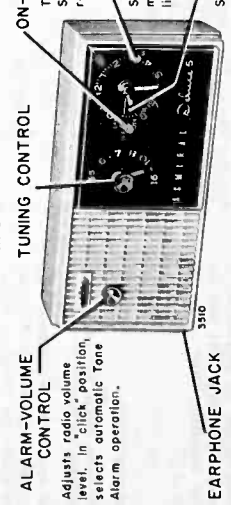


**TRANSISTOR RADIO
SECTION**



5E5B CHASSIS

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



- TUNING CONTROL**
ON-OFF-AUTO SWITCH
Turns set on and off.
Selects AUTOMATIC radio or alarm operation.
- SLEEP SWITCH**
Shuts radio off automatically after desired listening period.
- TURN-ON POINTER**
Sets time for radio or alarm to turn on automatically.

- ALARM-VOLUME CONTROL**
Adjusts radio volume level, in "click" position, selects automatic tone alarm operation.
- EARPHONE JACK**

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, \pm 5 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Four 1½ volt ordinary penlight "AA" size batteries or equivalent size mercury batteries.
- SPEAKER:** 2¼" 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	The Starlet	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 anchors, while springs inside the tube maintain the batteries under proper tension.

SERVICE MANUAL S841

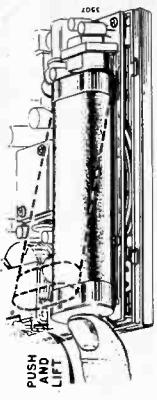


Figure 2. View Showing Method of Removing Battery Holder from Chassis Board.

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 proper 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**
- General900
- BurgessZ
- Eveready915
- Ray-O-VacR7 or 7LP
- MERCURY BATTERIES**
- MailoryRMS02R
- EvereadyE502

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.

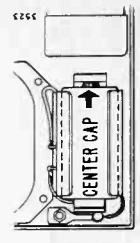


Figure 4. View Showing Clock Battery in Correct Position.

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.

- 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.
- 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 over-set 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 re-setting.
The speed of the clock mechanism has been pre-regulated 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.



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.

- Fresh batteries should be used.
- Set Volume control at maximum.
- Connect output meter across output transformer secondary. For best results, have speaker disconnected, use 12 ohm load.
- 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".				

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.

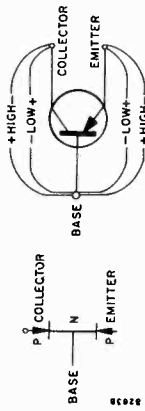


Figure 5B. Ohmmeter Test of Transistor.

Figure 5A. Germanium Diode Equivalent.

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".

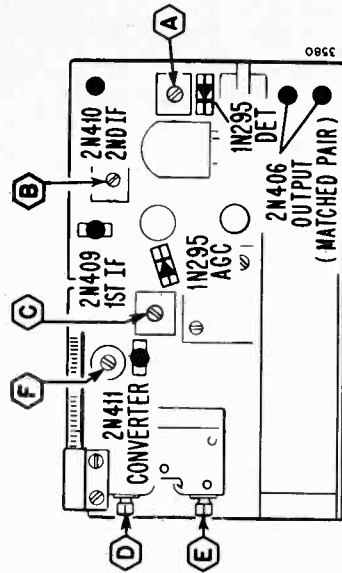


Figure 6. Transistor and Alignment Point Location.

PARTS LIST

Sym.	Description	Part No.
C11	.05 mf, 30 volts, cer. disc.	658 45-6
C12	.02 mf, 30 volts, cer. disc.	658 45-9
C14	1.0 mf, 30 volts, cer. disc.	658 45-15
C15	.02 mf, 30 volts, cer. disc.	658 45-16
C16	.05 mf, 50 volts, electrolytic	658 45-17
C18	8.2 mf, 5%, 500 volts, cer. disc.	658 15-151
C19	.02 mf, 50 volts, electrolytic	658 45-20
C20	.01 mf, 30 volts, cer. disc.	658 45-20
C21	.01 mf, 30 volts, cer. disc.	658 45-20
L1	Arrester, Ferrite Bar, Yellow dot.	658 218-9
L2	Transformer, 1st IF.	72C 182-8
L3	Transformer, 2nd IF.	72C 182-9
L4	Transformer, 3rd IF.	72C 182-10
L5	Transformer, Driver	72C 182-11
L6	Transformer, Output	72C 182-12
M1	Speaker, 2 1/2", P.M.	788 122-3
M2	Clock Switch	See C15
S1	Radio Alarm Switch	See C15
S2	Jack, Earphone	888 193-1
S3	Jack, Earphone, plug	888 193-50
W1	Nut, for plug jack	888 193-50
W2	Nut, for plug jack	888 193-50
W3	Nut, for plug jack	888 193-50
W4	Nut, for plug jack	888 193-50
W5	Nut, for plug jack	888 193-50
W6	Nut, for plug jack	888 193-50
W7	Nut, for plug jack	888 193-50
W8	Nut, for plug jack	888 193-50
W9	Nut, for plug jack	888 193-50
W10	Nut, for plug jack	888 193-50
W11	Nut, for plug jack	888 193-50
W12	Nut, for plug jack	888 193-50
W13	Nut, for plug jack	888 193-50
W14	Nut, for plug jack	888 193-50
W15	Nut, for plug jack	888 193-50
W16	Nut, for plug jack	888 193-50
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W92	Nut, for plug jack	888 193-50
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W94	Nut, for plug jack	888 193-50
W95	Nut, for plug jack	888 193-50
W96	Nut, for plug jack	888 193-50
W97	Nut, for plug jack	888 193-50
W98	Nut, for plug jack	888 193-50
W99	Nut, for plug jack	888 193-50
W100	Nut, for plug jack	888 193-50

RESISTORS

Sym.	Description	Part No.
R1	15,000 ohms, 1/2 watt	658 45-18
R2	3,000 ohms, 1/2 watt	658 45-19
R3	500 ohms, 1/2 watt	658 45-21
R4	100 ohms, 1/2 watt	658 45-22
R5	1,000 ohms, 1/2 watt	658 45-23
R6	1,500 ohms, 1/2 watt	658 45-24
R7	10,000 ohms, 1/2 watt	658 45-25
R8	100 ohms, 1/2 watt	658 45-26
R9	1,000 ohms, 1/2 watt	658 45-27
R10	2,000 ohms, 1/2 watt	658 45-28
R11	5,000 ohms, 1/2 watt	658 45-29
R12	12,000 ohms, 1/2 watt	658 45-30
R13	25,000 ohms, 1/2 watt	658 45-31
R14	50,000 ohms, 1/2 watt	658 45-32
R15	100,000 ohms, 1/2 watt	658 45-33
R16	1,000 ohms, 1/2 watt	658 45-34
R17	100 ohms, 1/2 watt	658 45-35
R18	100 ohms, 1/2 watt	658 45-36
R19	100 ohms, 1/2 watt	658 45-37
R20	10 ohms, 1/2 watt	658 45-38

CAPACITORS

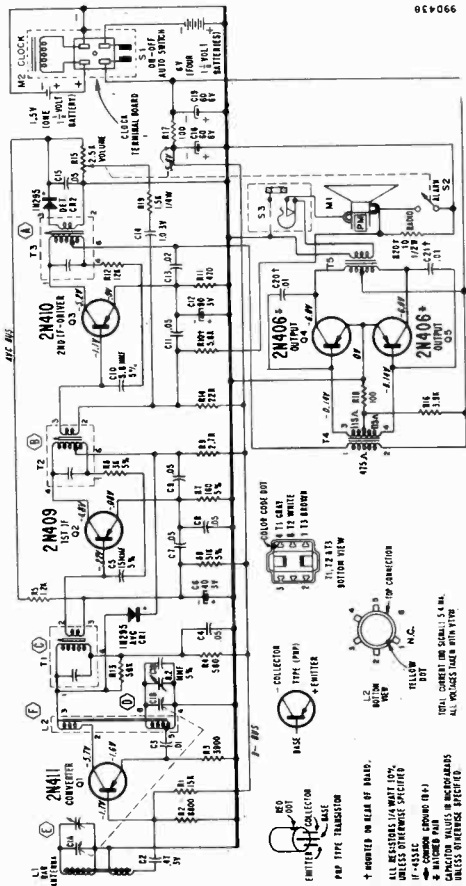
Sym.	Description	Part No.
C1	150 pF, mica, con. gang	658 75-1
C2	47 pF, 30 volts, ceramic disc.	658 45-16
C3	.01 mf, 50 volts, electrolytic	658 45-17
C4	.05 mf, 50 volts, electrolytic	658 45-18
C5	.15 mf, 500 volts, 5%	658 45-6
C6	40 mFD temp. coefficient	658 10-3-40
C7	.05 mf, 30 volts, cer. disc.	658 45-6
C8	.05 mf, 30 volts, cer. disc.	658 45-6
C9	.05 mf, 30 volts, cer. disc.	658 45-6
C10	5.6 mf, 500 volts, 5%, cer. disc.	658 45-6
	N750 temp. coeff.	658 10-176

CABINET PARTS

Sym.	Description	Part No.
CP1	Cabinet Front	34E 142-2
CP2	Model 1776, Tan	34E 142-2
CP3	Model 1776, Green	34E 142-2
CP4	Cabinet Rear	34E 142-4
CP5	Model 1776, White	34E 142-7
CP6	Model 1776, Green	34E 142-7
CP7	Control, Clock Front	34E 142-3
CP8	Control, Clock Rear	34E 142-3
CP9	Knob, Tuning	34E 142-3
CP10	Knob, Volume	34E 142-3
CP11	Knob, Alarm	34E 142-3
CP12	Pointer, Dial	34E 142-3

CLOCK PARTS

Sym.	Description	Part No.
CK1	Clock (Weston) Timer	91C 32-3
CK2	Knob for Clock, clear	91C 32-10



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.

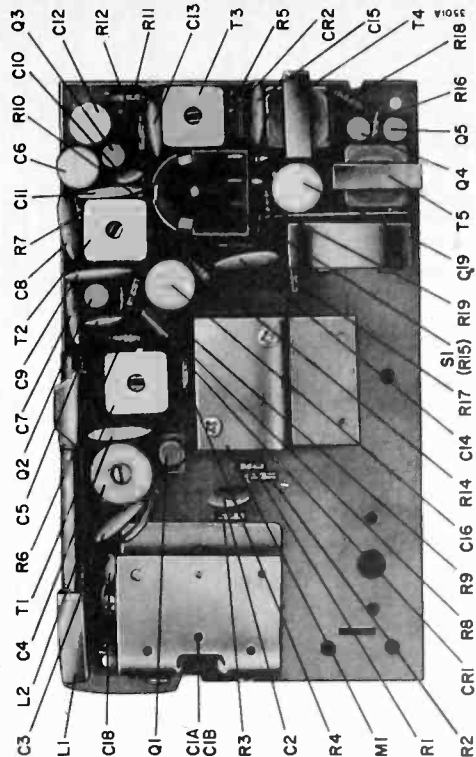


Figure 8. Top View of Chassis Showing Part Locations.

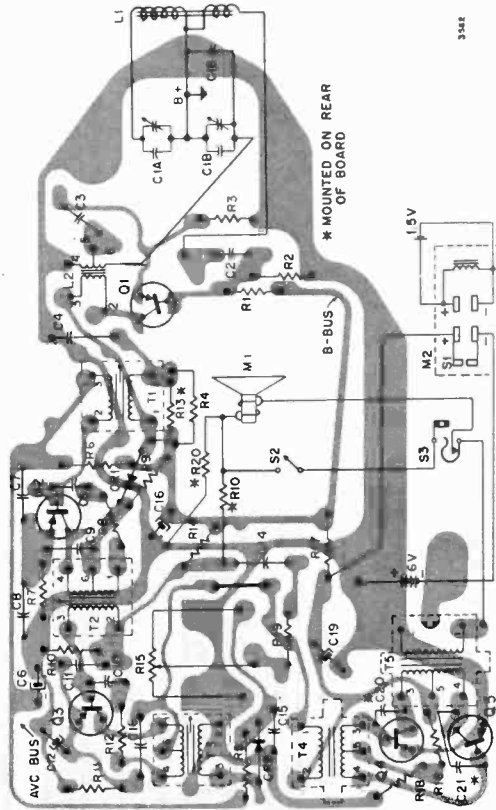


Figure 7. Rear View of Etched Circuit Board. Gray area represents etched wiring; black symbols and lines represent components and connections on opposite side.

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

MODEL	COLOR	CHASSIS
1111B	Black and White	8S1C
1116B	Gold and White	8S1C

GENERAL

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

The tone alarm switch is mounted on the Volume control (R27). To have the Tone Alarm, read 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 when off Tone Alarm turns on the radio. The radio (and Tone Alarm) Off-On switch is located at the left side of the clock.

Another added feature is a newly developed, compensating type diode used as an output bias inductor. The action of this diode is to compensate for the effects of reduced battery supply voltage due to aging, temperature, load, etc.

SERVICE HINTS

The tuning slugs in the 2nd and 3rd IF transformers are accessible from the rear, but are located near the top of the can. Use care if more than one to the right is required, to prevent damage to the slug against the top of the can.

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

To improve sound quality in the 8S1A chassis (ear production) R31 (27,000 ohms, 1/2 watt) resistor was wired in parallel with R24 (6,800 ohms). Also the foil connecting the emitters of Q8 and Q9 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 replace 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, 1/2 watt 60B 8-150
- R31 27,000 ohms, 1/2 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

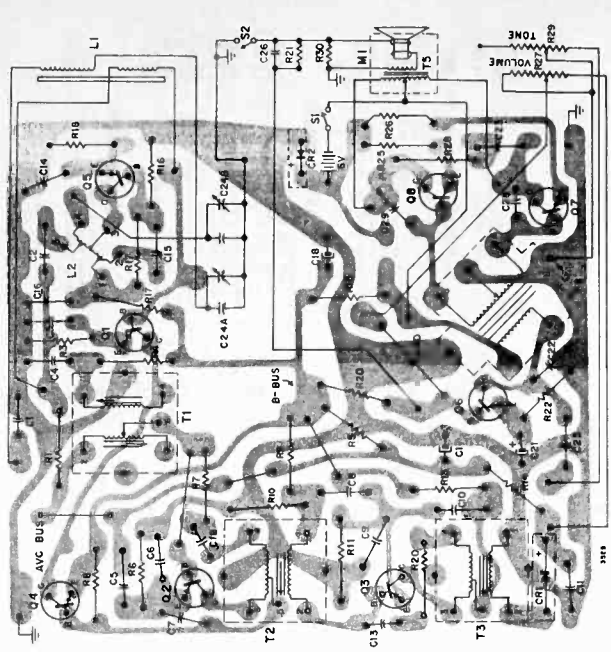
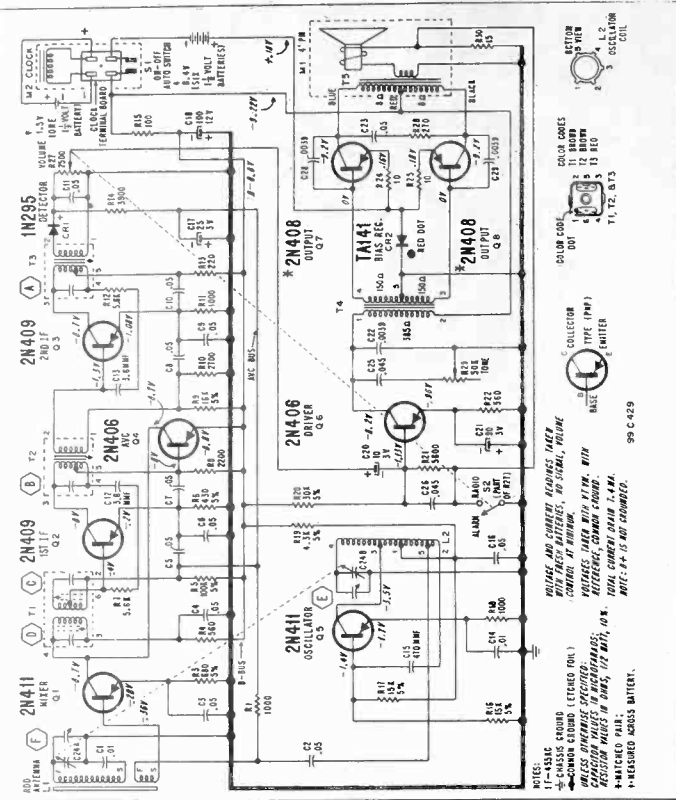
TRANSISTORS AND DIODES

- 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 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

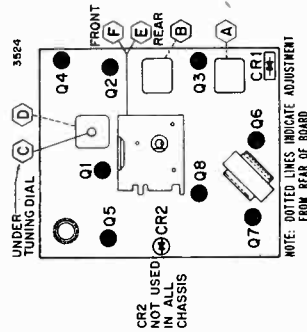
CORRECTIONS

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

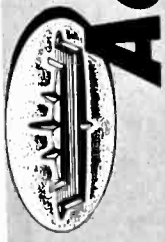
Schematic of 8S1C Chassis.



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



Transistor and Alignment Point Locations.



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.

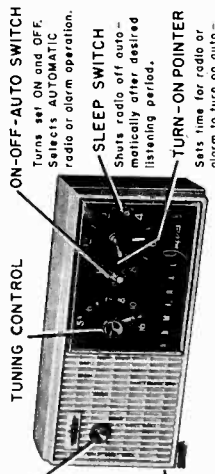


Figure 1. Front View of Set, Showing Controls.

SPECIFICATIONS

- ANTENNA:** Built-in Ferro-Scope (ferrite bar).
- CIRCUIT:** Superheterodyne using eight PNP type transistors and one germanium diode.
- CLOCK:** (Westclox) Battery operated, with automatic regulation.
- 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

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

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.

SERVICE MANUAL S842

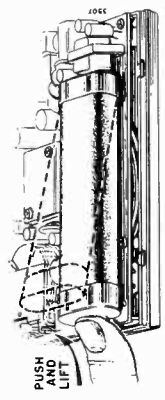


Figure 2. View Showing Method of Removing Battery Holder from Chassis Board.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

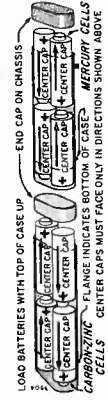


Figure 3. Battery Holder, Showing Ordinary and Mercury Batteries in Correct Positions.

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 General900
- Eveready915 Ray-O-VacR7 or 7LP
- MERCURY BATTERIES**
- EvereadyE502 MalloryRM502R

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.**

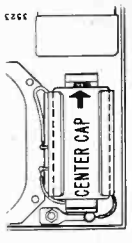


Figure 4. View Showing Clock Battery in Correct Position.

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.

- 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.
- 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 over-set hands so that they must be turned back.**

If the hour hand is turned counterclockwise pull 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 pre-regulated 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.

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.

- Fresh batteries should be used.
- 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.
- Set Volume control at maximum.
- Connect output meter across output transformer secondary. For best results, have speaker disconnected, use 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 Coll 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.

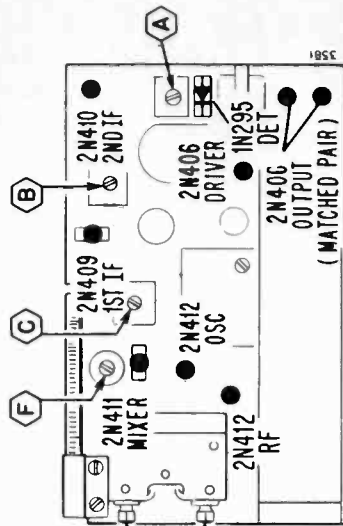


Figure 6. Transistor and Alignment Point Locations.

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 needed 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.

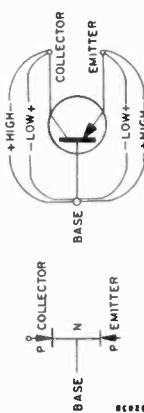


Figure 5A. Germanium Diode Equivalent.
Figure 5B. Ohmmeter Test of Transistor.

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.

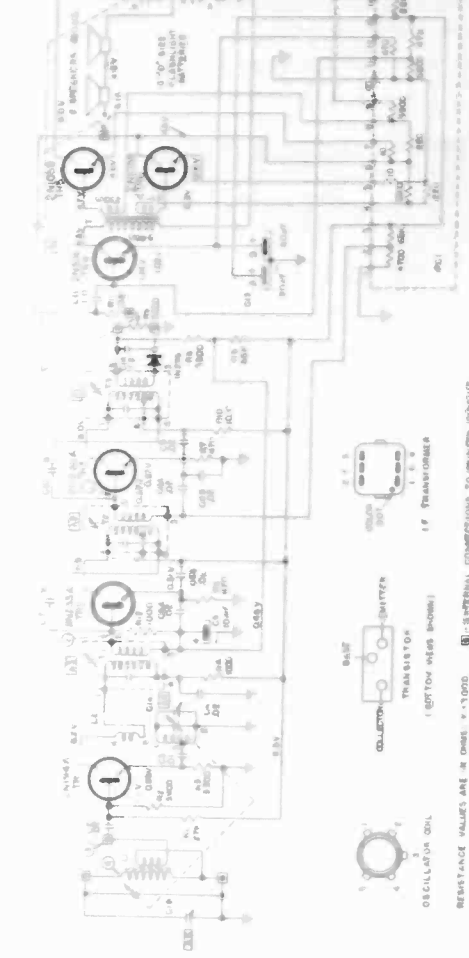
SERVICE HINTS

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."



SIGNAL REPRESENTATION	TEST POINT	FUNCTION	TEST POINT
1	6X4	6X4	6X4
2	6AR5	6AR5	6AR5
3	6AV6	6AV6	6AV6
4	6BE6	6BE6	6BE6
5	6BE7	6BE7	6BE7

RESISTANCE VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED. CAPACITANCE VALUES LESS THAN 100 P.F. ARE IN MICROFARADS (μF); THE VALUES GREATER THAN 100 ARE IN MFD. MICROFARADS (μF) SHOULD BE NOTED.
 VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNLESS NO SIGNAL INDICATED WITH RANGE SELECTOR CLOSED AND VOLUME CONTROL AT MAXIMUM COUNTER ROTATION.
 NO SIGNAL BATTERY CURRENT 7 mA TO 10 mA

SPEAKERS
 Type: Permanent Magnet
 Size: 4"
 Voice Coil Impedance 16 ohms

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

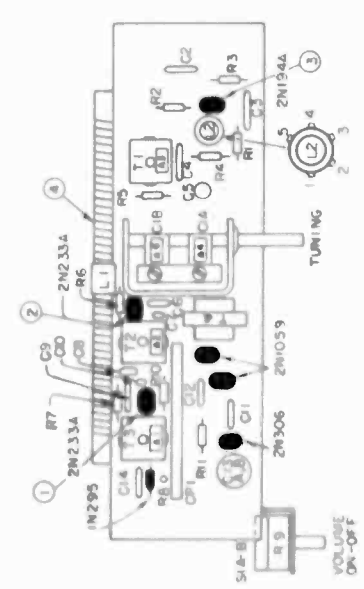
POWER OUTPUT
 Undistorted 150 MW
 Maximum 200 MW

TRANSISTORS AND FUNCTIONS
 Mixer - OSC
 1st & 2nd IF
 Driver
 Output

ALIGNMENT PROCEDURE
 Output meter reading to indicate 50 milliwatts 1.2 V
 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	C1-B	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I.F. I.F. I.F.
Open	1670 Kc	*Test Loop	*Test Loop	A4	Oscillator
Open	1400 Kc	*Test Loop	*Test Loop	A6	Antenna
500 Kc	600 Kc			Check Point	

Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter replaced 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.



SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIB.	SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIB.
C1A, B	47316	Variable	E 16	L1	4881-3	Inductor	7.00
C2, 4, 5, 14	48364-4	0.2 μf. Disc	90	L2	4881-3	Inductor	1.00
C3		0.1 μf. Disc		L3	4881-3	Inductor	1.00
C4, B, 8A, R		10 μf. 10V. Electrolytic		L4	4881-3	Inductor	1.00
C5, 10		50 μf. Disc		L5	4881-3	Inductor	1.00
C6		1 μf. 5V. Disc					
C7, 10		20 μf. Disc					
C8, 9, B	4881-3	50 μf. 10V. Electrolytic	1.70				
B1		6X4					
B2, 4		6AR5					
B3		6AV6					
B4, 10, 11		6BE6					
B5, 7		6BE7					
B6, 1		Transformer, 4" x 1 1/2"					
B7, 8, 11A, B	44500-27	1000 ohm, 1/2W. 10%					
P17		1000 ohm, 1/2W. 10%					

CHASSIS: 1. 47200

MODEL 7595 SPECIFICATIONS CHASSIS 1.47200

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

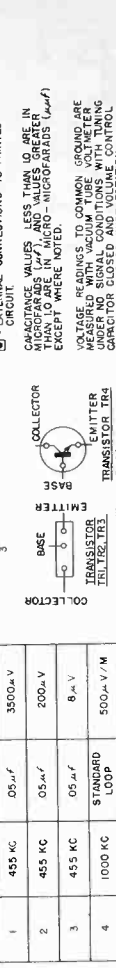
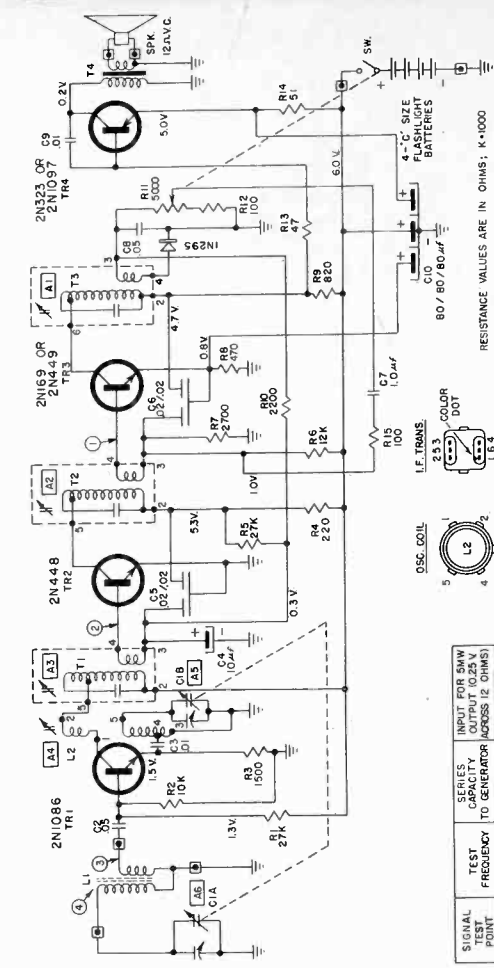
FREQUENCY RANGE
Broadcast 540-1670 Kc
IF 455 Kc

TRANSISTORS AND FUNCTIONS
Mixer-Osc 2N1086
IF 2N448
Reflex IF 2N449
Output 2N1121
2N1097

ALIGNMENT PROCEDURE
Output meter reading to indicate 5 milliwatts25V
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	Function of Trimmer
Open	455 Kc	.05 µf	C1A	A1 (Top of T8) 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 TO GENERATOR (KCS OR OHMS)	SERIES CAPACITY TO GENERATOR (OHMS)	INPUT FOR 5MW OUTPUT (0.25 V)	OUTPUT (OHMS)
1	455 KC	05 µf	3500µ V	
2	455 KC	05 µf	200µ V	
3	455 KC	05 µf	8 µV	
4	1000 KC	STANDARD LOOP	500µ V/M	

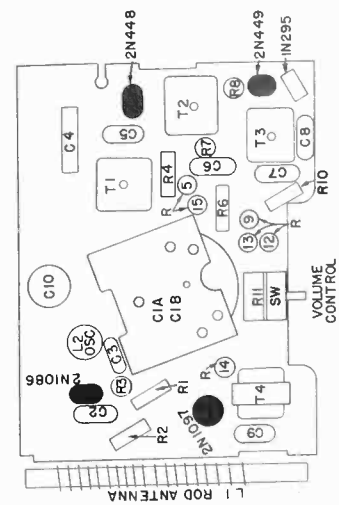
RESISTANCE VALUES ARE IN OHMS; K=1000
RESISTOR CONNECTIONS TO PRINTED CIRCUIT CONNECTIONS TO PRINTED
CAPACITANCE VALUES LESS THAN 10 ARE IN MICROFARADS (µF) AND VALUES GREATER THAN 10 ARE IN MILLIFARADS (mF) EXCEPT WHERE NOTED OTHERWISE
VOLUME CONTROL IS A 500K OHM TAPER POTENTIOMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR FULLY COUNTERCLOCKWISE ROTATION.

