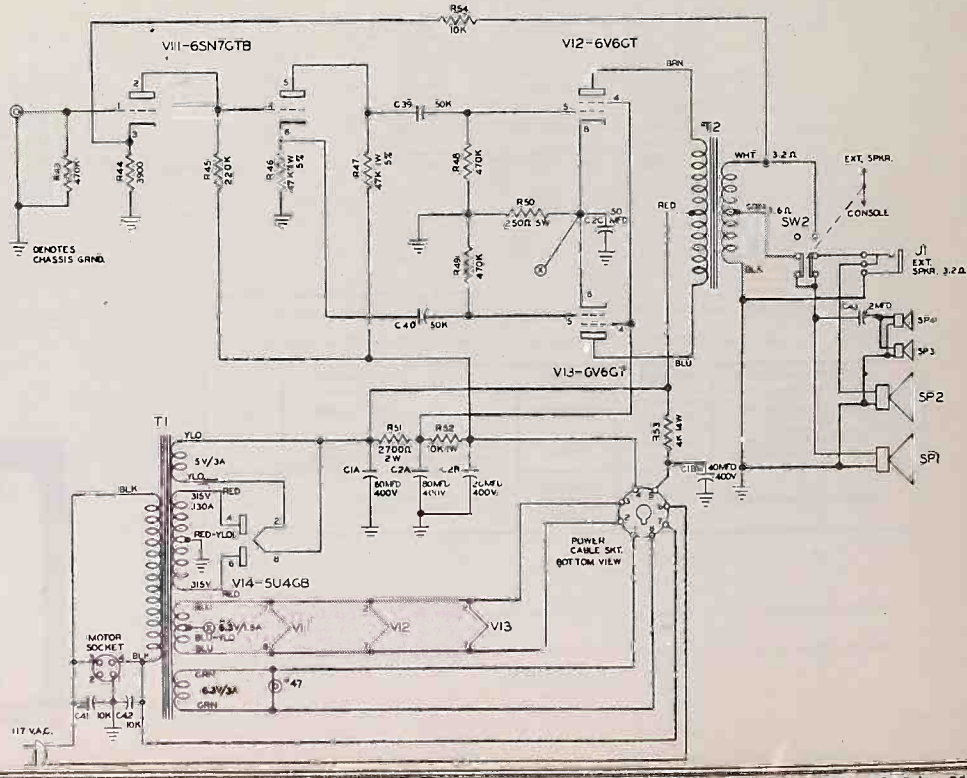
MISCELLANEOUS (Cont.)

118	8 prong molded octal sockets
104A	Single prong phono socket
1601A	Line cord, 8 ft.
115	7 pin molded sockets
116	9 pin molded sockets
117	7 pin tube shield base
1516	Dial Lamp holders
1802C	Special control nuts
120	Octal plug
1N64	Diode
317	Antenna terminal with mounting strap
1546	24" White wire with amplifier connector
1546A	22" Yellow wire with amplifier connector
119	7 Pin tube shield
119A	9 Pin tube shield
318	Tube holder
2070B	Cabinet—Mahogany
2071B	Cabinet—Blond
1515B	Pilot light bracket with 2-12" leads
2208A	Plastic Pilot light Jewel
2435	Dial Knob
2436	Function Knob
1742	Dial Pointer
1784	Escutcheon Plate
2516	45 R.P.M. Adapter
1931	Adapter Clip Changer, VM-1200 Cartridge, Electro-Voice Power Point 56DS (use 60°51)
1790	Self balancing lid support

PARTS LIST FOR GAA-301 AND GAA-302 EXTENSION SPEAKER

2633	3½" PM Speaker
2633B	8" PM Speaker
1567	Line cord with male plug
1875C	Male speaker plug only
830	2 Mfd. 50 Volt Condenser

AUDIO CHASSIS SCHEMATIC MODELS GAA-2620A AND GAA-2621A



SERVICE MANUAL

AND REPAIR PARTS

FOR REPAIR SERVICE DEPARTMENT

MANUAL 576A

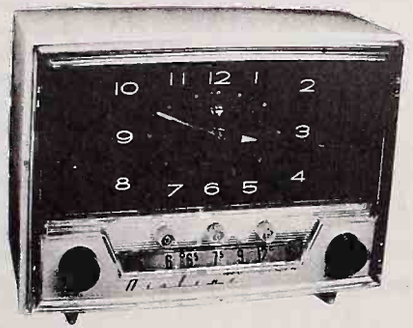
Airline

CLOCK-RADIO

GTM 1653A
GTM 1654A

SERIAL NO.
75X

Form No. 62Z-577B



MODELS

GTM 1653A *WHITE*

GTM 1654A *TURQUOISE*

GENERAL DESCRIPTION

This Airline Clock-Radio is a five (5) tube AC, AM superheterodyne receiver with an appliance outlet. A high gain ferrite-core antenna provides excellent pickup without the need for an external antenna. The clock used in these receivers features: automatic control of radio on-off, use as an alarm clock and as an appliance on-off control. Conelrad frequencies are clearly marked.

When used as an appliance timer the AC plug from the unit to be controlled (to be turned on or shut off as desired) is inserted into the appliance outlet. The clock is then set to turn the radio on or off and the AC power to the external appliance will be likewise controlled.

TUBE COMPLEMENT

1 – 12BE6 Converter
1 – 12BA6 I.F. Amplifier
1 – 12AV6 Detector, AVC, A.F. Amplifier
1 – 50C5 Audio Output
1 – 35W4 Rectifier

ELECTRICAL SPECIFICATIONS

POWER SUPPLY – 105 to 120 Volts – 60 Cycle – AC Current only – 30 Watts
FREQUENCY RANGE – 540 to 1600 kc.
I.F. FREQUENCY – 455 kc.
LOUDSPEAKER – 3½" PM
POWER OUTPUT – Undistorted 0.9 watt – Maximum 1.5 watts
APPLIANCE OUTLET CAPACITY – 1100 watts

SERVICE LETTER REMINDER
Record numbers of service letters below that apply to models listed in this manual.

ALIGNMENT

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal Generator to—	Signal Generator Frequency	Tuning Capacity	Adjust for Maximum Output
(1)	Stator of ant. tuning capacitor (A) through a 200 mmf capacitor	455 kc.	Minimum capacity	Bottom and top slugs of T2 and T1 in order given*
(2)	Same as step 1	1620 kc.	Minimum capacity	Oscillator trimmer (D)
(3)	Radiated signal	1400 kc.	1400 kc.	Antenna trimmer (B)

**It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.*

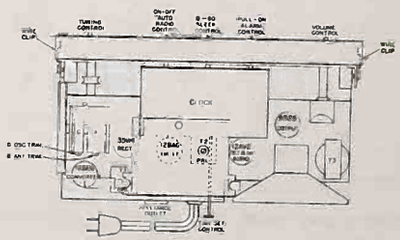


FIGURE 2 CHASSIS LAYOUT

CLOCK REMOVAL INFORMATION

If it is necessary to remove the clock for repairs the following procedure should be used:

1. Remove the chassis from the cabinet by removing the four mounting screws located on the back of the cabinet. The chassis will slide forward from the cabinet. Take care to pass the time set knob through the hole in the cabinet.
2. Remove the five knobs from the front of the receiver.
3. Remove the six hex head screws from the springs clips (three screws on each side of front assembly).
4. Remove the front assembly by pulling forward.
5. Move the dial pointer to the extreme right past the brass section on bottom of the clock face.
6. Pull clock slowly forward.
7. Unsolder red and white leads from switch and black lead from terminal on clock motor.
8. Remove clock.

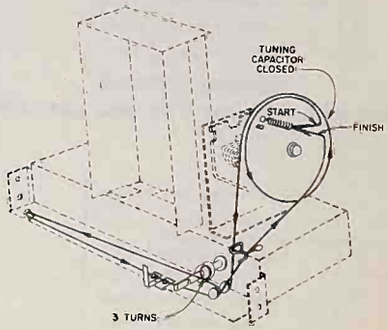


FIGURE 3 DIAL STRINGING

M O N T G O M E R Y W A R D

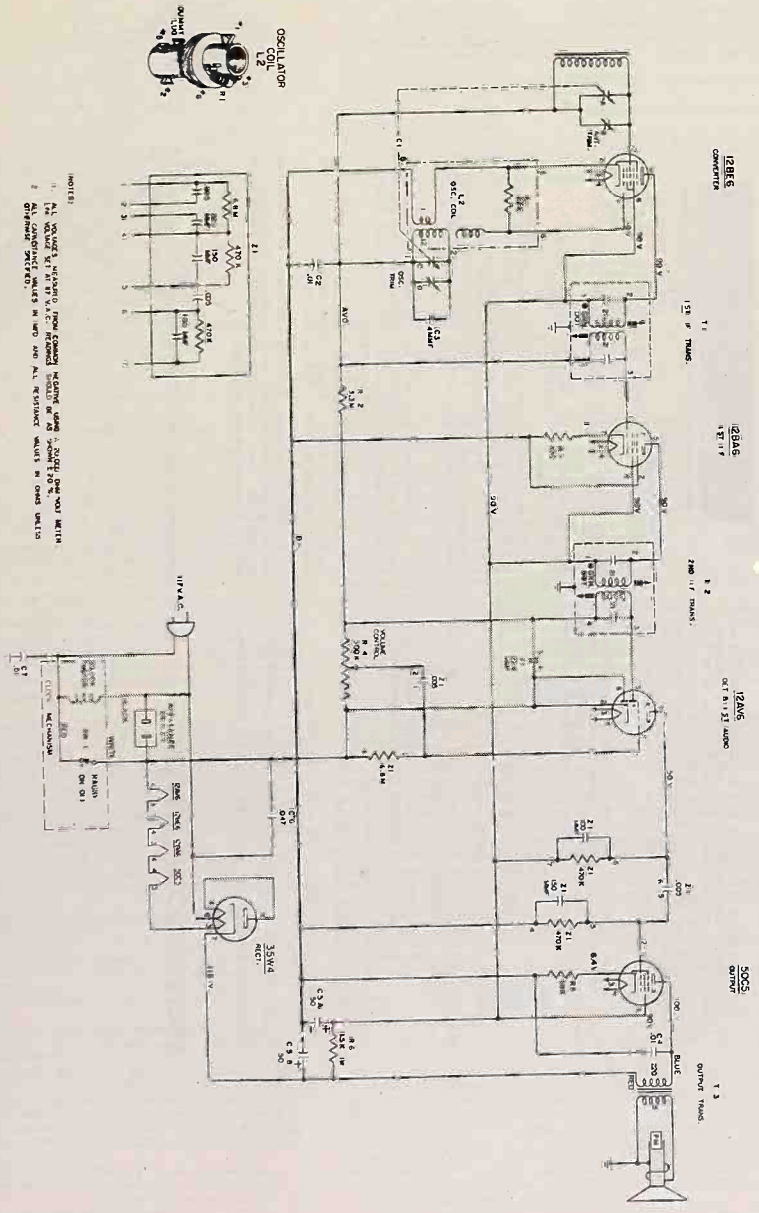


FIGURE 1) SCHEMATIC DIAGRAM

PARTS LIST

CAPACITORS

C1	V-14637-1	Gang Condenser	
C2		.01 mf 500V Ceramic	
C3	215V304M01	4 mmf 500V Ceramic Tubular N-3300	
C4		.01 mf 1KV Ceramic	
C5A, C5B		50 mf, 50 mf 150V Electrolytic	
C6		.047 mf 400V Tubular	
C7		.01 mf 400V Tubular	
C8, C9, C10, C11		Part of Couplate Z1	

RESISTORS

		OHMS	WATTS	
R1		22K	0.5	Carbon
R2		3.3 meg	0.5	Carbon
R3		100	0.5	Carbon
R4	V-9993-16	500K		Volume
R5		180	0.5	Carbon
R6		1.5K	1.0	Carbon
R7, R8, R9	Part of Couplate Z1			

TRANSFORMERS AND COILS

L1	V-14641-1	Antenna Loop (Iron Core)
L2	V-14639-1	Oscillator Coil (includes R1)
T1	V-10945-2	1st I-F Transformer
T2	V-10945-2	2nd I-F Transformer
T3	V-14645-1	Output Transformer

MISCELLANEOUS

V-10789-2	Multiple Resistor – Capacitor Assembly (Z1) Centralab Part #PC 151
V-5847-3	Bushing – AC cord (strain relief)
513V015M01	Cabinet – White (Model 1653)
513V015M02	Cabinet – Turquoise (Model 1654)
659V001M01	Clock Assembly (includes clock dial)
770V351M01	Clip – upper (front to clock assembly)
770V352M01	Clip – lower (front to chassis)
558V059M01	Front (includes radio dial)
V-11573-1	Knob (clock)
550V035M01	Knob (tuning or volume)
558V066M01	Pointer (dial)
761V036M58	Screw (top rear of cabinet – 3-9/16")
761V036M16	Screw (bottom rear of cabinet – 1")
761V036M06	Screw (bottom rear of cabinet – 3/8")
V-14643-2	Shaft Assembly (tuning)
V-14644-2	Shield (chassis bottom)
V-14747-1	Speaker (3½" PM)
751V521M01	Socket (appliance outlet)
V-6795-3	Spring (dial drive)
V-6295-1	Tube socket (12BA6, 12AV6)
V-6295-2	Tube socket (50C5, 35W4, 12BE6)

NOTE: USE UNIVERSAL PARTS WHERE PART NUMBERS ARE NOT LISTED. ORDER FROM (LRS)

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
HK-42	HS-783
HK-43	HS-786

SUPERSEDES PRELIMINARY SERVICE MANUAL PART NO. 68P645912 PRELIM

GENERAL INFORMATION

Models HK42 and HK43 are High Fidelity, AM-FM tuners custom-designed for installation in the record storage compartment of various Motorola models or into other audio equipment (see Installing HK42 or HK43 AM-FM Tuner Into Other Audio Equipment). Model HK42 tuner is custom-designed for installation in Motorola models 6K13, 6K22, SK11, SK12, SK13, SK14, SK22, SK24, SK36, SK37, or SK38; model HK43 tuner is custom-designed for installation in Motorola models SK28, SK29, SK30, or SK31. Model HK42 has a wiring harness (which is connected between record changer power plug and amplifier phono receptacle) for its AC power requirements; model HK43 has a line cord for its AC power.

These models feature an AM loop antenna with provision for either a built-in or external FM antenna, flywheel tuning, tuning eye, extra wide-band IF's, a tuned RF stage on FM, an FM limiter stage, a grounded-grid FM RF amp, a temperature-compensated FM oscillator circuit, and vertically and horizontally reading dial scale to provide universal installation.

If tuner installation is made outside the customer's home, it is then shipped to the customer with two shipping screws and washers rigidly holding tuner to cabinet. These screws must be removed to loosely suspend tuner on its vibration-absorbing cushion mounting; see installation illustrations for shipping screw location. These screws should be installed and the tone arm secured to its support post (see Phonograph Operating Instruction Booklet) whenever the set is to be transported, but must be removed before tuner is again operated.

When the tuner is installed into the Motorola models as per the instructions which follow, all former phonograph operating instructions remain identical when the tuner OPERATION SELECTOR knob is in the PHONO position (or OFF position on HK43); in the AM or FM positions, the phonograph motor is automatically shut off (HK42 only) and the AM or FM stations can be played through the amplifier-speaker system of the phonograph.

The first eight pages of this manual cover installation of these tuners into the various Motorola models and other audio equipment as mentioned above; the last eight pages cover all necessary service data and information.

SPECIFICATIONS

TUBES - 6 plus rectifier and tuning eye

DIMENSIONS - 14-7/16" x 6-1/8" x 8-9/16" (HWD - with vertically reading dial scale installed)

6-1/8" x 14-7/16" x 8-9/16" (HWD - with horizontally reading dial scale installed)

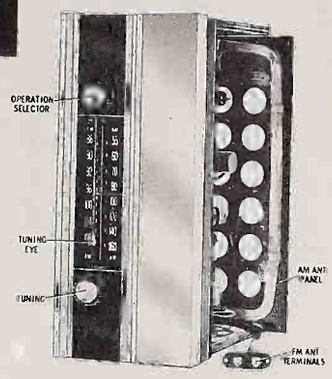
AM TUNING RANGE - 540 to 1600 Kc

FM TUNING RANGE - 88 to 108 Mc

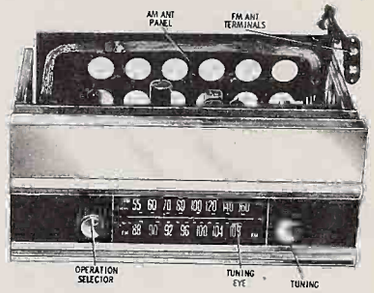
FREQUENCY RESPONSE - FM - 20 to 20,000 cps
AM - 20 to 8,000 cps

AUDIO OUTPUT - in excess of 1 volt (AM); .5 volt (FM)

OPERATES FROM - 120 volts, 60 cycle AC only; 40 watts



MODEL HK-43



MODEL HK-42

MODEL HK-42 GENERAL INSTALLATION INSTRUCTIONS

(For Motorola Models SK11, SK12, SK13, SK14, SK22, SK24, SK36, SK37, SK38, 6K13, 6K22)

The installation of this tuner into Motorola High Fidelity and Stereophonic Phonographs varies from model to model, however, each installation is made according to a few basic steps. It is best to acquaint yourself with these steps before going ahead with the actual installation. (For other audio equipment, see Installing HK42 or HK43 Into Other Audio Equipment.)

1. The tuner will be placed into the record storage compartment of the phonograph, which must first be prepared to receive the tuner. Two dial scales permit use in either horizontal or vertical compartments.

2. The tuner power connection is made through the wiring harness of the tuner. Signal connections are made with cables supplied with tuner and existing ones.

3. An AM loop antenna, supplied with tuner, is mounted in the phonograph cabinet and wired to tuner, and adjustment is made for best reception. Instructions for installing a built-in FM antenna are included.

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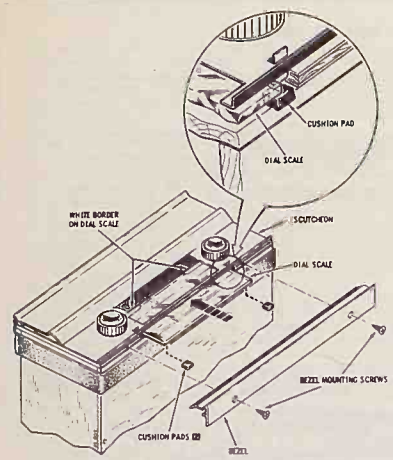


FIGURE 1. CHANGING DIAL SCALES

TUNER DIAL SCALE

(All Models Except SK22, SK24 Series)

The HK42 tuner was shipped from the factory with a horizontally reading dial scale installed. When the tuner is to be installed in models other than SK22 or SK24 series, replace the horizontally reading dial scale with the vertically reading one (packed in envelope stapled to tuner cabinet). To replace the dial scale refer to Figure 1.

MODEL HK42 INSTALLATION INSTRUCTIONS

Check each of the following steps against the installation figures for your set to insure correct installation. Only cables, jacks, etc., which are used in the installation are shown. Do not change any other connections. Where several models are mentioned, follow only those instructions which apply to your set.

A. Unpack Tuner

1. Remove two packing screws and washers, and cardboard shipping strip from bottom of tuner; save washers, discard screws and cardboard strip. Remove envelope stapled to side of tuner cabinet (envelope contains alternate dial scale). Remove all staples on outside of tuner cabinet.
2. The washers from step #1 will be used in conjunction with the long (#10-32 x 1-3/8") bolts for securing tuner to phono cabinet when set is to be moved (see SHIPPING OR TRANSPORTING YOUR INSTALLED TUNER).
3. If set is an SK11, 12, 13 or 14 or a 6K13, 22 or if installation requires a vertically reading dial scale, install alternate scale packed with tuner (see TUNER DIAL SCALE section).

B. Prepare Phono Cabinet For Receiving Tuner

1. Remove cabinet back cover.
2. Temporarily remove cabinet lid support. On models SK36, 37 and 38 only, also temporarily remove the thin wooden strip from inside front wall of cabinet; 4 wood screws hold it in position.
3. Remove rubber cushion from bottom of record storage compartment.
4. Remove panel which separates record storage compartment from record changer compartment. This panel is held in place by wood screws near top.
5. Mount AM antenna panel to phono cabinet or cabinet back, as shown in Figures 2, 3, 4, 5 & 6. Use #6 x 3/8" tapping screws when mounting to cabinet, or #6-32 x 3/8" machine screws, washers and hex nuts when mounting to cabinet back (on Models SK22, SK24). Mount panel so that flat side is against cabinet or cabinet back, and connecting clips are positioned as shown.
6. On Models SK22 or 24, mount angle bracket inside tuner compartment using #8-32 x 3/4" machine screws and washers. Locate holes in front panel of compartment; line up holes on bracket with holes in compartment (see Figure 4).

C. Make These Preliminary Connections Before Lowering Tuner Into Cabinet

1. From back of cabinet, measure distance from AM antenna loop connecting clips to front left corner on bottom of tuner compartment. Add 8 to 9 inches to your measurement and cut white and green antenna leads to this length (measuring from plug end). Solder green lead to lug on tuning gang of tuner closest to dial pulley, and white lead to lug on gang frame.
2. If your set is an SK11, 12, 13 or 14, plug one end of CABLE B into TUNER OUTPUT JACK.

If your set is an SK22, or 24, plug one end of CABLE B into PHONO INPUT JACK.

If your set is an SK36, 37, or 38, plug CABLE A into PHONO INPUT JACK and CABLE B into TUNER OUTPUT JACK.

If your set is a 6K13 or 6K22, plug one end of CABLE B into TUNER INPUT JACK.

D. Install Tuner Into Record Storage Compartment

1. Lower tuner, with attached leads and cables, into record storage compartment so tubes are visible through side of compartment where panel has been removed.

Caution: To avoid scratching cabinet, place thin pieces of cardboard between tuner and cabinet when lowering tuner into compartment; remove strips once tuner is in place.

2. Put green and white AM antenna leads and FM antenna terminals through separate holes in bottom of compartment. Keep AM antenna leads separated.
3. Wirlug harness and phono cables should come through side of compartment where panel has been removed (except in SK11, SK22 and 24)-cables and wiring harness should be put through holes in bottom of compartment (see Figures 2 and 4).

E. Make Connections With Phonograph

To facilitate making these connections on Models SK36, 37, 38, remove sounding board under record changer. It is held in place by two screws at front and two screws at rear. Replace this board after all connections are completed.

1. Disconnect the 4-pin phono power plug and receptacle beneath record changer. Insert phono power plug into receptacle of wiring harness, and connect phono power receptacle with plug of wiring harness.
2. Connect phono cables as follows: (refer to illustrations).

SK11, 12, 13, 14--Unplug existing cables from AUX JACK on pre-amplifier, and cut this cable at its termination o jack strip on cabinet back. Plug CABLE B into AUX JACK on pre-amplifier.

SK22, 24--Unplug existing cable from "R" jack on record changer base and insert into TUNER OUTPUT JACK. Plug CABLE B into "R" jack on changer.

SK36, 37, 38--Unplug cable from PHONO INPUT "R" jack on pre-amplifier and insert it into receptacle of CABLE A. Plug CABLE B into PHONO INPUT "R" jack on pre-amplifier.

6K13, 6K22--Unplug existing cable from PHONO INPUT JACK on amplifier chassis, and insert it into PHONO INPUT JACK on tuner. Plug CABLE B into PHONO INPUT JACK on amplifier. PHONO INPUT JACK is located at front end of amplifier chassis; do not confuse with TAPE-TUNER INPUT JACK at rear of chassis.

3. Mount FM ANT TERMINALS on rear of cabinet, so they coincide with half-punch cut-out on cabinet back cover. Use #6 x 3/8 tapping screws (copper).
4. Install built-in FM antenna by connecting a length of insulated wire (not furnished with tuner) to one of the FM ANT TERMINALS, and staple wire inside cabinet along side and bottom of cabinet, as shown in illustrations. This wire should be disconnected if an external FM antenna is used. See FM ANTENNA section.

F. Adjust AM Antenna Trimmer

1. Check to see that all connections are made according to instructions.
2. Set OPERATION SELECTOR on tuner to AM position.
3. Set controls on phonograph as follows:

On models SK11, 12, 13, 14, turn COMPENSATOR control to AUX position; on model 6K13, turn COMPENSATOR control to RIAA position.

Set FUNCTION control (or STEREO-MONAURAL switch on stereo converted 6K13 or 6K22) to MON position. Turn set on--see Operating Instruction Booklet for your set and adjust LOUDNESS control for average listening level.

4. With TUNING control, tune in a weak station near 1400 Kc (on AM portion of dial scale).
5. Through hole in bottom of tuner compartment, locate AM antenna trimmer (trimmer closest to dial pulley) and adjust for maximum station volume. DO NOT TOUCH THE OSCILLATOR TRIMMER (located next to antenna trimmer) OR RE-ALIGNMENT OF TUNER WILL BE NECESSARY.

G. Replace Cabinet Back and Lid Support

1. Knock out half-punch cut-out on cabinet back cover, and replace cabinet back cover.
2. Replace cabinet lid support (on models SK36, 37 and 38 also replace wooden strip).
3. Discard any remaining, unused material.

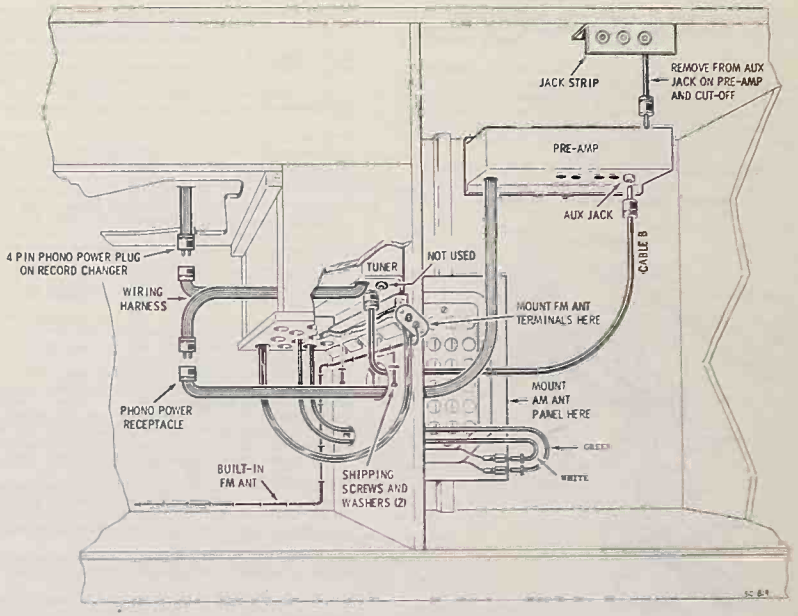


FIGURE 2. SK11 INSTALLATION

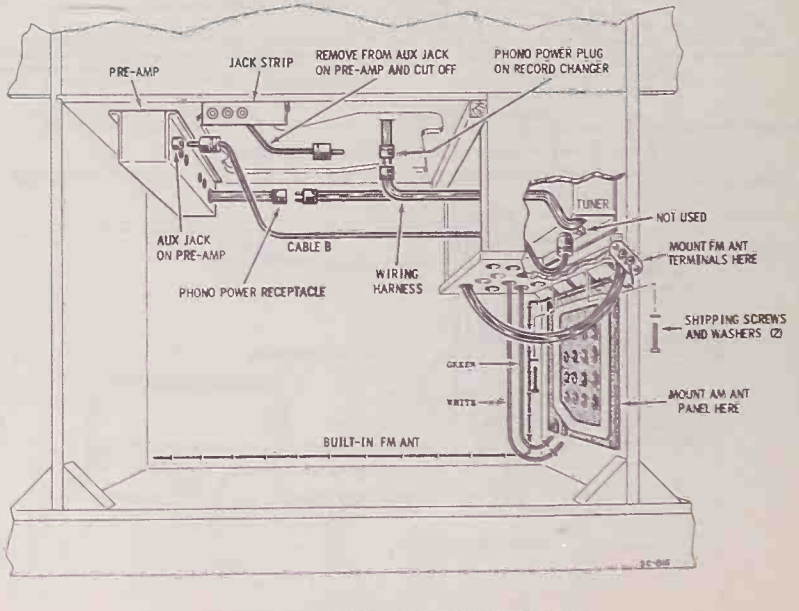


FIGURE 3. SK12, SK13, SK14 INSTALLATION

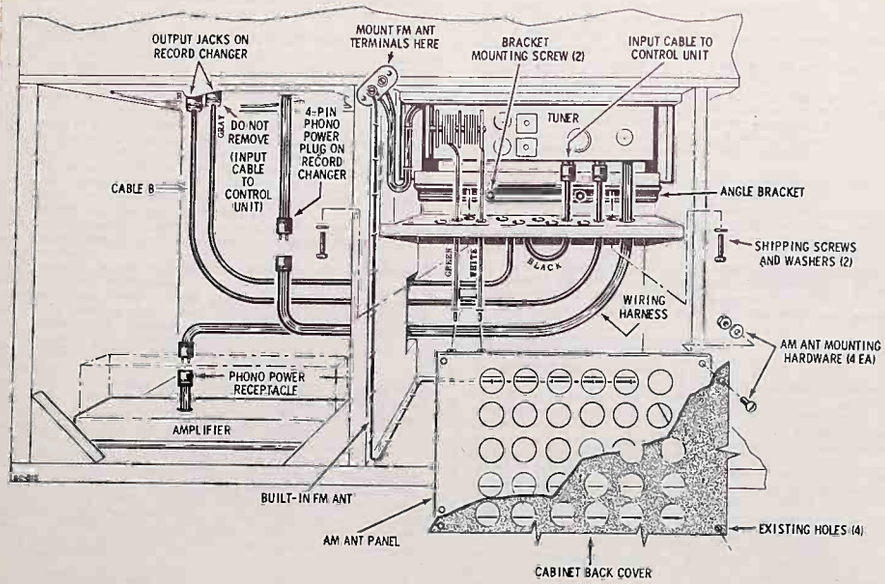


FIGURE 4. SK22, SK24 INSTALLATION

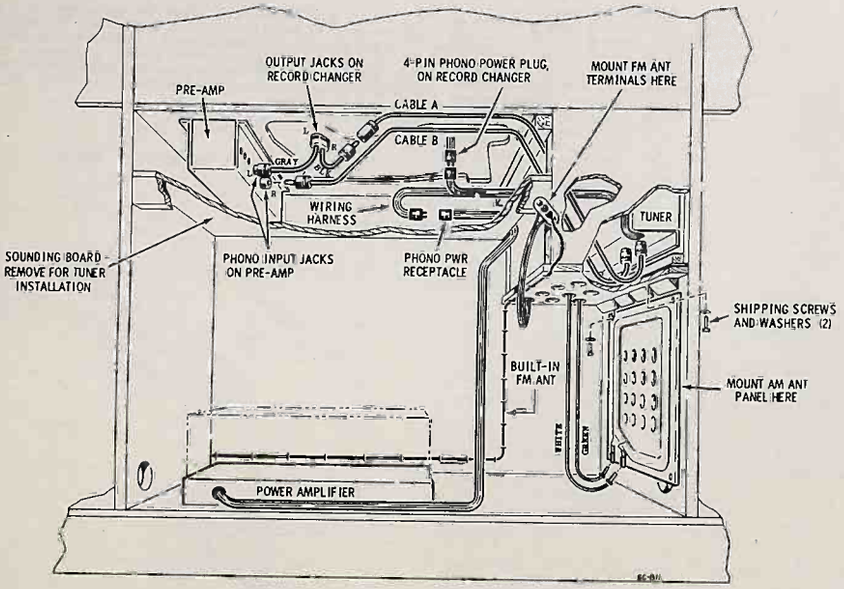


FIGURE 5. SK36, SK37, SK38 INSTALLATION

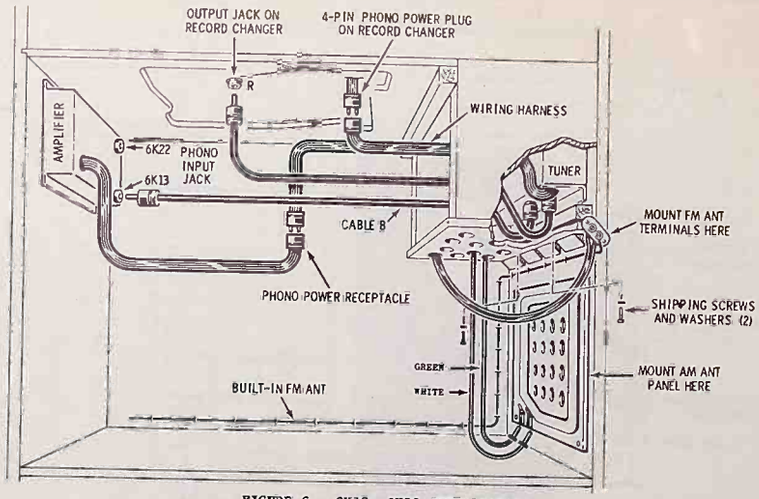


FIGURE 6. 6K13, 6K22 INSTALLATION

OPERATING INSTRUCTIONS
(For the Installed HK42 Tuner)

To listen to AM or FM stations, set the OPERATION SELECTOR knob (on tuner) to the AM or FM position. Turn phonograph amplifier "on" (see Operating Instruction Booklet for that particular set) and set up for tuner reception as follows:

1. On Stereo models or stereo-converted monaural models, set FUNCTION control or STEREO-MONAURAL switch to MON position.
2. On Models SK11, SK12, SK13, or SK14, turn COMPENSATOR knob to AUX position. On Model 6K13, turn COMPENSATOR knob to R1AA position.
3. Adjust LOUDNESS knob for desired listening level.

Tune in stations with the TUNING knob (on tuner); use the tuning eye while tuning - see Tuning Eye.

To listen to the phonograph only, turn OPERATION SELECTOR knob to PHONO position. This will turn off the tuner and will allow the phonograph to operate as per instructions in the Operating Instruction Booklet for that set.

TUNING EYE: Stations are indicated by the rise and closure of the green pattern on the TUNING EYE. With no station tuned in, the pattern is at its lowest point. As a station is approached, the pattern will rise; correct and accurate tuning is indicated by the maximum rise and closure of the pattern. Tune back and forth slightly to locate maximum rise point. When tuning AM stations, the height of the tuning eye pattern will vary with station signal strength. When tuning FM stations, the tuning eye pattern should be the same height for all stations unless the signal being received is extremely weak.

MODEL HK-43 GENERAL INSTALLATION INSTRUCTIONS
(For Motorola Models SK28, SK29, SK30, SK31)

The installation of this tuner into Motorola Phonographs follows a few basic steps. It is best to acquaint yourself with these steps before going ahead with the actual installation. (For other audio equipment, see Installing HK42 or HK43 into Other Audio Equipment.)

1. The tuner will be placed into the record storage compartment of the phonograph which must first be prepared to receive the tuner. Two dial scales permit use in either horizontal or vertical compartments (see TUNER DIAL SCALE section).
2. The tuner power connection is made by plugging the power cord of the tuner into the AC outlet on the power amplifier chassis (of Motorola models).
3. Signal connection is made thru the tuner output cable (supplied with tuner) between the TUNER OUTPUT JACK and the jack on the pre-amplifier chassis.
4. An AM loop antenna (supplied with tuner) is mounted in phonograph cabinet, wired to the tuner, and adjusted for the best reception. Instructions for connecting a built-in FM antenna are included.

TUNER DIAL SCALE
(Model SK29 Series Only)

The HK43 tuner was shipped from the factory with a vertically reading dial scale installed. When the tuner is to be installed in Model SK29 series, replace the vertically reading dial scale with the horizontally reading one (packed in envelope stapled to tuner cabinet). To replace dial scale refer to Figure 7.

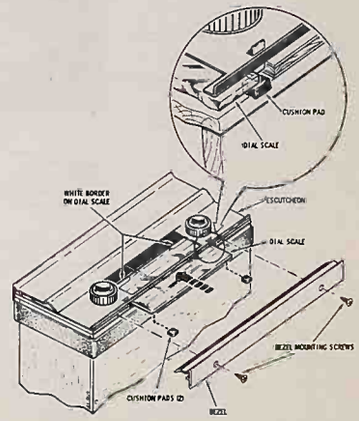


FIGURE 7. CHANGING DIAL SCALES

MODEL HK43 INSTALLATION INSTRUCTIONS

Check each of the following steps against the installation figure for your set to insure correct installation. Only cables, jacks, etc., which are used in the installation are shown. Do not change any other connections. Where several models are mentioned, follow only those instructions which apply to your set.

A. Unpack Tuner

1. Remove two packing screws and washers, and cardboard shipping strip from bottom of tuner; save washers.

discard screws and cardboard strip. Remove envelope stapled to side of tuner cabinet (envelope contains alternate dial scale). Remove all staples on outside of tuner cabinet.
2. The washers from step #1 will be used in conjunction with the long (#10-32 x 1-3/8") bolts for securing tuner to phono cabinet when set is to be moved (see SHIPPING OR TRANSPORTING YOUR INSTALLED TUNER).
3. If set is an SK29 or if installation requires a horizontally reading dial scale, install alternate scale packed with tuner (see TUNER DIAL SCALE section).

B. Prepare Phono Cabinet For Receiving Tuner

1. Remove cabinet back cover.
2. Temporarily remove cabinet lid support.
3. Remove rubber cushion from bottom of record storage compartment.
4. Remove panel which separates record storage compartment from record changer compartment. This panel is held in place by wood screws near top.
5. Mount AM antenna panel to phonograph cabinet as shown in illustrations. (If corrugated cardboard is inserted under winding of AM loop, remove cardboard before installing loop.) Use #6 x 3/8" tapping screws to secure panel to cabinet. Mount panel so flat side is against cabinet.
6. On Model SK29, mount angle bracket inside tuner compartment using #8-32 x 3/4" machine screws and washers. Locate holes in front panel of compartment; line up holes on bracket with holes in compartment (see Figure 9).

C. Make These Preliminary Connections Before Lowering Tuner Into Cabinet

1. Measure the green and white AM antenna leads (from plug end) and cut to 18". Solder green lead to the lug on tuning gang of tuner closest to dial pulley, and the white lead to the lug on gang frame (see Figures 8 and 9).
2. On SK28, 30 and 31, plug the tuner output cable into the TUNER OUTPUT JACK.

D. Install Tuner Into Record Storage Compartment

1. Lower tuner, with attached leads and cables, into record storage compartment so tubes are visible through side of compartment where panel has been removed.

Caution: To avoid scratching cabinet, place thin pieces of cardboard between tuner and cabinet when lowering tuner into compartment; remove strips once tuner is in place.

2. Put green and white AM antenna leads and FM antenna terminals through separate holes in bottom of compartment. Keep AM antenna leads separated.
3. Put AC power cord through hole in bottom of compartment. In SK28, SK30, and SK31, the tuner output cable should come through the side of compartment when panel has been removed.

E. Make Connections With Phonograph

1. Insert the AC power cord into the AC OUTLET on the power amplifier chassis.
2. Disconnect existing cable from the end jack on the pre-amplifier chassis and cut this cable at its termination (tuner) on jack strip on back of phonograph cabinet. On Model SK29, the pre-amplifier is located in a compartment at the front of the phonograph cabinet and is accessible after opening doors and removing the panel under the pre-amplifier compartment. This panel is held in place by six tapping screws; save the screws and panel, it will be replaced later.
3. Insert plug of tuner output cable into the jack on the pre-amplifier chassis. On SK29, plug the other end of cable into TUNER OUTPUT JACK--see Figure 9.
4. Mount the FM ANTENNA TERMINALS on the back of phonograph cabinet so that they coincide with the half-punch cut-out on the cabinet back cover. Use #6 x 3/8" tapping screws (copper). Keep the FM antenna as far away from phono cable as possible.
5. Connect AM antenna leads to loop as shown--keep leads separated.
6. Install built-in FM antenna by connecting a length of insulated wire (not supplied with tuner) to one of the FM ANTENNA TERMINALS and staple this wire inside the phonograph cabinet as shown in the installation illustrations. This wire should be disconnected if an external FM antenna is used (see FM ANTENNA section).

F. Adjust AM Antenna Trimmer

1. Check to see that all connections are made according to instructions.
2. Set OPERATION SELECTOR on tuner to AM position.
3. Set controls on phonograph as follows:
   SELECTOR CONTROL to TUNER position.
   BALANCE CONTROL to ON position.
   LOUDNESS CONTROL for average listening level.
4. With TUNING control, tune in a weak station near 1400 Kc (on AM portion of dial scale).
5. Through hole in bottom of tuner compartment, locate AM antenna trimmer (trimmer closest to dial pulley) and adjust for maximum station volume. DO NOT TOUCH THE OSCILLATOR TRIMMER (located next to antenna trimmer) OR RE-ALIGNMENT OF TUNER WILL BE NECESSARY.

G. Replace Cabinet Back and Lid Support

1. Knock out half-punch cut-out on cabinet back cover and replace cabinet back cover.
2. Replace cabinet lid support.
3. On Model SK29, replace panel under pre-amplifier compartment.
4. Discard any remaining, unused material.

OPERATING INSTRUCTIONS (For the installed HK43 Tuner)

To listen to AM or FM stations, set the OPERATION SELECTOR knob (on tuner) to the AM or FM position. Turn phonograph amplifier "on" (see Operating Instruction Booklet for your set) and set up for tuner reception as follows:
1. Turn SELECTOR knob to TUNER position.
2. Adjust LOUDNESS knob for desired listening level.

Tune in stations with the TUNING knob (on tuner); use the tuning eye while tuning - see Tuning Eye section in Operating Instructions (for the installed HK42 tuner).

To listen to the phonograph only, turn OPERATION SELECTOR knob to OFF position. This will turn off the tuner and will allow the phonograph to operate as per instructions in the Operating Instruction Booklet for that set.

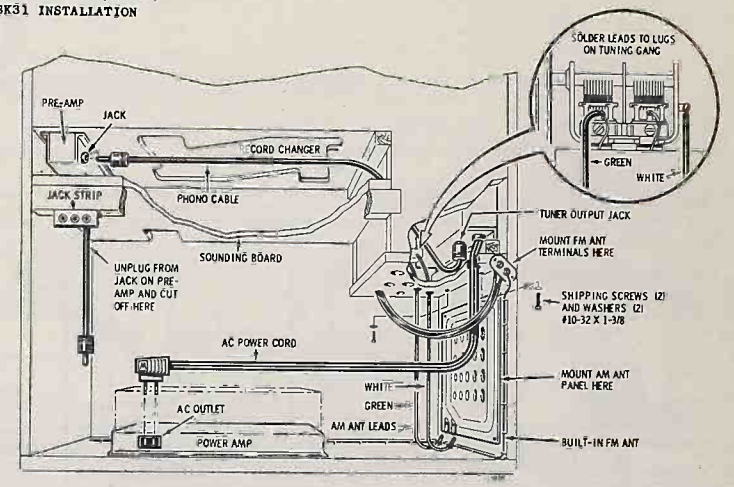
INSTALLING HK42 OR HK43 AM-FM TUNER INTO OTHER AUDIO EQUIPMENT

Should you desire to install either of these tuners into audio equipment other than the Motorola models listed above, determine the following before an installation is attempted:
1. Both tuners have the following dimensions: 6-1/8" x 14-7/16" x 8-9/16" (Height, Width, Depth--with horizontally reading dial scale installed); 14-7/16" x 6-1/8" x 8-9/16" (Height, Width, Depth--with vertically reading dial scale installed), therefore, the area where tuner installation is to be made must have the proper dimensions.
2. There must be adequate ventilation.
3. Model HK42 contains a wiring harness for its AC power (for phono motor shut-off when tuner operation is not desired - see General Information); model HK43 uses a line cord. Therefore, if automatic phono motor shut-off is desired, use the HK42 - see step 4; if conventional AC power connection hook-up is desired, use the HK43 - see step 5.
4. (HK42 only) Although the tuner is self-powered (through its included wiring harness), the audio equipment wiring arrangement should be such that the wiring harness provided can accommodate and provide the correct switching arrangement (tuner AC power, phono motor shut-off, etc.) for the audio equipment. A 4-pin plug and shell (Motorola Part Nos. 28B743781 and 15A639660 available at local Motorola Distributors, or equivalent) and a 4-pin receptacle and shell (Motorola Part Nos. 9K690618 and 15A639660, or equivalent) are necessary for connection into the wiring harness; some audio equipment may already have this incorporated. To assist in making the connections, see schematic diagram.
5. (HK43 only) The tuner power cord may be plugged into any convenient 120 volt, 60 cycle AC receptacle. If there is such a receptacle available on the existing equipment, note whether the receptacle is switched on and off by a control on the existing equipment, and alter the operating procedure accordingly to accommodate this switching. To assist in making connections, see schematic diagram.
6. Since these tuners have a relatively high output impedance, the capacitance of the tuner output cable used should not exceed 200 mmfd; use of excessively long cable will cause high frequency loss due to the capacitance shunting effects introduced by the output cable. Some Motorola cables (with phono plugs on each end) which can be used with this tuner are listed below--they are available at your local Motorola Distributor.

Cable Length	Motorola Part Number
16"	30K642865
24"	30K639988
35"	30K639986
39"	*30K645356
61"	30K639989

*Supplied originally with HK42 & HK43 Tuners.

FIGURE 8. SK28, SK30, SK31 INSTALLATION



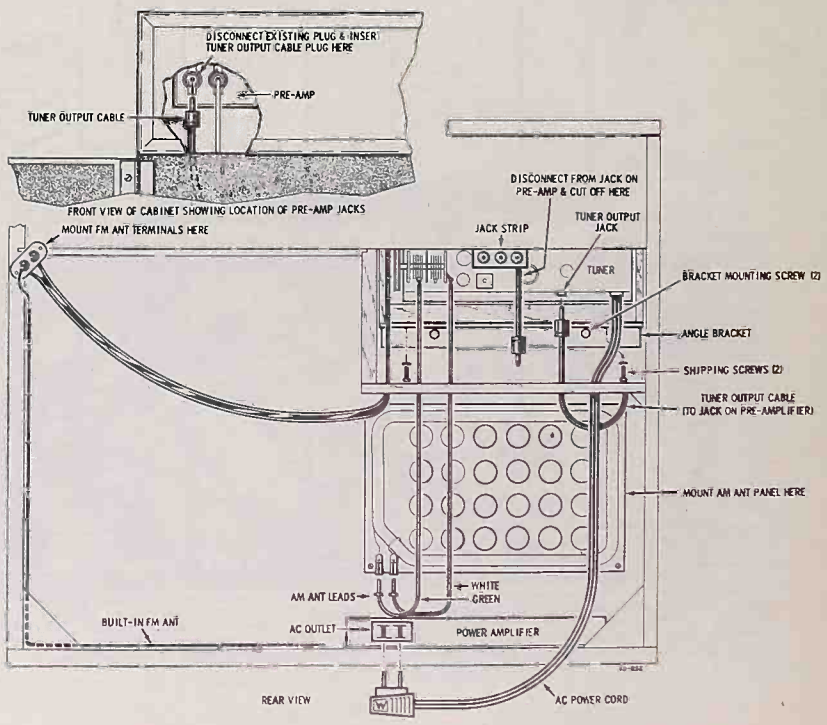


FIGURE 9. SK29 INSTALLATION

FM ANTENNA

These tuners may be operated with a built-in FM antenna made of a length of any light gauge solid or stranded, insulated copper wire, tacked to the inside of the phonograph cabinet as shown in the installation illustrations (the length of wire will be determined by the particular installation). This wire is not furnished with the tuner. In areas where this type of antenna will not give satisfactory reception, an external FM antenna should be used. The external FM antenna is connected to the FM ANTENNA TERMINALS through standard 300 ohm lead-in line, and can be either an indoor TV antenna, or, for even greater signal pick-up, an outdoor FM antenna. An existing outdoor TV antenna can be used; make the connection to the FM ANTENNA TERMINALS through a suitable antenna coupler (to isolate the TV set from the tuner). NOTE: Disconnect the built-in FM antenna when using an external one.

SHIPPING OR TRANSPORTING THE INSTALLED TUNER

If it becomes necessary to ship or transport the phonograph with its installed tuner, first, mount the tuner (at bottom) to the phono cabinet with the 10-32 x 1-3/8" shipping screws and flat washers originally supplied with tuner (see installation figure); secondly, secure the record changer tone arm to its support post (see Phonograph Operating Instruction Booklet); thirdly, secure record changer to cabinet by turning both record changer mounting screws counterclockwise until changer no longer floats.

Before putting unit back into operation, remove the shipping screws and washers (to prevent acoustical feedback); free the record changer tone arm previously secured to its support post and float record changer by screwing both record changer mounting screws (clockwise) down flush with the changer base.

SERVICE MANUAL SECTION

TUBE COMPLEMENT

Ref. No.	Type	Function
V1	6BQ7A	FM RF amp & converter
V2	6BA6	FM IF amp
V3	6BA6	FM-AM IF amp
V4	6AU6	FM limiter & AM det*
V5	6AL5	FM ratio det
V6	6BE6	AM converter
V7	6X4	Rectifier
V8	EM81/6DA5	Tuning eye

*See Production Changes; germanium diode used as AM det in some chassis.

PRODUCTION CHANGES

Chassis Coding	Changes
HS-783A & HS-786A	Original chassis
HS-783B & HS-786B	AM DETECTOR CHANGE: from a crystal diode type to a vacuum tube type (see HS-783B and HS-786B Schematic Diagram).

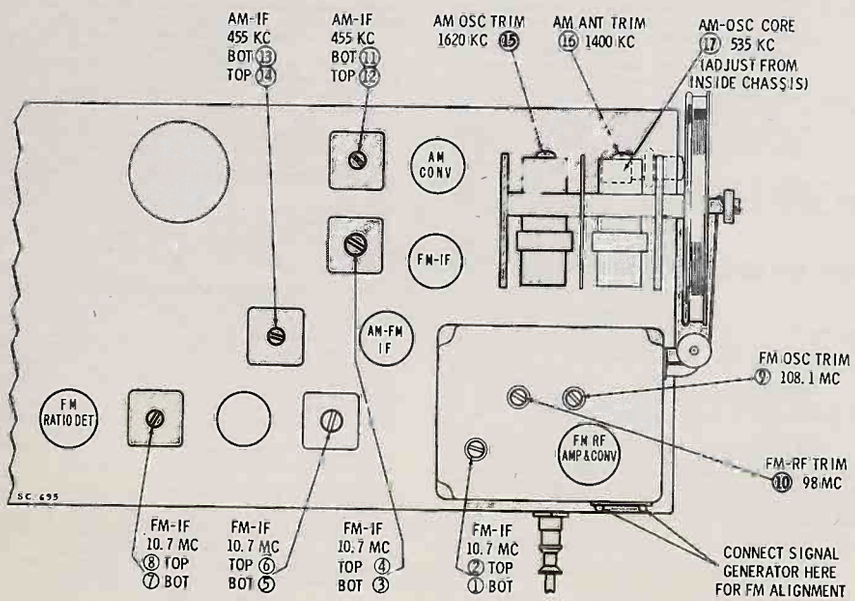


FIGURE 10. ALIGNMENT POINTS LOCATION DETAIL

ALIGNMENT

PRELIMINARY PROCEDURE

Either AM or FM alignment may be performed independent of the other. Use an AM signal generator and a VTVM as indicated. The AM antenna loop should be connected. Use insulated alignment tools. As stages are brought into alignment, keep reducing signal generator output so meter reads no more than -8V DC when aligning FM, or no more than -5V DC when aligning AM; this prevents overloading and assures greater accuracy. With gang fully closed, left edge of pointer (front) should line up with mark on left end of pointer rail (see Dial Stringing Detail). In AM alignment, signal generator should be modulated with 400 cps.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	BAND SW SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
FM-IF ALIGNMENT							
1.	FM ant terminals	10.7 Mc No mod	Fully open	FM	VTVM-DC probe to junction of C24 & R24, Com to chassis	1, 2, 3, 4, 5, 6 & 7	Adjust for max neg reading.
2.	FM ant terminals	"	"	FM	VTVM-DC probe to junction of C28 & R20, Com to chassis	8	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of correct setting. (If meter has zero center scale, use this scale) Repeat steps 1 and 2 until no further increase; step 2 should be last step.
FM-RF ALIGNMENT - See Note*							
3.	FM ant terminals	108.1 Mc No mod	Fully open	FM	VTVM-DC probe to junction of C24 & R24, Com to chassis	9	Adjust for max neg reading.
4.	FM ant terminals	98 Mc No mod	Tune for max	FM	"	10	"
AM-IF ALIGNMENT							
5.	6BE6 grid (pin 7) or antenna stator of AM tuning cap thru .1 mf & ch	455 Kc	Fully open	AM	VTVM-DC probe to AVC line (pin 3 of T4). Com to chassis	11, 12, 13 & 14	"
AM-RF ALIGNMENT							
6.	Radiation loop**	1620 Kc	"	AM	"	15	"
7.	"	1400 Kc	Tune for max	AM	"	16	With chassis installed in cabinet, adjust for max close of tuning eye
NOTE: Do not perform the following steps unless the oscillator core has been tampered with or associated components have been replaced.							
8.	6BE6 grid (pin 7) thru .1 mf & chassis	1620 Kc	Fully open	AM	VTVM-DC probe to AVC line (pin 3 of T4). Com to chassis	15	Adjust for max neg reading.
9.	"	535 Kc	Fully closed	AM	"	17	Adjust for max neg reading. Repeat steps 8 & 9 until oscillator covers required range; step 8 should be last adjustment.
10.	Repeat step 7.						

*If FM tuner string has been replaced or tampered with, check it for correct length and set-up before proceeding with steps 3 & 4. String should measure about 3" from FM tuner opening to gang shaft collar. Open gang fully, place collar and string on gang shaft, then turn collar counterclockwise to just remove slack from string; tighten collar setscrews (see Dial Stringing Detail).

**Connect generator across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver loop.

FM TUNER SERVICE NOTES

Do not free the dial cable pulley located on the FM tuner unit, as this may result in audio howl. This is due to core vibration caused by acoustic feed-back from the loudspeaker at certain frequencies. Silicon grease is applied at the junction of string and pulley, to insure smooth tuning action and must not be removed. Therefore, whenever tuning action is erratic, check for proper use of silicon grease (Motorola Part Number 11M490487). Also affecting tuning action, is the angle of the pulley bracket with respect to the take-up shaft. Position bracket until tuning action is as smooth as possible.

