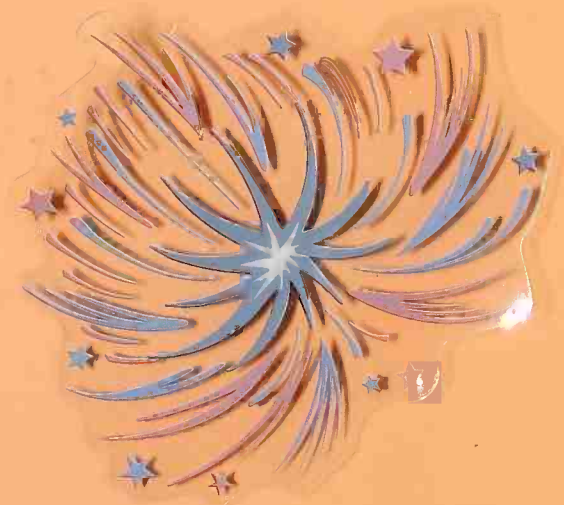


**TRANSISTOR RADIO
SECTION**



7P1 CHASSIS

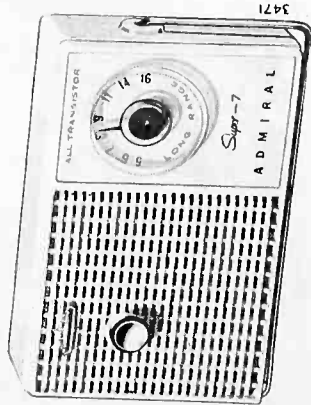


Figure 1. Front View of Cabinet.

SPECIFICATIONS

- ANTENNA:** Built-in Ferro-Scope (ferrite bar).
- CIRCUIT:** Superheterodyne using seven PNP type transistors and two germanium diodes.
- FREQUENCY RANGE:** Standard broadcast band: 535 to 1620 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Four 1½ volt ordinary penlight "AA" size batteries or equivalent size mercury batteries.
- SPEAKER:** 2¾" PM with Alnico V magnet. Voice coil impedance, 12 ohms.
- BATTERY INFORMATION AND REPLACEMENT**
Power is supplied by four 1½ volt ordinary (penlight) "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, check first to see which type battery holder is used.
In a few early production sets the batteries are placed in an open sided plastic holder and held on the board by clips (battery contacts), plus projections on the bottom of the holder that go through the board to prevent reversing the batteries in the circuit. See figure 2.
In later production sets the battery holder is a closed tube with end caps. The right cap (from rear)

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

TRANSISTOR POCKET PORTABLE

MODEL	COLOR	CHASSIS
703	WHITE	7P1
708	NASSAU GREEN	

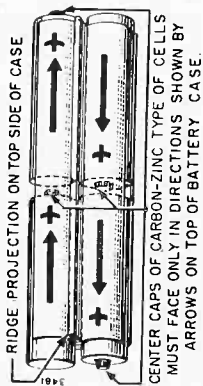


Figure 2. Early Production Battery Holder Showing Ordinary Batteries in Correct Positions.

is permanently attached to the board. The tube (with batteries) is then pushed into the attached cap. A flange on the left bottom of the tube goes through the board for anchorage, while springs inside the tube maintain the batteries under proper tension. See figure 4 showing method of removing this type battery holder.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

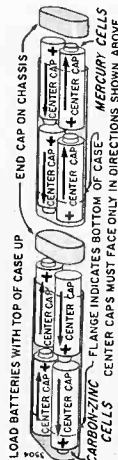


Figure 3. Later Production Battery Holder Showing Ordinary and Mercury Type Batteries in Correct Positions.

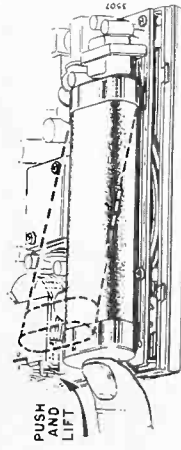


Figure 4. View Showing Method of Removing Later Type Battery Holder From Chassis Board.

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 or noisy or distorted after installing new batteries, turn set off immediately and check for improper battery installation.

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

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

PENLIGHT BATTERIES

CARBON-ZINC BATTERIES

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

MERCURY BATTERIES

Eveready E502 Mallory RM502R

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, 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.

CIRCUIT DESCRIPTION

This receiver uses 7 PNP type transistors and two germanium diodes.

Frequency conversion is accomplished by Q1, (mixer) with Q4 acting as a separate oscillator. Q2 and Q3 act as IF amplifiers and the diode (CR2)

functions as detector and AVC with Q6 and Q7 as a class B operated push-pull output stage. Q5 and T4 act as a transformer coupled driver stage.

Automatic Volume control (AVC) 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 R8 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 T1, thus reducing the gain of Q1.

SERVICE HINTS

Precautions To Take While Servicing Transistor Radios

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

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

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

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

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

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

ALIGNMENT PROCEDURE

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

- a. Fresh batteries should be used.
- b. Set Volume control at maximum.
- c. Connect output meter across output transformer secondary. For best results, have speaker disconnected, use 12 ohm load.
- d. Use lowest output of signal generator that will produce adequate indication on lowest scale of output meter. **IMPORTANT:** Output level should be held at 25 mw. or less. The voltage reading at the 25 mw. level is approximately 1.8 volts across the 12 ohm load.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Radiated Signal. Loop of several turns of wire, or place generator lead close to receiver for adequate signal.	455 KC	Gang fully open	3rd IF 2nd IF 1st IF	* (A) and (C) for maximum output.
2	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	(D) 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	(E) 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	(F) 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 (A), (B) and (C) 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 (E) 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.

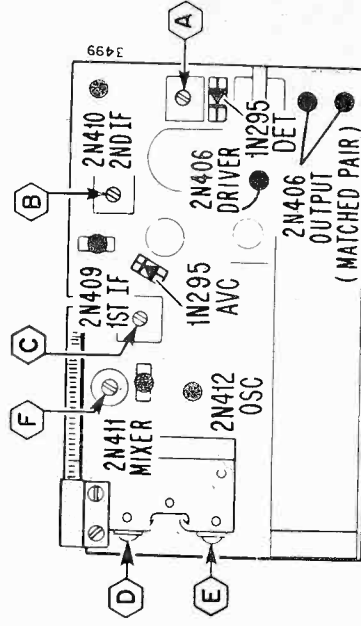


Figure 5. Transistor and Alignment Locations.

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 megohms to several megohms, depending on the ohmmeter used and the transistor type.

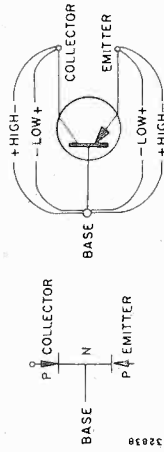


Figure 8A. Germanium Diode Equivalent.

CLEANING CABINET

To clean the cabinet use a mild solution of soap or detergent and lukewarm water. Apply the solution with a soft rag or sponge. Squeeze liquid out thoroughly before applying, to avoid any excess water from coming in contact with any of the electrical parts. Wipe with a damp cloth, and then wipe dry with a dry cloth.

Caution: Never use carbon tetrachloride, acetone, naphtha, alcohol, gasoline, or any commercial cleaning fluids for cleaning the cabinet.

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 8A.

Figure 8B illustrates the relative resistances for PNP type transistors used in this set. The polarity

Description	Part No.
Bracket, for mg jack	138 1981-1
Earphone end plug assembly	888 39-50
Screw, 4.40 x 1/2 BipHIST chassis mg. (special for plastic)	1A 71-571

TRANSISTORS AND DIODES

Symbol	Description	Part No.
Q1	Transistor (Driver)	2N 411
Q2	Transistor (IF Amp)	2N 406
Q3	Transistor (Oscillator)	2N 412
Q4	Transistor (Detector)	2N 406
Q5	Transistor (Output)	2N 406
Q6	Diode (AGC)	1N 295
Q7	Diode (Detector)	1N 295

CABINET PARTS

Description	Part No.
Cabinet, Rear	34E 141-5
Model 703 White	34E 141-7
Model 703 Nassau Green	34E 141-8
Cabinet, Front	34E 141-6
Model 703 White	34E 141-8
Model 703 Nassau Green	34E 141-8
Diode (AGC) Insert "Super 7"	22C 340-7
Gold	37A 183-1
Handle, "Gold"	33B 372-1
Holder, for Batteries	33B 372-1
Knob, Volume, for Action, open tube	33B 372-1
Knob, Volume, for Action, closed tube	33B 372-1
Knob, Tuning	33B 372-1
Knob, Volume	33B 372-1
Spring, Compression, for Tuning Knob	188 5-10
Spring, Compression, for Volume Knob	188 5-10

Sym.	Description	Part No.
C11	.05 mf, 30 volts, cer. disc.	658 45-6
C12	.05 mf, 30 volts, cer. disc.	658 45-6
C13	5 mmf, 500 volts, 5%, cer. disc.	65D 10-141
C14	.05 mf, 30 volts, cer. disc.	658 45-6
C15	.05 mf, 30 volts, cer. disc.	658 45-6
C15A	123.1 mmf, max ont } gang	68C 73-1
C15B	123.1 mmf, max ont } gang	65D 10-53
C16	.05 mf, 30 volts, cer. disc.	658 45-6
C17	.05 mf, 30 volts, cer. disc.	658 45-6
C18	.05 mf, 30 volts, cer. disc.	658 45-6
C19	.05 mf, 30 volts, cer. disc.	658 45-6
C20	1.0 mf, 3 volts, cer. disc.	658 45-15
C21	.05 mf, 3 volts, electrolytic	658 45-8
C22	.05 mf, 6 volts, electrolytic	658 45-8
C23	.05 mf, 30 volts, cer. disc.	658 45-6
C24	.05 mf, 30 volts, cer. disc.	658 45-6
C25	.01 mf, 30 volts, cer. disc.	658 45-20
C26	.01 mf, 30 volts, cer. disc.	658 45-20

COILS, TRANSFORMERS, ETC.

Sym.	Description	Part No.
L1	Antenna, Ferrite Bar	698 218-7
L2	Oscillator Coil, with Green dot	698 232-3
L3	IF Transformer, 1st IF	72C 182-8
L4	IF Transformer, 2nd IF	72C 182-9
L5	IF Transformer, 3rd IF	72C 182-10
T1	Transformer, 500 ohms	798 85-1
T2	Transformer, Output	798 85-1

MISCELLANEOUS CHASSIS PARTS

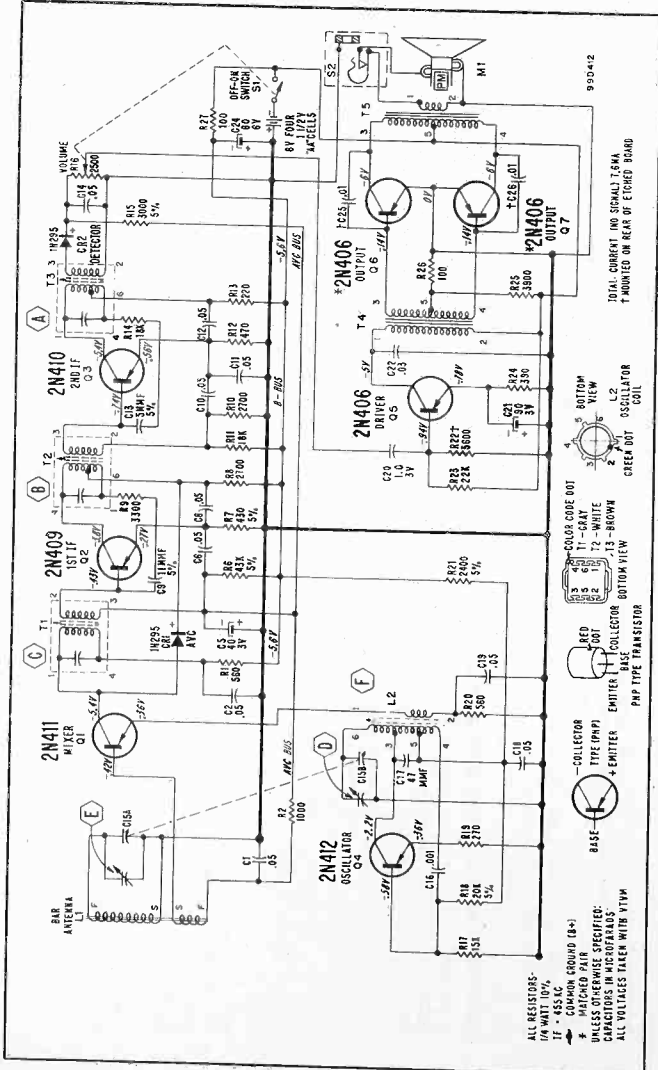
Sym.	Description	Part No.
M1	Speaker, 32" PM	788 125-3
S1	Switch, Off-on	Part of R16
S2	Earphone Jack (miniature)	888 39-3

Sym.	Description	Part No.
R1	560 ohms, 1/4 watt	608 45-561
R2	608 45-102	608 45-102
R3	43,000 ohms, 1/4 watt, 5%	608 45-561
R4	2,700 ohms, 1/4 watt, 5%	608 44-432
R5	2,700 ohms, 1/4 watt, 5%	608 44-432
R6	2,700 ohms, 1/4 watt, 5%	608 44-432
R7	2,700 ohms, 1/4 watt, 5%	608 44-432
R8	43,000 ohms, 1/4 watt, 5%	608 45-372
R9	2,700 ohms, 1/4 watt	608 45-372
R10	18,000 ohms, 1/4 watt	608 45-372
R11	2,700 ohms, 1/4 watt	608 45-372
R12	470 ohms, 1/4 watt	608 45-471
R13	220 ohms, 1/4 watt	608 45-221
R14	3,000 ohms, 1/4 watt, 5%	608 45-183
R15	2,500 ohms, 1/4 watt, 5%	608 44-302
R16	includes Off-on Switch (S1)	738 51-1
R17	15,000 ohms, 1/4 watt, 5%	608 45-153
R18	270 ohms, 1/4 watt, 5%	608 44-203
R19	560 ohms, 1/4 watt	608 45-561
R20	560 ohms, 1/4 watt	608 45-561
R21	2,400 ohms, 1/4 watt, 5%	608 44-242
R22	2,400 ohms, 1/4 watt, 5%	608 44-242
R23	2,400 ohms, 1/4 watt, 5%	608 45-562
R24	3,900 ohms, 1/4 watt, 5%	608 45-233
R25	3,900 ohms, 1/4 watt, 5%	608 45-391
R26	100 ohms, 1/4 watt	608 45-101
R27	100 ohms, 1/4 watt	608 45-101

RESISTORS

CAPACITORS

Sym.	Description	Part No.
C1	.05 mf, 30 volts, cer. disc.	658 45-6
C2	.05 mf, 30 volts, cer. disc.	658 45-6
C3	.05 mf, 30 volts, cer. disc.	658 45-6
C4	.05 mf, 30 volts, cer. disc.	658 45-6
C5	.05 mf, 30 volts, cer. disc.	658 45-6
C6	.05 mf, 30 volts, cer. disc.	658 45-6
C7	11 mmf, 500 volts, 5% cer. disc.	65D 10-175
C8	.05 mf, 30 volts, cer. disc.	658 45-6
C9	.05 mf, 30 volts, cer. disc.	658 45-6
C10	.05 mf, 30 volts, cer. disc.	658 45-6



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).

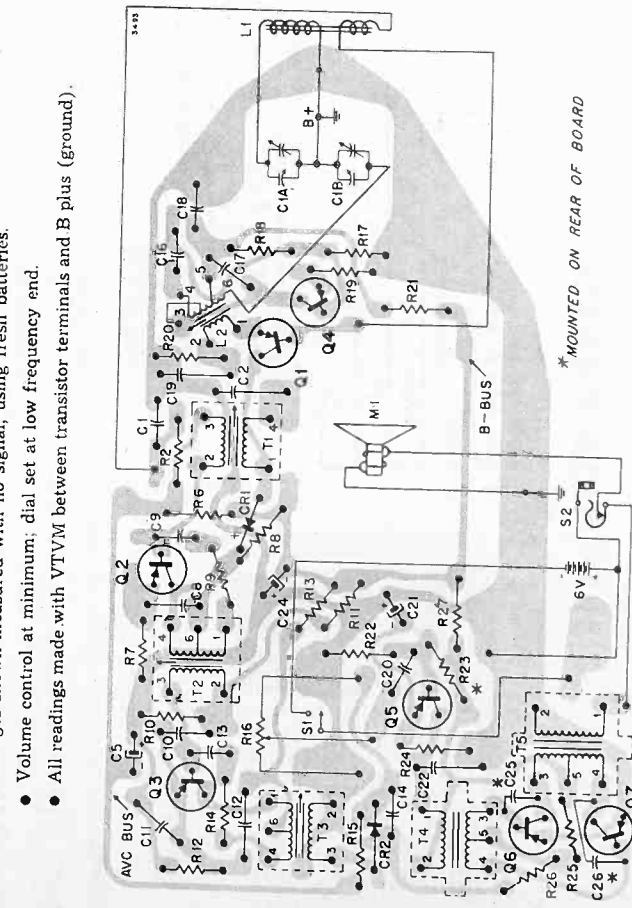


Figure 6. View of Etched Wiring Board. Gray area represents etched wiring; black symbols and lines represent components on opposite side.

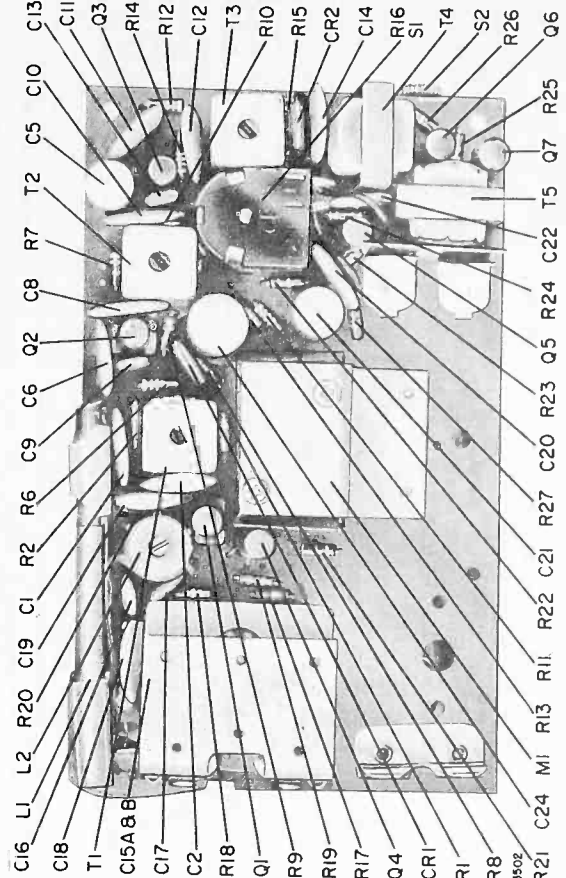


Figure 7. Top View of Chassis Showing Parts Location.

5E5 • 5E5A CHASSIS

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

TRANSISTOR POCKET PORTABLE		
MODEL	COLOR	CHASSIS
691	DOVE GREY	5E5
692	CORAL	5E5A

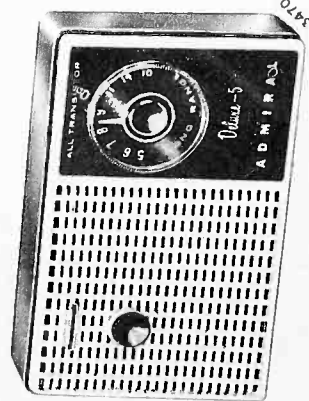


Figure 1. Front View of Cabinet. Model 691 Shown. Model 692 Has Earphone Jack and Gold Handle.

SPECIFICATIONS

- ANTENNA:** Built-in Ferro-Scope (ferrite bar).
- CIRCUIT:** Superheterodyne using five PNP type transistors and two germanium diodes.
- FREQUENCY RANGE:** Standard broadcast band: 535 to 1620 KC, ± 5 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Four 1½ volt ordinary penlight "AA" size batteries or equivalent size mercury batteries.
- SPEAKER:** 2¾" PM with Alnico V magnet. Voice coil impedance, 12 ohms.

BATTERY INFORMATION AND REPLACEMENT

Power is supplied by four 1½ volt ordinary (penlight) "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, check first to see which type battery holder is used.

In a few early production sets the batteries are placed in an open sided, plastic holder and held on the board by clips (battery contacts), plus projections on the bottom of the holder that go through the board to prevent reversing the batteries in the circuit. See figure 2.

In later production sets the battery holder is a closed tube with end caps. The right cap (from rear)

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

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

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

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

- PENLIGHT BATTERIES**
- CARBON-ZINC BATTERIES
 - Burgess Z 900
 - Eveready 315 Ray-O-Vac R7 or 7LP
 - MERCURY BATTERIES
 - Eveready E502 Mallory RM502R

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, 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.

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

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

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

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

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

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

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

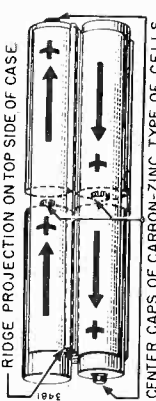


Figure 2. Early Production Battery Holder Showing Ordinary Batteries in Correct Positions.

is permanently attached to the board. The tube (with batteries) is then pushed into the attached cap. A flange on the left bottom of the tube goes through the board for anchorage, while springs inside the tube maintain the batteries under proper tension. See figure 4 showing method of removing this type battery holder.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

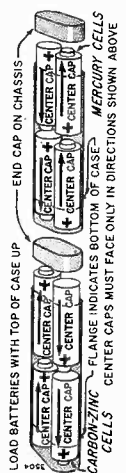


Figure 3. Later Production Battery Holder Showing Ordinary and Mercury Type Batteries in Correct Positions.

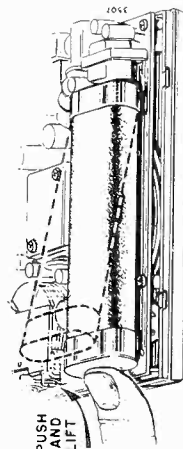


Figure 4. View Showing Method of Removing Later Type Battery Holder From Chassis Board.

ALIGNMENT PROCEDURE

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

a. Fresh batteries should be used.

b. Set Volume control at maximum.

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

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

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

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

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

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

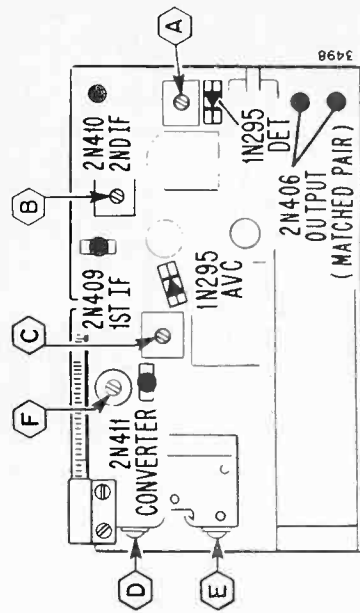


Figure 5. Transistor and Alignment Locations.

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 8A.

Figure 8B 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.

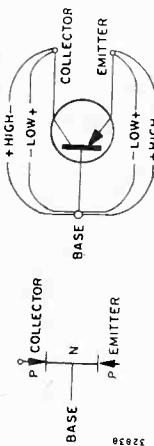


Figure 8A. Germanium Diode Equivalent.

CLEANING CABINET

To clean the cabinet use a mild solution of soap or detergent and lukewarm water. Apply the solution with a soft rag or sponge. Squeeze liquid out thoroughly before applying, to avoid any excess water from coming in contact with any of the electrical parts. Wipe with a damp cloth, and then wipe dry with a dry cloth.

Caution: Never use carbon tetrachloride, acetone, naphtha, alcohol, gasoline, or any commercial cleaning fluids for cleaning the cabinet.

PARTS LIST

Sym.	Description	Part No.
C11	.05 mf, 30 volts, cer. disc.	658 45-6
C12	.90 mf, 30 volts, electrolytic	678 32-10
C13	10 mf, 30 volts, cer. disc.	658 45-7
C14	.05 mf, 30 volts, cer. disc.	658 45-5
C15	.05 mf, 30 volts, cer. disc.	658 45-6
C16	.60 mf, 6 volts, electrolytic	678 32-8
C17	8.2 mmf, 500 volts, cer. disc.	659 19-131
C18	60 mfd temp. coeff. electrolytic	659 19-8
C19	.01 mf, 50 volts, cer. disc.	658 45-20
C20	.01 mf, 50 volts, cer. disc.	658 45-20
C21	.01 mf, 50 volts, cer. disc.	658 45-20
L1	Antenna Ferrite Bar	yellow dot. 698 218-8
L2	Oscillator Coils	yellow dot. 698 232-4
T1	Transformer, 1st IF	72C 182-2
T2	Transformer, 2nd IF	with Gray dot. 72C 182-8
T3	Transformer, 3rd IF	with White dot. 72C 182-9
T4	Transformer, Driver	798 84-10
T5	Transformer, Output	798 84-1
M1	Speaker, 23 1/2" PM	788 125-3
S1	Off-on Switch	Part of R15
S2	Jack, Earphone, Chassis 5E5A only	888 39-3
R1	500 ohms, 1/4 watt, 5%	158 198-1
R2	150 ohms, 1/4 watt, 5%	658 45-6
R3	500 ohms, 1/4 watt, 5%	658 45-6
R4	5.6 mf, 500 volts, 5% cer. disc.	658 45-6
R5	5.6 mf, 500 volts, 5% cer. disc.	658 45-6
R6	NT50 temp. coeff.	650 10-176

Sym.	Description	Part No.
R7	15,000 ohms, 1/4 watt	608 45-153
R8	5,800 ohms, 1/4 watt	608 45-682
R9	470 ohms, 1/4 watt	608 45-32
R10	2,200 ohms, 1/4 watt	608 45-32
R11	1,200 ohms, 1/4 watt	608 45-32
R12	51,000 ohms, 1/4 watt, 5%	608 44-513
R13	160 ohms, 1/4 watt, 5%	608 44-161
R14	2,700 ohms, 1/4 watt, 5%	608 45-32
R15	2,700 ohms, 1/4 watt, 5%	608 45-32
R16	470 ohms, 1/4 watt	608 45-471
R17	17,000 ohms, 1/4 watt	608 45-173
R18	22,000 ohms, 1/4 watt	608 45-553
R19	1,500 ohms, 1/4 watt	608 45-253
R20	758 51-1	
R21	608 45-392	
R22	608 45-101	
R23	608 45-101	
R24	608 45-101	
R25	608 45-132	

Sym.	Description	Part No.
C22	123.1 mmf, max. ant. gong	68C 73-1
C23	.47 mf, 30 volts, ceramic disc.	658 45-16
C24	.01 mf, 500 volts, cer. disc.	65D 10-41
C25	.15 mf, 30 volts, cer. disc.	658 45-6
C26	150 mfd, 500 volts, 5%	65D 10-143
C27	40 mf, 30 volts, electrolytic	678 32-9
C28	.05 mf, 30 volts, cer. disc.	658 45-6
C29	.05 mf, 30 volts, cer. disc.	658 45-6
C30	5.6 mf, 500 volts, 5% cer. disc.	658 45-6
C31	NT50 temp. coeff.	650 10-176

Sym.	Description	Part No.
L3	Antenna Ferrite Bar	yellow dot. 698 218-8
L4	Oscillator Coils	yellow dot. 698 232-4
T6	Transformer, 1st IF	72C 182-2
T7	Transformer, 2nd IF	with Gray dot. 72C 182-8
T8	Transformer, 3rd IF	with White dot. 72C 182-9
T9	Transformer, Driver	798 84-10
T10	Transformer, Output	798 84-1
M2	Speaker, 23 1/2" PM	788 125-3
S3	Off-on Switch	Part of R15
S4	Jack, Earphone, Chassis 5E5A only	888 39-3

Sym.	Description	Part No.
R26	500 ohms, 1/4 watt, 5%	158 198-1
R27	150 ohms, 1/4 watt, 5%	658 45-6
R28	500 ohms, 1/4 watt, 5%	658 45-6
R29	5.6 mf, 500 volts, 5% cer. disc.	658 45-6
R30	5.6 mf, 500 volts, 5% cer. disc.	658 45-6
R31	NT50 temp. coeff.	650 10-176

Sym.	Description	Part No.
C32	.05 mf, 30 volts, cer. disc.	658 45-6
C33	.90 mf, 30 volts, electrolytic	678 32-10
C34	10 mf, 30 volts, cer. disc.	658 45-7
C35	.05 mf, 30 volts, cer. disc.	658 45-5
C36	.05 mf, 30 volts, cer. disc.	658 45-6
C37	.60 mf, 6 volts, electrolytic	678 32-8
C38	8.2 mmf, 500 volts, cer. disc.	659 19-131
C39	60 mfd temp. coeff. electrolytic	659 19-8
C40	.01 mf, 50 volts, cer. disc.	658 45-20
C41	.01 mf, 50 volts, cer. disc.	658 45-20
C42	.01 mf, 50 volts, cer. disc.	658 45-20

CABINET PARTS

Cabinet, Front	Model 691 Gray	34E 141-12
Cabinet, Rear	Model 692 Gray	34E 141-4
Cabinet, Rear	Model 692 Gray	34E 141-3
Dial Plate Insert "DeLuxe 5"		23C 349-1
Model 691, Gray		23C 349-4
Model 692, Gray		29A 193-1
Grid C Grid, Model 692 only		33B 327-2
Knob, Tuning		33B 326-1
Knob, Volume		338 326-1
Spring, Compression, for Tuning Knob		188 3-10
Spring, Compression, for Volume Knob		188 3-2

MISCELLANEOUS CHASSIS PARTS

Speaker, 23 1/2" PM	788 125-3
Jack, Earphone, Chassis 5E5A only	888 39-3
Nut, for mg S2 Jack	158 198-1
Earphone for Baritone assembly	888 39-50
Holder for Baritone assembly	ES 201
Early Production open tube	338 322-1

TRANSISTORS AND DIODES

Transistor (Converter)	2N 411
Transistor (IF Amp)	2N 409
Transistor (IF Amp-Driver)	2N 410
Transistor (Output) Matched	2N 410
Transistor (Output)	2N 406
Diode (Detector-AVC)	1N 293
	1N 293

COILS, TRANSFORMERS, ETC.

Antenna Ferrite Bar	yellow dot. 698 218-8
Oscillator Coils	yellow dot. 698 232-4
Transformer, 1st IF	72C 182-2
Transformer, 2nd IF	with Gray dot. 72C 182-8
Transformer, 3rd IF	with White dot. 72C 182-9
Transformer, Driver	798 84-10
Transformer, Output	798 84-1

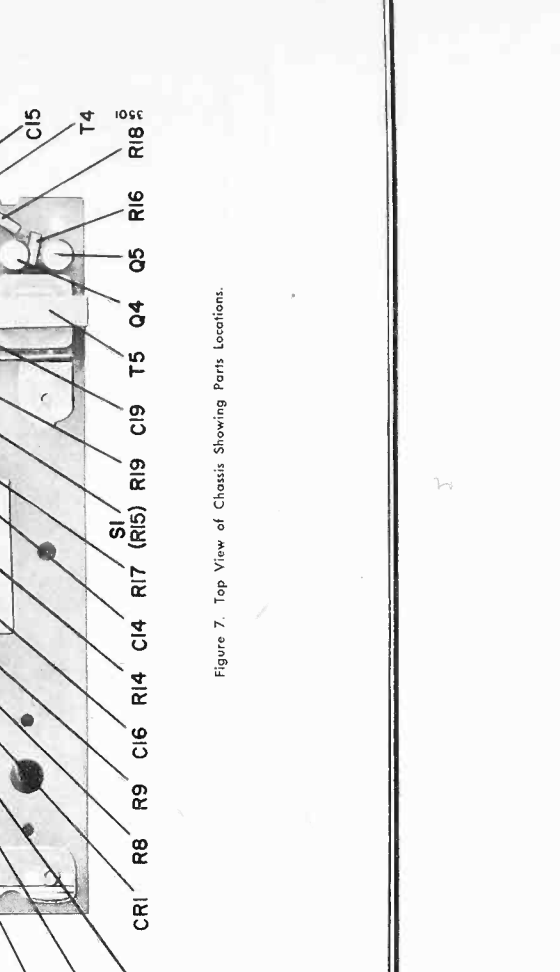
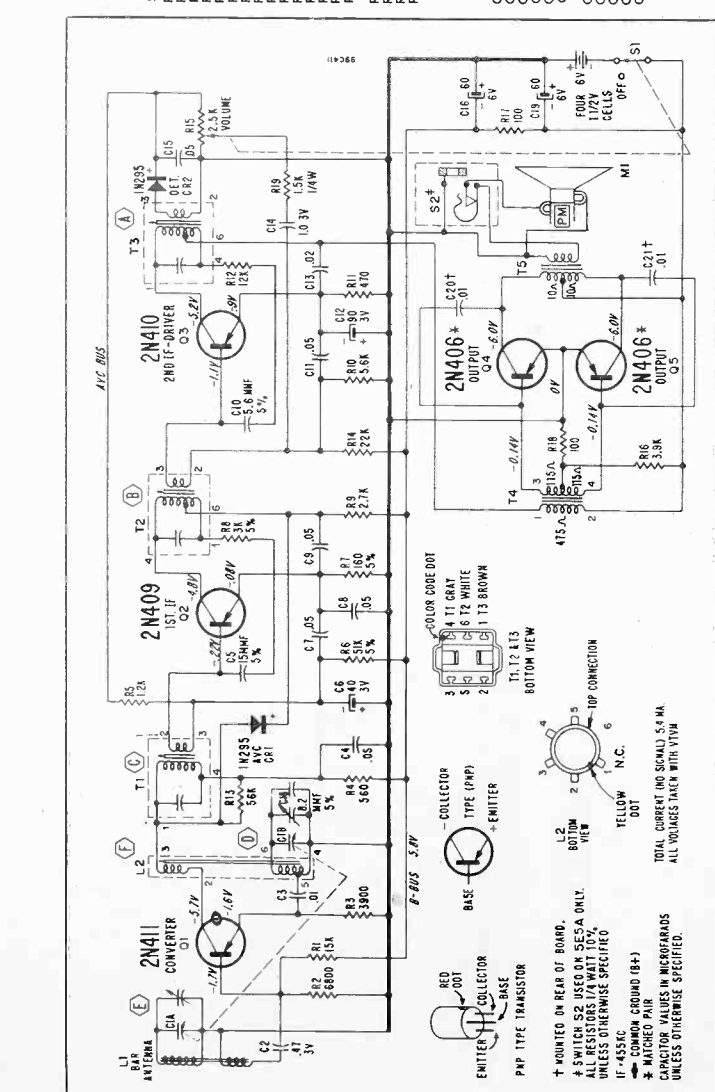
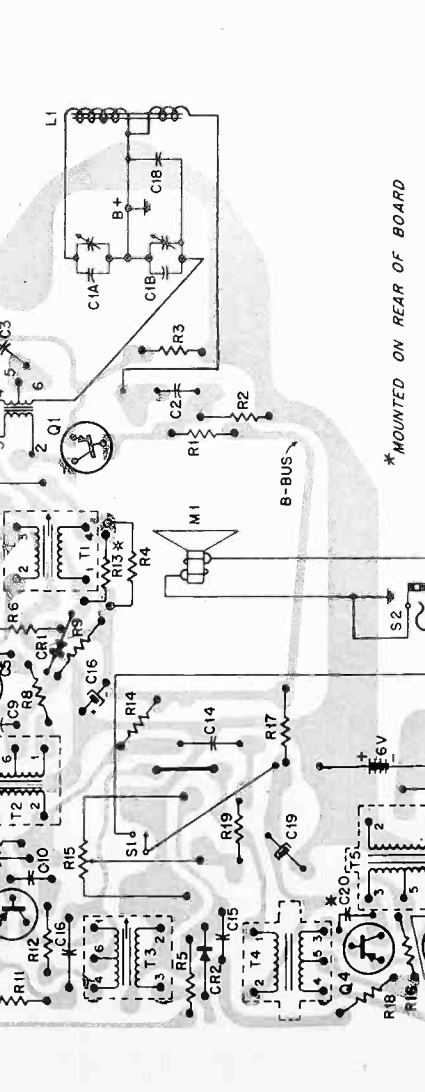


Figure 7. Top View of Chassis Showing Parts Locations.