SIGNAL TEST POINT	TEST FREQUENCY TO GENERATOR (KCS OR OHMS)	SERIES CAPACITY TO GENERATOR (OHMS)	INPUT FOR 5MW OUTPUT (0.25 V)	OUTPUT (OHMS)
1	455 KC	05 µf	3500µ V	
2	455 KC	05 µf	200µ V	
3	455 KC	05 µf	8 µV	
4	1000 KC	STANDARD LOOP	500µ V/M	

SIGNAL TEST POINT	TEST FREQUENCY TO GENERATOR (KCS OR OHMS)	SERIES CAPACITY TO GENERATOR (OHMS)	INPUT FOR 5MW OUTPUT (0.25 V)	OUTPUT (OHMS)
1	455 KC	05 µf	3500µ V	
2	455 KC	05 µf	200µ V	
3	455 KC	05 µf	8 µV	
4	1000 KC	STANDARD LOOP	500µ V/M	

SIGNAL TEST POINT	TEST FREQUENCY TO GENERATOR (KCS OR OHMS)	SERIES CAPACITY TO GENERATOR (OHMS)	INPUT FOR 5MW OUTPUT (0.25 V)	OUTPUT (OHMS)
1	455 KC	05 µf	3500µ V	
2	455 KC	05 µf	200µ V	
3	455 KC	05 µf	8 µV	
4	1000 KC	STANDARD LOOP	500µ V/M	

SIGNAL TEST POINT	TEST FREQUENCY TO GENERATOR (KCS OR OHMS)	SERIES CAPACITY TO GENERATOR (OHMS)	INPUT FOR 5MW OUTPUT (0.25 V)	OUTPUT (OHMS)
1	455 KC	05 µf	3500µ V	
2	455 KC	05 µf	200µ V	
3	455 KC	05 µf	8 µV	
4	1000 KC	STANDARD LOOP	500µ V/M	



CHASSIS: 1. 47600

MODEL 9595

SPECIFICATIONS

CHASSIS 1.47600

FREQUENCY RANGE
Broadcast 540-1670 Kc
IF 455 Kc

TRANSISTORS AND FUNCTIONS
Mixer-Osc. 2N194A
IF 2N233A
1st Audio 2N1101
Driver 2N1101
Output 2N1101 (Two)
Diodes IN294 (Two)

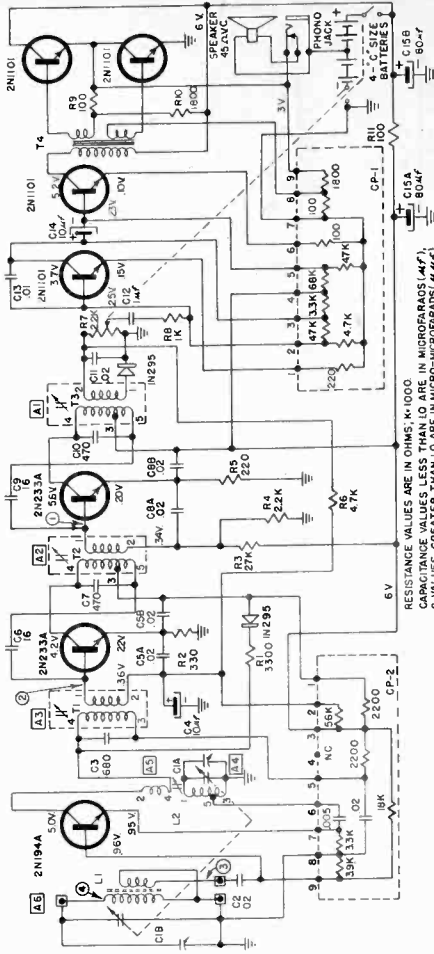
POWER SUPPLY
4 - "C" Size Flashlight cells

POWER OUTPUT
Undistorted 90 MW
Maximum 140 MW

ALIGNMENT PROCEDURE
Output meter reading to indicate 5 milliwatts475V
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
Open	455 Kc	.05 µf	C1B	A1 (Top of T8) A2 (Top of T2) A3 (Top of T1)	I. F. I. F. I. F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc			*Test Loop	A6	Antenna
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.

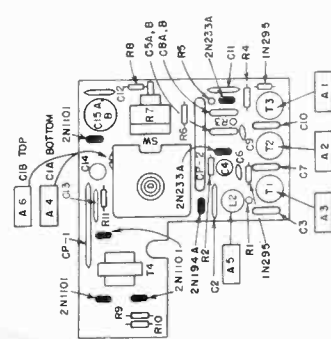


RESISTANCE VALUES ARE IN OHMS; K=1000 & CAPACITANCE VALUES LESS THAN 10 ARE IN MICROFARADS (µF) & VALUES GREATER THAN 10 ARE IN MICRO-MICROFARADS (µµF), EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH AN AC VOLTMETER. ALL VOLTAGE READINGS ARE WITH TUNING CAPACITOR CLOSED & VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.
- COMMON GROUND SYMBOL.
- EXTERNAL CONNECTION TO PRINTED CIRCUIT.

SIGNAL TEST POINT	TEST POINT FREQUENCY	SERIES RESISTOR	INPUT POINT
1	455 KC	05.4K	900 4V
2	455 KC	05.4K	30 4V
3	455 KC	05.4K	5 4V
4	1000 KC	STANDARD LOOP	200 4V/m



SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST	SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
C1A, B	47424	Variable	3.25	T3	44855-14	Transformer, 1st I. F.	2.00
C3, 11		.02 µf., Disc.	.90	T4	45804-3	Transformer, Output-Input	2.50
C4, 14	44396-4	10 µf., 10V., Elect.		MISCELLANEOUS			
C5A, B, 8A, B		.02 µf., Disc., Dual		*AA47461-67	Cabinet Front Assembly, White	6.50	
C6, 9		470 µf., Mica		*AA47461-68	Cabinet Front Assembly, Gray	6.50	
C7, 10		470 µf., Mica		*AA47461-69	Cabinet Back, White	1.75	
C13		.01 µf., Disc.		*AA47461-70	Cabinet Back, Gray	1.75	
C15A, B	44397-3	80/80 µf., 10V., Elect.	1.50	*AA47461-71	Cabinet Back, Charcoal	1.75	
R1		3300 ohm, 1/2W., 10%		*AA47461-72	Battery Cover, White	.50	
R2		330 ohm, 1/2W., 10%		*AA47461-73	Battery Cover, Gray	.50	
R3		27K., 1/2W., 10%		*AA47461-74	Handle, Chrome	.35	
R4		2200 ohm, 1/2W., 10%		*AA47461-75	Nameplate, Aluminum	.25	
R5		220 ohm, 1/2W., 10%		*AA47461-76	Knob, Volume-Off-On, White	.25	
R6		470 ohm, 1/2W., 10%		*AA47461-77	Knob, Volume-Off-On, Gray	.25	
R7		470 ohm, 1/2W., 10%		*AA47461-78	Knob, Volume-Off-On, Charcoal	.25	
R8		Control, Volume & Switch, 2200 ohm		*AA47461-79	Knob, Station Indicator	.35	
R9		1000 ohm, 1/2W., 10%	2.50	*AA47461-80	Speaker, 3 1/2" P. M., 45 ohm	4.25	
R10		1800 ohm, 1/2W., 10%		*AA47461-81	Battery Clip, Plus	.25	
L1	45534-13	Antenna Rod	2.00	*AA47461-82	Battery Clip, Minus	.25	
L2	45783-9	Coil, Oscillator	1.75	*AA47461-83	Diode, IN295	.50	
T1	44855-12	Transformer, 1st I. F.	1.00	*AA47461-84	Coil, Tuning	1.50	
T2	44855-13	Transformer, 1st I. F.	2.00	*AA47461-85	Contact Clip	.25	
				*AA47461-86	Phono Jack	.75	



MODEL 9594 SPECIFICATIONS CHASSIS 1. 47500

FREQUENCY RANGE
Broadcast 540-1670 Kc
IF 455 Kc

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

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

POWER OUTPUT
60 MW
90 MW
Undistorted
Maximum

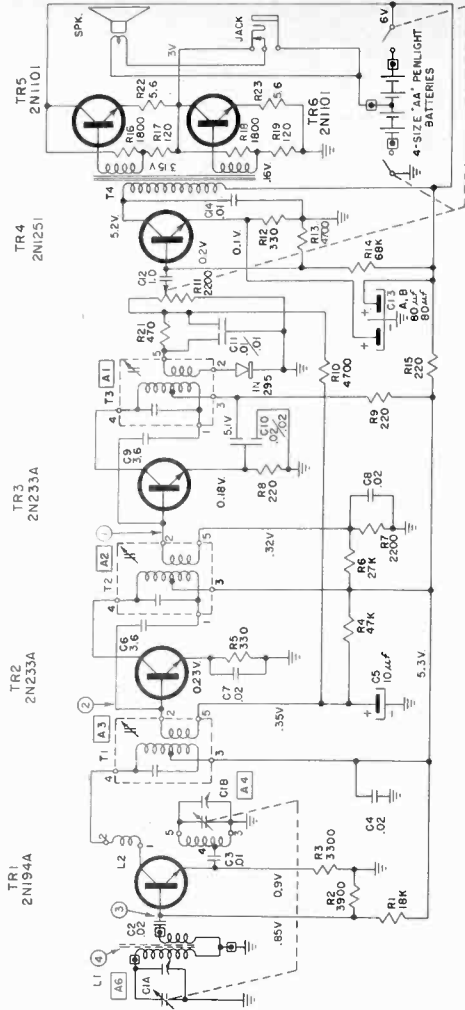
TRANSISTORS AND FUNCTIONS
2N194A Mixer-OSC
2N233A 1st & 2nd IF
2N1251 Driver
2N1101 Output

ALIGNMENT PROCEDURE

Output meter reading to indicate 5 milliwatts 24.5 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

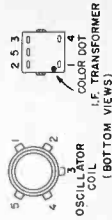
Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 µf	C1A	A1 (Top of T3) A2 (Top of T2) A3 (Top of T1)	I. F. I. F. I. F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna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



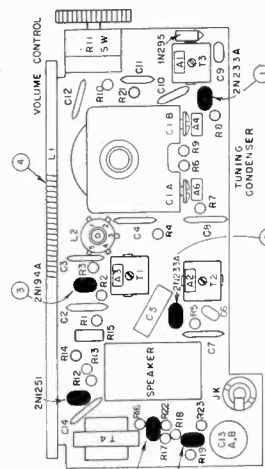
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µF), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµF) EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM COUNTERCLOCKWISE ROTATION.
RESISTANCE VALUES ARE IN OHMS, K=1000.
* - COMMON GROUND SYMBOL TO PRINTED CIRCUIT.
† - TOTAL BATTERY CURRENT DRAIN UNDER NO SIGNAL CONDITIONS, 7 TO 11 MA.

SIGNAL TEST POINTS	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR (47V ACROSS 454)	INPUT FOR 5MW OUTPUT (47V ACROSS 454)
1	455KC	.05µf	1500µV
2	455KC	.05µf	60µV
3	455KC	.05µf	10µV
4	1000KC	STANDARD LOOP	350µV/M



Model 19594 47155 859

SIGNAL TEST POINTS	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR (47V ACROSS 454)	INPUT FOR 5MW OUTPUT (47V ACROSS 454)	DESCRIPTION	PART NO.	SCHEMATIC LOCATION	LIST NO.
C1A, B	47431	Variable	3.00	Capacitors		L1	44511-6
C2, 4, 7, 8		.02 µf. Disc.				L2	45783-12
C5	44396-4	10 µf. 10V. Elect.	.90			L3	47181-1
C6, 9		3.6 µf. Disc.				T2	47181-3
C10		.02 µf. Disc.				T3	45604-3
C11	44681-9	1 µf. Dual Disc.	.75			T4	
C12	44397-3	80/50 µf. 12V. Elect.	1.50				
R1		18K ohm. 1/2W. 10%		Resistors	46921-29		
R2		3000 ohm. 1/2W. 10%			46941-67		
R3		3300 ohm. 1/2W. 10%			46558-29		
R5, 12		510 ohm. 1/2W. 10%			46558-57		
R6		27K ohm. 1/2W. 10%			47427-29		
R7, 8, 15		2200 ohm. 1/2W. 10%			34427-67		
R9, 10, 11		220 ohm. 1/2W. 10%			44280-2		
R11		220 ohm. 1/2W. 10%			43959		
R13		Control, Volume & Switch, 2200 ohm	2.00		44548		
R14		68K ohm. 1/2W. 10%			47170-1		
R15		1800 ohm. 1/2W. 10%			47181-1		
R16, 17, 19		470 ohm. 1/2W. 10%			47181-2		
R22, 23		5.6 ohm. 1/2W. 10%					



CHASSIS: 1. 47600

MODEL 9595

SPECIFICATIONS

CHASSIS 1.47600

FREQUENCY RANGE
Broadcast 540-1670 Kc
IF 455 Kc

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

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

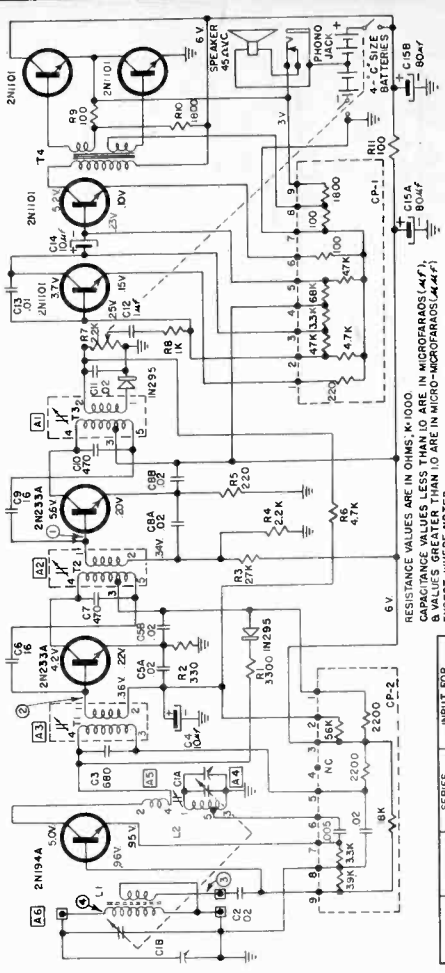
POWER SUPPLY
4 - "C" Size Flashlight cells

POWER OUTPUT
Undistorted 90 MW
Maximum 140 MW

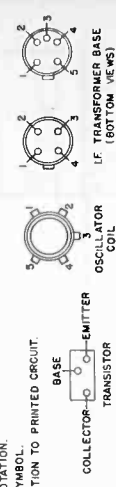
ALIGNMENT PROCEDURE
Output meter reading to indicate 5 milliwatts475V
Output meter connection Across speaker voice coil
Connection of generator ground lead Common Ground
Generator Modulation 30% 400 Cycles
Position of volume control Fully Clockwise

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 T8) A2 (Top of T2) A3 (Top of T1)	I. F. I. F. I. F.
Open	1670 Kc		*Test Loop	A4	Oscillator
1400 Kc			*Test Loop	A6	Antenna
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.

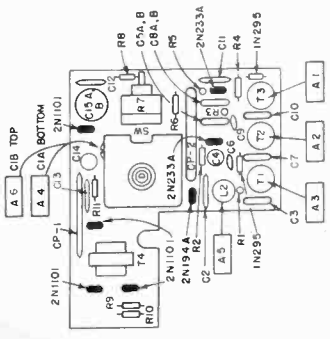


RESISTANCE VALUES ARE IN OHMS; K=1000 & CAPACITANCE VALUES LESS THAN 10 ARE IN MICROFARADS (µF) & VALUES GREATER THAN 10 ARE IN MICRO-MICROFARADS (µµF) EXCEPT WHERE NOTED.
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH AN AC VOLTMETER. ALL VOLTAGE READINGS ARE TO BE TAKEN WITH THE SET WITH TUNING CAPACITOR CLOSED & VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION.
⊖ = COMMON GROUND SYMBOL.
⊗ = EXTERNAL CONNECTION TO PRINTED CIRCUIT.



SIGNAL TEST POINT	TEST FREQUENCY	SERIES RESISTOR	INPUT FOR SIGNAL SOURCE
1	455 KC	05.4K	900 ΩV
2	455 KC	05.4K	30 ΩV
3	455 KC	05.4K	5 ΩV
4	1000 KC	STANDARD LOOP	200 ΩV/m

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
C1A, B	47124	Variable	3.25
C3, 11		02 µf., Disc.	.90
C4, 14	44396-4	680 µf., Nica	
C5A, B, 8A, B		10 µf., 10V., Elect.	
C6, 9		.02 µf., Disc., Dual	
C7, 10		400 µf., Nica	
C13		1 µf., Disc.	1.50
C15A, B	44397-3	.01 µf., Disc.	
		80/80 µf., 10V., Elect.	
R1		3300 ohm, 1/2W., 10%	
R2		316 ohm, 1/2W., 10%	
R3		27K., 1/2W., 10%	
R4		2200 ohm, 1/2W., 10%	
R5		220 ohm, 1/2W., 10%	
R6		220 ohm, 1/2W., 10%	
R7		220 ohm, 1/2W., 10%	
R8		Control, Volume & Switch, 2200 ohm	2.50
R9, 11		1000 ohm, 1/2W., 10%	
R10		1800 ohm, 1/2W., 10%	
L1	45534-13	Antenna Rod	2.00
L2	45781-9	Coil, Oscillator	1.75
T1	44855-12	Transformer, Ist I. F.	2.00
T2	44855-13	Transformer, 2nd I. F.	2.00
T3	44855-14	Transformer, 3rd I. F.	3.00
T4	4504-3	Transformer, Output Input	2.50
		MISCELLANEOUS	
	*AA17461-67	Cabinet Front Assembly, White	6.50
	*AA17461-59	Cabinet Front Assembly, Gray	6.50
	46811-19	Cabinet Back, Charcoal	6.50
	46811-67	Cabinet Back, White	1.75
	41611-59	Cabinet Back, Gray	1.75
	44610-67	Cabinet Back, Charcoal	1.75
	46890-59	Battery Cover, Gray	.50
	46890-67	Battery Cover, White	.50
	46891-19	Handle, Chrome	.35
	46892-1	Nameplate, Aluminum	.25
	46558-67	Knob, Volume-Off-On, White	.25
	46558-59	Knob, Volume-Off-On, Gray	.25
	46558-19	Knob, Volume-Off-On, Charcoal	.75
	46897	Knob, Stalrad Indicator	.35
	46523-2	Speaker, 3 1/2" P. M., 45 ohm	4.25
	46591-1	Battery Clip, Plus	.25
	46591-2	Battery Clip, Minus	.25
	43954	Diode, 1N295	1.00
	46890-5	Spring Unit	1.00
	46891-3	Contact Clip	.75
	417474	Phone Jack	.25



MODEL 9598 SPECIFICATIONS **CHASSIS I.47700**

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 Converter
 2N410
 or
 2N218 (Two) I. F.
 2N408 Driver
 2N270 (Two) Output

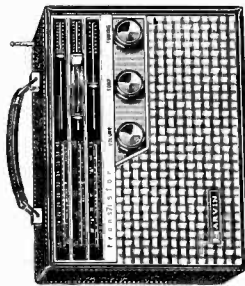
SPEAKER
 Type: Permanent Magnet
 Size: 5 inch 3.2 ohm v.c.c.

POWER SUPPLY
 8 - "D" Size Flashlight cells

POWER OUTPUT
 Normal 300 MW
 Extended 50 MW

ALIGNMENT PROCEDURE

Output meter reading to indicate 50 milliwatts4 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

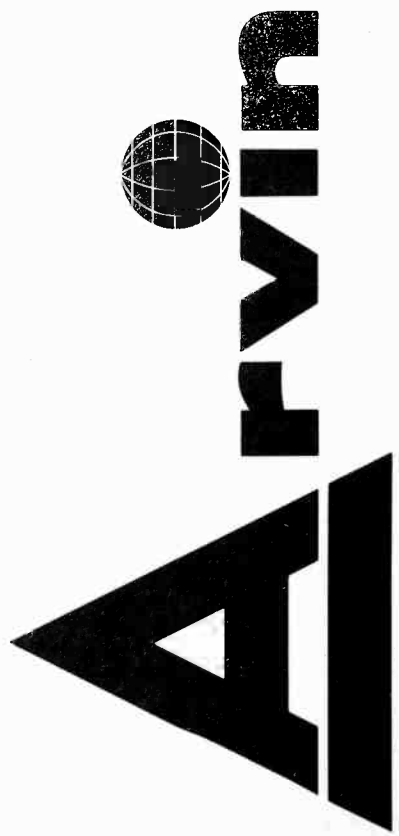


MODEL 9598

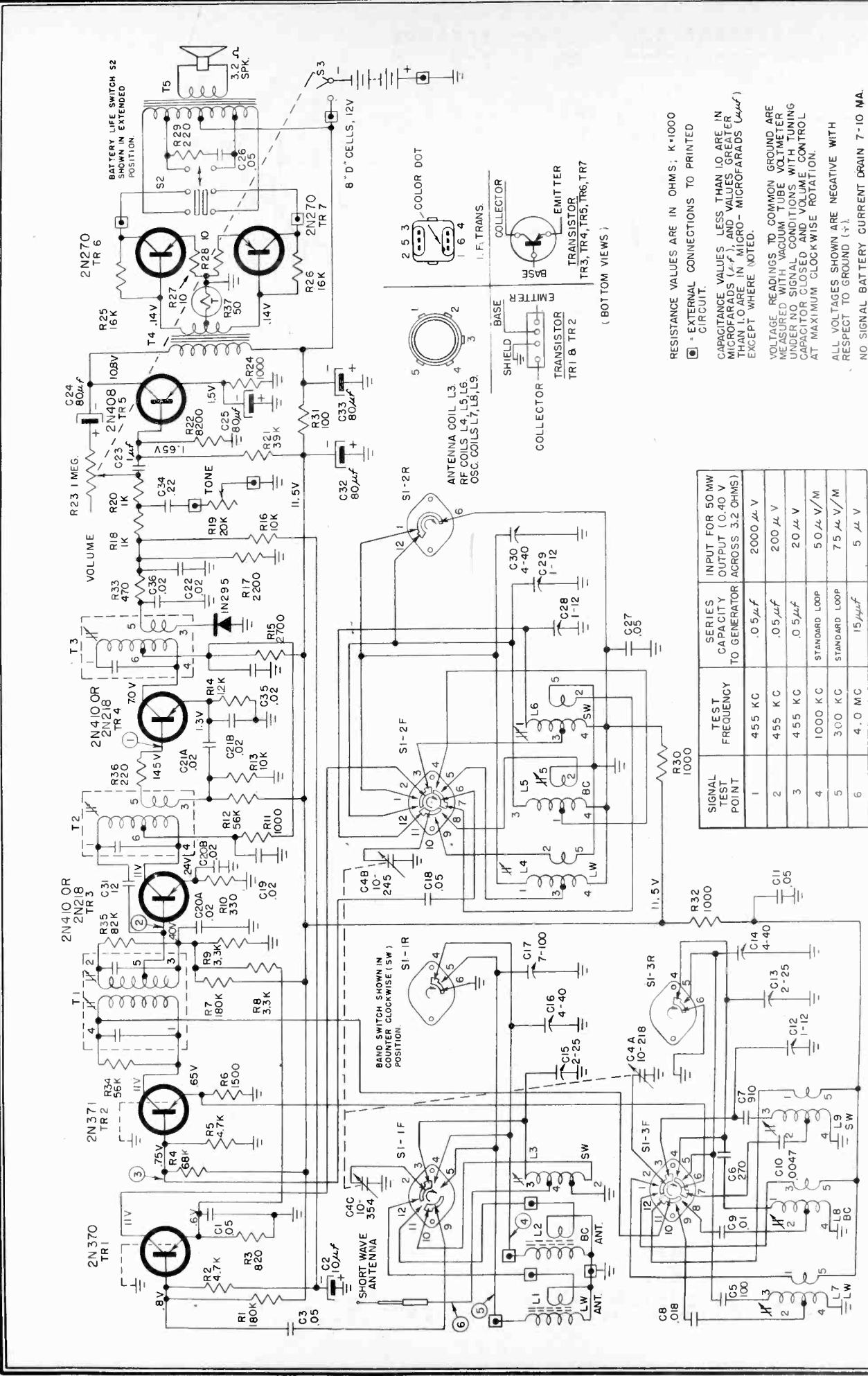
3 Wave Bands
 International
 Seven Transistor Portable

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	C14	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	SW Oscillator
2.5 Mc	2.5 Mc	15 µf	Whip Antenna	L3, L6 (Rock Variable)	SW Ant. & R. F.
5.5 Mc	5.5 Mc	15 µf	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.



CHASSIS: 1. 47700



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.