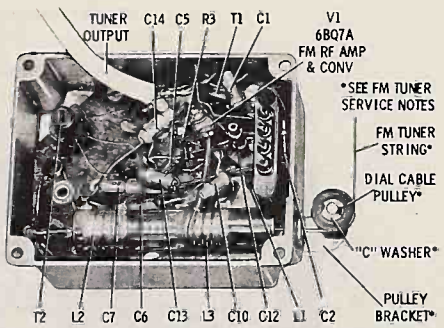
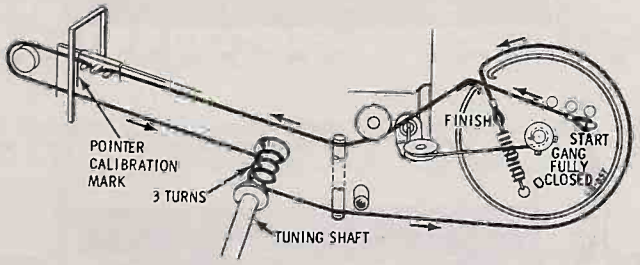
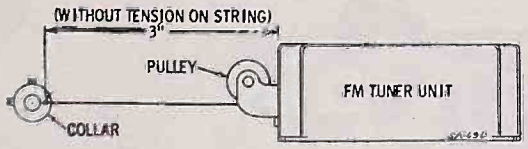


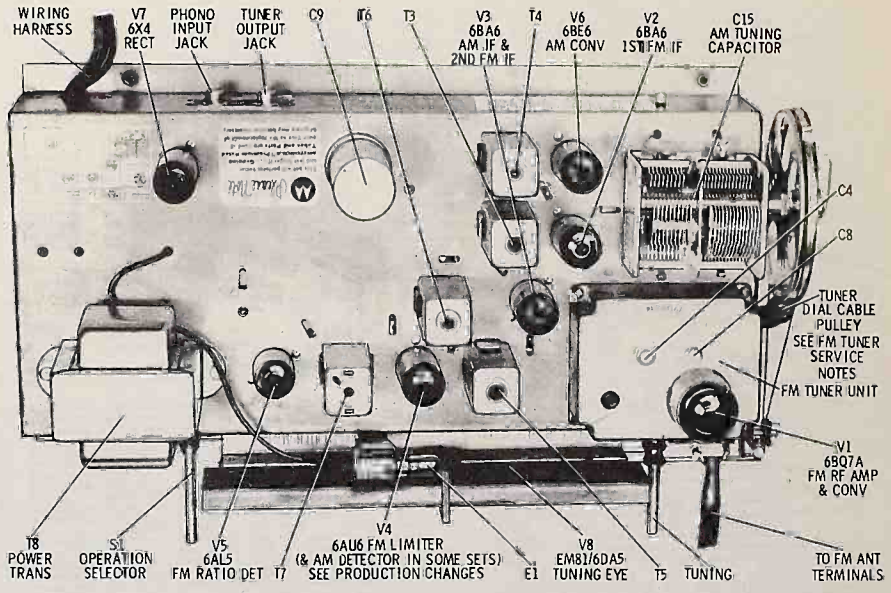
FIGURE 11. FM UNIT 77D638430 PARTS LOCATION

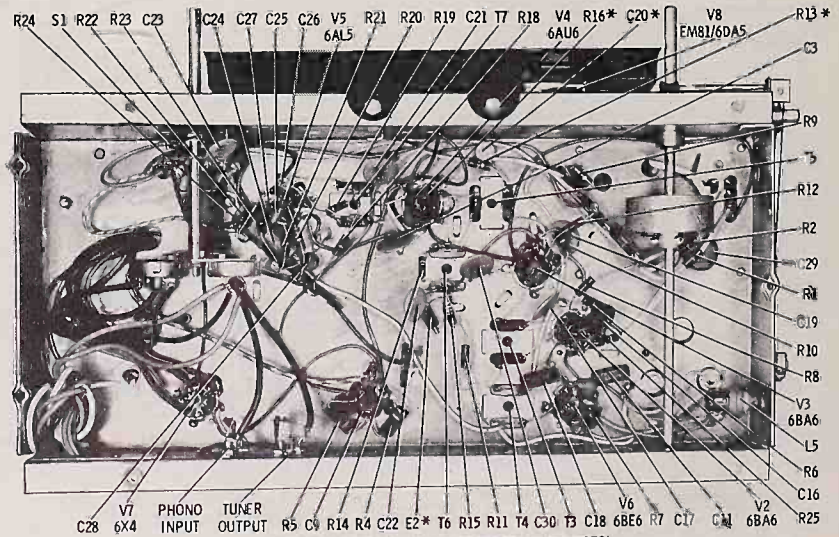




MEASURE FM TUNER STRING THIS WAY

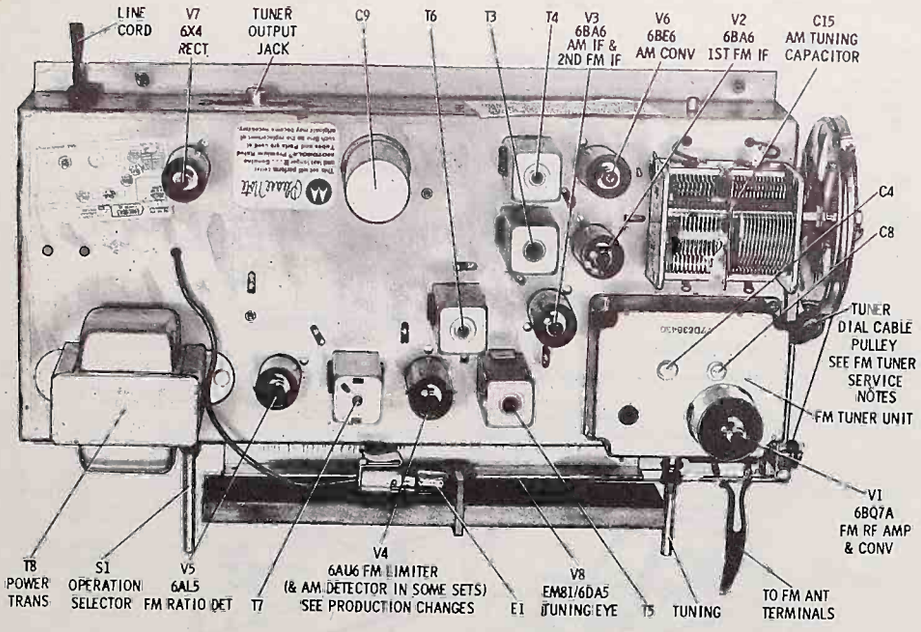
FIGURE 12. DIAL STRINGING DETAILS





*USED IN HS-783A ONLY (SEE PRODUCTION CHANGES)

FIGURE 13. HK-42 PARTS LOCATION (HS-783)



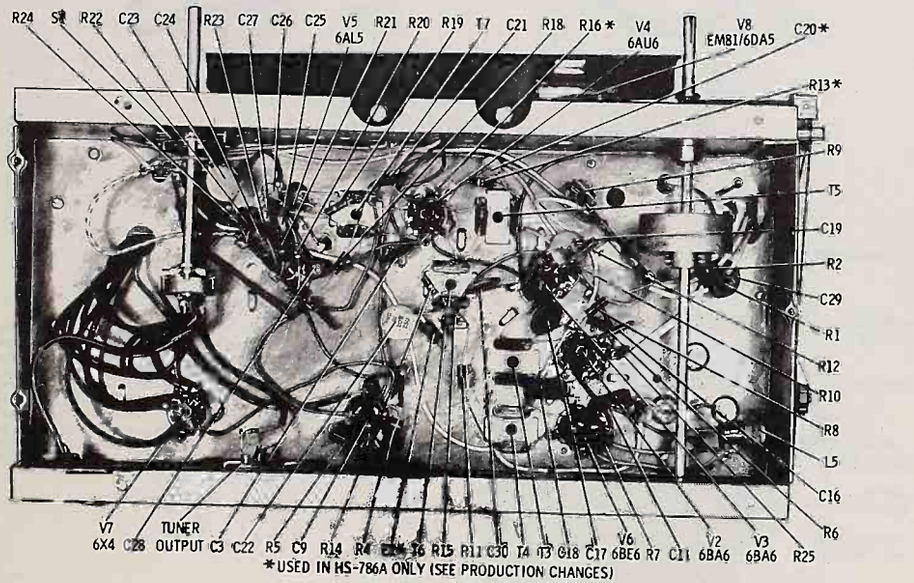


FIGURE 14. HK-43 PARTS LOCATION (HS-786)

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
FM TUNER 77D638430 (UT-343) ELECTRICAL PARTS		
C-1	21K640021	Capacitor, cer tub: 10 mmf 500V NTC750PPM
C-2	21K640022	Capacitor, cer tub: .001 mf 500V
C-4	20K640023	Capacitor, mica trim (RF trim)
C-5	21K640022	Capacitor, cer tub: .001 mf 500V
C-6	21K640024	Capacitor, cer tub: 20 mmf 500V
C-7	21K640024	Capacitor, cer tub: 20 mmf 500V
C-8	20K640025	Capacitor, mica trim (osc trim)
C-10	21K640026	Capacitor, cer tub: 10 mmf 500V NTC470PPM
C-12	21K640028	Capacitor, cer tub: 15 mmf 500V
C-13	21K640027	Capacitor, cer tub: 8.2 mmf 500V PTC100PPM
C-14	21K640029	Capacitor, cer tub: 68 mmf 500V NTC750PPM
L-1	76K640030	Ferrite Bead (This represents inductance shown as L1 on schematic)
L-2	24K640031	Coil, FM-RF: complete (incl L3)
L-3	-	Coil, FM Osc (part of L2)
R-3	17K640032	Resistor, carbon film: 1 meg 10%
T-1	25K640033	Transformer, FM ant
T-2	25K640034	Transformer, FM-IF: incl cores
FM TUNER 77D638430 (UT-343) MECHANICAL PARTS		
	77D638430	FM Tuner, complete
	43K640041	Collar, tuning gang shaft: less setscrews
	76K640043	Core, osc & RF coil: incl string
	76K640036	Core, IF transformer
	49K640035	Pulley, dial
	3K640042	Screw, machine (tuner sub-chassis mtg)
	3K640044	Setscrew (tuning gang shaft collar)
	9K640039	Socket, tube: 9 pin min
	41K640037	Spring, RF & osc coil return
	31K640040	Strip, ant terminal
	4K601456	Washer, "C" (pulley anti-vibrating)
	4K640038	Washer, "C" (pulley ret)
HS-783, 786 ELECTRICAL PARTS		
C-1,2,4,5,6,7,8, 10,12,13,14	-	See FM Tuner Parts List
C-3	21R482726	Capacitor, cer disc: .01 mf 500V
C-9	23D645336	Capacitor, electrolytic: 40-50-50mf/150V
C-11	8K129455	Capacitor, mylar: .05 mf 200V
C-15	19R641739	Capacitor, variable: 2 gang
C-16	21R482726	Capacitor, cer disc: .01 mf 500V
C-17	21R482726	Capacitor, cer disc: .01 mf 500V
C-18	8K128692	Capacitor, mylar: .1 mf 200V
C-19	21R482726	Capacitor, cer disc: .01 mf 500V
C-20	21R115593	Capacitor, cer disc: 47 mmf 500V(HS-783A&786A)
C-21	21R482726	Capacitor, cer disc: .01 mf 500V
C-22	21R482726	Capacitor, cer disc: .01 mf 500V
C-23	21R482726	Capacitor, cer disc: .01 mf 500V
C-24	23A638536	Capacitor, electrolytic: 8 mf 50V
C-25	21R129873	Capacitor, cer disc: 330 mmf 500V
C-26	21R129873	Capacitor, cer disc: 330 mmf 500V
C-27	21R129873	Capacitor, cer disc: 330 mmf 500V
C-28	21R121678	Capacitor, cer disc: .001 mf 500V
C-29	21R121946	Capacitor, cer disc: .01 mf 500V
E-1	65R10867	Bulb, pilot light: 6V #44
E-2	48K636691	Diode, crystal (AM detector - HS783A & HS-786A)
L-1,2,3	-	See FM Tuner Parts List
L-4	-	See Cabinet Parts List
L-5	24B638340	Coil, osc
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6K129828	10,000 20% 1/2W
R-2	6K129828	10,000 20% 1/2W
R-3	-	See FM Tuner Parts List
R-4	6K129830	330 20% 1W
R-5	6K129830	330 20% 1W
R-6	6K124797	150 10% 1/2W
R-7	6K129829	22,000 20% 1/2W
R-8	6K127960	1000 20% 1/2W
R-9	6K119928	2700 10% 1/2W
R-10	6K127516	82 10% 1/2W
R-11	6K129062	2.2 meg 20% 1/2W
R-12	6K127960	1000 20% 1/2W
R-13	6K125534	100,000 10% 1/2W (HS-783A & HS-786A only)
R-14	6K125892	47,000 10% 1/2W
R-15	6K129388	390,000 10% 1/2W
R-16	6K127516	82 10% 1/2W (HS-783A & HS-786A only)
R-17	6K129013	1 meg 10% 1/4W
R-18	8K129828	10,000 20% 1/2W
R-19	6K129874	68 10% 1/2W
R-20	6K124507	68,000 10% 1/2W
R-21	6K127513	1500 10% 1/2W
R-22	6K121301	1000 10% 1/2W
R-23	6K119930	6800 10% 1/2W
R-24	6K119930	6800 10% 1/2W
R-25	6K121300	27,000 10% 1/2W
S-1	40C645337	Switch, operation selector (incl On-off sw)
T-1 & 2	-	See FM Tuner Parts List
T-3	24C638646	Transformer, FM 1st IF: 10.7 Mc
T-4	24C634507	Transformer, AM 1st IF: 455 Kc
T-5	24K638647	Transformer, FM 2nd IF: 10.7 Mc
T-6	24K634508	Transformer, AM 2nd IF: 455 Kc
T-7	24C638488	Transformer, FM Ratio Detector
T-8	25C645339	Transformer, power
HS-783, 786 MECHANICAL PARTS		
	64B645261	Background, dial
	43A721314	Bushing, line cord (Use with 43K721440 ret - HK43 only)
	43A638267	Bushing, tuning shaft
	30C645335	Cable, power (HK42 only)
	42B733793	Clip, T3 thru T7 mtg
	5K3195	Eyelet (C15 insulating)
	49B638235	Flywheel, tuning shaft: less setscrews
	5K470916	Grommet, insulating (C15 ins)
	30K645340	Line Cord (HK43 only)
	2S7051	Palnut: 3/8-32 (sw & tuning shaft mtg)
	1K645298	Pointer, dial
	49A638219	Pulley, dial cord
	9K645419	Receptacle, 1-pin (tuner output & phono input - HK42 only)
	9K645718	Receptacle, 1-pin (tuner output - HK43 only)
	43K721440	Retainer, line cord (Use with bushing 43A721314 HK43 only)
	5B470101	Rivet, shoulder (dial cord pulley ret - long)
	5K12814	Rivet, shoulder (dial cord pulley ret - short)
	5K481776	Rivet, shoulder (under rollers)
	3S2294	Screw, lock: 6-32 x 1/2 (C15 mtg)
	3S127516	Screw, tapping: #4 x 3/8 (FM tuner unit mtg)
	2S9724	Setscrew: #6-32 x 1/4 (flywheel)
	9A638432	Socket, pilot light
	9K638433	Socket, tube: 7 pin min
	9K638368	Socket, tube: 9 pin min (tuning eye)
	41A471681	Spring, dial
	1K645290	Tuning Shaft & Pulley Assembly
	4K501364	Washer, "C" (tuning shaft)
HK42, 43 CABINET PARTS		
L-4	24D645324	Antenna & Panel
	13C645250	Bezel (top - large)
	13B645260	Bezel (bot - small)
	30K645356	Cable, double plug (HK42 & HK43)
	30K645743	Cable, receptacle & plug (HK42 only)
	42B645287	Clip, dial scale mtg
	64C645281	Escutcheon
	36K641534	Knob, control
	2K736069	Nut, hex (bezel mtg)
	34K645451	Scale, dial (horiz reading - HK42)
	*34K646124	Scale, dial (horiz reading - HK43)
	*34C646123	Scale, dial (vert reading - HK43)
	34C645450	Scale, dial (vert reading - HK42)
	3B749168	Screw, slotted washer head: 6-18 x 5/8 (FM ant terminals mtg)
	3S128310	Screw, wood: #6 x 3/8 (bot bezel mtg)
	31A21990	Strip, terminal (FM ant conn)
	29A76280	Terminal, pin (AM ant leads)
LIMITED REPLACEMENT PARTS		
Note:		The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.
	7B644345	Bracket, tuner shipping
	1V645373	Kit, mtg parts (HK42 & HK43)

*New Item, Appears in any List for First Time

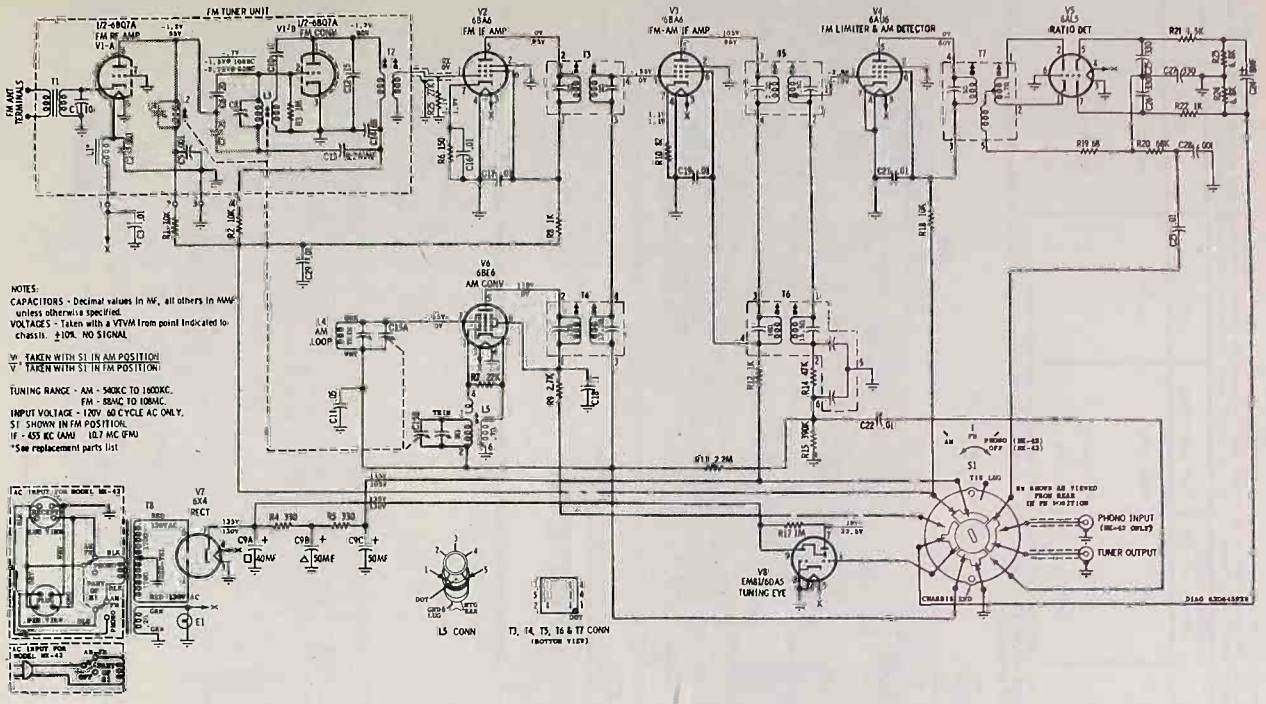


FIGURE 16. HS-783B & HS-786B SCHEMATIC DIAGRAM

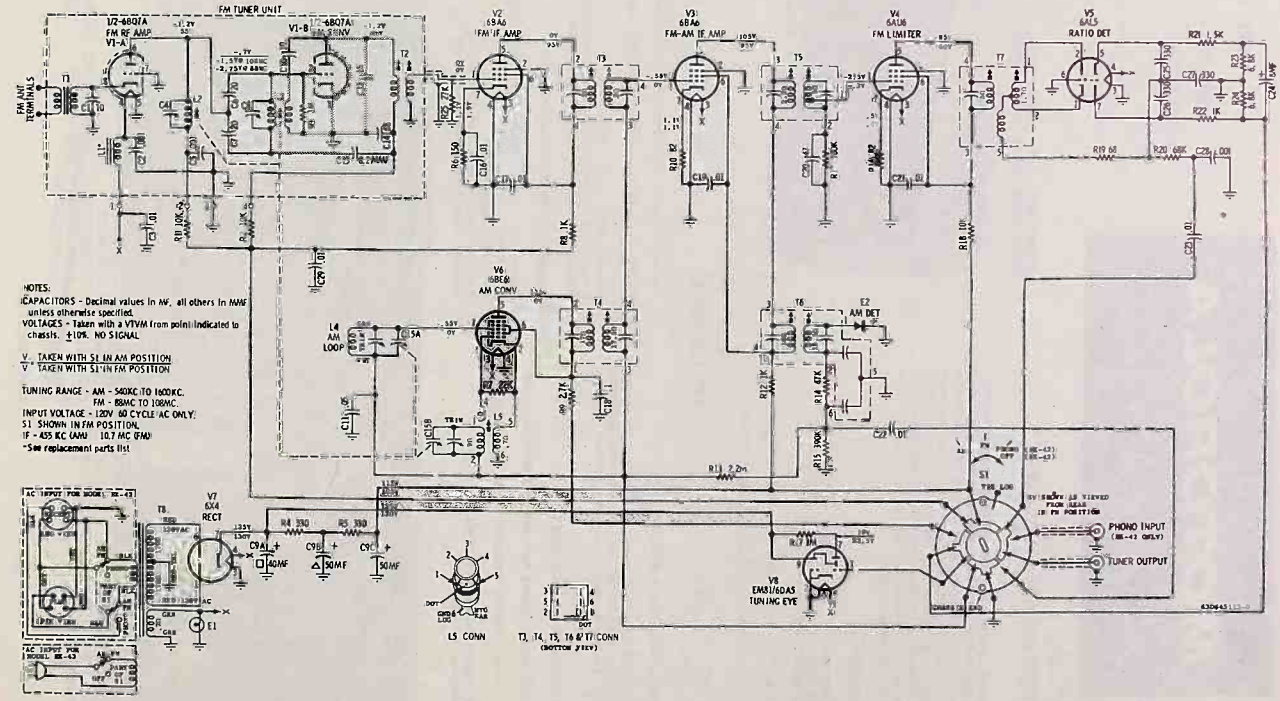


FIGURE 15. HS-783A & HS-786A SCHEMATIC DIAGRAM

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
C5G,S,W	HS-753

GENERAL INFORMATION

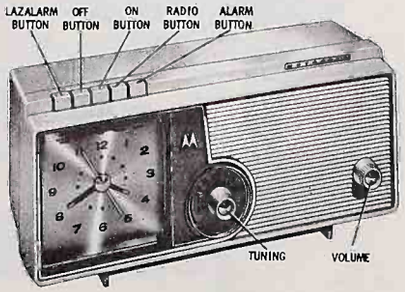
TYPE - AC clock model superheterodyne receiver featuring: pushbutton operated self-starting clock for automatically turning radio on and off, appliance outlet, lifetime PLAcir chassis using modern modular components and Tube Sentry unit. Clock also features a repeating awakening alarm and delayed radio (or appliance) shut-off. A built-in ferrite core antenna is used.

TUBE COMPLEMENT -

12BE6	Converter	50C5	Pwr amp
12BA6	IF amp	35W4	Rectifier
12AV6	Det-AVC-AF amp		

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts, 60 cycle AC only; 35 watts



SERVICE NOTES

SERVICING PLATED CHASSIS BOARDS

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing plated chassis boards.

TO REMOVE CHASSIS FROM CABINET

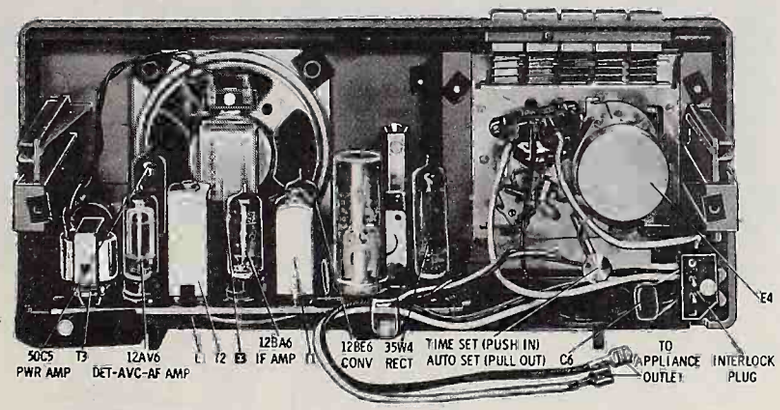
1. Remove dial scale, tuning and volume knobs; they pull off.
2. Remove 2 rear cabinet mounting screws and pull out rear cabinet.
3. Remove 4 chassis mounting screws.
4. Remove chassis from cabinet.
5. To free chassis, unsolder appropriate leads.

TO REMOVE CLOCK CRYSTAL AND ESCUTCHEON

1. Repeat steps 1 and 2 above.
2. From rear, remove 2 escutcheon mounting speed clips.
3. Remove escutcheon, then clock crystal.

TO REMOVE CLOCK FROM CABINET

1. Remove 2 rear cabinet mounting screws and pull out rear cabinet.
2. Unsolder clock leads.
3. Remove clock crystal and escutcheon.
4. Remove 4 clock mounting speed clips and remove clock.



PARTS LOCATION

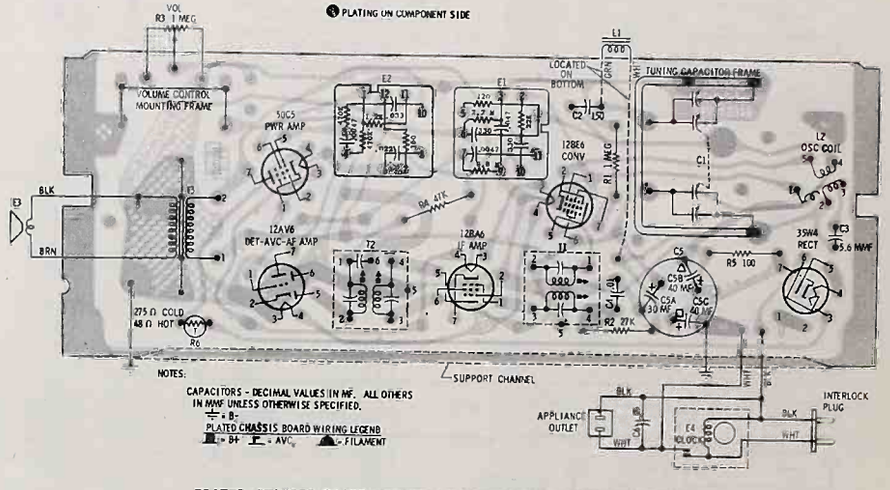
ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across the speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading the receiver.

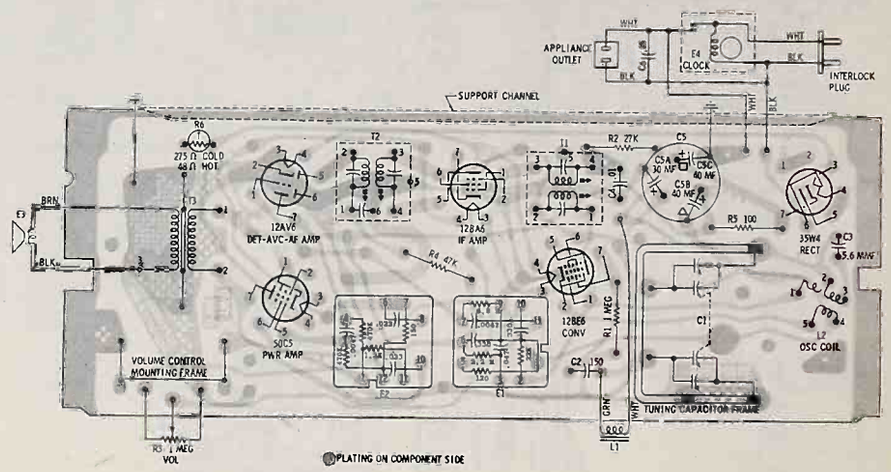
STEP	GENERATOR CONNECTION	GEN FREQ (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	12BE6 grid (pin 7) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Radiation loop*	1620 Kc	Fully open	5	Adjust for maximum.
3.	"	1400 Kc	Tune for max	6	"

4. Repeat steps 2 & 3 until no further increase; step 3 should be last adjustment.

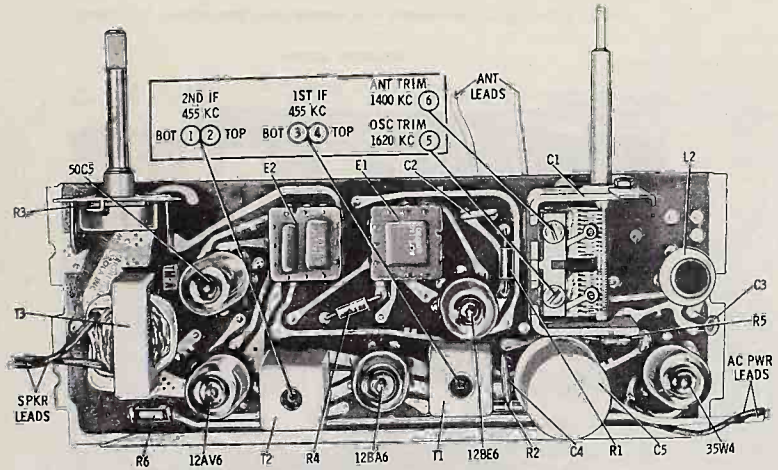
*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver antenna.



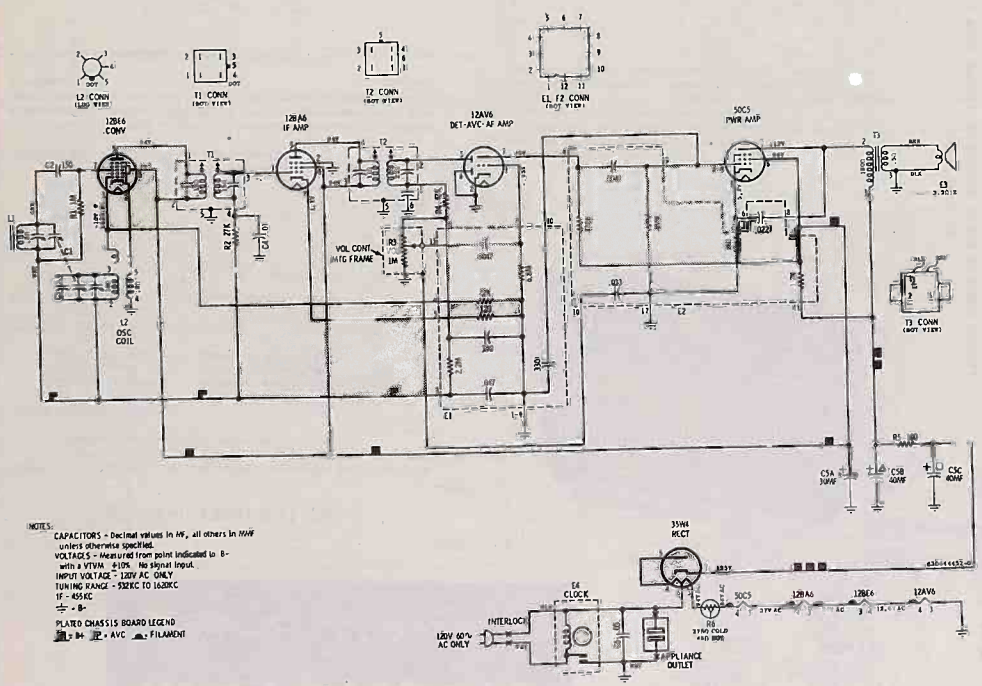
PLATED CHASSIS BOARD WIRING AS VIEWED FROM COMPONENT SIDE



PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM SIDE (COMPONENTS SHOWN ARE ON OPPOSITE SIDE)



ALIGNMENT POINTS AND PARTS LOCATIONS



NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to B- with a VTVM 410%. No signal input.
INPUT VOLTAGE - 120V AC ONLY
TUNING RANGE - 532KC TO 1620KC
IF - 455 KC
⏚ - B-
PLATED CHASSIS BOARD LEGEND
B+ = B+ A = AVC F = FILAMENT

SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	*19K614848	Capacitor, variable: 2 gang
C-2	21K127652	Capacitor, cer disc: 150 mmf 500V NTC750PPM
C-3	*21R129689	Capacitor, cer disc: 5.6 mmf 500V NTC750PPM
C-4	21B533471	Capacitor, cer disc: .01 mf 500V
C-5	23B639496	Capacitor, electrolytic: 30-40-40mf/150V
C-6	8K128690	Capacitor, mylar: .05 mf 400V
E-1	51C637000	Modular Component
E-2	51K637001	Modular Component
E-3	50K640832	Speaker, PM: 4"; 3.2 ohm VC
E-4	*72K643958	Clock Assembly: Westclox
L-1	24K638190	Antenna, ferrite rod
L-2	*24K644847	Coil, osc
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6K122324	1 meg 20% 1/2W
R-2	6K121300	27,000 10% 1/2W
R-3	*18K644846	Volume Control: 1 meg
R-4	6K121687	47,000 20% 1/2W
R-5	6R6018	100 20% 1/2W
R-6	*6B643916	Thermistor (tube sentry): 275Ω ±30% @ 25°C (cold res); 48Ω ±15% @ 40°C (hot res)
T-1	24K643903	Transformer, 1st IF: 455 Kc
T-2	24K639362	Transformer, 2nd IF: 455 Kc
T-3	25B640767	Transformer, output
MECHANICAL PARTS		
	*84K643988	Board, plated chassis: less all components
Note:		When ordering, specify part number (and letter - if any) found on original board, and mention model number of this set. If part number is different from that found in this parts list, order by complete part number found on board and mention model number of this set.
	SS124451	Rivet, shielding (tube socket center 12BA6)
	9K636609	Socket, tube: 7 pin min

Ref. No.	Part Number	Description
CABINET PARTS		
	*1V644581	Cabinet Front: green (C5G)
	*1V644582	Cabinet Front: maple sugar (C5S)
	*1V644583	Cabinet Front: antique white (C5W)
	*1V644577	Cabinet Rear: antique white (C5G, C5S, C5W)
	42A637826	Clip, speed (rear cab screw mtg)
	61B640819	Crystal, clock
	*13K643950	Escutcheon
	5K125601	Eyelet (line cord mtg)
	36B641068	Knob, dial scale: clear
	*36K643953	Knob, tuning: antique white
	*36K643952	Knob, volume: antique white
	30B640858	Line Cord: antique white
	29K534326	Lug, terminal (appliance outlet conn)
	2K736822	Nut, speed (clock & escutcheon mtg)
	2K637708	Nut, speed (spkr mtg)
	9B643019	Outlet, appliance
	28A641393	Plug, line cord interlock
	38K641367	Pushbutton: antique white (clock)
	3S120646	Screw, lock: 6-32 x 3/16 (gang brkt mtg)
	3S115599	Screw, machine: 6-32 x 1/2 (cabinet rear mtg)
	3S127592	Screw, machine: 10-24 x 3/4 (line cord mtg)
	3S122335	Screw, tapping: #6 x 1/2 (chassis & interlock plug mtg)
	3S128635	Screw, tapping: #6 x 5/8 (chassis mtg - wire cl p side)
	41K641368	Spring, pushbutton return

LIMITED REPLACEMENT PARTS

Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.

7B637862	Channel, plated chassis support
33A637852	Emblem, cabinet rear
14B638250	Insulator, antenna mtg
33A640988	Nameplate, cabinet front

*New item, Appears in Any List for First Time

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
A4G, W	HS-747

GENERAL INFORMATION

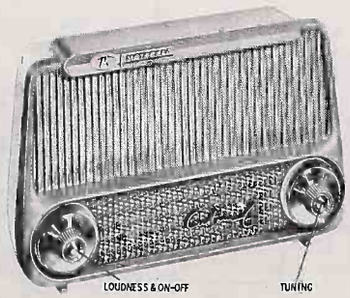
TYPE - AC/DC table model superheterodyne receiver with lifetime PLAcir chassis, Tube Sentry unit, and built-in ferrite loop antenna.

TUBE COMPLEMENT -

12BA6	RF amp	12AV6	Det-AVC-AF amp
12BE6	Conv	35C5	Pwr amp
12BA6	IF amp	35W4	Rectifier

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts AC/DC; 35 watts



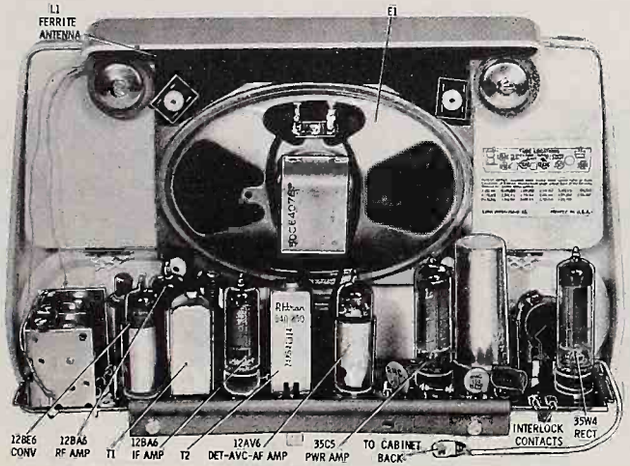
SERVICE NOTES

SERVICING PLATED CHASSIS BOARDS

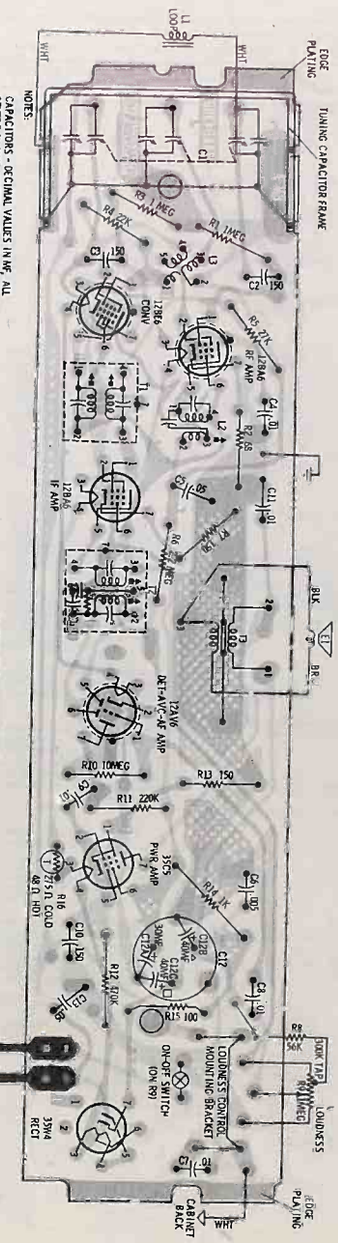
Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing plated chassis boards.

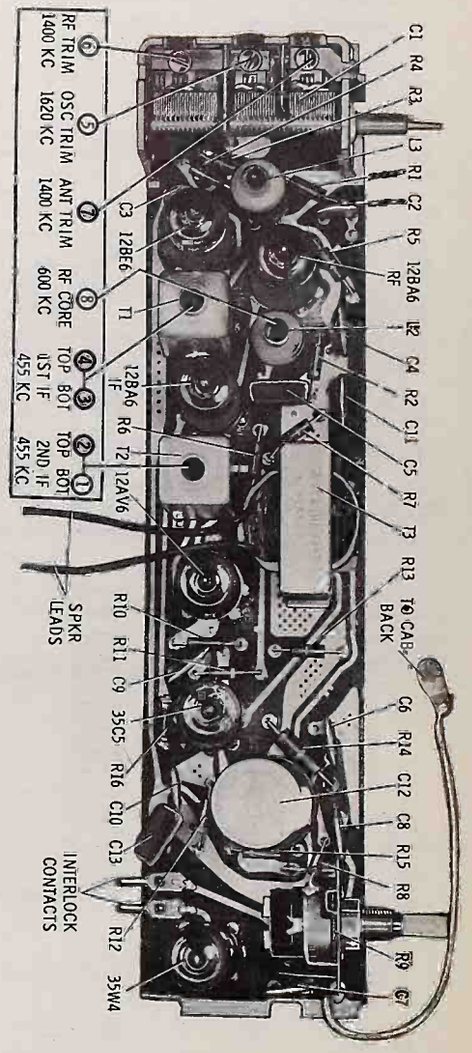
TO REMOVE CHASSIS FROM CABINET

and rear cabinet sections.
2. Pull off insert sections of knobs.
3. Pull off dial scale knob and remove screw behind knob.
4. Unscrew palnut from loudness control.
5. From rear, remove 2 screws on plated chassis mounting channel, and remove chassis from cabinet.
6. To free chassis, unsolder appropriate leads.

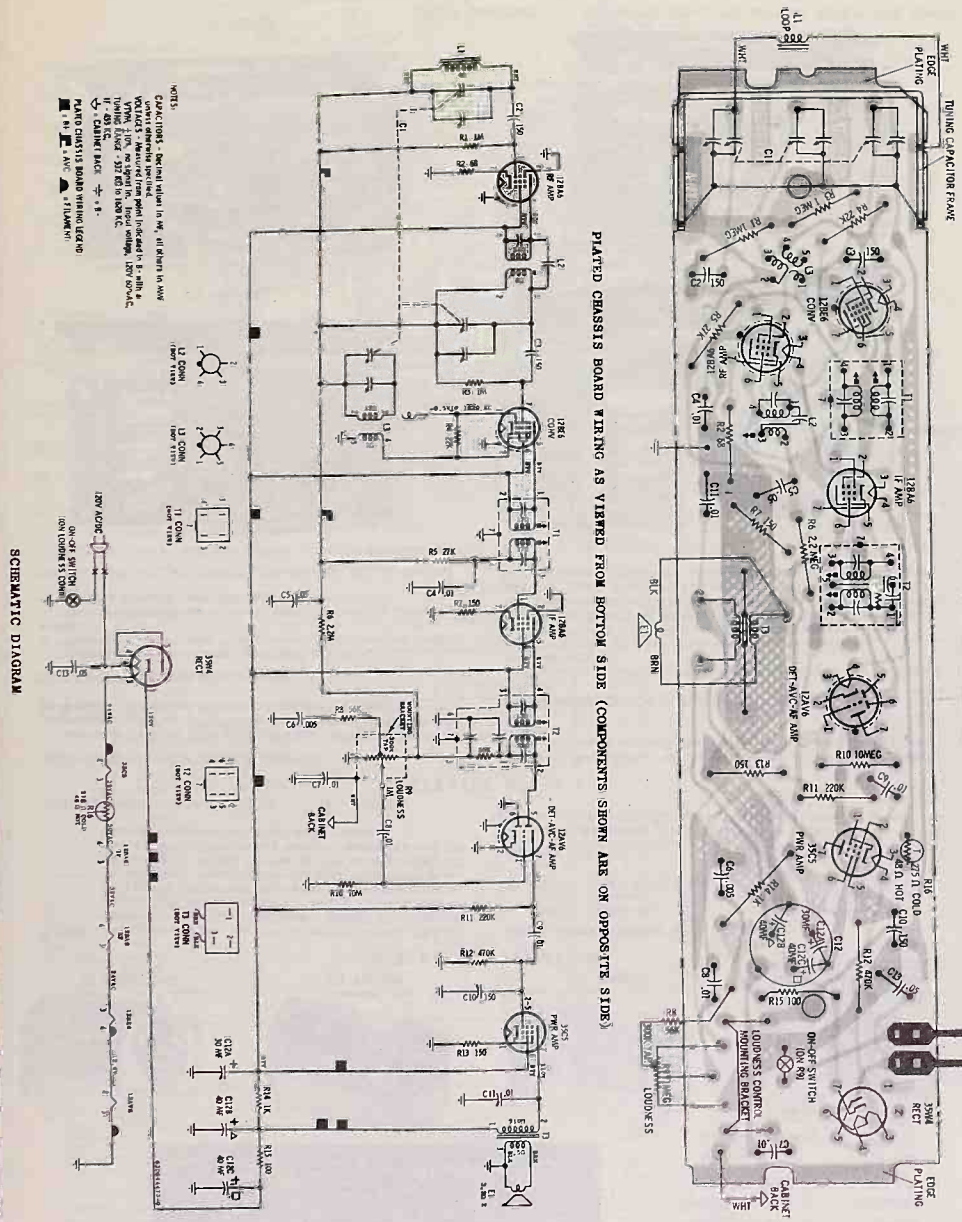


PARTS LOCATION





ALIGNMENT POINTS AND PARTS LOCATIONS



SCHEMATIC DIAGRAM

PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM SIDE (COMPONENTS SHOWN ARE ON OPPOSITE SIDE)

ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect the low side of the generator to B- thru a .1 mf capacitor. Connect a low range output meter across the speaker voice coil, and set loudness control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading; if noise is too high when using radiation loop, use 1.25 volts output. Use an insulated 3/32" hex alignment tool for RF core (8) and the IF adjustments.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	"	5	"
3.	Radiation loop*	1400 Kc	Tune for max	6 & 7	"
NOTE: Do not perform the following steps unless the RF core has been tampered with or associated components have been replaced.					
4.	Radiation loop*	1620 Kc	Fully open	5	Adjust for maximum
5.	"	600 Kc	Tune for max	8	"
6.	"	1400 Kc	"	6 & 7	"

7. Repeat steps 5 & 6 until no further increase; step 6 should be last adjustment.

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep loops at least 12" apart.

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	*19K644089	Capacitor, variable: 3 gang
C-2	21K127652	Capacitor, cer disc: 150 mmf 500V
C-3	21K127652	Capacitor, cer disc: 150 mmf 500V NTC750PPM
C-4	21B533471	Capacitor, cer disc: .01 mf 500V
C-5	8B128613	Capacitor, mylar: .05 mf 400V
C-6	21K633232	Capacitor, cer disc: .005 mf 500V
C-7	21B533471	Capacitor, cer disc: .01 mf 500V
C-8	21B533471	Capacitor, cer disc: .01 mf 500V
C-9	21B533471	Capacitor, cer disc: .01 mf 500V
C-10	21K127652	Capacitor, cer disc: 150 mmf 500V
C-11	8K128614	Capacitor, mylar: .01 mf 400V
C-12	23B639496	Capacitor, electrolytic: 30-40-40mf/150V
C-13	8B128613	Capacitor, mylar: .05 mf 400V
E-1	50K641323	Speaker, PM: 4 x 6"; 3.2 ohm VC
L-1	1V641198	Antenna, ferrite rod
L-2	24B641321	Coil, RF
L-3	24B641320	Coil, oscillator
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6K122324	1 meg 20% 1/2W
R-2	6R2039	68 10% 1/2W
R-3	6K122324	1 meg 20% 1/2W
R-4	6K119405	22,000 20% 1/2W
R-5	6K121300	27,000 10% 1/2W
R-6	6R3927	2.2 meg 20% 1/2W
R-7	6K124797	150 10% 1/2W
R-8	6K127841	56,000 10% 1/2W
R-9	*18B644100	Loudness Control & Switch: 1 meg; tap at 300K
R-10	6K119408	10 meg 20% 1/2W
R-11	6R6015	220,000 20% 1/2W
R-12	6K119406	470,000 20% 1/2W
R-13	6K124797	150 10% 1/2W
R-14	6R6327	1000 10% 1W
R-15	6R6326	100 10% 1/2W
R-16	6B643916	Thermistor: 275Ω ±30% @ 25°C (cold resistance) 48Ω ±15% @ 40°C (hot resistance)
T-1	24C643901	Transformer, 1st IF: 455 Kc
T-2	24K641314	*Transformer, 2nd IF: 455 Kc
T-3	25K640899	Transformer, output

Ref. No.	Part Number	Description
MECHANICAL PARTS		
	*1V644221	Board, plated chassis: less all components; incl interlock plug contacts & 84K643997 plated chassis board
	29A635682	Contact, interlock plug (on plated chassis board)
	5K636314	Rivet, shielding (tube socket center - 12BA6 RF & IF)
	9B635616	Socket, tube: 7 pin min
CABINET PARTS		
	*1V644158	Cabinet Front: green (A4G)
	*1V644158	Cabinet Front: antique white (A4W)
	*16K644105	Cabinet Rear: green (A4G)
	*16K644106	Cabinet Rear: antique white (A4W)
	*1V644144	Grille, trim: incl nameplate
	*36C644091	Knob, dial scale: brass insert (A4G & A4W)
	*36K644094	Knob, loudness indicator: brass insert (A4G & A4W)
	*36K645350	Knob, On-off & loudness: green (A4G)
	*36B645348	Knob, On-off & loudness: antique white (A4W)
	*36K645346	Knob, tuning: green (A4G)
	36B643620	Knob, tuning: antique white (A4W)
	*30B644242	Line Cord
	33A640999	Nameplate
	2S7005	Nut, hex: 6-32 x 1/4 (cab stand mtg)
	2K637708	Nut, speed (spkr mtg)
	2S7051	Palnut: 3/8-32 (loudness cont mtg)
	3S128740	Screw, machine: 6-32 x 1/2 (chassis mtg under tuning knob)
	*3S129802	Screw,tapping: #4 x 3/4(loudness knob mtg)
	3S122335	Screw, tapping. #6 x 1/2 (chassis & cover latch spring mtg)
	3S128636	Screw, tapping: #8 x 3/8 (cab back mtg)
	42B640989	Spring, cover latch
	7K642353	Stand, cabinet: gold (A4G & A4W)
	4A643646	Washer, cup (cover latch spring mtg)
	*4S129285	Washer flat: 1-1/4 (cover latch spring mtg)
LIMITED REPLACEMENT PARTS		
Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.		
	*7K643553	Channel, chassis mtg
	32B640979	Gasket, trim grille

*New Item, Appears in any List for First Time

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
A2G, N, P, W	HS-745
C1N, W	HS-749
C2B, P, W	HS-749
C3G, S, W	HS-750
C3G-1, S-1, W-1	HS-750


A2 SERIES


C1 SERIES


C2 SERIES


C3 SERIES (C3-1 SERIES SAME EXCEPT FOR CLOCK)

GENERAL INFORMATION

TYPE - Superheterodyne receivers with lifetime PLAcir chassis and built-in antenna. Model A2 series is an AC/DC table receiver. Model C1 series is an AC clock radio with provision for automatic turn-on of radio; Model C2 series adds automatic shut-off feature; Model C3 series has delayed shut-off and repeating awakening alarm. Model A2 and C3 series also contain a Tube Sentry unit.

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

TUBE COMPLEMENT -

12BE6	Converter	50C5	Pwr amp
12BA6	IF amp	35W4	Rectifier
12AV6	Det-AVC-AF amp		

POWER SUPPLY -

Model A2 Series - 120V AC/DC; 35 watts
Models C1, C2, C3 Series - 120V 60 cycle AC only; 35 watts

SERVICE NOTES

SERVICING PLATED CHASSIS BOARDS

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing plated chassis boards.

TO REMOVE CHASSIS FROM CABINET

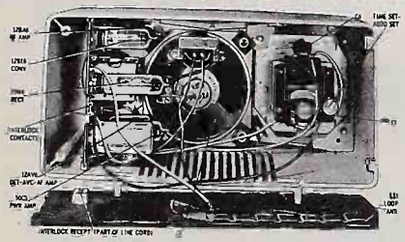
1. Remove back - 2 screws hold it in place.
2. Pull off volume and tuning knobs (place string under knob).
3. Remove screw from cabinet front and remove chassis.
4. To free chassis, unsolder appropriate leads.

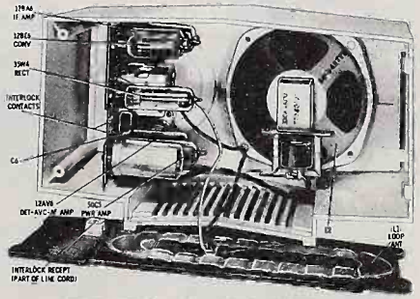
TO REMOVE CLOCK CRYSTAL (Models C1, C2, C3 Series)

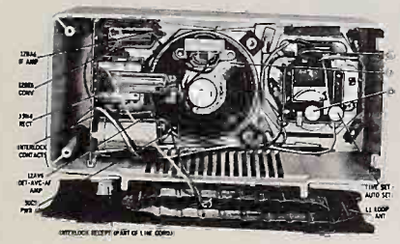
1. Pull off clock knob (or knobs). Insert a screwdriver between the cabinet and bottom edge of the clock crystal (near 6 o'clock on clock face) to release catch, then lift out crystal.

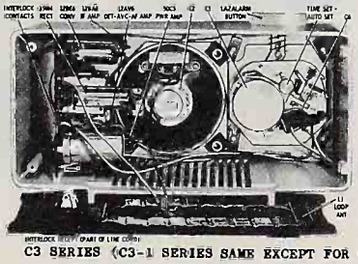
TO REMOVE CLOCK FROM CABINET (Models C1, C2, C3)

1. Remove 2 cabinet back mounting screws and remove cabinet back.
2. Unsolder 3 chassis leads connected to clock.
3. From rear, remove 4 clock mounting spring clips.
4. Pull off Lazalarm button from cabinet (Model C3 only).
5. Remove clock crystal (see "To Remove Clock Crystal"); remove clock from front of cabinet. NOTE: On Model C3 Series, install clock into cabinet before replacing Lazalarm button.

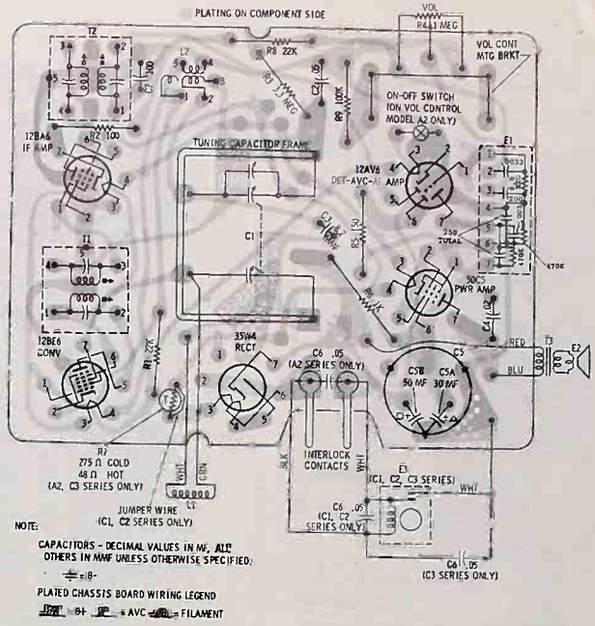

C1 SERIES


A2 SERIES

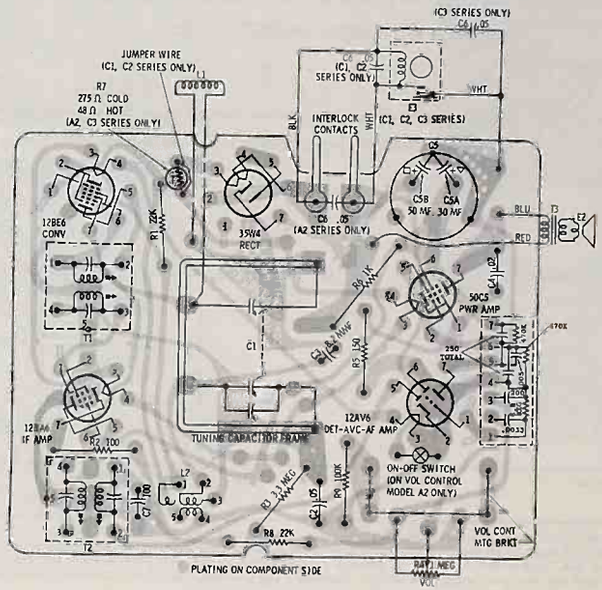

C2 SERIES


C3 SERIES (C3-1 SERIES SAME EXCEPT FOR CLOCK)

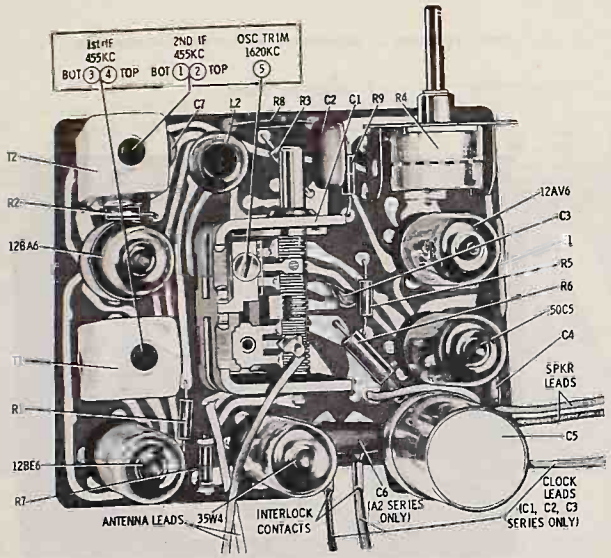
PARTS LOCATION



PLATED CHASSIS BOARD WIRING AS VIEWED FROM COMPONENT SIDE



PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM SIDE (COMPONENTS SHOWN ARE ON OPPOSITE SIDE)

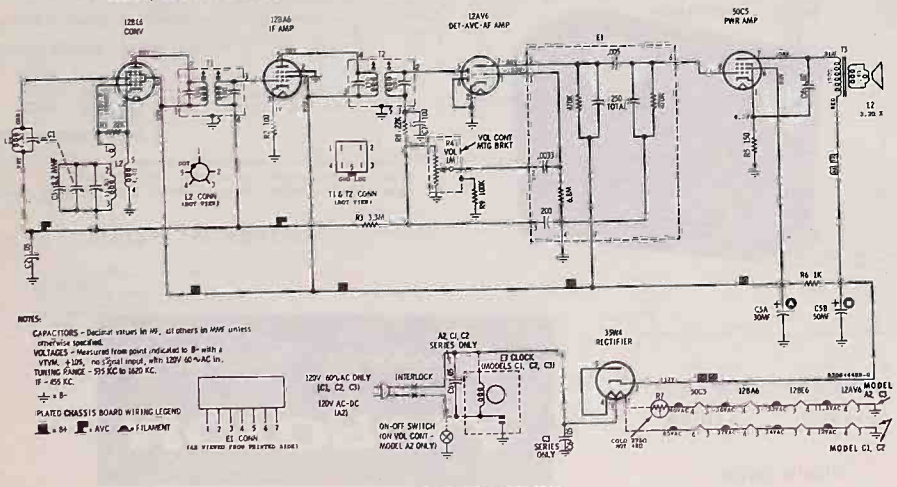


ALIGNMENT POINTS AND PARTS LOCATIONS

ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .40 volts on output meter to prevent overloading.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	Fully open	5	Adjust for maximum



SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	*19B643905	Capacitor, variable: 2 gang
C-2	8B128613	Capacitor, mylar: .05 mf 400V
C-3	*21K129671	Capacitor, cer disc: 8.2 mmf 500V NTC750PPM
C-4	8K128910	Capacitor, mylar: .02 mf 400V
C-5	23B632015	Capacitor, electrolytic: 30-50mf/150V
C-6	8K128690	Capacitor, mylar: .05 mf 400V
C-7	21R129366	Capacitor, cer disc: 100 mmf 500V
E-1	51B643849	Printed Capacitor - Resistor Plate
E-2	*50C643777	Speaker, PM: 5"; 3.2 ohm VC; incl T3 (A2 Series)
	*50D643924	Speaker, PM: 4"; 3.2 ohm VC; incl T3 (C1, C2, C3, C3-1 Series)
E-3	*72D643972	Clock Assembly: Telechron (C1 Series)
	*72D643993	Clock Assembly: Telechron (C2 Series)
	*72D643973	Clock Assembly: Westclox; less pushbutton (C3 Series)
	*72D644070	Clock Assembly: Telechron; less pushbutton (C3-1 Series)
L-1	-	Loop Ant (Part of Cabinet Back Assembly)
L-2	*24K644646	Coil, oscillator
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6K119405	22,000 20% 1/2W
R-2	6R6018	100 20% 1/2W
R-3	6K119407	3.3 meg 20% 1/2W
R-4	*18B643863	Vol Cont & Switch: 1 meg (A2 Series)
	*18B643869	Vol Cont: 1 meg (C1, C2, C3, C3-1 Series)
R-5	6K119403	150 20% 1/2W
R-6	6R3953	1000 20% 1W
R-7	6B643916	Thermistor (Tube Sentry-A2, C3, C3-1 Series only) 2750 ±30% @25°C (cold-resistance) 48 Ω ±15% @ 40°C (hot resistance)
R-8	6K119405	22,000 20% 1/2W
R-9	6K122313	100,000 20% 1/2W
T-1	24C643901	Transformer, 1st IF: 455 Kc
T-2	24K643902	Transformer, 2nd IF: 455 Kc
T-3	-	Transformer, output (Part of E2)
MECHANICAL PARTS		
	*1V644606	Board, plated chassis: less all components; incl interlock plug contacts & 84K645454 plated chassis board
	29A635682	Contact, interlock plug (on plated chassis board)
	5K636314	Rivet, shielding (tube socket center - 12BA6)
	9K636609	Socket, tube: 7-pin min
CABINET PARTS		
	*38K645234	Button, push: green (clock - C3G)
	*1V646011	Button, push: green; incl pushbutton escutcheon, springs, & lever (clock-C3G-1)
	*38K645233	Button, push: maple sugar (clock - C3S)
	*1V646012	Button, push: maple sugar; incl pushbutton escutcheon, springs, & lever (clock-C3S-1)
	*38K643951	Button, push: antique white (clock - C3W)
	*1V646013	Button, push: antique white; incl pushbutton, escutcheon, springs, & lever (clock - C3W-1)
	*1V644627	Cabinet Assembly: green; incl nameplate, dial disc & dial scale (A2G)
	*1V644628	Cabinet Assembly: mocha; incl nameplate, dial disc & dial scale (A2N)
	*1V644629	Cabinet Assembly: crystal pink; incl nameplate, dial disc & dial scale (A2P)
	*1V644637	Cabinet Assembly: antique white; incl nameplate, dial disc & dial scale (A2W)
	*1V645881	Cabinet Assembly: brown; incl dial disc & dial scale (C1N)
	*1V644735	Cabinet Assembly: antique white; incl dial disc & dial scale (C1W)
	*1V644754	Cabinet Assembly: mist blue; incl dial disc & dial scale (C2B)
	*1V644755	Cabinet Assembly: crystal pink; incl dial disc & dial scale (C2P)
	*1V644756	Cabinet Assembly: antique white; incl dial disc & dial scale (C2W)
	*1V644794	Cabinet Assembly: olive green; incl nameplate, dial disc & dial scale (C3G)
	*1V646007	Cabinet Assembly: olive green; incl nameplate, dial disc & dial scale (C3G-1)
	*1V644795	Cabinet Assembly: maple sugar; incl nameplate, dial disc & dial scale (C3S)
	*1V646008	Cabinet Assembly: maple sugar; incl nameplate, dial scale & dial disc (C3S-1)
	*1V644796	Cabinet Assembly: antique white; incl nameplate, dial disc & dial scale (C3W)
	*1V646009	Cabinet Assembly: antique white; incl nameplate, dial disc & dial scale (C3W-1)
	*24C643865	Cabinet Back Assembly: incl L1; less line cord (A2 Series)
	*24K643962	Cabinet Back Assembly: incl L1; less line cord (C1, C2 Series)
	*24K643961	Cabinet Back Assembly: incl L1; less line cord (C3 Series)
	*24K643963	Cabinet Back Assembly: incl L1; less line cord (C3-1 Series)
	41B536529	Clip, spring (clock mtg - C1, C2, C3 Series)
	*61K643858	Crystal, clock (C1W)
	*61C643857	Crystal, clock (C2, C3 Series)
	*61K644079	Crystal, clock (C3-1 Series)
	36K638216	Knob, clock: clear (C1W)
	36B637835	Knob, clock: clear (C2, C3, C3-1 Series)
	*36K644545	Knob, tuning: olive green (A2G, C3G, C3G-1)
	*36K644546	Knob, tuning: antique white (A2N)
	*36K644541	Knob, tuning: crystal pink (A2P, C2P)
	*36K644543	Knob, tuning: antique white (A2W, C2W, C3W, C3W-1)
	*36K643966	Knob, tuning: fawn brown (C1N, C1W)
	*36B643965	Knob, tuning: mist blue (C2B)
	*36K644544	Knob, tuning: maple sugar (C3S, C3S-1)
	*36K643948	Knob, volume: olive green (A2G, C3G, C3G-1)
	*36K643946	Knob, volume: antique white (A2N, A2W, C2W, C3W, C3W-1)
	*36K643944	Knob, volume: crystal pink (A2P, C2P)
	*36K643949	Knob, volume: fawn brown (C1N, C1W)
	*36B643788	Knob, volume: mist blue (C2B)
	*36K643947	Knob, volume: maple sugar (C3S, C3S-1)
	*30K644501	Line Cord: with plug & interlock recept
	2K637708	Nut, speed (spkr mtg - C1, C2, C3, C3-1 Series)
	*3S129686	Screw, machine: 6-32 x 1/4 (chassis mtg)
	3S122335	Screw, tapping: #6 x 1/2 (spkr mtg - A2 Series; cab back mtg - A2, C1, C2, C3, C3-1)
	41K641368	Spring, pushbutton return (C3 Series)

*New Item, Appears in Any List for First Time

LIMITED REPLACEMENT PARTS

Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.