VOLTAGE DATA

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



* MOUNTED ON REAR OF BOARD

Figure 6. View of Etched Wiring Board. Gray area represents etched wiring; black symbols and lines represent components on opposite side.

5F5 CHASSIS

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

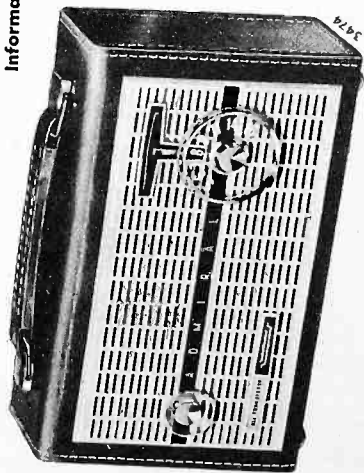


Figure 1. Front View of Cabinet.

SPECIFICATIONS

- ANTENNA:** Built-In Ferro-Scope (ferrite rod).
- CIRCUIT:** Superheterodyne using five PNP type transistors and two germanium diodes.
- FREQUENCY RANGE:** Standard broadcast band: 535 to 1620 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Six 1½ volts, "C" size, flashlight batteries.
- SPEAKER:** 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

TRANSISTOR PORTABLE		
MODEL	COLOR	CHASSIS
739	GREY	5F5

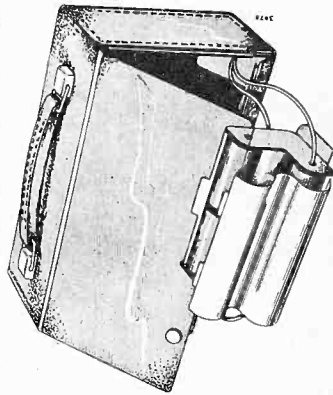


Figure 2. Rear View of Cabinet, Battery Case Removed.

If one or more batteries is reversed, the radio will play incorrectly or not at all. If radio does not 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 battery case as leakage may develop, thus causing corrosion damage to parts and wiring.

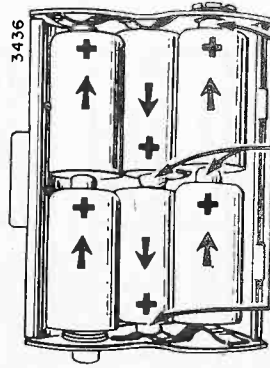


Figure 3. Battery Case Showing Batteries in Correct Positions.

"C" size batteries with manufacturers identification are listed below. Any equivalent substitute may be used.

- Burgess 1 General 914
- Eveready 935 Ray-O-Vac 11LP

REMOVING CHASSIS FROM CABINET

1. Remove the two knobs plus the two chassis mounting screws at the bottom of the cabinet, if used.
2. Unsnap back cover and remove battery case.
3. Remove the two screws at the right corners of the chassis.
4. Keeping one hand on front escutcheon, slide chassis to right to remove from cabinet.

NOTE: The left side of the chassis (from rear) is held by two flanges on the escutcheon and the escutcheon is held only by the chassis under the flanges.

CIRCUIT DESCRIPTION

This receiver uses 5 PNP type 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, R11 and C14, enable Q3 to function as both IF amplifier and audio amplifier. The recovered sound taken from a tap on the primary (point 5 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 R7 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 T1, thus reducing the gain of Q1.

SERVICE HINTS

Precautions To Take While Servicing Transistor Radios

The transistor is quite durable to shock 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", volume control at minimum.

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.

To provide a more rugged design, the chassis of these radios is soldered directly to the etched wiring board. Components are thereby made less accessible for replacement but the difference is offset by a sturdier portable chassis.

REMOVAL OF THE CHASSIS FROM THE BOARD IS NOT RECOMMENDED.

All component symbols (where possible) are screened onto the board. With a dental type mirror, needle nose pliers and a small pick, all except a very few components are accessible.

For servicing convenience, replacement of a resistor and/or capacitor may be made on the foil side of the etched board, after first removing defective component by unsoldering leads and pushing them through the holes in the board from the rear.

A quick check of a transistor receiver can be made by measuring the total current drain without a signal input.

Transistors often become shorted due to excess current flow which is usually indicative of circuit troubles. See schematic for the no signal current for this set.

IMPORTANT ALIGNMENT NOTES

The holes in the tuning slugs in the IF cans are square instead of the usual hexagon shape. Use alignment tool, Admiral part number 98A30-21. The slugs in some sets may be accessible only from the rear, but are located near the top of the can. Use care, if more than one turn is required, to prevent damage to the slug against the top of the can.

MODEL 739
CHASSIS 5F5

ALIGNMENT PROCEDURE

Alignment procedure of a transistor radio is similar to that of a vacuum-tube radio. However, there is more interaction between circuits, which means greater care in making adjustments plus a repetition of steps to achieve maximum output. For best results, follow the procedure exactly as given below.

- NOTE: Alignment instructions are given from the etched wiring side of the board. Alignment locations are shown on the component side.
- Fresh batteries should be used.
 - Set Volume control at maximum.
 - Connect output meter across sound output secondary, speaker disconnected, load 3.2 ohms.
 - Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- IMPORTANT: During alignment, output level should be held at 25 mw. or less. The voltage reading at 25 mw. level is approximately .3 volts across the 3.2 ohm load.
- e. THE SLUGS IN THE IF TRANSFORMERS HAVE SQUARE HOLES. Use non-metallic alignment tool, Admiral part no. 98A30-21.

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	(A), (B), and (C) for maximum output.
2	Repeat "Step 1" until maximum output is obtained.				
3	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	(D) for maximum output.
4	Same as "Step 1".	5 1400 KC	Tune in generator signal	Antenna Trimmer	(E) for maximum output.
5	Repeat "Steps 3 and 4" for maximum output.				

If unable to obtain enough signal output for a usable reading: clip "hot" lead of signal generator to mixer stator plates terminal of gang, clip ground lead to frame of gang. Adjust slugs for a usable reading only, then return to "Step 1".

CAUTION: If more than one turn is required, turn slugs away from center of can and then turn inward until the first peak is reached. A second or false peak with distortion and low gain is obtained by tuning slugs too far inward.

Antenna trimmer (E) 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.

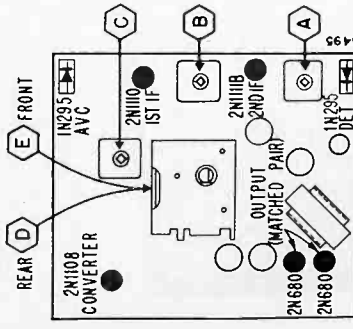


Figure 4. Transistor and Alignment Locations.

PARTS LIST

Sym.	Description	Part No.
R1	8,200 ohms, 1/2 watt	60B 8-222
R2	39,000 ohms, 1/2 watt	60B 8-393
R3	3,300 ohms, 1/2 watt	60B 8-332
R4	560 ohms, 1/2 watt	60B 8-561
R5	39,000 ohms, 1/2 watt	60B 8-393

CAPACITORS

C1A	272.3 mmf, max. ant. gang	68C 66-11
C1B	102.1 mmf, max. osc	65D 10-41
C2	.01 mf, ceramic disc	65D 10-5
C3	.005 mf, ceramic disc	65D 10-5
C4	8.2 mmf, ceramic disc	65D 10-131
C5	.05 mf, 30 volts, cer. disc	65B 45-6
C6	.05 mf, 30 volts, cer. disc	65B 45-6
C7	.05 mf, 30 volts, cer. disc	65B 45-6
C8	.05 mf, 30 volts, cer. disc	65B 45-6
C9	.05 mf, 30 volts, cer. disc	65B 45-6
C10	90 mf, 3 volts, electrolytic	67B 32-10
C11	.02 mf, 30 volts, cer. disc	65B 45-9
C12	25 mf, 3 volts, electrolytic	67B 32-13
C13	.05 mf, 30 volts, cer. disc	65B 45-6

MISCELLANEOUS PARTS

Case, Battery Compartment	A7545
Cover only for above case	15C 1863-1
Clamp plastic, antenna rig	11B 12-24
Cover, fiber for Volume Control	32A 427-1
Socket, 4-pin PM (includes transformer IS)	Part of M1
Screw, 6-32x5/16 RHP#SEMS	1C 191-77-71
Screw, 6-32x5/16 RHP#SEMS	1C 191-80-71
Socket, Transistor Q1	87B 63-3

COILS, TRANSFORMERS, ETC.

L1	Antenna, Ferrite Rod	69B 235-2
L2	Coil, Oscillator (with orange dot)	69A 223-3
T1	Transformer, 1st IF (with violet dot)	72C 190-7
T2	Transformer, 2nd IF (with gray dot)	72C 190-8
T3	Transformer, 3rd IF (with white dot)	72C 190-9
T4	Transformer, Driver	79B 76-4
T5	Transformer, Output	78C 196-2
M1	Speaker, 4" PM (includes transformer IS)	Part of M1
S1	Switch, Off-on	Part of R13

TRANSISTORS AND DIODES

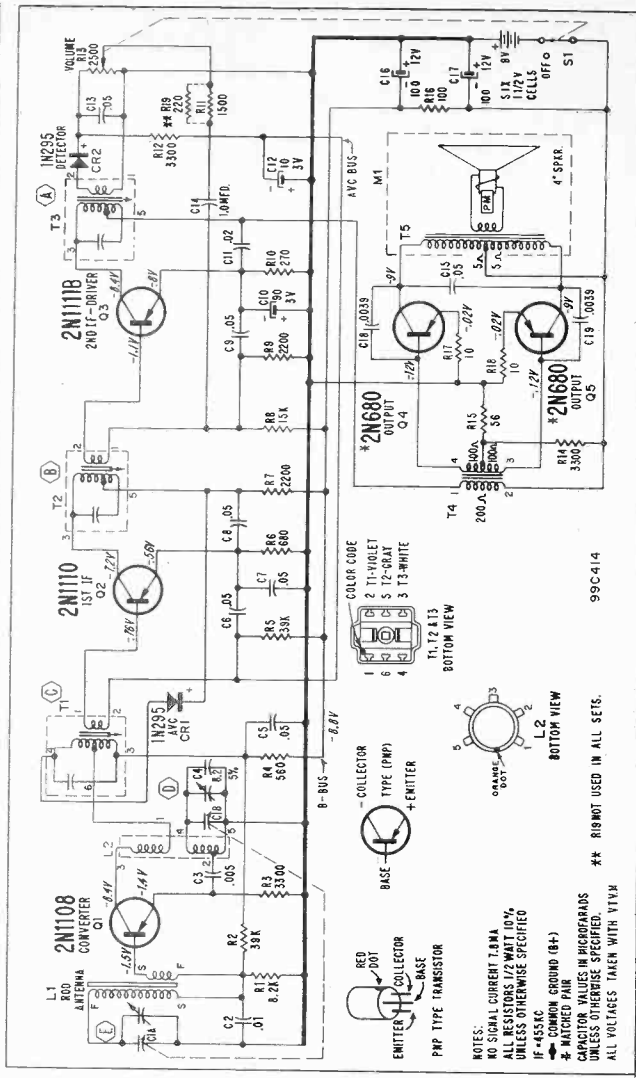
Sym.	Description	Part No.
Q1	Transistor (converter)	2N1108
Q2	Transistor (1st IF)	2N1110
Q3	Transistor (2nd IF—driver)	2N1111B
Q4	Transistor (output) [matched]	2N680
Q5	Transistor (output) [matched]	2N680
CR1	Diode (AVC)	IN295
CR2	Diode (detector—AVC)	IN295

CABINET PARTS

Cabinet, Gunmetal Gray	34D 140-1
Escutcheon Plate, Beige	23D 345-1
Grille Cloth	36B 98-1
Insert, Plastic, "ALL TRANSISTOR"	33B 320-1
Knob, Tuning	33B 314-1
Knob, Volume and Off-on	33B 311-1
Spring, for Tuning Knob	18B 5-12
Spring, for Volume Knob	18B 5-10
Nut, speed type mfg.	2C 10-70-71
Washer, cup	4A 7-6-71

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 VTM between transistor terminals and B plus (ground).



99C-414

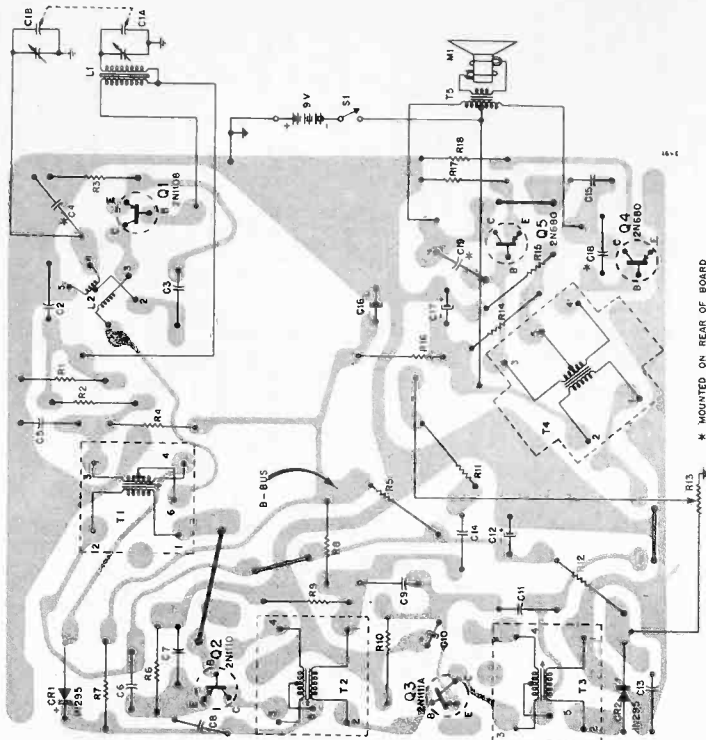


Figure 5. View of Etched Wiring Board. Gray area represents etched wiring, black symbols and lines represent components on opposite side.

CHASSIS 7Q1
MODELS 742 • 743

Note: For information on etched wiring and transistors, refer to Admiral Service Manual No. S559 and "Admiral Service Information For Transistors" No. S586.

CHASSIS 7Q1

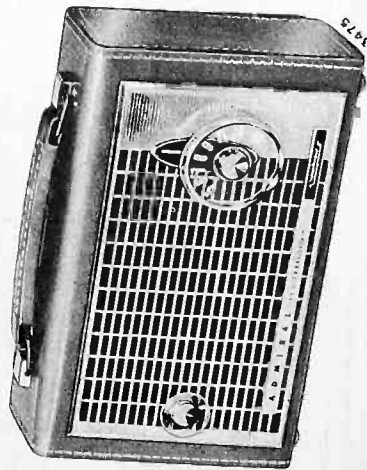


Figure 1. Front View of Cabinet.

TRANSISTOR PORTABLE

MODEL	COLOR	CHASSIS
742	RED	7Q1
743	WHITE	7Q1

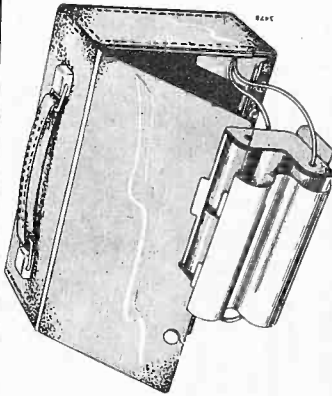


Figure 2. Rear View of Cabinet, Battery Case Removed.

SPECIFICATIONS

- ANTENNA:** Built-In Ferro-Scope (ferrite rod).
- CIRCUIT:** Superheterodyne using seven PNP type transistors and two germanium diodes.
- FREQUENCY RANGE:** Standard broadcast band: 535 to 1620 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Six 1½ volts, "C" size, flashlight batteries.
- SPEAKER:** 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

BATTERY INFORMATION AND REPLACEMENT

Power is supplied by six "C" size, 1½ volt, drycell batteries. The batteries are held in place in a metal case which is easily removed from the rear of the cabinet, see figure 2.

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 battery case from rear of cabinet and remove snap-on cover.

IMPORTANT: Arrows and + marks are etched on the inside of the battery case to indicate the directions that the battery center caps should face when placed into the case.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

Make certain all batteries face in the directions shown on the battery case, see figure 3.

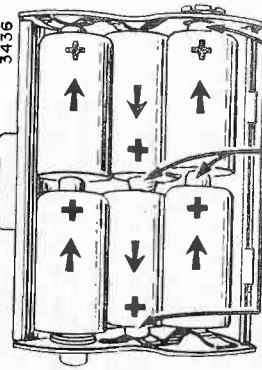


Figure 3. Battery Case Showing Batteries in Correct Position.

"C" size batteries with manufacturers identification are listed below. Any equivalent substitute may be used.

- Burgess 1
- Eveready 935
- General 914
- Ray-O-Vac 1LP

REMOVING CHASSIS FROM CABINET

1. Remove the two knobs plus the two chassis mounting screws at the bottom of the cabinet, if used.
2. Unsnap back cover and remove battery case.
3. Remove the two nuts at the right corners of the chassis.
4. Keeping one hand on front escutcheon, slide chassis to right to remove from cabinet.

NOTE: The left side of the chassis (from rear) is held only by two flanges on the escutcheon and the escutcheon, in some sets, is held only by the chassis under the flanges.

CIRCUIT DESCRIPTION

This receiver uses 7 PNP type transistors and two germanium diodes.

Frequency conversion is accomplished by Q1, (mixer) with Q4 acting as a separate oscillator. Q2 and Q3 act as IF amplifiers and the diode (CR2) functions as detector and AVC with Q6 and Q7 as a class B operated push-pull output stage. Q5 and T4 act as a transformer coupled driver stage.

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

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 R8 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 T1, thus reducing the gain of Q1.

SERVICE HINTS

Precutions To Take While Servicing Transistor Radios

The transistor is quite durable to shock but is extremely sensitive to heat and the application of incorrect 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", volume control at minimum.

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 capacities 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.

To provide a more rugged design, the chassis of these radios is soldered directly to the etched wiring board. Components are thereby made less accessible for replacement but the difference is offset by a sturdier portable chassis.

REMOVAL OF THE CHASSIS FROM THE BOARD IS NOT RECOMMENDED.

All component symbols, where possible, are screened onto the board. With a dental type mirror, needle nose pliers and small pick, all except a very few components are accessible.

For servicing convenience, replacement of a resistor and/or capacitor may be made on the foil side of etched board, after first removing defective component by unsoldering leads and pushing them through the holes in the board from the rear.

A quick check of a transistor receiver can be made by measuring the total current drain without a signal input.

Transistors often become shorted due to excess current flow which is usually indicative of circuit trouble. See schematic for the no signal current for this set.

IMPORTANT ALIGNMENT NOTE

The slugs are accessible from the rear, but are located near the top of the can. Use care, if more than one turn to the right is required, to prevent damage to the slug against the top of can.

ALIGNMENT PROCEDURE

Alignment procedure of a transistor radio is similar to that of a vacuum-tube radio. However, there is more interaction between circuits, which means greater care in making adjustments plus a repetition of steps to achieve maximum output. For best results, follow the procedure exactly as given below.

NOTE: Alignment instructions are given from the etched wiring side of the board. Alignment locations are shown on the component side.

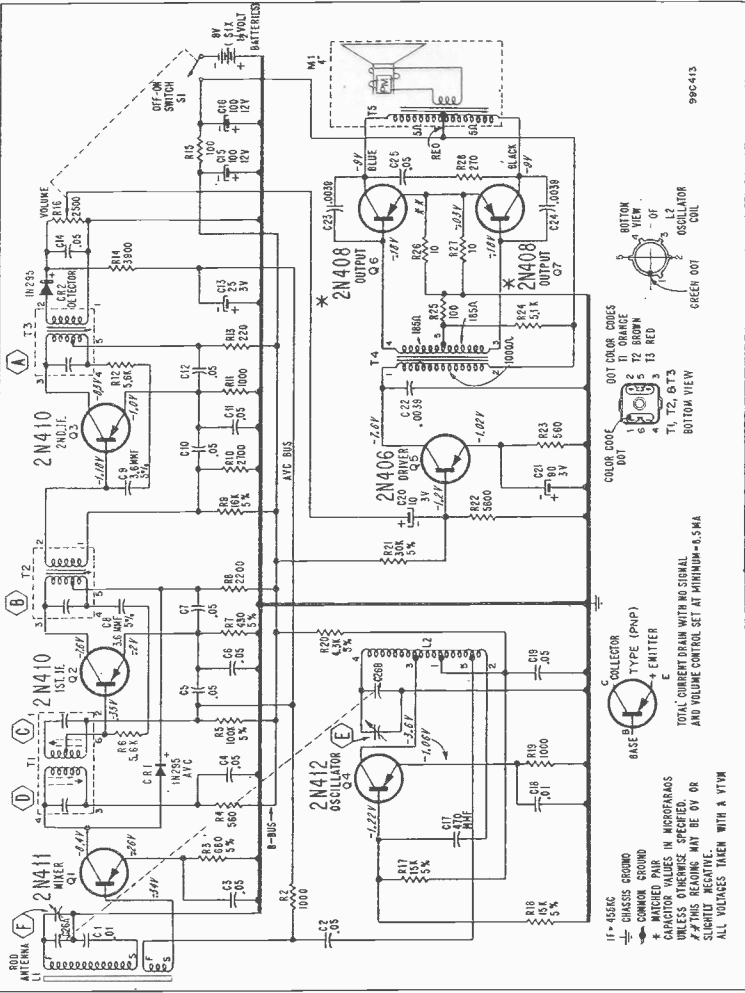
- Fresh batteries should be used.
 - Set Volume control at maximum.
 - Connect output meter across sound output secondary, speaker disconnected, load 3.2 ohms.
 - Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- IMPORTANT: During alignment, output level should be held at 25 mw, or less. The voltage reading at 25 mw level is approximately .3 volts across the 3.2 ohm load.
- e. Use a non-metallic alignment screwdriver for IF adjustments.

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	Repeat "Step 1" until maximum output is obtained.			Oscillator	Ⓔ for maximum output.
3	Same as "Step 1".	1620 KC	Gang fully open	Trimmer	Ⓕ for maximum output.
4	Same as "Step 1".	§ 1400 KC	Tune in generator signal	Antenna Trimmer	Ⓖ for maximum output.
5	Repeat "Steps 3 and 4" for maximum output.				

† If unable to obtain enough signal output for a usable reading; clip "hot" lead of signal generator to mixer stator plates terminal of gang, clip ground lead to frame of gang. Adjust slugs for a usable reading only, then return to "Step 1".

CAUTION: If more than one turn is required, turn slugs away from center of can and then turn inward until the first peak is reached. A second or false peak with distortion and low gain is obtained by tuning slugs too far inward.

§ 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.



99C-413

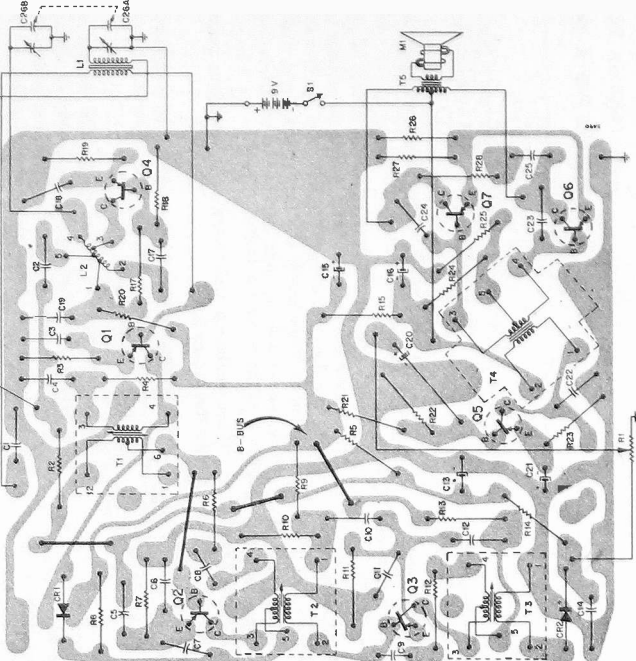


Figure 5. View of Etched Wiring Board. Gray area represents etched wiring, black symbols and lines represent components on opposite side.

Sym.	Description	Part No.
Q4	Transistor (oscillator)	2N412
Q6	Transistor (output) matched	2N408
Q7	Transistor (output)	2N408
CR1	Diode (AVC)	1N285
CR2	Diode (detector-AVC)	1N285

Sym.	Description	Part No.
L1	Antenna Ferrite Rod	69B 235-1
L2	Oscillator Coil	69A 222-2
T1	1st IF Transformer with Green dot	72C 189-3
T2	2nd IF Transformer with Red dot	72C 190-1
T3	3rd IF Transformer with Red dot	72C 190-2
T4	Driver Transformer	79B 76-1
T5	Output Transformer	78C 156-3
M1	Slide Switch (includes T5)	Part of R16
S1	Off-on Switch	Part of R16

COILS, TRANSFORMERS, ETC.

Sym.	Description	Part No.
C22	90 pf, 3.5 vdc electrolytic	67B 22-10
C23	.0039 mf, 50 volts	62B 45-14
C24	.0039 mf, 50 volts	62B 45-14
C25	.05 mf, 30 volts, cer. disc.	65B 45-6
C26	47.5 mf, 30 volts, cer. disc.	65B 45-6
C28	100 mf, 50 volts, cer. disc.	68C 66-11

Sym.	Description	Part No.
R16	2,600 ohms, 1/2 watt, volume control (in circuit S1)	72B 36-2
R17	15,000 ohms, 1/2 watt, 5%	60B 7-153
R18	15,000 ohms, 1/2 watt, 5%	60B 7-153
R19	100,000 ohms, 1/2 watt, 5%	60B 7-104
R20	4,300 ohms, 1/2 watt, 5%	60B 7-432
R21	30,000 ohms, 1/2 watt, 5%	60B 7-303
R22	5,600 ohms, 1/2 watt, 5%	60B 8-562
R23	560 ohms, 1/2 watt, 5%	60B 8-561
R24	300 ohms, 1/2 watt, 5%	60B 8-302
R25	100 ohms, 1/2 watt, 5%	60B 8-100
R26	10 ohms, 1/2 watt, 5%	60B 8-100
R27	10 ohms, 1/2 watt, 5%	60B 8-100
R28	270 ohms, 1/2 watt, 5%	60B 8-271

CAPACITORS

Sym.	Description	Part No.
C1	.01 mf, 500 volts, cer. disc.	65D 10-41
C2	.05 mf, 30 volts, cer. disc.	65B 45-6
C3	.05 mf, 30 volts, cer. disc.	65B 45-6
C4	.05 mf, 30 volts, cer. disc.	65B 45-6
C5	.05 mf, 30 volts, cer. disc.	65B 45-6
C6	.05 mf, 30 volts, cer. disc.	65B 45-6
C7	.05 mf, 30 volts, cer. disc.	65B 45-6
C8	3.6 mf, 500 volts, 5%, cer. disc. NPO temp.	65D 10-190
C9	3.6 mf, 500 volts, 5%, cer. disc. NPO temp.	65D 10-190
C10	.05 mf, 30 volts, cer. disc.	65B 45-6
C11	.05 mf, 30 volts, cer. disc.	65B 45-6
C12	.05 mf, 30 volts, cer. disc.	65B 45-6
C13	25 mf, 3 volts, electrolytic	67B 32-13
C14	.05 mf, 30 volts, cer. disc.	65B 45-6
C15	100 mf, 12 volts, elec.	67B 32-6
C16	100 mf, 12 volts, elec.	67B 32-6
C17	4 mf, 500 volts, cer. disc.	65D 10-70
C18	.01 mf, 500 volts, cer. disc.	65D 10-41
C19	.05 mf, 30 volts, cer. disc.	65B 45-6
C20	10 mf, 3 volts, electrolytic	67B 32-6

MISCELLANEOUS PARTS

Description	Part No.
Battery Case Assembly (less cover)	A7545
Cover for Battery Case	15C 1863-1
Clamp, plastic, antenna mgf.	32A 127-1
Knob, Volume	1C 191-77-71
Screw, 6-32x5/16 RHP/SEMS	1C 191-80-71
Socket Transistor	67B 63-3

TRANSISTORS AND DIODES

Sym.	Description	Part No.
Q1	Transistor (mixer)	2N411
Q2	Transistor (1st IF)	2N410
Q3	Transistor (2nd IF)	2N410

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).

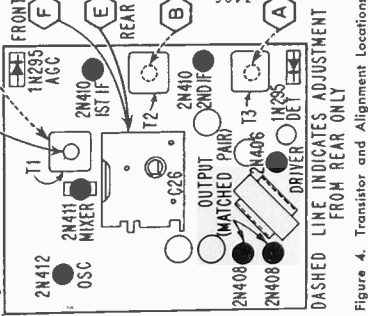


Figure 4. Transistor and Alignment Locations.

PARTS LIST

Sym.	Description	Part No.
R2	1,000 ohms, 1/2 watt, 5%	60B 8-102
R3	680 ohms, 1/2 watt, 5%	60B 7-681
R4	560 ohms, 1/2 watt, 5%	60B 8-561
R5	100,000 ohms, 1/2 watt, 5%	60B 7-104
R6	5,600 ohms, 1/2 watt, 5%	60B 7-432
R7	2,200 ohms, 1/2 watt, 5%	60B 7-432
R8	2,200 ohms, 1/2 watt, 5%	60B 8-222
R9	16,000 ohms, 1/2 watt, 5%	60B 7-163
R10	2,700 ohms, 1/2 watt, 5%	60B 8-272
R11	1,600 ohms, 1/2 watt, 5%	60B 8-162
R12	1,600 ohms, 1/2 watt, 5%	60B 8-162
R13	220 ohms, 1/2 watt, 5%	60B 8-221
R14	3,900 ohms, 1/2 watt, 5%	60B 8-392
R15	100 ohms, 1/2 watt, 5%	60B 8-101

CHASSIS 851A
MODELS 811 • 816

and run continuously without interruption until battery replacement is required.

REMOVING CABINET AND COMPONENTS

- To remove cabinet:
- 1. Remove 2 screws near front edge of cabinet bottom.
- 2. Remove 2 screws from upper section of cabinet back.
- 3. Pull cabinet free of front panel.

The speaker, etched circuit board, tone control, clock, and ferro-scope antenna are fastened separately to the front panel with screws. Remove them individually, as required, by removing their mounting screws. The push-on knobs must also be removed to completely free the tone control and wiring board from the panel.

It is easier to remove the knobs from their shafts by pulling the appropriate component away from the knob rather than the knob away from the component. This is especially true with regard to the large vernier knob, since it is set inside a gold escutcheon ring. After removing chassis mounting screws, to remove the volume, vernier and tuning knobs by this method, grasp the etched circuit board at the center of either opposite pair of edges between the thumb, and 1st and 2nd finger, using a similar position of the other hand to hold the panel. Then, pull the board directly away from the panel, until knobs release from their shafts.

REMOVING CLOCK: A bracket screwed to the front panel holds the clock in position. To remove clock, loosen and remove the 2 bracket screws and lift off bracket. (The clock battery holder is riveted to this bracket.) Pull off clock knobs and lift clock away from panel. The four leads connected to the clock may then be unsoldered from their terminals.

The outer clock face escutcheon (with numerals) is attached separately to the panel with 3 plastic "spring" tabs. These tabs extend through holes in the panel and the ends are visible on the rear of the panel. To remove escutcheon, press end of each spring tab radially (toward center of escutcheon) inward until tab releases from edge of hole. Then pull clock face escutcheon away from front of panel.

PARTS AND SERVICE FOR CLOCK

Consult your Admiral distributor for the address of the nearest parts and service station for clock used in this receiver.

BATTERY INFORMATION AND REPLACEMENT

Six "C" size flashlight batteries power the receiver, and one "C" size flashlight battery powers the clock. "C" size batteries with manufacturers identification are as follows: Burgess (1), Eveready (935), General (914), Ray-O-Yac (ILP). Equivalent substitutes may be used. Receiver battery life may exceed 900 hours under normal operating conditions.

To remove battery case from cabinet, push slide button toward center of door and pull out case. See figure 2.

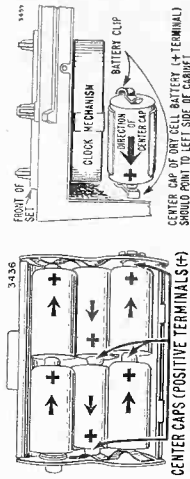


Figure 3. Battery Case Showing Batteries in Correct Position.

To replace radio batteries, remove cover by unsnapping clasp at top edge of case. Arrows and + marks etched in the case indicate the directions that the center caps should face when loading. See fig. 3. If radio does not play or sounds weak and/or noisy set immediately after installing new batteries, turn off and check for improper battery installation. Weak batteries can also cause the same symptoms.

Refer to figure 4 for replacing clock battery. Pull old battery straight out from clip at rear of clock. Note battery position for proper polarity. Battery life should be six months or more.

IMPORTANT: If clock does not start by itself when battery is installed, lift radio and gently rock sides of cabinet up and down. Clock will start

MODEL	COLOR	CHASSIS
811	Black and White	851A
816	Gold and White	851A

Note: Refer to Admiral Service Manual No. 5559 for service and repair information of etched circuit wiring.

TRANSISTOR CLOCK RADIO

clock will perform the same automatic "on-off" switching functions as an AC operated electric clock used with conventional AC receivers.

The clock has an automatic regulation feature which automatically compensates for "fast" or "slow" clock operation when normal time setting procedures are used. If the clock runs fast or slow, it can be regulated to the correct speed simply by periodically setting the hands to the correct time as follows:

1. To initially set clock (after battery installation), set clock to correct time by rotating hands in clockwise direction. Check time periodically for the first day or two.
2. If clock is running "slow", set hands up to correct time in clockwise direction ONLY. Setting the hands in a clockwise direction will cause clock to run slightly faster.
3. If clock is running "fast", set hands back to correct time in counterclockwise direction ONLY. Setting the hands in a counterclockwise direction will cause clock to run slightly slower.

Note: Resetting the clock causes an automatic speed regulation of approximately 4 seconds per 24 hours for each minute of resetting, up to a maximum of 20 seconds for a resetting of 5 minutes or more.