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	.05 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

SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST	SCHEMATIC LOCATION	PART NO.	DESCRIPTION	LIST
C1, 3, 11, 18, 27	47668-1	.05 µf., Disc.	1.20	L1	46861-2	Antenna Rod, LW	2.00
C2	47298	10 µf., 12V., Elect.	4.50	L2	46861-1	Antenna Rod, BC	2.00
C4A, B, C	47660-1	Variable	.25	L3	47657-1	Coil, Antenna	1.50
C5	47660-2	100 µf., Mica	.25	L4	47654-1	Coil, R.F., LW	1.50
C6	47660-3	270 µf., Mica	.25	L5	47655-1	Coil, R.F., BC	1.50
C7		910 µf., Mica	.25	L6	47656-1	Coil, R.F., SW	1.50
C8		.018 µf., Disc.		L7	45783-14	Coil, Oscillator, LW	2.25
C9		.01 µf., Disc.		L8	45783-13	Coil, Oscillator, BC	2.25
C10		.0047 µf., Disc.		L9	47391-1	Coil, Oscillator, SW	2.25
C12, 28, 29	47392-1	1-12 µf., Trimmer	.35	T1	47733-1	Transformer, 1st I.F.	2.50
C13, 15	47392-2	2-25 µf., Trimmer	.35	T2	45900-14	Transformer, 2nd I.F.	1.50
C14, 16, 30	47392-3	4-40 µf., Trimmer	.35	T3	45900-15	Transformer, 3rd I.F.	2.25
C17	47392-4	7-100 µf., Trimmer	.35	T4	45604-5	Transformer, Input	2.50
C19, 22, 35, 36		.02 µf., Disc.		T5	47658	Transformer, Output	2.75
C20A, B, 21A, B		.02 µf., Dual Disc.					
C24, 25, 32, 33	47668-2	1 µf., Disc.	1.20				
C26		80 µf./12V., Elect.					
C31		.05 µf., P.T.					
C34		12 µf., Disc.					
		.22 µf., P.T.					

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
45599-6	Speaker, 5" P.M., 3.2 ohm	4.75
47303	Antenna, SW	2.75
47386-1	Pulley	.50
47387-1	Pointer	.50
47305	Switch, Battery Saver	.35
47291	Band Switch	8.00

SPK

47303	Speaker, 5" P.M., 3.2 ohm	4.75
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S2

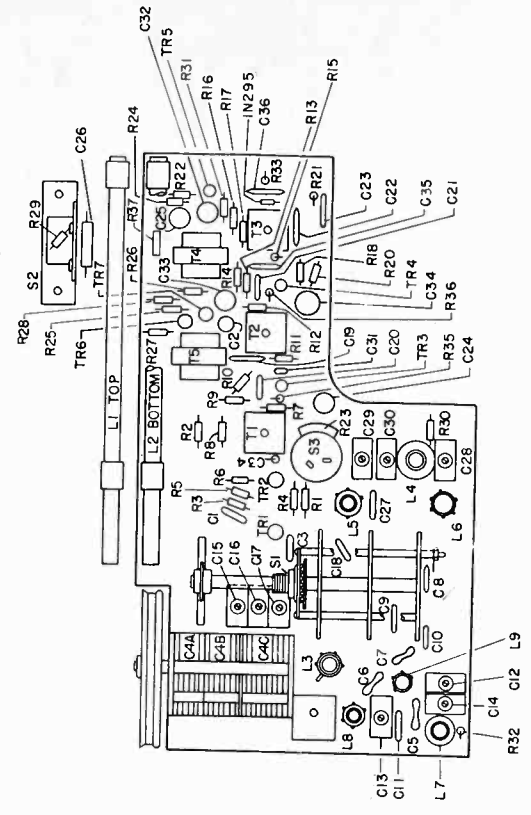
47305	Switch, Battery Saver	.50
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S1

47291	Band Switch	8.00
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RESISTORS

R1, 7	180 K., 1/2W., 10%	
R2, 5	4700 ohm, 1/2W., 10%	.75
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	1000 ohm, 1/2W., 10%	
R11, 18, 20, 24, 30, 32	56K ohm, 1/2W., 10%	
R12	10K ohm, 1/2W., 10%	
R13, 16	1.2K ohm, 1/2W., 10%	
R14	2700 ohm, 1/2W., 10%	
R15	2200 ohm, 1/2W., 10%	
R17	Control, Tone, 20K	
R19	39K ohm, 1/2W., 10%	
R21	8200 ohm, 1/2W., 10%	
R22	Control, Volume & Switch, 1 meg.	1.50
R23, S3	16K ohm, 1/2W., 10%	
R25, 26	10 ohm, 1/2W., 5%	
R27, 28	220 ohm, 1/2W., 10%	
R29, 36	100 ohm, 1/2W., 10%	
R31	470 ohm, 1/2W., 10%	
R33	56K., 1/2W., 10%	
R34	82K., 1/2W., 10%	
R35	50 ohm, Thermistor	.75
R37		



GENERAL ELECTRIC COMPANY
PRODUCT SERVICE, RADIO RECEIVER DEPARTMENT
 869 BROAD ST., UTICA, NEW YORK
PRELIMINARY SERVICE DATA



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, Al100, E95, Burgess ZR, or equivalent.
POWER OUTPUT:	10% Distortion 1 W Maximum: .125 W
OPERATING FREQUENCIES:	Tuning Range: 540 - 1600 Kilocycles I.F.: 455 Kilocycles

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 C128C2) should be referred to nearest G. E. Servicenter or G. E. Service Station.

CHASSIS REMOVAL

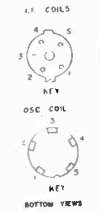
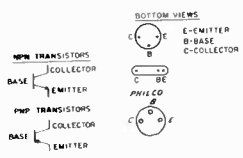
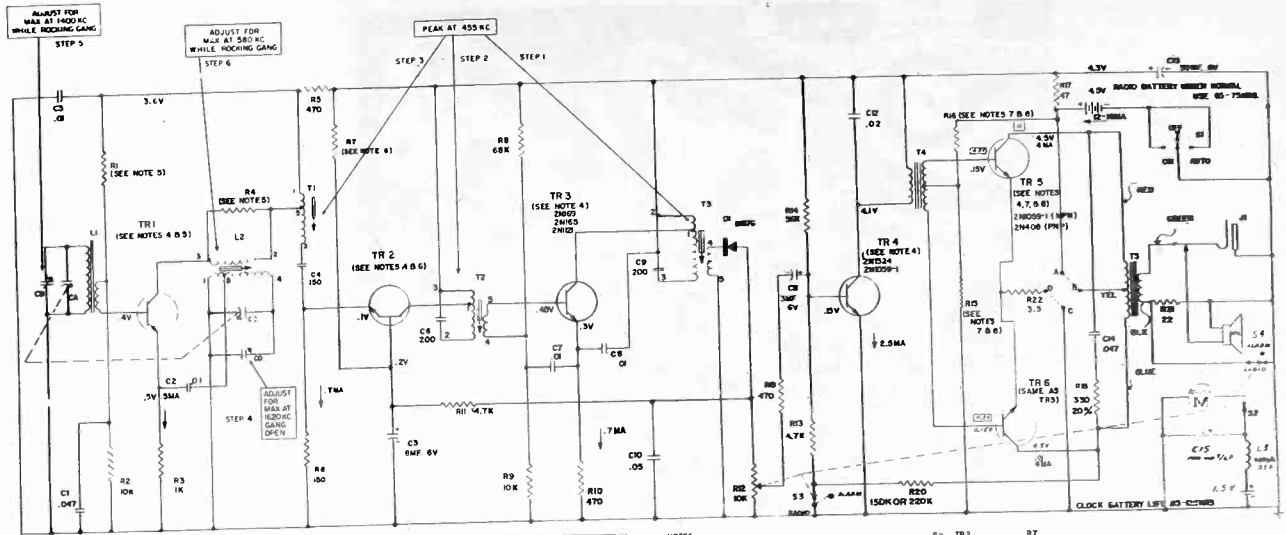
1. Remove two screws from cabinet back, lift cabinet back off.
2. Remove four screws holding circuit board to cabinet bosses (do not remove the two screws that secure antenna holder to circuit board.)
3. Remove volume control.
4. Remove output transformer from speaker.
5. Carefully lift chassis board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



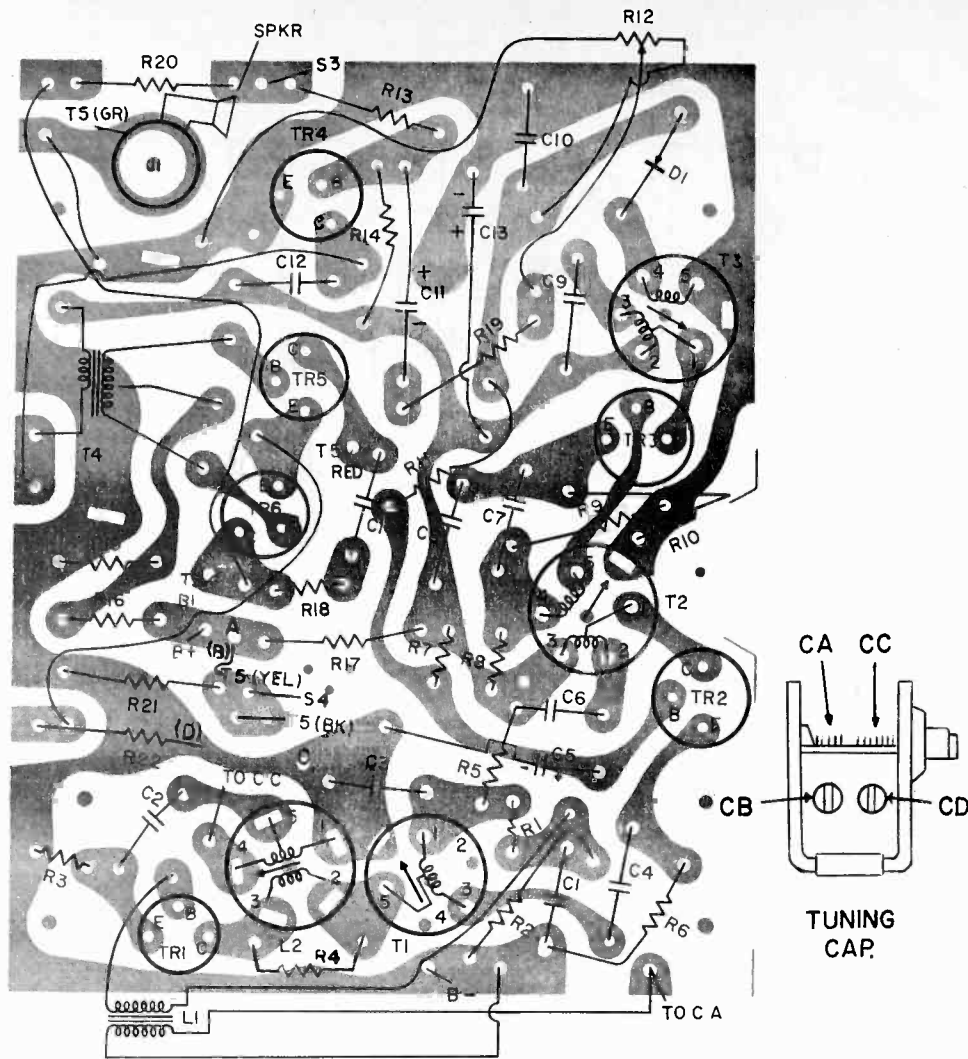
ALIGNMENT
 SET VOLUME CONTROL AT MAXIMUM
 CONNECT OUTPUT METER ON SCHEMATIC
 VOICE COIL
 INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER.

- NOTES**
- 1- UNLESS OTHERWISE NOTED CAPACITORS MORE THAN 1-μF AND RESISTORS LESS THAN 1-μF RESISTORS ARE 1/4 WATT ± 5%.
 - 2- VOLTAGE AND CURRENT RATINGS ARE AVERAGE UNDER NO SIGNAL. CAPACITORS VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND.
 - 3- VALUES SHOWN IN () ARE FOR PNP TRANSISTORS IN TR4 AND TR6.
 - 4- REPLACE WITH TRANSISTOR TYPE SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.
- | TR | TYPE | RES | VAL |
|----|---------|-----|------|
| 1 | 2N3638A | 47K | 1.5W |
| 2 | 2N3638B | 56K | 3.3W |
| 3 | 4N2228B | 30K | 1.0W |

- 5- TR 2: 2N94-132, 68K; 2N94-362, 82K
- 6- TR 2: 2N94-132, 68K; 2N94-362, 82K
- 7- FOR PNP TR5 & TR6: A- SOLDER TO YELLOW LEAD (B) TO POINT "A"; B- SOLDER TO SIDE OF R22 TO "C"; C- R16 MUST BE 100-Ω THERMISTOR.
- 8- FOR PNP TR5 & TR6: A- SOLDER TO "D" SIDE OF R22 TO "A"; B- SOLDER TO YELLOW LEAD (B) TO POINT "A"; C- R16 MUST BE 100-Ω THERMISTOR.

PRELIMINARY REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2, 3, 7, 8	0.1μf., 450V.	.30
RS-1021	C10	.05μf., 50V.	.50
RS-1225	C6, 9	200μmf., 300V.	.25
RS-1460	C11	3μf., 6V.	1.10
RS-1462	C5	8μf., 6V.	1.65
RS-1896	C4	150μmf., 300V.	.35
RS-2283	C12	.02μf., 50V.	1.10
*-RS-2402	CA, B, C, D	Tuning Capacitor	4.10
*-RS-2404	C13	50μf., 6V.	1.10
	C1, 14	.047μf., 50V	
RESISTOR			
RS-1995	(See Notes 7 & 8)	100-Ω, Thermistor	.70
POTENTIOMETER			
*-RS-2403	R17, S3, S4	Vol. Cont. 10K. & swb.	3.10

MODEL: CT455



COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
TRANSISTORS AND DIODE				MISCELLANEOUS (CONT'D.)		
RS-1531	TR1	Oscillator-Converter.....	3.55	*-RS-2390	Battery Contact (Neg.).....Pkg.2	.30
RS-1547	TR2	1st I.F.....	3.15	*-RS-2391	Screw, Cabinet.....	.35
RS-1548	TR3	2nd I.F.....	2.40	*-RS-2392	Rubber Gasket.....Pkg.5	.25
RS-1549	TR4	Driver.....	1.65	*-RS-2393	Rubber Bumper (cabinet foot).Pkg.5	.25
RS-1549	TR5-6	Audio Output (use when TR5 (NPN) and TR6 are NPN).....	1.65	*-RS-2394	Rubber Grommet (timer to cab).Pkg.5	.25
RS-1548	TR5-6	Audio Output (use when TR5 (PNP) and TR6 are PNP).....	2.40	*-RS-2405	Screw, (Cang to cab.).....Pkg.5	.25
RS-1811	D1	Diode.....	1.90	*-RS-2406	Screw, (Cab. Lock).....Pkg.5	.25
COILS AND TRANSFORMERS				CABINET AND APPEARANCE ITEMS		
*-PS-2395	T5	Output Transformer.....	3.00	*-RB-1138	Cabinet Front.....	5.95
*-RS-2396	T4	Driver Transformer.....	3.30	(Assem.)	Grille.....	
*-RS-2397	T1	1st I.F.....	2.35		Dial Insert.....	
*-RS-2398	T2	2nd I.F.....	2.35		Decorative Strip.....	
*-RS-2399	T3	3rd I.F.....	2.35		Decorative Insert.....	
*-RS-2400	L2	Oscillator Coil.....	1.60	*-RB-1139	Cabinet Back.....	1.30
*-PS-2401	L1	Antenna.....	1.85	(Assem.)	Stud.....	
MISCELLANEOUS						
RS-1195		Phone Jack.....	.90	*-RS-2347	Crystal.....	.60
RS-1363		Screw, Tuning Knob.....	.40	*-RS-2348	Grille Assem.....	1.00
PS-1991		Speaker, 2 3/4".....	7.25	*-RS-2349	Knob, Clock, (time-alarm)....Pkg.3	.30
PS-2324		Speaker Clip.....Pkg.5	.25	*-RS-2376	Knob, Clock, (on-off, auto)....Pkg.3	.30
*-RS-2384		Stud, Timer Slot.....Pkg.3	.30	*-RS-2377	Knob, Tuning.....	.80
*-RS-2385		Slide, Timer Slot.....Pkg.5	.25	*-RS-2378	Knob, Volume.....	.35
*-RS-2386		Stud, Compartment Door.....Pkg.5	.25	*-RS-2379	Battery Compartment Door.....	.75
*-RS-2387		Slide, Compartment Door.....Pkg.5	.25	*-RS-2380	Dial Insert.....	.80
*-RS-2388		Battery Contact.....Pkg.5	.25	*-RS-2381	Decorative Strip.....	.25
*-RS-2389		Battery Contact (Pos.).....Pkg.2	.30	*-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.

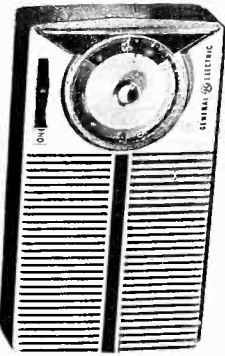
GENERAL ELECTRIC

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

SERVICE MANUAL FOR

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

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 2, #930, or (3) Mallory M15 Mercury Cells: (3) Eveready E9, or (3) Mallory Z89
OPERATING FREQUENCIES:	Tuning Range 540 - 1500 KC IF Frequency 455 KC



GENERAL INFORMATION

The models P745A, B and P746A, B are all transistor battery operated pocket portables. Models "A" versions is the "push button" (decent) tuning feature on the series-blunt knob or Pen-Light feature on the small hole located opposite 750 KC. The tuning knob. The slight resistance applied to the tuning knob makes a detent in the detent insert under the 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.

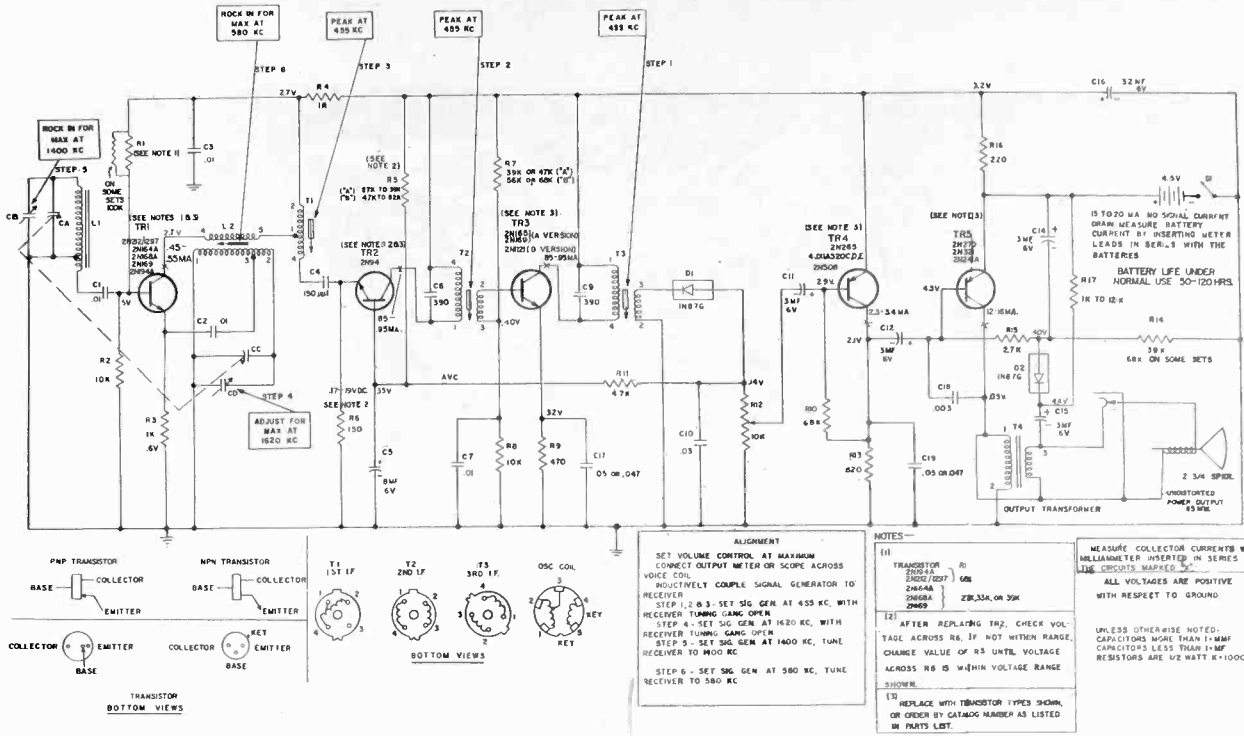
Bias for TR5 is developed by a sliding class A output circuit consisting of D2, T4, and C15. Under signal conditions, an AC voltage is developed across T4 and coupled to D2 through C15. When D2 conducts, the AC voltage is filtered by R14 and C14, then fed to the emitter of TR5. R15 is the emitter bias 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 tuning circuit leads attached to volume control and connecting 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.

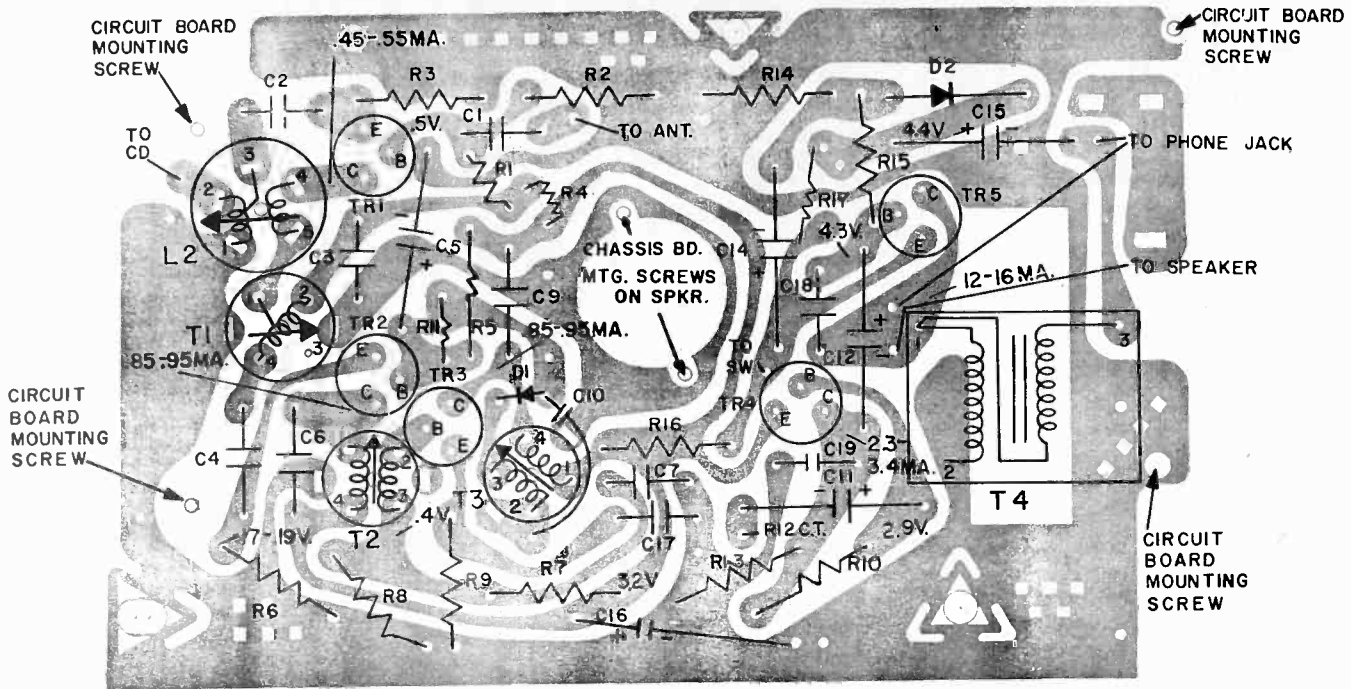


ALIGNMENT
SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL
INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER
STEP 1 - SET SIG. GEN AT 455 KC. WITH RECEIVER TUNING GANG OPEN
STEP 2 - SET SIG. GEN AT 1620 KC. WITH RECEIVER TUNING GANG OPEN
STEP 3 - SET SIG. GEN AT 1600 KC. TUNE RECEIVER TO 1600 KC.
STEP 4 - SET SIG. GEN AT 580 KC. TUNE RECEIVER TO 580 KC.

NOTES
(1) TRANSISTOR TR1 2N2638, TR2 2N2639, TR3 2N2640, TR4 2N2641, TR5 2N2642
(2) AFTER REPLACING TR2, CHECK VOLTAGE ACROSS R6. IF NOT WITHIN RANGE, CHANGE VALUE OF R3 UNTIL VOLTAGE ACROSS R6 IS WITHIN VOLTAGE RANGE
(3) REPLACE WITH TRANSISTOR TYPES 2N2638, OR OTHER BY CATALOG NUMBER AS LISTED IN PARTS LIST

MEASURE COLLECTOR CURRENTS WITH A MILLIAMMETER INSERTED IN SERIES WITH THE SPEAKER WINDING. ALL VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND.
UNLESS OTHERWISE NOTED, CAPACITORS MORE THAN 1-MF CAPACITORS LESS THAN 1-MF RESISTORS ARE 1/2 WATT R-1000

MODELS: P745A, B P746A, B



REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE	
CAPACITORS				MISCELLANEOUS (CONT'D.)			
RS-1022	C1,7	.01mf., 450V.....	.30	RS-1368	Battery Contact Spring & Retainer.....Pkg.2	.30	
RS-1024	C10,17,19	.05mf., 50V.....	.50	RS-1369	Cover, Battery Contact.....Pkg.2	.30	
RS-1047	C16	32mf., 6V.....	1.45	RS-1377	Speaker, 2 3/4".....	7.45	
RS-1378	CA,B,C,D	Tuning Cap.,P745A,P746A	4.15	RS-1675	Screw #2-56 x 1/8.....Pkg.5	.25	
RS-1460	C11,12,14,15	3mf., 6V.....	1.10	CABINET AND APPEARANCE ITEMS			
RS-1462	C5	8mf., 6V.....	1.65	RB-1058 (Assemb.)	Cabinet Front, (Ebony), P745A Cabinet Back, (Ebony)..... Insert, Decorative.....	3.75	
RS-1514	C18	.003mf., 100V.....	.25	RB-1062 (Assemb.)	Cabinet Front (Ant. White), P746A Cabinet Back (Turquoise)..... Insert, Decorative.....		3.75
RS-1996	C4	150mf., 300V.....	.35	RB-1088	Cabinet Back, (Ebony),P745A,B....		
RS-2034	CA,B,C,D	Tuning Cap.,P745B,P746B	4.10	RB-1089	Cabinet Back, (Turq.),P746A,B....	1.50	
RS-2035	C6,9	390mf., 300V.....	.35	RB-1106 (Assemb.)	Cabinet Front, (Ebony),P745B.... Insert..... Strip..... Grille Assem..... Detent Pad.....	2.90	
	C2,3	.01mf., 50V		RB-1107 (Assemb.)	Cabinet Front, (Ant. White), P746B.... Insert..... Strip..... Grille Assem..... Detent Pad.....		2.90
POTENTIOMETER				RS-1362	Knob (Tuning)"A" Version.....		
RS-1379	R12,S1	Volume Control 10K,& Sw	2.75	RS-1363	Thumbscrew (Tuning Knob).....	.40	
COILS AND TRANSFORMERS				RS-1364	Insert, Decorative P745A..... P746A.....	.55	
RS-1372	T4	Trans., Audio Output...	3.00	RS-1365	Strip, Decorative.....Pkg.2	.30	
RS-1373	L2	Coil, Oscillator.....	1.20	RS-1366	Knob, Volume, (Ebony), P745A,B....	.30	
RS-1374	T1	Trans., 1st. I.F.....	1.90	RS-1398	Knob, Volume, (Turq.),P746A,B....	.30	
RS-1375	T2	Trans., 2nd. I.F.....	2.10	RS-2030	Knob, Tuning w/insert and Detent Arm "B".....	1.25	
RS-1376	T3	Trans., 3rd. I.F.....	2.10	RS-2032	Insert, Detent P745B, P746B....	.25	
RS-1380	L1	Antenna.....	1.60	RS-2033	Spring, (Under Tuning Knob)"B"....	.40	
TRANSISTORS AND DIODE				RS-2036	Insert; Tuning Knob P745B, P746B	.40	
RS-1533	TR1	Osc. Conv.....	3.20				
RS-1531	TR1	Osc. Conv. (2N 212/1297)	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.....	.85				
		Battery Tube.....					
		Contact Spring.....					
		Retainer, Spring Contact.....					
		Cover, Battery Contact.....					
		Washer, Plain.....					
		Screws, (2) #4 x 3/8, type 25..					