11M128076	Adhesive: 2 oz. jar (dial scale, dial disc & C3-1 nameplate mtg)
*49A643878	Disc, dial (behind tuning knob on A2, C1, C2, C3, C3-1 Series - use 11M128076 adhesive)
*32B643923	Gasket, clock (C1, C2 Series)
*33A643862	Nameplate (A2 Series - use 11M128076 adhesive)
*33B643927	Nameplate (C3, C3-1 Series - use 11M128076 adhesive)
*34B643877	Scale, dial (A2, C1, C2, C3, C3-1 Series - use 11M128076 adhesive)

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
A1B,N,R,W	HS-744

GENERAL INFORMATION

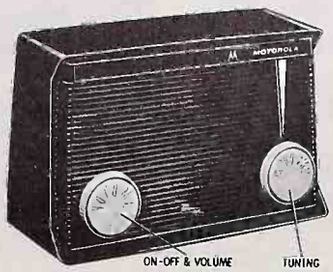
TYPE - AC/DC table model superheterodyne receiver with lifetime PLAcir chassis and built-in loop antenna. Chassis uses a printed resistor-capacitor plate.

TUBE COMPLEMENT -

12BE6	Converter	50C5	Pwr amp
12BA6	IF amp	35W4	Rectifier
12AV6	Det-AVC-AF amp		

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts AC/DC; 35 watts



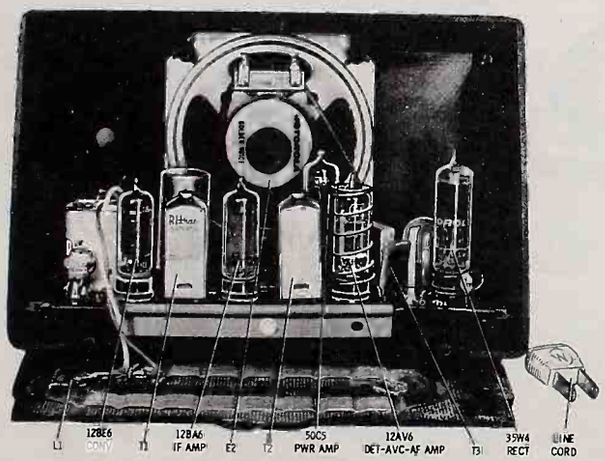
SERVICE NOTES

SERVICING PLATED CHASSIS BOARDS

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing plated chassis boards.

TO REMOVE CHASSIS FROM CABINET

1. Remove back cover - 2 screws hold it in place.
2. Remove chassis mounting screw at base of chassis.
3. Pull off volume knob and unscrew palnut under knob.
4. Slide chassis out of cabinet.
5. To free chassis, unsolder appropriate leads.
6. TO REMOVE TUNING KNOB, remove speed clip from rear of knob.

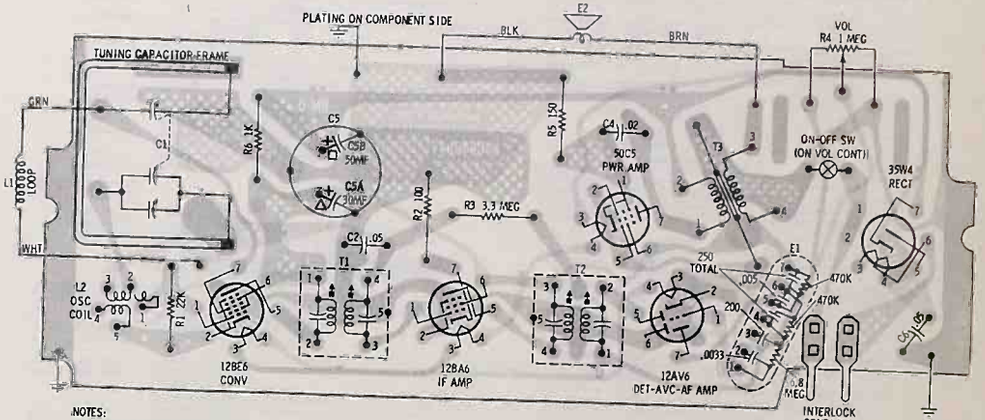


PARTS LOCATION

ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .40 volts on output meter to prevent overloading.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	Fully open	5	Adjust for maximum.



NOTES:

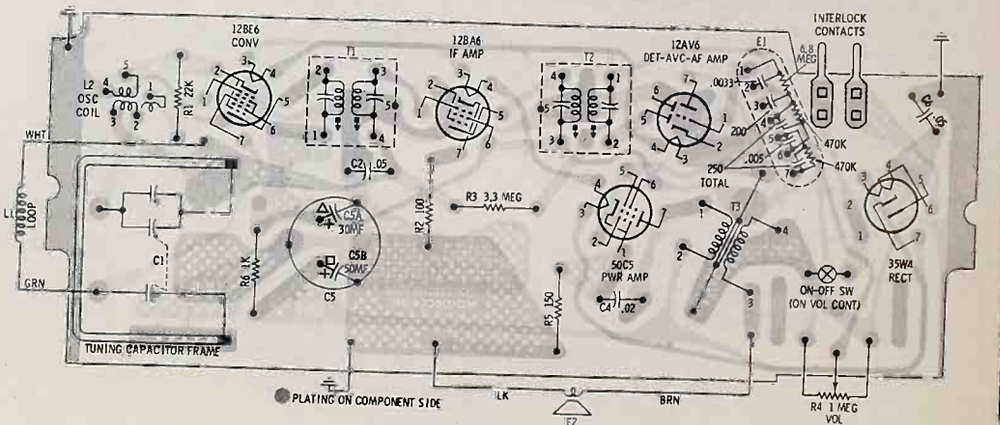
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.

⏚ = B-

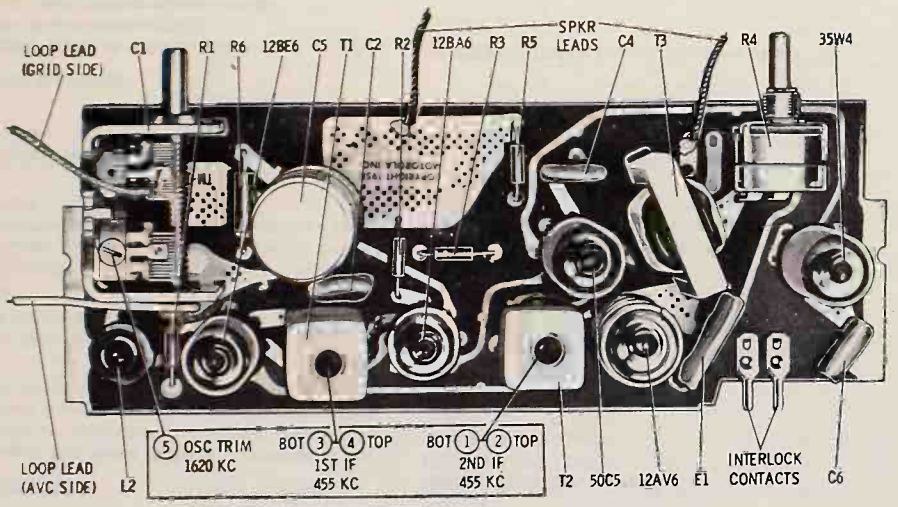
PLATED CHASSIS BOARD WIRING LEGEND

= FILAMENT = AVC = B+

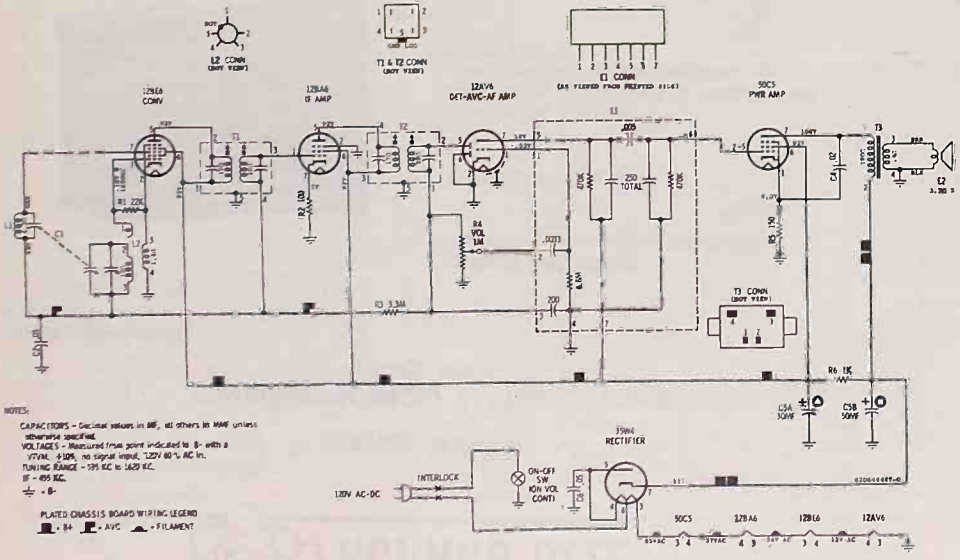
PLATED CHASSIS BOARD WIRING AS VIEWED FROM COMPONENT SIDE



PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM SIDE (COMPONENTS SHOWN ARE ON OPPOSITE SIDE)



ALIGNMENT POINTS AND PARTS LOCATIONS



SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	*19B643753	Capacitor, variable: 2 gang
C-2	*8B128613	Capacitor, mylar: .05 mf 400V
C-4	8K128910	Capacitor, mylar: .02 mf 400V
C-5	23B632015	Capacitor, electrolytic: 30-50mf/150V
C-6	8B128613	Capacitor, mylar: .05 mf 400V
E-1	51B643849	Printed Capacitor - Resistor Plate
E-2	*50C643906	Speaker, PM: 4"; 3.2Ω VC
L-1	-	Loop Antenna (See Cab Back Assembly)
L-2	*24B643864	Coil, oscillator
Resistors - Note:		All resistors are insulated carbon type unless otherwise specified.
R-1	6K119405	22,000 20% 1/2W
R-2	6R6018	100 20% 1/2W
R-3	6K119407	3.3 meg 20% 1/2W
R-4	*18B643755	Vol Cont & Switch: 1 meg
R-5	6K119403	150 20% 1/2W
R-6	6B119404	1000 20% 1W
T-1	*24C643901	Transformer, 1st IF: 455 Kc
T-2	*24K643902	Transformer, 2nd IF: 455 Kc
T-3	*25B643754	Transformer, output
MECHANICAL PARTS		
	*1V644535	Board, plated chassis: less all components; incl interlock plug contacts & 84C643847 plated chassis board
	29A635682	Contact, interlock plug
	5K636314	Rivet, shielding (tube socket center -12BA6)
	26A632710	Shield, tube: spring type

Ref. No.	Part Number	Description
	98635616	Socket, tube: 7 pin min
CABINET PARTS		
	*1V644531	Cabinet Assembly: cerulean blue; incl dial indicator & nameplate (A1B)
	*1V644532	Cabinet Assembly: espresso brown; incl dial indicator (A1N)
	*1V644533	Cabinet Assembly: regimental red; incl dial indicator & nameplate (A1R)
	*1V644534	Cabinet Assembly: antique white; incl dial indicator & nameplate (A1W)
	*24C643759	Cabinet Back Assembly: incl L1; less line cord
	*42A643749	Clip, speed (spkr mtg)
	*36C643758	Knob, tuning: antique white (A1B & A1R)
	*36K643943	Knob, tuning: brown (A1N & A1W)
	*36K643941	Knob, volume: antique white (A1B & A1R)
	*36K643942	Knob, volume: brown (A1N & A1W)
	30B644503	Line Cord: with plug & interlock recept
	2K640912	Nut, speed (tuning knob mtg)
	2S7051	Palnut: 3/8-32 (vol cont mtg)
	3S122335	Screw, tapping: #6 x 1/2 (cab back & chassis mtg)
LIMITED REPLACEMENT PARTS		
Note:		The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.
	11M128076	Adhesive, nameplate & dial indicator (2 oz jar)
	*7B644551	Channel, chassis mtg
	*34A643940	Indicator, dial (Use 11M128076 adhesive)
	*33B643757	Nameplate (A1B, A1R, A1W - Use 11M128076 adhesive)

*New Item, Appears in any List for First Time

MOTOROLA Service Manual

HOME RADIO

MODELS	CHASSIS
A1B,N,R,W	HS-744

GENERAL INFORMATION

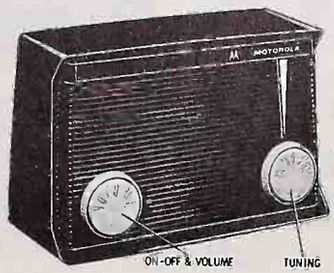
TYPE - AC/DC table model superheterodyne receiver with lifetime PLAcir chassis and built-in loop antenna. Chassis uses a printed resistor-capacitor plate.

TUBE COMPLEMENT -

12BE6	Converter	50C5	Pwr amp
12BA6	IF amp	35W4	Rectifier
12AV6	Det-AVC-AF amp		

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts AC/DC; 35 watts



SERVICE NOTES

SERVICING PLATED CHASSIS BOARDS

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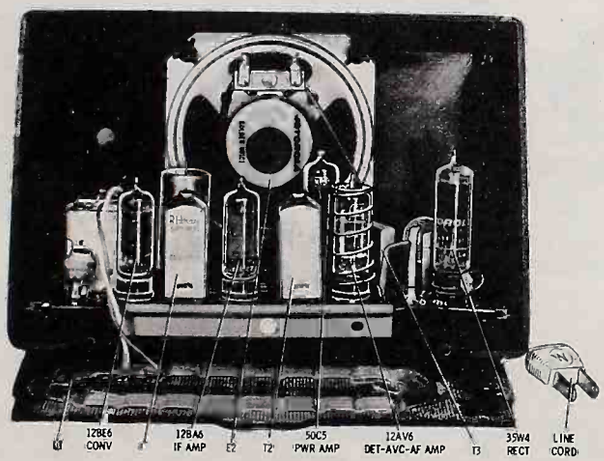
TO REMOVE CHASSIS FROM CABINET

1. Remove back cover - 2 screws hold it in place.
2. Remove chassis mounting screw at base of chassis.
3. Pull off volume knob and unscrew palnut under knob.
4. Slide chassis out of cabinet.
5. To free chassis, unsolder appropriate leads.
6. TO REMOVE TUNING KNOB, remove speed clip from rear of knob.

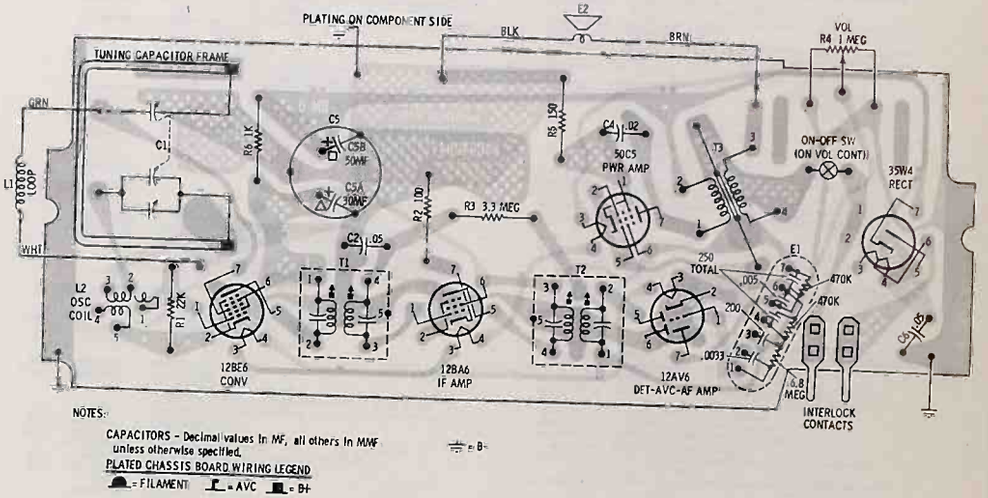


PARTS LOCATION

ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .40 volts on output meter to prevent overloading.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	Fully open	5	Adjust for maximum.



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PLATED CHASSIS BOARD WIRING LEGEND

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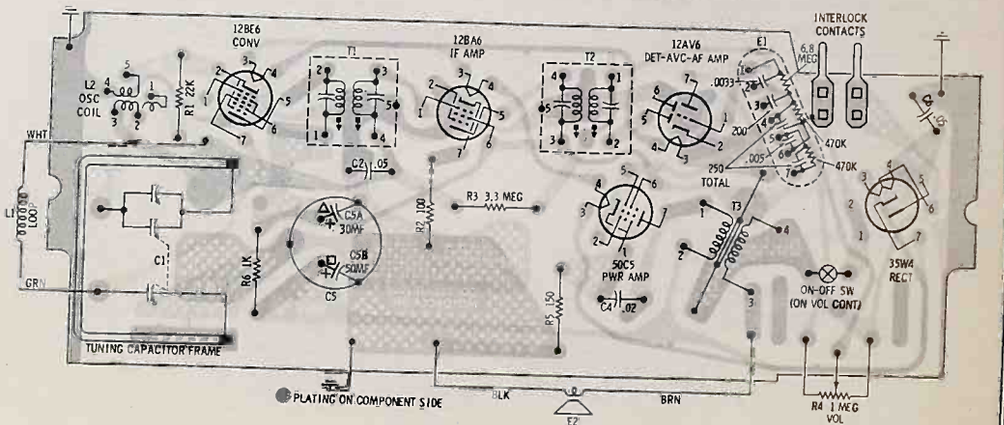
PLATED CHASSIS BOARD WIRING AS VIEWED FROM COMPONENT SIDE



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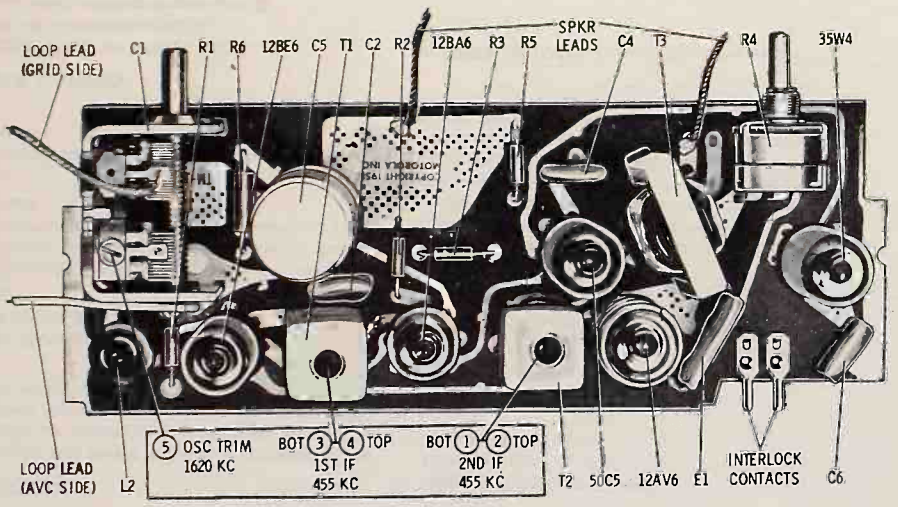
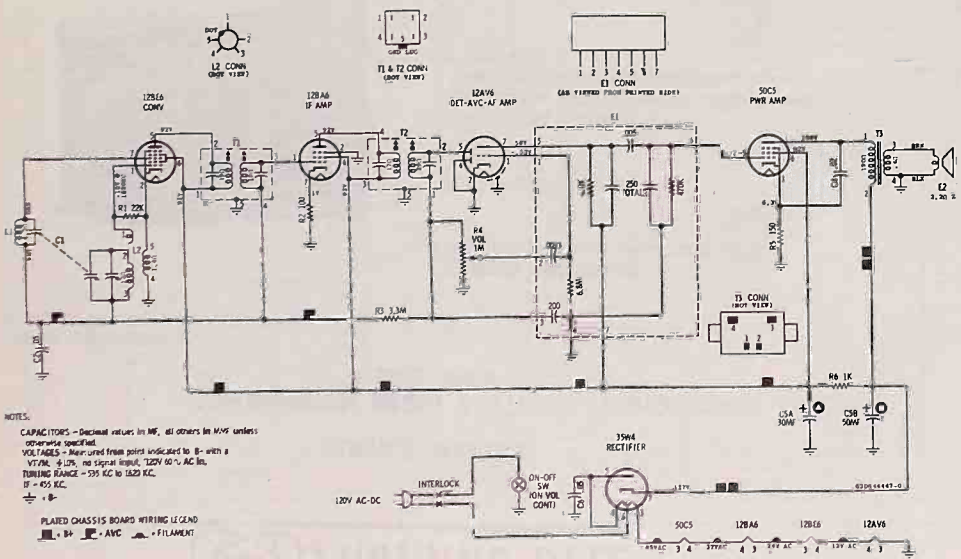


ALIGNMENT POINTS AND PARTS LOCATIONS



SCHEMATIC DIAGRAM

REPLACEMENT PARTS LIST

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Ref. No.	Part Number	Description
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C-4	8K128910	Capacitor, mylar: .02 mf 400V
C-5	23B632015	Capacitor, electrolytic: 30-50mf/150V
C-6	8B128613	Capacitor, mylar: .05 mf 400V
E-1	51B643849	Printed Capacitor - Resistor Plate
E-2	*50C643908	Speaker, PM: 4"; 3.2Ω VC
L-1	-	Loop Antenna (See Cab Back Assembly)
L-2	*24B643864	Coil, oscillator
Resistors - Note:		All resistors are insulated carbon type unless otherwise specified.
R-1	6K119405	22,000 20% 1/2W
R-2	6R6018	100 20% 1/2W
R-3	6K119407	3.3 meg 20% 1/2W
R-4	*18B643755	Vol Cont & Switch: 1 meg
R-5	8K119403	150 20% 1/2W
R-6	6B119404	1000 20% 1W
T-1	*24C643901	Transformer, 1st IF: 455 Kc
T-2	*24K643902	Transformer, 2nd IF: 455 Kc
T-3	*25B643754	Transformer, output
MECHANICAL PARTS		
	*1V644535	Board, plated chassis: less all components; incl interlock plug contacts & 84C643847 plated chassis board
	29A6356B2	Contact, interlock plug
	5K636314	Rivet, shielding (tube socket conter -12BA6)
	26A632710	Shield, tube: spring type
	9B6356l6	Socket, tube: 7 pin min
CABINET PARTS		
	*1V644531	Cabinet Assembly: cerulean blue; incl dial indicator & nameplate (A1B)
	*1V644532	Cabinet Assembly: espresso brown; incl dial indicator (A1N)
	*1V644533	Cabinet Assembly: regimental red; incl dial indicator & nameplate (A1R)
	*1V644534	Cabinet Assembly: antique white; incl dial indicator & nameplate (A1W)
	*24C643759	Cabinet Back Assembly: incl L1; less line cord
	*42A643749	Clip, speed (spkr mtg)
	*36C643758	Knob, tuning: antique white (A1B & A1N)
	*36K643943	Knob, tuning: brown (A1N & A1W)
	*36K643941	Knob, volume: antique white (A1B & A1N)
	*36K643942	Knob, volume: brown (A1N & A1W)
	30B644803	Line Cord: with plug & interlock recept
	2K640912	Nut, speed (tuning knob mtg)
	2S7051	Palnut: 3/8-32 (vol cont mtg)
	3S122335	Screw, tapping: #6 x 1/2 (cab back & chassis mtg)
LIMITED REPLACEMENT PARTS		
Note:		The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.
	11M128076	Adhesive, nameplate & dial indicator (2 oz jar)
	*7B644851	Channel, chassis mtg
	*34A643940	Indicator, dial (Use 11M128076 adhesive)
	*33B643757	Nameplate (A1B, A1R, A1W - Use 11M128076 adhesive)

*New Item, Appears in Any List for First Time

PACKARD BELL

SERVICE MANUAL

COMBINATION RADIO & STEREO-PHONO
MODEL RPC-6

12333 W. Olympic Blvd.
Los Angeles 64

Model RPC-6

DESCRIPTION

Packard Bell Model RPC-6 is a combination AM FM radio and stereophonic phonograph, complete in itself, and requiring no auxiliary equipment for stereophonic record reproduction.

The FM radio has automatic frequency control which may be switched on or off.

A connector for a multiplex adapter is located on the chassis. Two connecters are provided at the rear of the set for an auxiliary stereo input such as a stereo tape deck.

A remote balance and level control, Model RMS-2, is available.

SPECIFICATIONS

CHASSIS USED IN MODEL RPC-6
AM-FM tuner chassis 9TU-2
Dual power amplifier chassis DPA-20
Remote balance and level control RMS-2 (optional)

CABINET DIMENSIONS
Height, 30 in., Width, 46 in., Depth, 17 in.

SHIPPING WT: 145 lb

ELECTRICAL RATINGS
Line voltage: 110-120 volts AC, 60 cycles only
Power consumption (including phono motor)
170 watts

INTERMEDIATE FREQUENCIES:
I-F, FM: 10.70 mc
I-F, AM: 455 kc

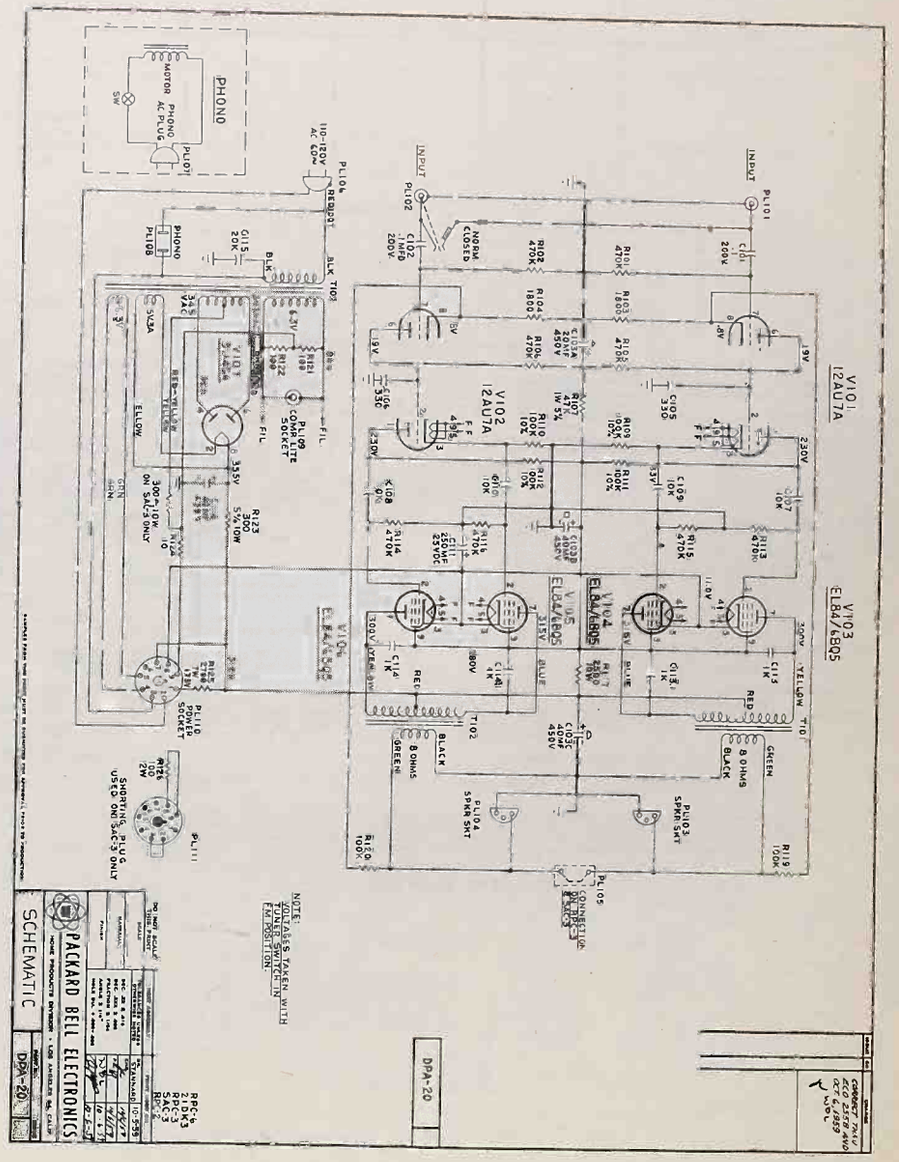
TUNING FREQUENCY RANGE:
AM radio, 530 to 1620 kc
FM radio, 88 to 108 mc

CONTROLS
Dual loudness, Dual bass, Dual treble, Selector (AM, FM, FM w/AFC, AUXiliary input, PHono), Dimension control, Tuning. ON-OFF switch is on dimension control.

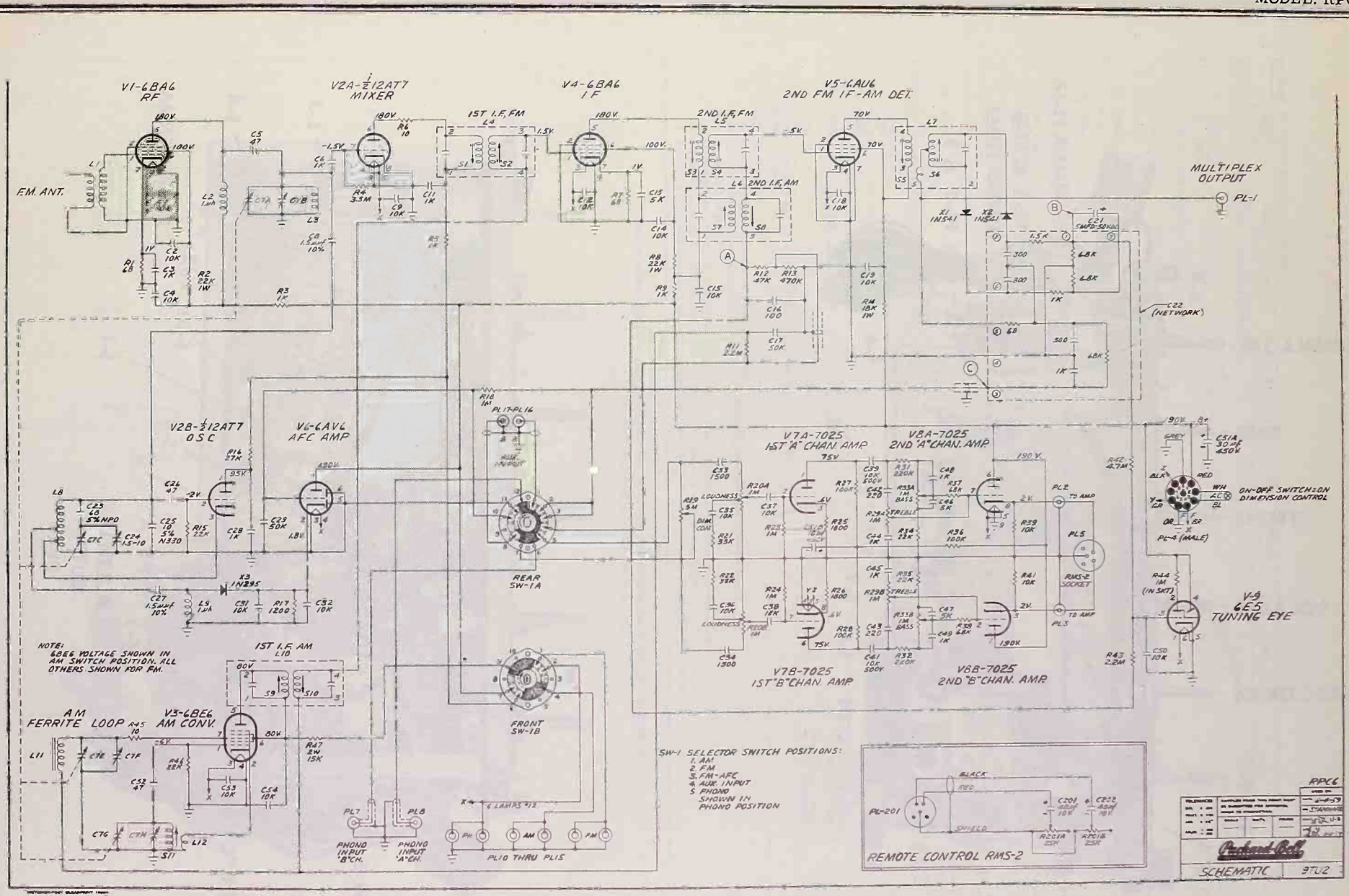
The dimension control provides a gradual adjustment between stereophonic and monaural playback. In the counterclockwise position the stereo effect is the greatest. As the dimension control is turned to the right, the speakers sound as though they were moving together. In the clockwise position (monaural), the sound seems to originate from the middle of the set.

NUMBER OF TUBES: Sixteen, plus three diodes

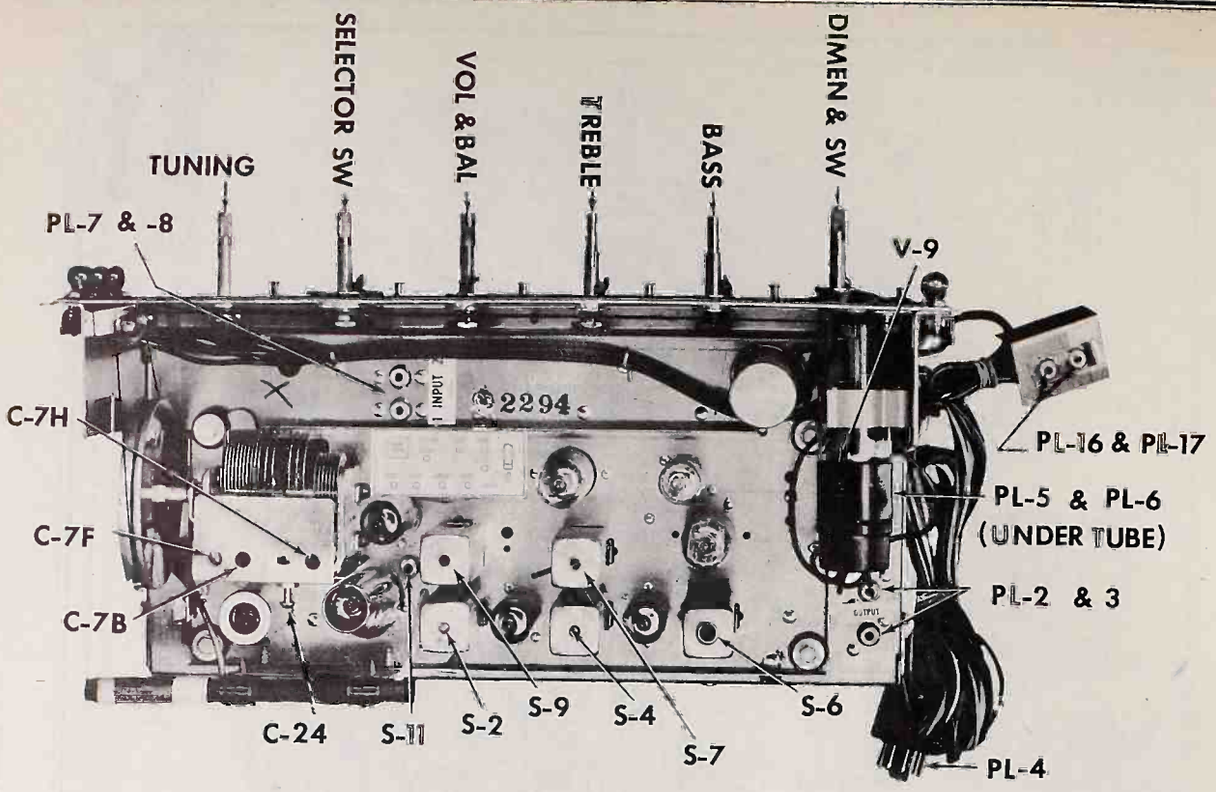
NUMBER OF SPEAKERS: Six (see parts list for details)



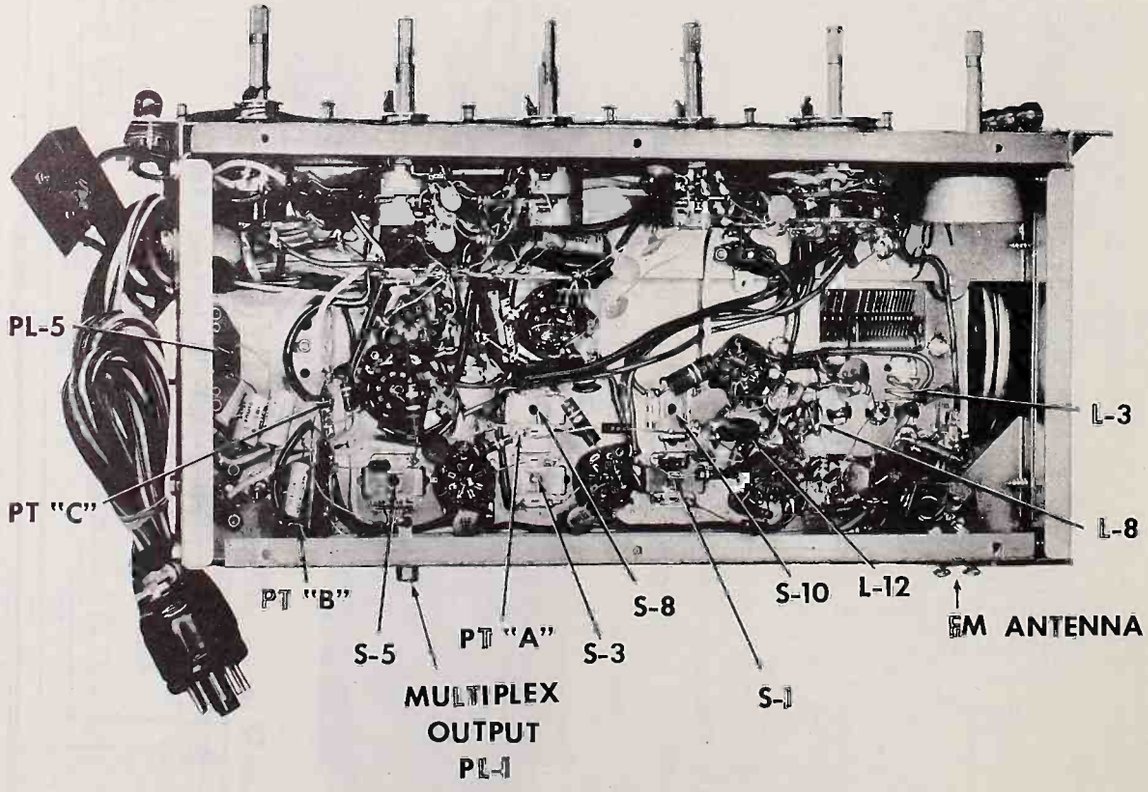
Schematic, Dual Power Amplifier DPA-20



Schematic, AM-FM Tuner 9TU-2 and Remote Control RMS-2



Tuner 9TU-2, Top View of Chassis



Tuner 9TU-2, Bottom View of Chassis

MODEL: RPC-6

BE SURE TO ALIGN AM SECTION FIRST

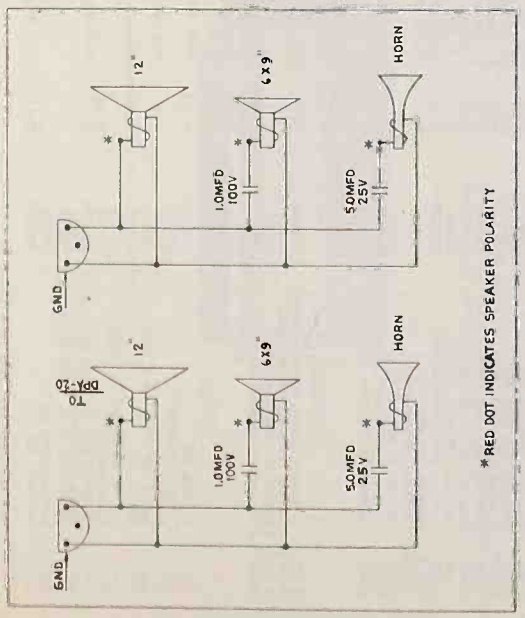
	DUMMY ANTENNA	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RADIO RECEIVER DIAL SETTING	VTVM CONNECTION	ADJUST	NOTES
ALIGNMENT OF I-F, FM SECTION Switch set to FM position							
1.	.01 mfd in series with gen. output	Pin 7 of V-3 (grid 3, 6BE6)	455 kc, modulated with 400 cps	Low frequency end point	Negative to point "A", positive to ground	S-7, S-8, S-9, & S-10 for MAXIMUM	Reduce signal generator output to lowest usable level
ALIGNMENT OF R-F, AM SECTION Switch set to AM position							
2.	None	Loose couple to loop	1620 kc, modulated with 400 cps	High frequency end point	Ditto	C-7H for MAXIMUM	None
3.	None	Ditto	530 kc, modulated with 400 cps	Low frequency end point	Ditto	S-11 for MAXIMUM	Repeat steps 2 & 3 till no increase in maximums
4.	None	Ditto	1500 kc, modulated with 400 cps	Tune in signal	Ditto	C-7F for MAXIMUM	None
ALIGNMENT OF I-F, FM SECTION Switch set to FM position (without AFC)							
5.	.01 mfd. in series with gen. output	Pin 7 of V-2A (grid, FM mixer, ½ 12AT7)	10.7 mc, unmodulated	Low frequency end point	Ditto	S-1, S-2, S-3, & S-4 for MAXIMUM	Reduce signal generator output to less than one volt at pt. "A"
6.	Ditto	Ditto	Ditto	Ditto	Negative to point "B", positive to ground	S-5 for MAXIMUM	None
7.	Ditto	Ditto	Ditto	Ditto	Negative to point "C", positive to ground	S-6 for ZERO	A plus or minus reading will be obtained on each side of setting.
ALIGNMENT OF R-F, FM SECTION Switch set to FM position (without AFC)							
8.	150 ohms in each lead	FM antenna terminal	106 mc, unmodulated	106 mc	Negative to point "B", positive to ground	C-24 for MAXIMUM	None
9.	Ditto	Ditto	Ditto	Ditto	Ditto	C-7B for MAXIMUM	None
10.	Ditto	Ditto	92 mc, unmodulated	92 mc	Ditto	Compress or expand L-8 for MAXIMUM	None
11.	Ditto	Ditto	Ditto	Ditto	Ditto	Compress or expand L-3 for MAXIMUM	None

12. REPEAT STEPS 8 THRU 11 UNTIL NO FURTHER INCREASE IN VTVM READING OCCURS.

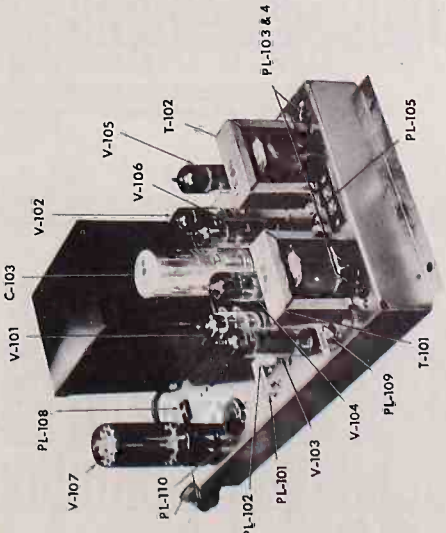
13. SWEEP TOUCH-UP
    a. Connect sweep generator to FM antenna terminals.
    b. Connect marker signal generator (AM or FM) to ground side of L-3.
    c. Connect scope to pt "A".
    d. Set sweep generator to 90 mc and tune in signal. Adjust sweep width to obtain a pattern on the scope.
    e. Set marker generator to 10.7 mc and adjust output so as to obtain a marker on the pattern.
    f. Retouch S-1, S-2, S-3, & S-4 for a symmetrical pattern and so that the 10.7 mc marker is at the peak of the curve.

ALIGNMENT CHART, TUNER 9TU-2

Equipment Required: Signal generator, AM-FM; two 150 ohm ½ watt resistors; one .01 mfd, 600 volt paper capacitor; VTVM.
For step 13 a sweep generator also is required.



Speaker Network Connections



Amplifier PPA-20

REPLACEABLE PARTS
TUNER 9TU-2

CAPACITORS

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
C-1	Ceramic, 10,000 mmf, 25 v	23612B
C-2	Ceramic, 10,000 mmf, 500 v	23632
C-3	Ceramic, 1000 mmf, 500 v	23860
C-4	Ceramic, 10,000 mmf, 500 v	23632
C-5	Ceramic, 47 mmf, 20%	23912
C-6	Ceramic, 1000 mmf, 500 v	23860
C-7 (A, B, C, E, F, G, & H)	Variable, four section, w/trimmers exc for C7C	23561
C-8	Ceramic, 1.5 mmf, 10%	23866
C-9	Ceramic, 10,000 mmf, 25 v	23612B
C-10	Not used	
C-11	Ceramic, 1000 mmf, 500 v	23860
C-12	Ceramic, 10,000 mmf, 25 v	23612B
C-13	Ceramic, 5000 mmf, 25 v	23624
C-14	Ceramic, 10,000 mmf, 500 v	23632
C-15	Ceramic, 10,000 mmf, 500 v	23632
C-16	Ceramic, 100 mmf, 20%	23914
C-17	Ceramic, 50,000 mmf, 25 v	23614
C-18	Ceramic, 10,000 mmf, 25 v	23612B
C-19	Ceramic, 10,000 mmf, 500 v	23632
C-20	Not used	
C-21	Electrolytic, 5 mfd/50 v	24164
C-22	Network, ratio det'r	23627A
C-23	Ceramic, 68 mmf, 5%, NPO	23992
C-24	Trimmer, 1.5 to 10 mmf (trims C7C)	23430
C-25	Ceramic, 10 mmf, 5%, N330	23896
C-26	Ceramic, 47 mmf, 20%	23912
C-27	Ceramic, 1.5 mmf, 10%	23866
C-28	Ceramic, 1000 mmf, 500 v	23860
C-29	Ceramic, 50,000 mmf, 25 v	23614
C-30	Not used	
C-31	Ceramic, 10,000 mmf, 25 v	23612B
C-32	Ceramic, 10,000 mmf, 25 v	23612B
C-33	Ceramic, 1500 mmf, 10%	23639
C-34	Ceramic, 1500 mmf, 10%	23639
C-35	Ceramic, 10,000 mmf, 25 v	23612B
C-36	Ceramic, 10,000 mmf, 25 v	23612B
C-37	Ceramic, 10,000 mmf, 25 v	23612B
C-38	Ceramic, 10,000 mmf, 25 v	23612B
C-39	Ceramic, 10,000 mmf, 500 v	23632
C-40	Not used	
C-41	Ceramic, 10,000 mmf, 500 v	23632
C-42	Ceramic, 220 mmf, 20%	23915
C-43	Ceramic, 220 mmf, 20%	23915
C-44	Ceramic, 1000 mmf, 500 v	23860
C-45	Ceramic, 1000 mmf, 500 v	23860
C-46	Ceramic, 5000 mmf, 25 v	23624
C-47	Ceramic, 5000 mmf, 25 v	23624
C-48	Ceramic, 1000 mmf, 500 v	23860
C-49	Ceramic, 1000 mmf, 500 v	23860
C-50	Ceramic, 10,000 mmf, 25 v	23612B
C-51A	Electlytic, 30 mfd/450 v } dual	24177
C-51B	Electlytic, 10 mfd/450 v } dual	24177
C-52	Ceramic, 47 mmf, 20%	23912
C-53	Ceramic, 10,000 mmf, 25 v	23612B
C-54	Ceramic, 10,000 mmf, 500 v	23632

CONTROLS

R-19	Dimension control, 5 megs w/switch	25996B
R-20 (A & B)	Dual one megohm, loudness	25079
R-29 (A & B)	Dual one megohm, treble	25532
R-33 (A & B)	Dual one megohm, bass	25532

COILS

L-1	Antenna, FM	29426A
L-2	Choke, 1 microhenry	29124
L-3	RF, F-M	29165
L-4	1st I-F, FM	29148
L-5	2nd I-F, FM	29152
L-6	2nd I-F, AM	29078
L-7	Ratio detector	29084
L-8	Oscillator, FM	29243A
L-9	Choke, 1 microhenry	29124
L-10	1st I-F, AM	29077
L-11	Loop antenna, AM	29364
L-12	Oscillator, AM	29247B

DIODES

X-1 } X-2 }	1N541, matched pair (ratio det'r)	72027
X-3	1N295, AFC rectifier	72028

RESISTORS
Unless specified, 10%, ½ watt

R-1	68 ohms	73011
R-2	22,000 ohms, 1 watt	73241
R-3	1000 ohms	73025
R-4	3.3 megohms, 20%	73167
R-5	1000 ohms	73025
R-6	10 ohms	73001
R-7	68 ohms	73011
R-8	22,000 ohms, 1 watt	73241
R-9	1000 ohms	73025
R-10	Not used	
R-11	2.2 megohms, 20%	73165
R-12	47,000 ohms	73045
R-13	470,000 ohms, 20%	73157
R-14	18,000 ohms, 1 watt	73240
R-15	22,000 ohms	73041
R-16	27,000 ohms	73042
R-17	1200 ohms	73026
R-18	1 megohm, 20%	73161
R-19	Dimension control, 5 megs w/switch	25996B
R-20 (A & B)	Dual one megohm, loudness	25079
R-21	33,000 ohms	73043
R-22	33,000 ohms	73043
R-23	1 megohm, 20%	73161
R-24	1 megohm, 20%	73161
R-25	1800 ohms	73028
R-26	1800 ohms	73028
R-27	100,000 ohms	73049
R-28	100,000 ohms	73049
R-29 (A & B)	Dual one megohm, treble	25532
R-30	Not used	
R-31	220,000 ohms, 20%	73153
R-32	220,000 ohms, 20%	73153
R-33 (A & B)	Dual one megohm, bass	25532
R-34	22,000 ohms	73041
R-35	22,000 ohms	73041
R-36	100,000 ohms	73049
R-37	68,000 ohms	73047
R-38	68,000 ohms	73047
R-39	10,000 ohms	73037
R-40	Not used	
R-41	10,000 ohms	73037
R-42	4.7 megohms, 20%	73169
R-43	2.2 megohms, 20%	73165
R-44	1 megohm, 20% (in 6E5 skt)	73161
R-45	10 ohms	73001
R-46	22,000 ohms	73041
R-47	15,000 ohms, 2 watts	73439

PLUGS AND SOCKETS

PL-1	Skt, multiplex output	79109
PL-2 } PL-3 }	Skts, to amplifier DPA-20	79109
PL-4	Plug & cable ass'y, pwr	22076B
PL-5	Skt for remote control RMS-2	79209
PL-6	Not used	
PL-7 } PL-8 }	Skts, phono input	79109
PL-9	Not used	
PL-10 thru PL-15	Skts, lamp	79191A
PL-16 } PL-17 }	Auxiliary input skts	79109

SWITCH

SW-1	(A & B) selector	86082

ELECTRON TUBES

V-1	RF amplifier	6BA6	V-6	AFC amplifier	6AV6
V-2A	FM mixer	½ 12AT7	V-7A	1st "A" channel amplifier	½ 7025
V-2B	FM oscillator (Replace with tube of same mfr.)	½ 12AT7	V-7B	1st "B" channel amplifier	½ 7025
V-3	AM converter	6BE6	V-8A	2nd "A" channel amplifier	½ 7025
V-4	I-F amplifier	6BA6	V-8B	2nd "B" channel amplifier	½ 7025
V-5	2nd I-F, FM; AM detector	6AU6	V-9	Tuning eye	6E5

REPLACEABLE PARTS, DPA-20 POWER SUPPLY AND AMPLIFIER

CAPACITORS

C-101	Paper, .1 mfd, 200 v	23107
C-102	Paper, .1 mfd, 200 v	23107
C-103A	Electrolytic, 20 mfd/450 v }	
C-103B	Electrolytic, 40 mfd/450 v } triple	24147
C-103C	Electrolytic, 40 mfd/450 v }	
C-104	Not used	
C-105	Ceramic, 330 mmf, 20%	23944
C-106	Ceramic, 330 mmf, 20%	23944
C-107	Ceramic, .01 mfd, GMV	23632
C-108	Ceramic, .01 mfd, GMV	23632
C-109	Ceramic, .01 mfd, GMV	23632
C-110	Ceramic, .01 mfd, GMV	23632
C-111	Electrolytic, 250 mfd 25 v	24144
C-112	Not used	
C-113	Ceramic, 1000 mmf, 20%	23965
C-113.1	Ceramic, 1000 mmf, 20%	23965
C-114	Ceramic, 1000 mmf, 20%	23965
C-114.1	Ceramic, 1000 mmf, 20%	23965
C-115	Ceramic, 20,000 mmf, AC	23634
C-116	Electrolytic, 40 mfd/450 v	24143

RESISTORS
(10%, ½ watt, unless noted otherwise)

R-101	470,000 ohms, 20%	73157
R-102	470,000 ohms, 20%	73157
R-103	1800 ohms	73028
R-104	1800 ohms	73028
R-105	470,000 ohms, 20%	73157
R-106	470,000 ohms, 20%	73157
R-107	47,000 ohms, 5%, 1 watt	73245-1
R-108	Not used	
R-109	100,000 ohms	73049
R-110	100,000 ohms	73049
R-111	100,000 ohms	73049
R-112	100,000 ohms	73049
R-113	470,000 ohms, 20%	73157
R-114	470,000 ohms, 20%	73157
R-115	470,000 ohms, 20%	73157
R-116	470,000 ohms, 20%	73157
R-117	Wirewound, 2500 ohms, 10 watts	73637
R-118	Not used	
R-119	100,000 ohms	73049
R-120	100,000 ohms	73049
R-121	100 ohms	73013
R-122	100 ohms	73013
R-123	Wirewound, 300 ohms, 5%, 10 watts	73615
R-124	10 ohms	73001
R-125	Wirewound, 2700 ohms, 7 watts	73713
R-126	100 ohms, 2 watts (used w/SAC-3 only)	73413

PLUGS & SOCKETS

PL-101	Phono input socket	79109
PL-102	Stereo input socket	79210
PL-103	Speaker socket	79004
PL-104	Speaker socket	79004
PL-105	Spkr terminal bd (connected on RPC-3)	88157A
PL-106	AC cord & plug	32031
PL-107	Changer AC cord & plug	p/o changer
PL-108	AC skt for PL-107	79096
PL-109	Lamp skt	79005
PL-110	Power socket	79122
PL-111	(used w/SAC3)	66055

TRANSFORMERS

T-101	Output, 10,000 ohms to 8 ohms	89460A
T-102	Output, 10,000 ohms to 8 ohms	89460A
T-103	Power	89083B
	Primary: 117 v, 60 cycles	
	Secondary: 650 v CT @ 200 ma	
	6.3 v @ 3 amp	
	6.3 v @ 4 amp	
	5.0 v @ 3 amp	

ELECTRON TUBES

V-101	Audio & inverter, left channel	12AU7A
V-102	Audio & inverter, right channel	12AU7A
V-103	Push-pull output, left channel	EL84/6BQ5
V-104	Push-pull output, left channel	EL84/6BQ5
V-105	Push-pull output, right channel	EL84/6BQ5
V-106	Push-pull output, right channel	EL84/6BQ5
V-107	Rectifier	5U4-GA

REPLACEABLE PARTS REMOTE CONTROL *RMS-2*

Capacitor, electrolytic, 40 mfd/10 v (C-201 & C-202)	24151C	Plug, 5-pin (PL-201)	66065
		Knob, inside	52262
Control, dual 25,000 ohms (R-201, A & B)	25987	Knob, outside	52263

MISCELLANEOUS REPLACEABLE PARTS

Cable, amplifier input, 2½ ft w/phono plug ea end	22052A	Lamp, compartment, T-47	54002
Cable, phono, 2½ ft w/phono plug one end	22062	Lamp, tuner dial light, GE #12 (siv)	54008
Cap'r, electrolytic, 1 mfd/100 v, two in spkr netwk	23040	Lamp, tuner dial light, GE #12 (six)	54008
Cap'r, electrolytic, 5 mfd/25 v, non-polarized, two in spkr netwk	24146	Plug, speaker (used w/shield 78026)	66013
Dial, glass, tuning	38193	Pointer, dial	67049C
Drive cord, 90" (uses spring 84028)	40003	RECORD CHANGER	58084B
KNOBS		Glaser-Steers Model 77 with diamond and sapphire stereo cartridge 63045 or 63047, and 45 rpm spindle 58084-1	
Single knobs (Selector, Tuning, Dimension Control)	52285B	SPEAKERS (two of each)	
Dual knobs (Loudness, Bass, Treble)		Horn, 12 to 16 ohms impedance	83128B
Outside knob	52278C	Nine x six in. oval, 6.4 ohms impedance	83113B
Inside knob (w/spring 84109)	52286B	Twelve in., 8 ohms impedance	83807D

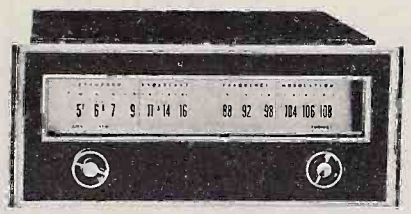
PHILCO HOME RADIO

SERVICE MANUAL

AM/FM TUNER

MODEL RT-300

PHILCO Factory-Supervised Service



SPECIFICATIONS

This tuner is equipped with a front panel and mounting board and is intended for quick installation in the space provided in the "H" line Philco Hi-Fidelity Phonographs.