IMPORTANT: When regulating clock, a period of over one hour must be allowed between each individual change in time setting. Do not overset hands in either direction so that they must be turned back. To change time, pull out Time Set knob, determine correct direction of rotation and turn slowly and accurately to bring hands directly to correct position.

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.

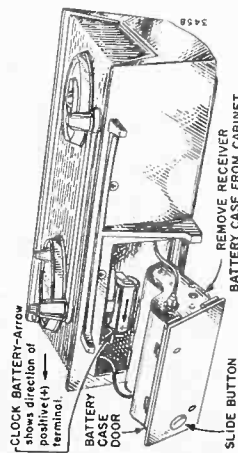


Figure 2. Removing Battery Case.

851A CHASSIS

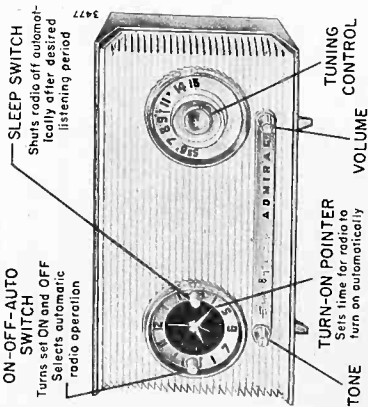


Figure 1. Front View of Cabinet.

SPECIFICATIONS

CIRCUIT: Superheterodyne using eight transistors and one germanium diode.

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

INTERMEDIATE FREQUENCY: 455 KC.

POWER SUPPLY: The receiver is operated from power supplied by six 1½ volts, "C" size, flashlight batteries. The clock is powered independently by one 1½ volt "C" size flashlight battery.

ANTENNA: Built-In Ferro-Scope (iron core).

SPEAKER: 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

CLOCK: Battery operated, with time switch for turning radio on or off.

GENERAL
By employing transistors and a specially designed clock motor, this battery operated clock receiver retains all of the advantages of portability inherent in a self powered unit, and at the same time approaches the economy of operation of many conventional power line operated receivers without any sacrifice in operating performance. In fact, this receiver will surpass the performance of many vacuum tube, power line operated receivers.

This receiver uses eight PNP type transistors plus a germanium diode. The superheterodyne circuit consists of a separate oscillator and mixer, two IF amplifiers, and a germanium diode detector. A separate audio driver stage drives a push-pull class B operated output amplifier. An additional transistor augments conventional "diode detector" type of AVC for preventing the receiver from overloading under very strong signal conditions.

Important Clock Information

The clock is one of the first of its kind commercially available. A single 1½ volt "C" size flashlight battery will operate the clock for a period of six months or more. Besides being a dependable timepiece, this

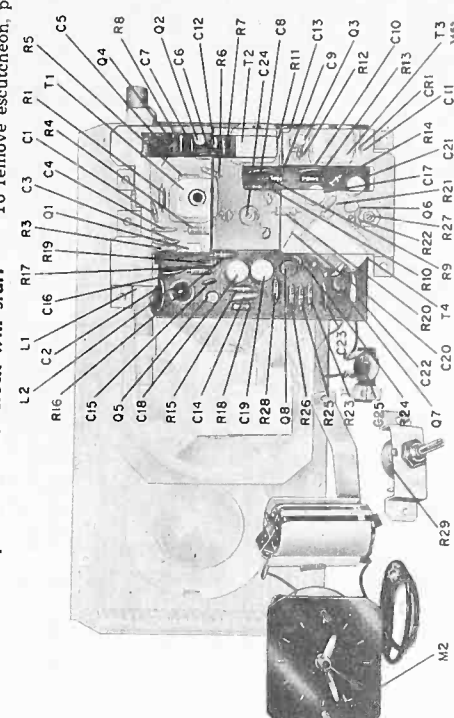


Figure 5. Top View of Chassis Showing Parts Location.

MODELS 811 • 816
CHASSIS 8S1A

ALIGNMENT PROCEDURE

Alignment procedure of the 8S1A chassis is similar to alignment procedure of an ordinary vacuum-tube radio. However, there is somewhat more interaction between circuits, thus requiring greater care in the setting of the adjustments as well as repetition of some of the steps. 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 speaker voice coil.
- Use a non-metallic alignment tool for IF adjustments.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Couple radiated signal through several turns of wire or place "hot" lead near antenna.	455 KC	Gang fully open	3rd IF 2nd IF 1st IF	* (A), (B), (C) and (D) for maximum output.
2	Repeat "Step 1".			Oscillator Trimmer	(E) for maximum output.
3	Same as "Step 1".	1620 KC	Gang fully open	Antenna Trimmer	(F) for maximum output.
4	Same as "Step 1".	1400 KC	Tune in on generator signal		
5	Repeat "Step 3".				
6	Repeat "Step 4".				

† If signal generator does not produce sufficient output for usable reading, clip hot lead of generator to mixer stator plates of gang; clip ground lead to frame of gang.

* If difficulty is experienced in obtaining signal output, first rotate IF slug out several turns, then slowly adjust slug in until peak is reached. To align T1, rotate IF slugs out. Then, rotate inward until first peak is reached. A second (false) peak can be obtained by rotating slugs too far inward. Undesirable changes in gain and bandwidth are caused by tuning to the second peak. Adjustments (A), (B) and (C) are made from foil side of wiring board.

§ Antenna trimmer (F) should first be adjusted for maximum output with generator tuned to 1400 KC. Then try to increase output by rocking signal generator slightly while readjusting trimmer (F).

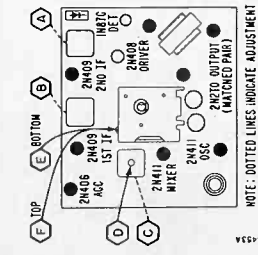


Figure 6. Transistor and Alignment Locations.

PARTS LIST

Sym.	Description	Part No.
R1	1,000 ohms, 1/2 watt	60B 7-153
R2	500 ohms, 1/2 watt	60B 8-272
R3	2,200 ohms, 1/2 watt	60B 8-552
R4	100,000 ohms, 1/2 watt	60B 8-221
R5	5%	60B 8-222
R6	430 ohms, 1/2 watt, 5%	60B 7-104
R7	2,200 ohms, 1/2 watt	60B 7-431
R8	10,000 ohms, 1/2 watt	60B 8-222
R9	16,000 ohms, 1/2 watt	60B 7-153
R10	2,700 ohms, 1/2 watt	60B 8-272
R11	500 ohms, 1/2 watt	60B 8-552
R12	5,600 ohms, 1/2 watt	60B 8-221
R13	220 ohms, 1/2 watt	60B 8-221
R14	3,900 ohms, 1/2 watt	60B 8-221
R15	100 ohms, 1/2 watt	60B 8-101
R16	150 ohms, 1/2 watt, 5%	60B 7-153

Sym.	Description	Part No.
C1	01 mf, 50 volts, ceramic	65D 10-41
C2	05 mf, 30 volts, ceramic	65B 45-6
C3	05 mf, 30 volts, ceramic	65B 45-6
C4	05 mf, 30 volts, ceramic	65B 45-6
C5	05 mf, 30 volts, ceramic	65B 45-6
C6	05 mf, 30 volts, ceramic	65B 45-6
C7	05 mf, 30 volts, ceramic	65B 45-6
C8	05 mf, 30 volts, ceramic	65B 45-6
C9	05 mf, 30 volts, ceramic	65B 45-6
C10	05 mf, 30 volts, ceramic	65B 45-6
C11	05 mf, 30 volts, ceramic	65B 45-6
C12	3.6 mfd, 500 volts, NPO temp. coef.	65D 6-190
C13	3.6 mfd, 500 volts, temp. coef.	65D 6-190
C14	01 mf, 600 volts	65D 10-41
C15	470 mfd, 500 volts, cer. disc.	65D 10-70
C16	05 mf, 30 volts, ceramic	65B 45-6
C17	25 mf, 3 volts, electrolytic	67B 32-13
C18	100 mf, 12 volts, electrolytic	67B 32-6
C19	10 electrolytic	67B 32-6

Sym.	Description	Part No.
L1	Antenna, Rod	15A 1879-1
L2	Transformer, 1st IF	72C 189-1
T1	Transformer, 2nd IF	72C 189-1
T2	Transformer, 3rd IF	72C 189-2
T3	Transformer, Driver	72C 189-2
T4	Speaker, 4" PM (includes output transformer T5)	78C 156
M1	Switch, On-Off	Part of R27
S1	Battery Case Cover	A7287
Battery Case	Model 811	A7284
Bracket, M. Mounting	(for Volume Control)	15A 1884-1
Bracket, M. Mounting	(for Gang)	15A 1884-1
Bracket, Gang Support	(for Volume Control)	15A 1903-1
Clamp, Antenna (plastic)		11A 12-5
Top, Case, Mounting	(includes Volume Control)	2A 2-69-71
Screws	#6-32x1/4 STS Phillips (mounts speaker and vol. control)	IA 71-8-71
	#6-32x5/16 BHMS (mounts cabinet front assembly to cabinet bottom, Brass plated)	IC 131-530-72
	#6-32x1/2 STS Phillips (mounts cabinet front)	JA-71-10-71

COILS, TRANSFORMERS, ETC.

Sym.	Description	Part No.
C20	10 mf, 3 volts, electrolytic	67B 35-6
C21	90 mf, 3 volts, electrolytic	67B 32-10
C22	0.05 mf, 50 volts, cer. disc.	65B 45-14
C23	05 mf, 30 volts, ceramic	65B 45-6
C24A	272.3 mfd, max. ant.	gang, 66B 66-10
C24B	102.1 mfd, max. osc.	gang, 66B 66-10
C28	0.0039 mf, 50 volts, cer. disc.	65B 45-6
C29	0.0039 mf, 50 volts, cer. disc.	65B 45-14

MISCELLANEOUS PARTS

Sym.	Description	Part No.
A1	Antenna, Rod	15A 1879-1
A2	Transformer, 1st IF	72C 189-1
A3	Transformer, 2nd IF	72C 189-1
A4	Transformer, 3rd IF	72C 189-2
A5	Transformer, Driver	72C 189-2
A6	Speaker, 4" PM (includes output transformer T5)	78C 156
A7	Switch, On-Off	Part of R27
A8	Battery Case Cover	A7287
A9	Bracket, M. Mounting (for Volume Control)	15A 1884-1
A10	Bracket, M. Mounting (for Gang)	15A 1884-1
A11	Bracket, Gang Support (for Volume Control)	15A 1903-1
A12	Clamp, Antenna (plastic)	11A 12-5
A13	Top, Case, Mounting (includes Volume Control)	2A 2-69-71
A14	Screws #6-32x1/4 STS Phillips (mounts speaker and vol. control)	IA 71-8-71
A15	#6-32x5/16 BHMS (mounts cabinet front assembly to cabinet bottom, Brass plated)	IC 131-530-72
A16	#6-32x1/2 STS Phillips (mounts cabinet front)	JA-71-10-71

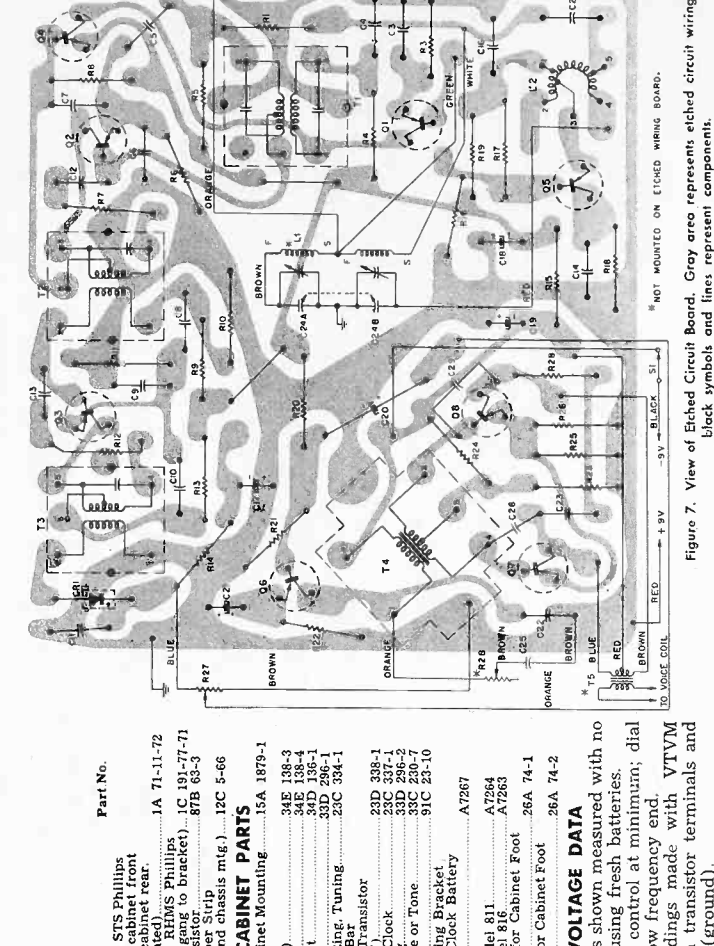
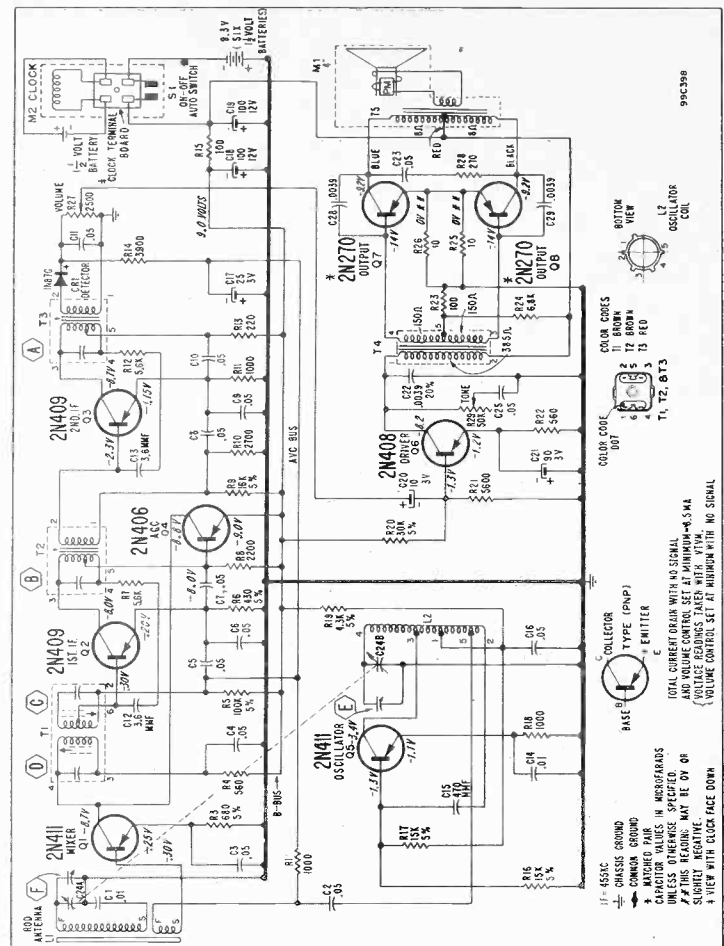


Figure 7. View of Etched Circuit Board. Gray area represents etched circuit wiring, black symbols and lines represent components.

8T1 CHASSIS

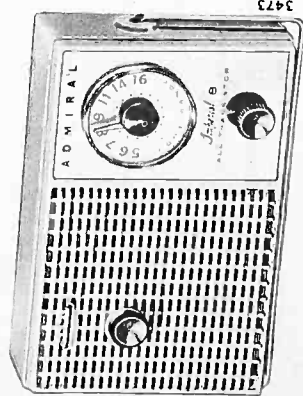


Figure 1. Front View of Cabinet.

SPECIFICATIONS

- ANTENNA:** Built-in Ferro-Scope (ferrite bar).
- CIRCUIT:** Superheterodyne using eight PNP type transistors and one germanium diode.
- FREQUENCY RANGE:** Standard broadcast band: 535 to 1620 KC.
- INTERMEDIATE FREQUENCY:** 455 KC.
- POWER SUPPLY:** Four 1½ volts, "AA" size, pen-light flashlight batteries.
- SPEAKER:** 2¾" PM with Alnico V magnet. Voice coil impedance, 12 ohms.

BATTERY INFORMATION AND REPLACEMENT

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, check first to see which type battery holder is used.

In a few early production sets the batteries are placed in an open sided plastic holder and held on the board by clips (battery contacts), plus projections on the bottom of the holder that go through the board to prevent reversing the batteries in the circuit. See figure 2.

In later production sets the battery holder is a closed tube with end caps. The right cap (from rear)

NOTE: For information on etched wiring and transistors, refer to Admiral Service Manual No. S559 and "Admiral Service Information For Transistors" No. S586.

TRANSISTOR POCKET PORTABLE

MODEL	COLOR	CHASSIS
711	BLACK-WHITE	8T1
717	TAN-WHITE	

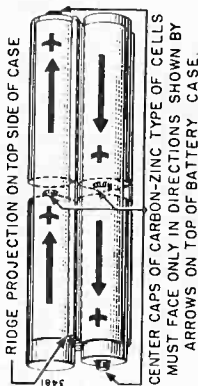


Figure 2. Early Production Battery Holder, Showing Ordinary Batteries in Correct Positions.

is permanently attached to the board. The tube (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. See figure 4 showing method of removing this type battery holder.

WARNING: IMPROPERLY INSTALLED BATTERIES CAN DAMAGE THE RADIO.

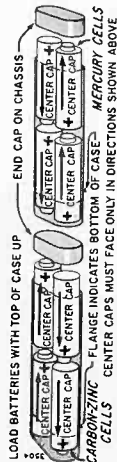


Figure 3. Later Production Battery Holder Showing Ordinary and Mercury Type Batteries in Correct Positions.

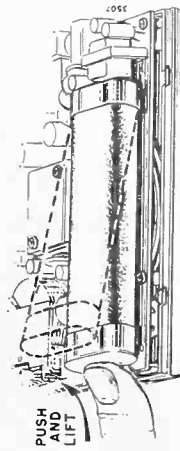


Figure 4. View Showing Method of Removing Later Type Battery Holder From Chassis Board.

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

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

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

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

PENLIGHT BATTERIES

- CARBON-ZINC BATTERIES**
 - Burgess Z General 900
 - Eveready 915 Ray-O-Vac R7 or 7LP
- MERCURY BATTERIES**
 - Eveready E502 Mallory RM502R

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, 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.

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

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

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

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

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

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

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

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ALIGNMENT PROCEDURE

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

a. Fresh batteries should be used.

b. Set Volume control at maximum.

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

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

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	Radiated Signal. 1 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	* A, B and C for maximum output.
2	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	D 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	E 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	F 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 A, B and C 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 E 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.

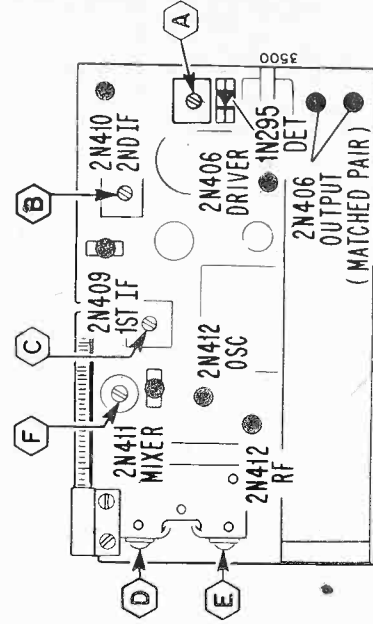


Figure 5. Transistors and Alignment Locations.

CHASSIS 8T1
MODELS 711 • 717

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.

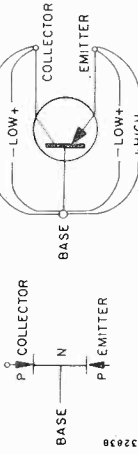


Figure 8A. Germanium Diode Equivalent.

Figure 8B. Ohmmeter Test of Transistor.

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 8A.

Figure 8B illustrates the relative resistances for PNP type transistors used in this set. The polarity signs shown in the illustration indicate the polarity

CLEANING CABINET

To clean the cabinet use a mild solution of soap or detergent and lukewarm water. Apply the solution with a soft tag or sponge. Squeeze out liquid thoroughly before applying; to avoid any excess water from coming in contact with any of the electrical parts. Wipe with a damp cloth, and then wipe dry with a dry cloth.

Caution: Never use carbon tetrachloride, acetone, naphtha, alcohol, gasoline, or any commercial cleaning fluids for cleaning the cabinet.

PARTS LIST

Sym	Description	Part No.
52	Lock Washers	688 39-3
	Washer for Reg. S2	688 39-4
	Nut for Reg. S2	688 39-5
	Washer for Reg. S2	688 39-6
	Washer for Reg. S2	688 39-7
	Washer for Reg. S2	688 39-8
	Washer for Reg. S2	688 39-9
	Washer for Reg. S2	688 39-10
	Washer for Reg. S2	688 39-11
	Washer for Reg. S2	688 39-12
	Washer for Reg. S2	688 39-13
	Washer for Reg. S2	688 39-14
	Washer for Reg. S2	688 39-15
	Washer for Reg. S2	688 39-16
	Washer for Reg. S2	688 39-17
	Washer for Reg. S2	688 39-18
	Washer for Reg. S2	688 39-19
	Washer for Reg. S2	688 39-20
	Washer for Reg. S2	688 39-21
	Washer for Reg. S2	688 39-22
	Washer for Reg. S2	688 39-23
	Washer for Reg. S2	688 39-24
	Washer for Reg. S2	688 39-25
	Washer for Reg. S2	688 39-26
	Washer for Reg. S2	688 39-27
	Washer for Reg. S2	688 39-28
	Washer for Reg. S2	688 39-29
	Washer for Reg. S2	688 39-30
	Washer for Reg. S2	688 39-31
	Washer for Reg. S2	688 39-32
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	Washer for Reg. S2	688 39-35
	Washer for Reg. S2	688 39-36
	Washer for Reg. S2	688 39-37
	Washer for Reg. S2	688 39-38
	Washer for Reg. S2	688 39-39
	Washer for Reg. S2	688 39-40
	Washer for Reg. S2	688 39-41
	Washer for Reg. S2	688 39-42
	Washer for Reg. S2	688 39-43
	Washer for Reg. S2	688 39-44
	Washer for Reg. S2	688 39-45
	Washer for Reg. S2	688 39-46
	Washer for Reg. S2	688 39-47
	Washer for Reg. S2	688 39-48
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	Washer for Reg. S2	688 39-74
	Washer for Reg. S2	688 39-75
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	Washer for Reg. S2	688 39-88
	Washer for Reg. S2	688 39-89
	Washer for Reg. S2	688 39-90
	Washer for Reg. S2	688 39-91
	Washer for Reg. S2	688 39-92
	Washer for Reg. S2	688 39-93
	Washer for Reg. S2	688 39-94
	Washer for Reg. S2	688 39-95
	Washer for Reg. S2	688 39-96
	Washer for Reg. S2	688 39-97
	Washer for Reg. S2	688 39-98
	Washer for Reg. S2	688 39-99
	Washer for Reg. S2	688 39-100

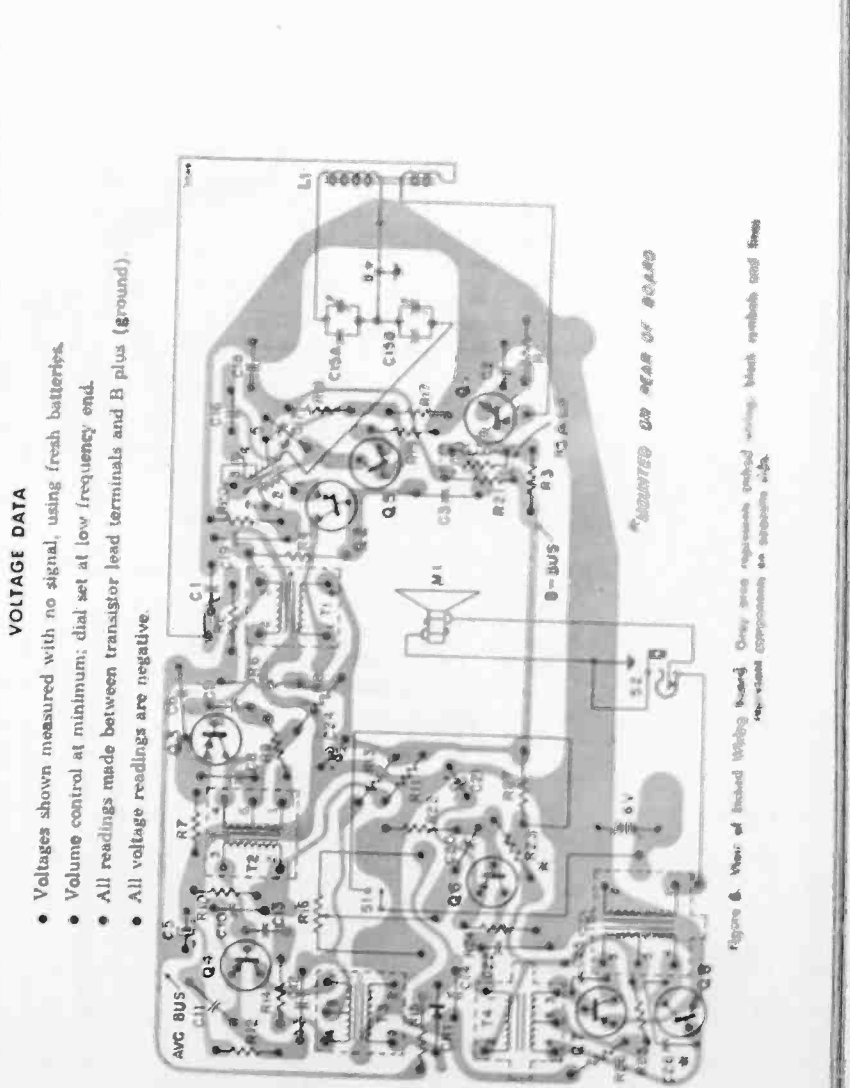
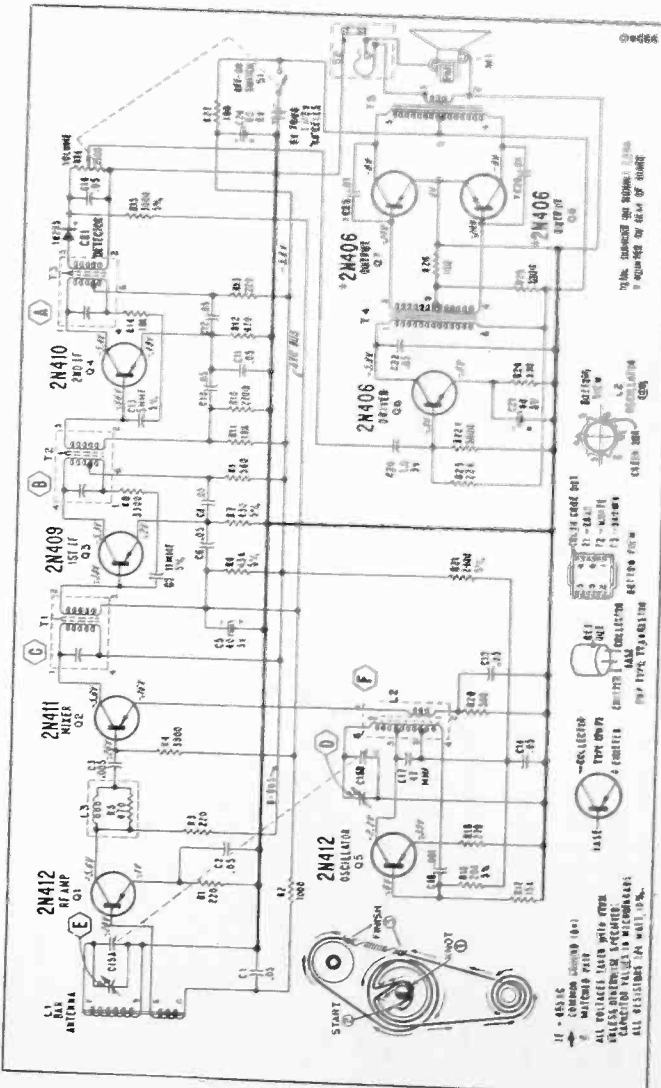


Figure 7 Top View of Chassis Showing Form Locations

Figure 8 View of Finished Wiring Board. Only areas representing pickup wiring; black symbols and lines represent components as shown in 26-14.

CHASSIS 8S1
MODELS 561 • 566

8S1 CHASSIS

Note: Refer to Admiral Service Manual No. 5559 for service and repair information of printed circuit wiring.

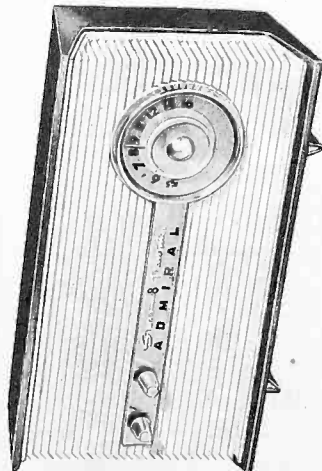


Figure 1. Front View of Cabinet.

SPECIFICATIONS

CIRCUIT: Superheterodyne using eight transistors and one germanium diode.

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

INTERMEDIATE FREQUENCY: 455 KC.

POWER SUPPLY: This receiver is operated from power supplied by six 1½ volts, "C" size, flashlight batteries.

ANTENNA: Built-In Ferro-Scope (iron core).

SPEAKER: 4" PM with Alnico V magnet. Voice coil impedance, 3.2 ohms.

BATTERY INFORMATION AND REPLACEMENT

Batteries are easily replaced by removing the battery case from the cabinet. The battery case access door is on the bottom of the cabinet and has a gold push-button on one end of the door. To remove the battery case from the cabinet, tip the cabinet on its back and slide push-button toward center of access door. First, pull button-end of access door slightly open so that flanges on opposite end of door will be free of projection on cabinet. Then pull door straight away from cabinet. Battery case is fastened to access door and should be removed from bottom of cabinet and set on the table. See figure 2. Use caution when removing case to prevent undue strain on the two wire leads connected to battery case. Although these two wires can be easily disconnected from the snaps on the battery case, it is not necessary to disconnect them to replace batteries. Open case lid with clamps at top edge of case and remove lid.

TRANSISTOR TABLE RADIO

MODEL	COLOR	CHASSIS
561	BLACK	8S1
566	GOLD	8S1

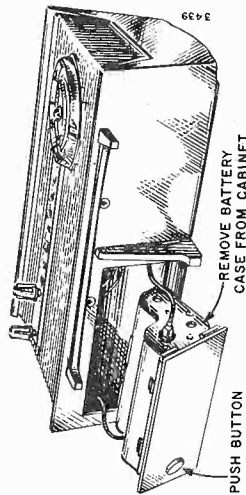


Figure 2. Removing Battery Case.

IMPORTANT: Install "C" size batteries exactly as shown with center caps facing in directions of arrows on case. If any battery is reversed, radio will not operate correctly or may not operate at all. When installing batteries, refer to figure 3 or the diagram on the bottom of the cabinet, to make sure the batteries have been installed correctly. If radio does not play or sounds weak, noisy and distorted after installing new batteries, turn off set immediately and check for improper battery installation.

Remove batteries from battery case and load new batteries in positions shown in illustration (figure 3). Case holds 6 "C" size batteries. Make certain all center caps face in positions shown. Arrows and + marks are etched onto the inside of the battery case. These arrows indicate the directions that the battery center caps should face when the "C" size batteries are loaded into the battery case.

Replace lid on battery case, being sure that lid has snapped tight onto case. Slide battery case straight into cabinet, making sure flanges on edge of access door fit into projection on opening in cabinet. Position access door flush with cabinet and slide push-button to fasten door to cabinet.

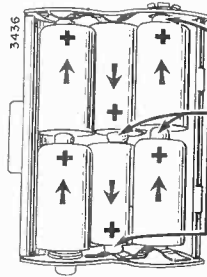


Figure 3. Battery Case Showing Batteries in Correct Position.

"C" size batteries with manufacturers identification are listed below. Any equivalent substitute may be used.

Burgess 1 General 914
Eveready 935 Ray-O-Vac 1LP

Under normal operating conditions, battery life may be in excess of 900 hours.

Weak batteries will cause weak, muffled or distorted reception. In addition, weak batteries can become corroded and develop leaks causing damage to metal parts. Replace batteries immediately if radio develops any of above symptoms.

REMOVING CHASSIS

1. Remove 2 screws near front edge of cabinet bottom.
2. Remove 2 screws from upper section of cabinet back.
3. Pull chassis and front panel free of cabinet.

The speaker, volume and tone control, and printed chassis board are all fastened separately with screws to the front panel. Remove them individually as required by removing their mounting screws.

CIRCUIT DESCRIPTION

Stage Function:

This receiver uses 8 PNP type transistors and a germanium diode. Frequency conversion is accomplished by mixer Q₁ and oscillator stage Q₂. Q₂ and Q₃ are the 1st and 2nd IF stages. CR₁, a germanium diode, functions as the 2nd detector. An audio driver stage Q₄ drives the push pull Class B operated output amplifier.

AVC Circuit Description

AVC is accomplished by 2 methods. The primary AVC action is conventional utilizing the detected signal voltage across the volume control R₂₇ and applying it through a filter network consisting of R₁₇, C₁₇ and R₁ to the base of mixer Q₁ and 1st IF amplifier Q₂. Since this voltage is positive and proportional to the strength of the received signals, the collector current (and therefore gain) of these two stages decreases in proportion to the strength of the received signals.

To produce a more uniform AVC characteristic, particularly on stronger signals, an additional transistor Q₄ is used in an "auxiliary" AVC circuit. The collector and emitter of this transistor is effectively connected across the primary of the 1st IF transformer T₁. With little or no signal the base of Q₄ is biased so that it does not conduct. Under these conditions it has little effect on the circuit. However, with stronger signals the collector current of Q₄ decreases due to the primary AVC action described earlier. As a result, the voltage drop across R₈ decreases causing the base bias of Q₄ to change in the conducting direction (becomes more negative). If the signal level is high enough, the base bias of Q₄ changes sufficiently causing emitter collector current flow. Q₄ then is in effect a very low impedance short across the primary of T₁. Thus the gain of Q₁ is further reduced, eliminating the possibility of "strong signal overload".

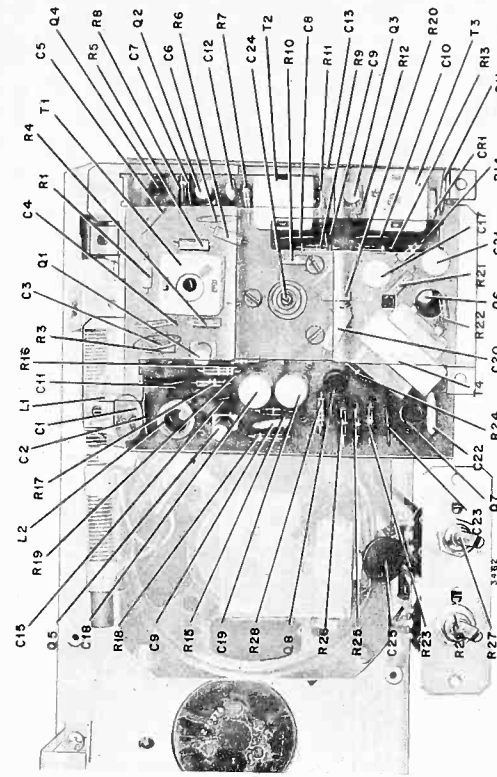


Figure 4. Top View of Chassis Showing Parts Location.