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 #28, 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. Repeat gang trimmers.
3. Radiate a 100KC signal from a signal generator to the receiver.
4. Tune receiver to the 100KC signal.
5. With a 3/16" spline, loosen dial pointer, hex-head screw and adjust dial pointer directly over the 100KC mark on dial scale. Do not adjust tuning gang.
6. After gang is directly over 100KC mark, tighten dial pointer (to firm) into place. Each of the above procedure must be repeated 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 milliammeter in series with the lead and + terminal. The total current drain should be between 10-20 ma. 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.

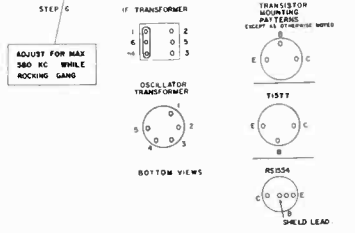
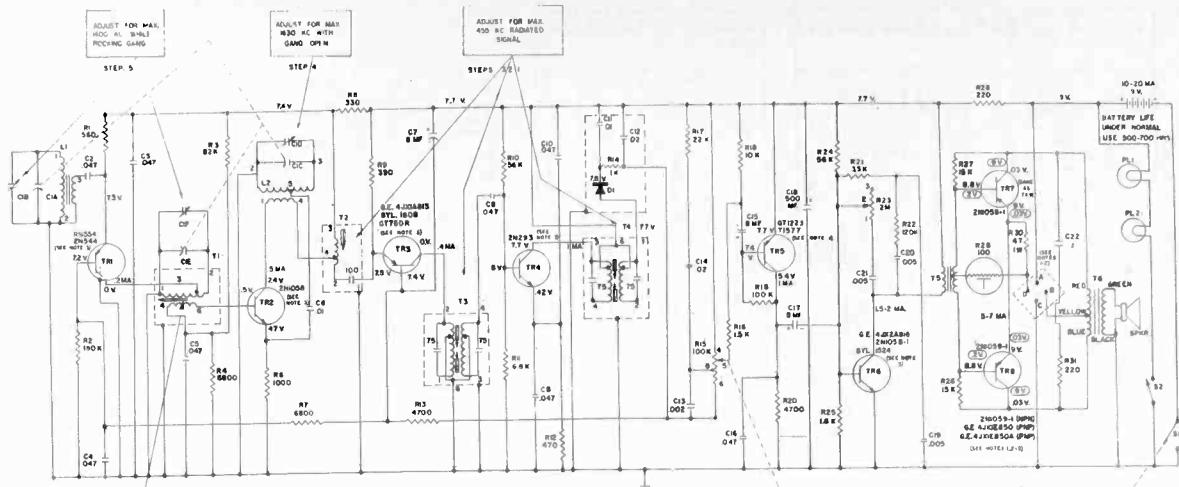
- WEAK AUDIO:**
1. Check battery voltage for 9 volts.
 2. Check battery current.
 3. Check alignment.
 4. Check solder connections on dip-soldered side of circuit board.

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 PNP or NPN 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	800mf., 450V.	.25
RS-1232	C13	300mf., 10V.	1.10
*RS-2228	C1	100mf., 450V.	.25
*RS-2228	C10	Tuning Cap.	6.00
*RS-2233	C12, 14	102mf., 450V.	1.90
*RS-2233	C18, 19	500mf., 12V.	1.90
*RS-2233	C15, 17	8mf., 15V.	2.40
	C2, 3, 4, 5	.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



ALIGNMENT

SET VOLUME CONTROL AT MAXIMUM. CONNECT OUTPUT METERS OR SCOP. ACROSS VOICE COIL. INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER.

STEP 1. 2. 8.5-SET 500 GEN. AT 455 KC. WITH RECEIVER TUNING GANG OPEN.

STEP 4. SET SIG. GEN. AT 830 KC. WITH RECEIVER TUNING GANG OPEN.

STEP 5. SET SIG. CH. AT 1400 KC. TUNE RECEIVER TO 1400 KC.

STEP 6. SET SIG. GEN. AT 580 KC. TUNE RECEIVER TO 580 KC.

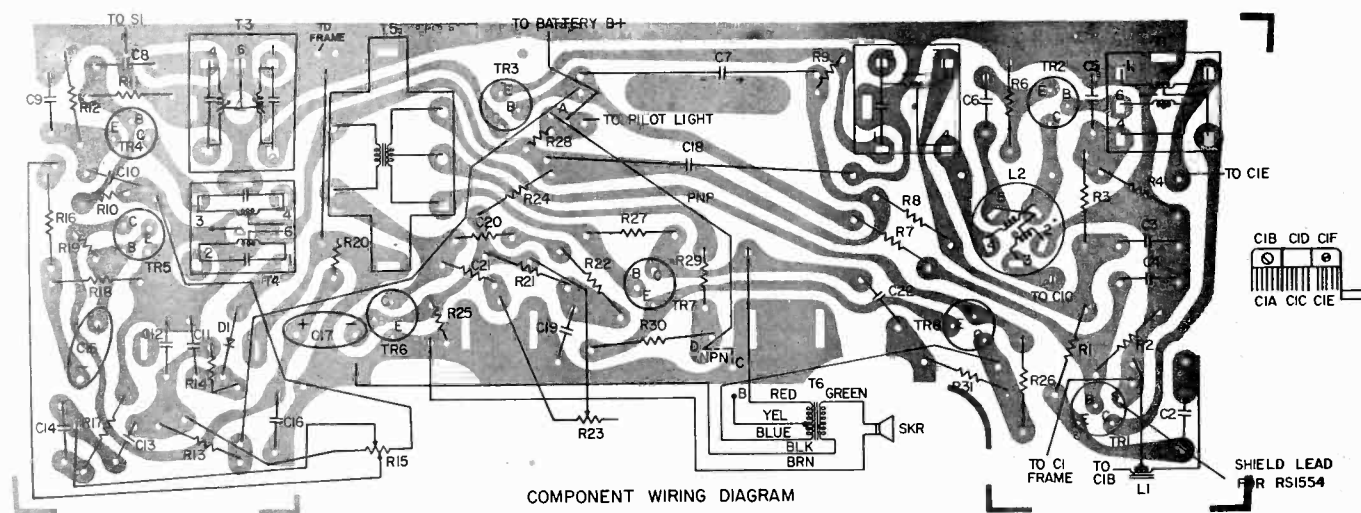
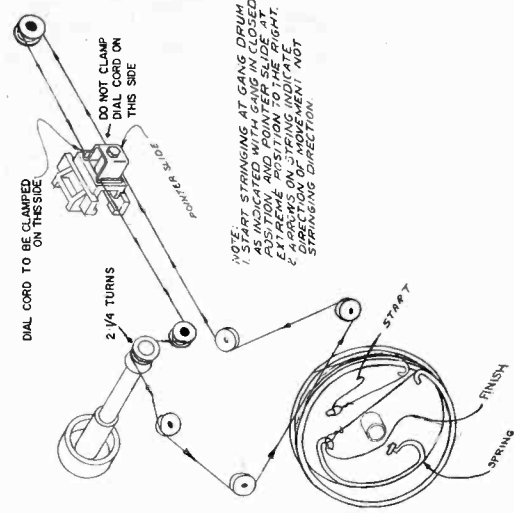
- NOTES:**
1. FOR NPN TR7 AND TR8:
 - A. CONNECT YELLOW LEAD TO POINT "A" (SEE COMPONENT WIRING DIAGRAM).
 - B. CONNECT A JUMPER WIRE BETWEEN POINTS "C" AND "D" (SEE COMPONENT WIRING DIAGRAM).
 2. FOR PNP TR7 AND TR8:
 - A. CONNECT YELLOW LEAD TO POINT "C" (SEE COMPONENT WIRING DIAGRAM).
 - B. CONNECT A JUMPER WIRE BETWEEN POINTS "A" AND "D" (SEE COMPONENT WIRING DIAGRAM).
 3. REPLACE WITH TRANSISTOR TYPES SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.
 4. UNLESS OTHERWISE NOTED: CAPACITORS MORE THAN 1000PF. CAPACITORS LESS THAN 100PF. RESISTORS ARE 1/2 WATT (X-10000).

5. VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND UNDER NO SIGNAL CONDITIONS.
6. VOLTAGES SHOWN IN [] ARE WITH TR7 AND TR8 OPEN.

MODEL: P780A

REPLACEMENT PARTS LIST (CONT'D.) - P780A		PRICE	DESCRIPTION	CAT. NO.	PRICE	DESCRIPTION	PRICE
COILS AND TRANSFORMERS (CONT'D.)							
*-RS-2222	Output Transformer.....	3.35		*-RS-2211	Slide, Pointer.....	Pkg.2	.30
*-RS-2223	Driver Transformer.....	4.20		*-RS-2212	Clamp, Dial String.....	Pkg.5	.25
*-RS-2224	2nd I.F.....	2.60		*-RS-2213	Tuning Shaft Assem. w/windless bushing, and "m" Ring.....		.75
*-RS-2225	3rd I.F.....	2.60		*-RS-2214	Battery Clip (Neg.).....		.40
*-RS-2226	R.F. Transformer.....	1.90		*-RS-2215	Switch Contact (Pilot Light)Pkg.5		.25
*-RS-2227	Oscillator Coil.....	.95		*-RS-2216	Spring (P.I.Sv.).....	Pkg.5	.25
*-RS-2230	Antenna.....	4.30		*-RS-2217	Insulator, (P.I.Sv.).....	Pkg.5	.25
TRANSISTORS AND DIODE							
*-RS-1554	TR1	4.85		*-RS-2218	Pilot Light Socket Assem.....	1.00	.25
RS-1531	TR2	3.55		*-RS-2219	Spacer, Handle.....	Pkg.5	.25
RS-1550	TR3	3.30		*-RS-2220	End Cap, Handle.....		.90
RS-1537	TR4	3.30		*-RS-2221	Handle Assem.....	1.90	.25
RS-1540	TR5	3.15		*-RS-2222	Pulley, 5/16 Dia.....	Pkg.2	.30
RS-1549	TR6	2.80		*-RS-2223	Spring, Dial Cord.....	Pkg.5	.25
RS-1549	TR7	1.65		*-RS-2224	Screw, #6 x 1/4.....	Pkg.3	.25
RS-1542	TR7-8	1.65		*-RS-2225	Screw, #6-32 x .420.....	Pkg.5	.25
RS-1811	DI	3.20		*-RS-2226	Compression Ring (Vol. Knob)Pkg.5		.25
MISCELLANEOUS							
*-RB-1128	Speaker, 5 1/4", 3.2ohms.....	8.40		*-RS-2227	Wire Clamp (Ant. to bracket).....	Pkg.5	.25
RS-1127	Pulley, 1/4 Dia.....	.25		*-RS-2228	Speed Clip, (Grille to Cab.).....	Pkg.3	.30
RS-1323	Pilot Light, #12.....	.25		*-RS-2229	Grommet (gang).....	Pkg.3	.30
RS-1781	Dial Cord.....	2.50		*-RS-2230	Eyelet (gang).....	Pkg.3	.30
RS-1809	Tubular Clip (Spkr. to Cab. Front).....	.30		*-RS-2231	Handle Support Plate.....	Pkg.3	.95
RS-1821	"C" Ring (Tuning Shaft).....	.25		CABINET AND APPEARANCE ITEMS			
RS-1954	Battery Clip (Neg.).....	.25		*-RB-1125	Cabinet Front.....		10.20
RS-1955	Battery Clip (Pos.).....	.25		*-RB-1126	Cabinet Back.....		5.50
RS-2082	Compression Ring (Tuning Knob).....	.25		*-RB-1127	Grille.....		4.00
*-RS-2209	Stud, Slide.....	.25		*-RS-2197	Rear Grille Cloth Assem.....		.45
*-RS-2210	Slide, Lock.....	.25		*-RS-2201	Bracket, (dial background).....		.40
*Denotes New Items Not Previously Cataloged.							

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



COMPONENT WIRING DIAGRAM

R1 --- 560 Ω	R11 --- 6.8K	R21 --- 33K	C1 --- Tuning Cap.	C12 --- .02
R2 --- 180K	R12 --- 470 Ω	R22 --- 120K	C2 --- .047	C13 --- .002
R3 --- 82K	R13 --- 4.7K	R23 --- 2M	C3 --- .047	C14 --- .02
R4 --- 6.8K	R14 --- 1K	R24 --- 56K	C4 --- .047	C15 --- 8mf.
R5 ---	R15 --- 100K	R25 --- 1.8K	C5 --- .047	C16 --- .047
R6 --- 1K	R16 --- 1.5K	R26 --- 15K	C6 --- .01	C17 --- 8mf.
R7 --- 6.8K	R17 --- 22K	R27 --- 15K	C7 --- 8mf.	C18 --- 500mf.
R8 --- 330 Ω	R18 --- 10K	R28 --- 220 Ω	C8 --- .047	C19 --- .005
R9 --- 390 Ω	R19 --- 100K	R29 --- 100 Ω	C9 --- .047	C20 --- .005
R10 --- 56K	R20 --- 4.7K	R30 --- 4.7 Ω	C10 --- .047	C21 --- .005
		R31 --- 220 Ω	C11 --- .01	C22 --- .1

©John F. Rider

GENERAL ELECTRIC

SERVICE MANUAL

FOR

TRANSISTOR RADIO RECEIVERS

(840-1600 KC., 455 KC., I-F.)

SUPERSIDES 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 #951; Burgess #2R or equivalent
POWER OUTPUT:	Undistorted 250 MW Maximum 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 button 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 from speaker.
5. Remove two lead screws holding chassis board and volume control bracket to cabinet bosses.
6. Move chassis slightly out and unsolder lead to dial light button lug; then remove chassis.
7. Troubleshooting

The total battery current drain should always be ascertained before proceeding with the servicing of per notes 1 or 2 on the schematic.

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 mls. 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.

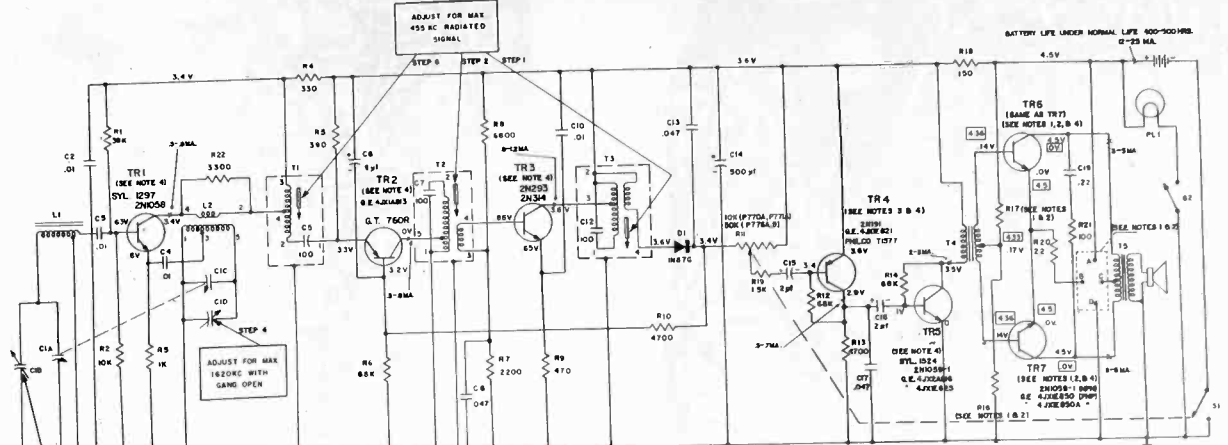
INTERMITTENT:

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. Contact surfaces are manufactured with either identical PNP 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 PNP's or NPN's as per notes 1 or 2 on the schematic.



NOTES:

1. FOR NPN TR6 & TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS B & D. (SEE PHANTOM WIRING DIAGRAM)
B. C & D MUST BE 50 OHMS (THERMISTOR).
C. R16 MUST BE 50 OHMS (THERMISTOR).
D. R17 MUST BE 50 OHMS (THERMISTOR).
2. FOR PNP TR6 & TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS A & B. (SEE PHANTOM WIRING DIAGRAM)
B. C & D MUST BE 50 OHMS (THERMISTOR).
C. R16 MUST BE 50 OHMS (THERMISTOR).
D. R17 MUST BE 50 OHMS (THERMISTOR).
3. TR77 (PHILCO) TRANSISTOR BASE LEAD MUST BE SOLDERED INTO B2 AS SHOWN ON PHANTOM WIRING DIAGRAM. BASE LEAD OF ALL OTHER RECOMMENDED TRANSISTORS FOR TR4 MUST BE SOLDERED INTO B1.
4. REPLACE WITH TRANSISTOR TYPES SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.

HOW TO CONSTRUCT A BATTERY CURRENT QUIESCENT CHECKER

1. CUT OUT FROM A SHEET OF COPPER TWO PIECES AS PER DIMENSIONS.
2. SOLDER AN ALLIGATOR CLIP TO EACH PIECE.
3. CUT OUT A PIECE OF DOUBLE-SIDED MASKING TAPE AS PER DIMENSIONS.
4. PLACE THE PIECES OF COPPER TOGETHER WITH THE MASKING TAPE INSERTED BETWEEN PLATES TO PREVENT PLATES FROM SHORTING.

ALIGNMENT

SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT METER A OR SCOPE ACROSS VOICE COIL
INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER
STEP 1 - SET SIG. GEN. AT 455 KC. WITH RECEIVER TUNING GANG OPEN
STEP 2 - SET SIG. GEN. AT 1620 KC. WITH RECEIVER TUNING GANG OPEN
STEP 3 - SET SIG. GEN. AT 400 KC. TUNE RECEIVER TO 400 KC.

ADJUST FOR MAX 455 KC. RADIATED SIGNAL

ADJUST FOR MAX 1620 KC. WITH GANG OPEN

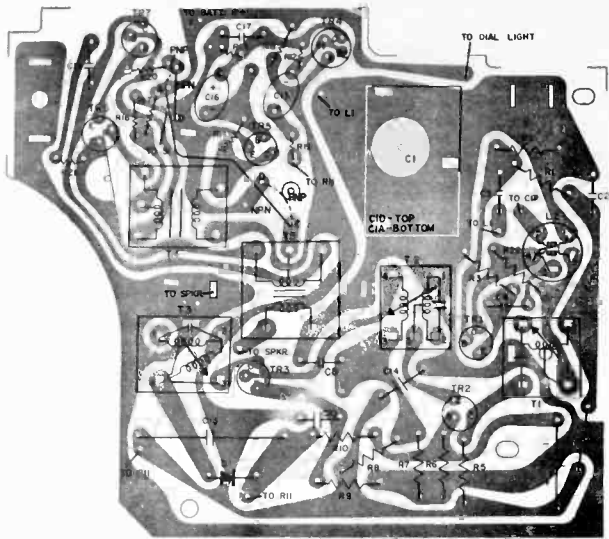
ADJUST FOR MAX 400 KC. WHILE TROUBLE SHOOTING

UNLESS OTHERWISE NOTED - CAPACITORS MORE THAN 1-1/2 MF CAPACITORS LESS THAN 1-1/2 MF RESISTORS ARE 1% WATT, R=1000

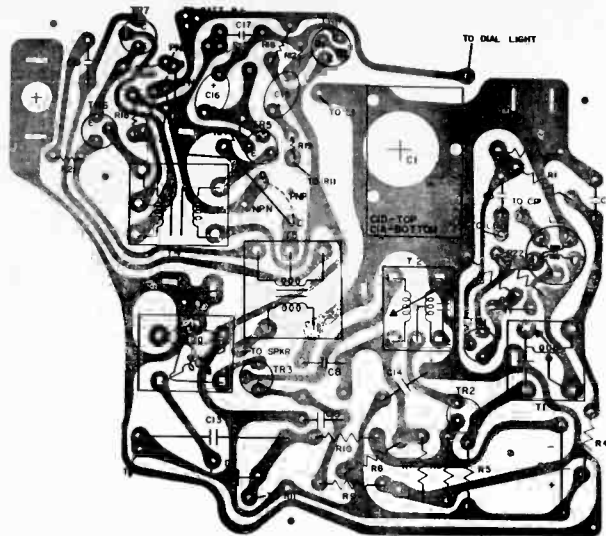
VOLTAGES ARE POSITIVE WITH RESPECT TO CHASSIS UNLESS INDICATED OTHERWISE

7 VOLTAGES SHOWN IN BOX ARE WITH TR6 & TR7 PNP

MODELS: P770A, P771A, P776A, B



PHANTOM WIRING DIAGRAM
MODELS P770A, P771A, P776A



PHANTOM WIRING DIAGRAM
MODEL P776B

REPLACEMENT PARTS LIST

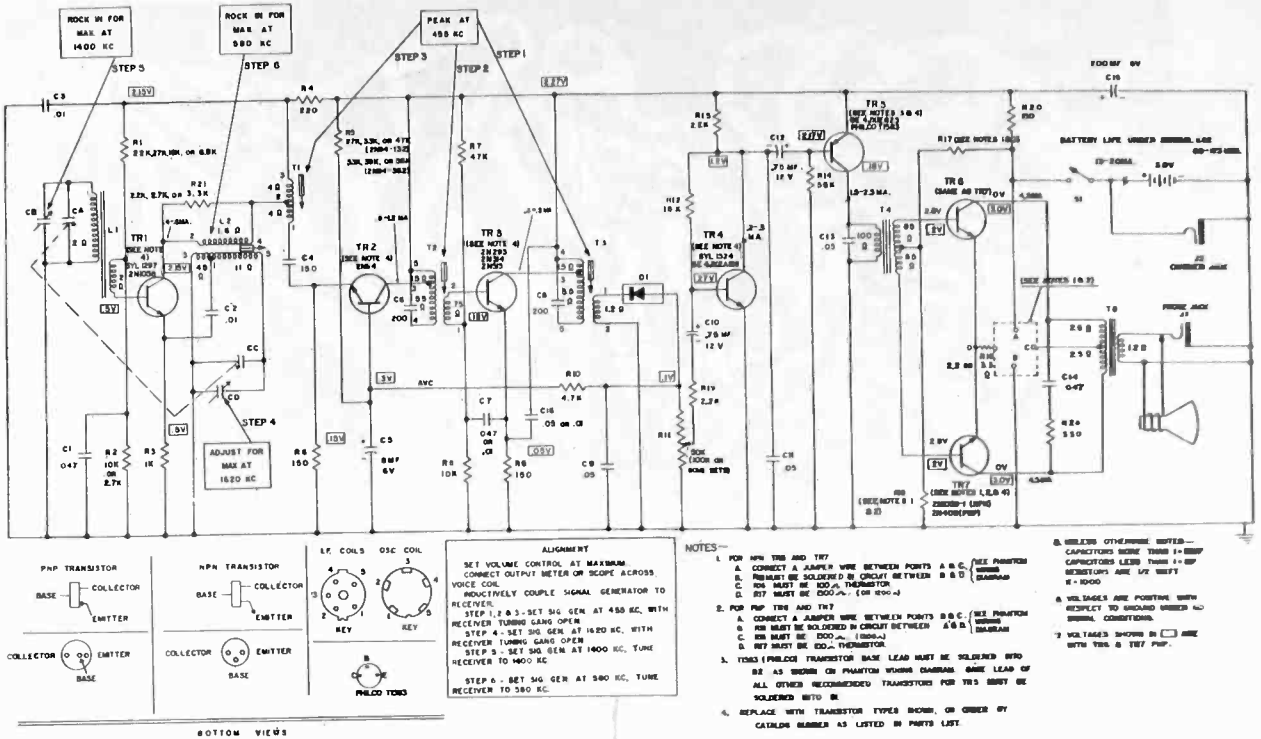
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE			
CAPACITORS									
RS-1022	C2,3 4,10	.01mf., 450V.....	.30	MISCELLANEOUS (CONT'D.)					
RS-1592	C6	8mf., 15V.....	1.10						
RS-1958	C1	Cap., Tuning, P776A.....	3.70						
RS-1959	C15,16	2mf., 10V.....	1.20						
RS-1960	C14	500mf., 6V.....	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-1355	See Notes 1 & 2	50 ohms, thermistor....	.50						
POTENTIOMETERS									
RS-1957	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 (1N87C) was RED- 001)....	1.90						
MISCELLANEOUS									
RB-1057	Speaker, 4".....	5.45							
RS-1188	Clamp, Antenna, P776A, B....	.30							
RS-1323	Light, Pilot, #12.....	.25							
RS-1809	Clip, Speaker Mounting....	.30							
RS-1810	Fastener, Speaker Mounting..	.25							
RS-1950	Contact, Pilot Light, P776A, B	.25							
Pkg.5	.25							
RS-2082	Ring, Compression, (Knob)..	.25							
RB-1097	Cabinet, (with mounting Board and Pilot Light well, P776A, B....	20.00							
RB-1102 (Assemb.)	Cabinet Front, (Ant. White), P770A Dial Window.....	4.90							
	Insert.....								
	Grille Assem.....								
RB-1103 (Assemb.)	Cabinet Front, (Green), P771A.... Dial Window.....	4.90							
	Insert.....								
	Grille Assem.....								
RB-1104 (Assemb.)	Cabinet Back, (Ant. White), P770A Stud Slide Catch.....	2.45							
	Slide Catch.....								
RB-1105 (Assemb.)	Cabinet Back (Green), P771A.... Stud Slide Catch.....	2.45							
	Slide Catch.....								
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.....	.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.