CIRCUIT—Six-tube superheterodyne plus rectifier Function switch allows reception on AM only or FM only.

FREQUENCY RANGES—AM broadcast 540 KC to 1620 KC
FM broadcast 88 MC to 108 MC

TUNING DRIVE RATIO—10:1 on both AM and FM

OPERATING VOLTAGE—105 to 120 volts, 60 cycle AC only.

POWER CONSUMPTION—45 watts

INTERMEDIATE FREQUENCIES—AM—455 KC
FM—10.7 MC

ANTENNAS—AM—Built-in Magnecore
FM—Line cord with provision for connecting external antenna.

PHILCO TUBES—6BE6 AM converter; (2) 6BA6 AM & FM IF; 12AT7 FM RF & converter; 6AU6 FM limiter; 6BJ7 AM detector & FM discriminator; 6X4 rectifier.

AM ALIGNMENT PROCEDURE

The AM alignment should be completed before the FM alignment is performed. Before beginning the alignment, allow the receiver and test equipment to warm up for fifteen minutes.

Dial Pointer—With the gang fully closed, adjust the pointer to coincide with the first small index mark to the left of the "54' (540 kc) on the scale.

Tuner Controls—Set the function switch to the AM position and the AM tuning control as indicated.

Output Indicator—Connect a scope to output jack, J1.

Signal Generator—Use an AM r-f signal generator with 30% modulation.

1. Connect generator, through a .05 μfd condenser, to the signal grid, pin 7 of the AM converter, S6 (6BE6). Connect the ground lead to chassis.
2. Set generator to 455 kc. Fully open tuning gang. Adjust, in order given, top of T7, bottom of T6, bottom of T7, and top of T6 for maximum output. Repeat until no further gain is indicated.
3. Connect generator to radiating loop. Set generator to 1600 kc. Set receiver to 1600 kc as indicated by pointer. Adjust VC6A (osc. trimmer) for maximum output.
4. Set generator to 1400 kc. Tune receiver to signal and adjust VC5A (antenna trimmer) for maximum output.

FM ALIGNMENT PROCEDURE

The AM alignment should be completed before the FM alignment is performed.

1. With the gang fully closed, adjust the pointer to coincide with the first small index mark to the left of the "88" (88 mc) on the scale.
2. Set the function switch to the FM position and the FM tuning control as indicated.
3. Connect an oscilloscope, through a 100,000 ohm isolating resistor, to junction of R8 and C20. Connect the oscilloscope ground lead to the chassis.
4. Connect the signal generator to the cathode of the FM, RF amplifier, pin 8 of S1. Connect the ground lead to the chassis.
5. Inject a 10.7 MC marker signal and a 10.7 MC sweep signal, approximately 150 KC total deviation (do not over sweep). Adjust cores in top and bottom of T3, T2 and T1 for maximum-amplitude, symmetrical curve with the 10.7 MC marker at the top of the curve. Adjust input signal to maintain output, as indicated on scope, below 2 volts peak during alignment. Repeat this step until no further gain is obtained.
6. Change scope connections to the output connector J1. Inject a 10.7 MC, 30% AM modulated signal to the grid of the 6AU6, pin 1 of S4. Adjust top of T4 for minimum indication between peaks. Inject 10.7 MC sweep signal, approximately 150 KC total deviation, to pin 1 of S4 and adjust bottom of T4 for maximum-amplitude, symmetrical output. Adjust input signal to maintain output, as indicated on scope, below 5 volts peak during alignment. (See NOTE below.)
7. Open tuning capacitor. Insert a 6-mil, non-metallic shim between stator and rotor of the FM gang and then close the capacitor against the shim. Inject 108.5 MC sweep signal (approx. 150 KC total deviation), through an antenna matching network, to the receiver antenna terminals. Adjust VC3 for maximum output.
8. Close (mesh) the tuning capacitor. Inject 87.75 MC sweep signal (approx. 150 KC total deviation) through an antenna matching network, to the receiver antenna terminals, and adjust X3 for maximum output (see NOTE below).
9. Set pointer to 91 MC and inject a 91 MC sweep signal. Adjust X2 for maximum output. (See NOTE below).
10. VC4 is the oscillator bridge capacitor used to minimize oscillator radiation. This is a factory adjustment and should not require further adjustment in the field.

NOTE: The signal input must be as low as possible in order to obtain a sharp indication. In some cases it may be necessary to set the signal generator to the first sub-harmonic.

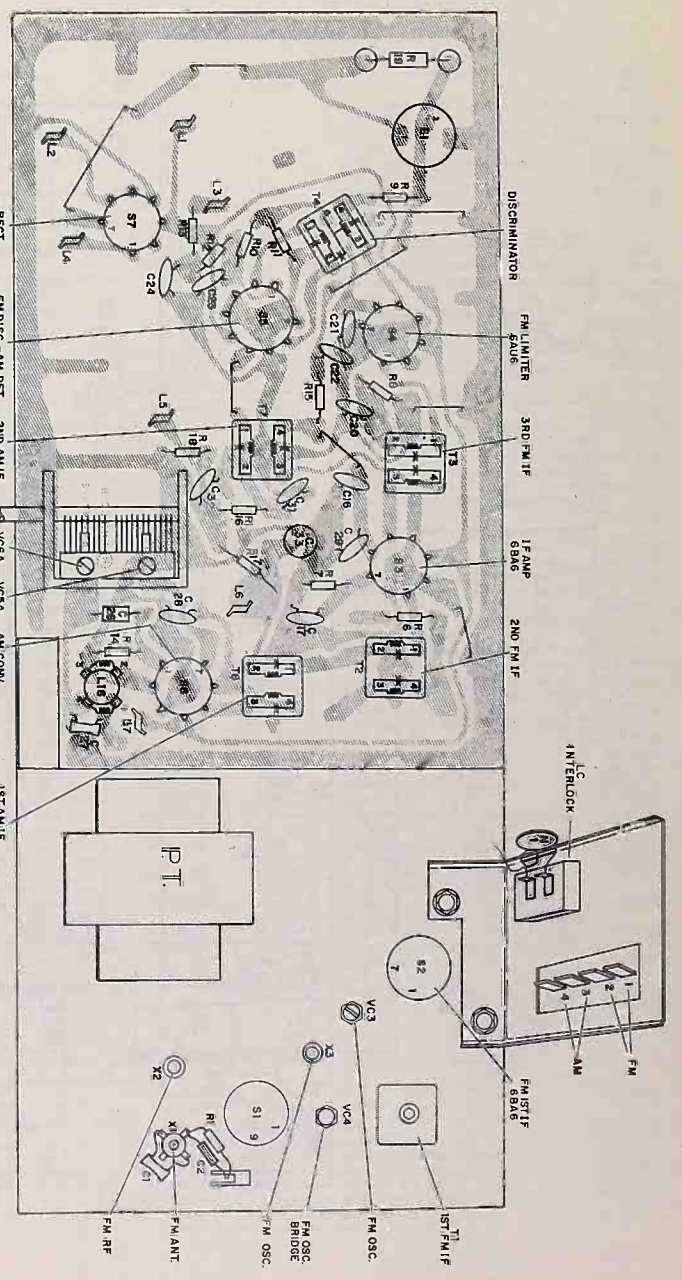


Figure 1. Top View—Showing Alignment Points, Tube Locations, Tie Lugs and Components

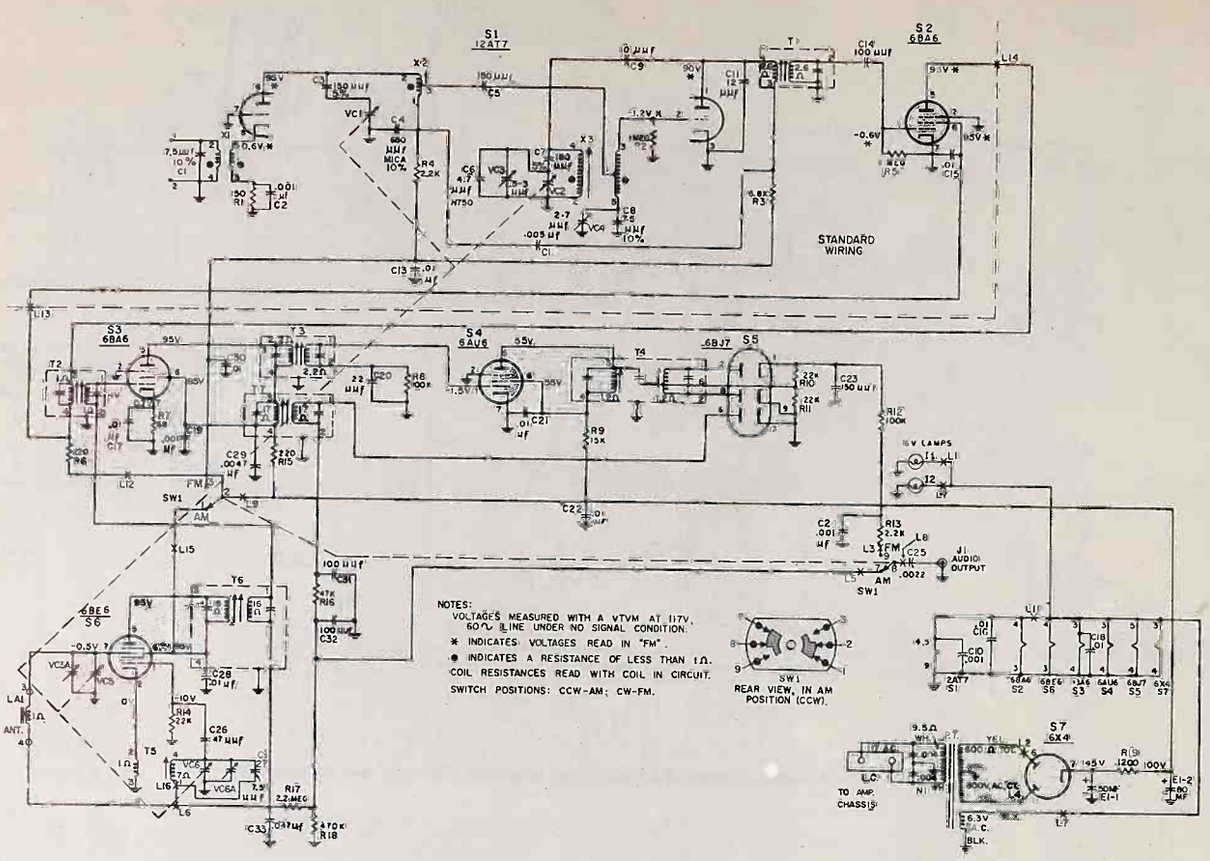


Figure 3. Schematic Diagram of RT-300

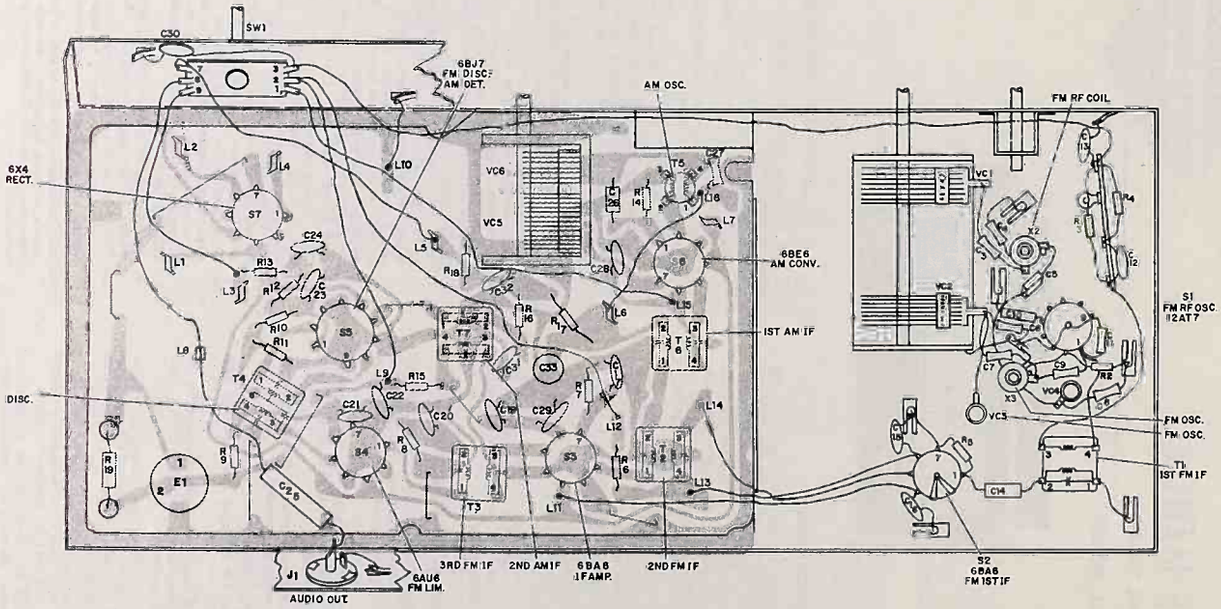


Figure 2. Bottom View—Showing Components, Tube Locations and Tie Lugs

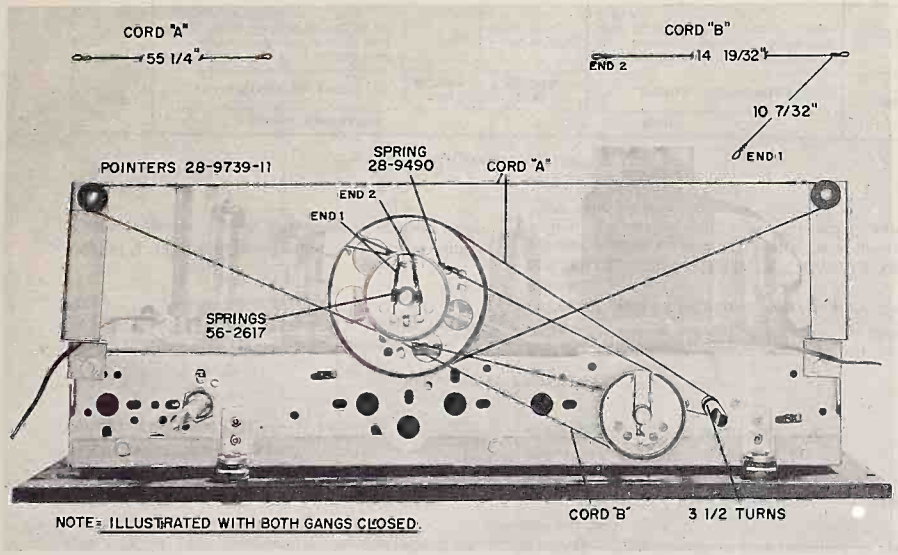


Figure 4. Drive Cord Installation Details

IDENTIFICATION OF "PERMA-CIRCUIT" TIE LUGS

L1. Brown pilot lamp lead.
L2 Yellow power transformer lead to pin 6 of 6X4.
L3 FM audio lead to WS1-9, under panel.
L4 Yellow power transformer lead to pin 1 of 6X4.
L5 AM audio lead to WS1-7, under panel.
L6 Black lead from low side of AM antenna (terminal 4), top of panel. Jumper lead to L16, bottom of panel.
L7 Black filament lead from power transformer and brown pilot lamp lead.
L8 Tie point, lead from WS1-8 and C25 audio output coupling, under panel.
L9 B+ lead to WS1-2, under panel.
L10 Bare ground wire to chassis lance, under panel.
L11 Filament lead to pin 4 of S2, under panel.
L12 B+ lead to WS1-2, under panel.
L13 B+ lead to screen, pin 6 of S2, under panel.
L14 Plate lead from pin 5 of S2, under panel.
L15 B+ lead to WS1-1, under lead.
L16 Jumper lead to L6, under panel.

REPLACEMENT PARTS LIST FOR MODEL RT-300

Reference Symbol	Description	Service Part No.
C1	Condenser, FM antenna tank, 7.5 μμf, 10% silver mica	30-1257-16
C2	Condenser, FM r-f cathode by-pass, .001, μfd, ceramic	62-210001011
C3	Condenser, FM r-f tracking, 150 μμf, 5%, silver mica	30-1257-13
C4	Condenser, FM r-f de-coupling, 680 μμf, 10%, silver mica	30-1257-15
C5	Condenser, FM r-f coupling, 150 μμf, mica	60-10155420
C6	Condenser, FM osc. comp., 4.7 μμf, N750, ceramic	30-1224-85
C7	Condenser, FM osc. tracking, 180 μμf, 5%, silver mica	30-1257-8
C8	Condenser, FM osc. bridge, 7.5 μμf, 10%, silver mica	30-1257-16
C9	Condenser, FM osc. coupling, 10 μμf, ceramic	62-010409001
C10	Condenser, filament by-pass, .001 μfd, ceramic	62-210001011
C11	Condenser, FM mixer plate by-pass, 12 μμf, ceramic	62-012300001
C12	Condenser, FM B+ neutralization, .005 μfd, disk	30-1238-20
C13	Condenser, FM B+ by-pass, .01 μfd, disk	30-1238-2
C14	Condenser, FM IF coupling, 100 μμf, ceramic	62-110009001
C15	Condenser, 1st FM I-F screen by-pass, .01 μfd, disk	30-1238-2
C16	Condenser, filament by-pass, .01 μfd, disk	30-1238-2
C17	Condenser, 2nd FM I-F cathode by-pass, .01 μfd, disk	30-1262
C18	Condenser, filament by-pass, .01 μfd, disk	30-1238-2
C19	Condenser, 2nd FM I-F screen by-pass, .001 μfd, disk	30-1262-11
C20	Condenser, FM limiter bias filter, 22 μμf, disk	30-1263-19
C21	Condenser, RM limiter screen by-pass, .01 μfd, disk	30-1262
C22	Condenser, B+ by-pass, .01 μfd disk	30-1262
C23	Condenser, FM discriminator I-F filter, 150 μμf, disk	30-1262-28
C24	Condenser, FM de-emphasis, .001 μfd, disk	30-1262-13
C25	Condenser, audio output coupling, .0022 μfd, moulded	30-4651-23
C26	Condenser, AM osc. coupling, 47 μμf, ceramic	30-1230-4
C27	Condenser, AM osc. temp. comp. 7.5 μμf, N2200, ceramic	30-1224-83
C28	Condenser, AM converter screen by-pass, .01 μfd, disk	30-1262
C29	Condenser, I-F B+ by-pass, .0047 μfd, disk	30-1262-3
C30	Condenser, B+ by-pass, .01 μfd, disk	30-1262
C31	Condenser, AM I-F filter, 100 μμf, disk	30-1262-41
C32	Condenser, AM I-F filter, 100 μμf, disk	30-1262-41
C33	Condenser, AVC filter, .047 μfd, moulded	30-4650-45
E1	Electrolytic condenser, 2 section filter, 80/150, 50/150	30-2585-12
I1, I2	Pilot lamps, type 1847 frosted	34-2031-13
J1	Jack, audio output	27-6186
LA1	Magnecore antenna, AM	32-4692-10
L.C.	AC interlock	27-6240-3
P.T.	Power Transformer	32-8912-1
N1	Condenser, live by-pass, .004/.004, dual ceramic disk	30-1266-1
R1	Resistor, FM r-f cathode, 150 ohms	66-1158340
R2	Resistor, FM ocs. grid return, 1 meg. ohm	66-5108340
R3	Resistor, FM mixer B+ de-coupling, 6800 ohms	66-2688340
R4	Resistor, FM r-f B+ de-coupling, 2200 ohms	66-2228340
R5	Resistor, 1st FM I-F grid return, 1 megohm	66-5108340
R6	Resistor, 1st FM B+ de-coupling, 220 ohms	66-1228340
R7	Resistor, 2nd I-F cathode, 68 ohms	66-0688340
R8	Resistor, limiter grid return, 100,000 ohms	66-4108340
R9	Resistor, limiter B+ de-coupling, 15,000 ohms	66-3158340
R10	Resistor, FM discriminator load, 22,000 ohms	66-3228340
R11	Resistor, FM discriminator load, 22,000 ohms	66-3228340
R12	Resistor, de-emphasis, 100,000 ohms	66-4108340
R13	Resistor, de-emphasis, 2200 ohms	66-2228340
R14	Resistor, AM osc. grid return, 22,000 ohms	66-3228340
R15	Resistor, 2nd I-F B+ de-coupling, 220 ohms	66-1228340
R16	Resistor, AM detector filter, 47,000 ohms	66-3478340
R17	Resistor, AVC filter, 2.2 megohms	66-5228340
R18	Resistor, AM detector load, 470,000 ohms	66-4478340
R19	Resistor, B+ filter, 1200 ohms, 2 watts	66-2125340
SW1	Switch, function	42-2058-6
T1	Transformer, 1st FM I-F	32-4715-1
T2	Transformer, 2nd FM I-F	32-4712-1
T3	Transformer, 3rd FM I-F	32-4712-2
T4	Transformer, FM discriminator	32-4714-3
T5	Transformer, AM oscillator	32-4693-10
T6	Transformer, 1st AM I-F	32-4584-17
T7	Transformer, 2nd AM I-F	32-4584-17
VC1, VC2	Tuning gang, 2 section FM	31-2789-3
VC3	Variable condenser, FM osc. trimmer, 0.5-3.0 μμf	31-6520-18
VC4	Variable condenser, FM osc. bridge, 2.0-7.0 μμf	31-6520-15
VC5, VC6	Tuning gang, 2 section AM	31-2783-18
X1	Transformer, FM antenna	32-4718-2
X2	Coil, FM r-f	32-4717-3
X3	Transformer, FM osc.	32-4716-1
	Perma-Circuit Panel	54-5474-2

MISCELLANEOUS PARTS

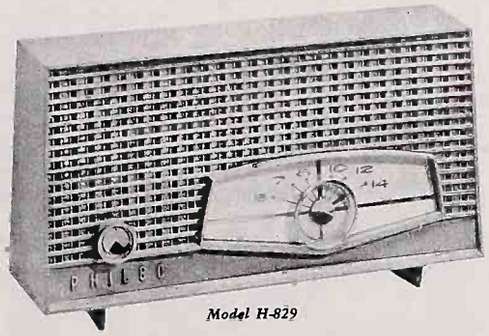
Description	Service Part No.
Antenna assy., FM	41-3791-5
Backplate and overlay assy.	76-11740-2
Bezel, plastic	54-5542-1
Clip, pilot lamp socket mtg., 2 used	56-3545-5FA3
Knob, function	28-11588-4
Knob. tuning	28-11588-1
Pointer, 2 used	28-9739-11
Shaft, tuning drive	28-11611-5
Shield, 6BE6 converter tube	28-11527-7
Socket, 7 pin min., panel mtg., 4 used	27-6309-1
Socket, 9 pin min., panel mtg.	27-6309-2
Socket, 7 pin min., 1st FM I-F	27-6275-8
Socket, 9 pin min., FM r-f & osc.	27-6323-5
Socket, assy., pilot light, 2 used	27-6233-4

PHILCO HOME RADIO

SERVICE MANUAL

PHILCO Factory-Supervised Service

MODEL H-829



Model H-829

SPECIFICATIONS

CABINET—Plastic table model, ivory or yellow.

CIRCUIT—4 tube superheterodyne (including rectifier).

FREQUENCY RANGE—540 KC to 1620 KC.

INTERMEDIATE FREQUENCY—455 KC.

AUDIO OUTPUT—.9 watt.

POWER CONSUMPTION—35 watts.

OPERATING VOLTAGE—105 to 120 volts, 60 cycles.

AERIAL—High impedance loop mounted on inside of cabinet back.

PHILCO TUBES—12AU6, oscillator converter; 12-AV6, 2nd detector; 1st audio; 50EH5, audio output and 35W4, rectifier.

SPEAKER—4-in., 3.2 ohm V.C., pm.

ALIGNMENT PROCEDURE

SIGNAL GENERATOR—Connect generator and set frequency as indicated in chart. Use modulated output, 30%.

OUTPUT LEVEL—During alignment, adjust signal-generator output to hold output-meter reading below .5 volts.

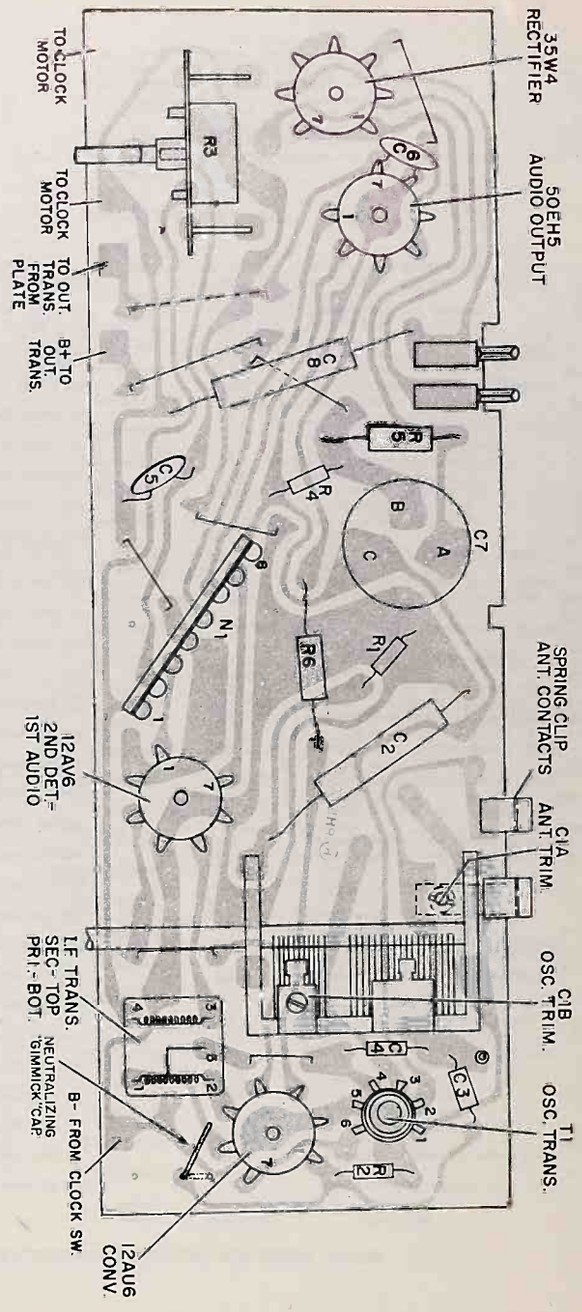
RADIO CONTROLS—Set volume control to maximum. Set tuning control as indicated in chart.

OUTPUT METER—Connect accross voice coil terminals.

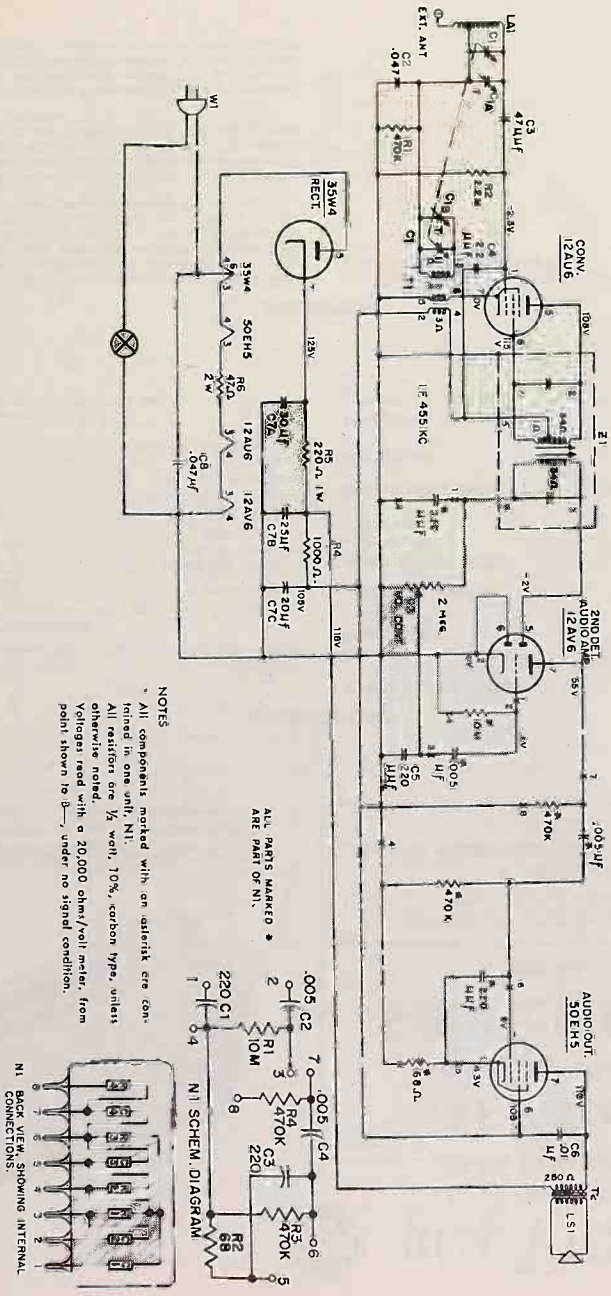
NEUTRALIZING "GIMMICK" CAPACITOR—To prevent oscillation, push "Gimmick" wire toward tube socket. To increase gain, move "Gimmick" wire away from tube socket.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1.	Ground lead to B—; output lead through a .1 mf condenser to grid (pin 1) of 12 U6 or top of r-f tuning condenser.	455 kc.	Tuning gang fully open.	Adjust tuning cores, in order given, for maximum output. Secondary core is located on top of transformer.	Z1—i-f sec. Z1—i-f pri
2.	Radiating loop	1620 kc.	Tuning gang fully open.	Adjust for maximum output.	C1-B—osc.
3.	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1-A—aerial



Model H-829—Base View PW Panel Component Layout



Schematic Diagram—Model H-829

NOTES

* All components marked with an asterisk are contained in one unit, N1.
All resistors are ½ watt, 10%, carbon type, unless otherwise noted.
Voltages read with a 20,000 ohms/volt meter, from point shown to ⏚, under no signal condition.

TO REMOVE PERMA-CIRCUIT ASSY.

1. Remove the two drive screws from back. Take back off of set by pulling gently on the bottom.
2. Remove panel mounting drive screw.
3. Remove the knobs.
4. The Perma-Circuit is now free to slide out. Be careful of speaker leads.

REPLACEMENT PARTS LIST

Reference Symbol	Description	Service Part No.
C1	Condenser, tuning	31-2790-7
C2	Condenser, gang return, .047 mfd, 400V	30-4650-45
C3	Condenser, converter grid coupling, 47 mmf, ceramic	30-1230-4
C4	Condenser, neutralizing, 2.2 mmf, ceramic	30-1221-6
C5	Condenser, IF filter and hi-cut, 220 mmf	62,122001001
C6	Condenser, tone compensation, .01 mfd, 500V, disk	30-1262
C7	Condenser, electrolytic, filter, 3 section, 30/25/20 mfd, 150V	30-2585-11
C8	Condenser, line by-pass, .047 mfd, 400V	30-4650-45
LA1	Antenna, cabinet back and loop assy.	76-10521-3
LS1	Speaker, 4", 3.2Ω V.C. with output transformer	36-1675-6
N1	Network, resistor-condenser	30-6500-2
R1	Resistor, gang return, 470,000 ohms	66-4478340
R2	Resistor, converter grid return, 2.2 megohms	66-5228340
R3	Volume control, 2 megohms	33-5575-22
R4	Resistor, B+ filter, 1000 ohms	66-2108340
R5	Resistor, B+ filter, 220 ohms, 1 watt	66-1224340
R6	Resistor, filament dropping, 47 ohms, 2 watts	66-0475340
T1	Transformer, oscillator	32-4776-1
T2	Transformer, audio output	Part of LS1
W1	Line cord	41-4270-1
Z1	Transformer, IF	32-4627-3
	Printed Panel	54-6585-12

MISCELLANEOUS PARTS

Description	Service Part No.
Cabinet, yellow	424-8091
Cabinet, ivory	424-8081
Contact, panel	28-12282
Contact, panel	28-12282-1
Contact, spring, antenna (2)	13520FE18
Dial	54-5488-4
Shaft, rear time set	28-11985-4
Knob, tuning	424-8083
Knob, volume	424-8082
Socket, tube, 4 used	27-6309-1

RCA VICTOR

AM-FM Radio Receiver

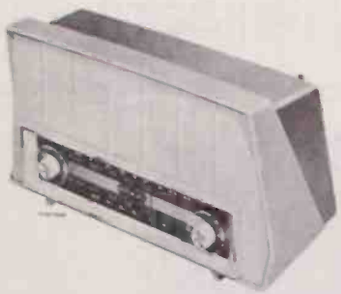
XF-3 SERIES

Chassis No. RC-1190A

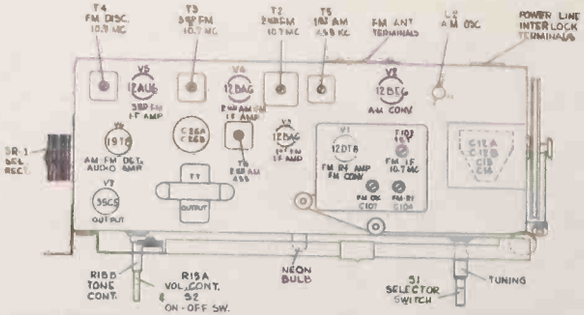
SERVICE DATA

— 1959 No. 6 —

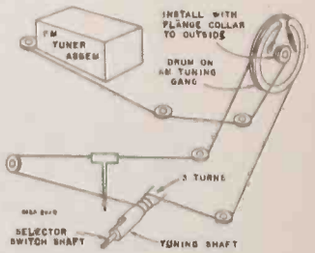
PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



XF-3 Series—The "Viscount"
Model XF-3EH—Antique White/Dawn Green
Model XF-3EM—Antique White/Maple Sugar
Model XF-3J—Moonmist Gray/Charcoal



Tube and Trimmer Locations



Dial and Drive Cord Drive

SPECIFICATIONS

TUNING RANGE
Standard Broadcast (AM) ..... 540–1600 kc
Frequency Modulation (FM) ..... 88–108 mc

INTERMEDIATE FREQUENCIES
AM 455 kc FM ..... 10.7 mc

TUBE COMPLEMENT
(1) RCA 12DT8 ..... FM R-F Amplifier and FM Converter
(2) RCA 12BE6 ..... AM Converter
(3) RCA 12BA6 ..... 1st FM I-F Amplifier
(4) RCA 12BA6 ..... AM and FM I-F Amplifier
(5) RCA 12AU6 ..... 3rd FM I-F Amplifier
(6) RCA 19T8 ..... FM Detector, AM Detector and Audio Amp.
(7) RCA 35C5 ..... Audio Output
A selenium rectifier is used.
A neon bulb is used for ON-OFF indication.

POWER SUPPLY RATING
115 volts, 50–60 cycles, or 115 volts d.c. ..... 35 watts

LOUDSPEAKER
Size and Type ..... 4" x 6" P.M.
Voice Coil Impedance ..... 3.2 ohms

AUDIO POWER OUTPUT
Undistorted ..... 1.0 watt
Maximum ..... 1.3 watts

TUNING DRIVE RATIO ..... 9½:1 (4¾ turns of knob)

NET WEIGHT ..... approx. 8¼ lbs.

DIMENSIONS (Overall)
Height ..... 8⅜" Width ..... 15" Depth ..... 6 13/16"

DESCRIPTION

Instruments of the XF-3 Series are table model AM-FM radio receivers designed to operate on a 115 volts A-C or D-C power supply. The tuning range covers the standard broadcast band 540 to 1600 kc and the FM band 88 to 108 mc. A ferrite rod antenna is used on AM and a power line antenna on FM. Provision is made for connecting an external FM antenna.

The chassis and speaker are housed in a two-piece molded wrap-around cabinet. Two sets of dual knobs are used for on-off volume, tone control, selector switch, and tuning. The controls are located at either end of the slide-rule dial with a neon on-off indicator in the center.

The circuit design features a minimum amount of switching, with none in the high-frequency circuits. On the standard broadcast band, four tubes and a selenium rectifier are used. On FM, six tubes and a selenium rectifier are used. The FM circuit includes a grounded-grid r.f. stage, an autodyne detector and three stages of i.f. amplification.

ALIGNMENT PROCEDURE

CAUTION

THE CHASSIS IS CONNECTED DIRECTLY TO ONE SIDE OF THE POWER LINE. AN ISOLATION TRANSFORMER SHOULD BE USED DURING ALIGNMENT OR OTHER SERVICE WORK.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin #1 of V5 (12AU6)	Connect VoltOhmyst across C8		
2		10.7 mc	—	T4 top core for ZERO voltage
3		Connect VoltOhmyst across R11		
4		10.7 mc	—	T4 bottom core for MAXIMUM voltage
5		Repeat Steps 2 and 4		
6	Pin #1 of V4 (12BA6)	Connect VoltOhmyst to pin #1 of V5 through a 270 k resistor with minimum exposed lead at pin #1		
7		10.7 mc*	—	T3 top core
8	Pin #1 of V3 (12BA6)		—	T2 top and bottom cores†
9	Antenna terminal board, center		—	T102 top and bottom cores†
10	Antenna terminal board, center, thru 270 ohms	87.5 mc*	Tuning condenser closed	FM tuner string drive collar
11		108.5 mc*	Tuning condenser fully open	Osc. trimmer C107
12		95 mc*	Tuned to 95 kc signal	R-F trimmer C104

* Adjust output level of signal generator to provide approximately 1 volt indication on VoltOhmyst.

† Alternate loading may be required for accurate peaking; the winding not being peaked should be loaded with a resistor, 270 ohms in Step 8 and 470 ohms in Step 9.

Oscillator frequency is above signal frequency on both AM and FM.

ALIGNMENT INDICATORS:

An RCA VoltOhmyst® or equivalent VTVM is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone control to mid-position.

SIGNAL GENERATOR:

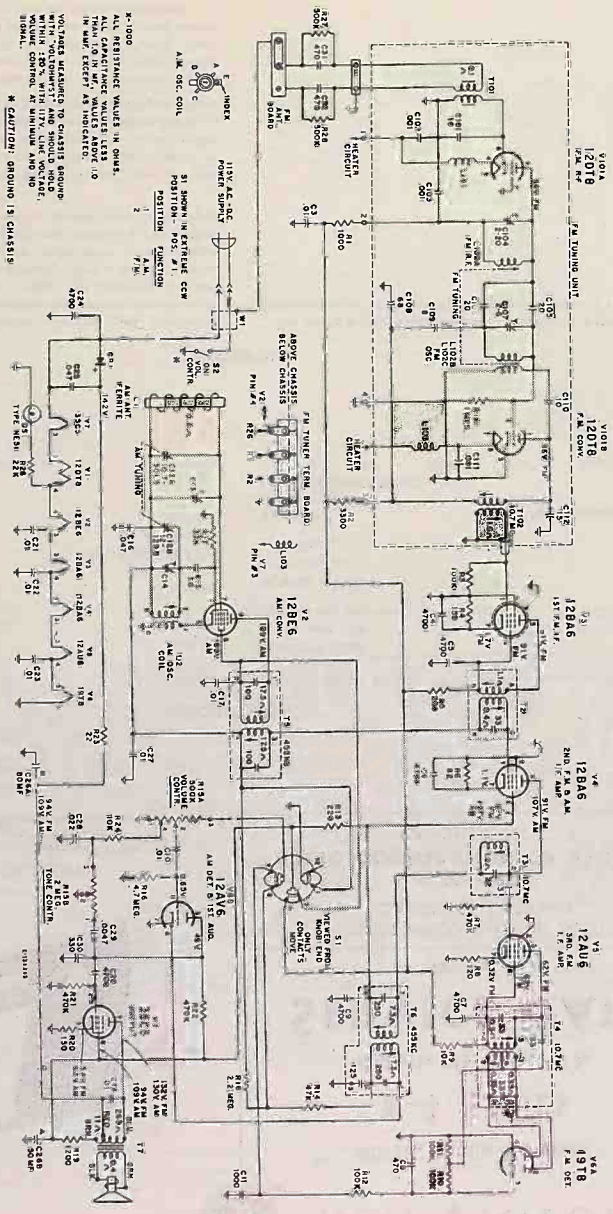
For all alignment operations, connect the low side of the signal generator to the receiver chassis, close to the point of signal injection. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C8, adjusting discriminator T4 top core for 10.7 mc crossover, and T4 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 270K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 7 of V2 in series with .01 mfd	455 kc. (mod.)	Quiet point at high freq. end	T6 bottom core (sec.) T6 top core (pri.)
2				T5 bottom core (sec.) T5 top core (pri.)
3	Assemble front panel including ferrite antenna			
4	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc. (gang fully open)	C14 (osc.)
5		1400 kc. (mod.)	1400 kc. signal	C13 (ant.)
6		600 kc. (mod.)	600 kc. signal	L2 (osc.) (rock gang)
7				
8	Repeat steps 5, 6 and 7 until Maximum gain is obtained			



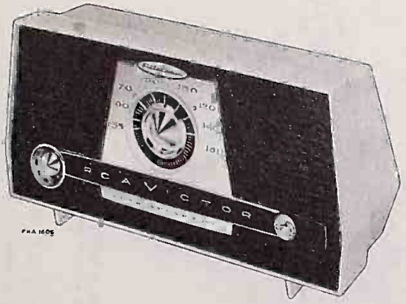
Schematic Circuit Diagram

CRITICAL LEAD DRESS

1. Dress all bus leads short and direct as possible.
2. Dress all bypass capacitor and coupling capacitor leads short and direct as possible.
3. Dress all insulated leads down to chassis.
4. Connect resistors R10 and R11 with minimum pigtails to T4 terminal #6.
5. Dress blue lead from T3 #1 to T6 #3 down to base and away from neutralizing lead on V4 pin #2 to ground lance.
6. Dress neutralizing lead down to base.
7. Connect minimum length pigtail of R14 to T6 #2 terminal.
8. Dress twisted volume control leads down to base.

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC1190-A
		CAPACITORS:
C3	73960	ceramic, 0.01 mf, +100%-0%, 500 v
C4 to C7	73473	ceramic, 4700 mmf, +100%-0%, 500 v
C8	105776	ceramic, 470 mmf, ±20%, 500 v
C9	73473	ceramic, 4700 mmf, +100%-0%, 500 v
C10	106185	paper, 0.01 mf, ±20%, 400 v
C11	102426A	paper, 0.001 mf, ±10%, 400 v
C12A, C12B	107002	variable, tuning (Includes C13 and C14) Included with C12A, C12B
C13, C14		
C15	71924	ceramic, 56 mmf, ±10%, 500 v, coef. −750
C16	105240	paper, 0.047 mf, ±20%, 400 v
C17	73960	ceramic, 0.01 mf, +100%-0%, 500 v
C18	106185	paper, 0.01 mf, ±10%, 400 v
C20	73473	ceramic, 4700 mmf, +100%-0%, 500 v
C21 to C23	73960	ceramic, 0.01 mf, +100%-0%, 500 v
C24	102226A	paper, 4700 mf, ±20%, 600 v
C25	73592	paper, 0.047 mf, ±20%, 600 v
C26A, C26B	73520	electrolytic, 80/50 mf, 150/150 v
C27	73960	ceramic, 0.01 mf, +100%-0%, 500 v
C28	79932	paper, 0.022 mf, ±20%, 400 v
C29	105230	paper, 0.0047 mf, ±20%, 400 v
C30	76552	ceramic, 330 mmf, ±20%, 500 v
C31, C32	104328	Circuit—Printed component circuit including 500,000 ohm, ¼ w resistor and 470 mmf, 500 v capacitor
C101 to C112		See FM Tuner Assembly
CR1	77519	Rectifier—Selenium rectifier
L2	79057	Coil—Oscillator coil
L101 to L103		See FM Tuner Assembly
		RESISTORS: Fixed composition unless otherwise specified:
R1		1000 ohm, ±10%, ½ w
R2		3300 ohm, ±10%, ½ w
R3		100,000 ohm, ±10%, ½ w
R4		150 ohm, ±10%, ½ w
R5		220 ohm, ±10%, ½ w
R6		82 ohm, ±10%, ½ w
R7		470,000 ohm, ±10%, ½ w
R8		120 ohm, ±10%, ½ w
R9		10,000 ohm, ±10%, ½ w
R10		100,000 ohm, ±10%, ½ w
R11, R12		100,000 ohm, ±10%, ½ w
R13		220 ohm, ±10%, ½ w
R14		47,000 ohm, ±10%, ½ w
R15A, R15B	107051	Control—Dual volume and tone control with "on-off" switch (S2)
R16		4.7 megohm, ±20%, ½ w
R17		33,000 ohm, ±20%, ½ w
R18		2.2 megohm, ±20%, ½ w
R19		1200 ohm, ±10%, 2 w
R20		150 ohm, ±10%, ½ w
R21, R22		470,000 ohm, ±10%, ½ w
R23		22 ohm, ±10%, 1 w
R24		10,000 ohm, ±10%, ½ w
R26		22,000 ohm, ±10%, ½ w
R27, R28	104328	Circuit—Printed component circuit including 500,000 ohm, ¼ w resistor and 470 mmf, 500 v capacitor
R101		See FM Tuner Assembly
S1	107003	Switch—AM/FM function switch
S2		Included with R15
T2	77513	Transformer—2nd FM IF transformer
T3	77512	Transformer—3rd FM IF transformer
T4	77511	Transformer—FM discriminator transformer
T5	77416	Transformer—1st AM IF transformer
T6	76328	Transformer—2nd AM IF transformer
T7	77517	Transformer—Output transformer
T101, T102		See FM Tuner Assembly
	107049	Backplate—Dial backplate less ¾" O.D. pulley and pointer
	73935	Clip—IF transformer mounting clip
	108002	Collar—FM dial cord retaining collar
	74594	Connector—2 contact male interlock for line cord
	72953	Cord—Drive cord for pointer (250 foot spool)—approx. 43" required for pointer drive. FM tuner drive cord is part of tuner
	102027	Grommet—For chassis bottom cover
	73482	Insulator—For tuning capacitor
	101857	Lamp—Neon pilot lamp
	107005	Pointer—Dial pointer
	72602	Pulley—13/32" O.D. aluminum pulley
	101663	Pulley—¼" O.D. aluminum pulley
	102627	Pulley—¾" O.D. aluminum pulley
	73584	Shield—Tube shield for V3
	73117	Socket—7 pin miniature socket for V2, V3, V4, V5 and V7
	76971	Socket—9 pin miniature socket for V6
	100642	Socket—Pilot lamp socket and lead assembly
	72540	Spring—Dial cord tension spring
	79885	Washer—"C" type retaining washer for tuning control sleeve
	77420	Washer—Nylon washer for tuning capacitor or dial backplate assembly
		FM TUNER ASSEMBLY
		CAPACITORS:
		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N750
		ceramic, 0.001 mmf, +50%-20%, 500 v
		trimmer, 2-10 mmf
		ceramic, 20 mmf, ±20 mmf, 500 v, coef. 0
		trimmer, 2-6 mmf
		ceramic, 68 mmf, ±5%, 500 v, coef. N750
		ceramic, 8.2 mmf, ±1 mmf, 500 v, coef. P100
		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N470
		ceramic, 0.001 mmf, +50%-20%, 500 v
		ceramic, 15 mmf, ±10%, 500 v, coef. 0
		Sleeve—Ferrite sleeve filament choke
		Coil—FM RF/Osc. tuning coil assembly
		Sleeve—Ferrite sleeve filament choke
		Resistor—Fixed composition, 1 megohm, ±10%, ½ w
		Transformer—Antenna transformer
		Transformer—1st FM IF transformer
	107004	Tuner—FM tuner assembly—less tube
		SPEAKER ASSEMBLY
	107006	Speaker—4" x 6" PM speaker with cone
		MISCELLANEOUS
L1	107050	Antenna—Ferrite rod antenna
	Y7036	Cabinet—Plastic cabinet—two-tone gray for Model XF3J
	Y7035	Cabinet—Plastic cabinet—white and green for Model XF3EH
	Y7034	Cabinet—Plastic cabinet—white and maple for Model XF3EM
	106992	Cable—A.C. power cord and plug with retainer
	107009	Knob—AM/FM function control knob
	107010	Knob—Tone control knob
	107008	Knob—Tuning knob
	107007	Knob—Volume Control knob
	102546	Nut—Retainer nut for speaker
	106993	Retainer—For power cord
	30900	Spring—Retaining spring for tone knob
	72845	Spring—Retaining spring for tuning knob
	107011	Window—Dial window



X-4 Series—The "Solitaire"

Model X-4DE—Black/Champagne White
Model X-4EF—Champagne White/Bonbon Pink
Model X-4HE—Bermuda Turquoise/Champagne White

RCA VICTOR

AC-DC Radio Receiver

X-4 SERIES

Chassis No. RC-1191A

SERVICE DATA

— 1959 No. 10 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

X-4 Series

Alignment Procedure

Test-Oscillator—For all alignment operations connect the low side of the test-oscillator through an isolating capacitor to the "common negative wiring." Keep the oscillator output as low as possible to avoid a-v-c action.

An isolation transformer (115 v./115 v.) may be necessary for the receiver if the test-oscillator is also a.c. operated.

CHASSIS REMOVAL

1. Remove two holding screws in bottom of cabinet.
2. Loosen captive holding screw at rear top of hood. DO NOT TRY TO REMOVE.
3. Grip cabinet by its ends, from the rear, allowing the fingers to extend loosely over the front.
4. Hold cabinet front-down and shake vertically until front separates from hood. Fingers will limit the separation.

CABINET REASSEMBLY

1. Place rib, on bottom of chassis mounting stud, in channel inside bottom of hood and slide sections firmly together.
2. Gently tighten captive holding screws at rear top of hood.
3. Insert and gently tighten two holding screws in bottom of cabinet.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. [illegible]	[illegible]	[illegible]	T2 (top) 2nd I-F trans.
2	[illegible] C1 [illegible] through .01 [illegible]			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	[illegible]	[illegible]	osc. trimmer C1-A
4		1,400 kc	[illegible]	ant. trimmer C1-B
5		[illegible]	[illegible]	osc. coil T-3 (rock gang)
6		Repeat steps 3, 4, and 5		

SPECIFICATIONS

TUNING RANGE .... 540–1,600 kc

INTERMEDIATE FREQUENCY .... 455 kc

TUBE COMPLEMENT
- (1) RCA 12BE6 .... Converter
- (2) RCA 12BA6 .... I.F. Amplifier
- (3) RCA 12AV6 .... Det.-AVC-A.F. Amp.
- (4) RCA 50C5 .... Output
- (5) RCA 35W4 .... Rectifier

POWER SUPPLY RATING
115 volts d. c. or 50 to 60 cycles a. c. .... 30 watts

TUNING DRIVE RATIO .... Planetary–Approx. 6:1

LOUDSPEAKER
Size and type .... One 3½", one 4" P.M.
Voice coil impedance at 400 cycles .... 3.2 ohms each

POWER OUTPUT
Undistorted .... 1.0 watts
Maximum .... 1.3 watts

WEIGHT .... Approximately 3¾ lbs.

CABINET DIMENSIONS
Height ..... 6¾" Width ..... 12¼" Depth ..... 5⅞"

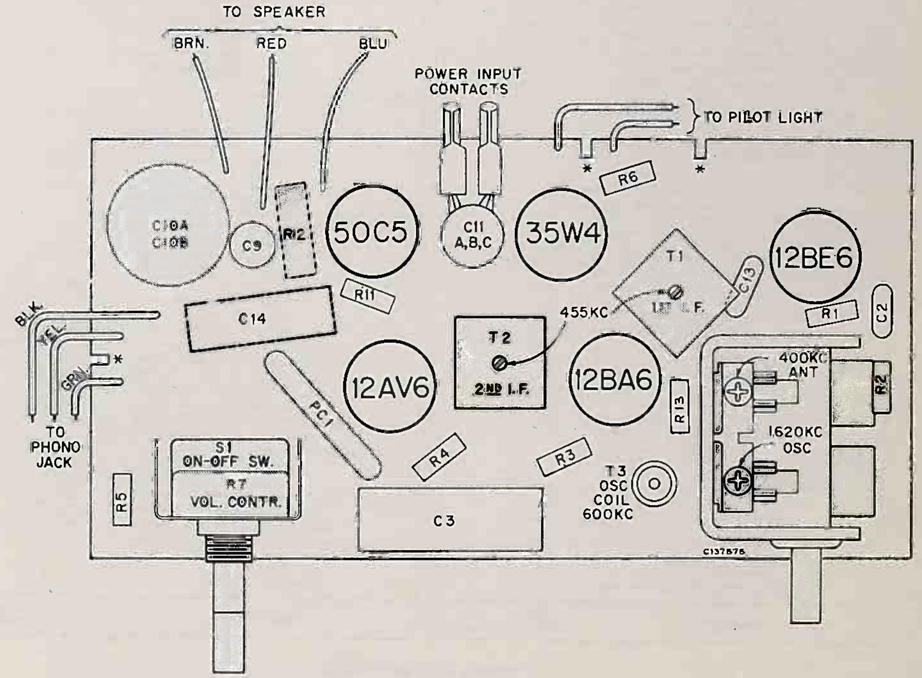
DESCRIPTION

Instruments of the "X-4 Series" are five-tube (including rectifier) table model radio receivers designed for operation on a 115 volt AC or DC power supply. The two-piece cabinet completely encloses the radio chassis, using a molded plastic hood instead of a conventional back cover. The chassis, "Filteramic" antenna, and speakers are attached to the molded plastic cabinet front, thus providing greater ease in servicing when the hood-back is removed.

The chassis is of the "Security Sealed Wiring" type in which all components, except antenna and speakers, are mounted on an insulation plate. Component connections are on the underside of the plate. A conventional superheterodyne circuit is employed using 150-milliampere series-string miniature tubes.

The "X-4 Series" instruments feature a "Filteramic" noise reduction antenna, dual speakers, push-pull type power switch incorporated with the calibrated volume control knob, which permits accurate presetting of the volume level, vernier station tuning, illuminated dial, and a jack for phono attachment.