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CHASSIS 8S1

ALIGNMENT PROCEDURE

Alignment procedure of the 8S1 chassis is similar to alignment procedure of an ordinary vacuum-tube radio. However, there is somewhat more interaction between circuits, thus requiring greater care in the setting of the adjustments as well as repetition of some of the steps. For best results, follow the alignment procedure exactly as given below.

- a. Fresh batteries should be used.
- b. Set Volume control at maximum.
- c. Connect output meter across speaker voice coil.
- d. During alignment, output level should be held at 25 mw. or less. The voltage reading at 25 mw. level is .28 volts across the 3.2 ohm voice coil.
- e. Use a non-metallic alignment tool for IF adjustments.

Step	Connection of Signal Generator	Signal Gen. Frequency	Receiver Gang Setting	Adjustment Description	Adjustment
1	† Couple radiated signal through several turns of wire or place "hot" lead near antenna.	455 KC	Gang fully open	3rd IF 2nd IF 1st IF	* (A), (B), (C) and (D) for maximum output.
2	Repeat "Step 1".				
3	Same as "Step 1".	1620 KC	Gang fully open	Oscillator Trimmer	(E) for maximum output.
4	Same as "Step 1".	§ 1400 KC	Tune in on generator signal	Antenna Trimmer	(F) for maximum output.
5	Repeat "Step 3".				
6	Repeat "Step 4".				

† If signal generator does not produce sufficient output for usable reading, clip hot lead of generator to mixer stator plates of gang; clip ground lead to frame of gang.

* If difficulty is experienced in obtaining signal output, first rotate IF slug out several turns, then slowly adjust slug in until peak is reached. To align I1, rotate IF slugs out. Then, rotate inward until first peak is reached. A second (false) peak can be obtained by rotating slugs too far inward. Undesirable changes in gain and bandwidth are caused by tuning to the second peak. Adjustments (A), (B) and (C) are made from foil side of wiring board.

§ Antenna trimmer (F) should first be adjusted for maximum output with generator tuned to 1400 KC. Then try to increase output by rocking signal generator slightly while readjusting trimmer (F).

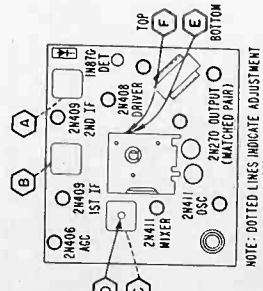


Figure 5. Transistor and Alignment Locations.

PARTS LIST

Sym.	Description	Part No.
R1	1,000 ohms, 1/2 watt	60B 8-102
R2	5,600 ohms, 1/2 watt	60B 8-561
R3	5,600 ohms, 1/2 watt	60B 8-561
R4	100,000 ohms, 1/2 watt	60B 8-100
R5	100,000 ohms, 1/2 watt	60B 8-100
R6	430 ohms, 1/2 watt	60B 7-104
R7	5,600 ohms, 1/2 watt	60B 8-562
R8	2,200 ohms, 1/2 watt	60B 8-222
R9	16,000 ohms, 1/2 watt	60B 7-165
R10	2,700 ohms, 1/2 watt	60B 8-272
R11	1,000 ohms, 1/2 watt	60B 8-102
R12	5,600 ohms, 1/2 watt	60B 8-562
R13	5,600 ohms, 1/2 watt	60B 8-561
R14	330 ohms, 1/2 watt	60B 8-330
R15	100 ohms, 1/2 watt	60B 8-101

Sym.	Description	Part No.	Sym.	Description	Part No.
R16	15,000 ohms, 1/2 watt	60B 7-153	C17	25 mf, 3 volts, electrolytic	67B 32-13
R17	15,000 ohms, 1/2 watt	60B 7-153	C18	100 mf, 12 volts, electrolytic	67B 32-6
R18	1,000 ohms, 1/2 watt	60B 8-102	C19	100 mf, 12 volts, electrolytic	67B 32-6
R19	4,300 ohms, 1/2 watt	60B 7-432	C20	10 mf, 3 volts, electrolytic	67B 35-6
R20	30,000 ohms, 1/2 watt	60B 7-303	C21	90 electrolytic	67B 35-6
R21	5,600 ohms, 1/2 watt	60B 8-562	C22	.0039 mf, 50 volts, cer. disc	67B32-10
R22	560 ohms, 1/2 watt	60B 8-561	C23	275 mf, 30 volts, ceramic	65B 45-14
R23	6,800 ohms, 1/2 watt	60B 8-101	C24	275 mf, 30 volts, ceramic	65B 45-6
R24	6,800 ohms, 1/2 watt	60B 8-101	C25	102.1 mf, max. exc. } gang	68B 66-10
R25	10 ohms, 1/2 watt	60B 8-100	C26	.0039 mf, 50 volts, cer. disc	65B 45-14
R26	10 ohms, 1/2 watt	60B 8-100	C27	.0039 mf, 50 volts, cer. disc	65B 45-14
R27	2,500 ohms, Volume control	60B 1-124			
R28	270 vol (includes switch S1) 75D	60B 8-271			
R29	50,000 ohms, Tone control	75D 1-123			

CAPACITORS

Sym.	Description	Part No.
C1	.01 mf, cer. disc	65D 10-41
C2	.05 mf, 30 volts, ceramic	65B 45-6
C3	.05 mf, 30 volts, ceramic	65B 45-6
C4	.05 mf, 30 volts, ceramic	65B 45-6
C5	.05 mf, 30 volts, ceramic	65B 45-6
C6	.05 mf, 30 volts, ceramic	65B 45-6
C7	.05 mf, 30 volts, ceramic	65B 45-6
C8	.05 mf, 30 volts, ceramic	65B 45-6
C9	.05 mf, 30 volts, ceramic	65B 45-6
C10	.05 mf, 30 volts, ceramic	65B 45-6
C11	.05 mf, 30 volts, ceramic	65B 45-6
C12	3.6 mmf, 500 volts, NFO temp. coef.	65D 6-190
C13	3.6 mmf, 500 volts, NFO temp. coef.	65D 6-190
C14	.01 mf, 600 volts, cer. disc	65D 10-41
C15	470 mmf, 500 volts, cer. disc	65D 10-20
C16	.05 mf, 30 volts, ceramic	65B 45-6

COILS, TRANSFORMERS, ETC.

Sym.	Description	Part No.
L1	Antenna, Rod	69B 225-4
L2	Oscillator Coil	69B 222-2
T1	Transformer, 1st IF	72C 189-1
T2	Transformer, 2nd IF	72C 190-1
T3	Transformer, Driver	79B 76-2
T4	Transformer, Output	Part of M1
M1	Speaker, 4" PM (includes output transformer T5)	78C 156
S1	Switch, On-Off	Part of R27

MISCELLANEOUS PARTS

Sym.	Description	Part No.
Battery Case Cover		15C 1863-1
Bracket, Mounting (for Volume and Tone Control)		15A 1884-1
Bracket, Gang Support		15A 1903-1
Clamp, Antenna (plastic)		11A 12-5
Nut, Hex, 3/8-32 (mounts Volume or Tone Control)		2A 2-69-71

8S1

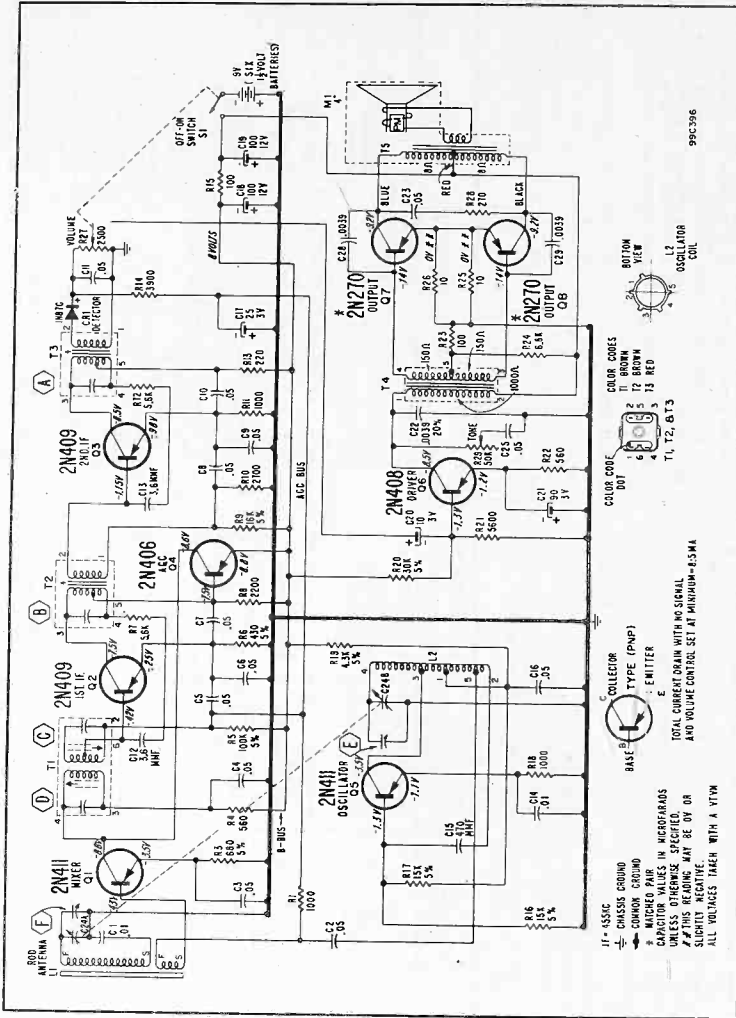


Figure 6. View of Printed Wiring Board. Gray area represents printed wiring, black symbols and lines represent components.

Part No.

- Screws: 1/4 STS Phillips (mounts speaker and vol. control) 1A 71-8-71
- #6-32x5/16 BHMS (mounts cabinet net iron assembly to cabinet) C 191-500-72
- #6-32x3/4 STS Phillips (mounts cabinet mounting bracket to cabinet front) 1A 71-10-71
- #6-32x7/16 STS Phillips (mounts cabinet rear) 1A 71-11-72
- Brass plated: 1A 71-11-72
- Socket-mounts gang to bracket) C 191-77-71
- Sponge Rubber Strip 87B 80-9
- (antenna and chassis mtg.) 12C 5-66

CABINET PARTS

Sym.	Description	Part No.
Bracket, Cabinet Mounting		15A 1879-1
Cabinet		34E 138-1
Black		34D 137-1
Cabinet, Front		23C 334-1
Escutcheon, Ring		23D 335-1
Knob, Tuning		33D 296-1
Knob, Vernier		33D 296-2
Battery Case		A7256
Gold, Model 561		A7257

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).

MODEL 55
"ALL-AMERICAN"
CHASSIS 120457

(AN ADDENDUM SERVICE NOTE FOR MODEL 555V WILL BE ISSUED SHORTLY.)

SPECIFICATIONS

TYPE: All-transistor superheterodyne (battery operated)

FREQUENCY RANGE: 540-1620 KC

TYPE OF TRANSISTORS AND CRYSTAL:

- Q-1 - PNP Converter
- Q-2 - PNP 1st IF Amplifier
- Q-3 - PNP 2nd IF Amplifier
- Q-4 - PNP Audio Output
- X-1 - Diode detector and A.V.C.

POWER SUPPLY

Four 1½-volt leakproof penlight batteries, Size "A-A", RAY-O-VAC #7LP, EVEREADY #915, #1015, or equivalent. For extra long life, use mercury cells: EVEREADY #E9 or MALLORY ZM-9, or equivalent.

AVERAGE CURRENT DRAIN:

20ma

GENERAL DESCRIPTION

The 555 "ALL-AMERICAN" is an all-transistor, pocket-size radio, using four (4) transistors, one (1) crystal diode, and requiring only a six-volt battery supply. A reflex-type amplifier circuit is employed.

All components are mounted on a single etched printed circuit board which becomes easily accessible for repair by removal of one cabinet-mounting screw.

This set is equipped with a built-in ferrite bar-loop directional antenna, personal listening attachment jack, and is enclosed in a "NEVABREAK" cabinet. It is recommended that the batteries be removed as soon as they are exhausted or if the set is not to be operated for a few months or more. Make certain that the on-off switch is left in the "off" position. Also, make certain that the radio is not placed close to a hot radiator or in an enclosed warm area such as the rear window shelf in an automobile. High degrees of heat may cause damage.

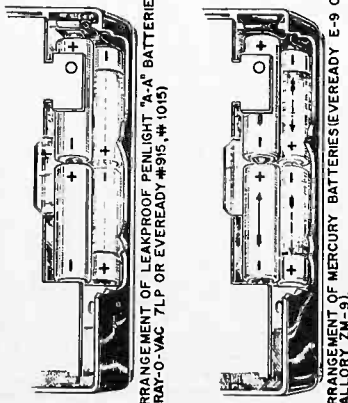
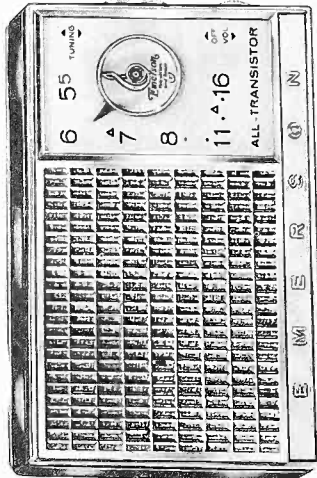


FIG. 1 - BATTERY REMOVAL



MODEL 555
"ALL-AMERICAN"

DISASSEMBLY INSTRUCTIONS

TO REPLACE BATTERIES:

1. Insert coin into slot located at bottom of cabinet, and twist to remove cabinet back.
2. Pry up top row of batteries with fingers.
3. Remove plastic battery holder by grasping tab and lifting upward.

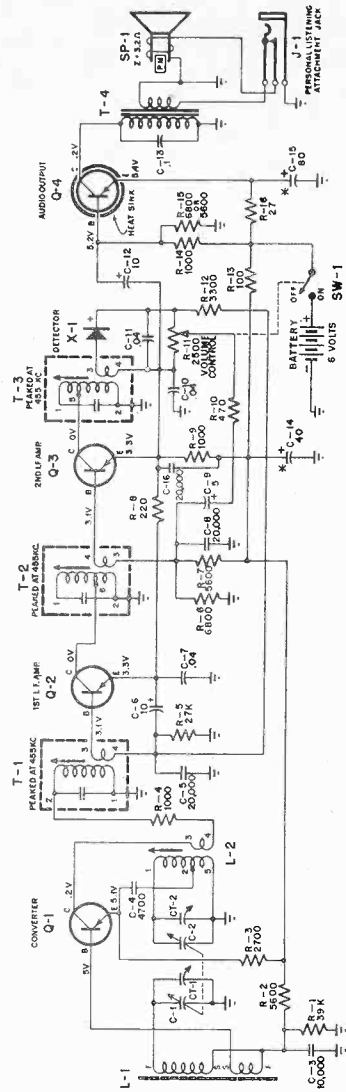
TO REMOVE CHASSIS

1. Remove back of cabinet. (Step 1, above.)
2. Place chassis so that end of board with Phillips head screw is on the right. Remove this screw only.
3. Lift right side carefully and pull chassis out toward the right.

Reverse procedure to reassemble.

SERVICING OF PRINTED BOARDS

To remove defective components one of several methods may be used. A recommended method is to cut close to the body of the defective component and solder the new part to the remaining leads. Another method is to apply heat at the junction point of the component wire lead and the printed board and lift out the component. If the wire lead is bent over, first heat and pry lead wire up. A defective component with many terminals may be removed by clipping into several parts and removing a small section at a time. Use a low wattage (20 to 30 watts) soldering iron. Be careful not to apply excessive heat since this may cause the printed foil to loosen. Broken foil leads may be repaired by soldering a hookup wire across the break. A small stiff bristled brush should be used to wipe away melted solder before it has a chance to accumulate or drip on adjacent parts or printed wiring.



* SIGNIFIES CERAMIC OR MICA CAPACITORS; CAPACITY IN MICROFARADS.
 † SIGNIFIES TUBULAR CAPACITORS; CAPACITY IN MICROFARADS.
 ‡ RESISTORS ARE IN OHMS (K=1000 OHMS) AND/OR WATT.
 NOTE: THE FOLLOWING TRANSISTOR COMBINATIONS MUST BE OBSERVED:
 A. Q-1 - PT. NO. 9000A, Q-2 - PT. NO. 9000A, Q-3 - PT. NO. 9000A, X-1 - PT. NO. 9000A, R-15 - 6800 OHM.
 B. Q-1 - PT. NO. 9000A, Q-2 - PT. NO. 9000A, Q-3 - PT. NO. 9000A, X-1 - PT. NO. 9000A, R-15 - 6800 OHM.
 C. Q-1 - PT. NO. 9000A, Q-2 - PT. NO. 9000A, Q-3 - PT. NO. 9000A, X-1 - PT. NO. 9000A, R-15 - 6800 OHM.
 * C-14 AND C-15 MAY BE INDIVIDUAL COMPONENTS WITH VALUES OF 40 MFD AND 100 MFD, RESPECTIVELY.

CHASSIS NO. 120457

SCHEMATIC, RADIO CHASSIS 120457

CONDITIONS FOR VOLTAGE READINGS

variation of ±15% in readings.

1. Voltages indicated on the schematic are positive D.C.
2. Measurements taken with V.T.V.M.
3. All measurements taken between points and chassis ground.
4. Measurement conditions:
 (a) Fresh 6 volt battery supply. NOTE: Should Mercury batteries be used, an approx. 15% lower voltage reading will be obtained which is considered to be normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.
 (b) Volume control set for maximum volume.
 (c) Variable capacitor fully closed and no signal applied.

NOTE: No resistance readings are given because of the possibility of applying excessive voltage to the transistor or to the capacitors during such a test. In addition, readings are not reliable since they depend upon the internal battery of meter.

ALIGNMENT INSTRUCTIONS

CONDITIONS:

1. Volume control - at maximum
2. Signal generator - 30% audio modulated.
3. Use an insulated alignment tool for adjustment.

COUPLING	SIGNAL GENERATOR		RADIO DIAL SETTING	OUTPUT METER CONNECTION	ADJUSTMENTS	REMARKS
	couple gen. thru .1 mfd cap. to junction of L1 & C1	FREQUENCY				
*couple loosely	455 KC (modulated)	tuning cap. fully opened	across voice coil	T-3, T-2, T-1 (in given order)	adjust for maximum output	adjust for maximum output
*couple loosely	1638 KC (modulated)	tuning cap. fully opened	across voice coil	CT-2 osc. trimmer	adjust for maximum output	adjust for maximum output
*couple loosely	1450KC (modulated)	tune for maximum output	across voice coil	CT-1 Ant. trimmer	adjust for maximum output	adjust for maximum output
*couple loosely	600KC (modulated)	tune for maximum output	across voice coil	padder slug in osc. L-2	rock the variable cap. each side of 600KC while adjusting osc. slug for maximum response	rock the variable cap. each side of 600KC while adjusting osc. slug for maximum response
*couple loosely	1638KC (modulated)	tuning cap. fully opened	across voice coil	CT-2 osc. trimmer	adjust for maximum output	adjust for maximum output

NOTE: *Loose coupling to set can be achieved by placing generator leads near bar-loop antenna. For optimum results, repeat entire alignment procedure.

CHASSIS 120457

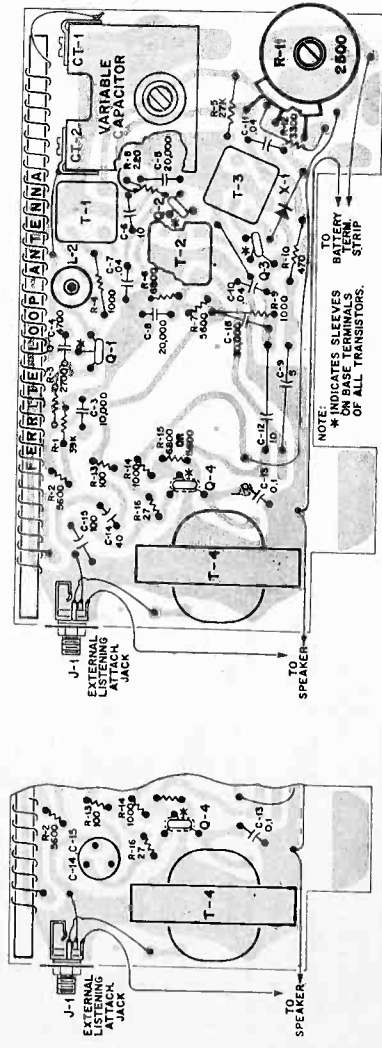


FIG. 2 - (A) TOP (B) BOTTOM VIEWS, ETCHED PRINTED CIRCUIT CHASSIS 120457

SERVICING THE ALL-TRANSISTOR RECEIVER

Since the failure rate of a transistor is far less than that of a receiving type tube, the transistor itself should be the last item to suspect. Before inserting a new transistor, all components in the suspected circuit should be carefully checked. Voltage measurements, signal tracing and signal injection methods of trouble shooting should be used. Resistance testing methods have severe limitations when applied to transistor circuits; consequently, they are not recommended. Should it become necessary to use resistance measurements, it is recommended to unsolder one terminal (of the suspected component) from the etched board before checking. When replacing transistors or components soldered to transistor leads, use extreme care as too much heat to the transistor leads cause damage to the transistor. The recommended method would be to grip the transistor lead between the etched board and the transistor body with long nose pliers before applying heat. A great deal of the heat will be absorbed by the pliers, thus protecting the transistor. As added precaution, use a small-tipped low-wattage (approx. 35 watts) soldering iron.

Should careful checking of all circuit components fail to reveal the defect, replace suspected transistor. If you do not have a replacement transistor available, then some form of transistor checking will become necessary. Inexpensive transistor checkers are now commercially available. If a transistor checker is not available, the following approximate resistance method may be used after the suspected transistor is unsoldered from the etched circuit board (use long-nose pliers to absorb some heat).

V. T. V. M. OHMMETER CHECK OF TRANSISTORS

An approximate check of the transistors may be made with a vacuum tube type of ohmmeter. They are checked as two separate crystal diodes might be checked, that is, by measuring the forward and inverse resistance of each section individually. Figure No. 3 shows the method of testing P-N-P types of transistors used in this receiver.

When the negative terminal of the ohmmeter (set on R x 10 scale) is connected to the base (B) terminal of a good PNP transistor and the positive terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a low resistance (in the order of 500 ohms or less).

When the positive terminal of the ohmmeter is connected to the base (B) terminal of a good PNP transistor and the negative terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a high inverse resistance in the order of 50K ohms or higher.

In the event your results are opposite from these, it is possible that the plus side of your meter is actually connected to the negative side of its internal battery.

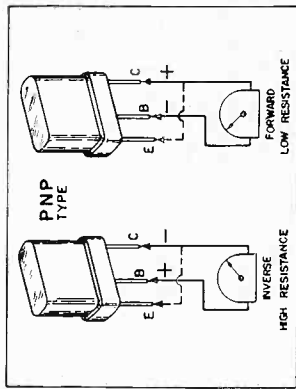


FIG. 3 - PNP TYPE TRANSISTORS

Use only a vacuum tube type of ohmmeter. The R x 10 scale must be used for all forward (low) resistance measurements. Do not use the R x 1 scale as this might damage the transistor. A shunt type ohmmeter should not be used. If in doubt as to the type of vacuum tube ohmmeter you have, place a 1,000 ohm resistor in series with it and sub-

CAUTION

tract this 1,000 ohms from the reading obtained. If these instructions are not followed, damage to the transistors may result since some non-electronic type of ohmmeters use high internal battery voltages.

CHASSIS PARTS LIST, CH. 120457

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
R-1	340872	39,000 OHM - CARBON ±10%	C-12	925467	10 MF - ELECTROLYTIC 3V.
R-2	340672	5,600 OHM - CARBON ±10%	C-13	923099	.1 MF - MYLAR ±40-20% 50V.
R-3	340592	2,700 OHM - CARBON ±10%	C-14	925466	40 MF - ELECTROLYTIC 10V.
R-4	340492	1,000 OHM - CARBON ±10%	Pt of C-14	80 MF - ELECTROLYTIC 10V.	
R-5	340832	27,000 OHM - CARBON ±10%	C-15	928988	20,000 MMF - CERAMIC GMV 30V.
R-6	340692	6,800 OHM - CARBON ±10%	Q-1	815041A or 815041B**	TRANSISTOR - CONVERTER
R-7	340672	5,600 OHM - CARBON ±10%	Q-2	815042B or 815042A**	TRANSISTOR - I.F. AMPLIFIER
R-8	340332	220 OHM - CARBON ±10%	Q-3	815043B or 815043A**	TRANSISTOR - REFLEX
R-9	340492	1,000 OHM - CARBON ±10%	Q-4	815044A or 815044B**	TRANSISTOR - AUDIO OUTPUT
R-10	340412	470 OHM - CARBON ±10%	X-1	817069	DIODE
R-11	390581 or 390584	2,500 OHM - VOLUME CONTROL	T-1	720342	1st I.F. TRANSFORMER
R-12	340612	3,300 OHM - CARBON ±10%	T-2	720343	2nd I.F. TRANSFORMER
R-13	350252	100 OHM - CARBON ±20%	T-3	720344	3rd I.F. TRANSFORMER
R-14	340492	1,000 OHM - CARBON ±10%	T-4	734179	AUDIO OUTPUT TRANSFORMER
R-15	340692 or 340672	6,800 OHM - CARBON ±10%	L-1	700145	BAR LOOP ANTENNA
R-16	340112	27 OHM - CARBON ±10%	L-2	716129	OSCILLATOR COIL
C-1	900186	VARIABLE CAPACITOR - R.F. SECTION	SP-1	180190	SPEAKER PM - 3"
CT-1	Pt of C-1	VARIABLE CAPACITOR - OSCILLATOR SECTION	SW-1	Pt of R-11	ON - OFF SWITCH ON VOLUME CONTROL
CT-2	Pt of C-1	TRIMMER - OSCILLATOR SECTION	J-1	508022	PERSONAL LISTENING ATTACHMENT JACK
C-3	928766	10,000 MMF - CERAMIC ±20% 30V.	NOTES:		
C-4	928767	4,700 MMF - CERAMIC ±20% 30V.	* Some sets use the following individually mounted components:		
C-5	928988	20,000 MMF - CERAMIC GMV 30V.	C14 - 925466A 40 MF ELECTROLYTIC 10 V.		
C-6	925464	10 MF - ELECTROLYTIC 3V.	C15 - 925466B 100 MF ELECTROLYTIC 10 V.		
C-7	923097	.04 MF - MYLAR ±40-20% 50V.	** Replace transistors with exact type (EX-815041A).		
C-8	928988	20,000 MMF - CERAMIC GMV 30V.			
C-9	925465	.04 MF - ELECTROLYTIC 3V.			
C-10	923097	.04 MF - MYLAR ±40-20% 50V.			
C-11	923097	.04 MF - MYLAR ±40-20% 50V.			

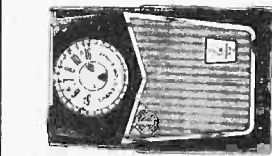
CABINET PARTS LIST, MODEL 555 'ALL AMERICAN'

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
962473	COMPLETE CABINET	413378	SPRING, BATTERY CONTACT
140962*	CABINET BODY (EBONY)*	461085	BATTERY CONTAINER
461081*	GRILLE RETAINER (EBONY)* (2)	461073	KNOB, TUNING (CLEAR)
461059	GRILLE FRONT (GOLD)	461072	KNOB, VOLUME, OFF-ON (CLEAR)
461050	GRILLE COVER (GOLD)	542282	SPRING, VOLUME KNOB
471153	BAFFLE GRILLE - CLOTH ASSEMBLY	962150	PERSONAL LISTENING ATTACHMENT
180190	SPEAKER, PM, 3"	962145	UNDERPILOW LISTENING ACCESSORIES
520270	DIAL PLATE (ALUM.)		
525082	POINTER		

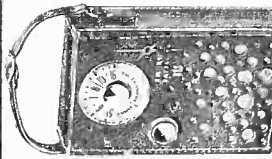
NOTE: *140962A Ivory B } Coral C } Charcoal D } Gold E } Turquoise
 *461081A Ivory B } Coral C } Charcoal D } Gold E } Turquoise

SERVICE NOTE

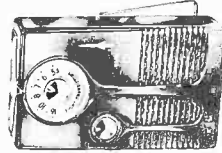
This note supersedes the Service Note covering the all-transistor portable Model 888 dated June 1957. The present issue contains basic 888 data and information pertinent to additional models and styles of the Model 888.



MODEL 888 (PIONEER)



SATELLITE



VANGUARD



MODEL 888

TYPE: All transistor superheterodyne battery portable.
 FREQUENCY RANGE: 540 - 1650 Kc.
 TYPES OF TRANSISTORS AND CRYSTAL:

- Q1 - PNP Converter
- Q2 - NPN 1st I.F. amplifier
- Q3 - NPN 2nd I.F. amplifier
- Q4 - PNP 3rd I.F. amplifier
- Q5 - NPN 1st audio amplifier
- Q6 - PNP 2nd audio amplifier

GENERAL INFORMATION

1. Basic Model 888 is an all-transistor portable which incorporates an etched circuit wiring board with a personal listening attachment jack. The circuit consists of eight transistors and one germanium diode powered by four penlight-type 1½ volt batteries. The nationally successful 120374 chassis is now available in additional, new and exciting models:

888 VANGUARD: utilizes the "Nevabreak" features of the original Model 888, also known as the Pioneer, in new cabinet styling. The tri-position handle that acts as an easel stand, carrying handle and which can fold away completely is retained.

888 VANGUARD DELUXE: similar to the 888 VANGUARD but is provided with a Listening Attachment.

888 SATELLITE: is contained in a genuine leather cabinet and uses a leather shoulder strap.

888 SATELLITE DELUXE: similar to the 888 SATELLITE but is provided with a Listening Attachment.

888 R (REMOTE): is a remote speaker housed in its own Ivory Cabinet and provided with a cable and plug for use with 888 models.

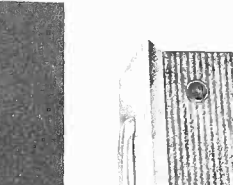
2. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.

3. The receiver has a self-contained bar loop antenna and does not require additional antenna or ground connection.

4. The self-contained bar loop antenna has directional properties. For maximum signal pickup on weak stations it is recommended that the set be rotated through a quarter of a circle, leaving it in the position which provides maximum volume.

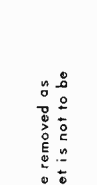
* For those who desire longer life cells, Mercury or Rechargeable (Nickel-Cadmium) batteries are available through your distributor. Mercury batteries are life rated at several times that of the penlight type. Recommended Mercury cells are Eveready E-9 or equivalent.

MODELS 888, 888R CHASSIS 120374



SCHEMATIC DIAGRAM, CHASSIS 120374

- CONDITIONS FOR VOLTAGE READINGS
1. Voltages indicated are positive D.C.
 2. Measurements taken with V.T.V.M.
 3. All measurements taken between points and chassis.
 4. Voltage measurements taken with:
 - (a) Fresh 6 Volt battery supply. Four 1½ Volt conventional penlight cells.
 - (b) Should Mercury or Nickel-Cadmium batteries be used, an approx. 13% lower voltage reading will be obtained from the battery supply which is considered to be perfectly normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.



BATTERY PACK LAYOUT SHOWN WITH POLARITIES FOR PENLIGHT AND RECHARGEABLE (NICKEL-CADMIUM) CELLS

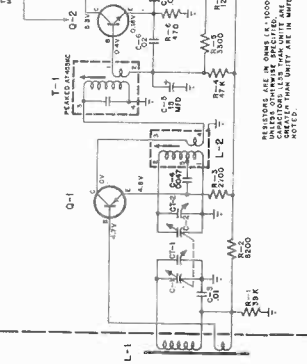
NOTE: MERCURY CELLS ARE PHYSICALLY REVERSED FROM ABOVE DRAWING BUT POLARITY REMAINS THE SAME.

ALIGNMENT INSTRUCTIONS

Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 .1 mfd.	High side to junction of L1 & C1. Low side to chassis.	455 K.C.	Tuning condenser fully open.	Across voice coil.	T2, T3 and T1	Adjust for maximum output starting with T3.
2	Use a loop set perpendicular and about 20" from center of bar loop ant. in set.	1650 K.C.	Tuning condenser fully open.	Across voice coil.	CT2 (Osc. trimmer)	Push loop of several turns of wire and radiate antenna loop of receiver. Adjust for maximum output.
3	"	1400 K.C.	Tune for maximum output.	Across voice coil.	CT1 (Ant. trimmer)	Adjust for maximum output.
4	"	600 K.C.	Tuning condenser set for 600 K.C.	Across voice coil.	Osc. slug in L-2	Rock the variable cond. each side of 600 KC while adj. osc. slug for maximum response.
5	"	1650 K.C.	Tuning condenser fully open.	"	CT2 Osc. trimmer	If readjustment is necessary repeat steps 2 to 4 until no further improvement is noted.

NOTE: For optimum results, repeat entire alignment procedure.



SCHEMATIC DIAGRAM, CHASSIS 120374

- CONDITIONS FOR VOLTAGE READINGS
1. Voltages indicated are positive D.C.
 2. Measurements taken with V.T.V.M.
 3. All measurements taken between points and chassis.
 4. Voltage measurements taken with:
 - (a) Fresh 6 Volt battery supply. Four 1½ Volt conventional penlight cells.
 - (b) Should Mercury or Nickel-Cadmium batteries be used, an approx. 13% lower voltage reading will be obtained from the battery supply which is considered to be perfectly normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.



BATTERY PACK LAYOUT SHOWN WITH POLARITIES FOR PENLIGHT AND RECHARGEABLE (NICKEL-CADMIUM) CELLS

NOTE: MERCURY CELLS ARE PHYSICALLY REVERSED FROM ABOVE DRAWING BUT POLARITY REMAINS THE SAME.

ALIGNMENT INSTRUCTIONS

Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.

DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 .1 mfd.	High side to junction of L1 & C1. Low side to chassis.	455 K.C.	Tuning condenser fully open.	Across voice coil.	T2, T3 and T1	Adjust for maximum output starting with T3.
2	Use a loop set perpendicular and about 20" from center of bar loop ant. in set.	1650 K.C.	Tuning condenser fully open.	Across voice coil.	CT2 (Osc. trimmer)	Push loop of several turns of wire and radiate antenna loop of receiver. Adjust for maximum output.
3	"	1400 K.C.	Tune for maximum output.	Across voice coil.	CT1 (Ant. trimmer)	Adjust for maximum output.
4	"	600 K.C.	Tuning condenser set for 600 K.C.	Across voice coil.	Osc. slug in L-2	Rock the variable cond. each side of 600 KC while adj. osc. slug for maximum response.
5	"	1650 K.C.	Tuning condenser fully open.	"	CT2 Osc. trimmer	If readjustment is necessary repeat steps 2 to 4 until no further improvement is noted.

NOTE: For optimum results, repeat entire alignment procedure.