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GENERAL ELECTRIC
 SERVICE MANUAL
 FOR
ER-S-P785A
RADIO
MODELS
P785A
P786A
P787A
TRANSISTOR RADIO RECEIVERS
 (840-1600 KC, 488 KC, I-F.)
 SUPERSEDES SERVICE NOTE S-P785A



A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring so that a slink to measure the current flow. After each current check is completed, solder the cut carefully to complete the circuit again.

SPECIFICATIONS	
CABINET:	P785A Black and white P786A Lt. white P787A Blue and white
ELECTRICAL RATING:	3 volts DC
BATTERIES:	(a) Carbon Pen-Light cells: 2 Eveready 915, 1015 or 2 Burgess 2 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

NO RECEPTION:

1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L1.

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 contacts. 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 can be removed by cleaning the terminals 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 PNP transistors in the TR6 and TR7 stages or identical NPN 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 interchanged 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 PNP or NPNs as per notes 1 or 2 on the schematic.

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 gong mounting plate to cabinet front.
3. Tip board and gong 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.

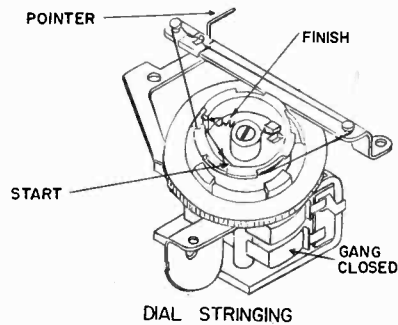
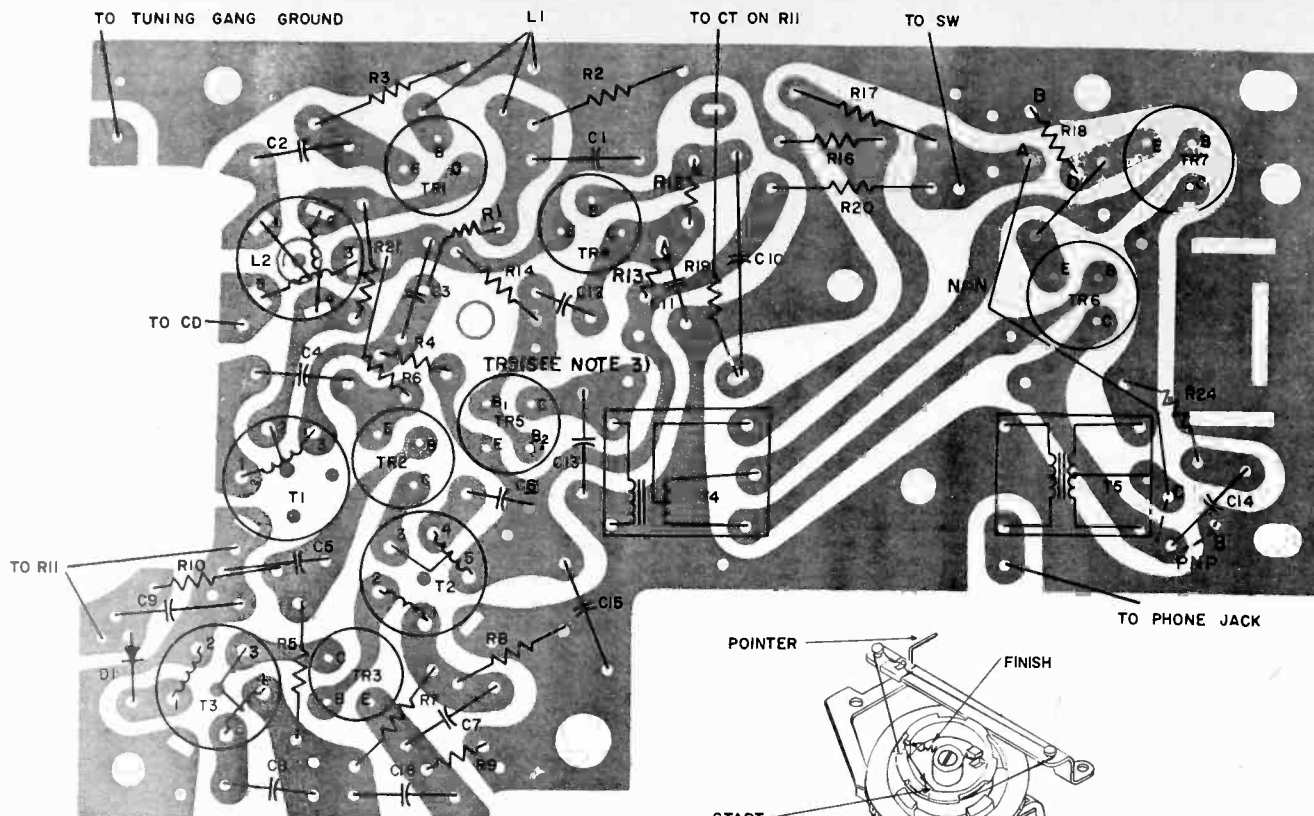
TROUBLESHOOTING

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 mA. 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.

MODELS: P785A, P786A, P787A



REPLACEMENT PARTS LIST						
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
CAPACITORS				MISCELLANEOUS (CONT'D)		
RS-1022	C3,7	.01mf. Disc. Cap.....	.30	RS-1781	Dial Cord.....	2.50
RS-1024	C9,11	.05mf. Disc. Cap.....	.50	RS-1981	Bracket Assem. w/charging jack....	.30
	13,16	.05mf. Disc. Cap.....	.50	RS-1982	Clip, Battery, (Upper).....Pkg.3	.30
RS-1225	C6,8	200mmf, Mica Cap.....	.40	RS-1983	Clip, Battery, (Lower).....Pkg.3	.30
RS-1462	C5	8mf., 6V., Elect.....	1.65	RS-1984	Contact, Battery, (Double)....Pkg.3	.30
RS-1992	CA,B,	Capacitor, Tuning.....	4.10	RS-1991	Speaker.....	7.25
	C,D	Capacitor, Tuning.....	4.10	RS-1998	Spring, Dial.....Pkg.3	.30
RS-1996	C4	150mmf., Mica Cap.....	.35	RS-1999	Screw, (tuning knob).....Pkg.5	.25
RS-1997	C15	200mmf., 6 V., Elect.....	1.30	RS-2000	Stud, gang Mtg. (Bracket to cabi- net front).....	.25
RS-2083	C10,12	.75mf., 6 V., Elect.....	1.10	RS-2001	Screw, Cab. (front to board).....	.25
	C1,14	.047mf., mylar		RS-2002	Hex nut, Ckt. board to self tap- ping screw.....Pkg.3	.30
	C2	.01mf.,		RS-2080	Screw, 6-32 x 3/16.....Pkg.5	.25
POTENTIOMETER				CABINET AND APPEARANCE ITEMS		
RS-1993	R11,S1	Vol. Cont. and Switch...	2.40	RB-1098	Cabinet Front Assem. w/grille,pad, insert dial L.H., insert dial R.H., cover plate.....	4.05
COILS AND TRANSFORMERS				RB-1099	Cabinet Back, P785A, Assem. w/rib- bon, batt. clip upper, batt. clip lower, batt. contact.....	1.90
RS-1985	T5	Output Transformer.....	4.25	RB-1100	Cabinet Back, P786A, Assem. w/rib- bon, batt. clip upper, batt. clip lower, batt. contact.....	1.90
RS-1986	T4	Driver Transformer.....	3.30	RB-1101	Cabinet back, P787A, Assem. w/rib- bon, batt. clip upper, batt. clip lower, batt. contact.....	1.90
RS-1987	T1	I.F. Trans., 1st.....	2.45	RS-1967	Grille.....	1.65
RS-1988	T2	I.F. Trans., 2nd.....	2.45	RS-1968	Knob, tuning.....	.30
RS-1989	T3	I.F. Trans., 3rd.....	2.50	RS-1969	Knob, volume, Black, P785A....Pkg.2	.30
RS-1990	L2	Osc. Coil.....	1.25	RS-1970	Knob, volume, White, P786A....Pkg.2	.30
RS-1994	L1	Antenna.....	1.90	RS-1971	Knob, volume, Blue, P787A....Pkg.2	.30
TRANSISTORS AND DIODE				RS-1972	Insert, Dial L.H.....Pkg.2	.30
RS-1531	TR1	Osc. Conv.....	3.55	RS-1973	Insert, Dial R.H.....Pkg.2	.30
RS-1547	TR2	1st I.F.....	3.15	RS-1974	Cover, Battery Compartment w/slide stud and lock, P785A, Black.....	.75
RS-1537	TR3	2nd I.F.....	3.15	RS-1975	Cover, Battery Compartment w/slide stud and lock, P786A, White.....	.75
RS-1549	TR4	1st Audio.....	1.65	RS-1976	Cover, Battery Compartment w/slide stud and lock, P787A, Blue.....	.75
RS-1551	TR5	Driver.....	2.40	RS-1977	Pointer.....	.25
RS-1548	TR6,7	(PNP) Audio Outputs.....	2.40	RS-1978	Slide Stud.....	.25
RS-1549	TR6,7	(NPN) Audio Outputs.....	1.65	RS-1979	Slide Lock.....Pkg.5	.25
RS-1811	D1	Diode.....	1.90	RS-1980	Cover Plate.....Pkg.2	.30
RESISTOR				MISCELLANEOUS		
RS-1995	(See Notes 1 & 2)	Thermistor 100	.70	RS-1019	Earphone Assembly.....	4.95
MISCELLANEOUS				RS-1052	Ring, Compression (Knob)....Pkg.5	.25
RS-1019		Earphone Assembly.....	4.95	RS-1057	Earphone Cordset.....	2.50
RS-1052		Ring, Compression (Knob)....Pkg.5	.25	RS-1195	Phone Jack.....	.90
RS-1057		Earphone Cordset.....	2.50			
RS-1195		Phone Jack.....	.90			

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



SPECIFICATIONS	
CABINETS:	Plastic: P830A, Charcoal P831A, Blue
ELECTRICAL RATING:	9 Volts DC (Battery)
BATTERIES:	(1) Eveready #226, Mallory #M-1600, Burgess #B6, F6, 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 sub-miniature pocket radios.
 An earphone jack for private listening is provided on the side of the radio. When the earphone (C. 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. Unslide the three gang connection lugs on dip-solder side of board.

TROUBLESHOOTING

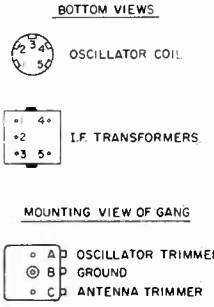
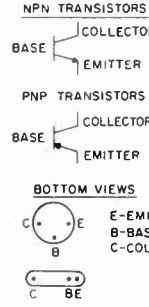
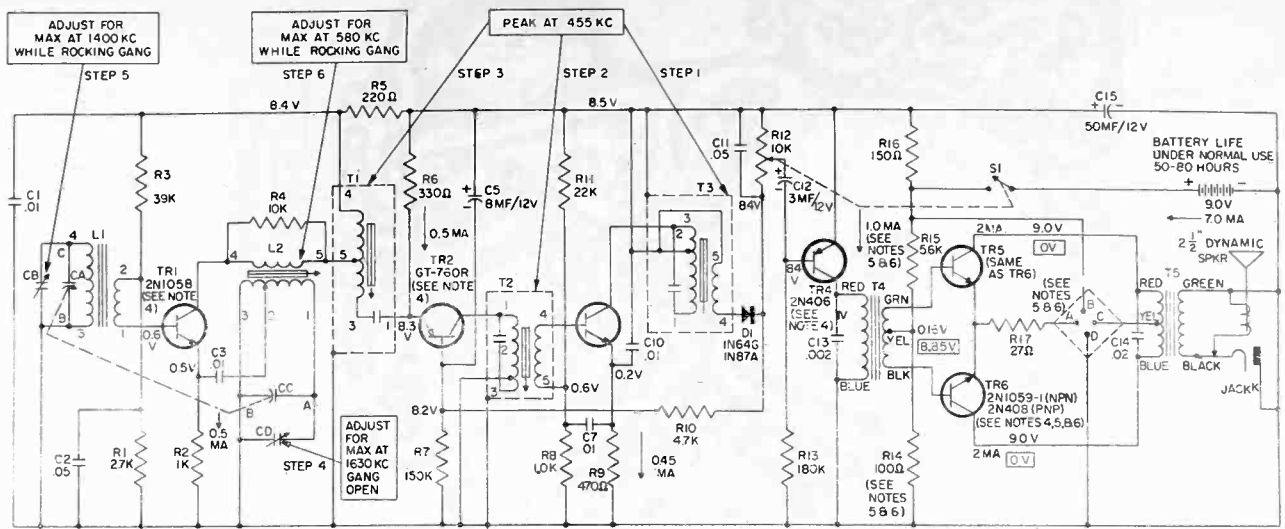
A check of battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the receiver turned on, volume control at maximum, tuning gang closed, with no signal conditions. The total receiver current drain is 6 to 9 ma. This is measured 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.
- 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 connections on dip-soldered side of circuit board.
 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.



- NOTES:**
- 1 UNLESS OTHERWISE NOTED-CAPACITORS MORE THAN 1-MMF CAPACITORS LESS THAN 1-MF RESISTORS ARE 1/2 WATT K=1000
 - 2 VOLTAGE AND CURRENT READINGS ARE AVERAGE UNDER NO SIGNAL CONDITIONS. VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND.
 - 3 VOLTAGES SHOWN IN ARE FOR PNP TRANSISTORS IN TR5 AND TR6
 - 4 REPLACE WITH TRANSISTOR TYPES SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST
 - 5 FOR NPN TR5 AND TR6
A CONNECT R17 ("A" SIDE) TO POINT "C"
B CONNECT YELLOW LEAD FROM T5 TO POINT "B"
C R14 MUST BE 100 ohms
D R15 MUST BE 5.6K

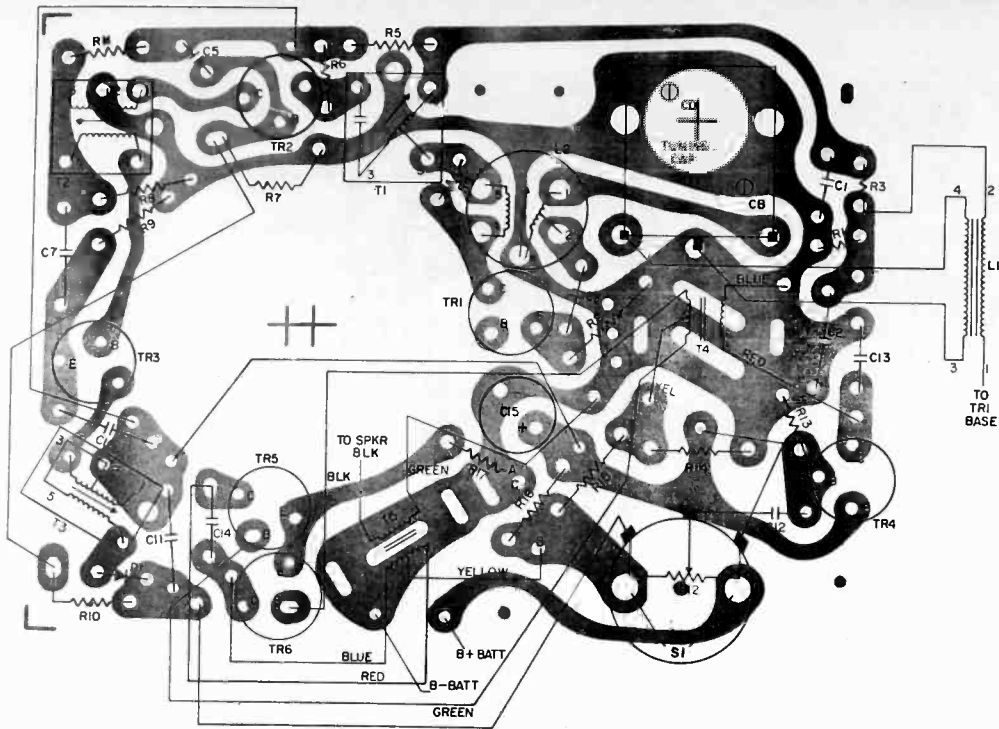
ALIGNMENT

SET VOLUME CONTROL AT MAXIMUM.
 CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL
 INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER.

- 6 FOR PNP TR5 AND TR6
- A CONNECT R17 ("A" SIDE) TO POINT "B"
 - B CONNECT YELLOW LEAD FROM T5 TO POINT "C"
 - C R14 MUST BE 5.6K
 - D R15 MUST BE 100 OHMS

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.P.	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	R12,51 Vol. Cont. 10K, & Sv....	3.65
COILS AND TRANSFORMERS		
*RS-2272	T5 Output Transformer.....	2.60
*RS-2273	T4 Driver Transformer.....	2.10
*RS-2274	T1 2nd I.F. Transformer.....	1.40
*RS-2275	T2 3rd 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 Sec. Conv.....	3.55
RS-1550	TR2 1st I.F. Trans.....	2.75

MODELS: P830A, P831A



CAPACITOR VALUES

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

RESISTOR VALUES

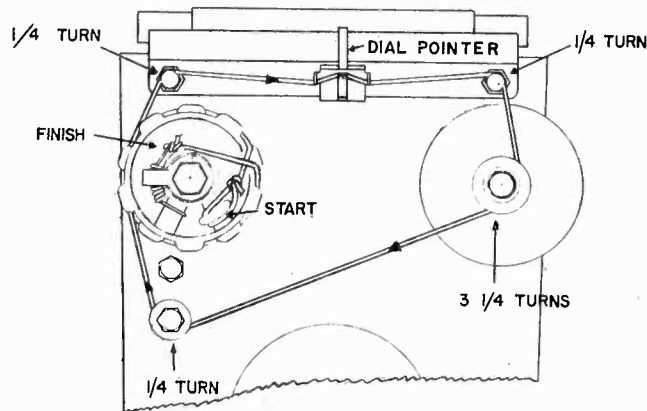
- R1 = 2.7K
- R2 = 1K
- R3 = 56K
- R4 = 10K
- R5 = 220
- R6 = 330
- R7 = 150K
- R8 = 1K
- R9 = 470
- R10 = 4.7K
- R11 = 22K
- R12 = 10K
- R13 = 180K
- R14 = 100 (NPN)
5.6K (PNP)
- R15 = 5.6K (PNP)
100 (PNP)
- R16 = 150
- R17 = 27

REPLACEMENT PARTS LIST - P830A, P831A (CONT'D.)						
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
TRANSISTORS AND DIODE (CONT'D.)				MISCELLANEOUS (CONT'D.)		
RS-1536	TR3	2nd I.F. Trans.....	3.15	*RS-2291	Screw (Gang to bd.).....Pkg.5	.25
RS-1543	TR4	Driver.....	2.35	*RS-2292	Screw (Drum to gang).....Pkg.5	.25
RS-1549	TR5, 6	Output (use when TR5 and TR6 are NPN).....	1.65	*RS-2293	Nut, Volume Control.....Pkg.5	.25
RS-1548	TR5, 6	Output (use when TR5 and TR6 are PNP).....	2.40	*RS-2294	Screw (Tuning Knob to shaft),Pkg.5	.25
RS-1811	D1	Diode.....	1.90	*RS-2514	Screw, (Sleeve & Jack brkt. to bd),Pkg.5	.25
MISCELLANEOUS				CABINET AND APPEARANCE ITEMS		
*RB-1133		Speaker 2 1/2".....	3.80	*RB-1129	Cabinet Front, Charcoal,.....P830A	1.00
*RS-2559		Earphone Jack.....	.90	*RB-1130	Cabinet Front, Blue,.....P831A	1.00
RS-1675		Screw (Jack brkt. to bd.).....Pkg.5	.25	*RS-1131	Cabinet Back, Charcoal,.....P830A (Assem.)	1.25
*RS-2267		Tuning Shaft.....	.30		Detent Spring.....	
RS-1781		Dial Cord.....	2.50		Rivet, Washer, Plate.....	1.25
*RS-2264		Drum.....	.25	*RS-1132	Cabinet Back, Blue,.....P831A (Assém.)	
*RS-2266		Stud (Slide Rail).....Pkg.3	.30		Detent Spring.....	1.25
*RS-2268		Spring (Dial Cord).....Pkg.5	.25		Rivet, Washer, Plate.....	
*RS-2269		Plate (Dial Cord Spring).....Pkg.5	.25	*RS-2259	Grille.....	1.15
*RS-2270		Detent Spring.....Pkg.5	.25	*RS-2260	Tuning Knob.....	.30
*RS-2271		Grille Pad.....Pkg.3	.30	*RS-2261	Volume Knob.....	.40
*RS-2278		Shield, I.F. Transformer.....Pkg.5	.25	*RS-2262	Pointer Slide.....	.25
*RS-2287		Contact, (Battery Pos.).....Pkg.2	.30	*RS-2263	Cabinet Stand.....	.40
*RS-2288		Contact, (Battery Neg.).....Pkg.2	.30	*RS-2265	Pointer.....	.25
*RS-2289		Screw (Vol. Cont. to Cir. bd.).....Pkg.5	.25	*RS-2322	Crystal, Dial.....	1.30
*RS-2290		Screw (Vol. Knob to Vol.Cont.)Pkg.5	.25			

*-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.



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

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GENERAL ELECTRIC

SERVICE MANUAL FOR TRANSISTOR RADIO RECEIVERS

(840-1600 KC., 455 KC., 1-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 mA. 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.

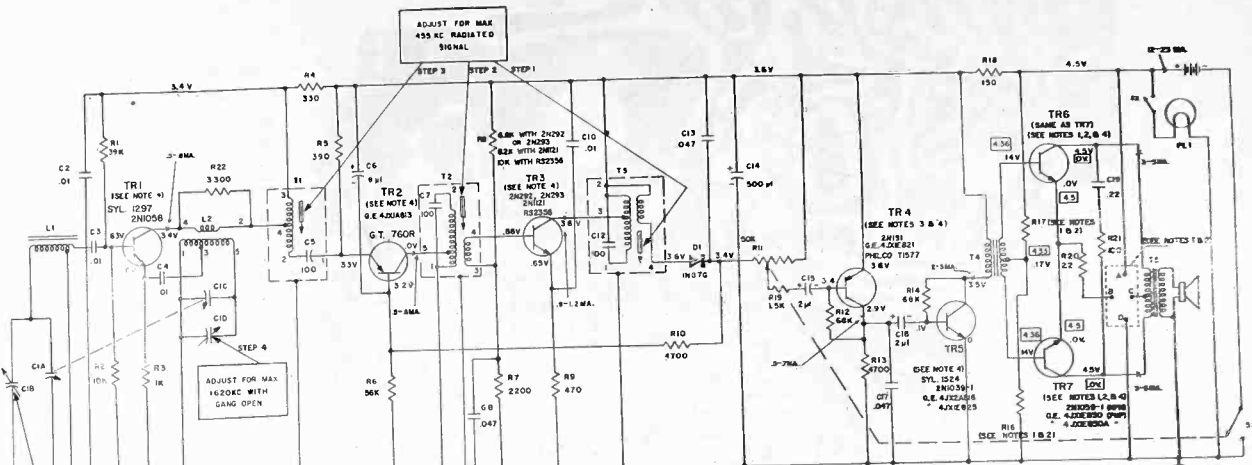
NO RECEPTION:

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.
 4. 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 TR3 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 PNP or NPN as per notes 1 or 2 on the schematic.