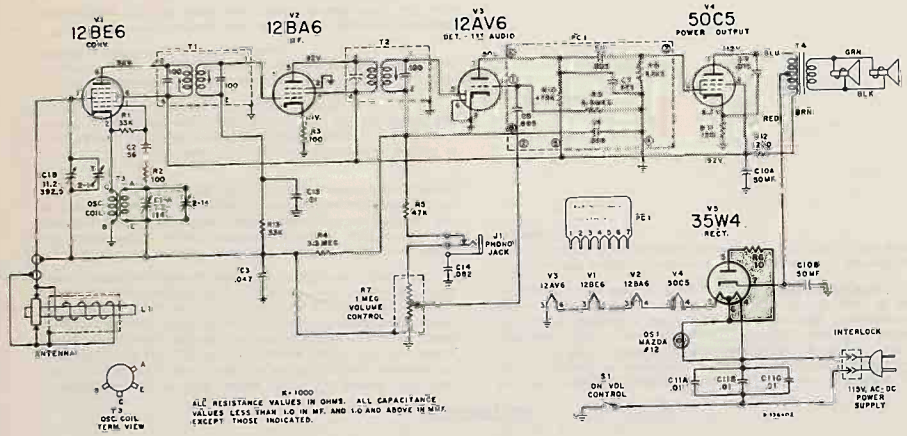
The power supply attachment cord is fastened to the hood and is disconnected from the chassis when the hood is removed.



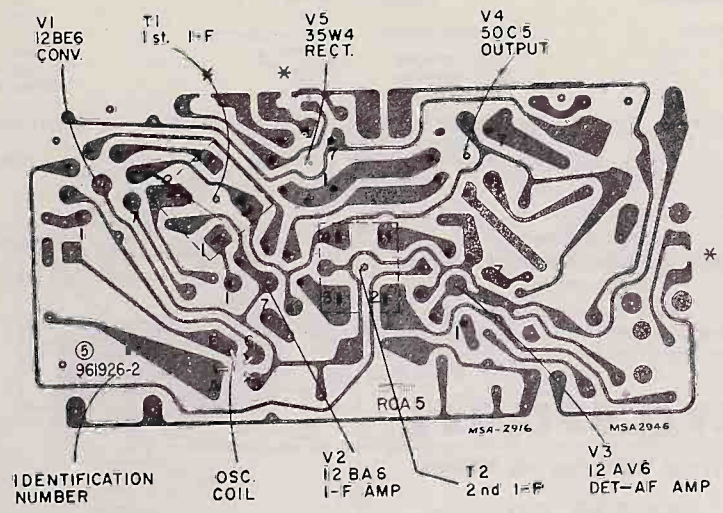
*NOTE-CUTS TO BE MADE IN REPLACEMENT BOARD

Tube and Trimmer Locations

X-4 Series



Schematic Diagram



The assembly represented above is viewed from the wiring side of the board.
The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 6 — Dated August 25, 1955.

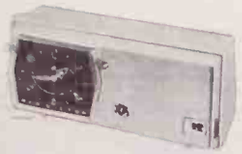
Chassis Wiring and Components — View from Wiring Side

X-4 Series

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1191A
		CAPACITORS
C1A, C1B	108225	variable tuning capacitor
C2	106986	ceramic, 56 mmf, ±20%, 500 v
C3		paper, 0.047 mf, ±20%, 400 v
C5 to C8		Part of PC1
C9		paper, 0.015 mf, ±10%, 400 v
C10A, C10B	108260	electrolytic, 50/50 mf, 150/150 v
C11A, C11B, C11C	79918	ceramic, 0.01 mf, +100%, −0%, 600 v
C13	73960	ceramic, 0.01 mf, +100%, −0%, 500 v
C14		paper, 0.082 mf, 400 v
PC1	106989	Circuit — Printed circuit audio coupling (includes R8, R9, R10, C5, C6, C7, and C8)
		RESISTORS—Fixed, composition, unless otherwise specified:
R1		33,000 ohm, ±20%, ½ w
R2, R3		100 ohm, ±20%, ½ w
R4		3.3 megohm, ±20%, ½ w
R5		47,000 ohm, ½ w
R6		10 ohm, ½ w
R7	108226	control—volume control with "on-off" switch (S1)
R8 to R10		Part of PC1
R11		150 ohm, ½ w
R12		1,200 ohm, 1 w
R13		33,000 ohm, ±20%, ½ w
S1		Part of R7
T1	108007	Transformer—1st IF transformer
T2	108008	Transformer—2nd IF transformer
	107012	Circuit—"Security Sealed Wiring" chassis assembly complete with fixed capacitors and resistors, IF transformers, oscillator coil, printed audio circuit and tube sockets. Less tuning capacitor and volume control.

SYMBOL NO.	STOCK NO.	DESCRIPTION
J1	75482	Connector—Female phono jack
	103236	Connector—Single contact female connector for AC leads
DS1	107046	Lamp—6.3 volt, miniature lamp with 2 pin base
	108258	Socket—Pilot lamp socket
	103201	Socket—7-pin miniature socket for V1, V2, V3
	103200	Socket—7-pin miniature socket for V4, V5
T3	103204	Transformer—Oscillator coil
		SPEAKER ASSEMBLY
T4	100661	Transformer—Output transformer
	108251	Speaker—3½" P.M. speaker—less output transformer
	103669	Speaker—4" P.M. speaker—less output transformer
		MISCELLANEOUS
	108257	Antenna—Ferrite "Filteramic" antenna
	103620	Cable—AC line cord
	Y7059	Cabinet — Champagne White/Bon Bon Pink — for Model X4EF
	Y7058	Cabinet — Black/Champagne White — for Model X4DE
	Y7060	Cabinet—Bermuda Turquoise/Champagne White—for Model X4HE
	108232	Dial—Tuning dial
	108230	Knob—Vernier tuning knob
	108227	Knob—Volume control knob
	108229	Lens—Dial light lens
	108228	Motif—"Filteramic"
	103908	Nut—Cabinet assembly retaining nut
	77521	Nut—Retainer nut for 3½" speaker
	102546	Nut—Retainer nut for 4" speaker
	108231	Pointer—Tuning indicator
	101874	Spring—Retainer spring for tuning knob
	101069	Spring—Retainer spring for volume knob and dial pointer



C-2 Series—The "Commentator"

Model C-2E—Champagne White
Model C-2FE—Bonbon Pink/Champagne White
Model C-2J—Charcoal/Moonmist Gray

C-3 Series—The "Dawnette"

Model C-3E—Champagne White
Model C-3EK—Champagne White/Driftwood Beige
Model C-3HE—Bermuda Turquoise/Champagne White

RCA VICTOR

A-C Operated Clock-Radio

C2 SERIES
C3 SERIES

Chassis No. RC-1188B, RC-1188D

SERVICE DATA

— 1959 No. 9 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA 12BE6	Converter
(2) RCA 12BA6	I.F. Amplifier
(3) RCA 12AV6	Det.-AVC-A.F. Amp.
(4) RCA 50C5	Output
(5) RCA 35W4	Rectifier

POWER SUPPLY RATING

115 volts, 60 cycles, a. c. ..... 35 watts

CAUTION: DO NOT CONNECT TO A D.C. POWER SUPPLY.

LOUD SPEAKER

Size and type	4 in. P.M.
Voice coil impedance	3.2 ohms at 400 cycles

POWER OUTPUT

Undistorted	1.0 watts
Maximum	1.3 watts

TUNING DRIVE RATIO ..... 1:1 (direct drive)

WEIGHT ..... Approximately 3¾ lbs.

CABINET DIMENSIONS

Height	6⅜"
Width	13⅜"
Depth	5"

DESCRIPTION

Instruments of the "C-2 Series" and "C-3 Series" are five-tube (including rectifier) table model clock-radio designed for operation on a 115 volt, 60 cycle power supply. The two piece cabinet completely encloses the radio chassis and clock, using a molded plastic hood instead of a conventional back cover. The chassis, clock, ferrite rod antenna, and speaker are attached to the molded plastic cabinet front, thus providing greater ease in servicing when the hood-back is removed.

The chassis is of the "Security Sealed Wiring" type in which all components, except antenna, speaker, and clock, are mounted on an insulation plate. Component connections are on the underside of the plate. A conventional superheterodyne circuit is employed using 150-milliampere series-string miniature tubes.

The "C-2 Series" and "C-3 Series" instruments feature a "Levermatic" clock-timer, and a calibrated volume control knob which permits accurate presetting of the volume level. The "C-3 Series" also includes an appliance outlet.

The "Levermatic" clock-timer operates continuously when connected to the power service. A moving sweep-second hand indicates that the clock is in operation.

The clock-timer features not only the commonly accepted self-starting type of clock with sweep-second hand, but also a clock controlled switch which will: (1) turn the radio off after a period of operation of up to 60 minutes (sleep); (2) turns the radio on at a time predetermined up to 11 hours in advance (Auto), and, in the "C-3 Series," sound a buzzer alarm (if desired) a short time after the radio is energized. Lever type clock-timer function controls are located at the perimeter of the clock face for maximum ease of operation.

The power supply attachment cord is fastened to the cabinet and becomes disconnected from the chassis when the hood is removed.

CHASSIS REMOVAL

1. Remove three cabinet holding screws; two on bottom and one at top rear of hood.
2. Grip cabinet with two hands allowing fingers to extend over edges of cabinet front.
3. Hold cabinet, front down, and shake in a vertical direction. Cabinet assembly will separate and the fingers will limit the separation.
4. The cabinet front and chassis assembly may now be separated completely.

CABINET REASSEMBLY

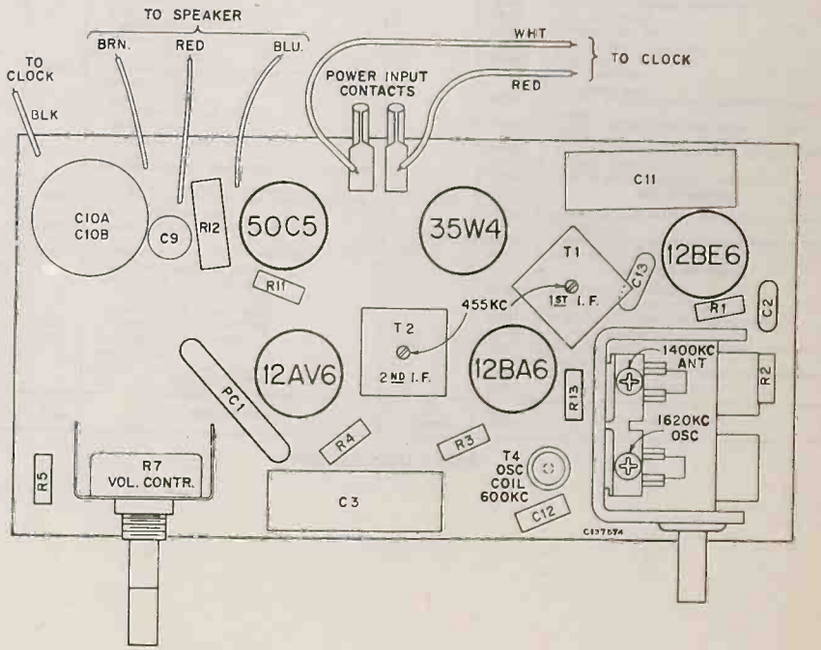
1. Place chassis front and chassis assembly on the cabinet back so that the ribs of the cabinet front rest on the bottom — inside of the cabinet back.
2. Push cabinet sections together firmly.
3. Insert three holding screws; two on bottom and one at top rear of hood.

Alignment Procedure

Test-Oscillator—For all alignment operations, connect the low side of the test-oscillator through an isolating capacitor to the "common negative wiring." Keep the oscillator output as low as possible to avoid a-v-c action.

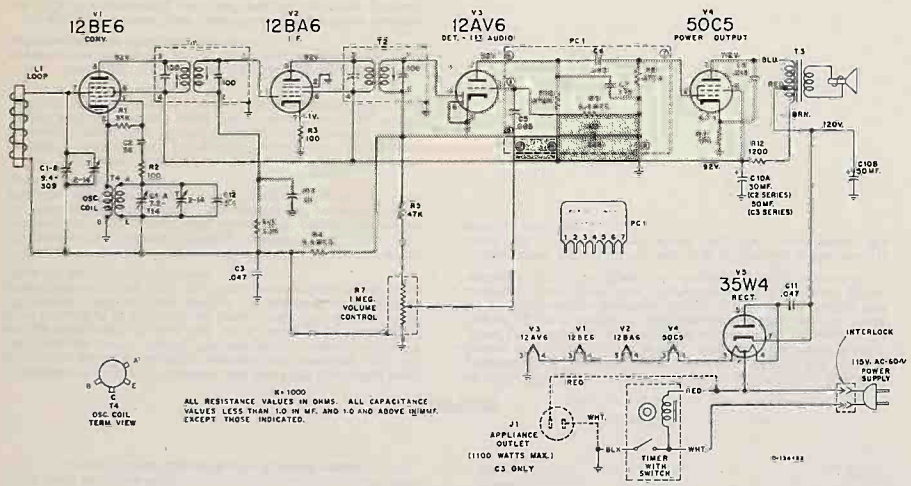
An isolation transformer (115v./115v.) may be necessary for the receiver if the test-oscillator is also a.c. operated.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 1-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1,620 kc	Gang fully open	osc. trimmer C1-A
4		1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6		Repeat steps 3, 4, and 5		

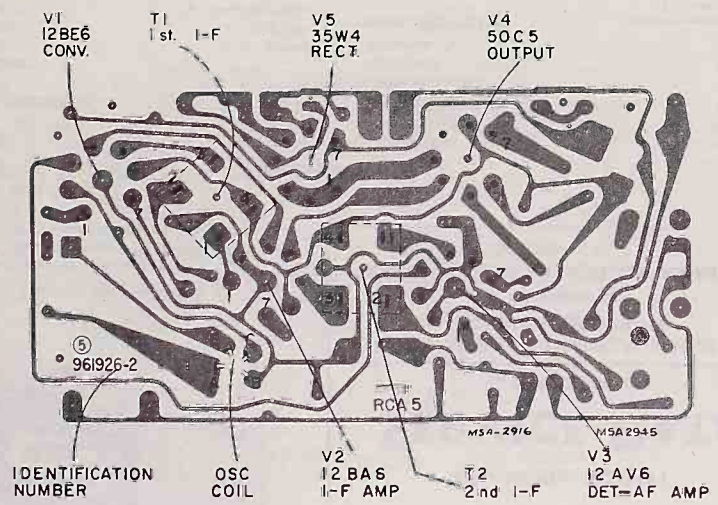


Complete Chassis Assembly — View from Component Side

C-2, C-3 Series



Schematic Diagram



Chassis Wiring and Components — View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.
The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 6 — Dated August 25, 1955.

C-2, C-3 Series

OPERATING INSTRUCTIONS

To Set Clock Time—Push in and turn TIME SET knob (at back of cabinet).

To Set Wake-up Time—Turn TIME SET knob (at back of cabinet).

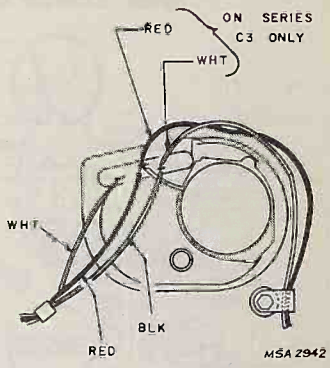
To Play the Radio—Move the SERVICE (Right Side) lever to "ON". Turn TUNING knob to select desired station and adjust VOLUME as desired. Move SERVICE lever to "OFF" when through listening.

For "Wake-up Music" Operation—Move SERVICE lever to "ON", tune in the desired station, adjust volume level, then move SERVICE lever to "AUTO". The radio will turn on automatically at the time for which the clock has been preset.

For "Sleep-Music" Operation—Move the SLEEP lever to the desired playing time (up to 60 minutes), TUNE in the desired station and adjust VOLUME as desired. "SLEEP" operation can be used individually or in conjunction with "Wake-up" operation.

In the "C-3 Series" the SERVICE lever may be moved to the "ALARM" position which will cause a buzzer-alarm to sound a short time after the radio is energized.

IMPORTANT—KEEP SERVICE LEVER AT "OFF" POSITION WHEN INSTRUMENT IS NOT IN USE.



Clock Connections

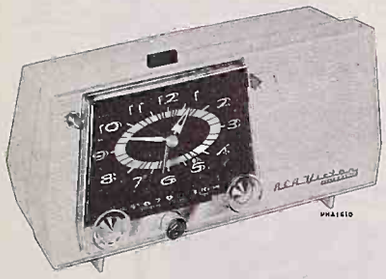
REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC1188-B,D
		CAPACITORS
C1A, C1B	108219	variable tuning capacitor
C2	106986	ceramic, 56 mmf, ±20%, 500 v
C3		paper, 0.047 mf, ±20%, 400 v
C5 to C8		Part of PC-1
C9		paper, 0.015 mf, ±10%, 400 v
C10A, C10B	106987	electrolytic, 30/50 mf, 150/150 v for C2 series
C10A, C10B	108260	electrolytic, 50/50 mf, 150/150 v for C3 series
C11		paper, 0.047 mf, ±20%, 400 v
C12	103440	ceramic, 5.6 mmf, ±0.5 mmf, 500 v., Coef. N3300
C13	73960	ceramic, 0.01 mf, +100% −0%, 500 v
PC1	106989	Circuit—Printed circuit—audio coupling (includes C5, C6, C7, C8 and R8, R9, R10)
		RESISTORS — Fixed, composition, unless otherwise specified:
R1		33,000 ohm, ±20%, ½ w
R2, R3		100 ohm, ±20%, ½ w
R4		3.3 megohm, ±20%, ½ w
R5		47,000 ohm, ±20%, ½ w
R7	108223	control—volume control
R8 to R10		Part of PC-1
R11		150 ohm, ±10%, ½ w
R12		1,200 ohm, ±10%, 1 w
R13		33,000 ohm, ±20%, ½ w
T1	108007	Transformer—1st IF transformer
T2	108008	Transformer—2nd IF transformer
T4	103204	Transformer—Oscillator coil
	107012	Circuit—"Security Sealed Wiring" chassis assembly complete with fixed capacitors, resistors, IF transformers, oscillator coil, printed audio circuit and tube sockets; less tuning capacitor and volume control.
	103236	Connector—AC interlock
	103201	Socket—7-pin miniature socket for V1, V2 and V3
	103200	Socket—7-pin minfature socket for V4 and V5
		SPEAKER ASSEMBLY
T3	79283	Transformer—Output transformer
	103669	Speaker—4" P.M.—less output transformer

SYMBOL NO.	STOCK NO.	DESCRIPTION
		MISCELLANEOUS
ANT	108265	Antenna—Ferrite rod antenna
	Y7055	Cabinet—Champagne White—for Model C-2E
	Y7056	Cabinet—Bonbon Pink/Champagne White—for Model C-2FE
	Y7057	Cabinet—Charcoal/Moonmist Gray—for Model C-2J
	Y7061	Cabinet—Champagne White—for Model C-3E
	Y7062	Cabinet—Champagne White/Driftwood Beige—for Model C-3EK
	Y7063	Cabinet—Bermuda Turquoise/Champagne White—for Model C-3HE
	103620	Cable—AC line cord and plug—for C-2 Series
	108235	Cable—AC line cord and plug—for C-3 Series
	108233	Connector—Appliance outlet receptacle
	108237	Escutcheon—"RCA Victor"—for C-3 Series
	107164	Grommet—Antenna mounting grommet
	108218	Knob—Time set knob
	108216	Knob—Tuning knob—black—for Model C-2E and C-2FE
	108222	Knob—Tuning knob—champagne white—for Model C-2J
	108238	Knob—Tuning knob—charcoal—for C-3 Series
	108220	Knob—Volume control knob
	107163	Nut—Cabinet assembly retaining nut
	102546	Nut—Retainer nut for speaker
	105968	Retainer—Clock window retainer
	101069	Spring—Retainer spring for volume or tuning knobs
	108221	Window—Clock timer window—for C-2 Series
	108236	Window—Clock timer window—for C-3 Series

CLOCK MECHANISM

If clock mechanism repair becomes necessary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.



C-4 Series — The "Sandman"
Model C-4E — Antique White
Model C-4EM — Antique White/Maple Sugar
Model C-4FE — Bonbon Pink/Antique White

RCA VICTOR

A-C Operated Clock-Radio

C-4 SERIES

Chassis No. RC-1191

SERVICE DATA

— 1959 No. 11 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

CHASSIS REMOVAL

1. Remove two holding screws in bottom of cabinet.
2. Loosen captive holding screw at rear top of hood. DO NOT TRY TO REMOVE.
3. Grip cabinet by its ends, from the rear, allowing the fingers to extend loosely over the front.
4. Hold cabinet front down and shake vertically until front separates from hood. Fingers will limit the separation.

CABINET REASSEMBLY

1. Place rib, on bottom of chassis mounting stud, in channel inside bottom of hood and slide sections firmly together.
2. Gently tighten captive holding screw at rear top of hood.
3. Insert and gently tighten two holding screws in bottom of cabinet.

Alignment Procedure

Test-Oscillator — For all alignment operations, connect the low side of the test-oscillator through an isolating capacitor to the "common negative wiring." Keep the oscillator output as low as possible to avoid a-v-c action.

An isolation transformer (115 v./115 v.) may be necessary for the receiver if the test-oscillator is also a.c. operated.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	[illegible]	455 kc	Quiet point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	[illegible]			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1,620 kc	Gang fully open	osc. trimmer C1-A
4		1,400 kc	1,400 k. signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6		Repeat steps 3, 4, and 5		

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT
(1) RCA 12BE6 ..... Converter
(2) RCA 12BA6 ..... I.F. Amplifier
(3) RCA 12AV6 ..... Det.-AVC-A.F. Amp.
(4) RCA 50C5 ..... Output
(5) RCA 35W4 ..... Rectifier

POWER SUPPLY RATING
115 volts, 60 cycles, a. c. ..... 35 watts
Caution: Do not connect to a d. c. power supply.

LOUDSPEAKER
Size and type ..... 4 in. P.M.
Voice coil impedance at 400 cycles ..... 3.2 ohms

POWER OUTPUT
Undistorted ..... 1.0 watts
Maximum ..... 1.3 watts

TUNING DRIVE RATIO ..... Planetary—Approx. 6:1 (3 turns of knob)

WEIGHT ..... Approximately 4 lbs.

CABINET DIMENSIONS
Height ..... 6 1/16"
Width ..... 12 3/4"
Depth ..... 6 7/16"

DESCRIPTION

Instruments of the "C-4 Series" are five-tube (including rectifier) table model clock-radios designed for operation on a 115 volt 60 cycle power supply. The two-piece cabinet completely encloses the radio chassis and clock, using a molded plastic hood instead of a conventional back cover. The chassis, clock, "Filteramic" antenna, and speaker are attached to the molded plastic cabinet front, thus providing greater ease in servicing when the hood-back is removed.

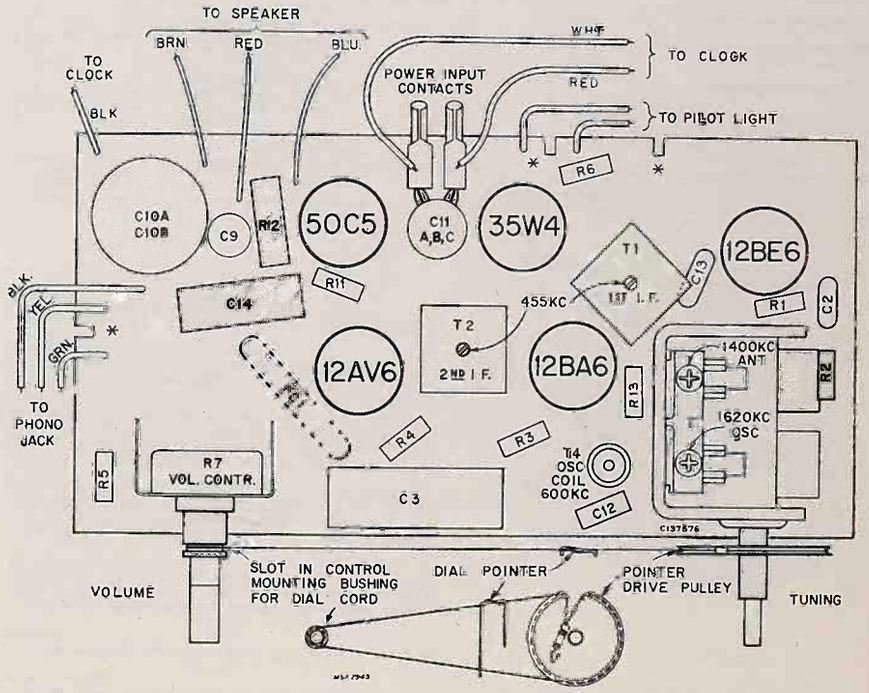
The chassis is of the "Security Sealed Circuit" type in which all components, except antenna, speaker, and clock, are mounted on an insulation plate. Component connections are on the underside of the plate. A conventional superheterodyne circuit is employed using 150-milliampere series-string miniature tubes.

The "C-4 Series" instruments feature a "Filteramic" noise reduction antenna, a "Levermatic" clock-timer, with sleep, wake-up, buzzer and "Drowse" alarms, a calibrated volume control knob for accurate presetting of the volume level, vernier station tuning, illuminated slide-rule dial, appliance outlet, and a jack for phono attachment.

The "Levermatic" clock-timer operates continuously when connected to the power source. A moving sweep-second hand indicates that the clock is in operation.

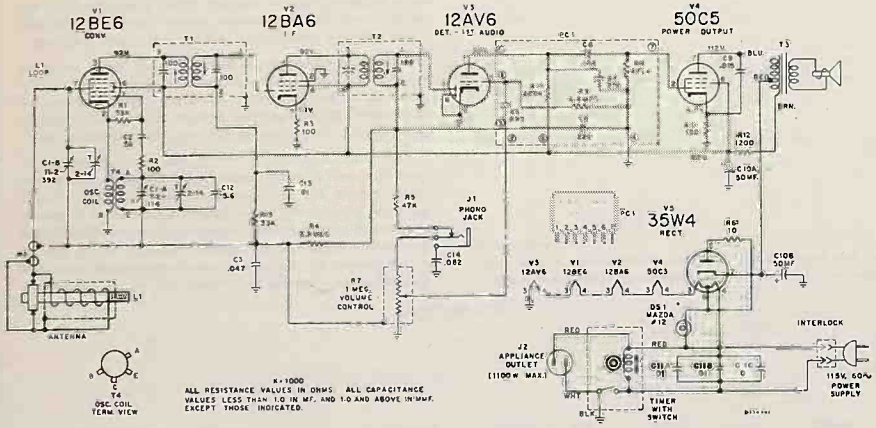
In the "C-4 Series," the "Levermatic" clock-timer features not only the commonly accepted self-starting type of clock with sweep-second hand, but also a clock controlled switch which will — (1) turn the radio off after a period of operation of up to 60 minutes (Sleep), (2) turn the radio on at a time predetermined up to 11 hours in advance (Auto), (3) sound a buzzer alarm (if desired) a short time after the radio is energized (Alarm), and (4) permit the buzzer alarm (if used) to be turned off for a period of 7 minutes after which interval it will be sounded again (Drowse Alarm) (radio is on during this interval). Lever type clock function controls are located at the perimeter of the clock face for maximum ease of operation.

The power supply attachment cord is fastened to the cabinet hood and becomes disconnected from the chassis when the hood is removed.

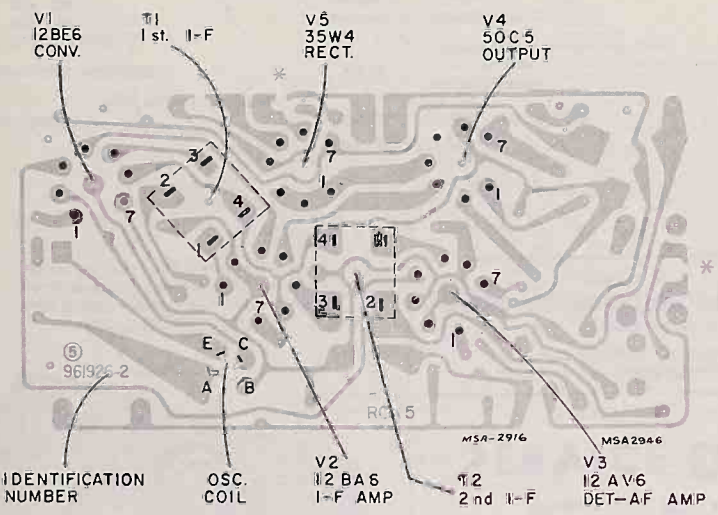


***NOTE—CUTS TO BE MADE IN REPLACEMENT BOARD**

Chassis Assembly and Dial Cord Arrangement — View from Component Side



Schematic Diagram



Chassis Wiring and Components — View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.

The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 6 — Dated August 25, 1955.

OPERATING INSTRUCTIONS

To Set Clock Time—Push in and turn TIME SET knob (at back of cabinet).

To Set Wake-up Time — Turn TIME SET knob (at back of cabinet).

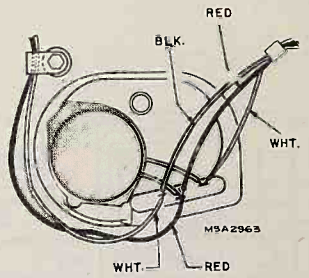
To Play the Radio — Set SERVICE lever to "ON." Turn TUNING knob to select desired station and adjust VOLUME as desired. Set SERVICE lever to "OFF" when through listening.

For "Radio Wake-up" Operation — With SERVICE lever set at "ON," tune in the desired station and adjust volume level. Set SERVICE lever to "AUTO." The radio will turn on automatically at the time for which the alarm has been preset.

For "Radio/Buzzer Wake-up" Operation — Setting SERVICE lever to "ALARM" will cause a buzzer to sound a short time after radio has been turned on. The buzzer feature only may be used without the radio feature by presetting the VOLUME knob to 0. Moving the SERVICE lever to any position other than "ALARM" will silence the buzzer.

For "Drowse" Operation — With the SERVICE lever set at "ALARM" and after the buzzer has sounded; it may be silenced for a period of about 7 minutes by pressing down the "DROWSE" button on top of the cabinet. If the radio feature is also being used it will continue to play during this interval. This operation may be repeated when the buzzer again sounds.

IMPORTANT — KEEP SERVICE KNOB AT "OFF" POSITION WHEN INSTRUMENT IS NOT IN USE.



Clock Connections

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1191
		CAPACITORS
C1A, C1B	108244	variable tuning capacitor
C2	106986	ceramic, 56 mmf, ±20%, 500 v
C3		paper, 0.047 mf, ±20%, 400 v
C5 to C8		Part of PC1
C9		paper, 0.015 mf, ±10%, 400 v
C10A, C10B	108260	electrolytic, 50/50 mf, 150/150 v
C11A, C11B, C11C	79918	ceramic, 0.01 mf, +100% −0%, 600 v
C12	103440	ceramic, 5.6 mmf, ±0.5 mmf, 500 v.
C13	73960	ceramic, 0.01 mf, +100% −0%, 500 v
C14		paper, 0.082 mf, ±10%, 400 v
PC1	106989	Circuit—Printed circuit (includes R8, R9, R10, C5, C6, C7 and C8)
		RESISTORS — Fixed, composition, unless otherwise specified
R1		33,000 ohm, ½ w
R2, R3		100 ohm, ½ w
R4		3.3 megohm, ½ w
R5		47,000 ohm, ½ w
R6		10 ohm, ½ w
R7	108245	control—volume control
R8 to R10		Part of PC1
R11		150 ohm, ½ w
R12		1,200 ohm, 1 w
R13		33,000 ohm, ½ w
T1	108007	Transformer—1st IF Transformer
T2	108008	Transformer—2nd IF transformer
T4	103204	Transformer—Oscillator coil
	107012	Circuit—"Security Sealed Wiring" chassis assembly complete with fixed capacitors and resistors, IF transformers, oscillator coil, printed audio circuit and tube sockets. Less tuning capacitor and volume control.
J1	75482	Connector—Female, phono input jack
	103236	Connector — Single contact female connector for AC leads

SYMBOL NO	STOCK NO.	DESCRIPTION
	72953	Cord—Pointer drive cord (250 ft. spool)
DS1	107046	Lamp—6.3 volt, miniature, 2 pin base—Type #12
	108239	Pointer—Dial indicator
	108259	Socket—Pilot lamp socket
	103201	Socket—7-pin miniature socket for V1, V2, V3
	103200	Socket—7-pin miniature socket for V4, V5
	72540	Spring—Dial cord tension spring
		SPEAKER ASSEMBLY
T3	79283	Transformer—Output transformer
	104099	Speaker—4" P.M. speaker
		MISCELLANEOUS
L1	108257	Antenna—"Filteramic" ferrite antenna
	108235	Cable—AC line cord
	Y7064	Cabinet — Antique White/Antique White — for Model C4E
	Y7066	Cabinet — Antique White/Maple Sugar — for Model C4EM
	Y7065	Cabinet—Bonbon Pink/Antique White—for Model C4FE
	108240	Clip—Lamp mounting clip
J2	108233	Connector—Appliance outlet receptacle
	102542	Emblem—Trademark emblem for clock window
	108264	Knob—Time set knob
	108243	Knob—Timer "drowse" alarm button
	108246	Knob—Tuning knob
	108247	Knob—Volume control knob
	103908	Nut—#8-32 tee nut for cabinet front
	102546	Nut—Retainer nut for speaker
	106997	Retainer—For clock window
	101069	Spring—Knob retaining spring
	108241	Window—Clock timer window

CLOCK MECHANISM

If clock mechanism repair becomes necessary, remove clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.

RCA VICTOR

AC-DC Radio Receiver

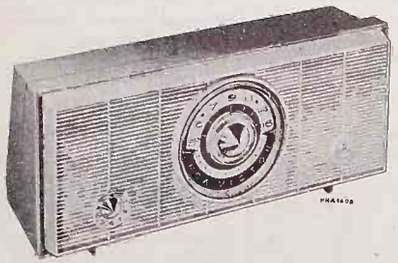
X-3 SERIES

Chassis No. RC-1188C

SERVICE DATA

— 1959 No. 12 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



X-3 Series — The "Starfire"

Model X-3EM — Antique White/Driftwood Beige
Model X-3EN — Antique White/Monterey Red
Model X-3HE — Dawn Green/Antique White

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc
Conelrad frequencies marked.

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT
(1) RCA 12BE6 ..... Converter
(2) RCA 12BA6 ..... I.F. Amplifier
(3) RCA 12AV6 ..... Det.-AVC-A.F. Amp.
(4) RCA 50C5 ..... Output
(5) RCA 35W4 ..... Rectifier

POWER SUPPLY RATING
115 volts d. c. or 50 to 60 cycles a. c. ..... 30 watts

TUNING DRIVE RATIO ..... 1:1 (direct drive)

LOUDSPEAKERS
Size and type ..... One 3½ in. P.M. and one 4 in. P.M.
Voice coil impedance at 400 cycles ..... 3.2 ohms each

POWER OUTPUT
Undistorted ..... 1.0 watts
Maximum ..... 1.3 watts

WEIGHT ..... Approximately 3½ lbs.

CABINET DIMENSIONS
Height ..... 6⅝" Width ..... 13⅝" Depth ..... 5"

DESCRIPTION

Instruments of the "X-3 Series" are five-tube (including rectifier) table model radio receivers designed for operation on a 115 volt AC or DC power supply. The two-piece cabinet completely encloses the radio chassis, using a molded plastic hood instead of a conventional back cover. The chassis, ferrite rod antenna, and speakers are attached to the molded plastic cabinet front, thus providing greater ease in servicing when the hood-back is removed.

The chassis is of the "Security Sealed Circuit" type in which all components, except antenna and speakers, are mounted on an insulation plate. Component connections are on the underside of the plate. A conventional superheterodyne circuit is employed using 150 milliampere series-string miniature tubes.

The "X-3 Series" instruments feature dual speakers and a push-pull type power switch incorporated with the calibrated volume control knob, which permits accurate presetting of the volume level.

The power supply attachment cord is fastened to the cabinet hood and is disconnected from the chassis when the hood is removed.

Alignment Procedure

Test-Oscillator — For all alignment operations, connect the low side of the test-oscillator through an isolating capacitor to the "common negative wiring." Keep the oscillator output as low as possible to avoid a-v-c action.

An isolation transformer (115 v./115 v.) may be necessary for the receiver if the test-oscillator is also a.c. operated.

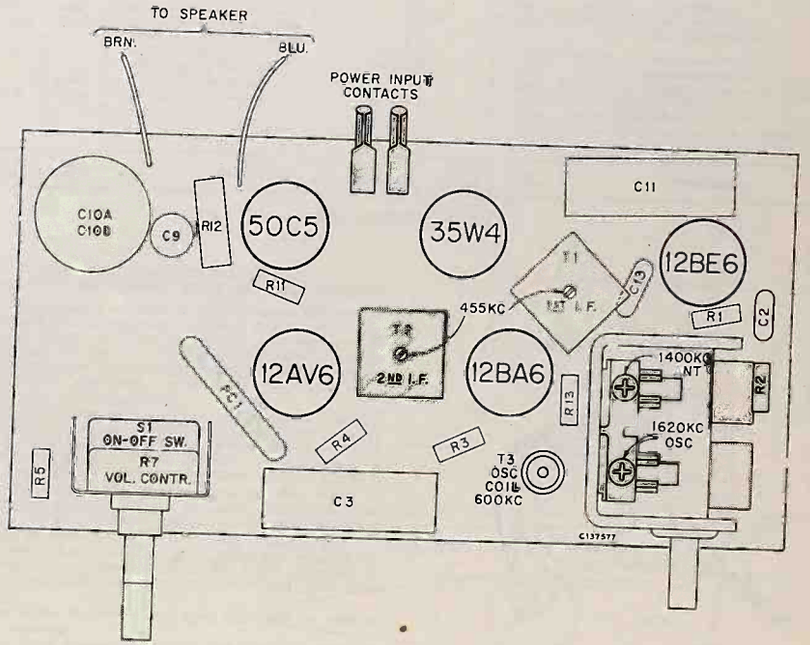
CHASSIS REMOVAL

1. Remove three cabinet holding screws; two at bottom and one at top rear.
2. Grip cabinet with two hands allowing fingers to extend over edges of cabinet front.
3. Hold cabinet, front down, and shake in a vertical direction. Cabinet assembly will separate and the fingers will limit the separation.
4. The cabinet front and chassis assembly may now be separated completely.

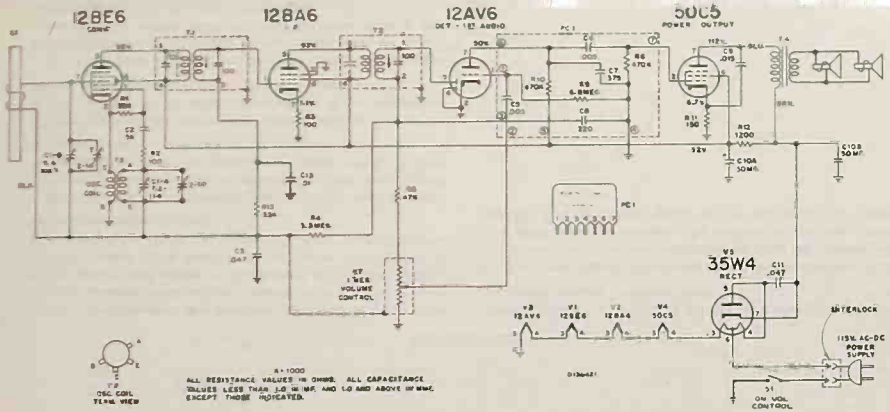
CABINET REASSEMBLY

1. Place cabinet front and chassis assembly on the cabinet back so that the ribs of the cabinet front rest on the bottom—inside of the cabinet back.
2. Push cabinet sections together firmly.
3. Insert the holding screws; two at bottom and one at top rear.
4. Gently tighten all screws.

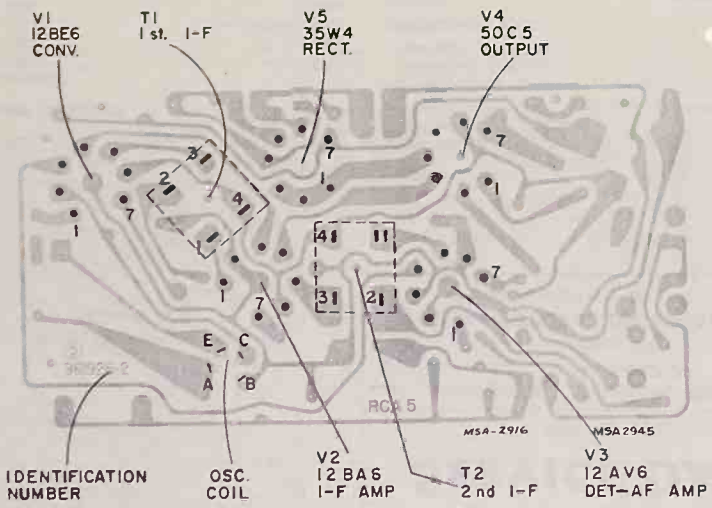
Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	1,500 ohm 1 W grid through .1 mfd capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd i.-F trans.
2	Shelter of C1-B through .01 mfd			T1 (top and bottom) 1st i.-F trans.
3	Short wire placed near loop to radiate signal	1,620 kc	Gang fully open	osc. trimmer C1-A
4		1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc coil T-3 (rock gang)
6		Repeat steps 3, 4, and 5		



Chassis Assembly — View from Component Side



Schematic Diagram



Chassis Wiring and Components — View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.

The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 6 — Dated August 25, 1955.

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1188C
		CAPACITORS
C1A, C1B	107162	variable, tuning
C2	106986	ceramic, 56 mmf, ±20%, 500 v
C3		paper, 0.047 mf, ±20%, 400 v
C5 to C8		Part of PC1
C9		paper, 0.015 mf, ±10%, 400 v
C10A, C10B	106987	electrolytic, 30/50 mf, 150/150 v
C11		paper, 0.047 mf, ±20%, 400 v
C13	73960	ceramic, 0.01 mf, +100 —0%, 500 v
PC1	106989	Circuit — Audio coupling circuit (includes C5, C6, C7 and C8; R8, R9, and R10)
		RESISTORS — Fixed, composition, unless otherwise specified
R1		33,000 ohm, ±20%, ½ w
R2, R3		100 ohm, ±20%, ½ w
R4		3.3 megohm, ±20%, ½ w
R5		47,000 ohm, ±20%, ½ w
R7	108248	control—volume control with "on-off" switch (S1)
R8 to R10		Part of PC1
R11		150 ohm, ±10%, ½ w
R12		1,200 ohm, ±10%, 1 w
R13		33,000 ohm, ±20%, ½ w
S1		Switch—(Part of R7)
T1	108007	Transformer—1st I.F. transformer
T2	108008	Transformer—2nd I.F. transformer
T3	103204	Transformer—Oscillator coil
	107012	Circuit—"Security Sealed Circuit" chassis assembly complete with fixed capacitors and resistors, IF transformers, oscillator coil, printed audio circuit and tube socket — less tuning capacitor and volume control.

SYMBOL NO.	STOCK NO.	DESCRIPTION
	103236	Connector — Single contact connector — for AC interlock
	103201	Socket—7 pin miniature socket—for V1, V2, and V3
	103200	Socket—7 pin miniature socket—for V4 and V5
		SPEAKER ASSEMBLY
T4	100661	Transformer—Output transformer
	108251	Speaker — 3½" P.M. speaker — less output transformer
	103669	Speaker—4" P.M. speaker
		MISCELLANEOUS
L1	108295	Antenna—Ferrite rod antenna
	Y7067	Cabinet — Antique White/Driftwood Beige — for Model X3EK
	Y7068	Cabinet — Antique White/Monterey Red — for Model X3EN
	Y7069	Cabinet—Dawn Green/Antique White—for Model X3HE
	103620	Cable—AC line cord with plug
	108292	Dial—Tuning dial insert
	108224	Fastener—For 3½" speakers (1 set of 2)
	107164	Grommet—Antenna mounting grommet
	108249	Knob—Tuning knob
	108250	Knob—Volume control knob
	107163	Nut—Cabinet assembly retaining nut
	102546	Nut—Retainer for 4" speaker
	101069	Spring — Retaining spring for volume or tuning knobs
	100217	Washer—Felt washer—for tuning knob

RCA VICTOR

A-C Operated Clock-Radio

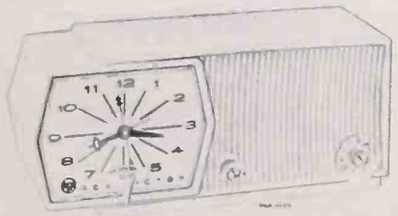
PC-1 SERIES

Chassis No. RC-1188A

SERVICE DATA

— 1959 No. 13 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



PC-1 — The "Correspondent"
Moonmist Gray

SPECIFICATIONS

TUNING RANGE ..... 540–1,600 kc

INTERMEDIATE FREQUENCY ..... 455 kc

TUBE COMPLEMENT

(1) RCA 12BE6	Converter
(2) RCA 12BA6	I.F. Amplifier
(3) RCA 12AV6	Det.-AVC-A.F. Amp.
(4) RCA 50C5	Output
(5) RCA 35W4	Rectifier

POWER SUPPLY RATING

115 volts, 60 cycles, a. c. ..... 35 watts

Caution: Do not connect to a d. c. power supply.

LOUDSPEAKER

Size and type ..... 4 in. P.M.
Voice coil impedance ..... 3.2 ohms at 400 cycles

POWER OUTPUT

Undistorted ..... 1.0 watts
Maximum ..... 1.3 watts

TUNING DRIVE RATIO ..... 1:1 (direct drive)

WEIGHT ..... Approximately 4¼ lbs.

CABINET DIMENSIONS

Height ..... 5 13/16"
Width ..... 13"
Depth ..... 5¼"

DESCRIPTION

The "Correspondent" is a five-tube (including rectifier) table model clock-radio designed for operation on a 115 volt 60 cycle power supply. The cabinet is a one-piece polystyrene molding with a speaker grille located at the center. A conventional superheterodyne circuit is employed using 150-milliampere series-string miniature tubes.

The chassis is of the "Security Sealed Circuit" type in which all components, except loop antenna and speaker, are mounted on an insulation plate. Component connections, except for short jumpers, are on the underside of the insulation plate.

The clock operates continuously when connected to a source of 105 to 125 volts, 60 cycle electric power. A moving sweep-second hand indicates that the clock is in operation.

The clock-timer features not only the commonly accepted self-starting type of clock with sweep-second hand but also a clock-controlled switch which will turn the radio on at a time predetermined up to 11 hours in advance.

A feature is a calibrated volume control knob which will permit accurate presetting of volume level when the instrument is used to provide "wake-up" music.

The power supply attachment cord is fastened to the cabinet back cover and becomes disconnected from the chassis when the back cover is removed. The chassis fits into two grooves molded into the cabinet and is held in position by two screws.

OPERATING INSTRUCTIONS

To Set Clock Time—Pull out and turn TIME SET knob (at back of cabinet).

To Set Wake-up Time—Push in and turn TIME SET knob (at back of cabinet).

To Play the Radio — Turn SERVICE knob to "ON." Turn TUNING knob to select desired station and adjust VOLUME as desired. Turn SERVICE knob to "OFF" when through listening.

For "Radio Wake-up" Operation — With SERVICE knob turned to "ON," tune in the desired station and adjust volume level. Turn SERVICE knob to "AUTO." The radio will turn on automatically at the time for which the time has been set.

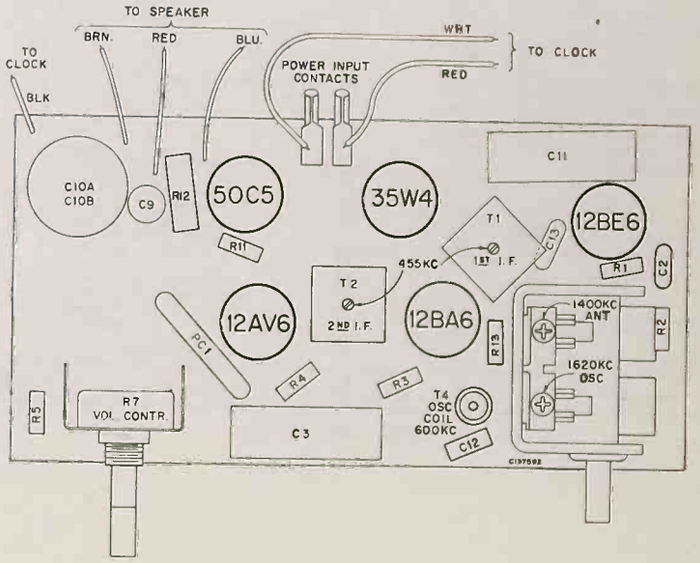
IMPORTANT — KEEP SERVICE KNOB AT "OFF" POSITION WHEN INSTRUMENT IS NOT IN USE.

ALIGNMENT PROCEDURE

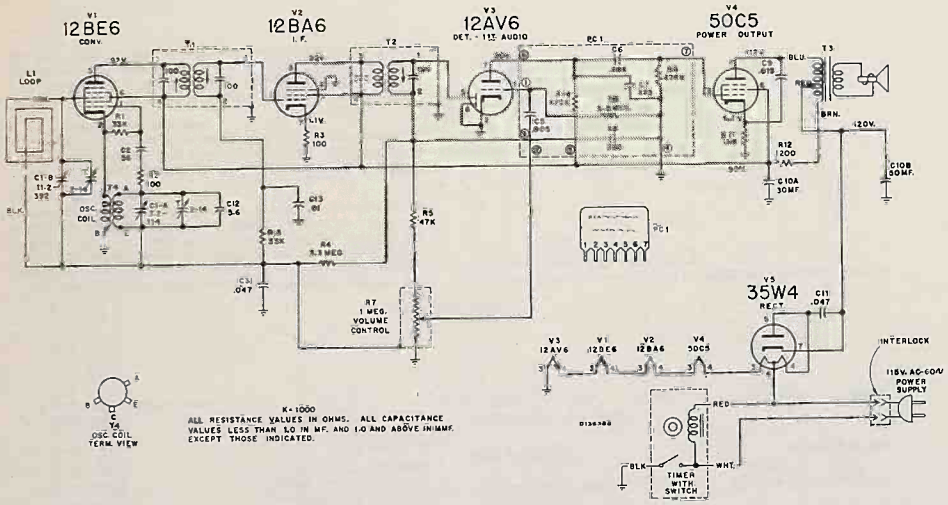
Test-Oscillator — For all alignment operations, connect the low side of the test-oscillator through an isolating capacitor to the "common negative wiring." Keep the oscillator output as low as possible to avoid a-v-c action.

An isolation transformer (115 v./115 v.) may be necessary for the receiver if the test-oscillator is also a.c. operated.

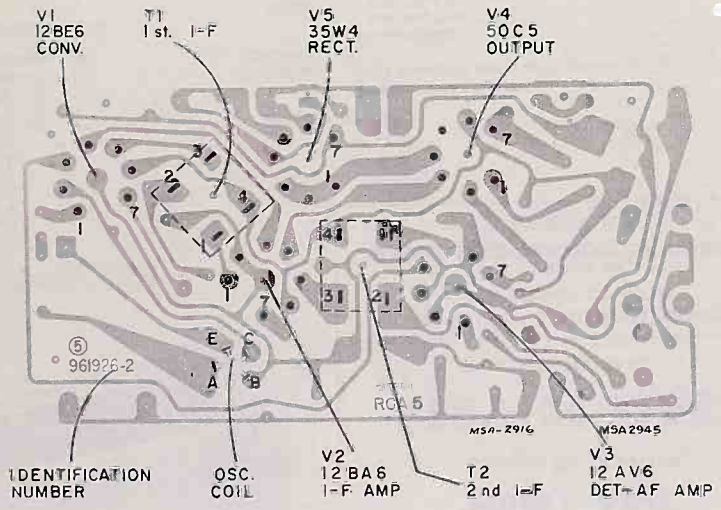
Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1,620 kc	Gang fully open	osc. trimmer C1-A
4		1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6		Repeat Steps 3, 4, and 5		



Chassis Assembly — View from Component Side



Schematic Diagram



Chassis Wiring and Components — View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.

The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

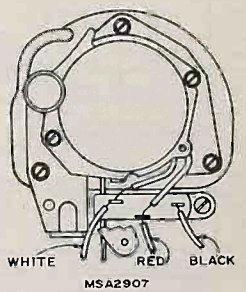
Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI — Issue 6 — Dated August 25, 1955.

CLOCK REMOVAL

1. Remove the clock control knob and clock window.
2. Remove the hands *one at a time* by grasping them at their hub and gently pulling them straight off. First the second hand, next the minute hand, then the hour hand, and lastly the alarm hand. NOTE: As the hubs are a tapered force fit, care should be used not to damage them.
3. The clock mechanism may then be dismounted by removing the fasteners holding it to the cabinet.

CLOCK REPLACEMENT AND SETTING

1. Remount the clock mechanism in the cabinet.
2. Push in and turn the time set knob slowly until a click is heard indicating that the radio has been turned on, or until a stop is reached, depending upon the direction in which the knob is turned. CAUTION ⇒ Do not attempt to force against, or past, the stop as damage to the clock mechanism could result.
3. Replace the alarm hand on the shaft pointing to 12:00 o'clock and press it firmly in place.
4. Replace the hour, minute, and second hands on the shaft, *one at a time* in that order, pointing to 12:00 o'clock and press each firmly in place before replacing the next hand.
5. Set alarm to 2:00 o'clock. Turn time hands and note when radio is turned on. This time should correspond to time shown by alarm hand; if not, reset either the alarm or time hands.
6. Replace clock window and control knob.



Clock Connections

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1188A
		CAPACITORS
C1A, C1B	103209	variable, tuning capacitor
C2	106986	ceramic, 56 mmf, ±20%, 500 v
C3		paper, 0.047 mf, ±20%, 400 v
C5 to C8		Part of PC-1
C9		paper, 0.015 mmf, ±10%, 400 v
C10A, C10B	104987	electrolytic, 30/50 mf, 150/150 v
C11		paper, 0.047 mf, ±20%, 400 v
C12	103440	ceramic, 5.6 mmf, ±0.5 mmf, 500 v, coef. N-3300
C13	73960	ceramic, 0.01 mf, +100 −0%, 500 v
L1	103606	Antenna — AM loop antenna and back cover assembly
PC1	106989	Circuit—Audio coupling circuit (Includes C5, C6, C7, C8, R8, R9 and R10)
		RESISTORS — Fixed, composition, unless otherwise specified
R1		33,000 ohm, ±20%, ½ w
R2, R3		100 ohm, ±20%, ½ w
R4		3.3 megohm, ±20%, ½ w
R5		47,000 ohm, ±20%, ½ w
R7	106988	control—volume control
R8 to R10		Part of PC-1
R11		150 ohm, ±10%, ½ w
R12		1,200 ohm, ±10%, 1 w
R13		33,000 ohm, ±20%, ½ w
T1	108007	Transformer—1st IF transformer
T2	108008	Transformer—2nd IF transformer
T3		Part of Speaker Assembly
T4	103204	Transformer—Oscillator coil
	106992	Cable—AC power cable and plug with retainer
	107012	Circuit—"Security Sealed Circuit" chassis assembly complete with fixed capacitors and resistors, IF transformers, oscillator coil, printed audio circuit and tube sockets—less tuning capacitor and volume control

SYMBOL NO.	STOCK NO.	DESCRIPTION
	103236	Contact—Single contact male connector—for AC interlock
	106993	Retainer—For power cable—RCA 106992
	103201	Socket—7 pin miniature socket—for V1, V2, V3
	103200	Socket—7 pin miniature socket—for V4 and V5
		SPEAKER ASSEMBLY
T3	79283	Transformer—Output transformer
	103669	Speaker—4" PM speaker complete with cone
		MISCELLANEOUS
	Y7071	Cabinet—Moonmist Gray
	108171	Hands—Clock timer hands (1 set of 4)
	106995	Knob—Clock timer function knob—Moonmist Gray
	106996	Knob—Time set knob
	106994	Knob—Volume control and tuning knobs (1 set of 2)—Charcoal Gray
	102546	Nut—For clock timer or speaker
	106997	Retainer—For clock window
	101069	Spring—Knob retaining spring
	103598	Window—Clock timer window

CLOCK MECHANISM

If clock mechanism repair becomes necessary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.

RCA VICTOR

AM-FM Radio Receiver

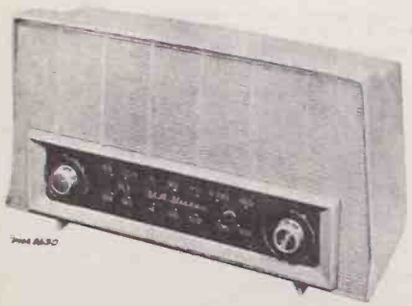
MODEL XF-2

Chassis No. RC-1190

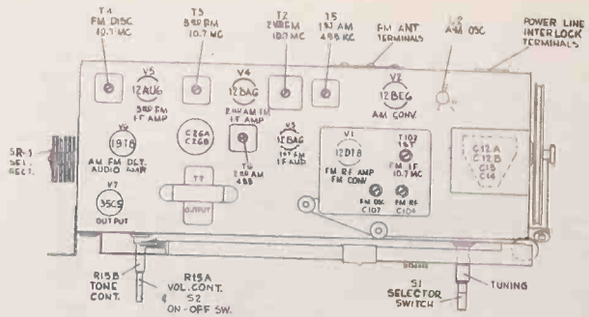
SERVICE DATA

— 1959 No. 19 —

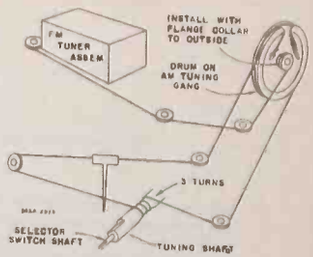
PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



Model XF-2—The "Marquis"
Moonmist Gray



Tube and Trimmer Locations



FM Tuner and Dial Cord Drive

SPECIFICATIONS

TUNING RANGE
Standard Broadcast (AM) ..... 540–1600 kc
Frequency Modulation (FM) ..... 88–108 mc

INTERMEDIATE FREQUENCIES
AM ..... 455 kc FM ..... 10.7 mc

TUBE COMPLEMENT
(1) RCA 12DT8 ..... FM R-F Amplifier and FM Converter
(2) RCA 12BE6 ..... AM Converter
(3) RCA 12BA6 ..... 1st FM I-F Amplifier
(4) RCA 12BA6 ..... AM and FM I-F Amplifier
(5) RCA 12AU6 ..... 3rd FM I-F Amplifier
(6) RCA 19T8 ..... FM Detector, AM Detector and Audio Amp.
(7) RCA 35C5 ..... Audio Output
A selenium rectifier is used.