CHASSIS 120374

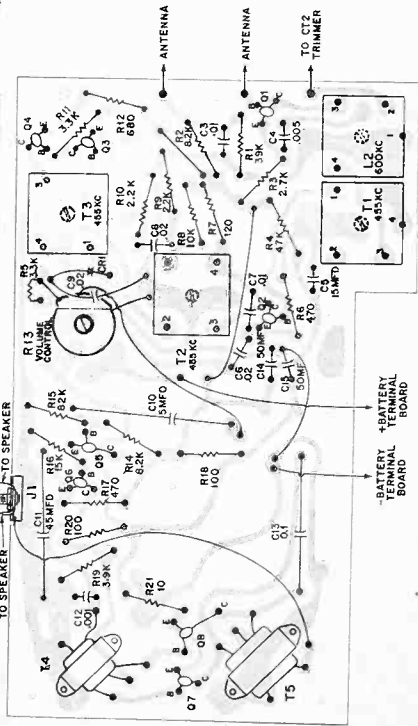


FIG. 3 - PRINTED CIRCUIT CHASSIS DIAGRAM

SERVICING ALL TRANSISTOR RECEIVERS

Two PNP matched transistors (pr. #815030) are used as a balanced push-pull class "B" audio output stage. This type of circuit yields greater audio output power at a much lower average battery drain. To optimize performance, these transistors are supplied as a matched pair. If one of these transistors becomes defective, replace both of them with a new matched pair. Should Q-2 or Q-3 NPN transistors be replaced be sure and follow the transistor combination as shown on schematic for best results.

Since the failure rate of a transistor is far less than that of a receiving type tube, the transistor itself should be the last item to suspect. Before inserting a new transistor, all components in the suspected circuit should be carefully checked. Voltage measurements, signal tracing and signal injection methods of trouble shooting should be used. Resistance testing methods have severe limitations when applied to transistor circuits; consequently, they are not recommended. Should it become necessary to use resistance measurements, it is recommended to unsolder one terminal (of the suspected component) from the etched board before checking. When replacing transistors or components soldered to transistor leads, use extreme care as too much heat to the transistor leads cause damage to the transistor. The recommended method would be to grip the transistor lead between the etched board and the transistor body with long nose pliers before applying heat. A great deal of the heat will be absorbed by the pliers, thus protecting the transistor. As added precaution, use a small-tipped low-wattage (approx. 35 watts) soldering iron.

Should careful checking of all circuit components fail to reveal the defect, replace suspected transistor. If you do not have a replacement transistor available, then some form of transistor checking will become necessary. Inexpensive transistor checkers are now commercially available. If a transistor checker is not available, the following approximate resistance method may be used after the suspected transistor is unsoldered from the etched circuit board (use long-nose pliers to absorb some heat).

ADDITIONAL TRANSISTOR REPLACEMENT INFORMATION

If will be seen from the schematic drawing of the 888 that certain transistors are used in pairs and are associated with specific resistors. Some individual transistors must likewise be used with specific resistors. This data and additional transistor substitution information is listed below for reference and convenience in ordering.

NOTES: 1—Because of the small physical size of the transistors, the last three digits, "815", have been replaced by the letter, "E" for Emerson. The "E" also signifies that these transistors have been made to our design tolerance.

2—To improve the operation of Q1, at the high end, a resistor 680K, $\pm 10\%$, $\frac{1}{2}W$, is added across pins 1 and 2 of L-2.

TRANSISTOR PAIRS ASSOCIATED		TRANSISTOR ASSOCIATED		TRANSISTOR ASSOCIATED	
Q2	Q3	Q2	Q3	R14	R14
815026B	815026A	815031	815032	3300	6800
815026C	815026D	815028	815033	8200	8200
815026B	815026D	815026F	815035	4700	10,000
TRANSISTOR SUBSTITUTES		TRANSISTOR		TRANSISTOR SUBSTITUTES	
FOR	USE	FOR	USE	FOR	USE
815026B	815026D	815033	02/Q3	815033	Q5
815026A	815026E	815034	Q5	815032	Q5
815026C	No Subst.	815031	Q5	815035	Q5

V. T. V. M. OHMMETER CHECK OF TRANSISTORS
An approximate check of the transistors may be made with a vacuum tube type ohmmeter. They are checked as two separate crystal diodes might be checked, that is, by measuring the forward and inverse resistance of each section individually. Figures No. 4 and No. 5 show the method of testing P-N-P and N-P-N types of transistors used in this receiver. When the negative terminal of the ohmmeter (set on R x 10 scale) is connected to the base (B) terminal of a good PNP transistor and the positive terminal of the meter is connected to the collector (C) or emitter (E) terminal of the ohmmeter, you should measure a low resistance (in the order of 500 ohms or less).

When the positive terminal of the ohmmeter is connected to the base (B) terminal of a good PNP transistor, and the negative terminal of the meter is connected to the collector (C) or emitter (E) terminal, you should measure a high inverse resistance in the order of 50K ohms or higher. In the event your results are opposite from these, it is possible that the plus side of your meter is actually connected to the negative side of its internal battery.

NPN type transistors are checked in a similar manner except the applied polarities from the ohmmeter are reversed (see figure no. 5) to give some inverse and forward resistance results.

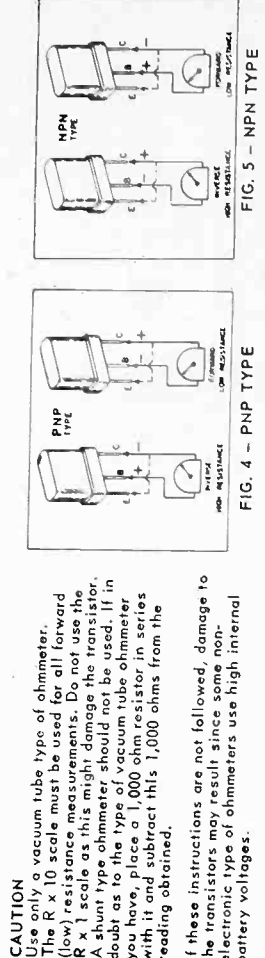


FIG. 4 - PNP TYPE

FIG. 5 - NPN TYPE

CAUTION
Use only a vacuum tube type of ohmmeter. The R x 10 scale must be used for all forward (low) resistance measurements. Do not use the R x 1 scale as this might damage the transistor. A shunt type ohmmeter should not be used. If in doubt as to the type of vacuum tube ohmmeter you have, place a 1,000 ohm resistor in series with it and subtract this 1,000 ohms from the reading obtained.
If these instructions are not followed, damage to the transistors may result, since some non-electronic type of ohmmeters use high internal battery voltages.

CHASSIS 120374 PARTS LIST

Symb.	Part No.	Description	List Price	Symb.	Part No.	Description	List Price
C-1	900172	Variable Capacitor, R. F. Section	3.45	R-15	340952	82,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14
CT-1	Pt. of C-1	Trimmer, R. F. Section		R-16	340772	15,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-2	Pt. of C-1	Variable Capacitor, Osc. Section		R-17	340412	470 OHM - Carbon $\pm 10\%$ 1/2W.	.14
CT-2	Pt. of C-1	Trimmer, Osc. Section		R-18	350252	3,900 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-3	928766	.01 MFD - Ceramic $\pm 20\%$ 30V.	.20	R-19	340632	100 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-4	928767	.0047 MFD - Electrolytic 3V.	.20	R-20	340252	100 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-5	925419	.15 MFD - Electrolytic 3V.	.70	R-21	340012	10 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-6	928138	.02 MFD - Ceramic GMV 30V.	.25	R-22	341172	580,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14
C-7	928758	.01 MFD - Ceramic GMV 30V.	.25	Q-1	815025	Transistor - Converter	P - N - P
C-8	928138	.02 MFD - Ceramic GMV 30V.	.25	Q-2	815026	Transistor - 1st I.F. Amplifier	P - N - P
C-9	928138	.02 MFD - Ceramic GMV 30V.	.25	Q-3	815026	Transistor - 2nd I.F. Amplifier	P - N - P
C-10	925420	5 MFD - Electrolytic 6V.	.70	Q-4	815027	Transistor - 3rd I.F. Amplifier	P - N - P
C-11	925421	45 MFD - Electrolytic 10V.	.70	Q-5	815028	Transistor - 1st Audio Amplifier	P - N - P
C-12	928919	.001 MFD - Ceramic $\pm 20\%$	.30	Q-6	815031	Transistor - 2nd Audio Amplifier	P - N - P
C-13	920795	.1 MFD - Paper $\pm 20\%$	.30	Q-7	815032	Transistor - P.P. Audio Output	P - N - P
C-14	925422	50 MFD - Electrolytic 10V.	1.25	Q-8	815030	Transistor - P.P. Audio Output	P - N - P
R-1	340872	39,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14	CR-1	817069	Crystal Diode	1.05
R-2	340712	8,200 OHM - Carbon $\pm 10\%$ 1/2W.	.14	L-1	700132	Barloop Antenna Oscillator Coil	1.55
R-3	340592	2,700 OHM - Carbon $\pm 10\%$ 1/2W.	.14	L-2	716118	Oscillator Coil	1.90
R-4	340892	47,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14	T-1	720302	1st I.F. Transformer	1.25
R-5	340612	3,300 OHM - Carbon $\pm 10\%$ 1/2W.	.14	T-2	720302	2nd I.F. Transformer	1.25
R-6	340612	3,300 OHM - Carbon $\pm 10\%$ 1/2W.	.14	T-3	720303	3rd I.F. Transformer	1.30
R-7	350272	120 OHM - Carbon $\pm 20\%$ 1/2W.	.14	T-4	734157	P.P. Input Transformer	2.10
R-8	340732	10,000 OHM - Carbon $\pm 10\%$ 1/2W.	.14	T-5	734158	P.P. Output Transformer	1.80
R-9	340572	2,200 OHM - Carbon $\pm 10\%$ 1/2W.	.14	J-1	508022	Etched Circuit Board (Less Comp.)	.65
R-10	340572	2,200 OHM - Carbon $\pm 10\%$ 1/2W.	.14	SP-1	180175	Speaker 3 1/2" PH	3.70
R-11	340612	3,300 OHM - Carbon $\pm 10\%$ 1/2W.	.14				
R-12	340452	680 OHM - Carbon $\pm 10\%$ 1/2W.	.14				
R-13	390494	2,500 OHM - Volume Control	1.05				
R-14	340712 or 340612	8,200 OHM - Carbon $\pm 10\%$ 1/2W.	.14				

: See Schematic Diagram

CABINET PARTS LIST. MODELS: 888 (PIONEER), SATELLITE, VANGUARD, 888R AND DELUXE VERSIONS**

PART NUMBERS		DESCRIPTION	
888 (Pioneer)	Satellite	888R	Vanguard
N.B. Plastic	N.B. Plastic	Ivory	N.B. Plastic
N.B. Plastic	N.B. Plastic	—	N.B. Plastic
280288*	280291†	280288*	280288*
—	545451†	412964A	412964A
—	412964A	—	—
413147	587003	587003	587003
576171	527000	527000	527000
587158	471100	471100	471100
630217	587158	587158	587158
—	630217	630217	630217

*Not supplied with replacement cabinet
†"NEVBREAK" Plastic
**Optional accessory (Factory supplied with Deluxe Set) see page 11

DESCRIPTION

888 (Pioneer) 888R

Satellite Vanguard 888R

604047A 604047A Dial Disc

460916 460916 Tuning Knob

265135 265135 Screw, Tuning Knob

413203 413203 Brass Inlay (tuning knob)

460535 460535 Emerson Scrip

604053 604053 Medallion (Emblem)

— — Volume Knob

180187 180187 Disc, Volume Knob

413245 413245 Speaker 16" x 9"

461000 461000 Card & Pig Assy

460916 460916 508315 Mameine Front

560816 560816 Listening Attachment

962150** 962150** Underpillow Listening Attachment

962145† 962145†

NOTE: ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

ADDENDUM TO SERVICE NOTE

This information should be considered as part of the service note for Model 999, using Chassis 120433B, issued May, 1958.

MODEL 999R
CHASSIS 120433R

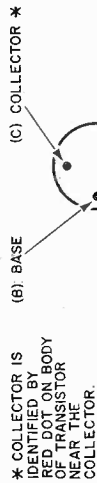
SPECIFICATIONS

TYPE: All-transistor superheterodyne (battery operated).
FREQUENCY RANGE: 530 - 1638KC
TYPE OF TRANSISTORS AND CRYSTAL:

- Q-1-PNP Converter
- Q-2-PNP 1st I.F. Amplifier
- Q-3-PNP 2nd I.F. Amplifier
- Q-4-PNP Audio Output
- X-1-Diode detector and A.V.C.

POWER SUPPLY:
One 9-volt battery, Eveready #216 or equivalent (for extra long life, use mercury battery: Eveready #146, or Mallory TR 146 R)

AVERAGE CURRENT DRAIN:
10.5 ma



GENERAL INFORMATION

MODEL 999R, using chassis 120433R, utilizes a reflex circuit.
A schematic, chassis parts list, and associated information are included in this service note.

For information concerning chassis alignment, disassembly, service procedures and cabinet parts list, refer to the service note for MODEL 999, using chassis 120433B, issued May, 1958, to which this is an addendum.

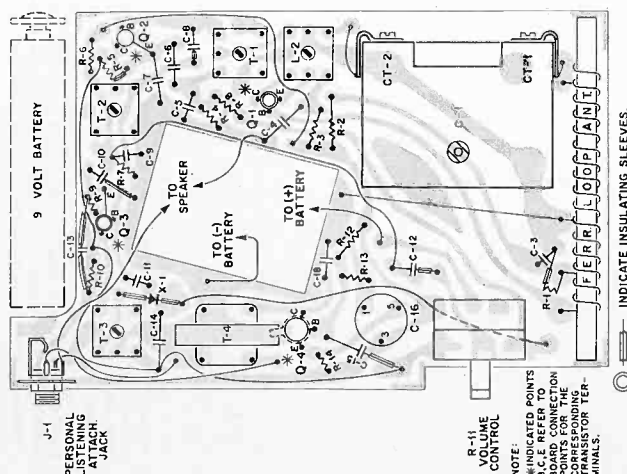


FIG. 2. PRINTED CIRCUIT CHASSIS DIAGRAM (TOP VIEW)

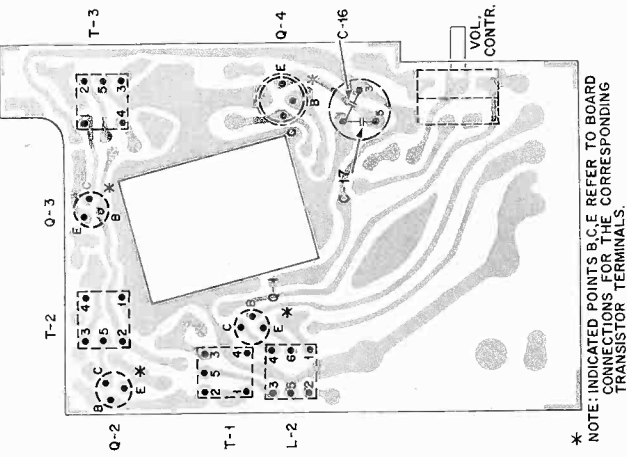
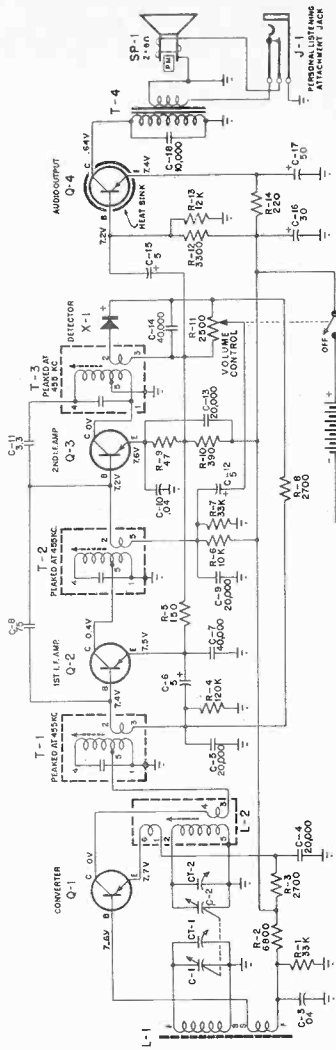


FIG. 3. PRINTED CIRCUIT CHASSIS DIAGRAM (BOTTOM VIEW)



* SIGMAs, CERAMIC CAPACITORS, CAPACITY IN MICROFARADS.
* SIGMAs, TUBULAR CAPACITORS, CAPACITY IN MICROFARADS.
* SIGMAs, TUBULAR CAPACITORS, CAPACITY IN MICROFARADS.
* SIGMAs, TUBULAR CAPACITORS, CAPACITY IN MICROFARADS.

SCHEMATIC DIAGRAM, CHASSIS 120433R CONDITIONS FOR VOLTAGE READINGS

1. Voltages indicated on the schematic are positive D.C.

2. Measurements taken with V.T.V.M.

3. All measurements taken between points and chassis ground.

4. Measurement conditions:

- (a) Fresh 9 volt battery supply. NOTE: Should Mercury batteries be used, an approx. 15% lower voltage reading will be obtained with the battery supply which is considered to be perfectly normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.
- (b) Volume control set for maximum volume.
- (c) Variable capacitor fully closed and no signal applied.

5. Normal tolerances in component values make possible a variation of $\pm 15\%$ in readings.
CAUTION: When taking voltage checks, avoid accidentally shorting across transistor leads as this may cause transistor damage. Do not use a non-vacuum tube-type voltmeter as the relatively low shunt resistance of this type of voltmeter can easily disrupt the transistor bias and result in erroneous readings as well as damage to the transistor.
NOTE: No resistance readings are given because of the possibility of applying excessive voltage to the transistor or to the capacitors during such a test. In addition, readings are not reliable since they depend upon the internal battery of meter.

RADIO CHASSIS 120433R PARTS LIST

SYMBOL	PART NO.	DESCRIPTION	SYMBOL	PART NO.	DESCRIPTION
R-1	340852	33,000 Ohm Carbon $\pm 10\%$	C-14	928983	40,000 MMF - Ceramic GMV
R-2	340852	33,000 Ohm Carbon $\pm 10\%$	C-15	925446	5 MF - Electrolytic
R-3	340852	33,000 Ohm Carbon $\pm 10\%$	C-16	925445	30 MF - Electrolytic
R-4	340852	33,000 Ohm Carbon $\pm 10\%$	C-17	925445	50 MF - Electrolytic
R-5	340732	150 Ohm Carbon $\pm 10\%$	C-18	928137	10,000 MMF - Ceramic GMV
R-6	340732	150 Ohm Carbon $\pm 10\%$	Q-1	815036	Transistor-Converter
R-7	340852	33,000 Ohm Carbon $\pm 10\%$	Q-2	815037	Transistor-1st. I.F. Amp.
R-8	340732	150 Ohm Carbon $\pm 10\%$	Q-3	815037	Transistor-2nd. I.F. Amp.
R-9	340732	150 Ohm Carbon $\pm 10\%$	Q-4	815038	Transistor-Audio Output
R-10	340392	47 Ohm Carbon $\pm 10\%$	X-1	817075	Diode - Detector
R-11	390557	390 Ohm Volume Control	L-1	700137	Barloop Antenna Oscillator Coil
R-12	340612	3,300 Ohm Carbon $\pm 10\%$	L-2	716123	Oscillator Coil
R-13	340752	12,000 Ohm Carbon $\pm 10\%$	T-1	720323	1st. I.F. Transformer
R-14	340332	220 Ohm Carbon $\pm 10\%$	T-2	720324	2nd. I.F. Transformer
C-1	900177	Variable Capacitor - R.F. Section	T-3	720325	Audio Output Transformer
CT-1	Pt. of C-1	Trimmer - R.F. Section	T-4	630236	Etched Printed Circuit Board (without components)
C-2	Pt. of C-1	Variable Capacitor - Osc. Section	J-1	508022	External Listening Jack
C-3	Pt. of C-1	Trimmer - Osc. Section	SP-1	180186	Speaker - PM, 2 1/2"
C-4	923097	.04 MF - Mylar $\pm 20\%$	SW-1	Pt. of R-11	On-Off Switch (on volume control)
C-5	928988	20,000 MMF - Ceramic GMV		585234	Battery Connector Cable
C-6	925449	5 MF - Electrolytic			Battery, Eveready No. 216 - 9 Volts
C-7	928983	40,000 MMF - Ceramic GMV			
C-8	928981	75 MF - Ceramic 5%			
C-9	928989	0.4 MF - Mylar $\pm 20\%$			
C-10	923097	0.04 MF - Mylar $\pm 20\%$			
C-11	925446	5 MF - Electrolytic			
C-12	925446	5 MF - Electrolytic			
C-13	928988	20,000 MMF - Ceramic GMV			

CHASSIS 120433B

MODEL 999
CHASSIS 120433B

SERVICE NOTE

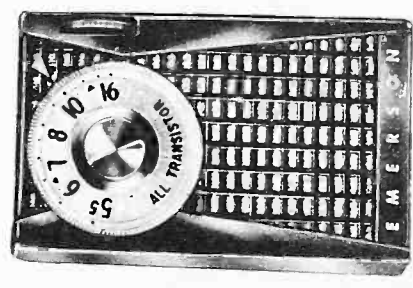
SPECIFICATIONS

TYPE: All-transistor superheterodyne (battery operated),
FREQUENCY RANGE: 530 - 1638 KC
TYPE OF TRANSISTORS AND CRYSTAL:

- Q-1-PNP Converter
- Q-2-PNP 1st I.F. Amplifier
- Q-3-PNP 2nd I.F. Amplifier
- Q-4-PNP Audio Output
- X-1-Diode detector and A.V.C.

POWER SUPPLY:

One 9-volt battery, Eveready #216 or equivalent (for extra long life, use mercury battery: Eveready #146, or Mallory TR 146 R)
AVERAGE CURRENT DRAIN:
10.5 ma, depending upon audio output.



MODEL 999

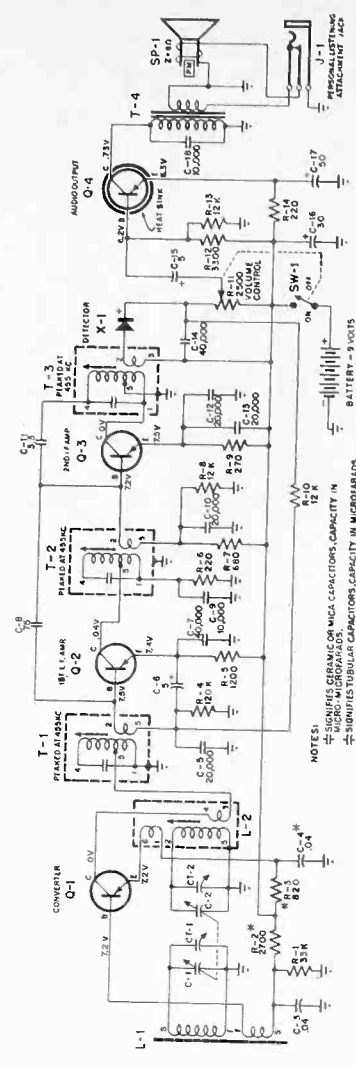
GENERAL INFORMATION

Model 999 is an all-transistor vest pocket radio requiring a 9-volt battery supply. The radio incorporates an etched circuit wiring board and is equipped with a personal listening attachment jack. The circuit utilizes four (4) transistors and one (1) germanium diode.

The cabinet may be opened by inserting a small coin in the slot at the bottom of the cabinet and gently twisting the coin. The receiver has a self-contained antenna and does not require additional antenna or ground connection. The ferrite bar loop antenna has directional properties. For maximum signal pickup on weak stations it is recommended that the set be rotated through a quarter of a circle, leaving it in the position which provides maximum volume. It is recommended that the battery be removed as soon as it is exhausted or if the set is not to be operated for a few months or more. Make certain that the on-off switch is left in the "off" position. (Do not place radio close to a hot radiator or in an enclosed warm area such as the rear window shelf in an automobile. High heat may cause damage).

DISASSEMBLY INFORMATION

- TO REPLACE BATTERY:**
1. Insert coin into slot located at bottom of cabinet, and twist to remove cabinet back.
 2. Lift out battery and remove battery connector.
 3. Attach battery connector to terminals of new battery.
 4. Insert battery into radio exactly as illustrated on drawing which appears on inside of cabinet back. (Use fishpaper barrier, if one has been used).
- TO REMOVE CHASSIS:**
1. Unscrew tuning knob screw.
 2. Remove tuning knob.
 3. Remove screw (long) which becomes accessible upon removal of tuning knob.
 4. Open cabinet as explained above.
 5. Remove battery (note position of fishpaper barrier, if used).
 6. Remove screw (short) located at the foot of the battery.
- The chassis can be replaced by reversing the indicated steps.



NOTES:
 * SIGNIF. CERAMIC OR POLY. CAPACITORS CAPACITY IN MICROFARADS.
 * RESISTORS USE 1/4 WATT CAPACITY UNLESS OTHERWISE NOTED.
 * SOME SETS WILL USE THE FOLLOWING VALUES:
 R-2, 5600Ω
 R-3, 2700Ω
 C-4, 20,000 (GERMANIC)

SCHEMATIC DIAGRAM, CHASSIS 120433B
CONDITIONS FOR VOLTAGE READINGS

1. Voltages indicated on the schematic are positive D.C.
 2. Measurements taken with V.T.V.M.
 3. All measurements taken between points and chassis ground.
 4. Measurement conditions:
 (a) Fresh 9 volt battery supply. NOTE: Should Mercury or Nickel-Cadmium batteries be used, an approx. 15% lower voltage reading will be obtained from the battery supply which is considered to be perfectly normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.
 (b) Volume control set for maximum volume.
 (c) Variable capacitor fully closed and no signal applied.
 5. Normal tolerances in component values make possible a variation of ±15% in readings.
- CAUTION:** When taking voltage checks, avoid accidentally shorting across transistor leads as this may cause transistor damage. Do not use a non-vacuum tube-type voltmeter as the relatively low shunt resistance of this type of voltmeter can easily disrupt the transistor bias and result in erroneous readings as well as damage to the transistor.
- NOTE:** No resistance readings are given because of the possibility of applying excessive voltage to the transistor or to the capacitors during such a test. In addition, readings are not reliable since they depend upon the internal battery of meter.

ALIGNMENT INSTRUCTIONS

1. Volume control - at maximum
2. Signal generator - 30% audio modulated.
 - Set no higher than necessary to obtain an output reading at the voice coil of 5 milliwatts across 8 ohms.
3. Use an insulated alignment tool for adjustment.

COUPLING	SIGNAL GENERATOR		RADIO DIAL SETTING	OUTPUT METER CONNECTION	ADJUSTMENTS	REMARKS
	FREQUENCY	MODULATION				
1. couple loosely	455 KC	(modulated)	Tuning condenser fully opened (no interference)	Across voice coil	T3, T2, T1 (in given order)	Adjust for maximum output
2. couple loosely	1638 KC	(modulated)	Tuning condenser fully opened (no interference)	Across voice coil	CT-2 (Osc. Trimmer) CT-1 (Ant. Trimmer)	Adjust for maximum output
3. couple loosely	600 KC	(modulated)	Tune for max. output at 600 KC position (SEE REMARKS)	Across voice coil	Padder slug in Osc. Trans. L-2	Rock the variable cond. each side of 600 kc while adj. osc. slug for maximum output
4. couple loosely	1683 KC	(modulated)	Fully open	Repeat step 2.	Repeat step 2.	Repeat step 2.
5. couple loosely	600 KC	(modulated)	Tune for maximum output.	Repeat step 3.	Padder slug in Osc. Trans. L-2 (should require very little adjustment)	For optimum results, repeat entire alignment procedure (steps 1 - 5).

NOTE: Radiation into set can be achieved by placing generator leads near loop antenna.

CAUTION
Use only a vacuum tube type of ohmmeter. The R x 10 scale must be used for all forward (low) resistance measurements. Do not use the R x 1 scale as this might damage the transistor. A shunt type ohmmeter should not be used. If in doubt as to the type of vacuum tube ohmmeter you have, place a 1,000 ohm resistor in series with it and subtract this 1,000 ohms from the reading obtained.

If these instructions are not followed, damage to the transistors may result since some non-electronic type of ohmmeters use high internal battery voltages.

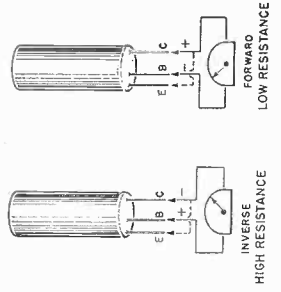


FIG. 3. PNP TYPE

CHASSIS 120433B PARTS LIST

SYMB.	PART NO.	DESCRIPTION	SYMB.	PART NO.	DESCRIPTION
R-1	340852	33,000 OHM CARBON ±10%	C-13	928988	20,000 MMF - CERAMIC GMV
R-2	340592	2700(6800)* OHM CARBON ±10%	C-14	928983	40,000 MMF - CERAMIC GMV
R-3	340472	120,000 OHM CARBON ±10%	C-15	925446	5 MF - ELECTROLYTIC
R-4	340992	820(2700)* OHM CARBON ±10%	C-16	925445	30 MF - ELECTROLYTIC
R-5	340512	1,200 OHM CARBON ±10%	C-17	Pt. of C-16	50 MF - ELECTROLYTIC
R-6	350332	220 OHM CARBON ±10%	C-18	928137	10,000 MMF - CERAMIC GMV
R-7	340452	680 OHM CARBON ±20%	Q-1	815036	TRANSISTOR-CONVERTER
R-8	340752	12,000 OHM CARBON ±10%	Q-2	815037	TRANSISTOR - 1st I.F. AMP.
R-9	340352	12,000 OHM CARBON ±10%	Q-3	815037	TRANSISTOR - 2nd I.F. AMP.
R-10	340752	12,000 OHM CARBON ±10%	Q-4	815038	TRANSISTOR - AUDIO OUTPUT
R-11	390557	2,500 OHM CARBON ±10%	X-1	817075	DIODE - DETECTOR
R-12	340612	3,300 OHM Volume Control	L-1	700137	BAR LOOP ANTENNA
R-13	340752	12,000 OHM CARBON ±10%	L-2	716123	OSCILLATOR COIL
R-14	340332	220 OHM CARBON ±10%	T-1	720323	1st I.F. TRANSFORMER
C-1	900177	Variable Capacitor - R.F. Section	T-2	720324	2nd I.F. TRANSFORMER
CT-1	Pt. of C-1	Trimmer - R.F. Section	T-3	720325	3rd I.F. TRANSFORMER
C-2	Pt. of C-1	Variable Capacitor - OSC. Section	T-4	734169	AUDIO OUTPUT TRANSFORMER
CT-2	Pt. of C-1	Trimmer - OSC. Section			
C-3	923097	.04 MF - MYLAR 40%-20%			
C-4	923097	.04 MF - MYLAR 40%-20%			
C-5	(928988)*	(20,000 MMF - CERAMIC GMV)	J-1	58022	ETCHED CIRCUIT BOARD
C-6	928988	20,000 MMF - CERAMIC GMV	SP-1	180186	EXTERNAL LISTENING JACK
C-7	928983	5 MF - ELECTROLYTIC	SW-1	Pt. of R-11	ON-OFF SWITCH (on Volume Control)
C-8	928981	75 MMF - CERAMIC ±5%		585234	BATTERY CONNECTOR CABLE
C-9	928137	10,000 MMF - CERAMIC GMV			BATTERY - Eveready No. 216 - 9 Volts (or equivalent)
C-10	928988	20,000 MMF - CERAMIC GMV			
C-11	928982	3.3 MMF - CERAMIC ±5%			
C-12	928988	20,000 MMF - CERAMIC GMV			

CABINET PARTS LIST, MODEL 999

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
461012	CABINET (SPECIFY COLOR)	461013	KNOB, VOLUME
265135	CABINET FRONT (SPECIFY COLOR)	471111	BAFFLE & GRILLE CLOTH ASSEMBLY
	CABINET BACK (SPECIFY COLOR)	180186	SPEAKER, 2 1/2"
	KNOB, TUNING	565484	FISH PAPER BARRIER (WHEN USED)
	SCREW, TUNING KNOB		

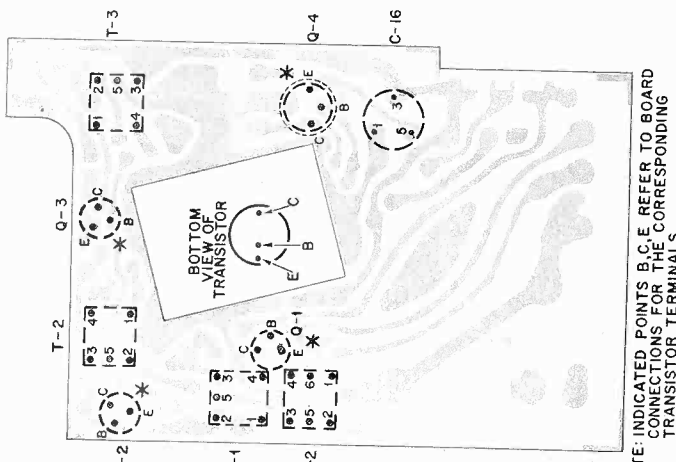


FIG. 2. PRINTED CIRCUIT CHASSIS DIAGRAM (BOTTOM VIEW)

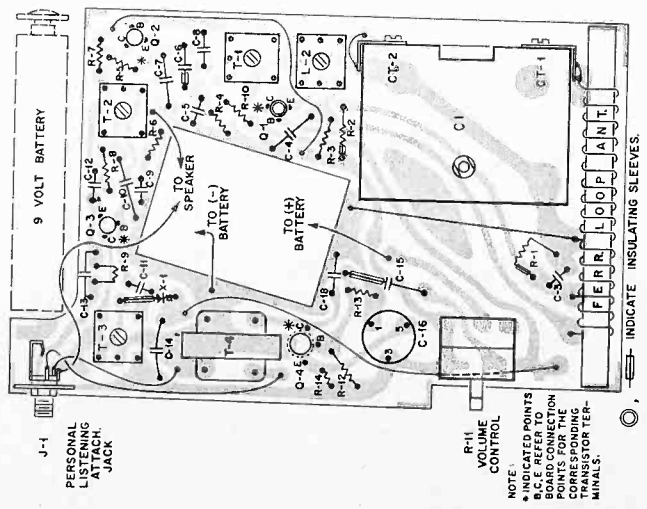


FIG. 1. PRINTED CIRCUIT CHASSIS DIAGRAM (TOP VIEW)

SERVICING THE ALL-TRANSISTOR RECEIVER

Since the failure rate of a transistor is far less than that of a receiving type tube, the transistor itself should be the last item to suspect. Before inserting a new transistor, all components in the suspected circuit should be carefully checked. Voltage measurements, signal tracing and signal injection methods of trouble shooting should be used. Resistance testing methods have severe limitations when applied to transistor circuits; consequently, they are not recommended. Should it become necessary to use resistance measurements, it is recommended to unsolder one terminal (of the suspected component) from the etched board before checking. When replacing transistors or components soldered to transistor leads, use extreme care as too much heat to the transistor leads cause damage to the transistor. The recommended method would be to grip the transistor lead between the etched board and the transistor body with long nose pliers before applying heat. A great deal of the heat will be absorbed by the pliers, thus protecting the transistor. As added precaution, use a small-tipped low-wattage (approx. .35 watts) soldering iron.