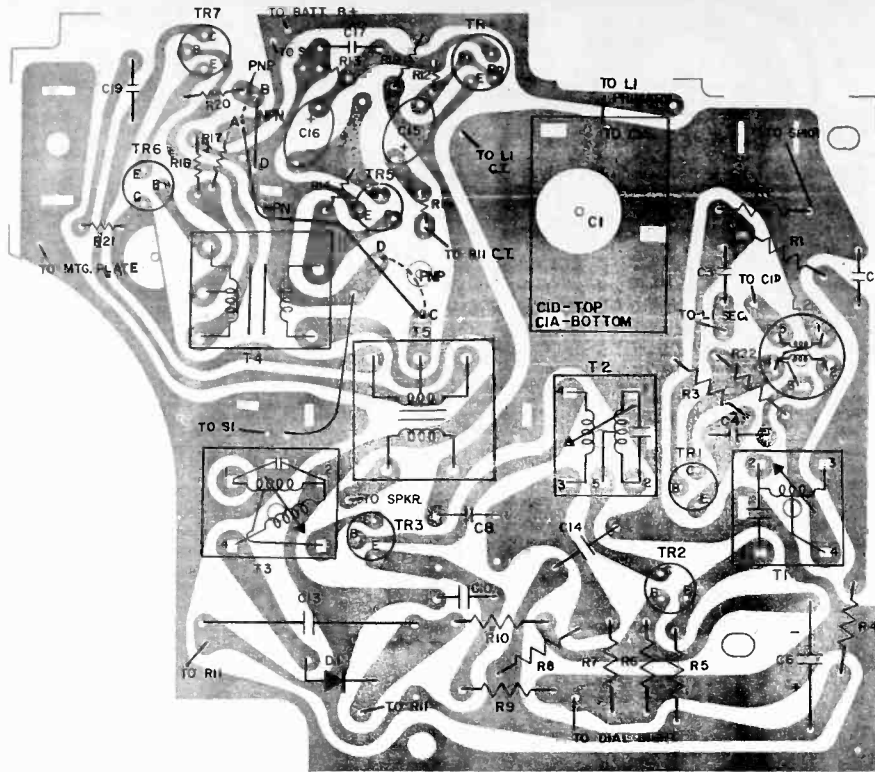
REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2, 3, 4, 10	0.1µf., 450V.	.30
RS-1592	C6	8µf., 10V.	1.10
RS-1959	C15, 16	2µf., 10V.	1.70
RS-1960	C14	500µf., 6V.	1.75
*-RS-2465	C1	Tuning Gang.	4.10
	C8, 17	.047µf., 50V (mylar)	
	C13	.047µf., 200V	
	C19	.22µf., 50V	
RESISTORS			
RS-1355	See Notes 1 & 2	50Ω thermistor	.50
POTENTIOMETER			
*-RS-2464	R11, S1	Volume Control, 50K Ω/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	2.50
TRANSISTORS AND DIODE			
RS-1531	TR1	One Conv.	3.55
RS-1350	TR2	1st I.F.	3.30



- NOTES-**
1. FOR NPN TR6 & TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS B B D (SEE PHANTOM WIRING DIAGRAM) A B C
B. C R6 MUST BE 50 OHMS
C. R7 MUST BE 50 OHMS
D. R7 MUST BE 50 OHMS
 2. FOR PNP TR6 & TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS A B B (SEE PHANTOM WIRING DIAGRAM) A B C
B. C R6 MUST BE 50 OHMS
C. R7 MUST BE 50 OHMS
D. R7 MUST BE 50 OHMS
 3. T577 (PHILCO) TRANSISTOR BASE LEAD MUST BE SOLDERED INTO B2 AS SHOWN ON PHANTOM WIRING DIAGRAM BASE LEAD OF ALL OTHER RECOMMENDED TRANSISTORS FOR TR4 MUST BE SOLDERED INTO B1.
 4. REPLACE WITH TRANSISTOR TYPES SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.
- ALIGNMENT**
- SET VOLUME CONTROL AT MAXIMUM. CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL. INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEPTOR. STEP 1, 2 B, 3 - SET SUG. GEN AT 455 KC. WITH RECEIVER TUNING GANG OPEN. STEP 4 - SET SUG. GEN AT 1620 KC. WITH RECEIVER TUNING GANG OPEN. STEP 5 - SET SUG. GEN AT 1400 KC. TUNE RECEIVER TO 1400 KC.
- ADJUST FOR MAX 455 KC. MODULATED SIGNAL**
- ADJUST FOR MAX 1620 KC. WITH GANG OPEN**
- ADJUST FOR MAX 1400 KC. WITH GANG OPEN**
- TRANSISTOR MOUNTING PATTERNS (EXCEPT T577)**
- PHILCO T577 ONLY**
- TOP VIEW**
- BOTTOM VIEW**
- STEP 3**
- STEP 4**
- STEP 1**
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- STEP 100**

MODELS: T145A, T146A



- CAPACITORS**
- C1 -- Tuning Cap.
 - C2 -- .01mf.
 - C3 -- .01mf.
 - C4 -- .01mf.
 - C6 -- 8mf.
 - C8 -- .047mf.
 - C10 -- .01mf.
 - C13 -- .047mf.
 - C14 -- .50mf.
 - 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 -- 2.2K
 - R21 -- 100
 - R22 -- 3.3K

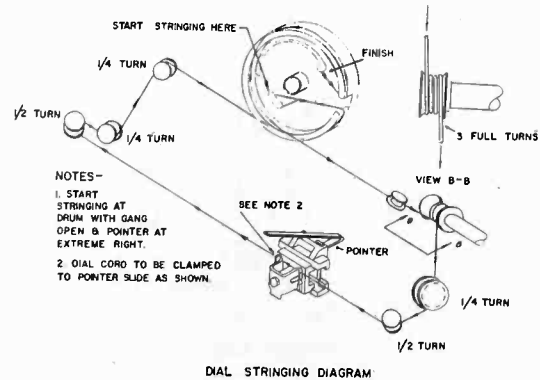
PHANTOM WIRING DIAGRAM

REPLACEMENT PARTS LIST (CONT'D.)						
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
TRANSISTORS AND DIODE (CONT'D.)				MISCELLANEOUS (CONT'D.)		
RS-1537	TR3	2nd I.F.	4.00	*RS-2459	Tuning Shaft Assembly	.85
RS-1540	TR4	1st Audio	3.70	*RS-2460	Switch Bracket	.30
RS-1549	TR5	Driver	1.65		Switch Contact	
RS-1549	TR6,7	Audio Output (use when TR6 and TR7 are NPN)	1.65		Switch Insulator	
RS-1542	TR6,7	Audio Output (use when TR6 and TR7 are PNP)	4.00	*RS-2463	Pilot Light Socket Assem.	.50
RS-1811	DL	Diode	1.90	*RS-2466	Rivet, (Pulley to chassis) Pkg.5	.25
				*RS-2555	Rivet, (String pulley) Pkg.5	.25
MISCELLANEOUS				CABINET AND APPEARANCE ITEMS		
RB-1046		Speaker 5 1/4"	6.25	*RB-1144	Cabinet Front (w/o grille) (Assem.)	6.50
RS-1127		Pulley Pkg.5	.25	*RB-1145	Crystal and insert (Assem.)	
RS-1323		Pilot Light (#12)	.25		Cabinet Back, Cocoa T146A	5.90
RS-1781		Dial Cord	2.50		Grille Cloth	
RS-1809		Clip Tubular (Spkr. to Cab.)	.30		Slide Stud and Lock	
RS-1951		Spring (Pilot Light) Pkg.5	.25	*RB-1146	Cabinet Back, Gray T145A (Assem.)	5.90
RS-1954		Battery Contact (Neg.)	.25		Grille Cloth	
RS-1955		Battery Contact (Pos.)	.25	RS-2018	Button, Pilot Light Pkg.3	.30
RS-1999		Screw, Drum to Shaft Pkg.5	.25	*RS-2444	Crystal	2.55
RS-2016		Slide Stud	.25	*RS-2445	Grille Cloth Assembly	.50
RS-2021		Slide Lock Pkg.5	.25	*RS-2446	Grille Assem. (T146A)	2.20
RS-2082		Ring, Compression (Knob to Shaft) Pkg.5	.25	*RS-2447	Grille Assem. (T145A)	2.20
RS-2153		Pulley Pkg.5	.25	*RS-2448	Battery Comp. Cover (T146A)	.25
RS-2211		Slider, Pointer Pkg.3	.30	*RS-2449	Battery Comp. Cover (T145A)	.25
RS-2235		Spring, Gang Drum Pkg.5	.25	*RS-2450	Tuning Knob, Cocoa (T146A)	.50
*RS-2455		Tapped Bushing (bd.mtg.) Pkg.3	.30	*RS-2451	Volume Knob, Cocoa (T146A)	.50
*RS-2456		Tapped Bushing (slide rail) Pkg.3	.30	*RS-2452	Insert, decorative	.50
*RS-2457		Slide Rail Pkg.2	.30	*RS-2453	Pointer	.40
*RS-2458		Drum, Gang	.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

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GENERAL ELECTRIC

SERVICE MANUAL

FOR
TRANSISTOR RADIO RECEIVERS
(840-1600 KC., 455 KC., I-F.)
SUPERSEDES SERVICE NOTE S-P795

S-P795-I
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 6 of 0 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 mills. 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 0 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

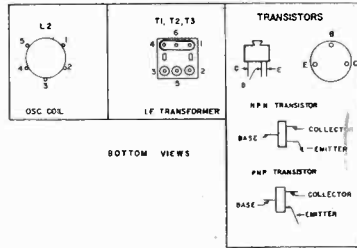
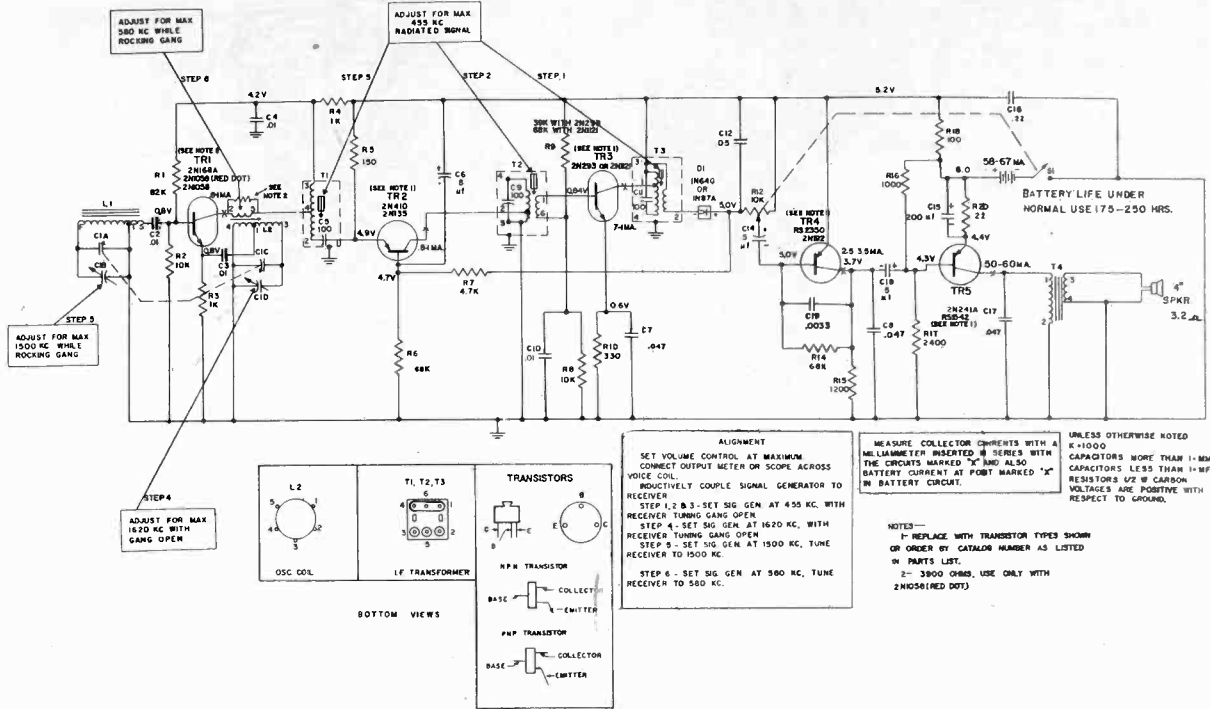
When measuring voltages at the transistor lead terminals, be sure to observe correct voltage polarities as shown on the schematic. Transistor, be sure when replacing a defective transistor, be sure to observe correct lead positions as shown on the schematic diagram in outline form. When replacing TR2, 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	5mf., @10V., Elect.	1.10
RS-1612	C14, 18	5mf., @10V., Elect.	1.20
RS-1813	C13	.22mf., 100V., Elect.	.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



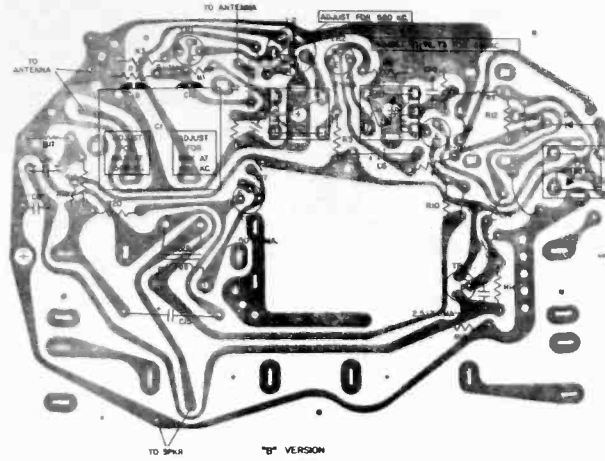
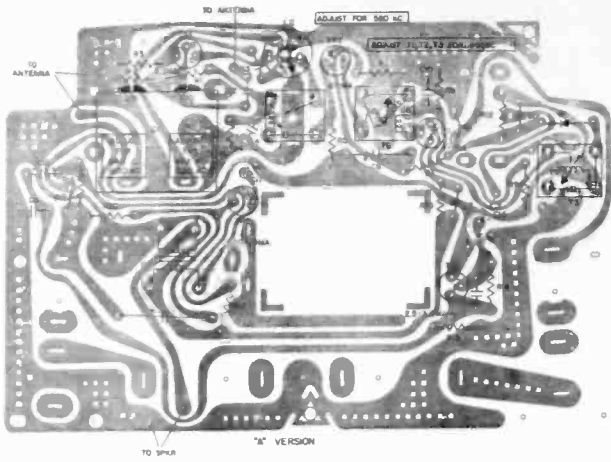
ALIGNMENT
SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT METER OR SCOPE ACROSS
VOICE COIL
INDUCTIVELY COUPLE SIGNAL GENERATOR TO
RECEIVER TUNING GANG OPEN
STEP 1. SET SIG. GEN AT 455 KC. WITH
RECEIVER TUNING GANG OPEN
STEP 2. SET SIG. GEN AT 1620 KC. WITH
RECEIVER TUNING GANG OPEN
STEP 3. SET SIG. GEN AT 1500 KC. TUNE
RECEIVER TO 1500 KC.
STEP 4. SET SIG. GEN AT 900 KC. TUNE
RECEIVER TO 840 KC.

MEASURE COLLECTOR CURRENTS WITH A
MILLIAMMETER INSERTED IN SERIES WITH
THE CIRCUITS MARKED "X" AND ALSO
BATTERY CURRENT AT POINT MARKED "Y"
IN BATTERY CIRCUIT.
UNLESS OTHERWISE NOTED
K=1000
CAPACITORS MORE THAN 1-MF
RESISTORS 1/2 W CARBON
VOLTAGES ARE POSITIVE WITH
RESPECT TO GROUND.
NOTES—
1—REPLACE WITH TRANSISTOR TYPES SHOWN
OR ORDER BY CATALOG NUMBER AS LISTED
IN PARTS LIST.
2—300 OHMS. USE ONLY WITH
2N241A (DOT)

MODELS: P795A, B P796A, B P797A, B

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MODELS: P795A, B P796A, B P797A, B



COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
CAPACITORS (cont'd.)				MISCELLANEOUS		
RS-1022	C2, 3, 4, 10	.01mf., 450V.....	.30	RB-1057	Speaker, 4".....	5.45
	C7, 8, 17	.047mf., 450V.....		RS-1188	Clamp, Antenna..... Pkg.2	.30
RS-1024	C12	.05mf., 50V.....	.50	RS-1320	I.F. Clip Strap..... Pkg.5	.25
RS-1514	C19	.003mf., 450V.....	.25	RS-1341	Battery Clip & Clamp (Pos) (Right Cent. Battery).....	.30
POTENTIOMETER				RS-1342	Battery Clip & Clamp (Neg) (Left Cent. Battery).....	.30
RS-1834	R12, S1	Vol. Cont. 10K & Sw....	1.85	RS-1344	Bracket, Antenna, (R.H.).....	.90
COILS & TRANSFORMERS				RS-1345	Bracket, Antenna, (L.H.).....	.70
RS-1424	T1	1st I.F. Transformer...	2.00	RS-1393	Battery Clip, (Pos), (Left Battery)	.25
RS-1425	T2	2nd I.F. Transformer...	1.95	RS-1394	Battery Clip & Clamp, (Pos), (Right Battery).....	.30
RS-1426	T3	3rd I.F. Transformer...	2.10	RS-1395	Battery Clip, (Neg), (Right Battery)	.15
RS-1427	L2	Oscillator Coil.....	1.20	RS-1396	Battery Clip & Clamp, (Neg), (Left Battery).....	.30
RS-1428	T4	Output Transformer.....	2.85	RS-1397	Heat Sink.....	.25
RS-1831	L1	Antenna "A" version.....	2.15	RS-2082	Ring, Compression..... Pkg.5	.25
*RS-2563	L1	Antenna "B" version.....	2.15	RS-1809	Ring, Tubular, Speaker..... Pkg.3	.30
TRANSISTORS AND DIODE				CABINET & APPEARANCE ITEMS		
RS-1531	TR1	Oscillator Converter...	3.55	RB-1091	Cabinet, P795A, B Black.....	8.80
RS-1539	TR2	1st I.F.....	4.00	RB-1092	Cabinet, P796A, B Blue.....	8.80
RS-1537	TR3	2nd I.F.....	4.00	RB-1093	Cabinet, P797A, B Beige.....	8.80
RS-1541	TR4	Audio Amplifier.....	4.00	RS-1382	Nameplate.....	.25
RS-1542	TR5	Audio Output.....	4.00	RS-1802	Grille, P795A, B P796A, B w/nameplate and medallion.....	1.65
RS-1811	D1	Crystal Diode,.....	1.90	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

"" 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.

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

GENERAL ELECTRIC

S-P780 -1
RADIO
MODEL
P780A, B

SERVICE MANUAL

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

SPECIFICATIONS	
CABINET:	Ginger with chrome grille
BATTERIES:	(6) 1 1/2 volt "np" size cells Evesady #950, A100, E95; Burgess #28, 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

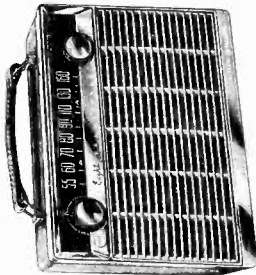
After replacing the dial pointer, the following procedure must be followed in order to properly calibrate dial pointer on the scale:

1. Mount antenna and antenna bracket securely on chassis.
2. Recheck gang trimmers.
3. Radiate 1000KC signal from a signal generator to the receiver.
4. Tune receiver to the 1000KC signal.
5. With a 3/16" spirit level, loosen dial 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 mA. 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 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 motorboat-ing are frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

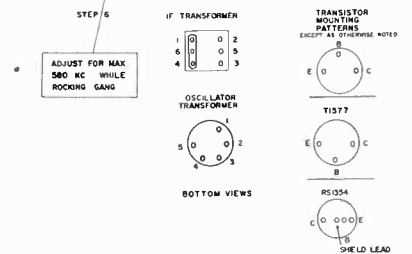
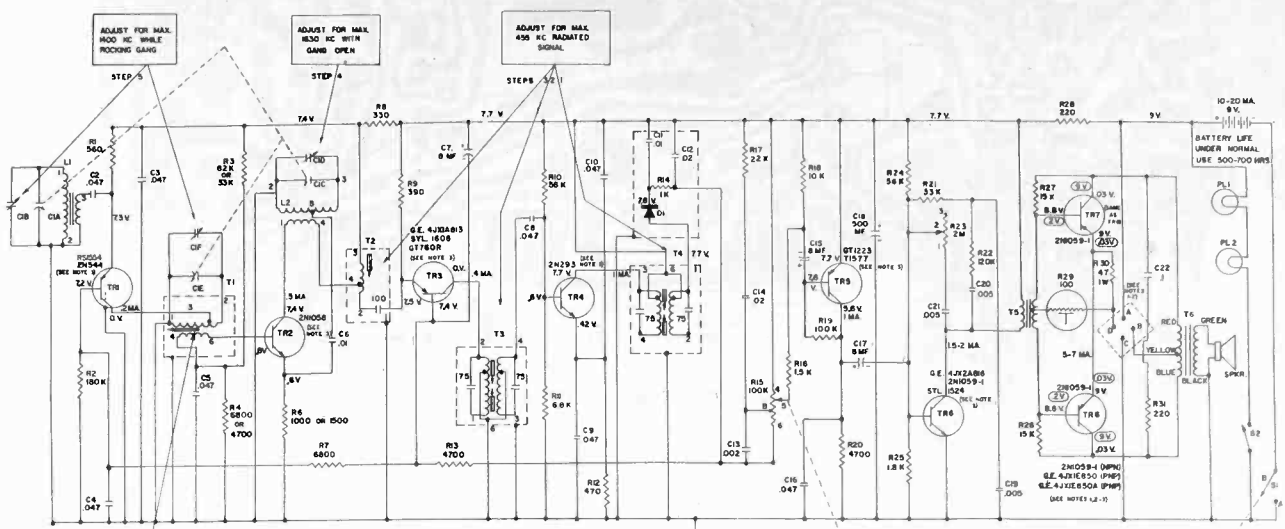
Oxidation may occur on the contacts of the batteries. This will tend to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

PNP receivers are manufactured with either identical PNP transistors in the TR7 and TR8 stages or identical NPN 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 PNP or NPN as per notes 1 or 2 on the schematic.

REPLACEMENT PARTS LIST

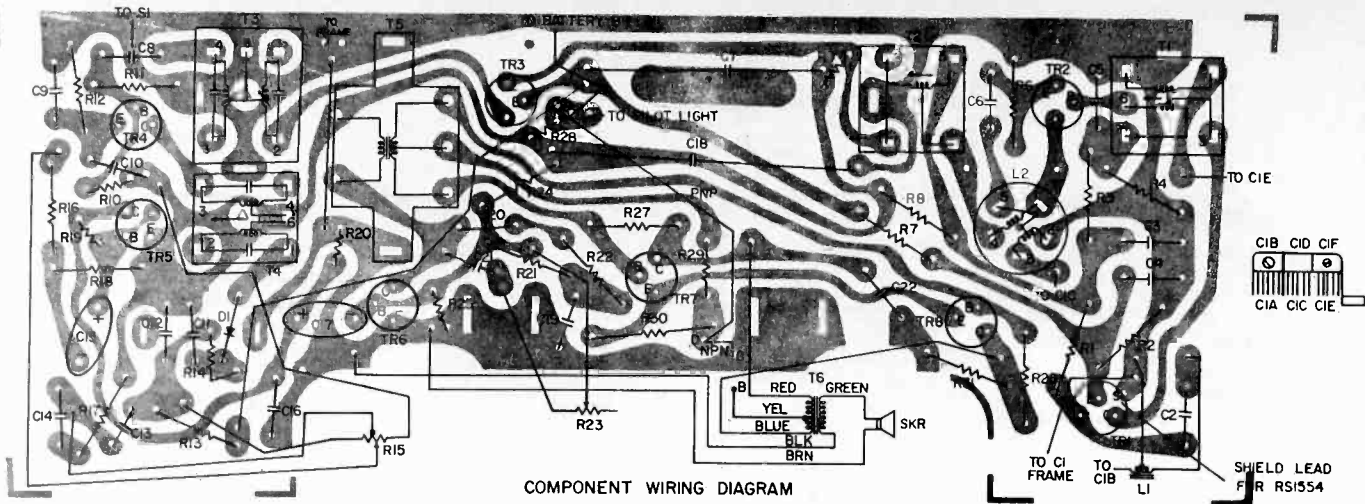
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
RS-1022	C6, 11	.01mf., 450V.	.30
RS-1023	C 20, 21	.005mf., 450V.	.25
RS-1592	C7	8mf., 10V.	1.10



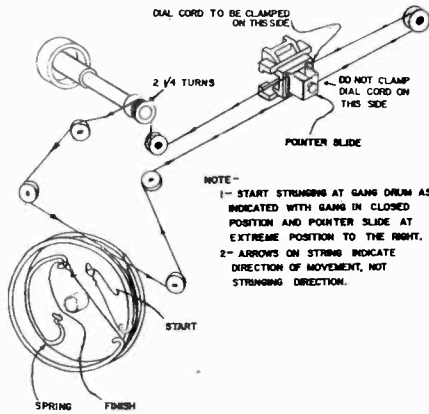
ALIGNMENT
SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL.
INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER
STEP 1 - 2 B.S. - SET 540 KC. GEN. AT 455 KC. WITH RECEIVER TUNING GANG OPEN
STEP 2 - SET 540 KC. GEN. AT 1400 KC. TUNE RECEIVER TO 1400 KC.
STEP 3 - SET 540 KC. GEN. AT 180 KC. TUNE RECEIVER TO 540 KC.

- NOTES:**
1. FOR NPN TR7 AND TR8
A. CONNECT YELLOW LEAD "D" FROM T6 TO POINT "K" (SEE COMPONENT WIRING DIAGRAM)
B. CONNECT A JUMPER WIRE BETWEEN POINTS "C" AND "D" (SEE COMPONENT WIRING DIAGRAM)
 2. FOR PNP TR7 AND TR8
A. CONNECT YELLOW LEAD "D" FROM T6 TO POINT "K" (SEE COMPONENT WIRING DIAGRAM)
B. CONNECT A JUMPER WIRE BETWEEN POINTS "C" AND "D" (SEE COMPONENT WIRING DIAGRAM)
 3. REPLACE WITH TRANSISTOR TYPES SHOWN OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.
 4. UNLESS OTHERWISE NOTED CAPACITORS MORE THAN 1-MF. CAPACITORS LESS THAN 1-MF. RESISTORS ARE 1/2 WATT (R=1000)
 5. VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND UNDER NO SIGNAL CONDITIONS.
 6. VOLTAGES SHOWN IN ARE WITH TR7 AND TR8 NPN.

MODELS: P780A, B



COMPONENT WIRING DIAGRAM



REPLACEMENT PARTS LIST (CONT'D.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE	
CAPACITORS (CONT'D.)				MISCELLANEOUS (CONT'D.)			
RS-1640	C13	.002mf., 450V.....	.25	RS-1781	Dial Cord (25yds. Bulk).....	2.50	
RS-2228	C1	Tuning Cap.....	6.00	RS-1821	"C" Ring (Tuning Shaft).....Pkg.5	.25	
RS-2231	C12,14	.02mf., 450V.....	.70	RS-1954	Battery Clip (Neg.).....	.25	
RS-2232	C18	500mf., 12V.....	1.90	RS-1955	Battery Clip (Pos.).....	.25	
RS-2233	C15,17	8mf., 15V.....	2.40	RS-2082	Compression Ring (Tuning Knob)Pkg.5	.25	
	C2,3,4,5	.047mf., 50V		RS-2209	Stud, Slide.....Pkg.2	.30	
	8,9,10,16			RS-2210	Slide, Lock.....Pkg.5	.25	
	C22			.1mf., 50V	RS-2211	Slide, Pointer.....Pkg.2	.30
					RS-2212	Clamp, Dial Spring.....Pkg.5	.25
			RS-2213	Tuning Shaft Assem. w/windlass, bushing, and "C" Ring.....	.75		
RESISTOR				RS-2214	Battery Clip (Neg.).....	.40	
RS-1995	R29	100ohms, thermistor.....	.70	RS-2215	Switch Contact (Pilot Light).....Pkg.5	.25	
POTENTIOMETER				RS-2216	Spring (p.l. Sw.).....Pkg.5	.25	
RS-2229	R15, S1	Vol. (100K) and Tone (2M) with switch.....	3.20	RS-2217	Insulator, (p.l. Sw.).....Pkg.5	.25	
COILS AND TRANSFORMERS				RS-2218	Pilot Light Socket Assem.....	1.00	
RS-1424	T2	1st I.F.....	2.00	RS-2219	Spacer, Handle.....Pkg.5	.25	
RS-2222	T6	Output Transformer.....	3.35	RS-2220	End Cap, Handle.....	.90	
RS-2223	T5	Driver Transformer.....	4.20	RS-2221	Handle Assem.....	1.90	
RS-2224	T3	2nd I.F.....	2.40	RS-2234	Pulley, 5/16 Dia.....Pkg.2	.30	
RS-2225	T4	3rd I.F.....	2.40	RS-2235	Spring, Dial Cord.....Pkg.5	.25	
RS-2226	T1	R.F. Transformer.....	1.90	RS-2236	Screw, #6 x 1/4.....Pkg.3	.30	
RS-2227	L2	Oscillator Coil.....	.85	RS-2237	Screw, #6-32 x .420.....Pkg.5	.25	
RS-2230	L1	Antenna.....	4.30	RS-2238	Compression Ring (Vol. Knob).....Pkg.5	.25	
TRANSISTORS AND DIODE				RS-2239	Wire Clamp (Ant. to bracket).....	.25	
RS-1554	TR1	R.F.....	4.85	RS-2240	Speed Clip, (Grille to Cab.).....	.25	
RS-1531	TR2	1st I.F.....	3.55	RS-2241	Grommet (gang).....Pkg.3	.30	
RS-1550	TR3	2nd I.F.....	3.30	RS-2242	Eyelet (gang).....Pkg.3	.30	
RS-1537	TR4	3rd I.F.....	3.15	RS-2323	Handle Support Plate.....	.95	
RS-1540	TR5	1st Audip.....	2.80	CABINET AND APPEARANCE ITEMS			
RS-1549	TR6	Driver.....	1.65	RB-1125	Cabinet Front "A" version.....	10.20	
RS-1549	TR7-8	Audio Output (use when TR7 and TR8 are NPN).....	1.65	RB-1126	Cabinet Back.....	5.50	
RS-1542	TR7-8	Audio Output (use when TR7 and TR8 are PNP).....	3.20	RB-1127	Grille "A" version.....	4.00	
RS-1811	D1	Diode.....	1.90	*RB-1154	Cabinet Front "B" version.....	10.20	
MISCELLANEOUS				*RB-1155	Grille "B" version.....	4.00	
RB-1128	Speaker, 5 1/4", 3.2ohms.....	8.40	RS-2197	Grille Cloth Assem. "A" version.....	.45		
RS-1127	Pulley, 1/4 Dia.....Pkg.5	.25	RS-2198	Rear Grille Cloth.....	.40		
RS-1323	Pilot Light, #12.....	.25	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.