POWER SUPPLY RATING
115 volts, 50–60 cycles, or 115 volts d.c. ..... 35 watts

LOUDSPEAKER
Size and Type ..... 4" x 6" P.M.
Voice Coil Impedance ..... 3.2 ohms

AUDIO POWER OUTPUT
Undistorted ..... 1.0 watt
Maximum ..... 1.3 watts

TUNING DRIVE RATIO ..... 9½:1 (4¾ turns of knob)

NET WEIGHT ..... approx. 8¼ lbs.

DIMENSIONS (Overall)
Height ..... 8⅜" Width ..... 15" Depth ..... 6$\frac{13}{16}$"

DESCRIPTION

The "Marquis" is a table model AM-FM radio receiver designed to operate on a 115 volts A-C or D-C power supply. The tuning range covers the standard broadcast band 540 to 1600 kc with the "Conelrad" frequencies marked, and the FM band 88 to 108 mc. A ferrite rod antenna is used on AM and a power line antenna on FM. Provision is made for connecting an external FM antenna.

The chassis and speaker are housed in a two-piece molded wrap-around cabinet. Two sets of controls are used for: on-off volume, selector switch, and tuning. The controls are located at either end of the slide-rule dial.

The circuit design features a minimum amount of switching; with none in the high-frequency circuits. On the standard broadcast band, four tubes and a selenium rectifier are used. On FM, six tubes and a selenium rectifier are used. The FM circuit includes a grounded-grid r.f. stage, an autodyne detector and three stages of i.f. amplification.

ALIGNMENT PROCEDURE

CAUTION

THE CHASSIS IS CONNECTED DIRECTLY TO ONE SIDE OF THE POWER LINE. AN ISOLATION TRANSFORMER SHOULD BE USED DURING ALIGNMENT OR OTHER SERVICE WORK.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin #1 of V5 (12AU6)	Connect VoltOhmyst across C8		
2		10.7 mc	—	T4 top core for ZERO voltage
3		Connect VoltOhmyst across R11		
4		10.7 mc	—	T4 bottom core for MAXIMUM voltage
5		Repeat Steps 2 and 4		
6	Pin #1 of V4 (12BA6)	Connect VoltOhmyst to pin #1 of V5 through a 270 k resistor with minimum exposed lead at pin #1		
7		10.7 mc*	—	T3 top core
8	Pin #1 of V3 (12BA6)		—	T2 top and bottom cores†
9	Antenna terminal board, center		—	T102 top and bottom cores†
10	Antenna terminal board, center thru 270 ohms	87.5 mc*	Tuning condenser closed	FM tuner string drive collar
11		108.5 mc*	Tuning condenser fully open	Osc. trimmer C107
12		95 mc*	Tuned to 95 kc signal	R-F trimmer C104

* Adjust output level of signal generator to provide approximately 1 volt indication on VoltOhmyst.

† Alternate loading may be required for accurate peaking; the winding not being peaked should be loaded with a resistor, 270 ohms in Step 8 and 470 ohms in Step 9.

Oscillator frequency is above signal frequency on both AM and FM.

ALIGNMENT INDICATORS:

An RCA VoltOhmyst® or equivalent VTVM is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone control to mid-position.

SIGNAL GENERATOR:

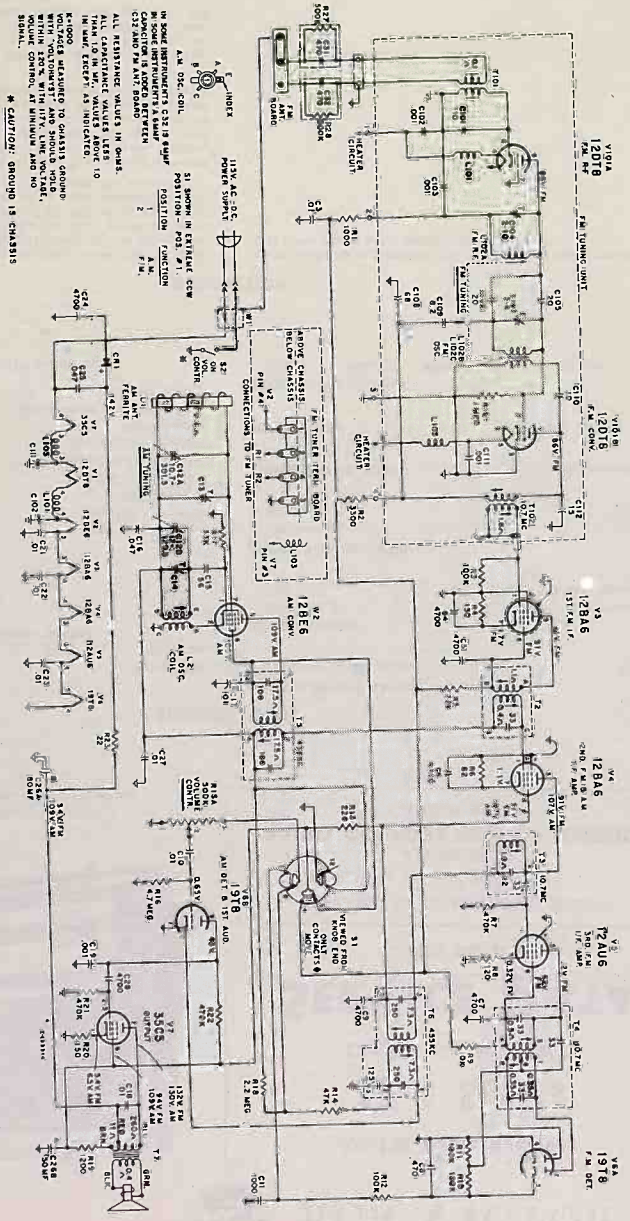
For all alignment operations, connect the low side of the signal generator to the receiver chassis, close to the point of signal injection. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C8, adjusting discriminator T4 top core for 10.7 mc crossover, and T4 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 270K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 7 of V2 in series with .01 mfd	455 kc. (mod.)	Quiet point at high freq. end	T6 bottom core (sec.) T6 top core (pri.)
2				T5 bottom core (sec.) T5 top core (pri.)
3	Assemble front panel including ferrite antenna			
4	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc. (gang fully open)	C14 (osc.)
5		1400 kc. (mod.)	1400 kc. signal	C12 (ant.)
6				
7		600 kc. (mod.)	600 kc. signal	L2 (osc.) (rock gang)
8	Repeat steps 5, 6 and 7 until Maximum gain is obtained			



Schematic Circuit Diagram

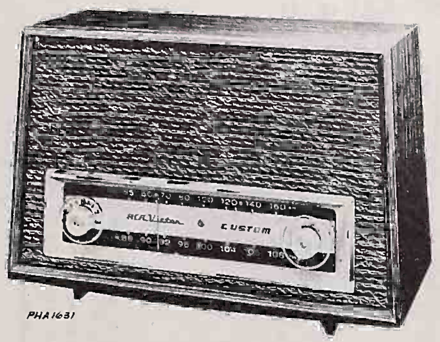
CRITICAL LEAD DRESS

1. Dress all bus leads short and direct as possible.
2. Dress all bypass capacitor and coupling capacitor leads short and direct as possible.
3. Dress all insulated leads down to chassis.
4. Connect resistors R10 and R14 with minimum pigtails to T4 terminal #6.
5. Dress blue lead from T3 #1 to T6 #3 down to base and away from neutralizing lead on V4 pin #2 to ground lance.
6. Dress neutralizing lead down to base.
7. Connect minimum length pigtail of R14 to T6 #2 terminal.
8. Dress twisted volume control leads down to base.

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1190
		CAPACITORS
C3	73960	ceramic, 0.01 mf, +100%, −0%, 500 v
C4 to C7	73473	ceramic, 4700 mmf, +100%, −0%, 500 v
C8	105776	ceramic, 470 mmf, ±20%, 500 w
C9	73473	ceramic, 4700 mmf, +100%, −0%, 500 v
C10		paper, 0.01 mf, ±20%, 400 v
C11		paper, 0.001 mf, ±10%, 400 v
C12A, C12B	107002	variable, tuning (includes C13 and C14) Part of C12A, C12B
C13, C14		
C15	71924	ceramic, 56 mmf, ±10%, 500 v, coef. −750
C16		paper, 0.047 mf, ±20%, 400 v
C17	73960	ceramic, 0.01 mf, +100%, −0%, 500 v
C18		paper, 0.01 mf, ±10%, 400 v
C19		paper, 0.001 mf, ±10%, 400 v
C20	73473	ceramic, 4700 mmf, +100%, −0%, 500 v
C21 to C23	73960	ceramic, 0.01 mf, +100%, −0%, 500 v
C24		paper, 4700 mf, ±20%, 600 v
C25		paper, 0.047 mf, ±20%, 600 v
C26A, C26B	73520	electrolytic, 80/50 mf, 150/150 v
C27	73960	ceramic, 0.01 mf, +100%, −0%, 500 v
C31, C32	104328	Circuit—Printed component circuit including resistor 500,000 ohm, ¼ w and capacitor 470 mmf, 500 v
C101 to C112		See FM Tuner Assembly
CR1	77519	Rectifier—Selenium rectifier
L2	79057	Transformer—Oscillator coil
L101 to L103		See FM Tuner Assembly
		RESISTORS—Fixed composition, ½ watt, unless otherwise specified
R1		1000 ohm, ±10%
R2		3300 ohm, ±10%
R3		100,000 ohm, ±10%
R4		150 ohm, ±10%
R5		220 ohm, ±10%
R6		82 ohm, ±10%
R7		470,000 ohm, ±10%
R8		120 ohm, ±10%
R9		10,000 ohm, ±10%
R10 to R12		100,000 ohm, ±10%
R13		220 ohm, ±10%
R14		47,000 ohm, ±10%
R15	108303	control—volume control with "on-off" switch (S2)
R16		4.7 megohm, ±20%
R17		33,000 ohm, ±20%
R18		2.2 megohm, ±20%
R19		1200 ohm, ±10%, 2 w
R20		150 ohm, ±10%
R21, R22		470,000 ohm, ±10%
R23		22 ohm, ±10%, 1 w
R24, R28	104328	Circuit—Printed component circuit including 500,000 ohm, ¼ w resistor, and 470 mmf, 500 v capacitor
R101		See FM Tuner Assembly
S1	107003	Switch—AM/FM function switch Part of R15
S2		
		TRANSFORMERS
T2	77513	2nd FM IF
T3	77512	3rd FM IF
T4	77511	FM discriminator
T5	77416	1st AM IF
T6	76328	2nd AM IF
T7	77517	output
	108302	Backplate—Dial backplate, less ¾" O.D. pulley and pointer

SYMBOL NO.	STOCK NO.	DESCRIPTION
	73935	Clip—IF transformer mounting clip
	108002	Collar—FM dial cord retaining collar with set screws
	74594	Connector—2 contact male interlock—for line cord
	72953	Cord—Drive cord for pointer (250 foot spool)
	102027	Grommet—For chassis bottom cover
	73482	Insulator—For tuning capacitor
	107005	Pointer—Dial pointer
	72602	Pulley—13/32" O.D. aluminum pulley
	101663	Pulley—¼" O.D. aluminum pulley
	102627	Pulley—¾" O.D. aluminum pulley
	73584	Shield—Tube shield—for V3
	73117	Socket—7 pin miniature socket—for V2, V3, V4, V5 and V7
	76971	Socket—9 pin miniature socket—for V6
	72540	Spring—Dial cord tension spring
	79885	Washer—"C" type retaining washer—for tuning control sleeve
	100089	Washer—Nylon washer—for tuning capacitor or dial backplate assembly
		FM RF TUNER ASSEMBLY
	107004	Tuner—FM tuner assembly—less tube
		CAPACITORS
C101		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N750
C102, C103		ceramic, 0.001 mmf, +50% −20%, 500 v
C104		trimmer, 2-10 mmf
C105, C106		ceramic, 20 mmf, ±20% mmf, 500 v, coef. 0
C107		trimmer, 2-6 mmf
C108		ceramic, 68 mmf, ±5%, 500 v, coef. N750
C109		ceramic, 8.2 mmf, ±1% mmf, 500 v, coef. P-100
C110		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N470
C111		ceramic, 0.001 mmf, +50% −20%, 500 v
C112		ceramic, 15 mmf, ±10%, 500 v, coef. 0
L101		Sleeve—Ferrite sleeve—filament choke
L102A/B/C		Coil—FM RF/OSC. coil assembly
L103		Sleeve—Ferrite sleeve—filament choke
R101		Resistor—Fixed composition—1 megohm, ±10%, ¼ w
T101		Transformer—Antenna transformer
T102		Transformer—1st FM IF transformer
		Core—IF transformer tuning core
		Core—Tuning core—with cord
		Pulley—For drive cord
		Screw—For mounting tuner chassis to case
		Socket—9 pin miniature socket—for V101
		Spring—For pulley
		Spring—Tension spring—for drive cord
		Terminal—Antenna terminal and insulator
		Washer—"C" type retainer washer—for pulley
		SPEAKER ASSEMBLY
	107006	Speaker—5" x 6" PM speaker—3.2 ohms—with cone
		MISCELLANEOUS
L1	107050	Antenna—Ferrite rod antenna
	Y7075	Cabinet—Moonmist gray
	104992	Cable—AC line cord and plug—with retainer
	108306	Knob—Function knob
	108305	Knob—Tuning knob
	108304	Knob—Volume control knob
	102546	Nut—Retainer for speaker
	104993	Retainer—For power cord
	72845	Spring—Retaining spring—for tuning control knob
	30900	Spring—Retaining spring—for volume control knob
	107011	Window—Dial window



XF-4 Series—The "Emissary"
Mahogany, Oak, Walnut and Maple Finish

RCA VICTOR

AM-FM Radio Receiver

XF-4 SERIES

Chassis No. RC-1190B

SERVICE DATA

— 1959 No. 21 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.

SPECIFICATIONS

TUNING RANGE
Standard Broadcast (AM) .... 540–1600 kc
Frequency Modulation (FM) .... 88–108 mc
Conelrad frequencies marked.

INTERMEDIATE FREQUENCIES
AM .... 455 kc   FM .... 10.7 mc

TUBE COMPLEMENT
(1) RCA 12DT8 .... FM R-F Amplifier and FM Converter
(2) RCA 12BE6 .... AM Converter
(3) RCA 12BA6 .... 1st FM I-F Amplifier
(4) RCA 12BA6 .... AM and FM I-F Amplifier
(5) RCA 12AU6 .... 3rd FM I-F Amplifier
(6) RCA 19T8 .... FM Detector, AM Detector and Audio Amp.
(7) RCA 35C5 .... Audio Output
A selenium rectifier is used.
A neon bulb is used for ON-OFF indication.

POWER SUPPLY RATING
115 volts, 50–60 cycles, or 115 volts d.c. .... 35 watts

LOUDSPEAKER
One 4" x 6" .... 3.2 ohm impedance
One 3½" .... 6–8 ohm impedance

AUDIO POWER OUTPUT
Undistorted .... 1.0 watt
Maximum .... 1.3 watts

TUNING DRIVE RATIO .... 9½:1 (4¾ turns of knob)

NET WEIGHT .... approx. 9 lbs.

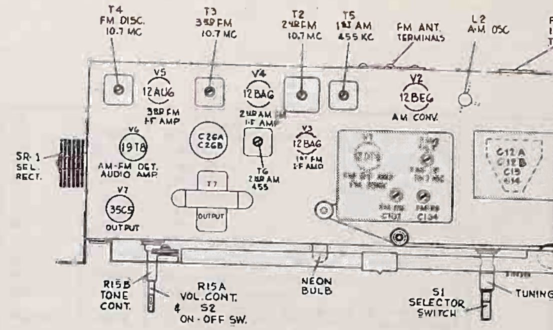
DIMENSIONS (Overall)
Height ..... 10⁷⁄₁₆"   Width ..... 15⅞"   Depth ..... 7⁹⁄₁₆"

DESCRIPTION

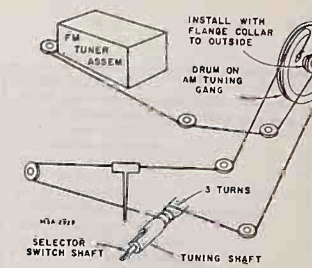
Instruments of the XF-4 Series are table model AM-FM radio receivers designed to operate on a 115 volts A-C or D-C power supply. The tuning range covers the standard broadcast band 540 to 1600 kc and the FM band 88 to 108 mc. A ferrite rod antenna is used on AM and a power line antenna on FM. Provision is made for connecting an external FM antenna.

The chassis and speakers are housed in a simulated wood cabinet. Two sets of dual knobs are used for on-off, volume, tone control, selector switch, and tuning. The controls are located at either end of the slide-rule dial with a neon on-off indicator in the center. A jack is provided in the rear to permit use of this instrument as an extension speaker for stereophonic instruments.

The circuit design features a minimum amount of switching; with none in the high-frequency circuits. On the standard broadcast band, four tubes and a selenium rectifier are used. On FM, six tubes and a selenium rectifier are used. The FM circuit includes a grounded-grid r.f. stage, an autodyne detector and three stages of i.f. amplification.



Tube and Trimmer Locations



FM Tuner and Dial Cord Drive

ALIGNMENT PROCEDURE

CAUTION

THE CHASSIS IS CONNECTED DIRECTLY TO ONE SIDE OF THE POWER LINE. AN ISOLATION TRANSFORMER SHOULD BE USED DURING ALIGNMENT OR OTHER SERVICE WORK.

FM Alignment

FUNCTION SWITCH IN FM POSITION—VOLUME CONTROL MINIMUM—TONE CONTROL CENTER

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin #1 of V5 (12AU6)	Connect VoltOhmyst across C8		
2		10.7 mc	—	T4 top core for ZERO voltage
3		Connect VoltOhmyst across R11		
4		10.7 mc	—	T4 bottom core for MAXIMUM voltage
5		Repeat Steps 2 and 4		
6	[illegible]	Connect VoltOhmyst to pin #1 of V5 through a 270 k resistor with minimum exposed lead at pin #1		
7		10.7 mc	—	T3 top core
8	Pin #1 of V3 (12BA6)		—	T2 top and bottom cores†
9	[illegible]		—	T102 [illegible]
10	Antenna [illegible] ohms	[illegible].5 mc	Tuning condenser closed	[illegible]
11		108.5 mc*	Tuning condenser fully open	[illegible] C107
12		95 mc*	Tuned to 95 kc signal	R-F trimmer C104

* Adjust output level of signal generator to provide approximately 1 volt indication on VoltOhmyst.

† Alternate loading may be required for accurate peaking; the winding not being peaked should be loaded with a resistor, 270 ohms in Step 8 and 470 ohms in Step 9.

Oscillator frequency is above signal frequency on both AM and FM.

ALIGNMENT INDICATORS:

An RCA VoltOhmyst® or equivalent VTVM is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone control to mid-position.

SIGNAL GENERATOR:

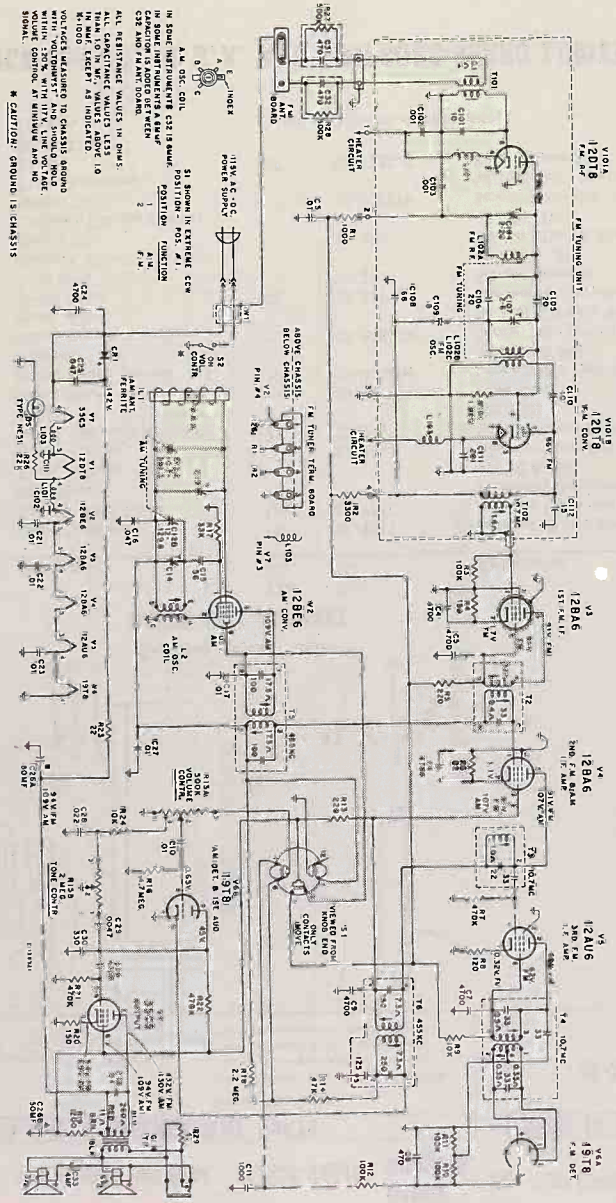
For all alignment operations, connect the low side of the signal generator to the receiver chassis, close to the point of signal injection. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C[illegible] adjusting discriminator T4 top core for 10.7 mc crossover, and T4 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 270K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

AM Alignment

FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 7 of V2 in series with .01 mfd	455 kc. (mod.)	Quiet point at high freq. end	T6 bottom core (sec.) T6 top core (pri.)
2				T5 bottom core (sec.) T5 top core (pri.)
3	Assemble front panel including ferrite antenna			
4	Short wire placed near loop for radiated signal	1620 kc. (mod.)	1620 kc. (gang fully open)	C14 (osc.)
5		1400 kc. (mod.)	1400 kc. signal	C13 (ant.)
6		600 kc. (mod.)	600 kc. signal	L2 (osc.) (rock gang)
7				
8	Repeat steps 5, 6 and 7 until Maximum gain is obtained			



Schematic Circuit Diagram

CRITICAL LEAD DRESS

1. Dress all bus leads as short and direct as possible.
2. Dress all bypass capacitor and coupling capacitor leads short and direct as possible.
3. Dress all insulated leads down to chassis.
4. Connect resistors R10 and R11 with minimum pigtails to T4 terminal #6.
5. Dress blue lead from T3 #1 to T6 #3 down to base and away from neutralizing lead on V4 pin #2 to ground lance.
6. Dress neutralizing lead down to base.
7. Connect minimum length pigtail of R14 to T6 #2 terminal.
8. Dress twisted volume control leads down to base.

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLY RC-1190B
		CAPACITORS
C3	73960	ceramic, 0.01 mf, +100% −0%, 500 v
C4 to C7	73473	ceramic, 4700 mmf, +100% −0%, 500 v
C8	105776	ceramic, 470 mmf, ±20%, 500 v
C9	73473	ceramic, 4700 mmf, +100% −0%, 500 v
C10		paper, 0.01 mf, ±20%, 400 v
C11		paper, 0.001 mf, ±10%, 400 v
C12A, C12B	107002	variable, tuning (includes C13 and C14) Part of C12A, C12B
C13, C14		
C15	71924	ceramic, 56 mmf, ±10%, 500 v, coef. −750
C16		paper, 0.047 mf, ±20%, 400 v
C17	73960	ceramic, 0.01 mf, +100% −0%, 500 v
C18		paper, 0.01 mf, ±10%, 400 v
C20	73473	ceramic, 4700 mmf, +100% −0%, 500 v
C21 to C23	73960	ceramic, 0.01 mf, +100% −0%, 500 v
C24		paper, 4700 mf, ±20%, 600 v
C25		paper, 0.047 mf, ±20%, 600 v
C26A, C26B	73520	electrolytic, 80/50 mf, 150/150 v
C27	73960	ceramic, 0.01 mf, +100% −0%, 500 v
C28		paper, 0.022 mf, ±20%, 400 v
C29		paper, 0.0047 mf, ±20%, 400 v
C30	76552	ceramic, 330 mmf, ±20%, 500 v
C31, C32	104328	Circuit—Printed component circuit including resistor 500,000 ohm, ¼ w and capacitor 470 mmf, 500 v
C33		Part of Speaker Assembly
C101 to C112		See FM Tuner Assembly
CR1	77519	Rectifier—Selenium rectifier
L2	79057	Coil—Oscillator coil
L101 to L103		See FM Tuner Assembly
		RESISTORS — Fixed, composition, ½ watt, unless otherwise specified
R1		1000 ohm, ±10%
R2		3300 ohm, ±10%
R3		100,000 ohm, ±10%
R4		150 ohm, ±10%
R5		220 ohm, ±10%
R6		82 ohm, ±10%
R7		470,000 ohm, ±10%
R8		120 ohm, ±10%
R9		10,000 ohm, ±10%
R10 to R12		100,000 ohm, ±10%
R13		220 ohm, ±10%
R14		47,000 ohm, ±10%
R15A/B	107051	control—dual volume and tone control with "on-off" switch (S2)
R16		4.7 megohm, ±20%
R17		33,000 ohm, ±20%
R18		2.2 megohm, ±20%
R19		1200 ohm, ±10%, 2 w
R20		150 ohm, ±10%
R21, R22		470,000 ohm, ±10%
R23		22 ohm, ±10%, 1 w
R24		10,000 ohm, ±10%
R26		150,000 ohm, ±10%
R27, R28	104328	Circuit—Printed component circuit including resistor 500,000 ohm, ¼ w and capacitor 470 mmf, 500 v
R29		Part of Speaker Assembly
R101		See FM Tuner Assembly
S1	107003	Switch—AM/FM function switch
S2		Part of R15A/B
		TRANSFORMERS
T2	77513	2nd FM IF
T3	77512	3rd FM IF
T4	77511	FM discriminator
T5	77416	1st AM IF
T6	76328	2nd AM IF
T7	77517	output

SYMBOL NO.	STOCK NO.	DESCRIPTION
T101, T102		See FM Tuner Assembly
	108565	Backplate—Dial backplate—less ¾" O.D. pulley
	38201	Clamp—Split rivet type clamp—for dial cord
	73935	Clip—IF transformer mounting clip
	108002	Collar—FM dial cord adjusting collar
	74594	Connector—2 contact male interlock connector—for line cord
	72953	Cord—Drive cord for pointer (250 foot spool)
	103027	Grommet—For chassis bottom cover
	73482	Insulator—For tuning capacitor
	101857	Lamp—Neon lamp
	107005	Pointer—Dial pointer
	72602	Pulley—13/32" O.D. aluminum
	101663	Pulley—¼" O.D. aluminum
	102627	Pulley—¾" O.D. aluminum
	73584	Shield—Tube shield—for V3
	100642	Socket—Pilot lamp socket and lead assembly
	73117	Socket—7 pin miniature socket—for V2, V3, V4, V5 and V7
	76971	Socket—9 pin miniature socket—for V6
	72540	Spring—Dial cord tension spring
	79885	Washer—"C" type retaining washer—for tuning control sleeve
	100089	Washer—Nylon washer—for tuning capacitor or dial backplate assembly
		FM RF TUNER ASSEMBLY
	107004	RF Tuner—FM RF tuner assembly—less tube
		CAPACITORS
C101		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N750
C102, C103		ceramic, 0.001 mf, +50% −20%, 500 v
C104		trimmer, 2-10 mmf
C105, C106		ceramic, 20 mmf, ±20% mmf, 500 v, coef. 0
C107		trimmer, 2-6 mmf
C108		ceramic, 68 mmf, ±5%, 500 v, coef. N750
C109		ceramic, 8.2 mmf, ±1 mmf, 500 v, coef. P-100
C110		ceramic, 10 mmf, ±1 mmf, 500 v, coef. N470
C111		ceramic, 0.001 mmf, +50% −20%, 500 v
C112		ceramic, 15 mmf, ±10%, 500 v, coef. 0
L101		Sleeve—Ferrite sleeve—filament choke
L102A/B/C		Coil—FM RF/OSC. coil assembly
L103		Sleeve—Ferrite sleeve—filament choke
R101		Resistor—Fixed composition—1 megohm, ±10%, ¼ w
T101		Transformer—Antenna transformer
T102		Transformer—1st FM IF transformer
		SPEAKER ASSEMBLY
C33	106353	Capacitor—Electrolytic, 4 mf, 10 v dc
R29		Resistor—Fixed composition, 47 ohm, ±10%, 1 w
	105395	Speaker—3½" PM speaker, complete with cone—6-8 ohm V.C.
	102634	Speaker—4" x 6" PM speaker, complete with cone—3.2 ohm V.C.
		MISCELLANEOUS
L1	107050	Antenna—Ferrite rod antenna
	X4619	Cabinet—Mahogany
	X4622	Cabinet—Maple
	X4621	Cabinet—Oak
	X4620	Cabinet—Walnut
	106992	Cable—AC line cord with retainer
	X5110	Cloth—Grille cloth—for Mahogany cabinet
	X5111	Cloth—Grille cloth—for Maple, Oak and Walnut cabinets
	108564	Escutcheon—Control dial
	101526	Jack—Stereo speaker jack
	107009	Knob—Function knob
	107010	Knob—Tone knob
	107008	Knob—Tuning knob
	107007	Knob—Volume knob
	106993	Retainer—For AC line cord
	30900	Spring—Retaining spring—for tone control knob
	106950	Spring—Retaining spring—for tuning control knob

Silvertone TECHNICAL MANUAL - CLOCK-RADIO — RADIO CHASSIS NO. 528.53630

HOW TO ORDER REPLACEMENT PARTS

PART ORDERS MUST CONTAIN:

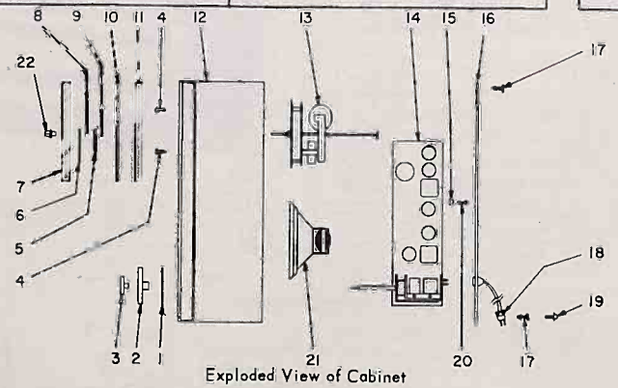
1. Part Number and Description.
2. Chassis Number - found on a metal plate on each chassis.
3. Model Number - found on the back, inside, or bottom of cabinet.

WHERE TO ORDER:

Order from any Sears Roebuck and Co., U.S.A., or Simpsons-Sears Limited, Canada, Retail or Mail Order Store. Prices are available upon application.

USED IN MODELS:

33-34



Exploded View of Cabinet

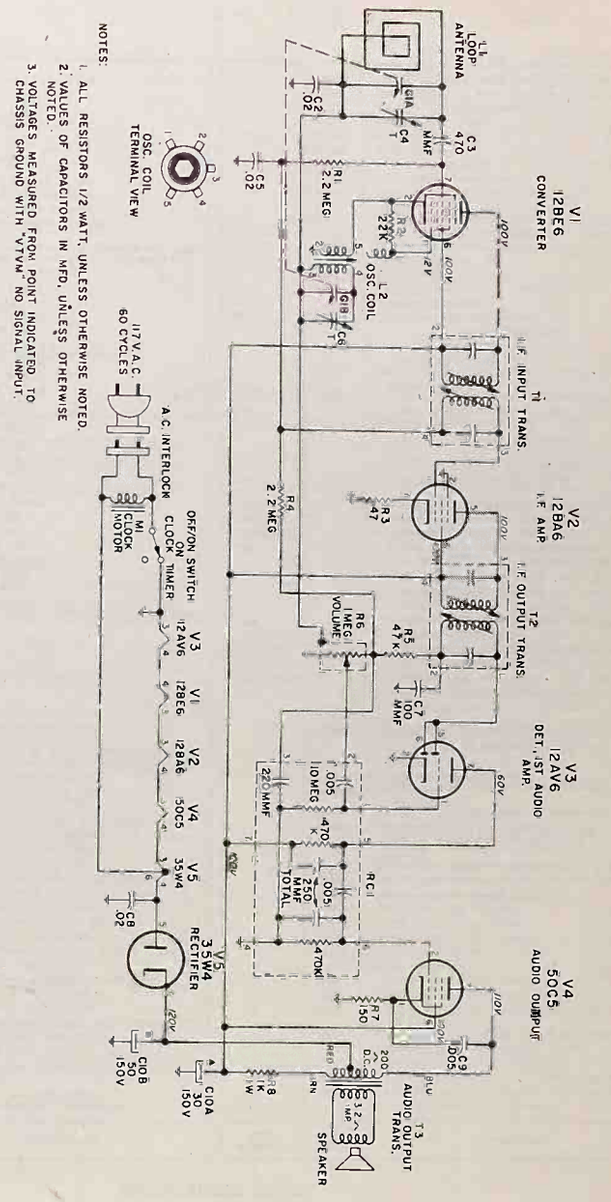
PARTS LIST--CABINET

Key No.	Part No.	Description
	38-3042	Owner's Manual
	38-3043-1	Service Data Sheet
1	40-86-2	Dial Face
2	52-1228-0	Knob, Volume
3	52-1229-0	Knob, Tuning
4	57-606264	Screw, (#6 x 3/8 phil bnd hd) (2)
5	52-191-1	Hand, Hour
6	52-185-1	Hand, Sweep Second
7	48-152-1	Window, Timer
8	52-187-1	Hand, Minute
9	52-66-1	Hand, Alarm
10	67-661-0	Timer Face
11	40-150-3	Trim Strip
12	42-81-1	Cabinet, Plastic (Brown) (Model 33)
	42-82-1	Cabinet, Plastic (White) (Model 34)
13	84-7479	Timer Assembly
	59-149	Timer
	39-188-3	Shaft, Timer
14	*	Chassis
15	11-1511	Bracket, Board Retainer
16	84-7563	Antenna Loop and Back Assembly (Inc. items 16, 17, 18 & 19)
	82-12-0	Antenna Loop and Back
17	22-2-5	Stud, Trimont (Back Mtg.) (3)
18	23-38-0	Line Cord
19	57-608209	Screw, (#6 x ½ phil. rnd. hd.) (Back Mtg.)
20	57-608219	Screw, (#6 x ½ phil. rnd. hd.) (2) (Chassis Mtg.)
21	33-407-4	Speaker, 4" (w/trans.)
	77-27-0	Spacer, Speaker Mounting (3)
	58-475	Washer, Flat (7/16 x 9/64 x 1/32) (3)
	57-608219	Screw, (6 x ½ phil. rnd. hd.) (3) (Spk'r Mtg.)
22	52-1230-0	Knob, Timer (2)

* Not supplied as a repair part

SEARS, ROEBUCK and CO., U. S. A. AND SIMPSONS-SEARS LIMITED

Schematic Diagram



SEARS ROEBUCK RADIO PAGE 27-1

NO. 528.53630 RADIO CHASSIS

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter reading to indicate 0.5 Watt across Voice Coil..... 0.4 Volt
Generator ground lead connection..... Floating Ground
Generator Modulation..... 30%, 400 cycles
Position of Volume Control ..... Fully on

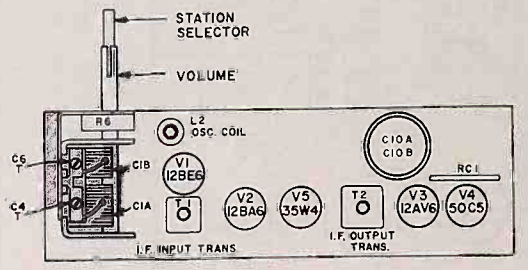
IMPORTANT ALIGNMENT NOTES:

The alignment must be done in the order given.
The entire Alignment Procedure should be repeated step by step in the original order given for greatest accuracy.
Always keep the output from the generator at its lowest possible value to prevent the AVC of the receiver from interfering with accurate alignment.

ALIGNMENT INSTRUCTIONS

Read entire alignment procedure before attempting alignment.

STEP	POSITION OF TUNING GANG	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	ADJUST	FUNCTION
1	Open	455 Kc.	.1 mfd.	Pin 1 12BA6	T2 (top & bottom)	I.F. Output Trans.
2	Open	455 Kc	.1 mfd.	Pin 7 12BE6	T1 (top & bottom)	I.F. Input Trans.
3	Repeat steps 1 and 2 until no further changes occur.					
4	Open	1610 Kc.	.1 mfd.	Pin 7 12BE6	C4 T	Oscillator Trimmer
5	Closed	1510 Kc.	.1 mfd.	Pin 7 12BE6	L2	Oscillator Coil
6	Repeat steps 4 and 5 until no further changes occur.					
7	1400 Kc.	1400 Kc.	Hazeltine Loop		C4 T	Antenna Trimmer



Top View of Chassis

PARTS LIST - RADIO CHASSIS

Schem Loc.	Part No.	Description
C1A & B	19-80-2	Variable Tuning
C2	16-20343	Tubular, .02 mfd., 400 v.
C3	20-66-0	Disc., 470 mmfd., 500 v.
C4 T	*	Trimmer, (Part of C1A)
C5	16-20323	Tubular, .02 mfd., 200 v.
C6 T	*	Trimmer, (Part of C1B)
C7	20-71-0	Disc., 100 mmfd., 500 v.
C8	20-95-0	Disc., .02 mfd., 500 v.
C9	20-91-0	Disc., .005 mfd., 500 v.
C10A&B	18-49-5	Electrolytic, 30 mfd., 150 v. (A); 50 mfd. 150v. (B)

RESISTORS

(All Resistors ½ w. 10% unless otherwise noted)

R1 & R4	63-22502	2.2 megohm
R2	63-22301	22K ohm
R3	63-47001	47 ohm
R5	63-47302	47K ohm
R6	24-348-0	1 megohm, Volume control
R7	63-15101	150 ohm
R8	63-10211	1K ohm, 1 w.
RC1	13-32-3	Couplate

Schem Loc.	Part No.	Description
		TRANSFORMERS AND COILS
T1	10-112-2	Transformer, 1st IF
T2	10-73-2	Transformer, 2nd IF
T3	80-99-1	Transformer, Audio Output
L1	82-12-1	Antenna Loop
L2	10-51-4	Coil, Oscillator
		MISCELLANEOUS CHASSIS PARTS
	11-1512	Bracket, Control Mounting and Gang
	45-112-2	Socket (7 pin min.) (2) (V1 & V2)
	45-138-2	Socket (7 pin min.) (V3)
	45-211-2	Socket (7 pin min.) (2) (V4 & V5)
	71-152-0	Shield, Tube (V3)
	45-210-0	Connector, Male Interlock (2)

* Not supplied as a repair part

COMPLETE SERVICE INFORMATION

for

CHASSIS: 1-644-1
MODEL: 4706

For record changer information refer to Service Data 1-319-1, -2, -3.
For amplifier information refer to Service Data 1-634-2.

AM/FM TUNER
CHASSIS 1-644-1

SERVICE LITERATURE
SYLVANIA
RADIO & TELEVISION

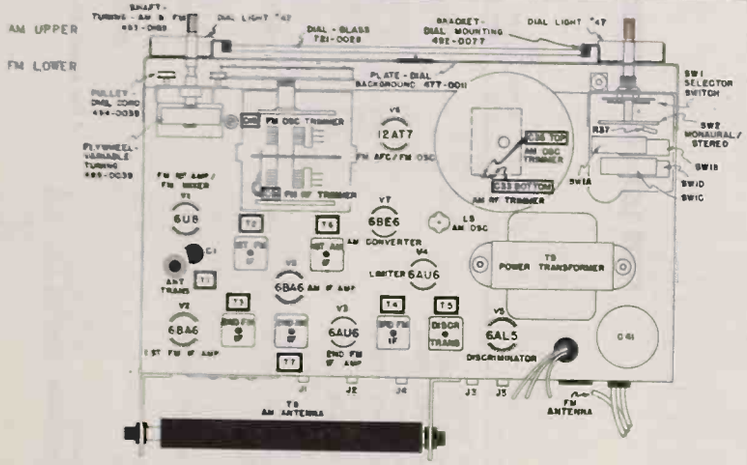
SYLVANIA HOME ELECTRONICS CORP., a marketing subsidiary of Sylvania Electric Products Inc., Batavia, New York

TUBE COMPLEMENT

V1	FM RF Amp/FM Mixer.....6U8
V2	1st FM IF Amp.....6BA6
V3	2nd FM IF Amp.....6AU6
V4	Limiter.....6AU6
V5	Discriminator.....6AL5
V6	FM AFC/FM OSC.....12AT7
V7	AM Converter.....6BE6
V8	AM IF Amp.....6BA6

SPECIFICATIONS

FREQUENCY RANGE (AM)	540 KC to 1650 KC
FREQUENCY RANGE (FM)	88 MC to 108 MC
POWER SUPPLY	117V. 60 Cycles
POWER CONSUMPTION	30 Watts
INTERMEDIATE FREQUENCY (IF) AM	455 KC
INTERMEDIATE FREQUENCY (IF) FM	10.7 MC



CHASSIS - TOP PARTS LAYOUT

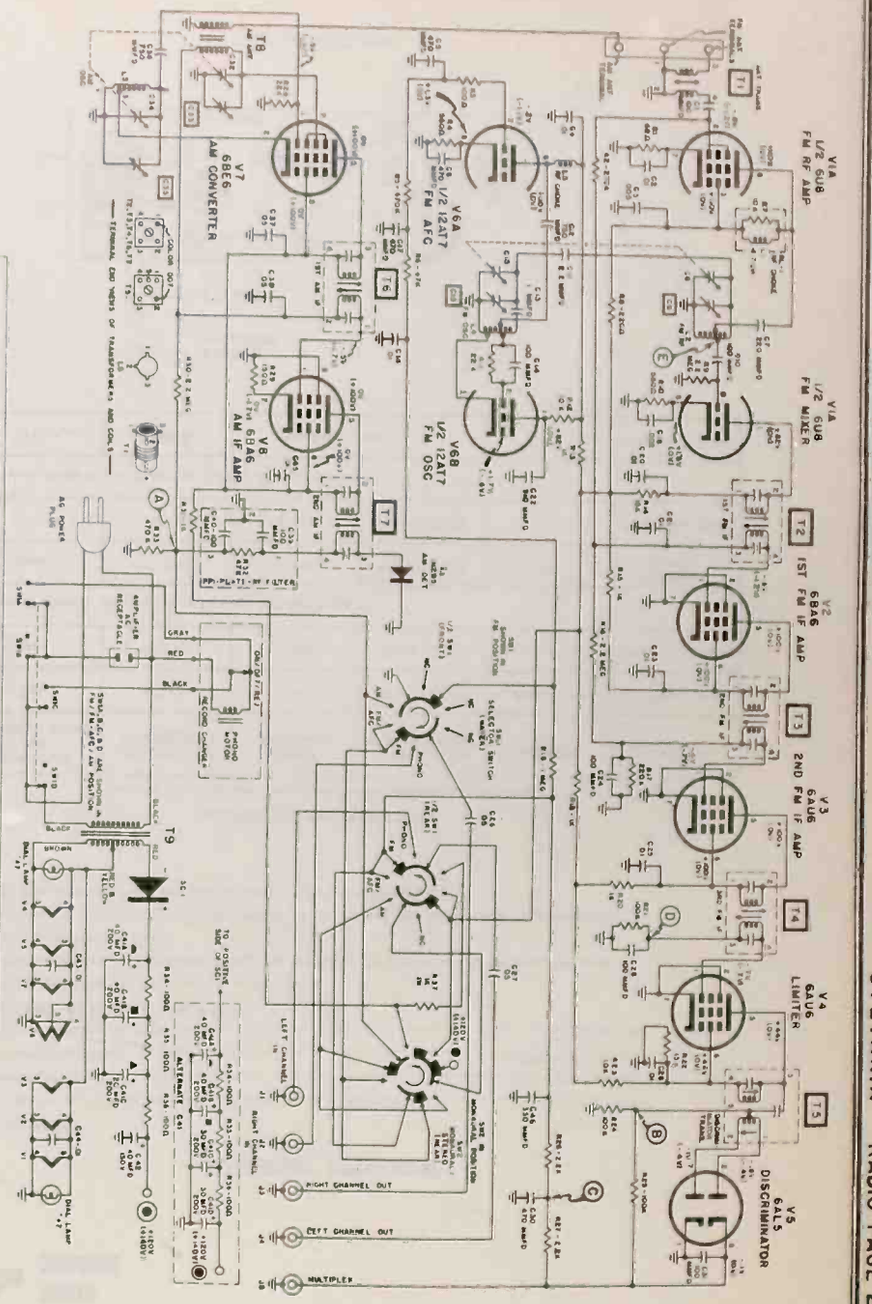
COILS and TRANSFORMERS RESISTANCE CHART

All resistances (RES), are in ohms.

	L5	T2	T3	T4	T5	T6	T7
BETWEEN	1 & 3 2 & 3	7 & 8 1 & 2 3 & 4 6	1 & 2 3 & 4	1 & 2 3 & 4	1 & 2 1 & 5 3 & 4	1 & 2 15 & 15 3 & 4	15 & 15
RES	1	1	1	1	5 5	15 15	15

CHASSIS REMOVAL PROCEDURE

1. Disconnect power line plug from power outlet.
2. Remove the four (4) tuner control knobs by pulling straight out.
3. Remove screws securing back cover and remove back cover.
4. Remove two (2) screws securing the top cover of tuner compartment. Remove the three (3) bottom screws on rear of tuner compartment. Remove cover.
5. Identify and disconnect all leads.
6. Remove four (4) screws securing chassis to cabinet shelf. Remove chassis. For under chassis tests, etc. remove four (4) screws securing plate to chassis and remove plate.
7. To replace chassis, reverse the above procedure, making certain all leads disconnected are re-connected to their respective sockets.



FM ALIGNMENT

STEP	SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1.	SELECTOR SWITCH IN FM POSITION (DO NOT ALIGN IN AFC POSITION). SET VARIABLE TUNING CAPACITOR TO A POINT OF NON INTERFERENCE.	SIGNAL GENERATOR - "HOT" LEAD TO POINT "E", GROUND LEAD TO CHASSIS. SET GENERATOR TO 10.7 MC UNMODULATED. AC VOLTMETER - "HOT" LEAD THRU A 1 MEGOHM RESISTOR TO POINT "B", GROUND LEAD TO CHASSIS.	T5 - BOTTOM CORE T4 - BOTTOM CORE T4 - TOP CORE T3 - BOTTOM CORE T3 - TOP CORE T2 - BOTTOM CORE T2 - TOP CORE FOR MAXIMUM METER READING.
2.	SAME AS STEP 1.	SIGNAL GENERATOR - SAME AS STEP 1. AC VOLTMETER - "HOT" LEAD THRU A 1 MEGOHM RESISTOR TO POINT "C", GROUND LEAD TO CHASSIS.	T5 - TOP CORE. ADJUST FOR METER READING OF ZERO.
3.	SET VARIABLE TUNING CAPACITOR TO 108 MC.	SIGNAL GENERATOR - "HOT" LEAD THROUGH A CARBON 270 OHM RESISTOR TO FM ANTENNA TERMINAL. GROUND LEAD TO CHASSIS. SET GENERATOR TO 108 MC. AC VOLTMETER - "HOT" LEAD TO POINT "D". GROUND LEAD TO CHASSIS.	C16 - FM OSC. TRIMMER. FOR MAXIMUM METER READING.
4.	SET VARIABLE TUNING CAPACITOR TO 106 MC.	SIGNAL GENERATOR - SAME AS STEP 3. SET GENERATOR TO 106 MC. AC VOLTMETER - SAME AS STEP 3.	C9 - FM RF TRIMMER. FOR MAXIMUM METER READING. WHILE SLOWLY ROCKING VARIABLE TUNING CAPACITOR.
5.	SET VARIABLE TUNING CAPACITOR TO 95 MC.	SIGNAL GENERATOR - SAME AS STEP 3. SET GENERATOR TO 95 MC. AC VOLTMETER - SAME AS STEP 3.	T1 - FM ANTENNA TRANSFORMER. FOR MAXIMUM METER READING.

SCHEMATIC NOTES

1. Voltages shown are average readings measured to chassis with no signal input. Variations may be noted due to normal production tolerances. Voltage readings in brackets taken with selector switch in the AM position. Voltage readings without brackets taken with selector switch in the FM position.
2. Resistances measured with components in circuit.
3. AC power source - 117V, 60 cycle "Variac regulated".
4. Voltage source is indicated by encircled symbol ◉ : corresponding symbol without circle ● , indicates voltage tie points.
5. Capacitance is in microfarads unless otherwise specified.
6. ⏚ Designates chassis ground.
7. Selector switch is shown in the AM position.

ALIGNMENT PROCEDURE

PRELIMINARY INSTRUCTIONS

1. Disconnect power line plug from power outlet.
2. Remove chassis as outlined under "Chassis" removal procedure.
3. Stand chassis in a position to facilitate under chassis IF alignment. Apply 117V. to chassis. Set signal generator for an RF output signal, amplitude modulated (AM) by 400 cycles. Allow chassis and signal generator several minutes warm-up time. During alignment, keep signal generator output at lowest possible level.
4. Use an AC Voltmeter to indicate output.

Alignment is an exacting procedure and should be undertaken only when necessary. If alignment of both AM and FM is required, the AM section should be done first. The following equipment is required for alignment.

1. Signal generator with a frequency range of at least from 455 KC to 1620 KC.
2. Signal generator with a frequency range of at least from 10.7 to 108.5 MC.
3. AC Voltmeter.

AM ALIGNMENT

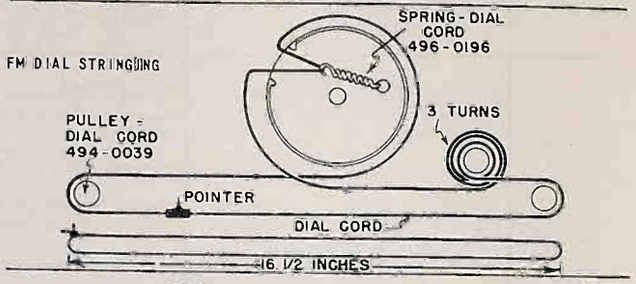
STEP	SET-UP NOTES	TEST EQUIPMENT HOOK-UP	ADJUST
1	SELECTOR SWITCH IN AM POSITION VARIABLE TUNING CAPACITOR FULLY OPEN.	SIGNAL GENERATOR - 'HOT' LEAD THROUGH A .01 MFD CAPACITOR TO PIN 7 - V7 GROUND LEAD TO CHASSIS. SET GENERATOR TO 455 KC. AC VOLTMETER - 'HOT' LEAD TO POINT 'A'. GROUND TO CHASSIS.	T7 - BOTTOM & TOP CORES. T6 - BOTTOM & TOP CORES. FOR MAXIMUM METER READING
2.	VARIABLE TUNING CAPACITOR TO THE 1650 KC POSITION.	SIGNAL GENERATOR - RADIATE SIGNAL TO RECEIVER THROUGH A LOOP OF SEVERAL TURNS OF WIRE. SET GENERATOR TO 1650 KC. AC VOLTMETER - SAME AS STEP 1.	C35 AM OSC TRIMMER FOR MAXIMUM METER READING
3.	VARIABLE TUNING CAPACITOR TO THE 1400 KC POSITION.	SIGNAL GENERATOR - RADIATE SIGNAL TO RECEIVER THROUGH A LOOP OF SEVERAL TURNS OF WIRE. SET GENERATOR TO 1400 KC. AC VOLTMETER - SAME AS STEP 1.	C33 AM RF TRIMMER FOR MAXIMUM METER READING

REPLACEMENT PARTS LIST

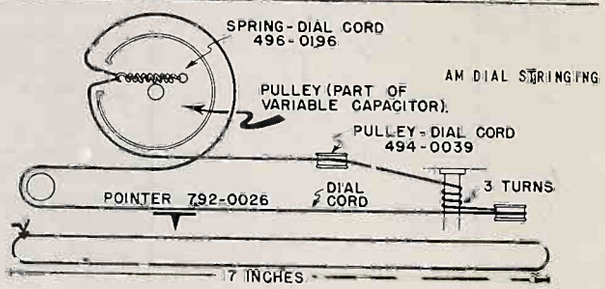
SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
RESISTORS (CONT'D)		
R37		1,000 OHM ± 10% ½ W
COILS AND TRANSFORMERS		
L1	PART OF RL1	SEE 'MISCELLANEOUS ELECTRICAL PARTS'
L2	112-0018	COIL - FM - RF
L3	145-0033	COIL - CHOKE - RF
L4	113-0048	COIL - FM - OSCILLATOR
L5	113-0053	COIL - AM - OSCILLATOR
T1	111-0029	TRANSFORMER - FM ANTENNA
T2	121-0034	TRANSFORMER - 1ST FM IF
T3	121-0034	TRANSFORMER - 2ND FM IF
T4	121-0034	TRANSFORMER - 3RD FM IF
T5	128-0016	TRANSFORMER - DISCRIMINATOR
T6	121-0033	TRANSFORMER - 1ST AM IF
T7	121-0033	TRANSFORMER - 2ND AM IF
T8	581-0020	TRANSFORMER - ANTENNA - FERRITE ROD
T9	141-0082	TRANSFORMER - POWER
MISCELLANEOUS ELECTRICAL PARTS		
	170-0035	CAPACITOR - VARIABLE FM (INCLUDES PULLEY)
C8, C9		FM RF GANG, FM RF TRIMMER
C15		FM OSCILLATOR GANG
	170-0034	CAPACITOR - VARIABLE AM (INCLUDES PULLEY)
C32, C33		AM RF GANG, AM RF TRIMMER
C34, C35		AM OSC GANG, AM OSC TRIMMER
PP1	190-0044	PLATE - DIODE RF FILTER
C39, C40		100 MMFD, 100 MMFD
R32		47,000 OHM
RL1	145-0035	CHOKE - RF
L1		4.7 UH
R7		10,000 OHM
SC1	517-0023	RECTIFIER - SELENIUM
SW1	573-0021	SWITCH - SELECTOR (WAFER)
SW1A	571-0033	SWITCH - ROTARY SNAP - 5 AMP - 125V
SW1B	571-0033	SWITCH - ROTARY SNAP - 5 AMP - 125V
SW1C	571-0033	SWITCH - ROTARY SNAP - 5 AMP - 125V
SW1D	571-0033	SWITCH - ROTARY SNAP - 5 AMP - 125V
SW2	573-0020	SWITCH - MONAURAL/STEREO (WAFER)

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CHASSIS PARTS		
	481-0025	BUSHING - DIAL DRIVE
	480-0026	BOARD - ANTENNA TERMINAL
	492-0077	BRACKET - DIAL GLASS MOUNTING
	195-0018	CORD - AC POWER
	721-0028	DIAL - GLASS
	489-0039	FLYWHEEL - VARIABLE TUNING AM AND FM
J1, 2, 4	417-0002	JACK - 1 PRONG
J3, 5	419-0021	JACK - 1 PRONG
	477-0011	PLATE - DIAL BACKGROUND
	792-0027	POINTER - FM
	792-0026	POINTER - AM
	494-0039	PULLEY - DIAL CORD
	493-0169	SHAFT - TUNING (AM/FM)
	417-0009	SOCKET - AMPLIFIER AC RECEPTICAL
	411-0038	SOCKET - PILOT LAMP
	496-0196	SPRING - DIAL CORD

FM DIAL STRINGING



AM DIAL STRINGING



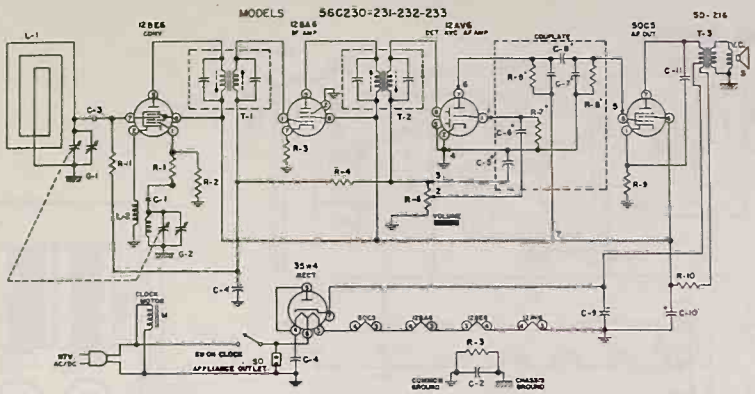
REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS		
C1		100 MMFD - 20% - 500V - CERAMIC
C2		.01 MFD - 20% - 500V - CERAMIC
C3		.005 MFD - 20% - 500V - CERAMIC
C4		.01 MFD - 20% - 500V - CERAMIC
C5		470 MMFD - 20% - 500V - CERAMIC
C6		470 MMFD - 20% - 500V - CERAMIC
C7		220 MMFD - 10% - 500V - CERAMIC
C8, C9		SEE 'MISCELLANEOUS ELECTRICAL PARTS'
C10		100 MMFD - 20% - 500V - CERAMIC
C11		2.2 MMFD - 5% - CERAMIC
C12		750 MMFD - 10% - 500V - CERAMIC
C13		1 MMFD - NPO - CERAMIC
C14		100 MMFD - 20% - 500V - CERAMIC
C15		SEE 'MISCELLANEOUS ELECTRICAL PARTS'
C16	172-0043	FM - OSCILLATOR TRIMMER
C17		470 MMFD - 20% - 500V - CERAMIC
C18		.01 MFD - 20% - 500V - CERAMIC
C19		.002 MFD - 20% - 500V - CERAMIC
C20		.01 MFD - 20% - 500V - CERAMIC
C21		.01 MFD - 20% - 500V - CERAMIC
C22		910 MMFD - 10% - 500V - CERAMIC
C23		.01 MFD - 20% - 500V - CERAMIC
C24		100 MMFD - 20% - 500V - CERAMIC
C25		.01 MFD - 20% - 500V - CERAMIC
C26		.05 MFD - 20% - 200V - PAPER
C27		.05 MFD - 20% - 200V - PAPER
C28		100 MMFD - 20% - 500V - CERAMIC
C29		.01 MFD - 20% - 500V - CERAMIC
C30		470 MMFD - 20% - 500V - CERAMIC
C31		100 MMFD - 20% - 500V - CERAMIC
C32, C33		SEE 'MISCELLANEOUS ELECTRICAL PARTS'
C34, C35		SEE 'MISCELLANEOUS ELECTRICAL PARTS'
C36		750 MMFD - 20% - 500V - CERAMIC
C37		.05 MFD - 20% - 200V - PAPER
C38		.05 MFD - 20% - 200V - PAPER
C39, C40	PART OF PP1	SEE 'MISCELLANEOUS ELECTRICAL PARTS'
C41	161-3040	3 SECTION ELECTROLYTIC (ON SOME MODELS)
A		40 MFD - 200V
B	SEE NOTE	40 MFD - 200V
C		20 MFD - 200V

NOTE: ON SOME MODELS C41 A, B, C AND C42 ARE SUBSTITUTED WITH C41 A, B, C, D A 4 SECTION ELECTROLYTIC.