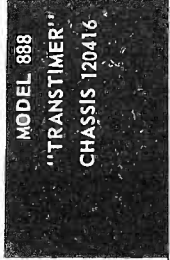
Should careful checking of all circuit components fail to reveal the defect, replace suspected transistor. If you do not have a replacement transistor available, then some form of transistor checking will become necessary. Inexpensive transistor checkers are now commercially available. If a transistor checker is not available, the following approximate resistance method may be used after the suspected transistor is unsoldered from the etched circuit board (use long-nose pliers to absorb some heat).

V. T. V.-M. OHMMETER CHECK OF TRANSISTORS

An approximate check of the transistors may be made with a vacuum tube type of ohmmeter. They are checked as two separate crystal diodes might be checked, that is, by measuring the forward and inverse resistance of each section individually. Figure No. 3 shows the method of testing P-N-P types of transistors used in this receiver. When the negative terminal of the ohmmeter (set on R x 10 scale) is connected to the base (B) terminal of a good PNP transistor and the positive terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a low resistance (in the order of 500 ohms or less).

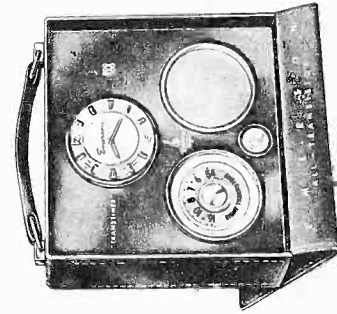
When the positive terminal of the ohmmeter is connected to the base (B) terminal of a good PNP transistor and the negative terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a high inverse resistance in the order of 50K ohms or higher.

In the event your results are opposite from these, it is possible that the plus side of your meter is actually connected to the negative side of its internal battery.



SERVICE NOTE

SPECIFICATIONS
 TYPE: All transistor superheterodyne battery portable.
 FREQUENCY RANGE: 540 - 1650 kc.
 TYPES OF TRANSISTORS AND CRYSTAL:
 Q1 - PNP Converter
 Q2 - NPN 1st I.F. amplifier
 Q3 - NPN 2nd I.F. amplifier
 Q4 - PNP 3rd I.F. amplifier
 Q5 - NPN 1st audio amplifier
 Q6 - PNP 2nd audio amplifier
 Q7 - PNP Matched Transistors
 Q8 - PNP Audio Output
 X1 - IN60 or IN295 diode detector & A.V.C.
 (Eveready #935; Ray-O-Vac #1LP or equiv.)
POWER SUPPLY: Four 1.5V "C" Type Batteries -
 (Eveready #935; Ray-O-Vac #1LP or equiv.)
POWER SUPPLY, Clock: One A-A Battery (Eveready
 E-9 (Mercury), Mallory #ZM-9 or equiv.)
CURRENT DRAIN: 7ma to 40ma depending on audio out-
 put power.



MODEL 888 "TRANSTIMER"

GENERAL INFORMATION

The 888 Transimer combines an 8-transistor portable AM radio chassis and an independently operated 7-level precision clock in a luxurious genuine top-grain cowhide case. The radio chassis incorporates an etched circuit wiring board and utilizes 8-transistors and one germanium diode. As much as 400 hours of radio playing life can be expected from ordinary "C" type flashlight batteries because of the efficient circuitry and low current drain of the transistors and associated circuits. A personal listening attachment jack is accessible through an opening in the bottom of the cabinet. The colored protective coating on the underside of the board will take solder and need not be removed prior to any soldering operation. A single mercury battery can operate the clock continuously for a period of from three to five years. To start the clock, remove the fibre insulator (included for shipping) from between the battery and its contact and then rotate the entire set from left to right. To set the time, apply an outward pull to the time-set knob and turn in either direction (clockwise or counterclockwise). The clock is factory regulated and requires no adjustment.

NOTE: As with all transistorized equipment, do not place the Transimer close to a hot radiator nor keep in an unventilated area such as the rear window shelf in an automobile. High heat may cause damage.

DISASSEMBLY INFORMATION

To Replace Radio Batteries:
 a. Remove 2 (two) screws from the rear flap of cabinet.
 b. Replace "C" batteries as shown in fig. 1, page 2. Use Eveready #935, Ray-O-Vac #1LP, or equivalent.
 c. Close rear flap.
To Replace Clock Battery:
 a. Remove two (2) screws from rear flap of cabinet.
 b. Replace mercury "A-A" battery as shown in fig. 1, page 2. Use Eveready #E-9 (mercury), Mallory #ZM-9, or equivalent.
 c. Close rear flap.
CAUTION: OBSERVE POLARITY OF BATTERIES.
CAUTION: OBSERVE POLARITY OF BATTERY.

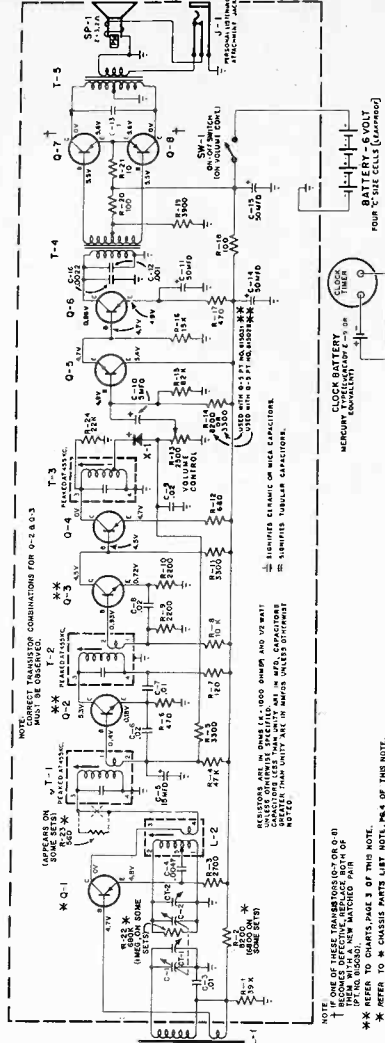
CHASSIS REMOVAL

1. Open front flap.
2. Remove knurled tuning knob screw and tuning knob.
3. Unscrew the one (1) Phillips head screw located to the left of the tuning shaft (the screw becomes accessible upon removal of tuning knob).
4. Pull the volume control knob off shaft.
5. Reverse cabinet. Remove two screws, open rear flap. Chassis is now accessible.
6. Remove the two (2) hexagonal nut and rubber washer combinations. Two (2) power leads connect the chassis and the first and last batteries. These can be unsoldered for complete separation of the chassis or can be left connected for servicing as required.
7. To reassemble chassis, reverse above procedures.

To Remove Clock:
 1. Remove clock battery from clip. 2. Remove rubber pads. 3. Unsolder two wire clock leads from battery clip terminals. 4. Pry speednut teeth up and lift off from stud. (See Fig. 1, Page 2). 5. Clock may now be removed by pushing clock gently towards face of set (Support clock front with other hand).
To Remove Clock Face Crystal and Bezel:
 1. Remove clock as above.
 2. The bezel has been force-fitted into place and can be removed by resting clock face on both hands and pressing down on back edges of bezel with both thumbs. Removing bezel also frees clock crystal. To replace, reverse above procedures.

NOTE: IN REPLACING CLOCK, ORIGINAL LEAD DRESS MUST BE ADHERED TO.

Most components and all testing points are readily accessible upon removal of chassis from cabinet. Components mounted underneath the speaker or tuning capacitor can be easily reached after removing speaker and/or tuning capacitor from the etched board.
 To remove speaker, remove two speaker mounting screws located on bottom side of chassis and unsolder speaker leads.
 To remove tuning capacitor, remove two tuning capacitor mounting screws located on top of tuning capacitor housing bracket and unsolder oscillator lead from tuning capacitor.



SCHEMATIC DIAGRAM, CHASSIS 120416

- CONDITIONS FOR VOLTAGE READINGS**
1. Voltages indicated are positive D.C.
 2. Measurements taken with V.T.V.M.
 3. All measurements taken between points and chassis.
 4. Voltage measurements taken with:
 (a) Fresh 6 Volt battery supply. Four 1½ Volt conventional "C" type cells.
 Note: Should Mercury batteries be used, an approx. 15% lower voltage reading will be obtained from the battery supply which is considered to be perfectly normal. Bear in mind that the voltage supply will vary slightly with the type and condition of batteries used.

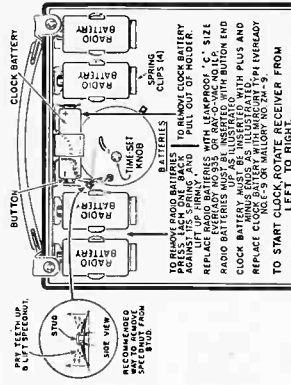


FIG. 1 - BATTERY & CLOCK INFORMATION

Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.

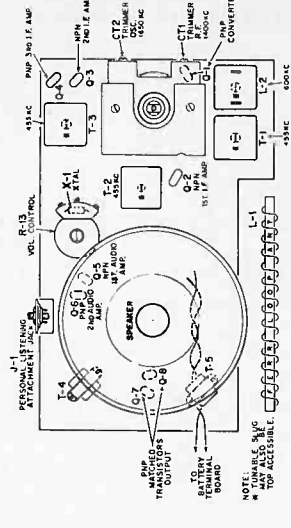


FIG. 2 - ALIGNMENT POINTS & TRANSISTOR LOCATIONS

Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.

DIMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1 .1 mfd.	High side to junction of L-1 & C-1. Low side to chassis.	455 KC.	Tuning condenser fully open.	Across voice coil.	T2, T3 and T1	Adjust for maximum output starting with T3.
2	Use a loop set perpendicular to center of bar loop ant. in act.	1650 KC.	Tuning condenser fully open.	Across voice coil.	CT2	Fashion loop of several turns of wire and radiate equal loop of maximum output. Adjust for maximum output.
3	"	1400 KC.	Tune for maximum output.	Across voice coil.	CT1	Adjust for maximum output.
4	"	600 KC.	Tuning condenser set for 600 KC.	Across voice coil.	Osc. slug in L-2	Rock the variable cond. each side of 600 KC while adj. osc. slug for maximum response.
5	"	1650 KC.	Tuning condenser fully open.	"	CT2	If readjustment is necessary repeat steps 2 to 4 until no further improvement is noted.

NOTE: For optimum results, repeat entire alignment procedure.

NPN type transistors are checked in a similar manner except the applied polarities from the ohmmeter are reversed (see figure no. 5) to give some inverse and forward resistance results.

CAUTION

Use only a vacuum tube type of ohmmeter. The R x 10 scale must be used for all forward (low) resistance measurements. Do not use the R x 1 scale as this might damage the transistor. A shunt type ohmmeter should not be used. If in doubt as to the type of vacuum tube ohmmeter you have, place a 1,000 ohm resistor in series with it and subtract this 1,000 ohms from the reading obtained.

If these instructions are not followed, damage to the transistors may result since some non-battery type of ohmmeters use high internal battery voltages.

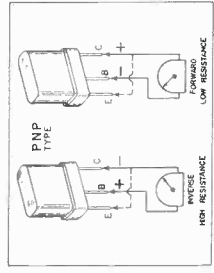


FIG. 4 - PNP TYPE

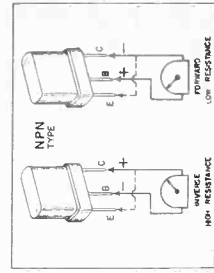


FIG. 5 - NPN TYPE

CHASSIS 120416 PARTS LIST

Symbol	Part No.	Description	List Price	Part No.	Description	List Price
C-1	900172	Variable Capacitor, R.F. Section	3.45	R-15	82,000 OHM - Carbon ±10% 1/2W.	.14
CT-1	Pt. of C-1	Trimmer, R.F. Section		R-16	15,000 OHM - Carbon ±10% 1/2W.	.14
C-2	Pt. of C-1	Variable Capacitor, Osc. Section		R-17	470 OHM - Carbon ±10% 1/2W.	.14
CT-2	Pt. of C-1	Trimmer, Osc. Section		R-18	100 OHM - Carbon ±20% 1/2W.	.14
C-3	928766	.01 MFD - Ceramic ±20% 30V.	.20	R-19	3,900 OHM - Carbon ±10% 1/2W.	.14
C-4	928767	.0047 MFD - Ceramic ±20% 30V.	.20	R-20	100 OHM - Carbon ±10% 1/2W.	.14
C-5	928419	.15 MFD - Electrolytic 3V.	.70	R-21	10 OHM - Carbon ±10% 1/2W.	.14
C-6	928138	.02 MFD - Ceramic GMV 30V.	.25	R-22	1 MEG - Carbon ±10% 1/2W.	.14
C-7	928738	.01 MFD - Ceramic GMV 30V.	.25	R-23	560 OHM - Carbon ±10% 1/2W.	.14
C-8	928138	.02 MFD - Ceramic GMV 30V.	.25	R-24	22,000 OHM - Carbon ±10% 1/2W.	.14
C-9	928138	.02 MFD - Ceramic GMV 30V.	.25	Q-1	Transistor - Converter P - N - P	N - P - N
C-10	925420	.5 MFD - Electrolytic 6V.	.70	Q-2	Transistor - 1st I.F. Amplifier N - P - N	N - P - N
C-11	925421	.45 MFD - Electrolytic 10V.	.70	Q-3	Transistor - 2nd I.F. Amplifier P - N - P	N - P - N
C-12	928919	.001 MFD - Ceramic ±20%	.20	Q-4	Transistor - 3rd I.F. Amplifier P - N - P	N - P - N
C-13	920795	.1 MFD - Paper ±20%	.30	Q-5	Transistor - 1st Audio Amplifier N - P - N	N - P - N
C-14	925422	.50 MFD - Electrolytic 10V.	1.25	Q-6	Transistor - 2nd Audio Amplifier P - N - P	N - P - P
C-15	Pt. of C-14	50 MFD - Electrolytic 10V.		Q-7	Transistor - P.P. Audio Output P - N - P	N - P - P
R-1	928921	2200 MWF - Ceramic ±20% 30V.	.20	Q-8	Transistor - P.P. Audio Output P - N - P	N - P - P
R-2	340692	39,000 OHM - Carbon ±10% 1/2W.	.14	X1	Crystal Diode	1.05
R-3	340592	6,800 OHM - Carbon ±10% 1/2W.	.14	L-1	Barloop Antenna	1.55
R-4	340592	2,700 OHM - Carbon ±10% 1/2W.	.14	L-2	Oscillator Coil	1.90
R-5	340612	47,000 OHM - Carbon ±10% 1/2W.	.14	T-1	1st I.F. Transformer	1.25
R-6	340412	3,300 OHM - Carbon ±10% 1/2W.	.14	T-2	2nd I.F. Transformer	1.25
R-7	350272	470 OHM - Carbon ±10% 1/2W.	.14	T-3	3rd I.F. Transformer	1.30
R-8	340732	120 OHM - Carbon ±10% 1/2W.	.14	T-4	P.P. Input Transformer	2.10
R-9	340572	2,200 OHM - Carbon ±10% 1/2W.	.14	T-5	P.P. Output Transformer	1.80
R-10	340572	2,200 OHM - Carbon ±10% 1/2W.	.14	J-1	Etched Circuit Board (Less Comp.)	.65
R-11	340612	3,300 OHM - Carbon ±10% 1/2W.	.14	662319	Battery Mounting Bd. Ass'y (Radio)	
R-12	340452	2,500 OHM - Carbon ±10% 1/2W.	.14	662319	Battery Mounting Bd. Ass'y (Radio)	
R-13	390494	8,200 OHM - Volume Control	1.05	180175	Speaker, 3 1/2" PM	3.70
R-14	340612	3,300 OHM - Carbon ±10% 1/2W.	.14			

NOTES: * When a 815025 Transistor (Q1) is used, R2 is 8200 (#340712), R22 is 680K (#341172) and R23 is not used (shorted out). (when a 815025A Transistor (Q1) is used, only values indicated on chassis parts list apply).

†† Re-schematic diagram (Pg. 2) and charts (pg. 3).

CABINET PARTS LIST, MODEL 888 TRANSFORMER

Part No.	Description	Part No.	Description
265096	CABINET LEATHER (SPECIFY COLOR)	471088	CLOCK
413252	SCREW, BACK FLAP	962322	CRYSTAL, CLOCK
	BEZEL (SPEAKER, GRILLE, RADIO DIAL)	962323	BEZEL, CLOCK
547534	ROLL PIN (FOR BEZEL)	547159	SPEEDNUT, CLOCK
542149	SPEEDNUT (FOR BEZEL)	461026	SCREW, TUNING
413257	PERFORATED GRILLE	265135	SCREW, KURLED (TUNING KNOB)
413258	DIAL BACK PLATE	461031	KNOB, VOLUME CONTROL
		565467	POST, FIBRE (CH. TO CABINET)

NOTE: ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.

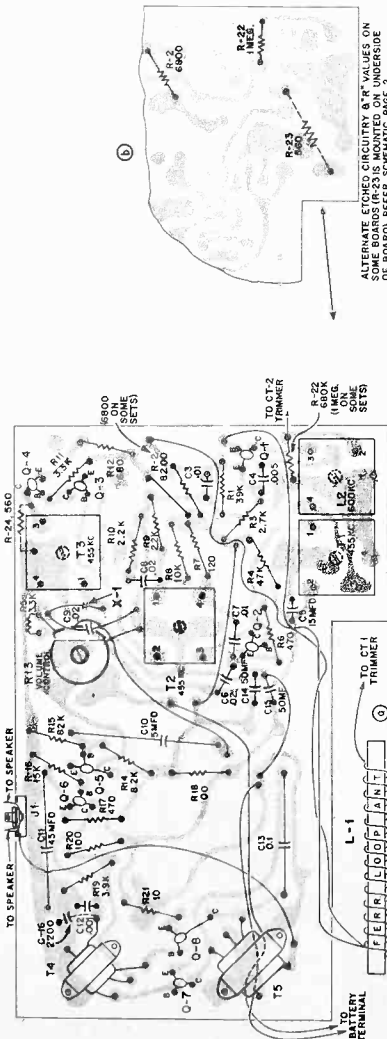


FIG. 3a, b - ETCHED PRINTED CIRCUIT CHASSIS DIAGRAMS

SERVICING ALL TRANSISTOR RECEIVERS

Two PNP matched transistors (pt. #815030) are used as a balanced push-pull class "B" audio output stage. This type of circuit yields greater audio output power at a much lower average battery drain. To optimize performance, these transistors are supplied as a matched pair. If one of these transistors becomes defective, replace both of them with a new matched pair. Should Q-2 or Q-3 NPN transistors be replaced be sure and follow the transistor combination as shown on schematic for best results.

Since the failure rate of a transistor is far less than that of a receiving type tube, the transistor itself should be the last item to suspect. Before inserting a new transistor, all components in the suspected circuit should be carefully checked. Voltage measurements, signal tracing and signal injection methods of trouble shooting should be used. Resistance testing methods have severe limitations when applied to transistor circuits; consequently, they are not recommended. Should it become necessary to use resistance measurements, it is recommended to unsolder one terminal (of the suspected component) from the etched board before checking. When replacing transistors or components soldered to transistor leads, use extreme care as too much heat to the transistor leads cause damage to the transistor. The recommended method would be to grip the transistor lead between the etched board and the transistor body with long nose pliers before applying heat. A great deal of the heat will be absorbed by the pliers, thus protecting the transistor. As added precaution, use a small-tipped low-wattage (approx. 35 watts) soldering iron.

Should careful checking of all circuit components fail to reveal the defect, replace suspected transistor. If you do not have a replacement transistor available, then some form of transistor checking will become necessary. Inexpensive transistor checkers are now commercially available. If a transistor checker is not available, the following approximate resistance method may be used after the suspected transistor is unsoldered from the etched circuit board (use long-nose pliers to absorb some heat).

ADDITIONAL TRANSISTOR REPLACEMENT INFORMATION

It will be seen from the schematic drawing of the 888 that certain transistors are used in pairs and are associated with specific resistors. Some individual transistors must likewise be used with specific resistors. This data and additional transistor substitution information is listed below for reference and convenience in ordering.

NOTE: Because of the small physical size of the transistors, the 1st three digits, "815", have been replaced by the letter, "E" for Emerson. The "E" also signifies that these transistors have been made to our design tolerances.

TRANSISTOR PAIRS	ASSOCIATED	TRANSISTOR SUBSTITUTES	TRANSISTOR NOS.
Q2	Q3	Q5	Q5
815026C	815026E	815033	815033
815026B	815026F	815034	815034
815026B	815026F	815035	815035

TRANSISTOR SUBSTITUTES	TRANSISTOR NOS.	FOR	USE
815026F	Q2/Q3	815033	Q5
815028	Q5	815034	Q5
815031	Q5	815035	Q5

V. T. V. M. OHMMETER CHECK OF TRANSISTORS

An approximate check of the transistors may be made with a vacuum tube type of ohmmeter. They are checked as two separate crystal diodes might be checked, that is, by measuring the forward and inverse resistance of each section individually. Figures No. 4 and No. 5 show the method of testing P-N-P and N-P-N types of transistors used in this receiver. When the negative terminal of the ohmmeter (set on R x 10 scale) is connected to the base (B) terminal of a good PNP transistor and the positive terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a low resistance (in the order of 500 ohms or less).

When the positive terminal of the ohmmeter is connected to the base (B) terminal of a good PNP transistor and the negative terminal of the meter is connected to the collector (C) or emitter (E) terminals, you should measure a high inverse resistance in the order of 50K ohms or higher.

In the event your results are opposite from these, it is possible that the plus side of your meter is actually connected to the negative side of its internal battery.

MODEL NO. RA48-9905A

Key No. RA 48



**RADIO
SERVICE MANUAL
AND PARTS LIST**

No. 603-467

FILE NUMERICALLY IN SERVICE INFORMATION SECTION OF SERVICE REFERENCE FILE

CORONADO RADIO



Coronado "88"

MODEL NO. RA48-9905A

This Cordless Table and Portable Receiver incorporates Transistors—the very latest scientific achievement in the field of Electronics. Like the vacuum tube, the Transistor amplifies weak radio signals. Unlike the vacuum tube, the Transistor does not have a filament, so the usual A Battery which required frequent replacement, is unnecessary. The second advantage of the Transistor is that it is an electric current flow device, which current can readily be furnished by 6 C size flashlight cells, so that the usual 67½ volt multi cell and expensive B battery is eliminated.

For these reasons, this portable radio will serve you for several hundred hours before renewal of the 6 Eveready #935 (Gamble #B17-402) batteries is necessary.

GENERAL DESCRIPTION

This Receiver is designed to operate from its self contained battery supply. The Ferrite Rod Antenna is designed to produce satisfactory reception in low signal areas. In some locations turning the Receiver in various directions may improve the reception.

This Receiver is equipped with an earphone Jack to receive Coronado Earphone 43-9894, for listeners desiring to listen to programs in private. The Earphone Plug disconnects and silences the Speaker. The program sound level when using Earphone is controlled by the Volume Control.

The Earphone Jack is located at the back of the cabinet.

CONTROLS

The bottom knob is the on-off switch and volume control. To turn on radio, turn this knob clockwise. The radio plays immediately - no warm-up time is required. To turn radio off, turn this knob counter-clockwise until click is heard.

The Tuning Control is the top knob. The numerals under this knob show Kilocycles with the last two ciphers left off.

To tune in station desired, move this tuning knob back and forth to the position which produces the deepest rounded tones.

The tuning knob shows the "CD" Civil Defense Emblem of Conelrad Frequencies - 640 and 1240 Kilocycles. In a Civil Defense emergency, tune to either of these frequencies to receive defense news, instructions and information.

To Install Batteries: Lay radio on table front face down. Open cabinet by unscrewing two screws at back of cabinet. A dime coin fits screw slot. Raise back of cabinet upward, lightly shake cabinet back loose and lift it away from the front panel with its attached chassis.

Remove battery case cover which opens at top cover: tab disengages bottom of case.

Place three Eveready #935 (Gamble #B17-402) Batteries in top section: center metal button of each battery is to the right, as shown in Figure 2.

Place three Eveready #935 (Gamble #B17-402) Batteries in bottom section so center metal button of each battery is to the left as shown in Figure 2.

Put battery case top cover back in place so its tab re-engages bottom of case.

Re-assemble radio by replacing back of cabinet over front panel and chassis. Put screws back in place and tighten screws.

It is very important that the batteries be inserted correctly. The top batteries must all have the metal button end facing to the right and all of the bottom batteries must all have the metal button end facing to the left. Make sure that the center battery is correctly in place. If this is not done right, the radio will not operate at full power.

If the batteries are not correctly inserted as to metal button end, the batteries will not be connected and the radio will not operate - remaining silent.

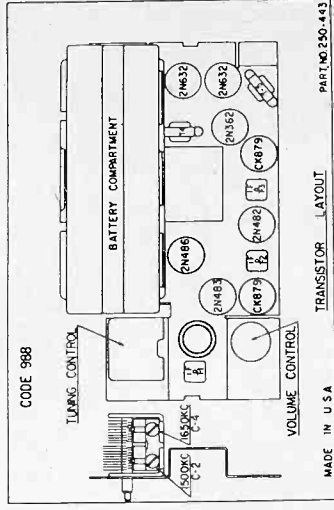
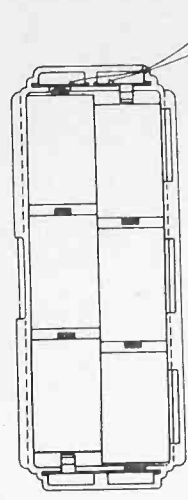


Fig. 1

WARNING

Old batteries become corroded and leaky. Before storing radio for a long period, remove batteries from cabinet to prevent damage. To clean the plastic case of this receiver, use only warm water and a soft cloth.

Note: We recommend that you use Eveready Batteries. However, C Batteries of other manufacturers are also acceptable.



BATTERY CASE, TOP VIEW
LID REMOVED Fig. 2

MODEL NO. RA48-9905A

MODEL NO. RA48-9905A

TRANSISTOR COMPLEMENT

RAYTHEON TYPE	FUNCTION
2N486	Oscillator Mixer
2N482	IF Amplifier
CK879	Overload A.G.C.
2N483	IF Amplifier
CK879	Detector
2N362	Driver
2N632	Audio Output Push-Pull

GENERAL SERVICING INFORMATION

CAUTION:

Never attempt to check a transistor with an Ohmmeter. Do not use heavy soldering iron; use small soldering iron, pencil type having a rating of not more than 35 watts. Always remove transistors from sockets before soldering.

1. Connect 1 volt output meter across the voice coil terminals.
2. Set volume control to maximum.
3. Use plastic alignment tool to prevent detuning.
4. Keep input signal from generator at minimum value to give indication on meter.
5. Use a level of .4 volts or 50 milliwatts.
6. Modulation for alignment— 1000 cycles - 30%.

ELECTRICAL SPECIFICATIONS

POWER SUPPLY — 9 volts — 6 Eveready #936

Frequency range 540 to 1650 Kilocycles

Intermediate frequency 455 K.C.

Tuning two gang capacitor 3.2 ohm voice coil impedance

Speaker 6x4 PM 250 milliwatts

Power output 10% distortion

Sensitivity 350 milliwatts maximum

..... 150 microvolts at 50 milliwatts

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number and series

RESISTORS

Ref. No.	Part No.	Description
R 1	180-194	4800 OHMS 1/2 watt 10%
R 2	180-209	3900 OHMS 1/2 watt 5%
R 3	180-152	18-K-OHMS 1/2 watt 10%
R 4	180-199	880 OHMS 1/2 watt 10%
R 5	180-178	560 OHMS 1/2 watt 5%
R 6	180-189	2200 OHMS 1/2 watt 5%
R 7	180-115	15-K-OHMS 1/2 watt 10%
R 8	180-218	330 OHMS 1/2 watt 5%
R 9	180-197	220-K-OHMS 1/2 watt 10%
R 10	120-161	VOLUME CONTROL
R 11	180-190	10-K-OHMS w/switch
R 12	180-199	10000 OHMS 1/2 watt 10%
R 13	180-191	1000 OHMS 1/2 watt 10%
R 14	180-186	68-K-OHMS 1/2 watt 5%
R 15	180-205	8200-K-OHM 1/2 watt 5%
R 16	180-147	150 OHM 1/2 watt 5%
R 17	180-147	10-OHM 1/2 watt 10%
R 18	180-178	560 OHM 1/2 watt 10%
R 19	180-197	220-K-OHM 1/2 watt 10%

CONDENSERS

Ref. No.	Part No.	Description
C 1	160-135B	VARIABLE CONDENSER
C 2	160-135B	05 MFD DISC 100WV
C 3	158-111	(in assembly 136-144)
C 4	158-111	05 MFD DISC 100WV
C 5	158-111	12 MFD 10V PIGTAIL INSUL.
C 6	158-111	05 MFD DISC 100WV
C 7	158-111	05 MFD DISC 100WV
C 8	158-111	05 MFD DISC 100WV
C 9	158-111	7.5 MMF NPO ERIE 5%
C 10	158-111	05 MFD DISC 100WV
C 11	158-111	05 MFD DISC 100WV
C 12	158-111	5.24 MMF NPO ERIE 5%
C 13	158-117	01 MFD DISC 500 WV
C 14	158-113	005 MFD DISC 500 WV
C 15	158-101	12 MFD - 10V PIGTAIL INSUL.
C 16	150-132	50 MFD 10V PIGTAIL INSUL.
C 17	150-130	100 MFD 10V PIGTAIL DUAL INSUL.
C 18	C 19	005 MFD DISC 500 WV
C 20	158-101	10 MMF 1 10%
C 21	156-115	

COILS AND TRANSFORMERS

Ref. No.	Part No.	Description
L 1	132-145A	ANTENNA FERRITE ROD
L 2	136-144A	OSCILLATOR COIL
T 1	130-136	I.F. TRANS.
T 2	130-137	I.F. TRANS.
T 3	130-138	I.F. TRANS.
T 4	138-142	INTERSTAGE AUDIO TRANS.
T 5	138-143	OUTPUT TRANS.

CABINET AND ACCESSORIES

Ref. No.	Part No.	Description
210-167E		CABINET SHELL WITH HANDLE IN CTN.
205-146F		FRONT GRILLE WITH ORNAMENTAL TRIM TOP, GOLD PERFORATION.
215-175B		W/A CREST CORONADO NAME PLATE
220-180B		KNOB CALIBRATION DISC W/A
220-160		TUNING KNOB (DRIVE) HANDLE
140-134		220-178 KNOB VOLUME

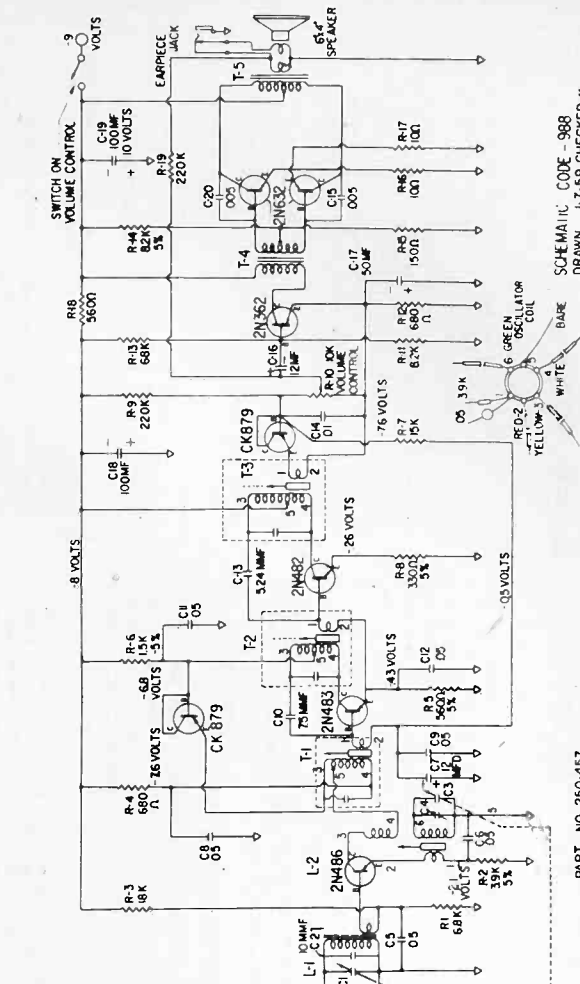
* FEDERAL EXCISE TAX INCLUDED

Prices Shown Are Approximate and Subject to Change Without Notice.

Part No. 250-440

SERVICE NOTE: Since this Schematic was printed the following Resistor changes have been made:

R 1	180-186	1000 ohms 10%
R 2	180-190	1000 ohms 10%
R 3	180-189	2200 ohms 10%
R 4	180-186	1000 ohms 10%
R 5	180-189	2200 ohms 10%



PART NO 250-457

SCHEMATIC CODE - 988
DRAWN 1-7-59 CHECKED: J

I.F. ALIGNMENT

STEP	Signal Generator Connections	Generator Frequency	Receiver Dial Setting	ADJUST	REMARKS
1	High end to loop stick secondary winding. Ground to chassis - use .1 mfd. dummy.	455 K.C. modulated	Receiver Gang Fully open	FERRITE CORES T1 - T2 T3	ADJUST for MAXIMUM

R.F. ALIGNMENT

2	Spray signal using loop of wire close to loop stick	1650 modulated	Receiver Gang Fully Open	O.S.C. Trimmer C-4	TUNE for MAXIMUM
3	Same as step 2	540 K.C. modulated	Receiver Gang Fully closed	O.S.C. Slug L-2	TUNE for MAXIMUM
4	Same as step 2	1400 K.C. modulated	1400 K.C.	Antenna Trimmer C-2	TUNE for MAXIMUM
5	Same as step 2	600 K.C. modulated	600 K.C.	Adjust L-2	Rock in gang for maximum output

6 Repeat steps 4 and 5 for maximum output.

MODEL RA48-9905A

MODEL NO. RA48-9905A

TRANSISTOR COMPLEMENT

RAYTHEON TYPE	FUNCTION
2N486	Oscillator Mixer
2N482	IF Amplifier
CK879	Overload
2N483	A.G.C.
CK879	IF Amplifier
2N362	Detector
2N632	Driver
2N632	Audio Output
2N632	Push-Pull

ELECTRICAL SPECIFICATIONS

POWER SUPPLY — 9 volts — 6 Eveready #936
 Frequency range "C" Cells
 Intermediate frequency 540 to 1650 Kilocycles
 Tuning two gang capacitor 455 K.C.
 Speaker 6x4 PM 3.2 ohm voice coil impedance
 Power output 250 milliwatts
 10% distortion
 350 milliwatts maximum
 150 microvolts at
 Sensitivity 50 milliwatts

GENERAL SERVICING INFORMATION

CAUTION:

Never attempt to check a transistor with an Ohmmeter. Do not use heavy soldering iron; use small soldering iron, pencil tyf having a rating of not more than 35 watts. Always remove transistors from sockets before soldering.

1. Connect 1 volt output meter across the voice coil terminals.
2. Set volume control to maximum.
3. Use plastic alignment tool to prevent detuning.
4. Keep input signal from generator at minimum value to give indication on meter.
5. Use a level of .4 volts or 50 milliwatts.
6. Modulation for alignment— 1000 cycles . 30%.