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.

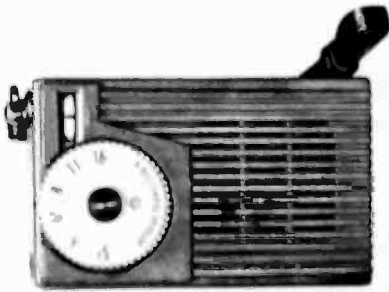
©John F. Rider



model TH-621

6 TRANSISTOR RADIO SERVICE MANUAL

No. 2/1959

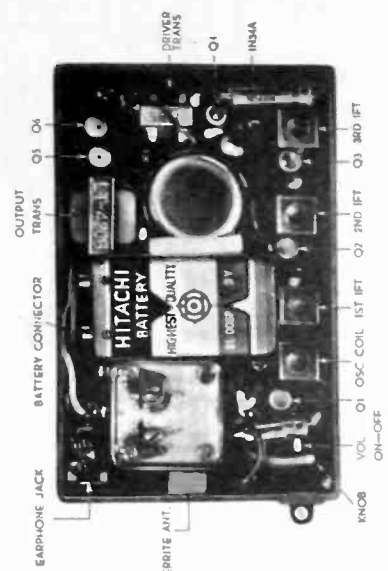


HOW TO OPERATE THIS RADIO

1. Volume control
 2. Station selection
 3. Battery replacement
- 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 anticlockwise direction until a volt click is heard and the golden stripe appears on the center.
- 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

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.
7. Don't remove any transistor from its socket (or reinsert it) when the set is turned on.
8. 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 TR₁ will give an indication of oscillator performance.
9. Voltage measurements should be made only with a sensitive voltmeter.
10. Interchanging transistors in the I-F stages may necessitate realignment.
11. A transistor should always be removed from its socket before using a soldering iron on the socket terminals.



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.

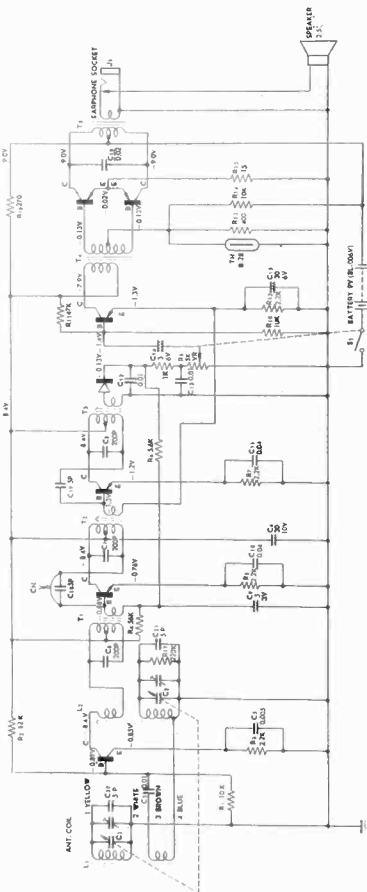
FEATURES

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 sensitive 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 BS 20H type home speaker.
7. Private listening can be enjoyed by using an ear-phon.

SPECIFICATIONS

Circuit system	6-transistor super-heterodyne	Thermistor	B-2B Temperature compensation
Tuning range	535-1605 KC	Output	40 mW (Non distorted)
Intermediate frequency	455 KC	Power source	60 mW (Maximum)
Transistor components	HJ28 Frequency converter HJ22 Intermediate frequency amplifier 1st stage HJ22 Intermediate frequency amplifier 2nd stage HJ15 Audio frequency amplifier HJ17 Power amplifier HJ17 Detector and automatic volume controller		9V BL-006P (Japan) NE DA 1604 Eveready 206 Ray-O vac 1604 Burgess 2U6 G.E. 9B
		Speaker	2 1/2" speaker with voice coil impedance of 8 ohms at 400 cycles
		Earphone Antenna	EL-212 Hitachi magnetic earphone Self contained ferrite-coil antenna
		Dimensions	2 3/8" W x 4 1/8" H x 1 1/2" D

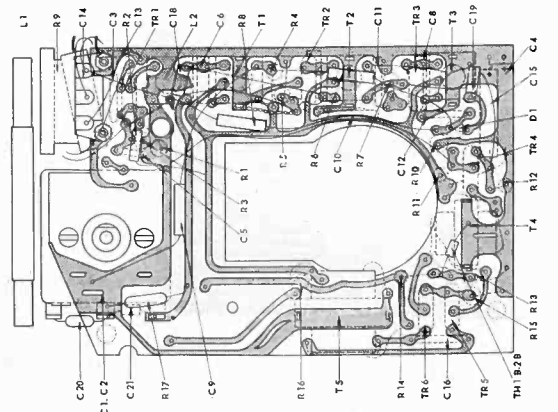
CONV. TR, HJ 23 1ST. I.F. TR, HJ 22 2ND. I.F. DETECTOR A.F. AMP. OUT PUT TR, HJ 15 IN 34/A TR, HJ 17x2



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	555 KC	Quiet point near 1600 KC	I F T ₁
2			Repeat step 1	I F T ₂
3	Short wire placed near antenna for radiated signal	595 KC	Lowest freq. of dial scale	Dust core of oscillator coil L ₂
4		1630 KC	Highest freq. of dial scale	Trimmer of oscillator condenser
5			Repeat 3 and 4	
6		650 KC	650 KC	Move antenna coil



Item No.	Symbol No.	Stock No.	Description
1		740702-1	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	2 $\frac{1}{2}$ Dynamic Speaker
10			Speaker Clamp
11			Washer, Felt
12	T H ₁	560701	Thermistor 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 RC1S 15 ohm
21			Solid Resistor RC1S 400 ohm
22	R ₆	141706	Solid Resistor RC1S 1,000 ohm
23	R ₃ R ₇ R ₁₂	141703	Solid Resistor RC1S 2,200 ohm
24	R ₆	141705	Solid Resistor RC1S 5,600 ohm
25	R ₁ R ₁₀ R ₁₁	141701	Solid Resistor RC1S 10,000 ohm
26	R ₁₁	141707	Solid Resistor RC1S 17,000 ohm
27	R ₁₂ R ₁₄	141704	Solid Resistor RC1S 56,000 ohm
28	R ₂	141702	Solid Resistor RC1S 82,000 ohm
29	R ₁₆	141711	Solid Resistor RC1S 270 ohm
30	R ₁₇		Solid Resistor RC1S 220,000 ohm
31	C ₃ C ₁₂ C ₁₃	255001	Ceramic Capacitor ULD-12
32	C ₅	254003	Ceramic Capacitor ULD 10
33	C ₁₆	255703	Ceramic Capacitor ULD-15
34	C ₁₀ C ₁₁	255701	Ceramic Capacitor ULD-30
35	C ₂₁	231004	Ceramic Capacitor S-26
36	C ₈ C ₇ C ₈	233001	Ceramic Capacitor S-32
37	C ₄	268701	Electro-Chemical Capacitor 30 μ F
38	C ₉	267702	Electro-Chemical Capacitor 5 μ F
39	C ₁₄	267703	Electro-Chemical Capacitor 3 μ F
40	C ₁₅	268702	Electro-Chemical Capacitor 30 μ F
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 (Accessories)
101			Leather Carrying Strap
102			Earphone
103			Leather Case Glove Skin
104			Dressing Box
105			Cardboard Sleeve for Dressing box
106			Polyethylene Bag for Radio Set
107			Polyethylene Bag for Polishing Cloth
108			Polishing Cloth
109			Operating Manual

Note: 1. Ex-godown Yokohama
2. Standard Export Packing:—
For 100 Radios 300x200x240 mm
For 500 Radios 550x320x320 mm
For 1,000 Radios 750x380x320 mm

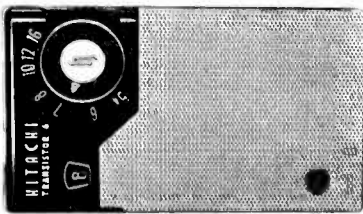
Gross Weight 5.5 kg
12 kg
18 kg



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 excellent 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	2N218×2 Frequency converter 1N34A-Detector and automatic gain controller B-2B Push-pull audio frequency power amplifier 80 mW
Thermistor	BL-06P (Japan)
Output	N.E.D.A. 1604
Power source	Eveready 216 Ray-O-Vac 1604 Burgess 2V6 G.E. 88
Earphone	EL-213 type magnetic earphone
Speaker	2" P.M. speaker
Dimensions	2 5/8" W × 3 3/8" H × 1 1/2" 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

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 R₁-R₁ 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 TR₁ 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 TR₁ 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 volt-

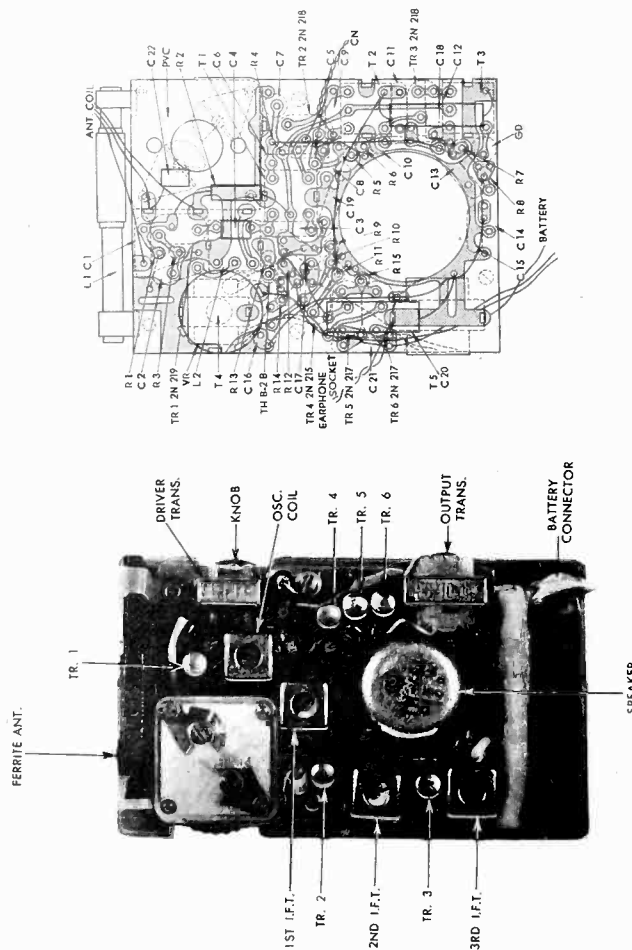
age applied to its terminals for conduction, testing continuity of a circuit which includes a transistor can result in misleading continuity indications. To avoid transistor damage and misleading continuity indications, remove the transistor from its socket before making continuity tests of its circuit.

ALIGNMENT PROCEDURE

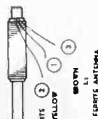
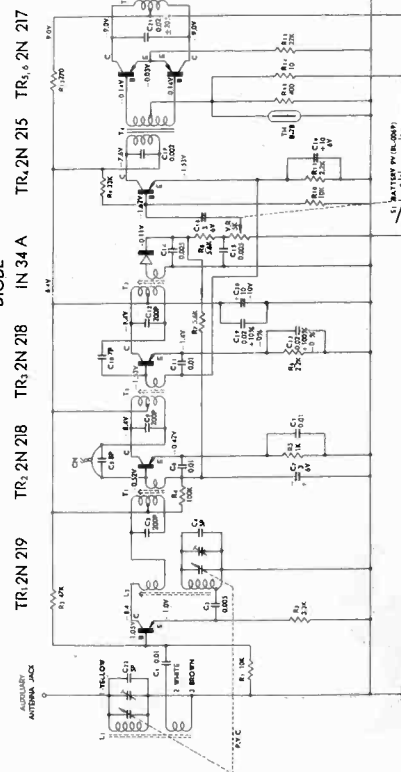
Connect an output meter across the voice coil terminals of the speaker and turn the receiver volume control to maximum.
For all alignment operations, connect the low side of the test oscillator to the receiver chassis and keep the oscillator output as low as possible to avoid A.C.C. action.

Step	Connect high side of S.G. to	S.G. output	Dial pointer acting	Adjust for
1	Variable tuning capacitor terminal of oscillator	455 kc	Quiet point near 1,600 kc	IFTs (IFTs IFT1)
2	Variable tuning capacitor terminal of oscillator	repeat	step 1	
3	Tip of antenna lead near antenna	325 kc	Lowest frequency of dial scale	Dust core of filter coil
4	Short wire placed near antenna lead radiated signal	1,630 kc	Maximum frequency of dial scale	Tolerance of oscillator variable capacitor
5	Short wire placed near antenna lead radiated signal	650 kc	Repeat 3 and 4	
6	Short wire placed near antenna lead radiated signal	650 kc	650 kc	Move antenna coil
7	Short wire placed near antenna lead radiated signal	1,300 kc	1,300 kc	Trimmer of variable capacitor

Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly
2		710737	Tuning Dial
3		620714	Volume Control Knob
4			2 inch Speaker
5			Speaker Clamp
6	J ₁		Earphone Jack
7		380724	Battery Cable Plug
8	L ₁		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 1N34A
24	TH	560701	Thermistor B-2B
25	VR	132719	Volume Control (with Switch)
26	R ₁ , R ₁₀ , R ₁₁	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 ₁ , 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	25-1002	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 ₁₁ , 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 ₁₅	268709	Do. 10 μF (B)
45	C ₁ , 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 ₆ , C ₂₀	232001	Do. S-26 10 pF
49		632729	Magnetic Earphone Packaging
50			



CONV. 1ST. I.F. 2ND. I.F. DETECTOR A.F. AMP. POWER AMP.





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:
 H171, Local Oscillator
 H172, 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 x 2, Power Amp. Class B Push-pull
 1N34A, Detector and Automatic Gain Controller
 B-2B, Temperature Compensator
 Output 120 mW (Undistorted), 180 mW (Maximum)
 Loud Speaker 2 1/2" 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 6 1/8" (155 mm) x Height 3 1/8" (91 mm) x Depth 1 3/8" (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 bottom compartment

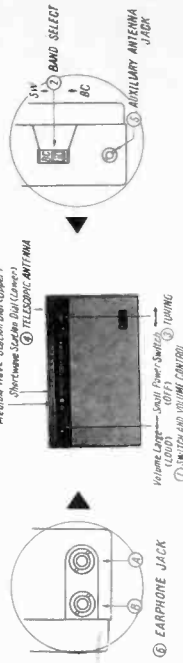
of the leather carrying case, in Rod Antenna Socket (4). An auxiliary Antenna Wire can be plugged in Antenna Jack (5) for better reception in remote area.

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 positive 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.

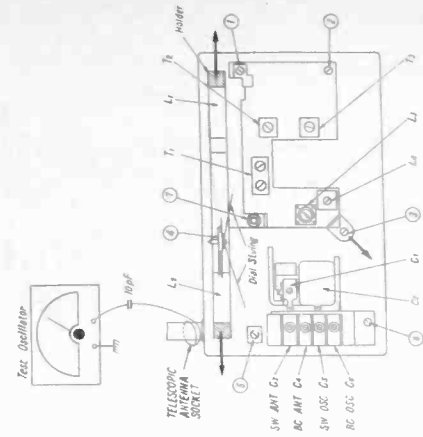


ALIGNMENT PROCEDURE

- The first thing to be done before proceeding with any adjustments is to check battery strength. If voltage is low, replace batteries.
- Turn volume control to maximum.
- 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.
- 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 Order	Adjustment	Adjustment Place	Remarks
1	Mix. BC Division	65 kc	T3
2	Mix. BC Division	65 kc	T2
3	Mix. BC Division	65 kc	T1 (RIGHT)
4	Mix. BC Division	65 kc	T1 (LEFT)
5	Mix. BC Division	65 kc	Repeat 1-4



Adjustment of high frequency circuit (SW)

Preparation Order	Adjustment Place	Oscillator Frequency	Remarks
12	Max. SW Division	12.3 Mc	C5
13	Min. SW Division	3.75 Mc	L3
14	Repeat 12 & 13		Repeat 12 & 13
15	Receive SW 11 Mc	11 Mc	C3
16	Receive SW 4 Mc	4 Mc	L1
17	Repeat 15 & 16		Repeat 15 & 16

Adjustment of high frequency circuit (BC)

Preparation Order	Adjustment Place	Oscillator Frequency	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

*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.

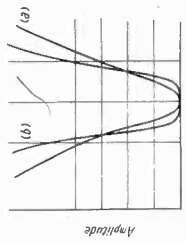


Fig. 1

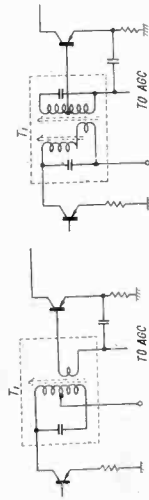


Fig. 2

COMBINATION TYPE FERRITE ANTENNA

A ferrite antenna core generally uses Q₁ material for BC band reception and M₁ material for SW band reception. Where dual band reception is to be made by the common antenna only the M₁ core is used for the reason of characteristic, so sacrificing the BC characteristics. The antenna of the WH-822 uses Q₁ core for BC band and M₁ 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:
Q₁...High *Q* over all range, and value of *Q* becomes greater around 1 Mc.
M₁...Low *Q*, but high *Q* over all range.

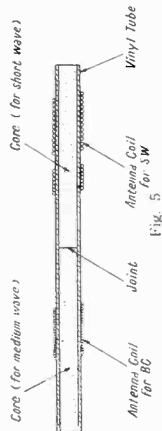
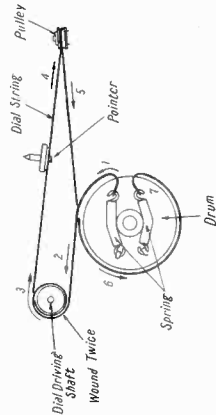


Fig. 5

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.

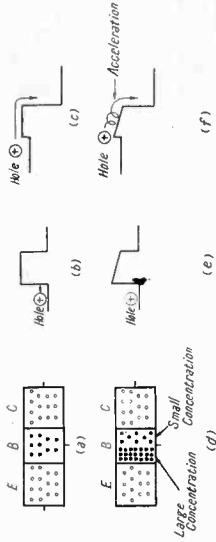
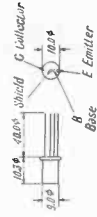
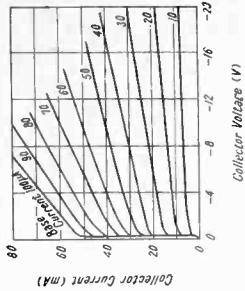
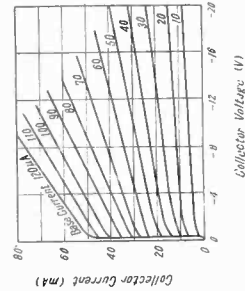
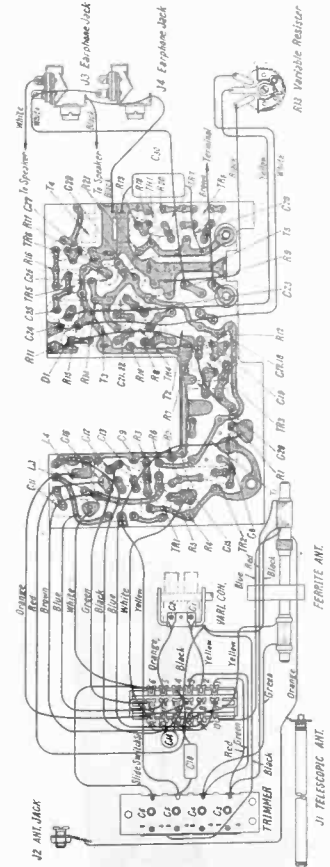
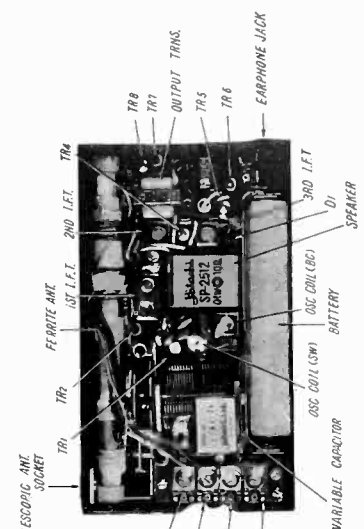
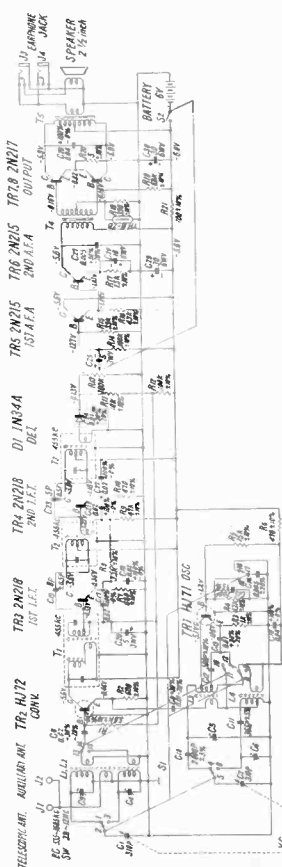
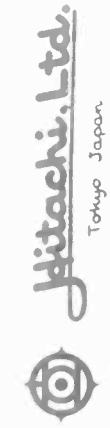


Fig. 6



Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly
2			Tuning Dial
3			Cushion A
4			Pointer
5	S P		2 1/2 inch Speaker
6			Terminal
7		632748	Band Indicator
8			Magnetic Earphone
9			External Antenna Wire
10		740771	Battery Case
11			Battery Container
12		740775	Leather Case
13			External Leather Case
14		273743	Variable Capacitor
15	C ₁ , C ₂ , C ₃ , C ₄ , C ₅ , C ₆		Trimmer Capacitor
16	R ₁₃		Antenna Supporter
17			Volume Control
18			Volume Control Knob
19			Tuning Control Knob
20	L ₁ , L ₂		Ferrite-core Antenna
21	TR ₇	380747	Transistor HJ 72
22	TR ₁	530715	Transistor HJ 71
23	TR ₂	530716	Transistor 2N 218
24	TR ₃	530721	Transistor 2N 215 (YELLOW)
25	TR ₅	530713	Transistor 2N 215 (GREEN)
26	TR ₅ , TR ₆	530725	Transistor 2N 217
27	D ₁	530714	Germanium Diode 1N34A
28	TH	550701	Thermistor B-2B
29	L ₄	370739	R.C. Oscillator Coil
30	L ₅	370740	S.W. Oscillator Coil
31	T ₁	420741	L.F. Transformer (A)
32	T ₂	420742	L.F. Transformer (B)
33	T ₃	420743	L.F. Transformer (C)
34	T ₄	480705	Driver Transformer
35	T ₅	470712	Output Transformer
36	R ₁₄ , R ₁₅	141714	Composition Resistor 100 kΩ ± 10%
37	R ₁	141707	Composition Resistor 47 kΩ ± 10%
38	R ₂	141730	Composition Resistor 39 kΩ ± 10%
39	R ₃	141730	Composition Resistor 15 kΩ ± 10%
40	R ₄ , R ₅	141701	Composition Resistor 10 kΩ ± 10%
41	R ₁₈	141728	Composition Resistor 6.8 kΩ ± 10%
42	R ₁ , R ₁₆	141705	Composition Resistor 5.6 kΩ ± 10%
43	R ₄ , R ₁₆	141705	Composition Resistor 4.7 kΩ ± 10%
44	R ₄ , R ₁₆	141712	Composition Resistor 3.3 kΩ ± 10%
45	R ₁₇	141723	Composition Resistor 1.5 kΩ ± 10%
46	R ₃	141705	Composition Resistor 1 kΩ ± 10%
47	R ₃ , R ₇	141725	Composition Resistor 680 Ω ± 10%
48	R ₄ , R ₁₈	141719	Composition Resistor 470 Ω ± 10%
49	R ₁₉	141727	Composition Resistor 380 Ω ± 10%
50	R ₁₁	141723	Composition Resistor 100 Ω ± 10%
51	R ₂₀	141726	Composition Resistor 5 Ω ± 10%
52	C ₁₉	231004	Ceramic Capacitor 8 pF ± 0.5 pF
53	C ₂₃	231004	Ceramic Capacitor 8 pF ± 0.5 pF
54	C ₁₅	235702	Ceramic Capacitor 200 pF ± 5%
55	C ₇ , C ₈ , C ₉ , C ₂₂		Block Ceramic Capacitor 0.02 μF × 2 ± 10%
56	C ₁₂	143707	Polystyrol Capacitor 500 pF ± 10% 125 V
57	C ₁₃	270709	Mica Capacitor 200 pF ± 0.5 pF 125 V
58	C ₁₆		Electrolytic Capacitor 10 μF ± 10% 6 V
59	C ₁₆	255701	Ceramic Capacitor 0.04 μF ± 20%
60	C ₁₄ , C ₁₇	255702	Ceramic Capacitor 0.005 μF ± 20%
61	C ₁₄ , C ₁₇	255703	Ceramic Capacitor 0.02 μF ± 10%
62	C ₄ , C ₁₁ , C ₂₄	255704	Ceramic Capacitor 0.01 μF ± 10%
63	C ₂₀ , C ₂₅	268703	Electrolytic Capacitor 10 μF ± 10% 10 V
64	C ₂₀ , C ₂₅	268703	Electrolytic Capacitor 10 μF ± 10% 10 V
65	C ₂₆ , C ₂₈	268701	Electrolytic Capacitor 30 μF ± 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

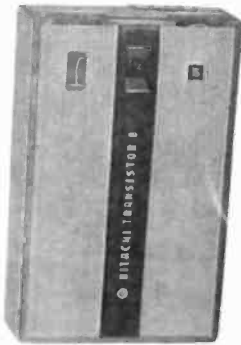




model TH-862R

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 excellent 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
Tuning range
Intermediate frequency
Transistor components

Varistor
Output
Power source

8-transistor super-heterodyne
535-1605 kc
455 kc
HJ 7A 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
HV15 Temperature and voltage compensation
80 mW (Undistorted), 100 mW (Maximum)

9 V Battery
Eveready 216
N.E.D.A. 1604
Ray-O-Vac 1604
Burgess 2V6
G.E. 88
EUC 006P
EL-213 type magnetic earphone
2 inch P.M. speaker
4 5/8" W × 2 3/4" H × 1 1/4" 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 right and the sound volume will increase. 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 terminals, 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 the other end to the hole of the dial drum.