C41	161-4029	4 SECTION ELECTROLYTIC (ON SOME MODELS)
A		40 MFD - 200V
B	SEE NOTE	40 MFD - 200V

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS (CONT'D)		
C		30 MFD - 200V
D		30 MFD - 200V
C42	161-1053	40 MFD - 150V ELECTROLYTIC (ON SOME MODELS)
C43		.01 MFD - 20% - 500V - CERAMIC
C44		.01 MFD - 20% - 500V - CERAMIC
C45		.01 MFD - 20% - 500V - CERAMIC
C46		330 MMFD - 20% - 500V - CERAMIC
RESISTORS		
R1		68 OHM - 10% - ½W
R2		270,000 OHM - 10% - ½W
R3		100 OHM - 10% - ½W
R4		560 OHM - 10% - ½W
R5		470,000 OHM - 10% - ½W
R6		47,000 OHM - 10% - ½W
R7	PART OF RL1	SEE 'MISCELLANEOUS ELECTRICAL PARTS'
R8		220 OHM - 10% - ½W
R9		2.2 MEGOHM - 10% - ½W
R10		560 OHM - 10% - ½W
R11		22,000 OHM - 10% - ½W
R12		10,000 OHM - 10% - ½W
R13		1,000 OHM - 10% - ½W
R14		15,000 OHM - 10% - ½W
R15		1,000 OHM - 10% - ½W
R16		2.2 MEGOHM - 5% - ½W
R17		220,000 OHM - 10% - ½W
R18		1,000 OHM - 10% - ½W
R19		1 MEGOHM - 10% - ½W
R20		1,000 OHM - 10% - ½W
R21		100,000 OHM - 10% - ½W
R22		15,000 OHM - 10% - ½W
R23		10,000 OHM - 10% - ½W
R24		100,000 OHM - 10% - ½W
R25		100,000 OHM - 10% - ½W
R26		2,200 OHM - 10% - ½W
R27		2,200 OHM - 10% - ½W
R28		22,000 OHM - 10% - ½W
R29		150 OHM - 10% - ½W
R30		2.2 MEG OHM - 10% - ½W
R31		1,000 OHM - 10% - ½W
R32	PART OF PP1	SEE 'MISCELLANEOUS ELECTRICAL PARTS'
R33		470,000 OHM - 10% - ½W
R34		100 OHM - 10% - ½W
R35		100 OHM - 10% - ½W
R36		100 OHM - 10% - ½W



PART NO.		DESCRIPTION	PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
IR- 4	R-1	47Ω RESISTOR 1/2W. 20%	CC-12	C- 1	47 MMFD. CERAMIC CONDENSER	SPK-55	3	4"x6" P.M. SPEAKER
IR-45	R-2	22MΩ RESISTOR 1/2W. 10%	PC- 8	C- 2	.1 MFD. CONDENSER 400 V.		V.C.	VOICE COIL
IR-20	R-3	220M Ω RESISTOR 1/2W. 20%	CC-33	C- 3	220 MMFD. 500 V. 20% CER. COND.	AT-24	T-3	OUTPUT TRANSFORMER
IR-23	R-4	3.3MEG RESISTOR 1/2W. 20%	PC- 5	C- 4	.05 MFD. CONDENSER 400 V.	LL-48	L-1	LOOP ANTENNA
IR-55	R-5	120Ω RESISTOR 1/2W. 10%	MC-19	C- 5	220 MMFD.	LO-27	L-2	OSC. COIL
VC-101	R-6	1 MEG. VOLUME CONTROL		C- 6	.002 MFD.	30-54	SO	APPLIANCE OUTLET SOCKET
MC-79	R-7	6.8 MEG.		C- 7	250 MMFD.			
	R-8	470MΩ		C- 8	.005 MFD.	CK- T	M	ELECTRIC CLOCK
IR-98	R-9	150Ω RESISTOR 1/2W. 10%	EC-68	C- 9	70 MFD. 150 W.V.D.C. ELECTROLYTIC		SW	
IR-42	R-10	1000Ω RESISTOR 1 W. 10%	PC-47	C-10	40 MFD.			
IR-12	R-11	1 MEG. RESISTOR 1/2W. 20%		C-11	.02 MFD. CONDENSER 400 V.			
LL-79	T- 1	INPUT I.F. TRANSFORMER	GC-24	G- 1	TUNING CONDENSER			
	T- 2	OUTPUT I.F. TRANSFORM		G- 2				

SUPERHETERODYNE CLOCK RADIO

MODELS 56C230, 56C231, 56C232, 56C233

SPECIFICATIONS

AC Superheterodyne Radio and Self-Starting Electric Clock Combination. Frequency Coverage 535 to 1620 Kilocycles with Conelrad Civil Defense symbols at 640 and 1240 Kilocycles. Operates on 117-volt, 60-cycle alternating current (AC) only (Connection to DC will damage the clock). Power Consumption: 35 Watts. Features a 117-volt, 60-cycle AC appliance timer outlet, on back of radio. Maximum appliance load: 1100 Watts. CONTROLS: Auto-Control switch, Time and Alarm Set knob, and Sleep switch, on clock; Volume and Tuning on right side of cabinet.

INSTALLATION

Simply insert the power plug into a 117-volt 60-cycle AC outlet and set the clock hands to the correct time. The clock operates continuously whether or not the radio is in use. An appliance (percolator, toaster, etc.) may be plugged into the outlet on the back of the set. If the switch on the appliance is turned on, the appliance will turn on and off with the radio. Your radio is equipped with a sensitive built-in antenna that eliminates the need for an external antenna.

OPERATION

TO SET THE CLOCK: Pull out Time and Alarm Set knob on back of receiver and turn it clockwise to set hands.

NON-AUTOMATIC RADIO OPERATION: To operate radio and appliance independently of the clock:

1. Turn Auto Control switch to ON position and allow 30 second for warm-up.
2. Adjust Tuning and Volume controls for desired station and loudness. To turn set off, turn Auto Control switch to the OFF position.

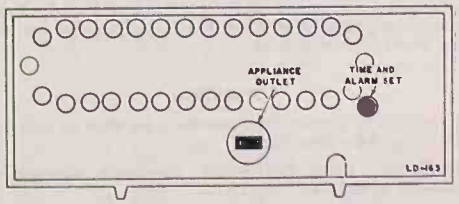
AUTOMATIC RADIO-OPERATION

1. Push in Time and Alarm Set knob on back of receiver and turn it until Gold hand on clock indicates time you wish radio to turn on automatically.
2. Turn Auto Control switch to ON position and allow 30 second for warm-up.
3. Adjust Tuning and Volume controls for desired station and loudness.
4. Turn Auto Control switch to Radio position.
   The radio and appliance will turn on automatically at the pre-set time. If the buzzer alarm is also desired turn the Auto Control to the Alarm position.
5. The radio and appliance will turn on at the pre-set time and the buzzer alarm will sound approximately 10 minutes later. To turn off the radio and buzzer, turn the Auto Control switch to the OFF position. To turn off the buzzer and keep the radio playing, turn the Auto Control switch to the ON position.

NOTE: If the clock is set for automatic radio operation more than 10 hours in advance, the radio will turn on immediately and automatic operation will not be obtained.

SLEEP SELECTOR: Permits radio to be turned off automatically after operating for up to 60 minutes. Turn the Auto Control switch to OFF. Turn Sleep Selector knob clockwise to period of time you wish radio to remain on. Set Tuning and Volume for desired station and loudness. The radio will play for desired period, then turn off automatically.

The Sleep selector may also be used with automatic operation. Set radio for Automatic Operation. Turn Sleep knob clockwise to period of time you wish radio to remain on. The radio will play for desired time, turn off automatically, and turn on again at time indicated by Gold hand on clock.

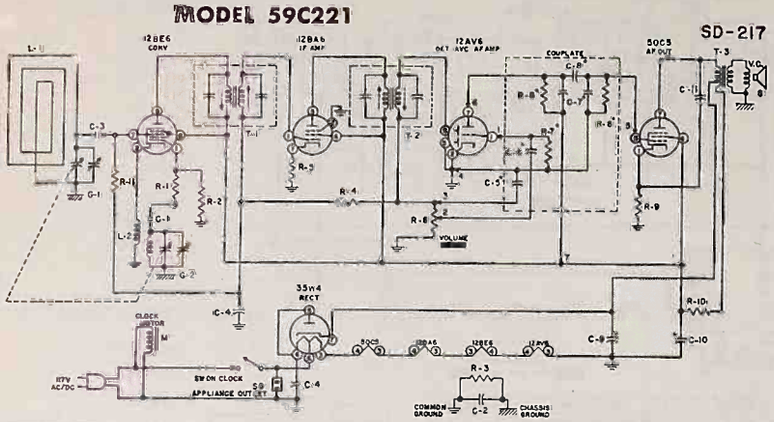


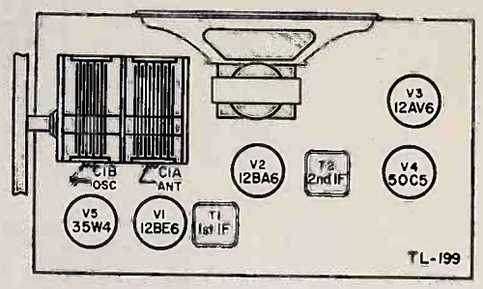
WARRANTY: This receiver has been carefully tested and was shipped from our factory in perfect operating condition. If the set arrives damaged in any way, it is important that you file claim immediately against the carrier. We warrant this receiver to be free from defective materials and workmanship. We agree to exchange any part, which under normal use, becomes defective within a period of 90 (ninety) days from the date of sale to the original purchaser. This does not include the furnishing of any labor or transportation expense such as that required with the return of defective parts to the dealer, distributor or manufacturer. If this receiver does not operate, it should be returned for service to the dealer from whom it was purchased.

This warranty does not apply if the receiver has been damaged, tampered with, or misused. If the receiver is returned to the factory, transportation charges must be prepaid. No receiver may be returned without our written consent.

MODEL 59C221

SD-217





PART NO.		DESCRIPTION		PART NO.		DESCRIPTION	PART NO.		DESCRIPTION
IR-4	R-1	47Ω. RESISTOR	1/2W. 20%	CC-12	C-1	47 MMFD. CERAMIC CONDENSER	SPK-56	S	4" P.M. SPEAKER
IR-45	R-2	22M.Ω. RESISTOR	1/2W. 10%	PC-8	C-2	.1 MFD. CONDENSER 400 V.		VC	VOICE COIL
IR-20	R-3	220M.Ω. RESISTOR	1/2W. 20%	CC-33	C-3	220 MMFD. 300V. 20% CER. COND.		T-3	OUTPUT TRANSFORMER
IR-23	R-4	3.3MEG. RESISTOR	1/2W. 20%	PC-3	C-4	.05 MFD. CONDENSER 400 V.	LL-48	L-1	LOOP ANTENNA
IR-153	R-5	120Ω. RESISTOR	1/2W. 10%		C-5*	220 MMFD.	LO-27	L-2	OSC. COIL
VC-101	R-6	MEG. VOLUME CONTROL		MC-19	C-6*	.002 MFD.	SO-54	SO	APPLIANCE OUTLET SOCKET
MC-19	R-7*	6.8 MEG.			C-7*	250 MMFD.			
	R-8*	470M.Ω.			C-8*	.005 MFD.	CK-7	M	ELECTRIC CLOCK
IR-98	R-9	150Ω. RESISTOR	1/2W. 10%	EC-68	C-9	70 MFD. 150 W.V.D.C. ELECTROLYTIC		SW	
IR-42	R-10	1000Ω. RESISTOR	1 W. 10%		C-10	40 MFD.			
IR-12	R-11	1MEG. RESISTOR	1/2W. 20%	PC-47	C-11	.02 MFD. CONDENSER 400 V.			
LI-19	T-1	INPUT I.F. TRANSFORMER		GC-24	G-1	TUNING CONDENSER			
	T-2	OUTPUT I.F. TRANSFORMER			G-2				

SUPERHETERODYNE CLOCK RADIO

MODEL 59C221

SPECIFICATIONS

AC Superheterodyne Radio and Self-Starting Electric Clock Combination. Frequency Coverage 535 to 1620 Kilocycles with Conelrad Civil Defense symbols at 640 and 1240 Kilocycles. Operates on 117-volt, 60-cycle alternating current (AC) only (Connection to DC will damage the clock). Power Consumption: 35 Watts. Features a 117-volt, 60-cycle AC appliance-timer outlet, on back of radio. Maximum appliance load: 1100 Watts. CONTROLS: Auto-Control switch, Time and Alarm Set knob, and Sleep switch, on clock; Volume and Tuning on right side of cabinet.

INSTALLATION

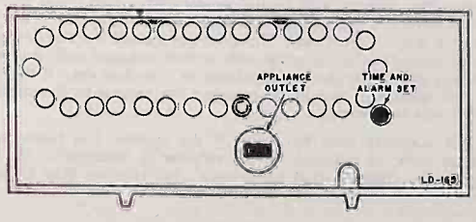
Simply insert the power plug into a 117-volt 60-cycle AC outlet and set the clock hands to the correct time. The clock operates continuously whether or not the radio is in use. An appliance (percolator, toaster, etc.) may be plugged into the outlet on the back of the set. If the switch on the appliance is turned on, the appliance will turn on and off with the radio. Your radio is equipped with a sensitive built-in antenna that eliminates the need for an external antenna.

OPERATION

TO SET THE CLOCK: Pull out Time and Alarm Set knob on back of receiver and turn it clockwise to set hands.

NON-AUTOMATIC RADIO OPERATION: To operate radio and appliance independently of the clock:

1. Turn Auto Control switch to ON position and allow 30 second for warm-up.
2. Adjust Tuning and Volume controls for desired station and loudness. To turn set off, turn Auto Control switch to the OFF position.



AUTOMATIC RADIO-OPERATION

1. Push in Time and Alarm Set knob on back of receiver and turn it until Gold hand on clock indicates time you wish radio to turn on automatically.
2. Turn Auto Control switch to ON position and allow 30 second for warm-up.
3. Adjust Tuning and Volume controls for desired station and loudness.
4. Turn Auto Control switch to Radio position. The radio and appliance will turn on automatically at the pre-set time. If the buzzer alarm is also desired turn the Auto Control to the Alarm position.
5. The radio and appliance will turn on at the pre-set time and the buzzer alarm will sound approximately 10 minutes later. To turn off the radio and buzzer, turn the Auto Control switch to the OFF position. To turn off the buzzer and keep the radio playing, turn the Auto Control switch to the ON position.

NOTE: If the clock is set for automatic radio operation more than 10 hours in advance, the radio will turn on immediately and automatic operation will not be obtained.

SLEEP SELECTOR: Permits radio to be turned off automatically after operating for up to 60 minutes. Turn the Auto Control switch to OFF. Turn Sleep Selector knob clockwise to period of time you wish radio to remain on. Set Tuning and Volume for desired station and loudness. The radio will play for desired period, then turn off automatically.

The Sleep selector may also be used with automatic operation. Set radio for Automatic Operation. Turn Sleep knob clockwise to period of time you wish radio to remain on. The radio will play for desired time, turn off automatically, and turn on again at time indicated by Gold hand on clock.

Westinghouse

RADIO SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

A Tech-Lit Publication

MODELS

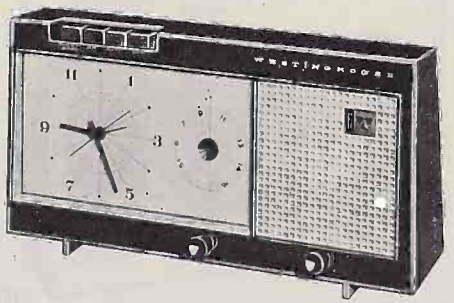
H-722T6
(Cameo beige/mocha)

H-723T6
(Pink/Charcoal)

CHASSIS V-2401-2

SPECIFICATIONS

Frequency Range	540 to 1600KC
Intermediate Frequency	455KC
Tube Complement	
1 12BA6	RF Amp
1 12BE6	Converter
1 12BA6	IF Amp
1 12AV6	Det. AVC & 1st AF Amp
1 35C5	Output Amp
1 35W4	Rectifier
Power Output:	
Undistorted	1.0 watts
Maximum	1.5 watts
Speaker	4" PM
Operating Voltage	105 to 120 Volts 60 cycle AC
Power Consumption	30 watts



CLOCK REMOVAL

1. Remove the chassis. (See chassis removal instructions)
2. Unsolder the leads from the clock.
3. Remove the clock crystal from the cabinet front. (See Figure 6 and clock crystal removal instructions) *CAUTION:* Crystal is held on by two screws. Failure to follow removal instructions will result in damage to crystal.
4. Remove the clock hands in this order: Second, Minute, Hour and Alarm Set.
5. Remove the 4 nuts holding the clock to the cabinet front and slide the clock out. The push button knobs should not be removed from the clock.

CLOCK INSTALLATION

Before installing the clock into the cabinet front, perform the following steps:

Note: In order for the clock to perform properly, its hands must be installed at a specific time setting with the actuator lever in the "Hand Placement Position B." This is accomplished as follows:

1. Depress first the OFF pushbutton and then the AUTO pushbutton. The clock actuator lever should then be in "COCKED POSITION A."
2. If actuator lever is not in "COCKED POSITION A" it will not be visible through the front window. In this case, pull the time alarm set control shaft back and turn it four or five turns clockwise (looking at clock from rear). Repeat step one until actuator lever can be seen in "COCKED POSITION A."
3. Push in time alarm set control shaft and rotate *very* slowly clockwise until a click is heard. The actuator lever should now be in "HAND PLACEMENT POSITION B". (See Figure 6). If time alarm set control shaft is rotated too rapidly, the actuator lever will not be visible. Do *not*, under any circumstances, install the hands unless the actuator lever can be seen in "HAND PLACEMENT POSITION B." If the actuator lever is not visible in this position, repeat steps one, two and three, rotating the shaft more slowly.
4. Secure the clock onto the cabinet front with the four nuts.
5. Repeat step 1.
6. Install the clock hands as follows:
   a. Point the alarm set hand to 6:30.
   b. Point the hour hand to 6:30.
   c. Point the minute hand to 6:27.
   d. Point the second hand to 6:00.
7. Resolder the leads to the clock motor and switch.

CLOCK CRYSTAL REMOVAL

1. Remove the cabinet front from the cabinet. (See chassis removal instructions)
2. Remove the 2 screws that mount the speaker and extend into the clock crystal studs. (See Figure 6)
3. The clock crystal is now free. Gently pull it forward on the speaker end and ease it out of the notches on the clock end.

CHASSIS REMOVAL

1. Remove four screws, two from top corners on cabinet back and two from cabinet bottom.
2. Slide cabinet front and attached chassis out from cabinet.

CHASSIS REPLACEMENT

1. Slide chassis and attached cabinet front into cabinet, making sure that etched circuit board enters notches provided in the back of the cabinet shell.
2. Replace the four screws removed in "Chassis Removal."

CLOCK SERVICE INFORMATION

All service on the clock should be referred to the nearest Telechron Authorized Timer Service Station. (See pages 4 & 5 of Service Manual for Models H-718,19,20T5. (RM 4519) Do not forward the complete clock radio. The clock should be removed from the cabinet and forwarded to the service station.

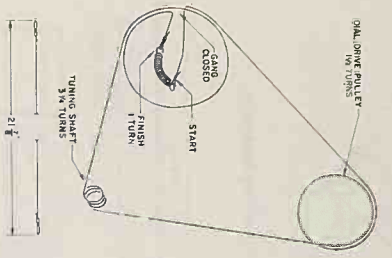


Figure 1 – Dial cord stringing.

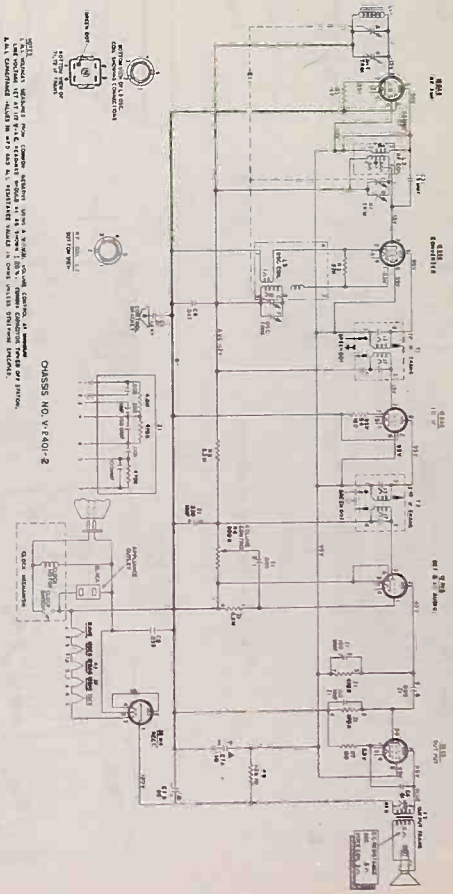


Figure 2 – Schematic diagram.

ALIGNMENT PROCEDURE

Step	Connect Signal Generator To:	Signal Generator Freq. Mod. 400 Cycles	Radio Dial Setting	V.T.V.M. Across Voice Coil For Max. Output
1.	Pin #7 of 12BE6 through a 200mmf capacitor	455KC	Minimum Capacity	Top & bottom slugs of T2 & T1 in order given. *
2.	Stator of antenna tuning capacitor "A" through a 200mmf capacitor	1625KC	Minimum Capacity	Oscillator trimmer (F)
3.	Same as step 2	1400KC	1400KC	RF trimmer (D)
4.	Provide loosely coupled signal to L1	1400KC	1400KC	Antenna trimmer (B)

ALIGNMENT PROCEDURE

It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

While making adjustments, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

* It is recommended that a fiber alignment tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

PARTS LIST

MISCELLANEOUS

Ref. No.	Part No.	Description	List Price
†	558V291H02	Background, clock	.95
	787V212H01	Bracket, weld assy, control (incl dial bearing & tuning shaft bearing)	.50
†	513V057H04	Cabinet, H-722T6	5.60
†	513V057H05	Cabinet, H-723T6	5.60
	650V017H01	Clock, pushbutton, Telechron #J5G1 (incl off-on switch)	12.50
	770V415H01	Contact, mole (AC interlock)	.10
	751V006H02	Cord, AC power	1.25
	558V277H01	Crystal, clock	3.65
†	550V139H02	Dial, tuning	.60
†	787V213H02	Dial, assy, snooze indicator (incl dial and shaft)	.50
†	558V276H02	Front, cabinet, H-722T6	3.25
†	558V276H03	Front, cabinet, H-723T6	3.25
†	558V288H01	Hand, hour	.15
†	558V289H01	Hand, minute	.15
†	558V290H02	Hand, second	.10
	558V182H02	Hand, alarm set	.15
	783V061H01	Insert, special	.35
†	558V292H02	Insignia	.15
†	550V138H02	Knob, pushbutton (clock) H-722T6	.10
†	550V138H03	Knob, pushbutton (clock) H-723T6	.10
	550V141H01	Knob, control	.30
	783V093H01	Pulley, dial cord stringing	.15
	761V815H04	Screw, special (mtg front to cabinet)	.05
	783V080H04	Shaft, time set extension	.20
	783V172H01	Shaft, tuning	.20
	758V503H01	Shield, RF coil	.17
	751V503H03	Socket, snap in, 7 pin (no center pin)	.17
	751V503H06	Socket, snap in, 7 pin (incl center pin)	.15
	778V188H01	Socket, rivet assy (appliance socket)	1.15
	570V077H01	Speaker, 4" PM (incl T3)	6.25
	690V011H16	Switch, clock, off-on, Telechron #40X765	1.00

CHASSIS PARTS

Ref. No.	Part No.	Description	List Price
†C1	330V032H01	Variable, 3 gang (incl pulley)	4.95
C2	215V016A80	68mmf, ceramic	.22
†C3	217V011A59	1.5mmf, fixed comp	.15
C4	210V116H04	.047mf	.25
C5	215V306H03	.01mf, 1.4KV, ceramic	.35
C6	215V300H03	.01mf, ceramic	.22
C7A, C7B	218V037H04	30mf, 150V, elec; 80mf, 150V, elec	1.75
C8	210V213A33	.033mf, molded	.40
L1	310V056H01	Loop, antenna	1.95
†L2	230V086H01	Coil, RF	1.75
L3	230V004H03	Coil, oscillator	1.00
R1	RC20AE470K	47 ohm	.05
R3	RC20AE223K	22K ohm	.07
R4	RC20AE181K	180 ohm	.10
R5	RC20AE335K	3.3 megohm	.09
R6	270V083H01	Control, 500K, volume	1.25
R7	RC20AE181K	180 ohm	.10
R8	RC30AE122K	1200 ohm, 1W	.12
T1	235V023H11	Transformer, 1st IF	1.57
T2	235V023H11	Transformer, 2nd IF	1.57
T3	570V077H01	Transformer (audio output) (part of speaker)	
Z1	219V001H01	Couplate, resistor, condenser, combination	.95

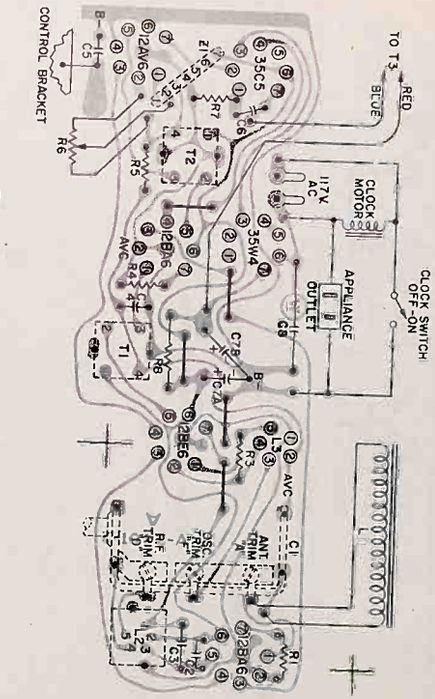


Figure 5 – Bottom view of chassis

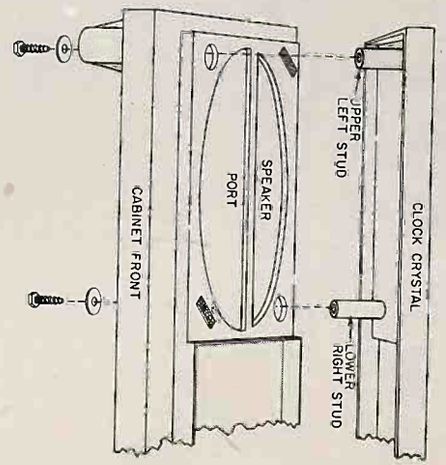


Figure 6 – Clock crystal removal.

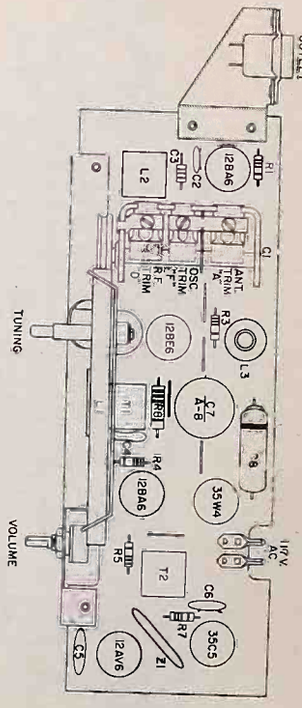


Figure 3 – Top view of chassis.

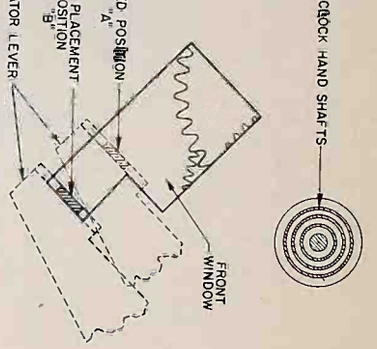


Figure 4 – Cocking mechanism.

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RADIO SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

A Tech-Lit Publication

MODELS

H-718T5
(Turquoise/White)

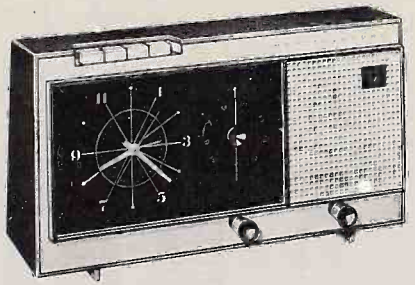
H-719T5
(Ivory/White)

H-720T5
(Coral/White - Pink/White)

CHASSIS V-2401-1

SPECIFICATIONS

Frequency Range	540 to 1600 KC
Intermediate Frequency	455 KC
Tube Complement	
1 12BE6	Converter
1 12BA6	IF Amp.
1 12AV6	Det., AVC & 1st AF Amp.
1 50C5	Output Amp.
1 35W4	Rectifier
Power Output	
Undistorted	1.0 watts
Maximum	1.5 watts
Speaker	One 4" PM
Operating Voltage	105 to 120 volts, 60 cycle AC
Power Consumption	30 watts



CLOCK REMOVAL

1. Remove the chassis. (See chassis removal instructions)
2. Unsolder the leads from the clock.
3. Remove the clock crystal from the cabinet front. (See Figure 6 and clock crystal removal instructions) *CAUTION:* Crystal is held on by two screws. Failure to follow removal instructions will result in damage to crystal.
4. Remove the clock hands in this order: Second, Minute, Hour and Alarm Set.
5. Remove the 4 nuts holding the clock to the cabinet front and slide the clock out. The push button knobs should not be removed from the clock.

CLOCK INSTALLATION (See Figure 4)

Before installing the clock into the cabinet front, perform the following steps:

Note: In order for the clock to perform properly, its hands must be installed at a specific time setting with the actuator lever in the "Hand Placement Position B." This is accomplished as follows:

1. Depress first the OFF push button and then the AUTO push button. The clock actuator lever should then be in "COCKED POSITION A."
2. If actuator lever is not in "COCKED POSITION A" it will not be visible through the front window. In this case, pull the time alarm set control shaft back and turn it four or five turns clockwise (looking at clock from rear). Repeat step one until actuator lever can be seen in "COCKED POSITION A."
3. Push in time alarm set control shaft and rotate *very* slowly clockwise until a click is heard. The actuator lever should now be in "HAND PLACEMENT POSITION B". (See Figure 4.) If time alarm set control shaft is rotated too rapidly, the actuator lever will not be visible. Do *not*, under any circumstances, install the hands unless the actuator lever can be seen in "HAND PLACEMENT POSITION B." If the actuator lever is not visible in this position, repeat steps one, two and three, rotating the shaft more slowly.
4. Secure the clock onto the cabinet front with the four nuts.
5. Repeat step 1.
6. Install the clock hands as follows:
   a. Point the alarm set hand to 6:30.
   b. Point the hour hand to 6:30.
   c. Point the minute hand to 6:27.
   d. Point the second hand to 6:00.
7. Resolder the leads to the clock motor and switch.

CLOCK CRYSTAL REMOVAL

1. Remove the cabinet front from the cabinet. (See chassis removal instructions)
2. Remove the 2 screws that mount the speaker and extend into the clock crystal studs. (See Figure 6)
3. The clock crystal is now free. Gently pull it forward on the speaker end and ease it out of the notches on the clock end.

CHASSIS REMOVAL

1. Remove four screws, two from top corners on cabinet back and two from cabinet bottom.
2. Slide cabinet-front and attached chassis out from cabinet.

CHASSIS REPLACEMENT

1. Slide chassis and attached cabinet-front into cabinet, making sure that etched circuit board enters notches provided in the back of the cabinet shell.
2. Replace the four screws removed in "Chassis Removal."

CLOCK SERVICE INFORMATION

All service on the clock should be referred to the nearest Telechron Authorized Timer Service Station. (See pages 4 & 5). Do not forward the complete clock radio. The clock should be removed from the cabinet and forwarded to the service station.

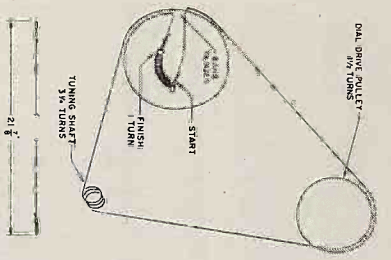


Figure 1 – Dial cord stringing.

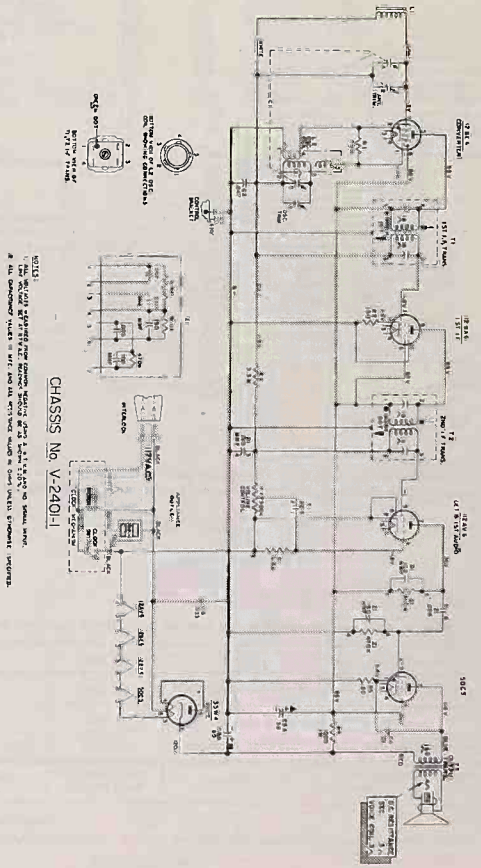


Figure 2 – Schematic diagram.

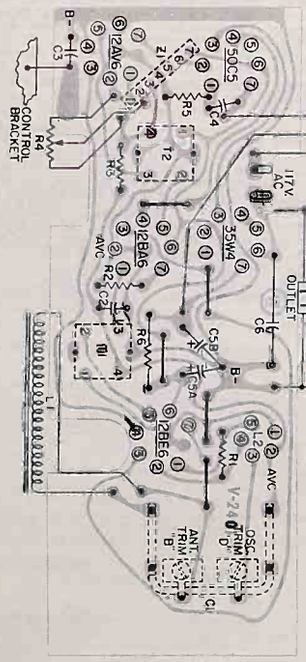


Figure 5 – Bottom view of chassis.

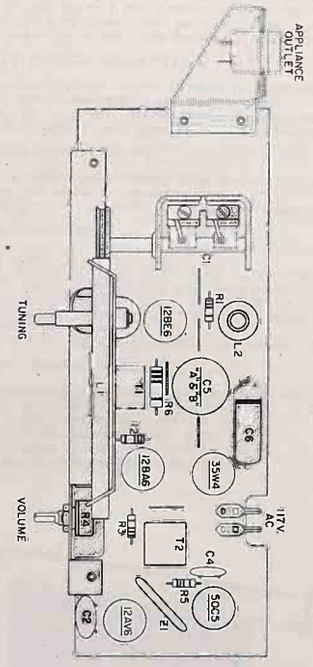


Figure 3 – Top view of chassis.

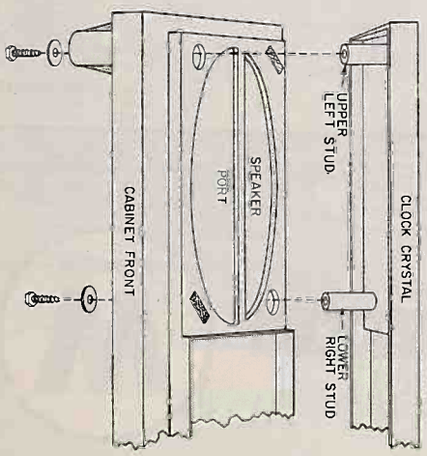


Figure 6 – Clock crystal removal.

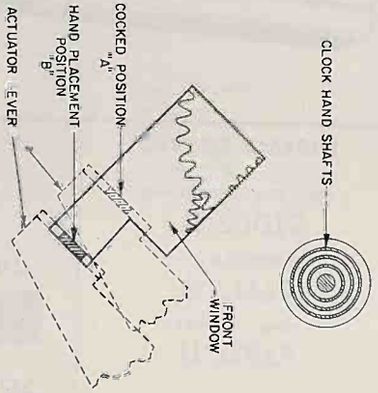


Figure 4 – Cocking mechanism.

ALIGNMENT

While making the following adjustments, keep the volume control set for maximum output and the signal generator output attenuated to weakest usable signal level.

Step	Connect Signal Generator to –	Signal Gen. Frequency	Radio Dial	Connect VTVM Across Voice Coil and Adjust for Maximum Output –
1	Stator of ant. tuning capacitor (A) through a 200 mmf capacitor.	455KC 400 Cps. 30% Mod.	Minimum capacity	Top and bottom slugs of T2 and T1. *
2	Radiated signal	1625 KC	Minimum capacity	Oscillator trimmer (D)
3	Radiated signal	1400 KC	1400 KC	Antenna trimmer (B)

* It is recommended that a fiber aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.* Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.

MISCELLANOUS

Ref. No.	Part No.	Description	List Price
†	558V291H01	Background, clock	.95
†	787V212H01	Bracket weld assy, control (incl dial bearing & tuning shaft bearing)	.50
†	513V057H01	Cabinet, H-718T5	5.60
†	513V057H02	Cabinet, H-719T5	5.60
†	513V057H03	Cabinet, H-720T5, coral	5.60
	513V057H05	Cabinet, H-720T5, pink	5.60
†	650V017H01	Clock, push button (Telechron J5G1) (incl off-on switch)	12.50
	770V415H01	Contact, male (AC interlock)	.10
	751V006H02	Cord, AC power	1.25
†	558V277H01	Crystal, clock	3.65
†	550V139H01	Dial, tuning	.60
†	787V213H01	Dial assy, snooze indicator (incl dial & shaft)	.50
†	558V276H01	Front, cabinet	3.25
†	558V288H02	Hand, hour	.15
†	558V289H02	Hand, minute	.15
†	558V290H02	Hand, second	.10
†	558V182H02	Hand, alarm set	.15
	783V061H01	Insert, special	.35
†	558V292H01	Insignia	.15
†	550V138H01	Knob, push button (clock)	.10
†	550V141H01	Knob, control (tuning, volume)	.30
	783V093H01	Pulley, dial cord stringing	.15
†	761V815H04	Screw, special (mtg front to cabinet)	.05
†	783V080H04	Shaft, time set extension	.20
†	783V172H01	Shaft, tuning	.20
	751V503H06	Socket, snap in, (7 pin) (has center pin)	.15
	751V503H03	Socket, snap in (7 pin) (no center pin)	.17
†	778V188H01	Socket rivet assy, (appliance socket)	1.15
†	570V077H01	Speaker, 4" PM (incl T3)	6.25
†	690V011H16	Switch, clock, off-on, Telechron #40X765	1.00

CHASSIS PARTS

Ref. No.	Part No.	Description	List Price
†C1	330V033H01	Variable, 2 gang (incl pulley)	3.35
C2	210V116H04	.047mf	.25
C3	215V306H03	.01mf, 1.4KV, ceramic	.35
C4	215V300H03	.01mf, ceramic	.22
†C5A } †C5B }	218V037H04	30mf, elec 80mf, elec	1.75
C6	210V213A33	.033mf, molded	.40
†L1	310V056H01	Loop, antenna	1.95
†L2	230V004H03	Coil, oscillator	1.00
R1	RC20AE223K	22K ohm	.07
R2	RC20AE151K	150 ohm	.06
R3	RC20AE335K	3.3 megohm	.09
†R4	270V083H01	Control, 500K ohm, volume	1.25
R5	RC20AE181K	180 ohm	.10
R6	RC20AE152M	1500 ohm, 1W	.10
†SW1	690V011H16	Switch, clock (Telechron #40X765)	1.00
T1	235V023H11	Transformer, 1st IF	1.57
T2	235V023H11	Transformer, 2nd IF	1.57
T3	570V077H01	ransformer, audio output (part of speaker)	
Z1	219V001H01	Couplatep (resistor-condenser combination)	.95

Westinghouse

ADVANCE SERVICE INFORMATION

SERVICE DEPARTMENT • TELEVISION-RADIO DIVISION
WESTINGHOUSE ELECTRIC CORP., METUCHEN, N.J.

MODELS

H-M1400 – *(Walnut)*
H-M1401 – *(Mahogany)*
H-M1402 – *(Cherry Provincial)*
H-M1403 – *(Cherry Colonial)*

CHASSIS

V-2511-1 – Tuner Pre-Amp
V-2510-2 – Amp & Power Supply

This information is advance chassis service information only. The service manual, containing completely detailed information on parts locations, disassembly procedures, adjustments, etc., will be part of a TECH-LIT subscriber mailing in the near future.

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*
Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.
Resistors are ½ watt, 10% unless otherwise specified.
†New part listed for the first time in Westinghouse Television of Radio service information.
*Price furnished on request.

MISCELLANEOUS

Ref. No.	Part No.	Description	List Price
	671V007H02	Adapter, 45 RPM (VM)	*
	778V180H03	Bracket rivet assy (speaker, switching) (incl Term BD) (mounts J2,J3 & SW1)	.60
†	778V197H01	Bracket rivet assy (ant mounting)	.40
	778V189H01	Bracket rivet assy (AFC switch, SW3, and mounting)	.75
	778V191H01	Bracket rivet assy (incl triple and double connectors)	.95
	778V192H01	Bracket rivet assy (incl interlock)	.40
†	516V136H01	Cabinet, H-M1400	*
†	516V139H01	Cabinet, H-M1401	*
†	516V118H01	Cabinet, H-M1402	*
†	516V114H01	Cabinet, H-M1403	*
	754V038H51	Cap, amp-lok (503) (9 contact) (less contacts)	.25
	671V009H01	Cartridge, stereo, 8TA45D (Sonotone, incl stylus)	20.50
	770V643H01	Clip, spring (mtg crystal)	.10
	754V021H01	Connector, phono (double)	.22
	754V043H01	Connector, phono (triple)	.30
	768V102H01	Contact, amp-lok (use with amp-lok caps & plugs)	.05
	751V006H02	Cord, AC power	1.25
†	787V001H91	Cover assy, back, H-M1400 (incl AC cord & bracket)	3.75
†	787V001H92	Cover assy, back, H-M1401 (includes AC cord & bracket)	3.75
†	787V001H93	Cover assy, back, H-M1402 (incl AC cord & bracket)	3.75
†	787V001H94	Cover assy, back, H-M1403 (incl AC cord & bracket)	3.75
†	558V267H01	Crystal (cabinet mounted)	3.75
	559V079H01	Dial, crystal assy (incl logging scale) (Part of tuner chassis)	3.65
†	521V003H24	Grill cloth, H-M1400	8.25
†	521V003H19	Grill cloth, H-M1401	8.25
†	521V003H21	Grill cloth, H-M1402	8.25
†	521V003H22	Grill cloth, H-M1403	8.50
	768V080H05	Hinge, butt	.57
	558V265H01	Holder, 45 RPM adapter	.50
	558V283H01	Insignia	.15
	558V271H01	Jewel	.15
	559V070H01	Knob, bottom, treble, bass, balance	1.00
†	559V071H01	Knob, bottom, loudness	1.00
	550V135H01	Knob, tuning	.40
	550V114H04	Knob, top, treble, bass, balance, loudness	.35
†	550V137H01	Knob, selector	1.25
	756V501H02	Lamp #1847	.22
	558V297H01	Overlay, crystal	.85
	778V194H01	Panel rivet, assy (incl pulley tuning shaft & bearing)	1.50
	558V270H01	Pointer	.65
	754V038H02	Plug, amp-lok (9 contact) (501) (less contacts)	.35
†	754V038H10	Plug, amp-lok (4 contact) (502) (less contacts)	.25
	754V029H02	Plug, phono	.10
	787V216H01	Pulley assy, gang (incl hub-pulley and pulley)	.65
	670V010H01	Record Changer (VM 1211) (incl cartridge)	*
	763V000H24	Ring, retaining	.05
	761V060H03	Screw, set #6-32	.22
	761V814H01	Screw, special #6-32 (used with C-14)	.10
	787V167H04	Shaft assy, dial (incl tuning shaft & pulley)	.40
	768V068H01	Shield, sockets (V10, V11 & V12)	.10
	770V649H01	Sleeve, spring (tuning knobs)	.10
	754V039H01	Socket (external speakers) jack	.75
	751V519H01	Socket, octal (V5)	.20
	751V543H03	Socket, 9 pin molded (V2A, V2B, V3, V4, V5, V6)	.22
	751V503H06	Socket, 7 pin (V6, V7, V10, V11, V12, V13)	.15
	751V543H04	Socket, 9 pin (V1A, V1B)	.25
	751V549H01	Socket, shielded, 7 pin (V8)	.45
	751V549H02	Socket, shielded, 9 pin (V9A, V9B)	.45
	751V566H02	Socket, pilot light	.35

Ref. No.	Part No.	Description	List Price
	570V072H01	Speaker, 12" PM	17.95
	570V071H01	Speaker, 8" PM	4.25
	690V023H05	Stylus (1 mil sapphire, 0.7 mil diamond)	18.75
	768V024H08	Toenut, #8-32 (amp-lok)	.20

V-2511-1 AM-FM TUNERS & PRE AMP CHASSIS

Ref. No.	Part No.	Description	List Price
C1	215V308H05	.01mf, 500V, disc	.15
C2	215V308H05	.01mf, 500V, disc	.15
C3	210V052A23	.022mf, 400V	.22
C4	210V052A23	.022mf, 400V	.22
C5	210V014A73	.047mf, 200V	.27
C6	330V015H08	Variable (2 gang)	3.00
†C7	215V184A72	.0047mf, ceramic	.15
C8	215V300M21	3.3mmf, ceramic	.17
†C9	215V172A22	.0022mf, ceramic	.15
†C10	215V172A22	.0022mf, ceramic	.15
C11	215V111A01	100mmf, ceramic	.20
C12	215V111A01	100mmf, ceramic	.20
C13	219V025H02	1500mmf, feedthrough	.25
C14	215V307H01	1.5mmf to 6mmf, trimmer	.25
C15	215V308H02	.001mf, ceramic	.20
C16	215V308H02	.001mf, ceramic	.20
C17	215V102A22	.0022mf, ceramic	.22
†C18	330V016H03	Variable (2 gang)	3.75
C19	215V308H02	.001mf, ceramic	.20
†C20	215V304H02	2.7mmf, N-750, ceramic	.20
†C21	215V304H03	4.7mmf, N-470, ceramic	.20
C22	215V300H45	47mmf, N-750, ceramic	.20
C23	217V001A09	1mmf, fixed comp	.27
C24	215V104A71	470mmf, ceramic	.20
C25	215V308H04	.005mf, ceramic	.20
C26	219V025H02	1500mmf, feedthrough	.20
C27	219V025H02	1500mmf, feedthrough	.20
†C28	215V172A22	.0022mf	.15
†C29	215V172A22	.0022mf, ceramic	.15
†C30	215V184A72	.0047mf, ceramic	.15
C31	215V113A03	.01mf, disc	.15
C32	210V014A73	.047mf, 200V	.27
†C33	215V172A22	.0022mf, ceramic	.15
C34	218V012H13	4mf, elec	1.15
C35	215V113A03	.01mf, ceramic	.15
C36	219V025H02	1500mmf, feedthrough	.20
C37	215V113A03	.01mf, ceramic	.15
C38	210V213A33	.033mf, ceramic	.40
†L1	310V055H01	Loop, antenna (AM)	2.75
L2	230V040H04	Coil, oscillator (AM)	.95
†L3	230V065H01	Coil, antenna, (FM)	.25
L4	230V045H01	Coil, RF (FM)	.90
L5	230V056H17	Coil, mixer plate (incl 1K ohm resistor	.40
†R1A, B	270V089H01	Control, dual, 1 megohm (loudness)	2.00
R2A	RC20AE274K	270K ohm	.06
R2B	RC20AE274K	270K ohm	.06
R3	RC20AE106M	10 megohm	.06
R4	RC20AE106M	10 megohm	.05
R5	RC20AE274K	270K ohm	.06
R6	RC20AE274K	270K ohm	.06
†R7A, R7B	270V089H02	Control, dual, 1 megohm (balance)	2.00
†R8A, R8B	270V089H03	Control, dual, 1 megohm(bass)	1.95
R9	250V221A04	100K ohm	.12
R10	250V221A04	100K ohm	.12
†R11A, R11B	270V082H02	Control, dual, 1 megohm (treble) (incl SW3 (if-On)	2.85
R12	RC20AE223K	22K ohm	.06
R13	250V721A52	1.5K ohm	.15
R14	250V723A35	3.3 megohm	.12
R15	250V221A01	100 ohm	.12
R16	250V723A35	3.3 megohm	.12
R17	RC20AE102K	1K ohm	.04
R18	RC20AE105K	1 megohm	.05
R19	RC20AE684K	680K ohm	.06

V-2510-2 PUSH-PULL STEREO AMPLIFIERS & POWER SUPPLY

Ref. No.	Part No.	Description	List Price
R20	RC20AE684K	680K ohm	.06
R21	RC20AE474K	470K ohm	.05
R22	RC20AE475K	4.7 megohm	.05
R23	250V226A81	680 ohm	.17
R24	250V226A81	680 ohm	.17
R25	250V223A35	3.3 megohm	.06
R26	RC20AE103K	10K ohm	.05
R27	RC20AE105K	1 megohm	.05
R28	250V226A81	680 ohm	.17
R29	RC20AE680K	68 ohm	.04
R30	RC20AE102K	1K ohm	.05
R31	250V222A25	2.2 megohm	.12
R32	250V222A24	220K ohm	.12
R33	RC20AE680K	68 ohm	.04
R34	RC20AE474K	470K ohm	.05
R35	RC20AE102K	1K ohm	.05
R36	RC20AE104M	100K ohm	.05
R37	RC20AE680K	68 ohm	.04
R38	RC20AE223K	22K ohm	.06
R39	RC20AE105K	1 megohm	.05
R40	RC20AE103K	10K ohm	.05
SW1A, SW1B	756V048H01	Switch, 8 position, 4 deck (selector)	5.50
SW1C, SW1D			
SW2	778V189H01	Switch, slide (AFC)	.75
†SW3	270V082H02	Switch, ofhen (attached to R11A & R11B)	2.85
T1	235V023H11	Transformer, 1st IF (AM)	1.57
T2	235V023H11	Transformer, 2nd IF (AM)	1.57
T3	230V045H02	Transformer, oscillator (FM)	.95
T4	235V039H03	Transformer, 1st IF (FM)	1.65
†T5	235V059H01	Transformer, 2nd IF (FM)	1.65
†T6	235V060H01	Transformer, limiter (FM)	1.35
†T7	235V061H01	Transformer, ratio detector (FM)	2.50
VR1	756V515H01	Lamp, neon	.60
X1	296V002H06	Diode, AVC	1.40
X2	296V002H06	Diode detector (AM)	1.40
†X3	296V008H01	Diode, AFC (FM)	3.50
Z1	219V021H01	Package circuit (tone)	1.12
Z2	219V021H01	Package circuit (tone)	1.12
†Z3	219V022H03	Package circuit, detector filter (AM)	.50
†Z4	219V036H01	Package circuit, detector filter (FM)	1.25
	210V054A73	.047mf, 400V	.22
C2	210V056A73	.047mf, 400V	.22
C3	218V037H07	100mf, 25V, elec (incl C8A & C8B)	2.00
C4	218V025H19	4mf, non-polarized elec	2.50
C5	218V025H19	4mf, non-polarized elec	2.50
C6	210V117A61	.047mf, 600V	.35
C7A, C7B, C7C	218V037H08	80mf, 400V, elec; 40mf, 400V, elec; 30mf, 400V, elec	4.75
C8A, C8B	218V037H07	10mf, 300V elec (included in C3); 30mf, 350V	
L1	430V064H01	Reactor, filter	2.30
R1	RC20AE225M	2.2 megohm	.06
R2	RC20AE225M	2.2 megohm	.06
R3	RC20AE222K	2.2K ohms	.05
R4	RC20AE222K	2.2K ohms	.05
R5	250V221A04	100K ohms	.12
R6	250V221A04	100K ohms	.12
R7	RC20AE334K	330K ohms	.05
R8	RC20AE273K	27K ohms	.07
R9	RC20AE334K	330K ohms	.05
R10	RC20AE683K	68K ohms	.05
R11	RC20AE102M	1K ohm	.04
R12	250V423A90	39 ohms, 2W	.27
R13	RC20AE102M	1K ohm	.04
R14	RC20AE683K	68K ohms	.05
R15	RC20AE330K	33 ohms	.05
R16	RC20AE330K	33 ohms	.05
R17	RC20AE221M	220 ohms	.05
R18	RC20AE221M	220 ohms	.05
R19	RC20AE102M	1K ohm	.04
R20	RC20AE102M	1K ohm	.04
R21	RC20AE330K	33 ohms	.05
R22	RC20AE330K	33 ohms	.05
R23	RC20AE221M	220 ohms	.05
R24	RC20AE221M	220 ohms	.05
R25	RC40AE152K	1.5K ohms, 2W	.20
†R26	251V020H26	3.9K ohms, 15W	.60
R27	RC20AE223K	22K ohms	.04
SW1	756V046H01	Switch, speaker	1.40
†T1	430V093H01	Transformer, audio (single end)	5.75
†T2	430V094H01	Transformer, audio output (push-pull)	8.25
†T3	410V017H01	Transformer, power	21.95

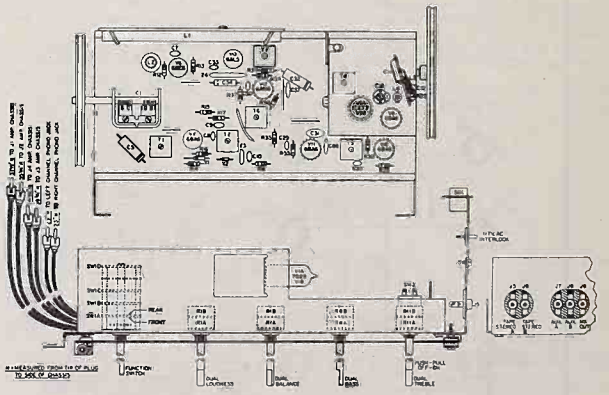


Figure 1 – Top View of V-2511-1 Chassis (AM-FM tuners & Pre-Amp

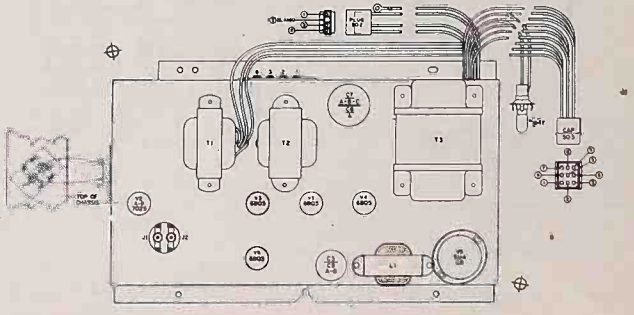


Figure 2 – Top View of V-2510-2 Chassis (Push-Pull Stereo amplifier & power supply)

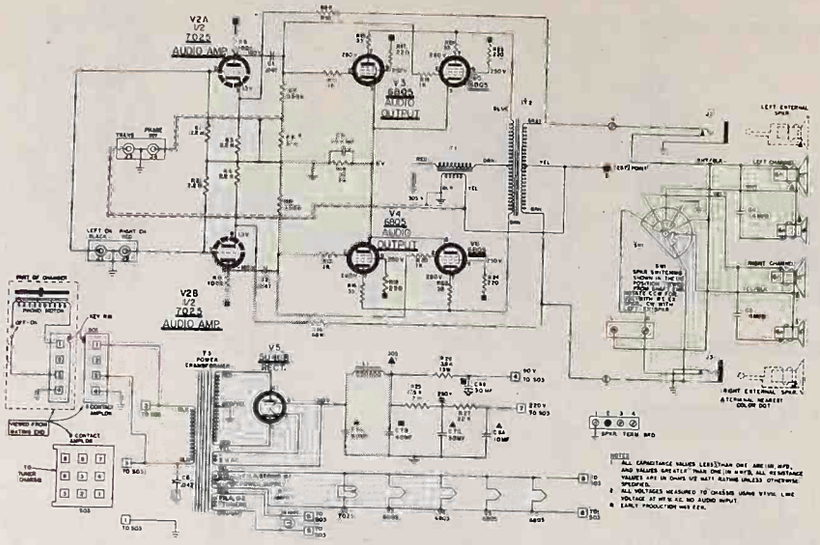


Figure 4 – V-2510-2 Schematic Diagram

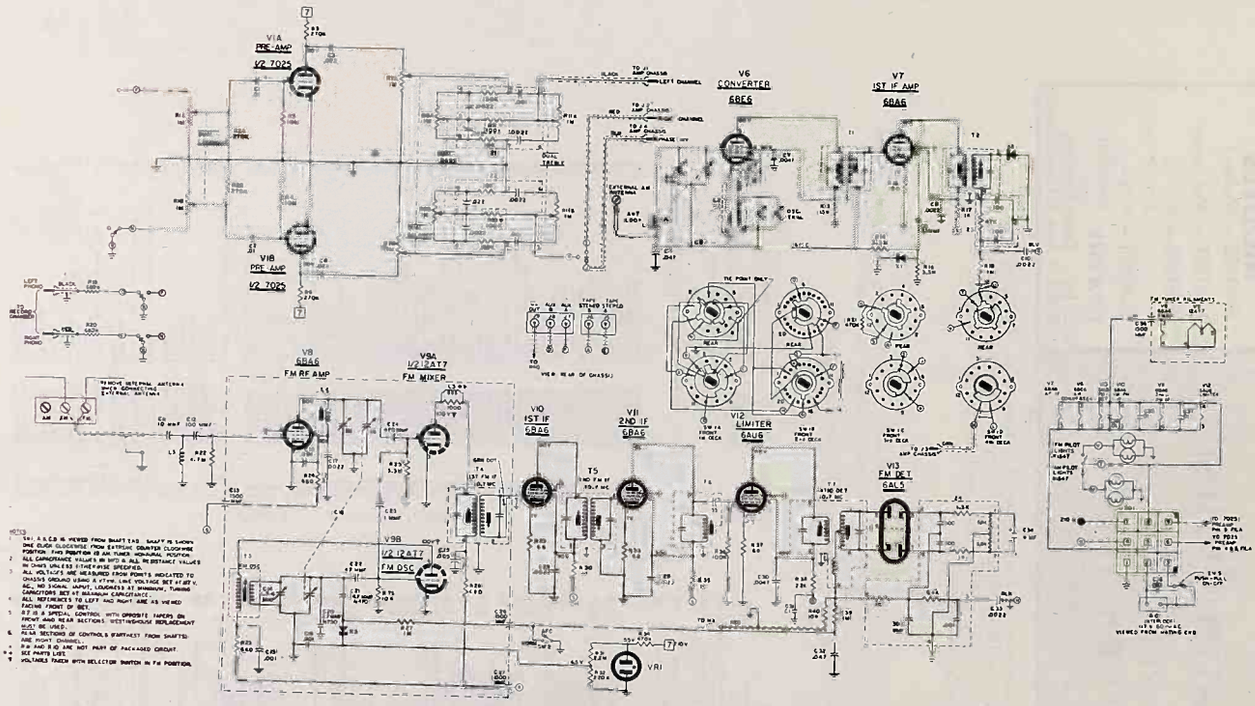


Figure 3 – V-2511-1 Schematic Diagram

Westinghouse

HIGH FIDELITY SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

A Tech-Tips Publication

MODELS

H-R1200	*(Walnut)*
H-R1201	*(Mahogany)*
H-R1202	*(Maple)*
H-R1203	*(Limed Oak)*
H-R1204	*(Cherry Provincial)*

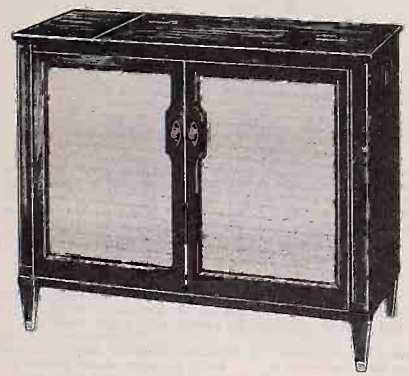
CHASSIS V-2509-2

STEREO HIGH FIDELITY PHONOGRAPH WITH AM RADIO

SPECIFICATIONS

Tube Complement	
V1: 7025 or 12AX7	Pre-Amp
V2: 7025 or 12AX7	Driver
V3: 6BQ5	Audio Output, Left Channel
V4: 6BQ5	Audio Output, Right Channel
V5: 6BE6	Converter, AM Radio
V6: 6BA6	1st IF Amplifier
V7: 5Y3-GT	L. V. Rectifier
X1: LD145	Detector, Diode (Crystal)
Operating Voltage	105 to 120V 60 cps AC
Power Consumption	120 Watts
Audio Output Power	
Undistorted	15 Watts
Maximum	20 Watts
Undistorted Stereo Audio Output	7.5 Watts each channel
Frequency Response	Flat 100 cps to 20,000 cps ± 1 db at 1/2W output
Speakers	
Two	12" PM
Two	4" PM

Phono cartridge (part 671V009H01) .... Sonotone 8TA stereo
Stylus, dual (part 690V023H05) ..... Diamond & Sapphire



PUSH-PULL STEREO AMPLIFIER

It is important that the cartridge leads be attached properly to the cartridge holder terminals. In most systems, the two middle terminals would be connected to ground. The push-pull stereo amplifier requires that one of these terminals be connected to the right channel input. (see figure 5 for correct hookup). The crystals for ordinary stereo systems are set up so that the lateral movements of the stylii produce in-phase signals wheteas the vertical movements produce out-of-phase signals. Monaural records produce only lateral motion, with equal output from each crystal. If in-phase signals of equal amplitude are sent through the push-pull stereo system, they tend to cancel each other out.