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number and series

RESISTORS

Ref. No.	Description
R 1	6800 OHMS 1/2 watt 10%
R 2	3700 OHMS 1/2 watt 5% (in assembly 136-144)
R 3	180-152
R 4	180-199
R 5	180-178
R 6	180-189
R 7	180-115
R 8	180-218
R 9	180-197
R 10	120-161
R 11	180-190
R 12	180-199
R 13	180-191
R 14	180-186
R 15	180-205
R 16	180-147
R 17	180-147
R 18	180-178
R 19	180-197

CONDENSERS

Ref. No.	Description
C1, C2	VARIABLE CONDENSER
C3, C4	.05 MFD DISC 100WV (in assembly 136-144)
C 5	.05 MFD DISC 100WV
C 6	158-111
C 7	150-132
C 8	158-111
C 9	.05 MFD DISC 100WV
C10	158-111
C11	.05 MFD DISC 100WV
C12	158-111
C13	524 MFM NPO ERIE 5%
C14	.01 MFD DISC 100WV
C15	.005 MFD DISC 500 WV
C16	150-132
C17	150-130
C18, C19	100 MFD 10V PIGTAIL INSUL. INSUL.
C20	.005 MFD DISC 500 WV
C21	10 MMF 1 10%

COILS AND TRANSFORMERS

Ref. No.	Description
L 1	ANTENNA FERRITE ROD
L 2	OSCILLATOR COIL
T 1	I.F. TRANS.
T 2	I.F. TRANS.
T 3	I.F. TRANS.
T 4	INTERSTAGE AUDIO TRANS.
T 5	OUTPUT TRANS.

CABINET AND ACCESSORIES

Ref. No.	Description
210-167E	CABINET SHELL WITH HANDLE IN CTN.
205-146F	FRONT GRILLE WITH ORNAMENTAL TRIM TOP; GOLD PERFORATION; W/A CREST
215-175B	CORONADO NAME PLATE
220-180B	KNOB CALIBRATION DISC W/A TUNING KNOB (DRIVE)
220-160	140-134
220-178	KNOB VOLUME

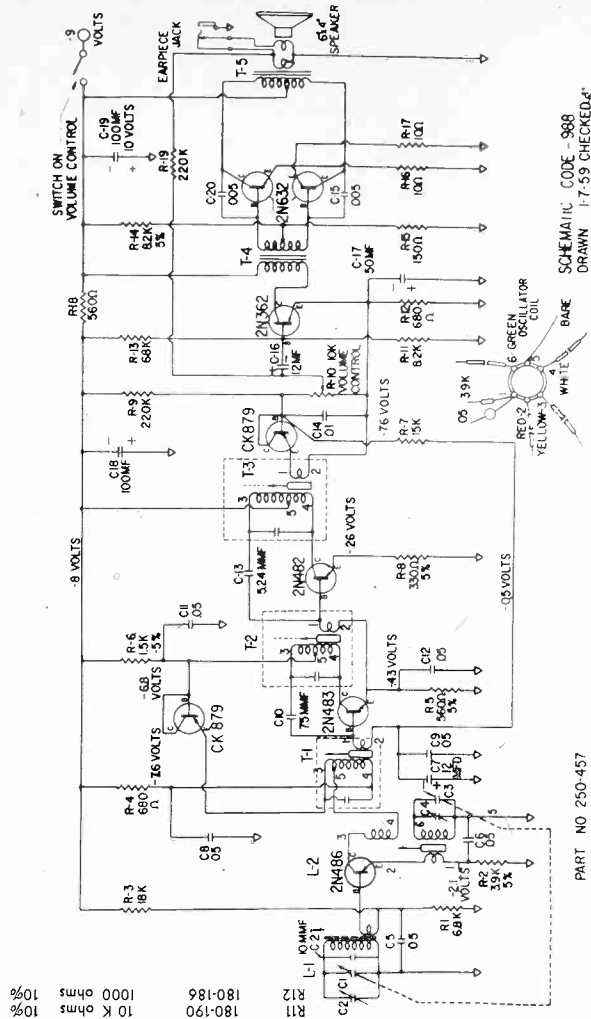
* FEDERAL EXCISE TAX INCLUDED

Prices Shown Are Approximate and Subject to Change without Notice.

Part No. 250-440
 2200 ohms 10%
 10 K ohms 10%
 1000 ohms 10%
 100 ohms 10%

SERVICE NOTE:
 Since this schematic was printed the following resistor changes have been made:
 CK879
 T-1, T-2, T-3
 T-4, T-5
 T-6

I.F. ALIGNMENT		R.F. ALIGNMENT	
STEP	Signal/Generator Connections High end to loop stick secondary winding. Ground to chassis - use 1 mfd. dummy.	Generator Frequency	Remarks
1		455 K.C. modulated	RECEIVER DIAL SETTING Receiver Gang Fully open
2	Spray signal using loop of wire close to loop stick	1650 modulated	FERRITE CORES T1 - T2, T3 ADJUST for MAXIMUM
3	Same as step 2	540 K.C. modulated	O.S.C. Trimmer C-4 TUNE for MAXIMUM
4	Same as step 2	1400 K.C. modulated	O.S.C. Slug L-2 Antenna Trimmer C-2 TUNE for MAXIMUM
5	Same as step 2	600 K.C. modulated	Adjust L-2 TUNE for MAXIMUM
6	Repeat steps 4 and 5 for maximum output.		Rock in gang for maximum output



PART NO. 250-457
 SCHEDULE CODE 988
 DRAWN 1-7-59 CHECKED: g'

MODEL NO. RA48-9903A

This Cordless Table and Portable Receiver incorporates Transistors—the very latest scientific achievement in the field of Electronics. Like the vacuum tube, the Transistor amplifies weak radio signals. Unlike the vacuum tube, the Transistor does not have a filament, so the usual A Battery which required frequent replacement, is unnecessary. The second advantage of the transistor is that it is an electric current flow device, which current can readily be furnished by 6 C size flashlight cells, so that the usual 67 1/2 volt multi cell and expensive 8 battery is eliminated.

For these reasons, this portable radio will serve you for several hundred hours before renewal of the 6 Eveready #936 (Gamble #B17 402) battery is necessary.

GENERAL DESCRIPTION

This Receiver is designed to operate from its self contained battery supply. The Ferrite Rod Antenna is designed to produce satisfactory reception in low signal areas. In some locations turning the Receiver in various directions may improve the reception.

This Receiver is equipped with an earphone Jack to receive Coronado Earphone 43-9894, for listeners desiring to listen in private. The Earphone Plug disconnects and silences the Speaker. The program sound level when using Earphone is controlled by the Volume Control

The Earphone Jack is located at the back of the cabinet.

CONTROLS

The bottom knob is the on-off switch and volume control. To turn on radio, turn this knob clockwise. The radio plays immediately—no warm-up time is required. To turn radio off, turn this knob counter-clockwise until click is heard.

The Tuning Control is the top knob. The numerals under this knob show Kilocycles with the last two ciphers left off.

To tune in station desired, move this tuning knob back and forth to the position which produces the deepest rounded tones.

The tuning knob shows the "CD" Civil Defense Emblem at . Conelrad Frequencies - 640 and 1240 Kilocycles. In a Civil Defense emergency, tune to either of these frequencies to receive defense news, instructions and information.

To Install Batteries: Lay radio on table front face down. Open cabinet by unscrewing two screws at back of cabinet. Raise back of cabinet upward, lightly shake cabinet back loose and lift it away from front panel with its attached chassis. Remove battery case cover which opens as top cover tab disengages bottom of case.

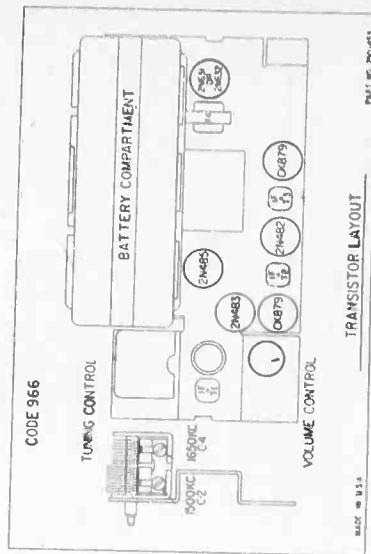
Place three Eveready #936 (Gamble #B17 402) Batteries in top section. Center metal button of each battery is to the right, as shown in Figure 2. Place three Eveready #935 (Gamble #B12 402) center metal button of each battery is to the left as shown in Figure 2.

Put battery case top cover back in place to its tab re-engages bottom of case.

Re-assemble radio by replacing back of cabinet over front panel and chassis. Put screws back in place and tighten screws.

It is very important that the batteries be inserted correctly. The top batteries must all have the metal button end facing to the right and all of the bottom batteries must all have the metal button end facing to the left. Make sure that the center battery is correctly in place. If this is not done right, the radio will not operate at full power.

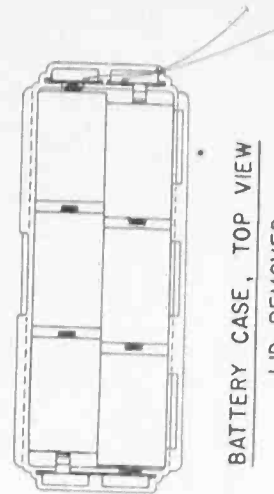
If the batteries are not correctly inserted as to metal button end, the batteries will not be connected and the radio will not operate—remaining silent.



WARNING

Old batteries become corroded and leaky. Before storing radio for a long period, remove batteries from cabinet to prevent damage. To clean the plastic case of this receiver, use only warm water and a soft cloth.

Note: We recommend that you use Eveready Batteries. However, C Batteries of other manufacturers are also acceptable.



RADIO SERVICE MANUAL AND PARTS LIST

FILE NUMERICALLY IN SERVICE INFORMATION SECTION OF SERVICE REFERENCE FILE

No. 603-468

CORONADO RADIO



Coronado "66"

MODEL NO. RA48-9903A

MODEL RA 48-9903A

MODEL NO. RA48-9903A

TRANSISTOR COMPLEMENT

- RAYTHEON TYPE FUNCTION
 2N485 Oscillator Mixer
 2N483 I. F. Amplifier
 CK879 Detector
 2N482 Audio Amplifier
 2N631 Audio Output
 CK879 Overload - A.G.C.

ELECTRICAL SPECIFICATIONS

- Power Supply 9 volts — 6 Eveready #936
 "C" Batteries
 Frequency Range 540 to 1650 Kilocycles
 Intermediate frequency 455 K.C.
 Tuning two gang capacitor
 Speaker 4" PM 3.2 ohm voice coil impedance
 Power output 50 milliwatts maximum
 Sensitivity 200 microvolts at 5 milliwatts

GENERAL SERVICING INFORMATION

CAUTION
 Never attempt to check a transistor with an Ohmmeter. Do not use heavy soldering iron; use small soldering iron, pencil type, having a rating of not more than 35 watts.

ALIGNMENT PROCEDURE

1. Connect 1 volt OUTPUT METER across the voice coil.
2. Set volume control to maximum.
3. Use plastic alignment tool to prevent detuning.
4. Keep input signal from Generator at minimum value to give indication on meter.
5. Use a level between .1 and .2 volts on A.C. meter.
6. Measurements taken at 5 milliwatt level or .13 volts.
7. Modulation for alignment - 1000 cycles - 30%.

I.F. ALIGNMENT		R.F. ALIGNMENT		REMARKS
STEP	Signal/Generator Connections	Generator Frequency	Receiver Dial Setting	ADJUST
1	High end to loop stick secondary winding. Ground to chassis - use .1 mfd. dummy.	455 K.C. modulated	Receiver Gang Fully open	FERRITE CORES T1 - T2 T3
2	Spray signal using loop of wire close to loop stick	1650 modulated	Receiver Gang Fully Open	O.S.C. Trimmer C-4
3	Same as step 2	540 K.C. modulated	Receiver Gang Fully closed	O.S.C. Slug L-2
4	Same as step 2	1400 K.C. modulated	1400 K.C.	Antenna Trimmer C-2
5	Same as step 2	600 K.C. modulated	600 K.C.	Adjust L-2
6	Repeat steps 4 and 5 for maximum output.			Rock in gang for maximum output

MODEL NO. RA48-9903A

REPLACEMENT PARTS LIST

When ordering parts, specify part number, model number and series

RESISTORS

Ref. No.	Description	Part No.
R 1	33-K-OHM 1/2 watt 10%	160-135B
R 2	2200 OHM 1/2 watt 10%	158-114
R 3	1000 OHM 1/2 watt 10%	158-113
R 4	120 OHM 1/2 watt 10%	158-115
R 5	100 OHM 1/2 watt 10%	158-114
R 6	220-K-OHM 1/2 watt 10%	158-114
R 7	2200 OHM 1/2 watt 10%	158-114
R 8	470 OHM 1/2 watt 10%	158-119
R 9	1500 OHM 1/2 watt 10%	158-114
R 10	10-K-OHM 1/2 watt 10%	158-114
R 11	1000 OHM 1/2 watt 10%	158-114
R 12	120-163	158-114
R 13	180-188	158-114
R 14	180-190	158-114
R 15	180-192	158-114
R 16	180-149	158-114
R 17	180-121	158-114

CONDENSERS

Ref. No.	Description	Part No.
C1, C2	VARIABLE CONDENSER	160-135B
C3, C4	01 MFD-DISC CAP 20%	158-114
C 5	01 MFD DISC CAP 20%	158-113
C 6	4.7 MMF NPO 5%	158-114
C 7	02 MFD-DISC CAP 20%	158-114
C 8	05 MFD-DISC CAP 20%	158-114
C 9	02 MFD-DISC CAP 20%	158-114
C10	3.5 MMF NPO 5%	158-119
C11	50 MFD-DISC CAP 20%	158-114
C12	12 MFD-10V PIGTAIL INSUL.	158-132
C13	02 MFD-DISC CAP 20%	158-114
C14	12 MFD-10V PIGTAIL INSUL.	158-132
C15	02 MFD-DISC CAP 20%	158-114
C16	25 MFD-10V PIGTAIL INSUL.	158-133
C17	02 MFD-DISC CAP 20%	158-114
C18	100 MFD-10V PIGTAIL INSUL.	150-148
C19	25 MFD-10V PIGTAIL INSUL.	150-133
C20	100 MFD-10V PIGTAIL INSUL.	150-148
C21	05 MFD-DISC CAP 20%	158-111

COILS AND TRANSFORMERS

Ref. No.	Description	Part No.
T 1	1/2 K TRAN EX 08175 (MOD)	130-139
T 2	1/2 K TRAN EX 08176	130-140
T 3	1/2 K TRAN EX 08177	130-141
T 4	OUTPUT TRANS. 4A99 500-3.2	138-144
L 1	LOOP-STICK 11/32x6 1/2 x 1/8	132-145
L 2	OSC. WITH TINN. CLIP	136-146

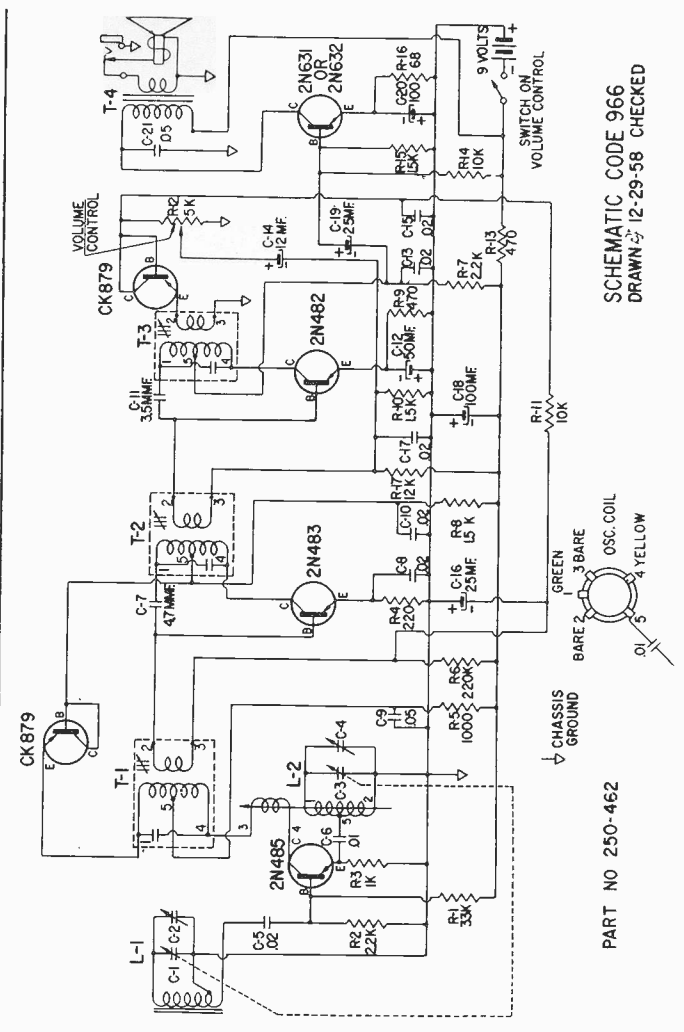
CABINET AND ACCESSORIES

Ref. No.	Description	Part No.
195-231	HOLDER LOOPSTICK ANT.	195-231
195-196A	(2) PLASTIC	195-196A
195-197B	BATTERY COMPARTMENT TOP	195-197B
195-202	BATTERY COMPARTMENT BOTTOM	195-202
210-179	SPRING CONTACTS SET	210-179
210-167E	CORONADO NAME PLATE	210-167E
205-146F	CABINET SHELL (IN CTN.)	205-146F
220-180C	GRILLE, PLASTIC	220-180C
220-160	KNOB CALIBRATION DISC W.A.	220-160
240-165	TUNING-KNOB (Drive) W.A.	240-165
240-134	HANDLE	240-134
220-178	SPEAKER BAFFLE	220-178

CHASSIS AND TRANSFORMERS

Ref. No.	Description	Part No.
T 1	1/2 K TRAN EX 08175 (MOD)	130-139
T 2	1/2 K TRAN EX 08176	130-140
T 3	1/2 K TRAN EX 08177	130-141
T 4	OUTPUT TRANS. 4A99 500-3.2	138-144
L 1	LOOP-STICK 11/32x6 1/2 x 1/8	132-145
L 2	OSC. WITH TINN. CLIP	136-146

* FEDERAL EXCISE TAX INCLUDED
 Prices Shown Are Approximate and Subject to Change Without Notice.
 Part No. 250-452



SCHEMATIC CODE 966
 DRAWN 12-29-58 CHECKED

PART NO 250-462

Key No. RA50

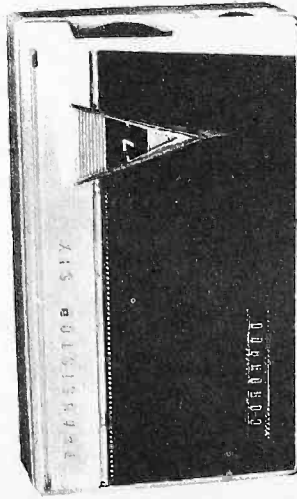


RADIO SERVICE MANUAL AND PARTS LIST

No. 603-461

FILE NUMERICALLY IN SERVICE INFORMATION SECTION OF SERVICE REFERENCE FILE

CORONADO Six Transistor POCKET RADIO



MODEL RA 50-9902A

SPECIFICATIONS

- Transistors.....6 Transistors plus thermistor and crystal diode
 - Power Source .9V battery such as Gambles No.17-330 Eveready No. 216, and NEIDA No. 1604
 - Frequency Range...Tunes through 540 KC & 1640 KC
 - Speaker.....2.25" P.M. Alnico V
 - Voice Coil Impedance.....11 ohms at 400 cps
 - Power Consumption.....No signal - 6 MA Loud Signal - 25 MA
 - Antenna.....Ferrite Rod
 - Intermediate Frequency.....455 KC
 - Sensitivity.....500 microvolts per meter for 10 milliwatts output
 - Selectivity......8 KC at 6 db bandwidth
- Warning: An old or exhausted battery may damage the radio. Remove battery from cabinet if radio is to stand un-used for a long period of time.

TRANSISTOR COMPLEMENT

- 2S52.....Converter
- 2S45.....1st I.F.
- 2S53.....2nd I.F.
- 1N60.....2nd Detector
- 2S54.....A.F. Driver
- 2S56.....(2) Matched P.P. Output

MODEL RA 50-9902A

GENERAL DESCRIPTION

The Coronado "Six Transistor" Pocket Portable uses six transistors and a thermistor and diode of the latest types for best performance.

The receiver uses a superheterodyne circuit, designed on a printed circuit board, and consists of: one (1) converter stage, two (2) stages of I.F. amplification, a second detector, an audio driver stage and a push-pull class "B" output stage.

An automatic gain control is used on the 1st and 2nd IF stages. A ferrite rod antenna provides high signal pickup and excellent image rejection.

The I.F. Transformers are of permeability design for high gain and maximum stability.

For private listening, an earphone socket is provided for insertion of an earphone, which automatically disconnects the speaker.

REMOVAL OF PRINTED BOARD FROM CABINET

1. Open rear panel, and remove two screws holding the printed board to the cabinet.
2. Lift the printed board out of cabinet.
3. Unsolder speaker leads and remove the round nut of earphone jack.

ALIGNMENT INSTRUCTIONS

To check and reset alignment of the receiver, connect an output meter across the speaker coil lugs, set volume at maximum and feed signals into receiver as below outlined reducing signal generator to provide no more than 0.4 volts on the output meter.

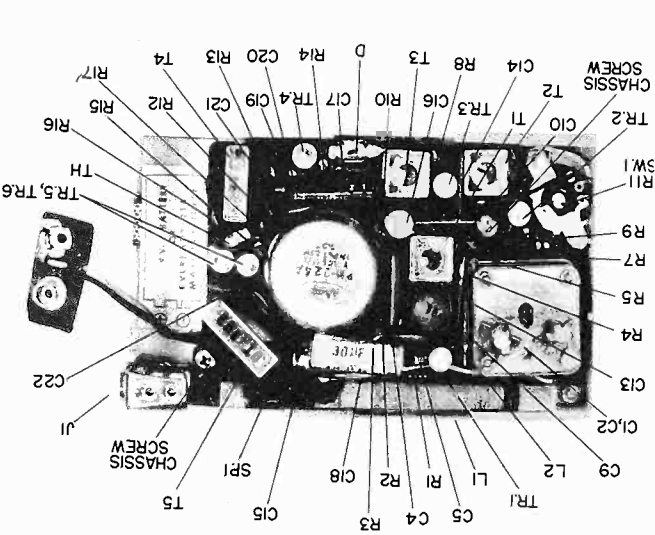
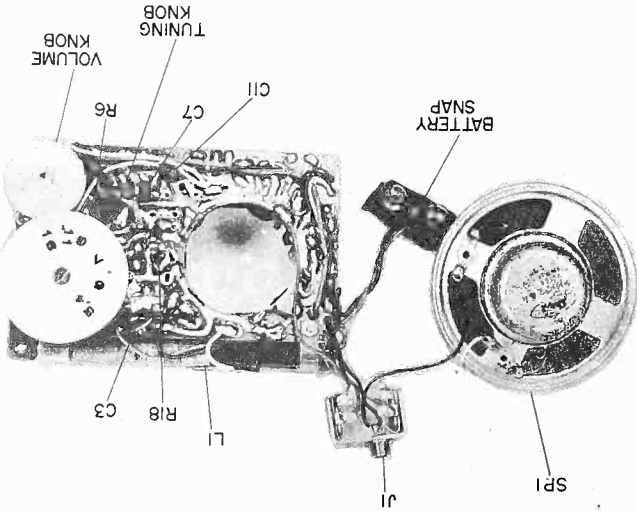
TEST OSCILLATOR					
STEP	Set Receiver Dial To	Adjust Test Oscillator Frequency To:	Use Dummy Antenna in Series With Output of Signal Generator Consisting Of:	Attach Output of Signal Generator To:	Refer to Fig. 2 for Location of Alignment Adjustments
1	Tuning gang fully open (Min. capacity)	455 KC	.05 MFD Condenser	High side of signal generator to base of converter trans. Ground lead of S.G. to common Ground.	Using a Non-metallic alignment tool, adjust all three I.F. transformer cores for maximum output.
2	Tuning gang fully open (Min. capacity)	Exactly 1670 KC	Loosely couple generator output to ferrite stick antenna. Wind a short length of insulated hookup wire loosely around the antenna coil several times, and connect generator output to one end of this wire. Generator ground lead remains connected to printed board common Ground.		Adjust trimmer C2B for maximum output.
3	1400 KC	1400 KC	Leave connected as above.		Adjust trimmer C1B for maximum output.
4	600 KC	600 KC	Leave connected as above.		Check alignment of antenna loop by connecting a piece of powdered iron (such as a coil slug) near the antenna loop stick, then a piece of brass. If iron increases output, loop requires more inductance. If brass increases output, loop requires less inductance. Change loop inductance by altering number of turns or by changing diameter of wire. Increase inductance, or way to decrease inductance, if a large change was required, repeat Step 3.
NOTE: DO NOT PERFORM THE FOLLOWING STEPS UNLESS THE OSCILLATOR CORE HAS BEEN TAMPED.					
5	Tuning gang fully closed (max. capacity)	Exactly 525 KC	Leave connected as above		Adjust oscillator core for maximum output.
6	Tuning gang fully open (Min. cap.) Same procedure as in step 2	Exactly 1670 KC	Leave connected as above.		Adjust trimmer C2B for maximum output
7	Repeat steps 5 & 6 until oscillator covers required range. Step 6 should be in the last adjustment.				
8	Repeat steps 3 & 4				

COMPONENT REPLACEMENT

- VERY IMPORTANT:** Use only a small low wattage soldering iron (25 watts) in servicing this printed board. When replacing a transistor, the heat must be carried away from the transistor to prevent heat damage to the transistor electrodes.
- Grasp transistor leads with a pair of long-nose pliers to dissipate the heat.
 - Apply soldering iron for a short while only, otherwise the excessive heat will burn the very thin printed leads or loosen them from the board material.
 - Lift transistor leads off the board one by one with the pliers.
 - Clean all the solder from connecting holes and place new transistor into the holes.
 - Make sure that the collector, marked with a red dot, is connected to its proper hole.
 - When removing defective components, heat each pigtail or lug individually and shake or brush off as much solder as possible.
 - Printed connections or leads, if damaged, may be replaced with a regular hook up wire.

SERVICE HINTS

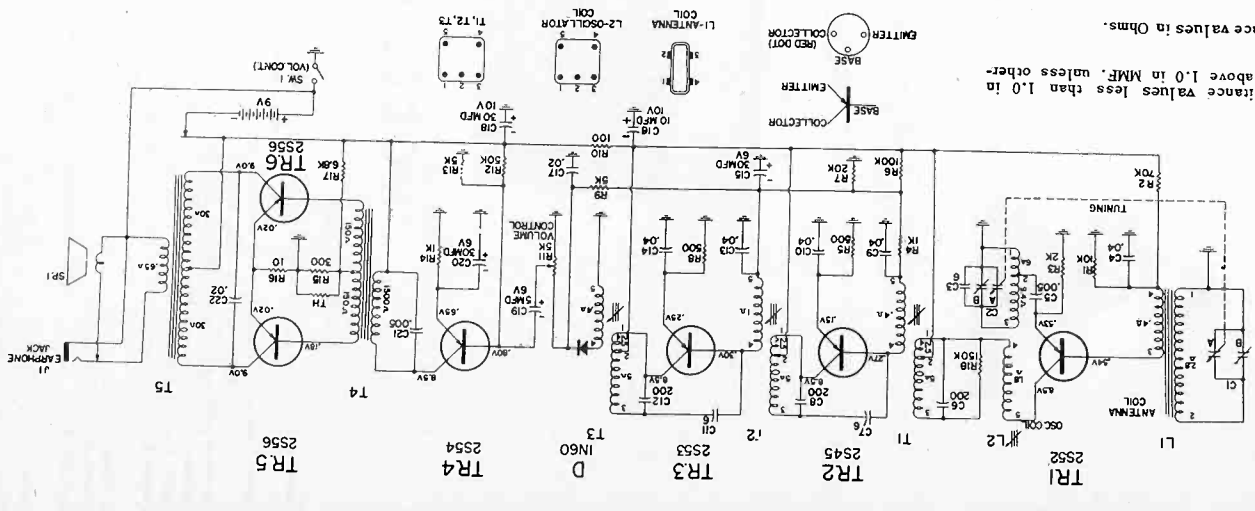
- The procedure to be followed in servicing transistor radios is very much the same as for vacuum tube radios although certain precautions must be observed.
- The service hints described below should be carefully read before attempting to service this radio receiver.
- The first thing to check when the receiver is inoperative — is the battery pack. With the receiver turned "on", a new battery pack should test 9 volts when measured with a sensitive voltmeter, although the radio can be expected to operate with batteries which test 8 volts or more.
 - It is possible to damage a transistor when testing circuit continuity. Since a transistor needs only a low voltage applied to its terminals for conduction, use of an ohmmeter having an internal battery voltage of more than 7.5 volts, will damage the transistor.
 - Testing continuity of a circuit which includes a transistor. A transistor in the conduction direction is low in comparison to the resistance in the non-conduction direction. It is more reliable to make voltage measurements and check if voltages shown on the schematic diagram are present. Reference to the schematic diagram and to the printed board artwork will permit tracing the circuit and locating components on the printed board.
 - To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurement should be made.
 - Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as has been done for many years with the conventional vacuum tube radios.
 - The base of a transistor is connected in series with a capacitor to avoid shorting out bias voltages.
 - The collector is the signal output terminal (corresponding to signal grid of tubes).
 - The emitter is the common terminal (corresponding to cathode of tubes).
 - Oscillator performance can not be judged by measurement of a DC voltage developed across a resistor. Measurement of oscillator signal strength with an A.C. VTVM at the emitter will give an indication of oscillator performance.
 - In class "B" output, used in the receiver, the battery current increases greatly with increased signal input (over 60 MA with volume control set at maximum).
 - Do not short across the base and collector terminals of the transistor while the radio is operating, as permanent damage to the transistor may result.



**REPLACEMENT PARTS LIST
MODEL RA50-9902**

Ref. No.	No.	Description	Ref. No.	Description
R1	10,000 Ohms 10% 1/4 Wt.	R1	LA-502	Loop ferrite
R2	70,000 Ohms 10%	R2	7030	Oscillator coil
R3	2,000 Ohms 10%	R3	8511	1st IF trans.
R4, R14	1,000 Ohms 10%	R4	8503	2nd IF trans.
R5, R8	500 Ohms 10%	R5	8518	3rd IF trans.
R6	100,000 Ohms 10%	R6	T-453	Driver trans.
R7	20,000 Ohms 10%	R7	OT-301	Output trans.
R9, R13	5,000 Ohms 10%	R9	PM-224A	Speaker 2 1/2"
R10	400 Ohms 10%	R10	J-992	Cabinet, complete with back cover, grill, trim.
R11	Vol. Contr. 5,000 Ohms	R11	K-506	Volume knob
R12	50,000 Ohms 10% 1/4 Wt.	R12	K-516 EX	Tuning knob
R15	300 Ohms 10%	R15	J-1007	Earphone Jack w/nut type "H"
R16	10 Ohms 10%	R16	MR-1A	Earphone
R17	6,800 Ohms 5%	R17	SN-4D	Battery snap
R18	150,000 Ohms 10%	R18	M8601	Thermistor
C1, C2	Variable capacitor	C1	2S52	Converter
C3, C7, C11	6 MMFD	C3	TR2	1st IF
C4, C9, C10	.04 MFD.	C4	TR3	2nd IF
C13, C14	.005 MFD.	C5	TR4	2nd IF
C5, C21	200 MMFD (with I.F.T.)	C6, C8, C12	TR5, TR6	Audio Driver (Matched) D.P. Output
C6, C8, C12	Electrolytic 6V-30 MFD	C17, C22	IN60	2nd Detector
C15, C20	Electrolytic 10V-30 MFD.	J1		
C17, C22	Electrolytic 6V-5 MFD.	J2		
C18	Electrolytic 10V-10-MFD.	J3		
C19		J4		
C16		J5		

FOR PRICES: SEE CORRESPONDING KEY NUMBER IN PRICE LIST



All Capacitance values less than 1.0 in MFD, and above 1.0 in MMFD, unless otherwise noted.

All resistance values in Ohms.

PRELIMINARY SERVICE DATA

S-P776A
RADIO
MODEL
P776A

SPECIFICATIONS

CABINET:	Top Grain Leather
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 Model P776 is a transistor battery operated portable radio.
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.

Use saddlesoap to clean leather portion of cabinet.

CHASSIS REMOVAL

1. Remove volume and tuning knobs.
 2. Open cabinet flap and remove batteries.
 3. Remove screw located in center of battery compartment.
 4. Pull cabinet apart.
 5. Unsolder two leads from speaker.
 6. Remove hex-head screws holding chassis board and volume control bracket to cabinet bosses.
 7. Move chassis slightly out and unsolder lead to dial light button lug; then remove chassis.
- Note: to replace dial light, follow steps 1 thru 5 as above; and lift chassis out.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. To measure the total battery current, unsolder the lead from the + terminal on the chassis side of the battery compartment and insert a milliammeter in series with the lead and + terminal. (The total battery current can also be measured by means of a "battery current quiescent checker." Construction of this current checker is outlined on the schematic. Merely insert this checker between the + and - of two batteries in the battery compartment and attach a milliammeter to the alligator clips on the checker.) The total current drain should be between 12-25 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.