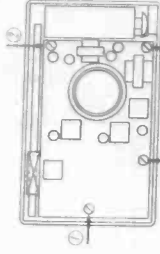


Fig. 1. How to Demount the Circuit Board

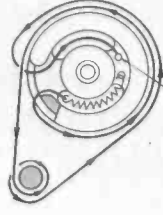
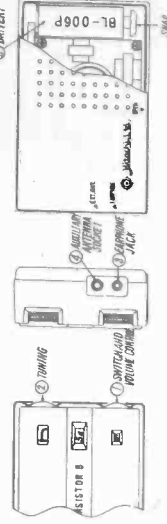


Fig. 2. How to Apply the Dial String

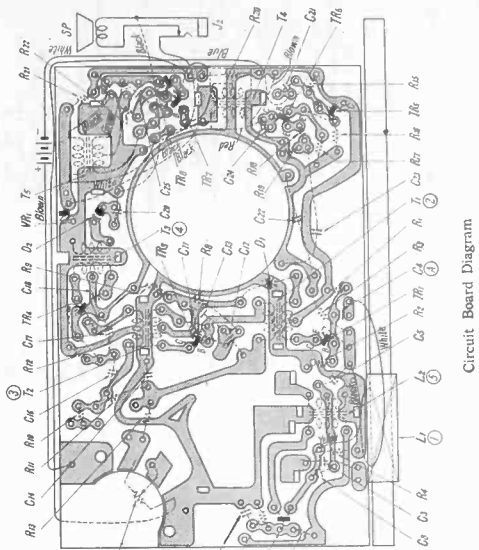
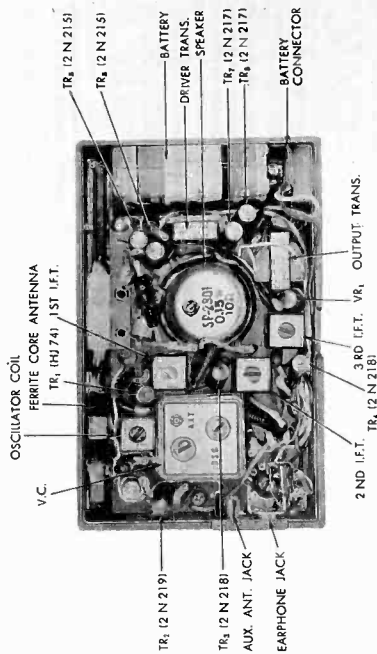
3. Investigate trouble by the following procedure. When a faulty item is discovered inspect L, C, R and the transmitter of the relative circuit by referring to the circuit diagram, base plate diagram and parts arrangement diagram.
 - Inspection 1 Check battery voltage
 - a. The battery voltage should be 6~7 volts or more when checked by a tester.
 - b. Replace with new battery when no tester is available.



MODEL TH-862R SERVICE MANUAL

- Inspection 2** Check for faulty connection
- Check the continuity of the battery snap lead wires by means of a tester.
 - 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)
- 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.
 - 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.
- Check the emitter voltage of TR_{1,2}. If it is abnormal, check the resistors, capacitors and coils. Also, check the voltage of the collector and base.
 - Check the emitter voltage of TR₃. If it is abnormal, check the resistors, capacitors and coils.
 - Check the emitter voltage of TR₄. 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.
- Check the emitter voltage of TR₁, TR₂, TR₃ and TR₄ in this order. If the emitter voltage is abnormal, check the resistors, capacitors and coils of that circuit.

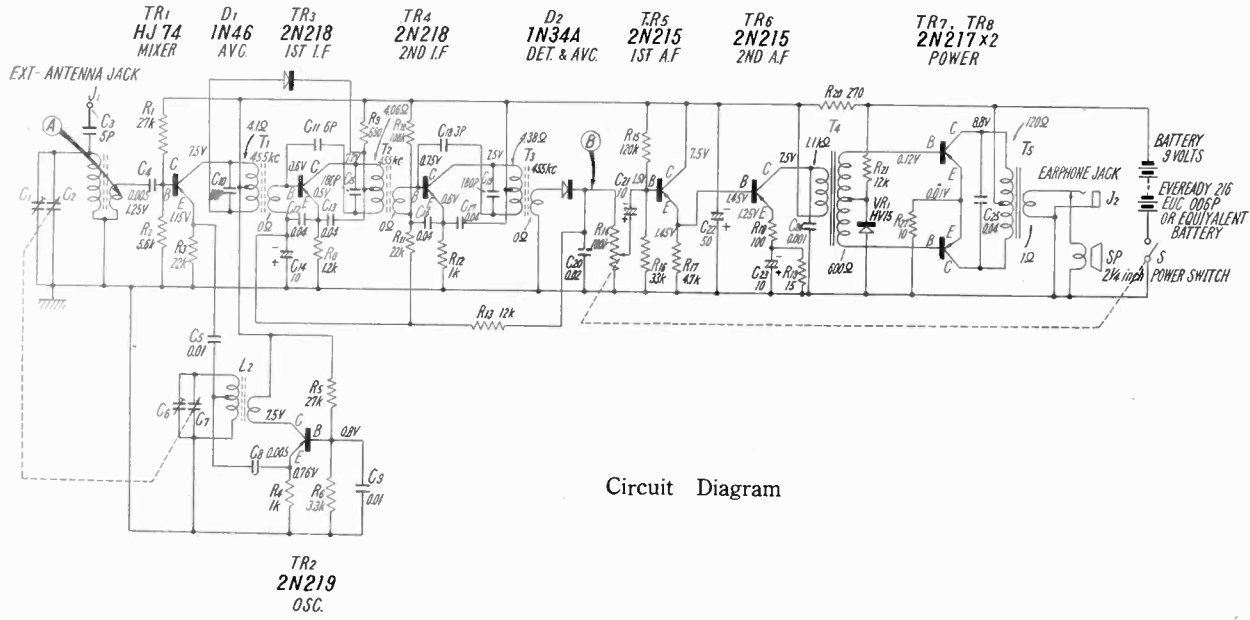
- the core ((5) in circuit board diagram) of the oscillator coil (L₁) to obtain the point where the voltmeter will give maximum indication.
- Set the test oscillator's frequency at 1,650 kc and adjust the oscillator trimmer of the variable capacitor so that the signal will be received at the highest point on the receiver dial.
- 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.
- 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.
- Repeat the above procedure once or twice.



ALIGNMENT PROCEDURE

- ADJUSTMENT ON IF CIRCUIT**
- 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.
 - 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.
 - 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.
 - 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.
 - Adjust the IF transformer so that the voltmeter reading will be maximum for T₂ (1), T₂ (3) and T₁ (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.
 - 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**
- Set the test oscillator's frequency at 525 kc and set the receiver's dial at the lowest frequency. Then adjust

Item No.	Symbol No.	Stock No.	Description
1			Cabinet Assembly TH-862 R
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	L ₁	632748	Magnetic Earphone (EL-213)
13	L ₂	360794	Ferrite Core Antenna
14	L ₃	370739	Oscillator Coil
15	T ₁		I.F. Transformer (A)
16	T ₂	420741	I.F. Transformer (B)
17	T ₃		I.F. Transformer (C)
18	T ₄	420742	Driver Transformer
19	T ₅		Output Transformer
20	TR ₁	530719	Transistor HJ74
21	TR ₂	530711	Transistor 2N219
22	TR ₃	530712	Transistor 2N218
23	TR ₄	530713	Transistor 2N215
24	TR ₅	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		Adjustable Capacitor
29	C ₂	273746	Variable Capacitor
30	C ₃	231004	Ceramic Capacitor 5 pF ± 0.5 pF
31	C ₄	254003	Ceramic Capacitor 0.005 μF ± 10%
32	C ₅	255704	Ceramic Capacitor 0.01 μF ± 10%
33	C ₆	254702	Ceramic Capacitor 0.005 μF ± 10%
34	C ₇		Ceramic Capacitor 180 pF ± 5%
35	C ₈		Ceramic Capacitor 6 pF ± 5 pF
36	C ₉		Ceramic Capacitor 0.04 μF ± 10%
37	C ₁₀	255701	Electrolytic Capacitor 10 μF 10 WV
38	C ₁₁	268709	Electrolytic Capacitor 3 pF ± 5 pF
39	C ₁₂	231704	Ceramic Capacitor 0.02 μF ± 10%
40	C ₁₃	255703	Electrolytic Capacitor 50 μF 10 WV
41	C ₁₄		Ceramic Capacitor 0.001 μF ± 10%
42	C ₁₅		Ceramic Capacitor 0.04 μF ± 10%
43	R ₁	141705	Composition Resistor 27 kΩ ± 10%
44	R ₂	141703	Composition Resistor 5.6 kΩ ± 10%
45	R ₃	141706	Composition Resistor 2.2 kΩ ± 10%
46	R ₄		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 ₇		Composition Resistor 1.2 kΩ ± 10%
50	R ₈	141725	Composition Resistor 680 Ω ± 20%
51	R ₉	141714	Composition Resistor 100 kΩ ± 10%
52	R ₁₀	141703	Composition Resistor 22 kΩ ± 10%
53	R ₁₁	141703	Composition Resistor 12 kΩ ± 10%
54	R ₁₂	131726	Volume Control 100 kΩ ± 20%
55	R ₁₃		Composition Resistor 120 kΩ ± 10%
56	R ₁₄	141713	Composition Resistor 33 kΩ ± 10%
57	R ₁₅	141707	Composition Resistor 4.7 kΩ ± 10%
58	R ₁₆	141723	Composition Resistor 100 Ω ± 20%
59	R ₁₇		Composition Resistor 1.5 kΩ ± 10%
60	R ₁₈	141711	Composition Resistor 270 Ω ± 20%
61	R ₁₉		Composition Resistor 10 Ω ± 10%
62	J ₁		External Antenna Jack
63	SP		Earphone Jack
64	SP		2 1/4 inch P. M. Speaker



MODEL TH-862R

HOFFMAN P706 TRANS - SOLAR PORTABLE RADIO ALIGNMENT PROCEDURE

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 - Squelching 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 - Motor-boating

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.

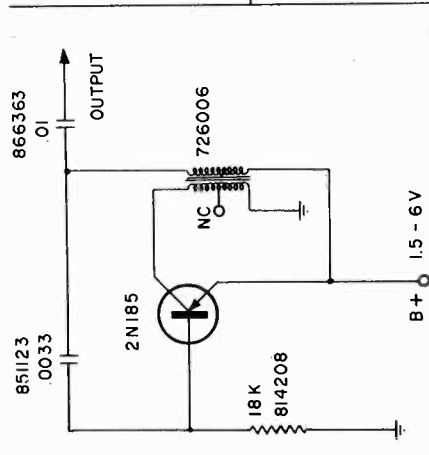
SYMPTOM - Weak battery operation and no solar operation.

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 #200. 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.



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.

STEP	FREQUENCY	GENERATOR INPUT TO	RADIO DIAL SETTING	ADJUST	REMARKS
1.	455 KC	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.	1400 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 transistorized 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.

TRACING

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

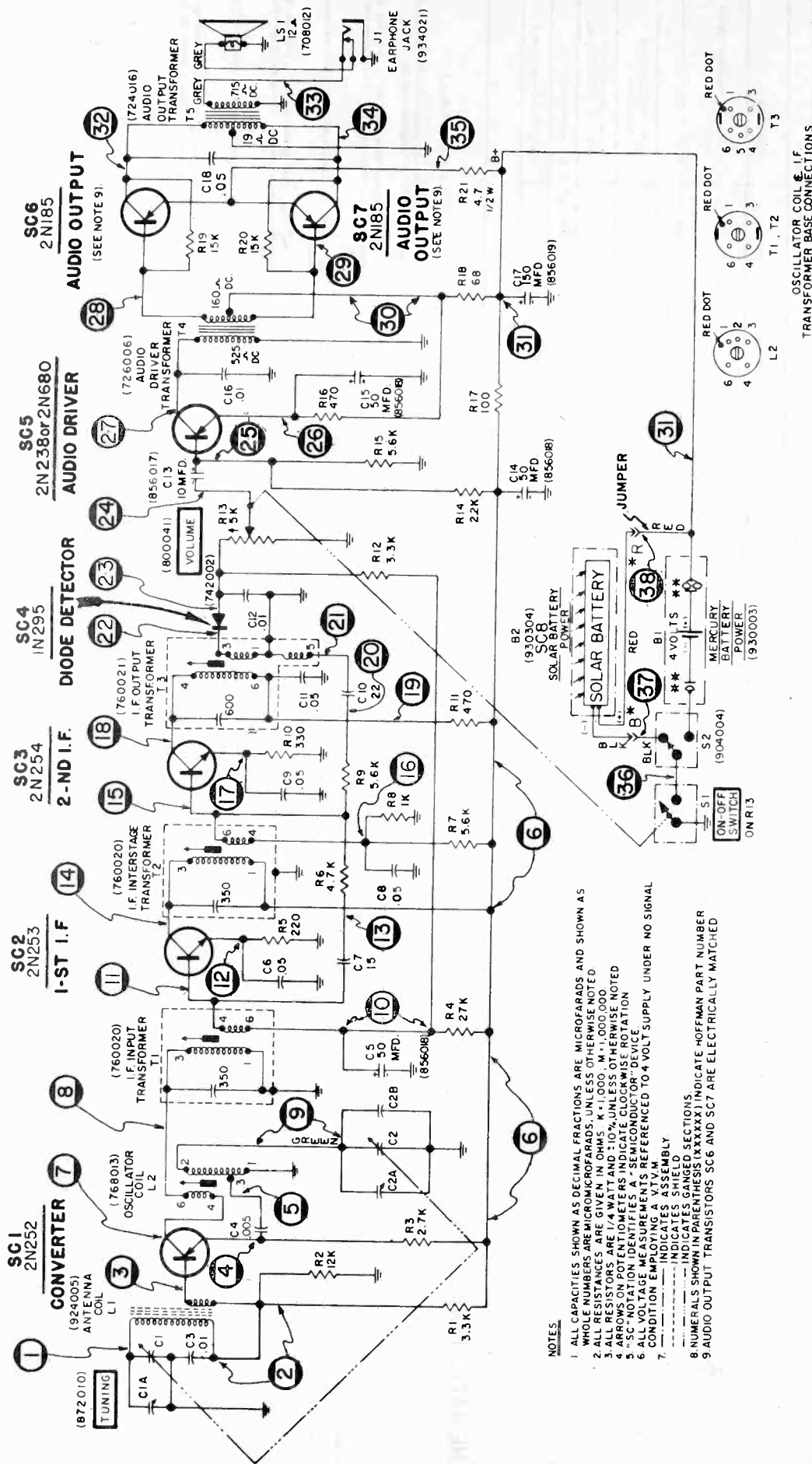
1. Set the signal generator for a 1400 KC signal. Tune in the signal on the radio.

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.

CHASSIS: 1123

NUMBERS ENCIRCLED ON SCHEMATIC CORRESPOND TO LARGE NUMBERS ON SKETCH

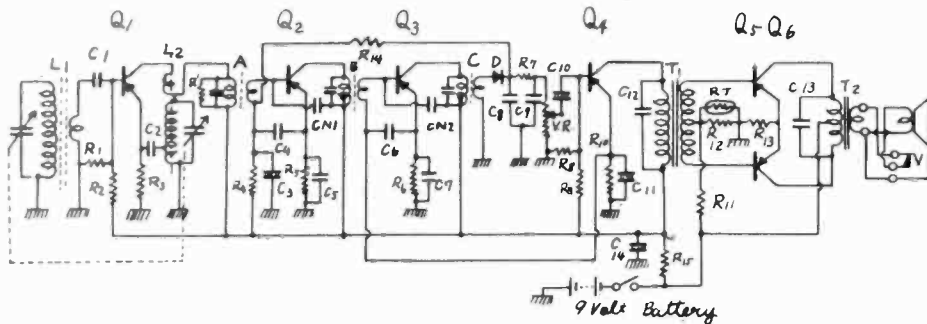


OSCILLATOR COIL & I.F. TRANSFORMER BASE CONNECTIONS

- 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 RESISTANCES ON POT ARE 1/4 WATT AND ±10% UNLESS OTHERWISE NOTED
 - 4 ARROWS ON POT ARE IN THE COUNTERCLOCKWISE ROTATION
 - 5 "SC" NOTATION IDENTIFIES A "SPECIAL" COMPONENT
 - 6 ALL VOLTAGE MEASUREMENTS REFERENCED TO 4 VOLTS SUPPLY UNDER NO SIGNAL CONDITION EMPLOYING A VTVM
 - 7 --- INDICATES ASSEMBLY
 - 8 --- INDICATES SHIELD
 - 9 NUMERALS SHOWN IN CIRCLES (XXXXXX) INDICATE HOFFMAN PART NUMBER
 - 9 AUDIO OUTPUT TRANSISTORS SC6 AND SC7 ARE ELECTRICALLY MATCHED

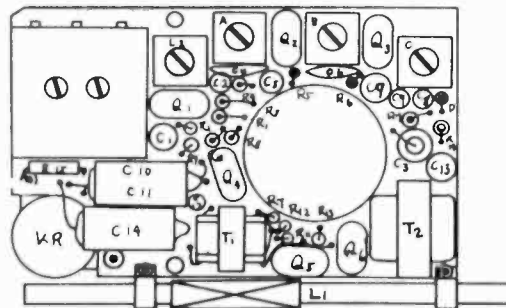
HOFFMAN CHASSIS 1123 - MODEL P 706

LAFAYETTE FS-200

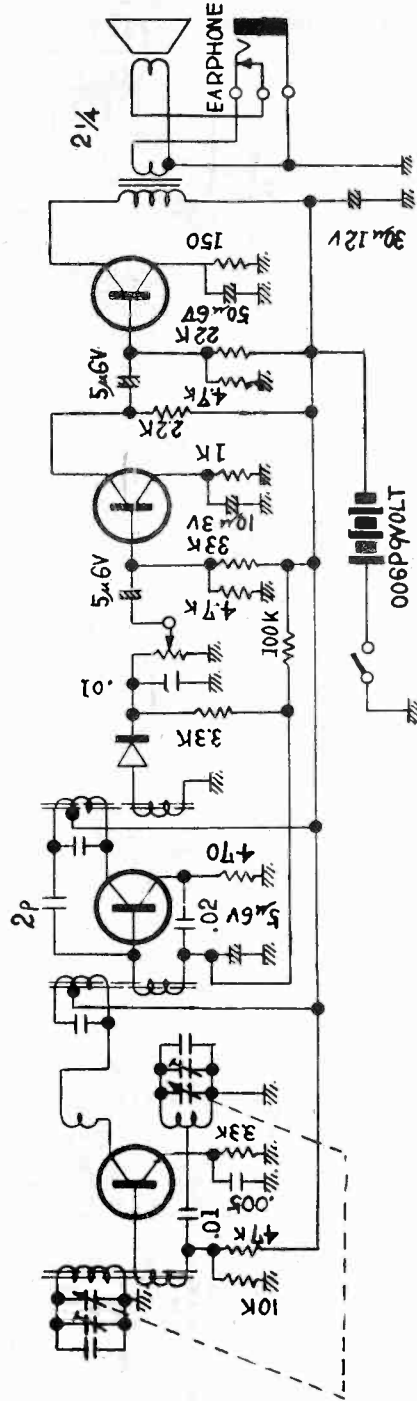


Parts NO	Constant	Parts NO	Constant	Parts NO	Constant	Parts NO	Constant	Parts NO	Constant
R1	5K Ω	R10	1K Ω	C2	.01 μ F	C11	6WV 30 μ F	B	# 8503
"2	15K Ω	"11	10	"3	6WV 60	C12	0.01 μ F	C	# 8549
"3	3K Ω	"12	390 Ω	"4	.02	"13	.04 "	T1	TRT-13
"4	100K Ω	"13	22 Ω	"5	"	"14	10 μ V 500	T2	" 14
"5	1K Ω	"14	3.3K Ω	"6	"	CN1	5-12pF	D	SD-46
"6	1.2K Ω	"15	150 Ω	"7	.04 "	CN2	5-12pF	Q1	HJ-2N219
"7	500 Ω	VR	5K Ω EA	"8	.01 "	L1	90 μ Ant	Q2	"-2N218
"8	68 Ω	RT	B-2B	"9	"	L2	# 356	Q3	"-2N215
"9	33 Ω	C1	.02 μ F	"10	6WV 30	A	# 8508	Q4	" 2N217

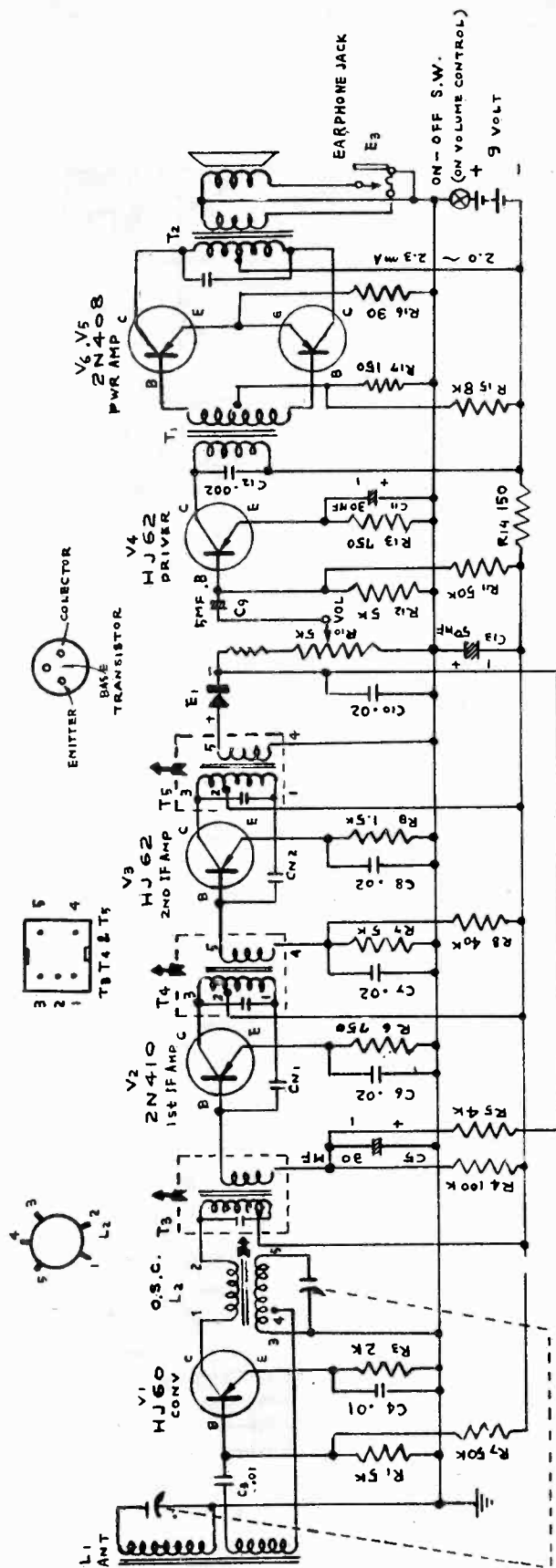
R'.....100K Ω



SCHEMATIC DIAGRAM LAFAYETTE MODEL FS-204

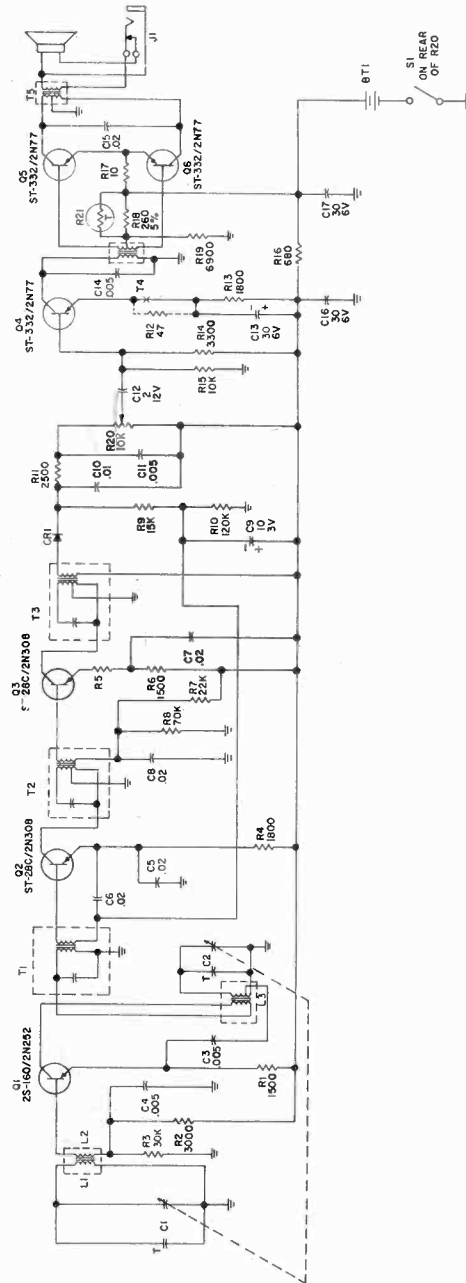


LAFAYETTE RADIO MODEL FS-206 SCHEMATIC DIAGRAM



PRELIMINARY SERVICE MANUAL 1333

SCHEMATIC DIAGRAM AM-22



LAFAYETTE RADIO MODEL FS-206 SCHEMATIC DIAGRAM