Reversing the leads to the holder makes the lateral signals out-of-phase and the vertical signals in-phase, therefore monaural records can be played through this system. Whatever vertical components happen to be present tend to block each other out. This is a distinct advantage over ordinary stereo systems, since all of the vertical components in monaural records are undesirable. (wows, rumbles, etc.) To completely eliminate the vertical component, a switch is provided across T1. (see figure 7)

Because the cartridge leads are reversed, the speaker leads of one channel must also be reversed for proper phasing. (see SPEAKER PHASING, this manual)

CHASSIS REMOVAL

1. Remove top control knobs.
2. Remove back cover.
3. Disconnect amp-lok plug from record changer.
4. Remove phono plugs from base plate of record changer.
5. Remove screws holding speaker switching bracket to cabinet.
6. Remove screws holding antenna loop to cabinet.
7. Disconnect speaker leads (Note connection of color coded wires)
8. Remove pilot light socket from plate mounted on block on baffle.
9. Remove two screws holding chassis to cabinet. There are two spring clips holding chassis to top of cabinet. Pull chassis out from chassis mounting board, then pull slowly in downward direction.
10. Remove chassis.

Figure 1 – Speaker Switching Bracket, Front View

EXTERNAL SPEAKERS

An external speaker can be used to reproduce either the left channel or the right channel, by plugging it into the appropriate jack (see figure 3). If the external speaker is located less than six feet from the master unit, the screwdriver control slot should be left in the "N" position. This position cuts out those speakers nearest to the external speaker.

If the external speaker is more than six feet away best results will be obtained with the control slot in the "R" position if the external speaker is in the right or in the "L" position if the external speaker is on the left. In these positions the external speaker plays one channel and all of the internal speakers are hooked up together to play the other channel.

When no external speaker is used, the control slot should remain in the "N" position.

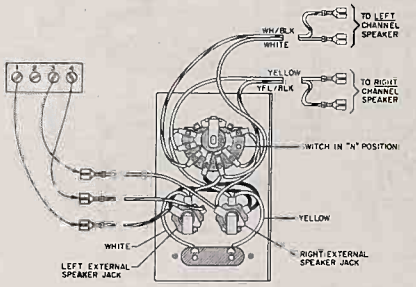


Figure 2 – Speaker Switching Bracket, Rear View

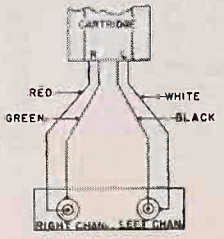


Figure 3 – Rear View of Cartridge Wiring

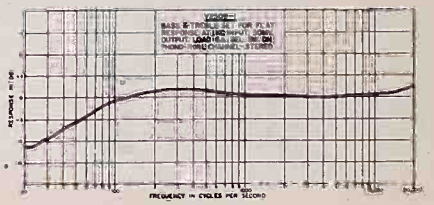


Figure 4 – Frequency Response Curve

TONE ARM HEIGHT

The tone arm height is adjusted by means of the height adjustment screw (refer to figure 1.) To raise the tone arm, turn the screw counter-clockwise. To lower the tone arm, turn it clockwise.

The tone arm height should be adjusted so that with a 1 1/8" stack of records on the turntable the tone arm lifts 1/4" straight up as the change cycle starts.

STYLUS SET-DOWN

If the stylus sets-down too far in or out on the record, then the stylus set-down adjustment must be reset. Turn the screw (shown in figure) a small amount until the stylus lands in the correct position. If set-down is adjusted for 10" records it will also be correct for 7" and 12" records.

RECORD CHANGER

The record changer used in the models covered by this manual is the VM1211A, manufactured especially for Westinghouse. For service information and parts list, refer to service manual RM4415 and supplement #2, RM4506.

CARTRIDGE REPLACEMENT

Write down the sequence of colored wires connecting to the four terminals at rear of cartridge. Remove the mounting screws securing the cartridge in the tone arm. Remove the push-on connectors from the cartridge terminals. Push the connectors onto the terminals of the replacement cartridge with the wire-colors in the sequence previously noted for the original cartridge.

STYLUS REPLACEMENT

To remove Stylus (item #1), move Lever Handle (#2) halfway until it is pointing down. Gently pull Spring Clip (#3) slightly open with finger. Grasp Stylus by Lever Handle and slip it out from under clip. To replace Stylus, slip heel of Stylus under Clip. Gently pull Clip slightly open with finger. Slip Stylus under Clip making certain that Stylus shaft rests in center of Coupler (#4).

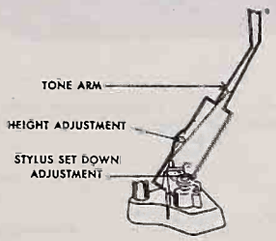


Figure 5 – Stylus Set-down

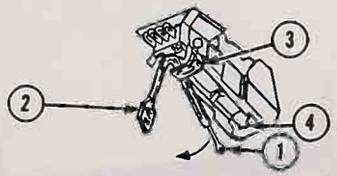


Figure 6 – Stylus replacement

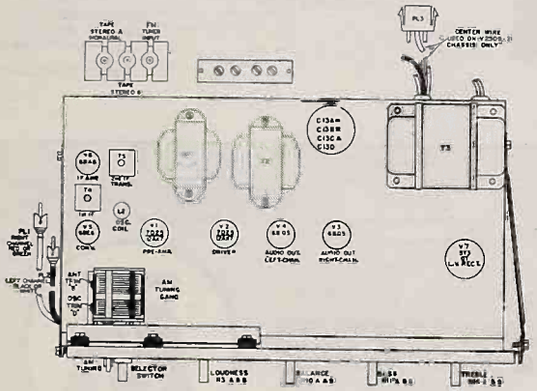


Figure 7 – Top View of Chassis

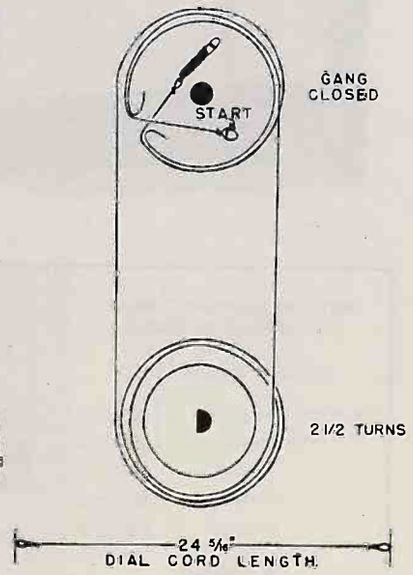


Figure 8 – Dial Cord Stringing

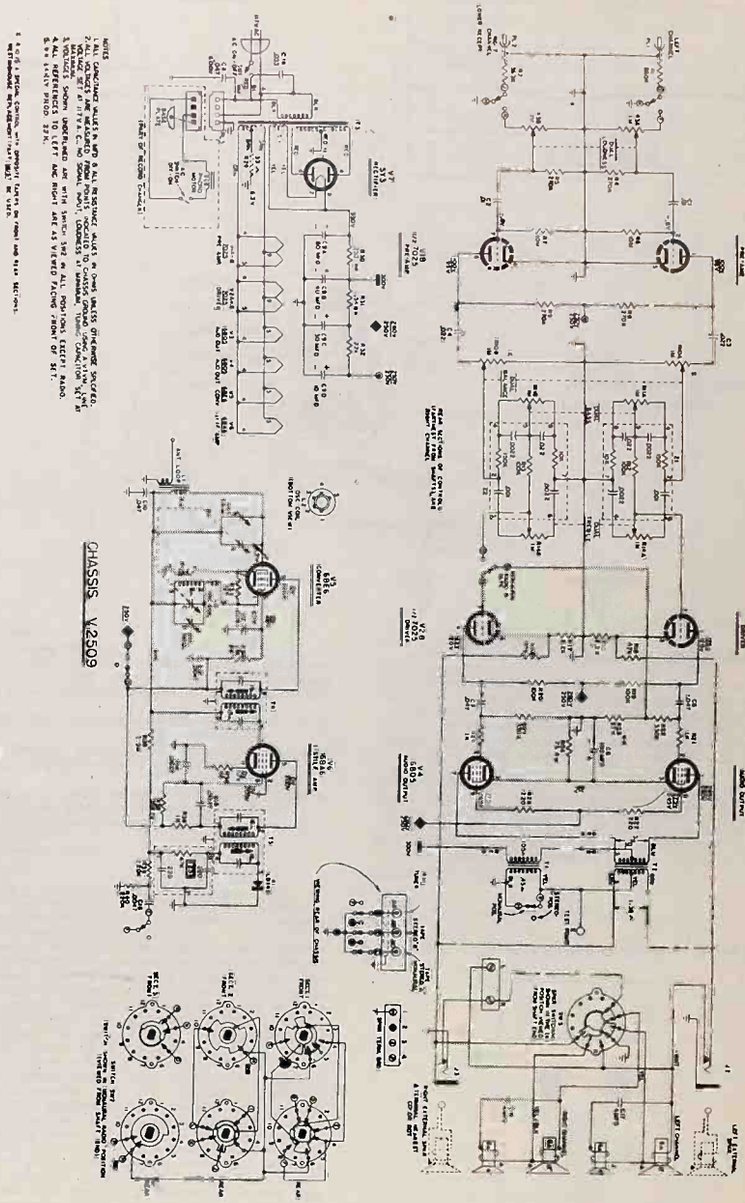


Figure 9 – Schematic Diagram

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*
Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.
Resistors are ½ watt, 10% unless otherwise specified.
†New part listed for the first time in Westinghouse Television or Radio service information.
*Price furnished on request.

Ref. No.	Part No.	Description	List Price
†	671V007H02	Adapter, 45 RPM spindle	*
	778V181H01	Background assy (incl spacer)	*
	778V182H01	Bracket assy, tuning gang (incl bearing)	*
†	778V180H02	Bracket assy, aux spkr	*
	759V070H09	Cable, phono, 30" long (incl connector)	.95
†	671V009H01	Cartridge, stereo	*
	516V097H01	Cabinet, walnut, H-R1200	*
	516V099H01	Cabinet, mahogany, H-R1201	*
	516V096H01	Cabinet, maple, H-R1202	*
	516V097H02	Cabinet, limed oak, H-R1203	*
†	516V162H01	Cabinet, cherry, provincial	*
	770V843H01	Clip, spring (mfg crystal)	.10
	768V102H01	Contact, amp-lok	.05
	782V050H01	Cover, back, H-R1200/3	
	782V050H02	Cover, back, H-R1201	
	782V050H03	Cover, back, H-R1202	
†	521V003H73	Grill Cloth H-R1204	*
	751V002H01	Cord, AC power	.72
	558V267H02	Crystal, radio escutcheon	3.95
	550V117H03	Dial, AM tuner indicator	.75
†	555V052H01	Escutcheon, control panel	3.15
†	521V003H27	Grille cloth, H-R1200	*
†	521V003H18	Grille cloth, H-R1201	*
†	521V003H26	Grille cloth, H-R1202	*
†	521V003H27	Grille cloth, H-R1203	*
†	782V050H04	Cover, back H-R1204	3.65
	768V080H05	Hinge, but H-R1200, 1, 2, 3	.57
	768V080H06	Hinge, but H-R1203	.57
	558V265H01	Holder, 45 RPM spindle	*
†	558V283H01	Insignia, record changer	.15
	558V271H01	Jewel	.15
	559V070H01	Knob,assy, numerical ind, balance (bottom)	*
	559V071H01	Knob assy, numerical ind, loudness, bass and treble (bottom)	*
	559V072H01	Knob, AM tuning	*
	550V114H04	Knob, balance, loudness, bass & treble (top)	.35
	550V137H02	Knob, function selector	1.25
	756V501H02	Lamp, #1847	.22
	768V044H04	Nut, round push-on (Jewel)	.05
	558V296H01	Overlay, crystal	*
		Socket, ext spkr jack (see J2)	
	751V545H03	Socket, pilot light	1.00
	751V519H01	Socket, tube, octal	.20
	751V527H02	Socket, tube, 7 pin	.17
	751V543H03	Socket, tube, 9 pin	.22
	570V071H01	Speaker, 4" PM	*
†	570V072H01	Speaker, 12" PM	*
	787V167H03	Shaft assy, dial (incl pulley)	*
	770V250H07	Spring, dial drive	.10
	768V024H06	Tee-nut, #10-32 (mtg chassis)	*
	768V024H08	Tee-nut, #8-32 (mtg chassis clips)	.20
C1	215V101A03	.01mf, 400V, cer	.35
C2	215V101A03	.01mf, 400V, cer	.35
C3	210V052A23	.022mf, 400V	.22
C4	210V052A23	.022mf, 400V	.22
C5	210V054A73	.047mf, 400V	.22
C6	218V025H14	100mf, 25V, elect	1.30
C7	210V054A73	.04mf, 400V	.22
C8	210V117A01	.047mf, 600V, mica	.27
C9A, C9B, C9C, C9D	218V037H03	80mf, 450V, elect; 40mf, 350V, elect; 30mf, 350V, elect; 10mf, 300V, elect	4.75
C10	210V054A73	.047mf, 400V	.22
†C11	330V031H01	Tuning capacitor	3.95
C12	215V103A32	.0033mf, cer	.27
C13	215V114A72	.0047mf, cer	.17
C14	215V103A32	.0033mf, cer	.27
C15	215V114A72	.0047mf, cer	.17
C16	215V114A72	.0047mf, cer	.17
C17	218V025H19	4mf, 50V, non-polarized elect	1.35
C18	218V025H19	4mf, 50V, non-polarized elect	1.35
C19	210V213A33	.033mf, 600V	.40
J1A, J1B, J1C	754V043H01	Connector, three phone jacks	.30
J2	754V039H01	Socket, ext spkr jack	*
J3	754V039H01	Socket, ext spkr jack	*
L1	310V054H01	Loop, ant	2.50
L2	230V085H01	Coil, osc	1.00
PL1	754V029H02	Plug, phono	.10
PL2	754V029H02	Plug, phono	.10
†PL3	754V038H10	Plug, amp-lok, 4 pin	*
R1	RC20AE564K	560K ohms	.05
R2	RC20AE564K	560K ohms	.05
R3A, R3B	270V062H03	Control, dual, loudness, 1 megohm	2.00
R4	RC20AE274K	270K ohms	.06
R5	RC20AE274K	270K ohms	.06
R6	RC20AE106M	10 megohms	.05
R7	RC20AE106M	10 megohms	.05
R8	RC20AE274K	270K ohms	.06
R9	RC20AE274K	270K ohms	.06
R10A, R10B	270V062H04	Control, dual, balance, 1 megohm	2.00
R11A, R11B	270V062H05	Control, dual, bass, 1 megohm	2.00
R12	RC20AE104M	100K ohms	.05
R13	RC20AE104M	100K ohms	.05
R14A, R14B	270V082H01	Control, dual, treble, 1 megohm (incl SW1)	2.85
R15	RC20AE473K	47K ohms	.05
R16	RC20AE222K	2.2K ohms	.05
R17	RC20AE222K	2.2K ohms	.05
R18	RC20AE473K	47K ohms	.05
R19	RC20AE104K	100K ohms	.05
R20	RC20AE104K	100K ohms	.05
R21	RC20AE102M	1K ohms	.04
R22	RC20AE334M	330K ohms	.05
R23	RC20AE273K	27K ohms	.06
R24	250V417A50	75 ohms, 4W	.25
R25	RC20AE334M	330K ohms	.05
R26	RC20AE102M	1K ohms	.04
R27	RC20AE222K	220 ohms	*
R28	RC20AE222K	220 ohms	*
R29	RC20AE330M	33 ohms	.05
R30	251V020H25	230 ohms, 4W	.30
R31	251V020H12	1.5K ohms, 4W	.35
R32	RC20AE223K	22K ohms	.06
R33	RC20AE223K	22K ohms	.06
R34	RC42AE153K	15K ohms, 2W	.25
R35	250V223A35	3.3 megohms	.12
R36	RC20AE680K	68 ohms	.04
R37	RC30AE333K	33K ohms, 1W	.10
R38	RC20AE102M	1K ohms	.04
R39	RC20AE224M	220K ohms	.05
R40	RC20AE224M	220K ohms	.05
SW1	270V082H01	Switch, incl R14	2.85
SW2	756V045H01	Switch, 6 position, 3 wafer	4.25
†SW3	756V046H01	Switch, aux spkr	1.40
T1	430V089H01	Transformer, audio	3.95
T2	430V090H01	Transformer, audio	6.95
T3	410V014H01	Transformer, power	13.95
T4	235V057H01	Transformer, 1st IF	1.50
T5	235V057H02	Transformer, 2nd IF	1.50
X1	296V002H06	Diode, crystal, CBS LD-145	1.40
Z1	219V021H01	Packaged circuit, tone	1.12
Z2	219V021H01	Packaged circuit, tone	1.12
Z3	219V035H01	Packaged circuit, detector	.50

AM ALIGNMENT

1. Connect VTVM as indicated in the AM alignment chart.
2. Use signal generator covering 455 kc to 1700 kc, AM modulated, with adjustable output attenuator.
3. Set loudness control, R3, at maximum.
4. Set Selector Switch in monaural radio position.
5. Keep the signal generator output voltage level low to avoid AVC action.

AM ALIGNMENT CHART

STEP	CONNECT SIGNAL GENERATOR	SIGNAL GENERATOR FREQUENCY	C15 SETTING	VTVM CONNECTION	ADJUST
1	To pin 7 of 6BE6 through .05 mfd capacitor	455 kc modulated	Minimum capacity	Across voice coil	Primary and secondary of T5 and T4 for maximum output
2	To stator of antenna tuning capacitor "A" through .05 mfd capacitor	1625 kc modulated	"	"	Oscillator trimmer capacitor "D" for maximum output
3	Radiated signal	1400 kc modulated	Tune for Signal	"	Antenna trimmer "B" for maximum output

Westinghouse

RADIO SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

Tech-Lit Publication

MODELS

H-751P4
(Charcoal/White)
H-752P4
(Gray/White)

V-2394-5 CHASSIS

These models are almost identical to models H-659P4 and H-660P4, chassis V-2394-1. Refer to manual RM-4354 for all service information.

The differences are:

1. A planetary drive has been added to the tuning gang and it uses a new knob.
2. A speaker with a heavier magnet is used.
3. The schematic must be changed as follows:
   a. Change R9 from 3 watts to 5 watts.
   b. Add C9, .01mf, 1400 V capacitor across the AC input.
   c. Remove C6 from across X1.
   d. Change R8 from 2K to 2.1K, 7W.

PARTS LIST

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Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.
Resistors are ½ watt, 10% unless otherwise specified.
†New part listed for the first time in Westinghouse Television or Radio service information.
*Price furnished on request.

CABINET & MISC. PARTS

Ref. No.	Part No.	Description	List Price
	770V565H01	Bracket, handle	.10
	778V104H01	Bracket rivet assy (incl AC receptacle)	.45
†	513V035H09	Cabinet assy, charcoal/white	8.75
†	513V035H10	Cabinet assy, gray/white	8.75
	759V042H02	Cable, batteries	.70
†	559V027H03	Catch assy, H-751P4	1.00
	559V027H08	Catch assy, H-752P4	.35
	751V009H01	Cord, AC power	.75
†	555V028H02	Escutcheon	1.00
	558V159H03	Handle	.65
†	558V166H02	Insignia	.35
	550V096H03	Knob, volume	.70
	559V058H01	Knob, dial	*
	559V043H01	Knob, tuning	*
†	558V162H05	Nameplate	.75
	768V044H09	Nut, round (push-on) (captivate knob)	.05
	751V513H05	Socket, 7 pin, shielded (1U4, 1R5)	.17
	751V513H04	Socket, 7 pin (3V4)	.17
	570V050H02	Speaker, 4" PM	*
	770V520H01	Spring, hinge	.10

CHASSIS PARTS

Ref. No.	Part No.	Description	List Price
†C1	330V014H04	Capacitor, variable (2 gang) (vernier)	3.75
C2	215V111A03	.01mf, cer	.20
C3	210V111H08	.15mf, 200V	.35
C4	215V112A22	.0022mf, cer	.17
C5	215V308H04	.005mf, cer	.20
C6		Not used	
C7A, C7B, C7C	218V025H18	Elec, 80mf, 150V / Elec, 250mf, 15V / Elec, 60mf, 150V	2.45
C8	215V306H03	.01mf, 1.4KV, cer	.35
C9	215V306H03	.01mf, 1.4KV, cer	.35
L1	310V041H01	Loop, iron-core, antenna	1.80
L2	230V063H01	Coil, oscillator	.95
R1	250V231A04	100K ohm	.05
R2	250V234A73	47K ohm, 5%	.17
R3	250V226A81	680 ohm	.17
R4	250V234A72	4.7K ohm, 5%	.12
R5	270V027H06	Control, Megohm, volume (incl SW1, off-on)	1.95
R6	250V222A70	27 ohm	.06
R7	250V228A21	820 ohm	.12
R8	251V026H01	2.1K ohm, 7W, ballast	.70
R9	251V020H55	150 ohm, 5W, ballast	.35
R10	250V221A56	15 megohm, 5%	.20
SW1	270V027H06	Switch, off-on (part of R5)	
SW2	756V030H01	Switch, AC to battery	1.45
T1	235V043H01	Transformer, 1st IF, 455 KC	1.60
T2	235V043H02	Transformer, 2nd IF, 455 KC	1.60
T3	570V050H02	Transformer, audio output (part of spkr)	
X1	259V014H01	Rectifier, selenium	2.00
Z1	219V026H01	Module, used with 1U5	2.30

Westinghouse

ADVANCE SERVICE INFORMATION

SERVICE DEPARTMENT • TELEVISION-RADIO DIVISION
WESTINGHOUSE ELECTRIC CORP., METUCHEN, N.J.

MODELS

H-M1300 – *(Walnut)*
H-M1301 – *(Mahogany)*
H-M1302 – *(Limed oak)*
H-M1303 – *(Fruitwood)*

CHASSIS

V-2511-1 – Tuner Pre-Amp
V-2510-1 – Amp & Power Supply

This information is advance chassis service information only. The service manual, containing completely detailed information on parts locations, disassembly procedures, adjustments, etc., will be part of a TECH-LIT subscriber mailing in the near future.

PARTS LIST

When ordering parts, specify part number, description of part and model number. *Do not order by model number alone.*
Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.
Resistors are ½ watt, 10% unless otherwise specified.
†New part listed for the first time in Westinghouse Television or Radio service information.
*Price furnished on request.

Ref. No.	Part No.	Description	List Price
		MISCELLANEOUS	
	673V007H01	Adapter, 45 RPM (Collaro)	*
†	778V191H01	Bracket rivet assy (incl triple and double converter)	.95
†	778V180H01	Bracket rivet assy (spkr switching) (incl term BD) (mounts jack)	.60
†	778V192H01	Bracket rivet assy (incl interlock)	.40
†	778V197H01	Bracket rivet assy (ant mounting)	.40
	778V189H01	Bracket rivet assy (AFC switch SW3 & mounting)	.75
†	516V113H01	Cabinet, M-M1300	*
†	516V133H02	Cabinet, M-M1301	*
†	516V113H03	Cabinet, M-M1302	*
†	516V113H04	Cabinet, M-M1303	*
	754V038H01	Cap, amp-lok (9 contact) (503) (less contacts)	.25
	671V001H02	Cartridge, stereo, Astatic 13T (incl stylus)	7.75
	770V843H01	Clip, spring (crystal mounting)	.10
	754V031H03	Connector, phono (double)	.22
	754V543H01	Connector, phono (triple)	.38
	768V102H01	Contact, amp-lok (use with amp-lok caps & plugs)	.05
	751V006H02	Cord, AC power	1.25
†	787V214H01	Cover assy, back (incl AC cord & bracket)	3.75
	558V267H01	Crystal (cabinet mounted)	3.75
†	559V079H01	Dial crystal assy, (incl logging scale)Kept at tuner chassis)	3.65
†	521V013H04	Grill cloth, M-M1300, M-M1302	5.60
†	521V903H29	Grill cloth, M-M1301	5.75
†	521V002H26	Grill cloth, M-M1303	6.00
	768V080H03	Hinge, butt, M-M1300, M-M1301, M-M1303	.57
	768V080H06	Hinge, butt, M-M1302	.57
	558V265H01	Holder (45 RPM adaptor)	.50
	558V271H01	Jewel	.15
	559V070H01	Knob, bottom, treble, bass, balance	1.00
	559V071H01	Knob, bottom, loudness	1.00
	550V135H01	Knob, tuning (AM & FM)	.40
	550V137H01	Knob, selector	1.25
	550V134H04	Knob, top, treble, bass, balance, loudness	.35
	754V501H02	Lamp #1847	.22
†	518V001H25	Leg, M-M1300	1.65
†	518V001H31	Leg, M-M1301	1.65
†	518V001H24	Leg, M-M1302	1.65
†	518V001H26	Leg, M-M1303	1.65
†	558V297H01	Overlay, crystal	.85
†	778V194H03	Panel rivet assy (incl pulley tuning shaft & bearing)	1.50
†	558V270H01	Pointer	.65
	754V038H02	Plug, amp-lok 9 contact (501) (less contacts)	.35
†	754V038H08	Plug, amp-lok 3 contact (502) (less contacts)	.25
	754V029H02	Plug, phono	.10
†	787V216H01	Pulley assy, gang (incl hub-pulley & pulley)	.65
	670V009H01	Record changer (Collaro Conquest) (cartridge not included)	*
	763V000H24	Ring, retaining	.05
†	761V814H01	Screw, special, #6-32 (used with C14)	.10
	761V660H03	Screw, set #6-32	.22
	787V167H01	Shaft assy dial (incl tuning shaft & pulley)	.50
	768V068H01	Shield, sockets (V10,11,12)	.10
	770V649H01	Sleeve, spring (tuning knobs)	.10
	754V039H01	Socket (ant speakers) (jack)	.75
	751V519H01	Socket (octal) (V5)	.20
	751V503H06	Socket (7 pin) (V6, V7, V10, V11, V12, V13)	.15
†	751V543H04	Socket (9 pin) (V1A, V1B)	.25
	751V543H03	Socket (9 pin mid-rd) V2A, V2B, V3, V4, V5, V6)	.22
	751V566H02	Socket, pilot lights	.35
	751V549H01	Socket, shielded (7 pin) V8	.45
	751V549H02	Socket, shielded (9 pin) V9	.45
	570V076H01	Speaker, 8" PM	9.50
	570V071H01	Speaker, 4" PM	4.25
†	770V250H09	Spring, dial drive	.12
	768V024H08	Toenut, 8-32 (amp mtg)	.20
	768V024H04	Toenut (legs)	.15
		V-2511-1 AM-FM TUNERS & PRE AMP CHASSIS	
C1	215V308H05	.01mf, 500V disc	.15
C2	215V308H05	.01mf, 500V disc	.15
C3	210V052A23	.022mf, 400V	.22
C4	210V052A23	.022mf, 400V	.22
C5	210V014A73	.047mf, 200V	.27
C6	330V035H08	Variable (2 gang)	3.00
†C7	215V184A72	.0047mf, ceramic	.15
C8	215V200N21	3.3mmf, ceramic	.17
†C9	215V172A22	.0022mf, ceramic	.15
†C10	215V172A22	.0022mf, ceramic	.15
C11	213V182H02	10mmf, mica	.20
C12	215V131A01	100mmf, ceramic	.26
C13	219V025H02	1500mmf, feedthrough	.25
C14	215V307H01	1.5mmf to 6mmf, trimmer	.35
C15	215V308H02	.001mf, ceramic	.20
C16	215V308H02	.001mf, ceramic	.20
C17	215V102A22	.0022mf, ceramic	.22
†C18	330V016H03	Variable (2 gang)	3.75
C19	215V308H02	.001mf, ceramic	.20
†C20	215V304H02	2.7mmf, N-750, ceramic	.20
†C21	215V304H03	4.7mmf, N-470, ceramic	.20
C22	215V300H45	47mmf, N-750, ceramic	.25
C23	217V001A09	1mmf, fixed comp	.27
C24	215V104A71	.470mmf, ceramic	.20
C25	215V308H04	.005mf, ceramic	.20
C26	219V025H02	1500mmf, feedthrough	.20
C27	219V025H02	1500mmf, feedthrough	.20
†C28	215V172A22	.0022mf	.15
†C29	215V172A22	.0022mf, ceramic	.15
†C30	215V184A72	.0047mf, ceramic	.15
C31	215V111A03	.01mf, disc	.15
C32	210V014A73	.047mf, 200V	.27
C33	215V173A22	.0022mf, ceramic	.15
C34	218V012H13	4mf, disc	1.15
C35	215V111A03	.01mf, ceramic	.15
C36	219V025H02	1500mmf, feedthrough	.20
C37	215V111A03	.01mf, ceramic	.15
C38	210V213A33	.033mf, ceramic	.40
†L1	310V055H01	Loop, antenna (AM)	2.75
L2	230V040H04	Coil, oscillator (AM)	.95
†L3	230V065H01	Coil, antenna, (FM)	.25
L4	230V045H01	Coil, RF (FM)	.90
L5	230V056H17	Coil, mixer plate (incl 1K ohm resistor	.40
†R1 A B	270V089H01	Control, dual, 1 megohm (loudness)	2.00
R2A	RC20AE274K	270K ohm	.06
R2B	RC20AE274K	270K ohm	.06
R3	RC20AE104M	10 megohm	.05
R4	RC20AE106M	10 megohm	.05
R5	RC20AE274K	270K ohm	.06
R6	RC20AE274K	270K ohm	.06
†R7A	270V089H02	Control, dual, 1 megohm (balance)	2.00
R7B			
†R8A	270V089H03	Control, dual, 1 megohm (bass)	1.95
R8B			
R9	250V221A04	100K ohm	.12
R10	250V221A04	100K ohm	.12
†R11A	270V082H02	Control, dual, 1 megohm (treble) (incl SW3 Off-On)	2.85
R11B			
R12	RC20AE223K	22K ohm	.06
R13	250V221A52	1.5K ohm	.15
R14	250V223A35	3.3 megohm	.12
R15	250V221A01	100 ohm	.12
R16	250V223A35	3.3 megohm	.12
R17	RC20AE102K	1K ohm	.04
R18	RC20AE105K	1 megohm	.05
R19	RC20AE684K	680K ohm	.06
R20	RC20AE684K	680K ohm	.06
R21	RC20AE474K	470K ohm	.05
R22	RC20AE475K	4.7 megohm	.05
R23	250V226A81	680 ohm	.17
R24	250V226A81	680 ohm	.17
R25	250V223A35	3.3 megohm	.06
R26	RC20AE103K	10K ohm	.05
R27	RC20AE105K	1 megohm	.05
R28	250V226A81	680 ohm	.17
R29	RC20AE684K	68 ohm	.04
R30	RC20AE102K	1K ohm	.05
R31	250V222A25	2.2 megohm	.12
R32	250V222A24	220K ohm	.12
R33	RC20AE680K	68 ohm	.04
R34	RC20AE474K	470K ohm	.05
R35	RC20AE102K	1K ohm	.05
R36	RC20AE104M	100K ohm	.05
R37	RC20AE680K	68 ohm	.04
R38	RC20AE223K	22K ohm	.06
R39	RC20AE105K	1 megohm	.05
R40	RC20AE103K	10K ohm	.05
SW1A	756V048H01	Switch, 8 position, 4 deck (selector)	5.50
†SW1B			
SW1C			
SW1D			
SW2	778V189H01	Switch, slide (AFC)	.75
†SW3	270V082H02	Switch, off-on (attached to R11A & R11B)	2.85
T1	235V023H11	Transformer, 1st IF (AM)	1.57
T2	235V023H11	Transformer, 2nd IF (AM)	1.57
T3	230V045H02	Transformer, oscillator (FM)	.95
T4	235V039H03	Transformer, 1st IF (FM)	1.65
†T5	235V059H01	Transformer, 2nd IF (FM)	1.65
†T6	235V060H01	Transformer, limiter (FM)	1.35
†T7	235V061H01	Transformer, ratio detector (FM)	2.50
VR1	756V515H01	Lamp, neon	.60
X1	296V002H06	Diode, AVC	1.40
X2	296V002H06	Diode detector (AM)	1.40
†X3	296V008H01	Diode, AFC (FM)	3.50
Z1	219V021H01	Package circuit (tone)	1.12
Z2	219V021H01	Package circuit (tone)	1.12
†Z3	219V022H03	Package circuit, detector filter (AM)	.50
†Z4	219V036H01	Package circuit, detector filter (FM)	1.25

Ref. No.	Part No.	Description	List Price
		V-2510-1 PUSH-PULL STEREO AMPLIFIERS & POWER SUPPLY	
C1	210V054A73	.047mf, 400V	.22
C2	210V054A73	.047mf, 400V	.22
C3	218V037H07	100mf, 25V, elec (incl C8A & C8B)	2.00
C4	218V025H19	4mf, non-polarized, elec	2.50
C5	218V025H19	4mf, non-polarized, elec	2.50
C6	210V117A61	.047mf, 600V	.35
C7A	218V037H08	80mf, 400V, elec	4.75
C7B		40mf, 400V, elec	
C7C		30mf, 400V, elec	
C8A	218V037H07	10mf, 300V, elec (included in C3)	
C8B		30mf, 350V, elec	
R1	RC20AE225M	2.2 megohm	.06
R2	RC20AE225M	2.2 megohm	.06
R3	RC20AE222K	2.2K ohm	.05
R4	RC20AE222K	2.2K ohm	.05
R5	250V221A04	100K ohm	.12
R6	250V221A04	100K ohm	.12
R7	RC20AE334K	330K ohm	.05
R8	RC20AE273K	27K ohm	.07
R9	RC20AE334K	330K ohm	.05
R10	RC20AE333K	33K ohm	.05
R11	RC20AE102M	1K ohm	.04
R12	251V020H28	75 ohm, 2W	.30
R13	RC20AE102M	1K ohm	.04
R14	RC20AE333K	33K ohm	.05
R15	RC20AE221M	220 ohm	.05
R16	RC20AE221M	220 ohm	.05
†R17	251V020H29	250 ohm, 10W	.30
R18	RC40AE152K	1.5K ohm, 2W	.20
†R19	251V020H27	3.3K ohm, 15W	.60
R20	RC20AE123K	22K ohm	.05
T1	430V089H02	Transformer, audio (single end)	3.95
†T2	430V090H02	Transformer, audio (push-pull)	6.95
†T3	410V019H01	Transformer (power)	21.00

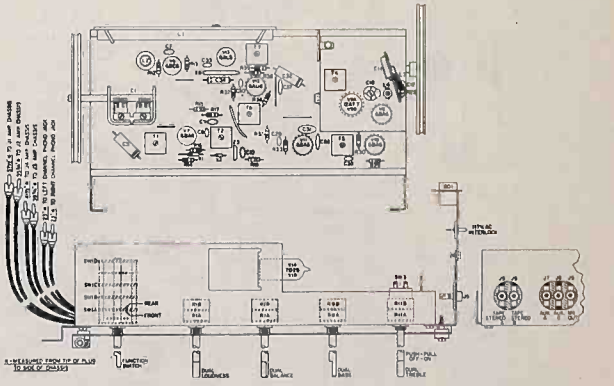


Figure 1 – Top View of V-2511-1 Chassis (AM-FM tuners & Pre-Amp)

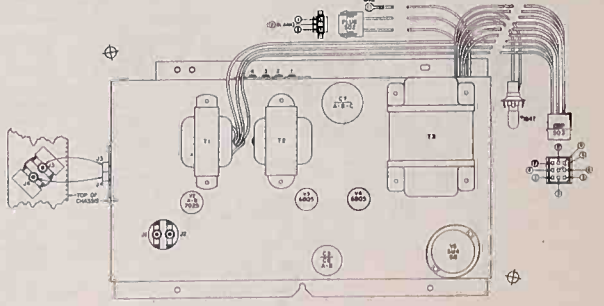


Figure 2 – Top View of V-2510-1 Chassis (Dual Amplifiers & Power Supply)

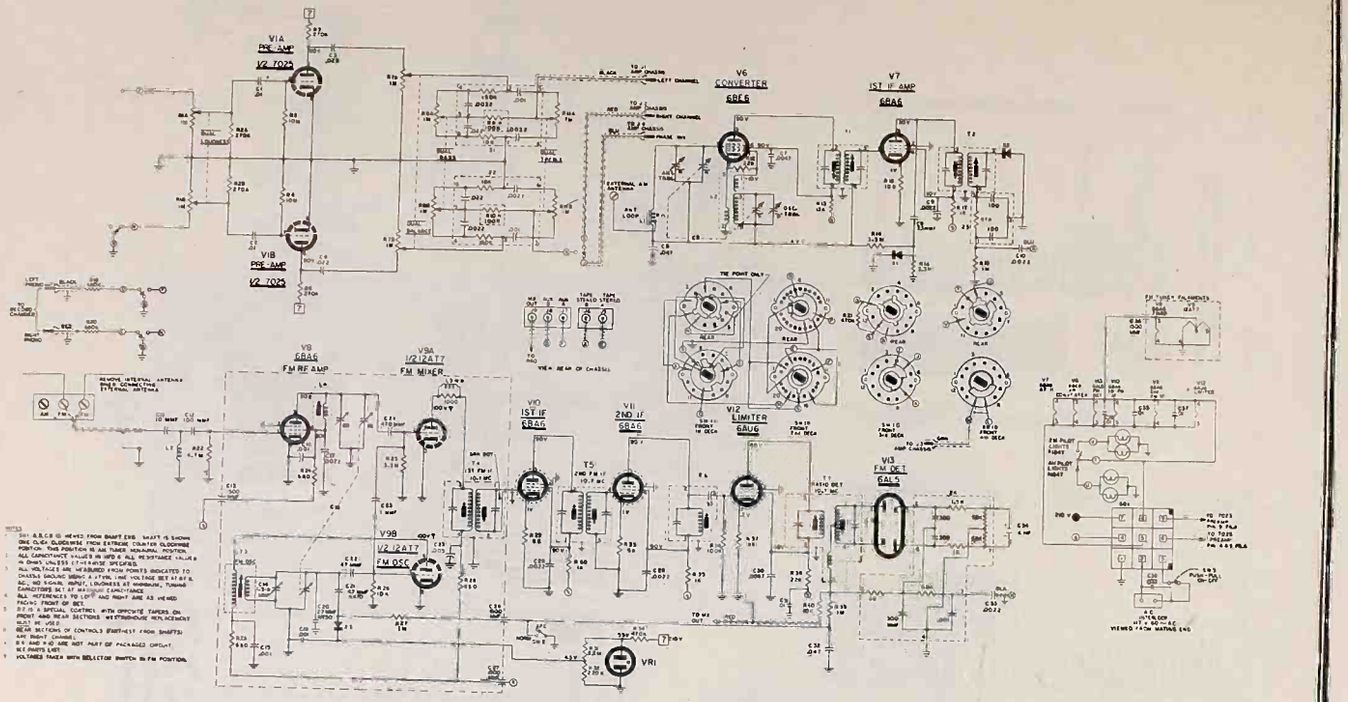


Figure 3 – V-2511-1 Schematic Diagram

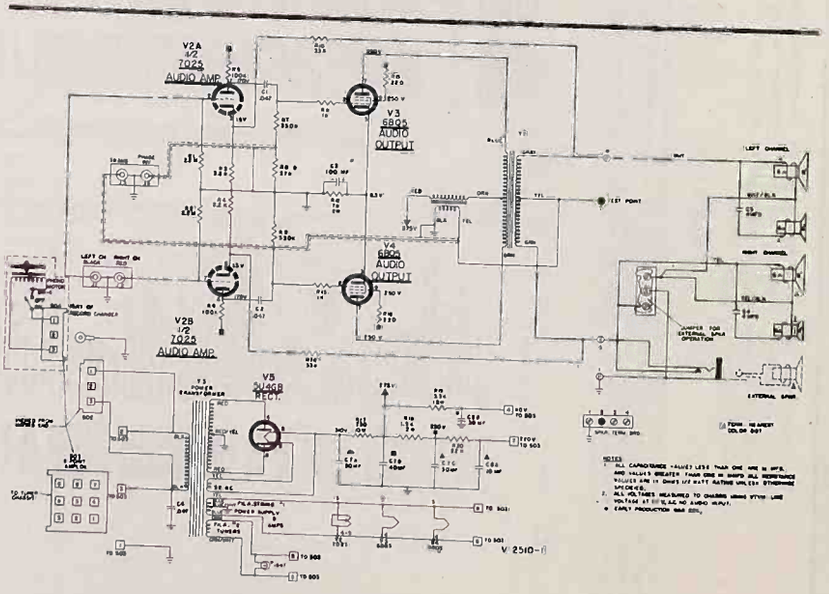
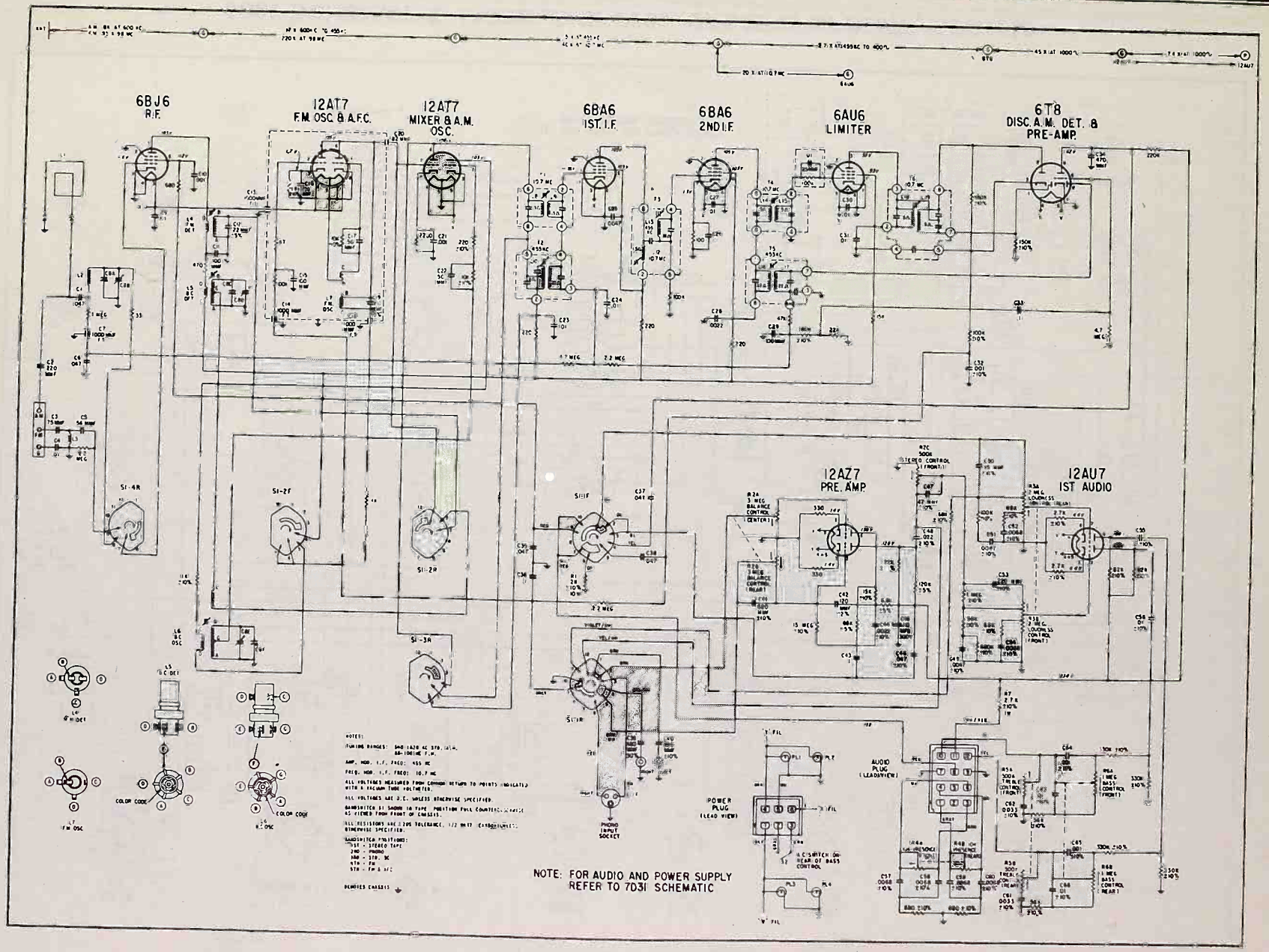
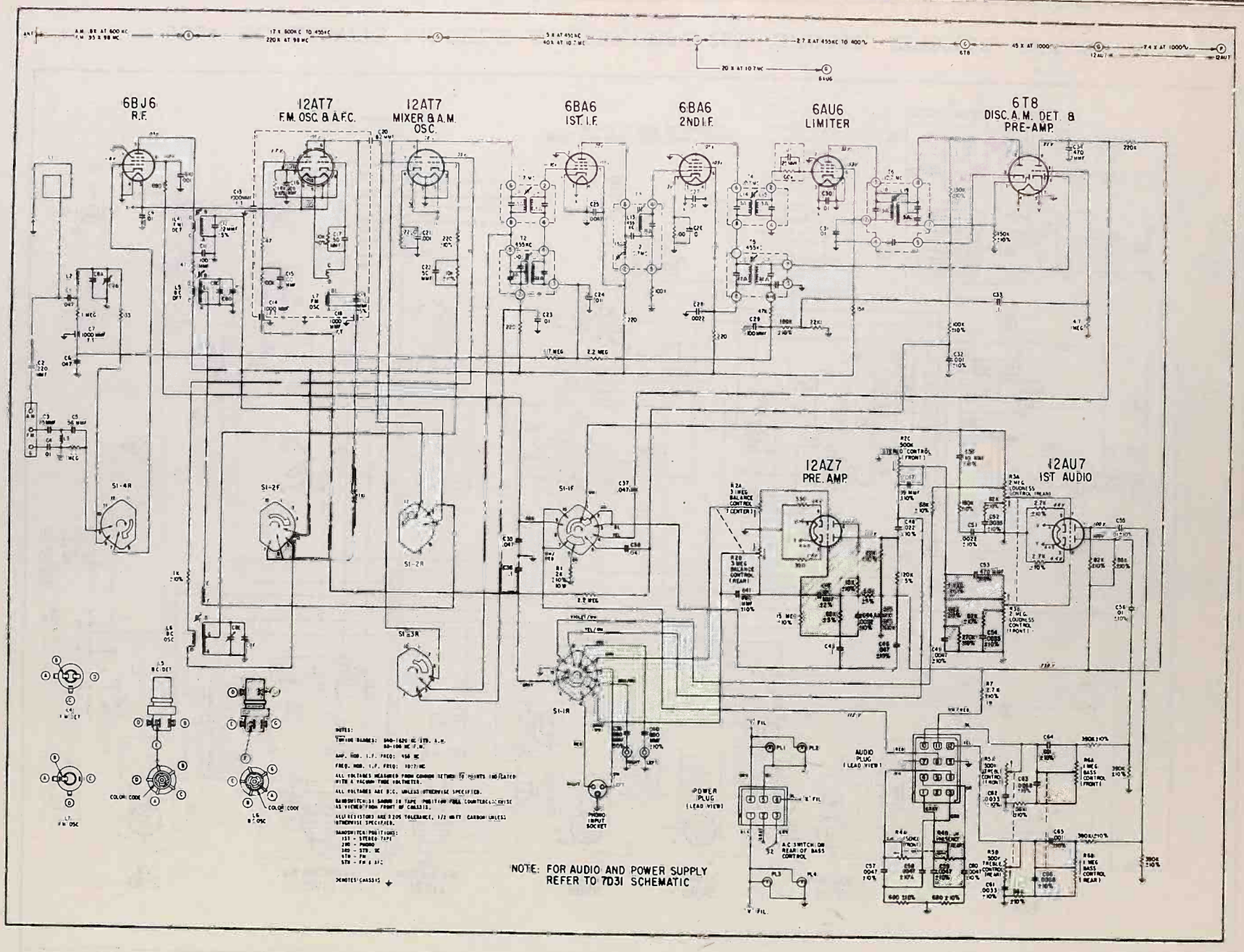


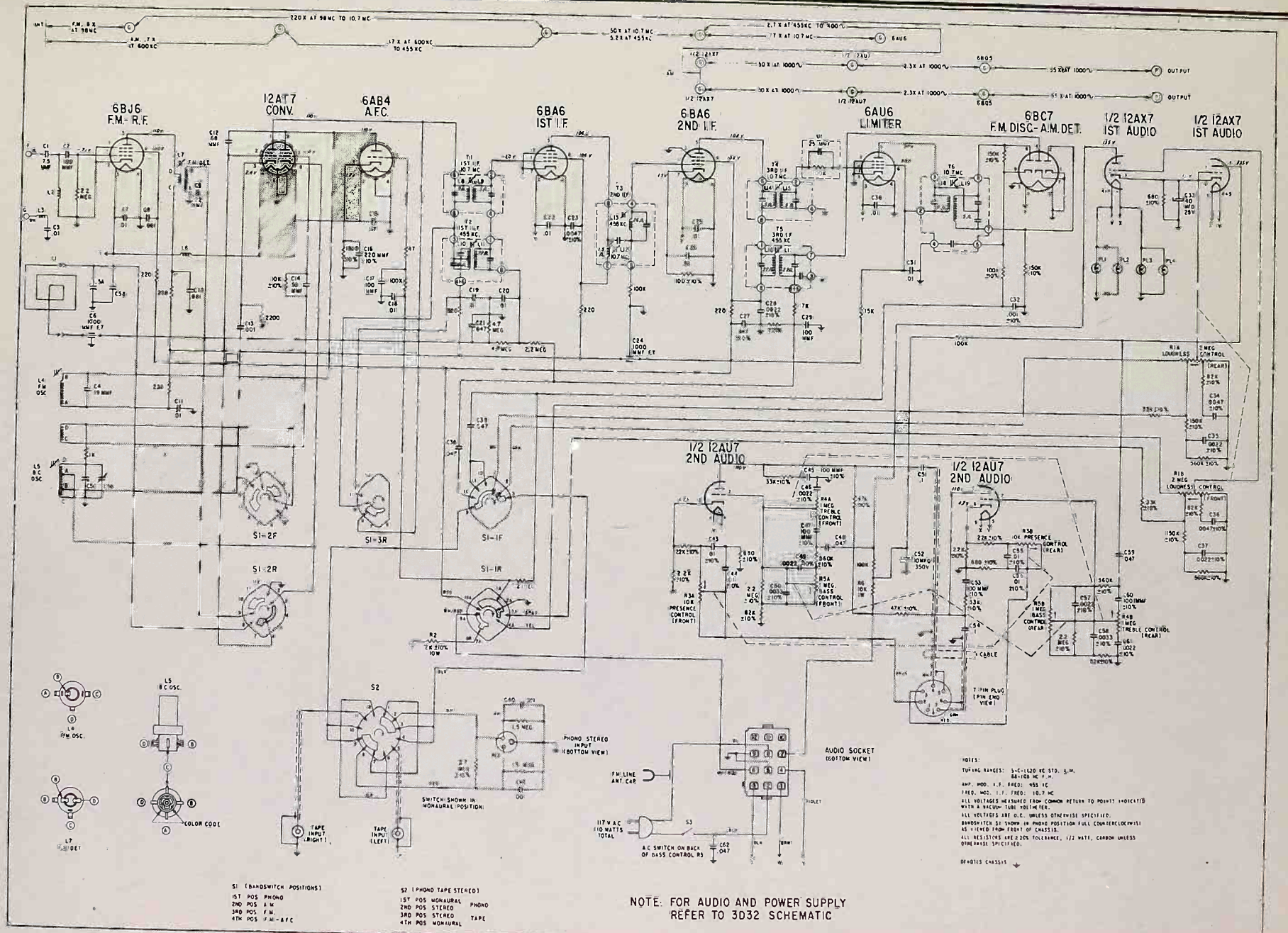
Figure 4 – V-2510-1 Schematic Diagram



9D24 SCHEMATIC MODELS SFD283, SFD 285, SFD288, SFD2560, SFD2565



9D25 SCHEMATIC MODELS SFD290, SFD2570, SFD2575, SFD2580



NOTE: FOR AUDIO AND POWER SUPPLY REFER TO 3D32 SCHEMATIC

9D26 SCHEMATIC MODELS SFD280, SFD2530, SFD2535