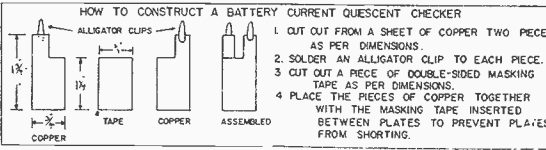
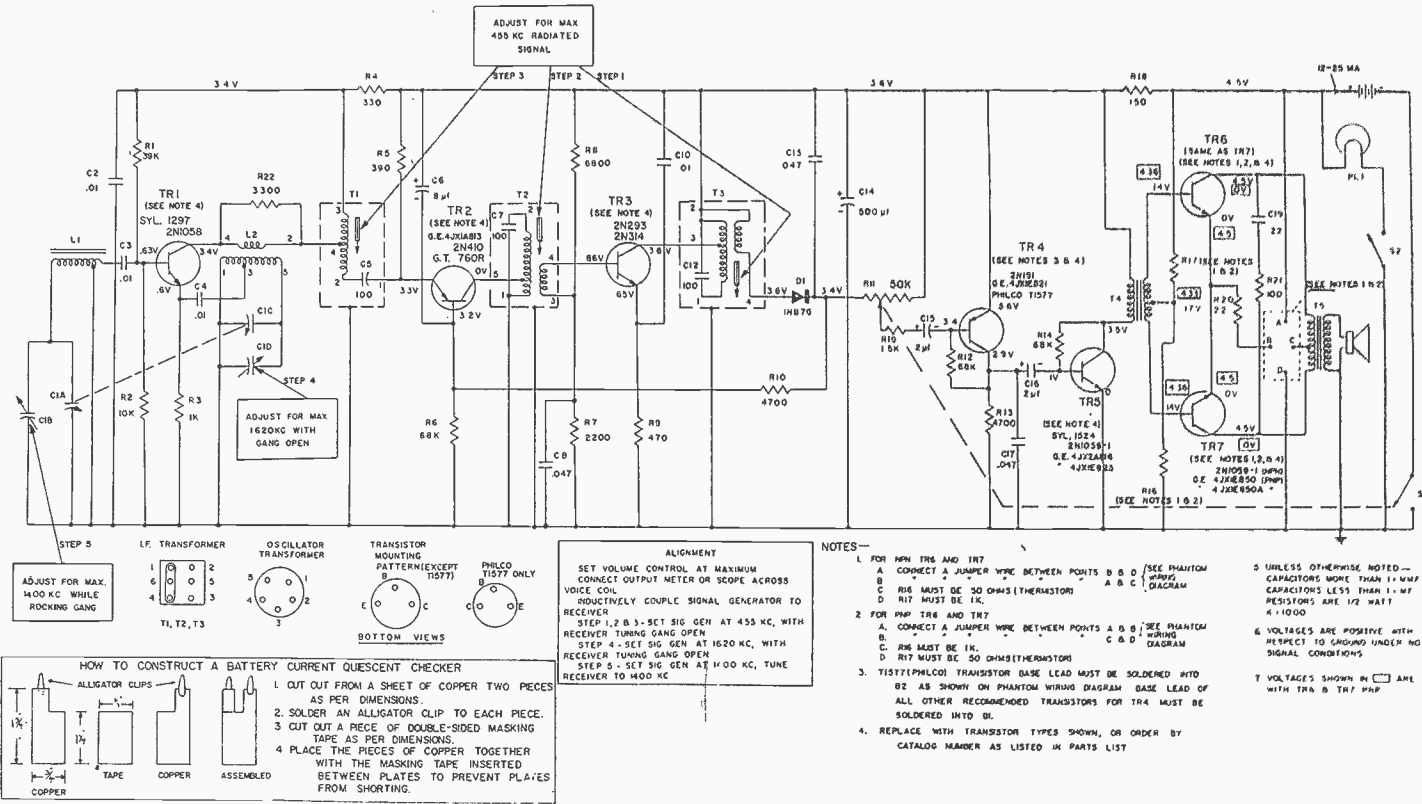
Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs and increase electrical resistance. The terminals on the batteries should be cleaned to insure positive electrical contact.

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

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

REPLACEMENT PARTS LIST - P776A

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2,3	.01mf., 450V.	.30
	4,10	8mf., 15V.	1.10
RS-1592	C6	Capacitor, Tuning.	3.70
*-RS-1958	C1	2mf., 10V.	1.20
*-RS-1959	C15,16	500mf., 6V.	1.75
*-RS-1960	C14	.047mf., 50V.	
	C8,17	.02mf., 50V.	
	C13	.22mf., 50V.	
	C19		
RESISTOR			
RS-1355	See Notes 1 & 2	50 ohms, thermistor.	.50
POTENTIOMETER			
*-RS-1957	R11, S1	Control, Volume, 50K and Sw.	1.55
COILS AND TRANSFORMERS			
RS-1424	T1	Transformer, 1st I.F.	2.00
*-RS-1961	T4	Transformer, Driver.	3.30
*-RS-1962	T5	Transformer, Output.	3.65
*-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-1531s	TR1	Osc. Conv.	3.55
RS-1539s	TR2	1st I.F.	3.30
RS-1537s	TR3	2nd I.F.	3.15
RS-1540s	TR4	1st Audio.	2.80
*-RS-1549s	TR5	Driver.	1.65
RS-1549s	TR6-7	Audio Output (use when TR6 (NPN) and TR7 are PNP).	1.65
RS-1542s	TR6-7	Audio Output (use when TR6 (PNP) and TR7 are PNP).	3.20
RS-1811	DI	Diode (1N87G) was RED-001.	1.90



ALIGNMENT
SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT METER OR SCOPE ACROSS
VOICE COIL
INDUCTIVELY COUPLE SIGNAL GENERATOR TO
RECEIVER
STEP 1, 2, 3 - SET SIG GEN AT 455 KC, WITH
RECEIVER TUNING GANG OPEN
STEP 4 - SET SIG GEN AT 1620 KC, WITH
RECEIVER TUNING GANG OPEN
STEP 5 - SET SIG GEN AT 1000 KC, TUNE
RECEIVER TO 400 KC

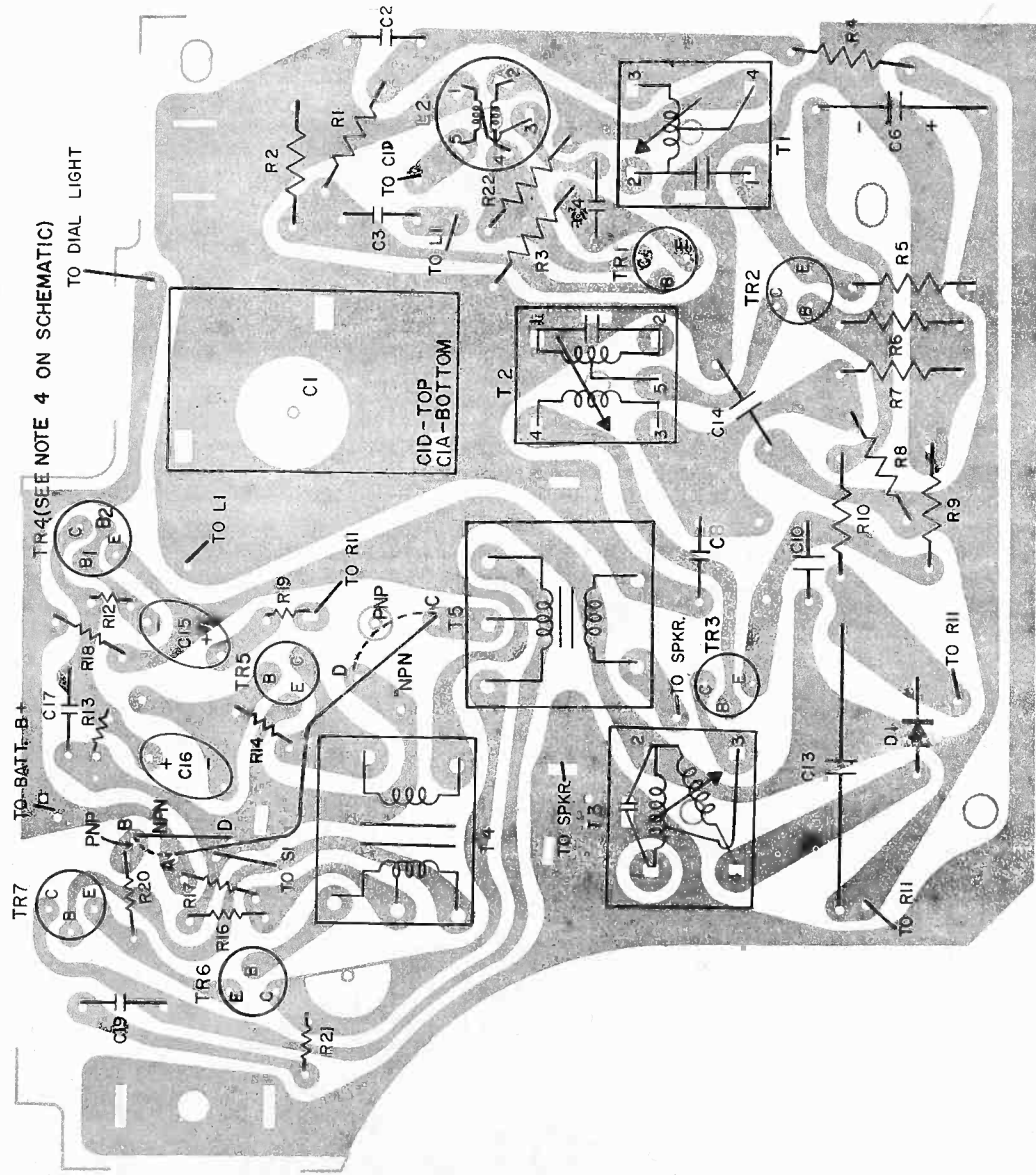
- NOTES**
1. FOR PNP TR6 AND TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS B & D (SEE PHANTOM WIRING DIAGRAM)
B. R16 MUST BE 50 OHMS (THERMISTOR)
C. A, B, C, D - SEE PHANTOM WIRING DIAGRAM
D. R17 MUST BE 1K
 2. FOR PNP TR6 AND TR7
A. CONNECT A JUMPER WIRE BETWEEN POINTS A, B & C (SEE PHANTOM WIRING DIAGRAM)
B. R16 MUST BE 1K
C. R17 MUST BE 50 OHMS (THERMISTOR)
D. R17 MUST BE 50 OHMS (THERMISTOR)
 3. T157T1 (PMLCO) 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
 5. UNLESS OTHERWISE NOTED - CAPACITORS MORE THAN 1 MF. CAPACITORS LESS THAN 1 MF. RESISTORS ARE 1/2 WATT 4% TOLERANCE
 6. VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND UNLESS INDICATED OTHERWISE
 7. VOLTAGES SHOWN IN [] ARE WITH TR6 & TR7 PNP

PARTS LIST (CONT'D)		DESCRIPTION		PRICE	
CAT. NO.	DESCRIPTION	CAT. NO.	DESCRIPTION	PRICE	PRICE
MISCELLANEOUS					
RB-1057	Speaker, 4"	*RB-1097	Cabinet, (with mounting Board and Pilot Light well)	5.45	20.00
RS-1188	Clamp, Antenna	*RS-1945	Grille	.15	4.80
RS-1323	Light, Pilot, #12	*RS-1946	Knob, Tuning	.25	.95
RS-1808	Ring, Compression, (knob)	*RS-1947	Knob, Volume	.03	.50
RS-1809	Clip, Speaker Mounting	*RS-1948	Button, Pilot Light	.10	.10
RS-1810	Fastener, Speaker Mounting	*RS-1949	Insert, Pilot Light	.04	.80
*RS-1950	Contact, Pilot Light			.05	
*RS-1951	Spring, Push Button			.20	
*RS-1952	Screw, Cabinet			.65	
*RS-1953	Socket, Pilot Light			.20	
*RS-1954	Battery Contact, (Neg.)			.20	
*RS-1955	Battery Contact, (Pos.)			.20	
*RS-1956	Screw, Cabinet Lock			.05	

*" 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.



PHANTOM WIRING DIAGRAM

S-P 795
COVERS
MODELS
P 795
P 796
P 797

PRELIMINARY SERVICE DATA

SPECIFICATIONS	
CABINET:	P795A Black P796A Pastel Blue P797A Light Beige
BATTERIES:	4 Batteries; Eveready #950, Burgess #2R or equivalent.
POWER OUTPUT:	Undistorted: 80 Milliwatts Maximum: 150 Milliwatts
TRANSISTOR COMPONENT:	TR1 Osc.-Conv. 2N168A, 2N212 / 1297 / 2N135 TR2 1st I.F. 2N293 or 2N314 TR3 2nd I.F. 2N192 or 2N324 TR4 Audio Amplifier 2N241A, 2N321 or 2N270 TR5 Audio Output 2N241A, 2N321 or 2N270
GERMANIUM DIODE:	D1 Detector 1N87

GENERAL INFORMATION

The models P795A, P796A, and P797A are all transistor battery operated portable radios. The B+ is supplied by four 1 1/2 volt flashlight type batteries producing the total B+ of 6 volts.

CHASSIS REMOVAL

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

TROUBLESHOOTING

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

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

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

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

NO RECEPTION:

1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:

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

INTERMITTENT:

1. Check battery contacts for corrosion.
 2. Check solder connections on dip-soldered side of circuit board.
- Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. Remove batteries and bend both the contact springs and holding springs inward to increase their tension. Oxidation may occur on the contacts of the batteries themselves. This tends to insulate the batteries from the battery contact springs, and increase electrical resistance. The terminals on the batteries should be cleaned with emery cloth to insure positive electrical contact.

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

TRANSISTOR REPLACEMENT

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

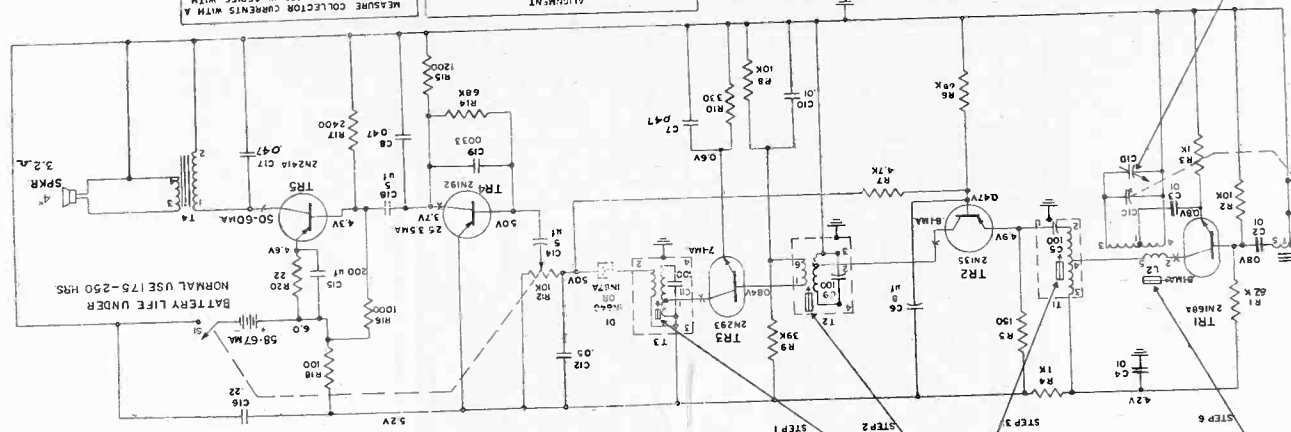
REPLACEMENT OF COMPONENTS

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.

PRELIMINARY REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
*-RS-1832	C1, A, B, C, D	Tuning Capacitor.....	3.55
	C2, 3, 4, 10	.01mf., 450V.....	1.10
RS-1592	C6	.8mf., @10V., Elect.....	1.20
	C7, 8, 17	.047mf., 450V.....	1.20
*-RS-1812	C14, 18	5mf., @10V., Elect.....	1.20
*-RS-1814	C15	200mf., 4.5V., Elect.....	.45
*-RS-1813	C16	.22mf., 100V.....	
	C19	.003.....	
POTENTIOMETER			
*-RS-1834	R12, S1	Vol. Cont. 10K & Sw.....	1.85
COILS & TRANSFORMERS			
RS-1424	T1	1st I.F. Transformer....	2.00
RS-1425	T2	2nd I.F. Transformer....	1.95
RS-1426	T3	3rd I.F. Transformer....	2.10
RS-1427	L2	Oscillator Coil.....	1.20



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

STEP 1
RECEIVER TUNING GANG OPEN
STEP 1.2 & 3. 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 580 KC. TUNE RECEIVER TO 580 KC.

STEP 2
MEASURE COLLECTOR CURRENTS WITH A MILLIAMETER INSERTED IN SERIES WITH THE BATTERY CURRENT AT POINT MARKED "X" UNLESS OTHERWISE NOTED
CAPACITORS WORK THAN 1-MF. RESISTORS 1/2 W CARBON
VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND

STEP 3
ADJUST FOR MAX. 1500 KC. WHILE ROCKING GANG

STEP 4
ADJUST FOR MAX. 580 KC. WHILE ROCKING GANG

STEP 5
ADJUST FOR MAX. 1500 KC. WHILE ROCKING GANG

STEP 6
ADJUST FOR MAX. 580 KC. WHILE ROCKING GANG

TRANSISTORS
NPN TRANSISTOR
PNP TRANSISTOR

OSC. COIL
L2

1.F. TRANSFORMER
T1, T2, T3

TOP VIEW

MODELS P795, 796, 797

REPLACEMENT PARTS LIST (CON'T.)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
RS-1428	T4	Output Transformer.....	2.85	RS-1057	Speaker 4".....	5.45
*RS-1831	L1	Antenna.....	1.85	RS-1188	Clamp, Antenna.....	.15
				RS-1320	I.F. Clip Strap, Strain relief.....	.04
				RS-1341	Battery Clip & Clamp (Pos) (Right Cent. Battery).....	.30
RS-1531s	TR1	Oscillator Conv.....	3.55	RS-1342	Battery Clip & Clamp (Neg) (Left Cent. Battery).....	.30
RS-1539s	TR2	1st I.F.....	3.30	RS-1344	Bracket, Antenna, (R.H.).....	.90
RS-1537s	TR3	2nd I.F.....	3.15	RS-1345	Bracket, Antenna, (L.H.).....	.70
RS-1541s	TR4	Audio Amplifier.....	2.90	RS-1393	Battery Clip (Pos) (Left Battery).....	.20
RS-1542s	TR5	Audio Output.....	3.20	RS-1394	Battery Clip & Clamp (Pos) (Right Battery).....	.30
Δ-RS-1811s	D1	Crystal Diode (was RED001).....	1.90	RS-1395	Battery Clip (Neg) (Right Battery).....	.15
				RS-1396	Battery Clip & Clamp (Neg) (Left Battery).....	.30
				RS-1397	Heat Sink.....	.25
				*RS-1808	Ring, Compression, Speaker.....	.03
				Δ-RS-1809	Ring, Tubular, Speaker (was RHC095).....	.10
				*RS-1810	Speed Clip.....	.04

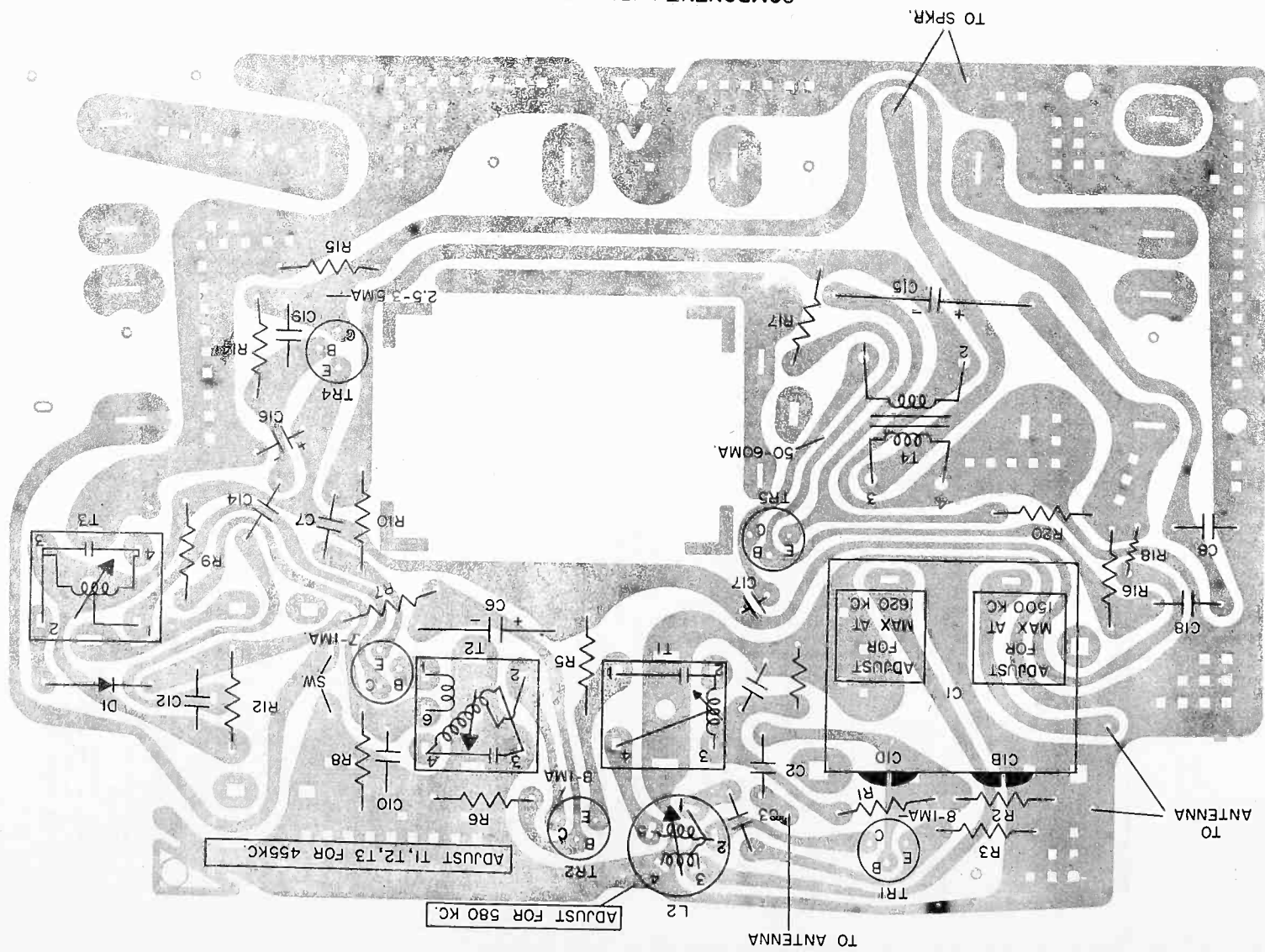
All resistors and capacitors not cataloged are common types obtainable from radio parts jobbers. Refer to schematic for symbols and values.

"*" Denotes Items Not Previously Cataloged.

"Δ" Denotes part used in former radio/phone models. You may have it stocked under number shown in parenthesis. Please change your records to the new number with two-letter prefix.

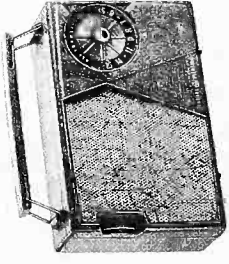
Prices Are Suggested List Prices And Are Subject To Change Without Notice.

COMPONENT WIRING DIAGRAM



S-P805
COVERS
MODELS
P-805
P-806

PRELIMINARY SERVICE DATA



SPECIFICATIONS	
CABINET:	P805 Ant. White P806 Blue
ELECTRICAL RATING:	Mallory M1605 or Eveready 266 or Burgess M6 - Battery Pack 9V
OPERATING FREQUENCIES:	540-1600KC 455 KC I.F.
POWER OUTPUT:	Undistorted 50 MW Maximum 80 MW

TO REMOVE CIRCUIT BOARD

1. Turn screw in cabinet back counterclockwise until it becomes loose (this a captive screw and remains in the cabinet).
2. Insert a coin in either slot on the cabinet bottom and twist to remove the cabinet back.
3. Remove screw holding tuning dial.
4. Remove 3 screws under the tuning dial to release the tuning gang from the cabinet front.
5. Remove one 11/32" nut (bottom center of circuit board) and 3 hexhead screws holding circuit board to bosses on cabinet front.
6. Fold tuning gang and circuit board out of cabinet front toward the volume control end. It is not necessary to remove the volume control to repair the circuit board.

TO REMOVE VOLUME CONTROL

1. Remove cabinet back.
2. Remove hexhead screw from center of volume control knob.
3. Remove chassis.
4. Remove pal nut holding volume control to cabinet front boss.

TO REMOVE SPEAKER

1. Remove cabinet back.
2. Remove chassis.
3. Unsolder speaker wires.
4. Remove clips holding speaker to cabinet front.

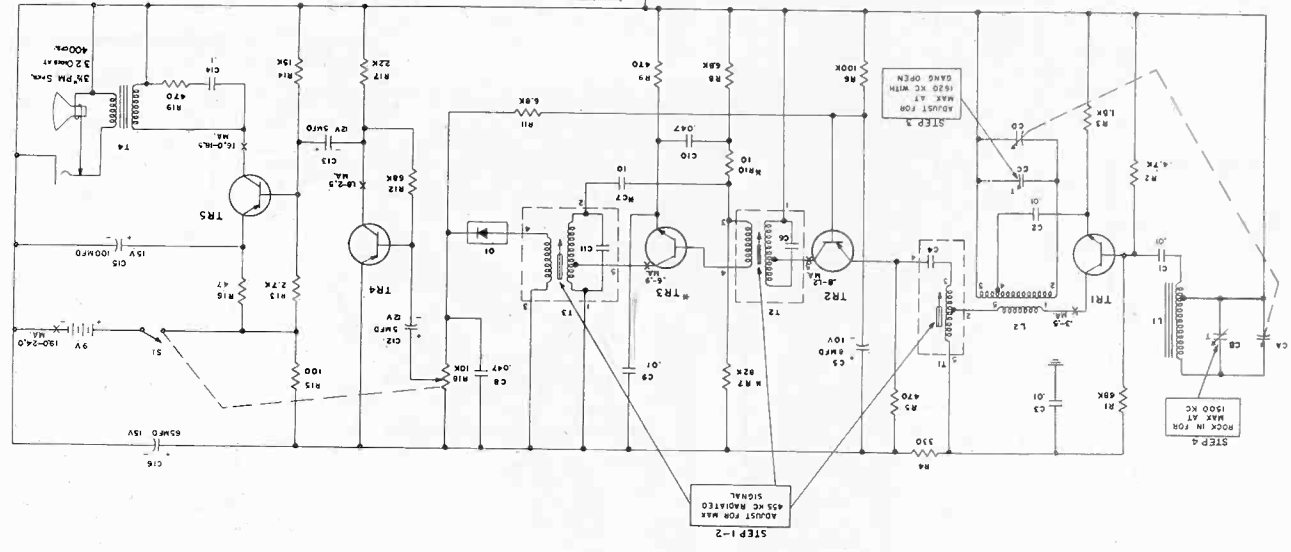
TROUBLE SHOOTING

A check of battery current drain will indicate if a receiver is operating properly. To measure the current drain, remove cabinet back, unsnap ground section of battery terminal and swing away from battery. Connect millimeter between battery terminal and battery contact.
The total current drain should be between 19.0 and 24.0 ma. The current drain is measured with no signal conditions (tuning gang closed) and volume control at maximum.
If an excessive current drain is recorded, the individual collector current readings should be checked on each transistor. Current drain is an important indication of the transistor operating conditions. The proper current values for each transistor are shown on the schematic. An excessive current reading may mean a shorted transistor and no current will indicate an open transistor or other component in the circuit.
A "heat sink" is placed around the output transistor (TR5) and the heat is transferred to the output transformer case via the flexible shield.

It is important that this "heat sink" be in place at all times. If it becomes necessary to replace TR5 remove it from the circuit board and slide the "heat sink" off of the top of the transistor. When installing a new transistor slide the "heat sink" over the top of the new transistor. Do not try to snap the "heat sink" around the transistor body as this will spring it out of shape.
When replacing TR2, mount carefully so that the transistor casing does not touch other circuit components.
Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. This may be caused by oxidation or corrosion of the battery contacts. To correct this problem, remove the oxidation with fine emery cloth or small wire brush.

REPLACEMENT PARTS

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C1, 2,	.01mf.	.30
	3, 9	.01mf.	.30
RS-1590	C16	65mf., @15V., Elect.	1.10
RS-1591	C15	100mf., @15V., Elect.	1.25
RS-1592	C5	8mf., @10V., Elect.	1.10
RS-1593	C12, 13	5mf., @12V., Elect.	1.10
RS-1586	CA, B, C, D,	Tuning Capacitor	3.85
RS-1829	C7	10mf., (was RCM3127)	1.25
POTENTIOMETER			
RS-1587	R18	Vol. Cont. 10K and Sw....	1.80
COILS AND TRANSFORMERS			
RS-1581	T4	Output Transformer	2.55
RS-1582	T1	I.F. Transformer 1st.....	2.05
RS-1583	T2	I.F. Transformer 2nd.....	2.30
RS-1584	T3	I.F. Transformer 3rd.....	2.15
RS-1585	L2	Oscillator Coil.....	.90
RS-1588	L1	Antenna.....	2.35
TRANSISTORS			
RS-1530B	TR1	2N194A (Sylvania).....	3.20
RS-1532B	TR3	2N233A (Sylvania).....	1.95
RS-1539B	TR2	2N135 (General Electric).....	3.30
RS-1543B	TR4	2N406 (RCA).....	2.35
RS-1548B	TR5	2N408 (RCA).....	2.40
RS-1811	DI	Crystal Diode.....	1.90



SET VOLUME CONTROL AT MAXIMUM
CONNECT OUTPUT WIRE ON SCREWS
TO RECEIVER COILS SIGNAL GENERATOR
ACROSS VOICE COIL.
STEP 1-2: SET SIG. GEN. AT 455 KC.
WITH RECEIVER TUNING GANG OPEN.
STEP 3: SET SIG. GEN. AT 455 KC.
WITH RECEIVER TUNING GANG OPEN.
STEP 4: SET SIG. GEN. AT 455 KC.
WITH RECEIVER TUNING GANG OPEN.
STEP 5: SET SIG. GEN. AT 455 KC.
WITH RECEIVER TUNING GANG OPEN.
WHEN TR5 IS 2N135
C1 IS OBTAINED
BY A JUMPER
IN BATTERY CIRCUIT.

TRANSISTOR MOUNTING
OSCILLATOR TRANSFORMER
I.F. TRANSFORMER

TRANSISTOR CHART

TR1	2N194	2N135	2N169	2N192	2N241A
TR2	2N135	2N169	2N192	2N241A	
TR3	2N135	2N169	2N192	2N241A	
TR4	2N135	2N169	2N192	2N241A	
TR5	2N135	2N169	2N192	2N241A	

When a 2N169 is used in position (TR1) resistor R1 should be 82K
When a 2N122 (1297) is used in position (TR1) resistor R1 should be 33K

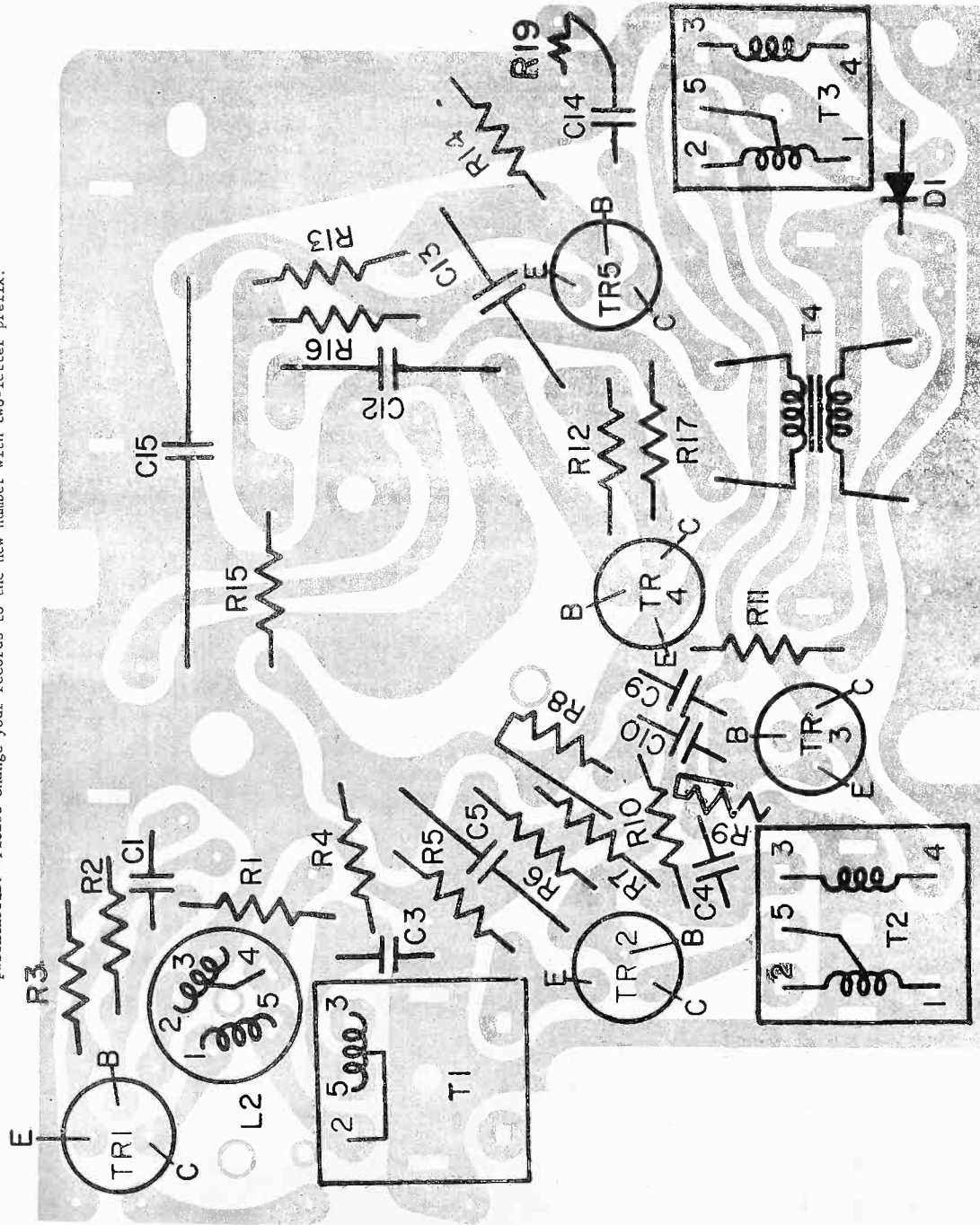
REPLACEMENT PARTS		PRICE	CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS					
RS-1195	Jack, Earphone.....	.90			
RS-1363	Screw, Tuning dial.....	.40			
RS-1578	Ball, Handle.....	.05			
*RS-1827	Screw, Cabinet Lock.....	.10			
RS-1589	Battery Contact Assem.....	.35			
RS-1594	Clip, U Type.....	.05			
RB-1083	Speaker 3.2ohms 3 1/2".....	4.95			
*RS-1830	Screw (cir. board to cab. front)	.35			
RS-1019s	Earphone Assem.....	4.95			
*RS-1833	Ring Retaining (Cabinet Lock)...	.04			
CABINET AND APPEARANCE ITEMS					
*RB-1095	Cabinet Front, Back, Grille,				4.95
	Insert P805.....				
*RB-1096	Cabinet Front, Back, Grille,				4.95
	Insert P806.....				
RS-1573	Knob, Tuning.....				.50
RS-1574	Insert.....				.35
RS-1575	Grille Assem.....				1.20
RS-1576	Knob, Volume.....				.35
*RS-1825	Handle P805.....				.60
*RS-1826	Handle P806.....				.60

*-Denotes Parts Not Previously Cataloged.

Prices Are Suggested List Prices Subject To Change Without Notice.

All Parts Not Listed By Cat. Nos. Are Common Items, Obtainable From Local Radio Parts Jobbers.

Δ Denotes part used in former radio/phone models. You may have it stocked under number shown in parenthesis. Please change your records to the new number with two-letter prefix.



PRELIMINARY SERVICE DATA

S-P770A
RADIO
MODELS
P770A
P771A

SPECIFICATIONS	
CABINET:	Plastic - P770A, Ant. White P771A, Green
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 P770A and P771A 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

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.

TROUBLESHOOTING

The total battery current drain should always be ascertained before proceeding with the servicing of this receiver. To measure the total battery current, unsolder the lead from the + terminal on the chassis side of the battery compartment and insert a milliammeter in series with the lead and + terminal. (The total battery current can also be measured by means of a "battery current quiescent checker." Construction of this current checker is outlined on the schematic. Merely insert this checker between the + and - of two batteries in the battery compartment and attach a milliammeter to the alligator clips on the checker.) The total current drain should be between 12-25 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.

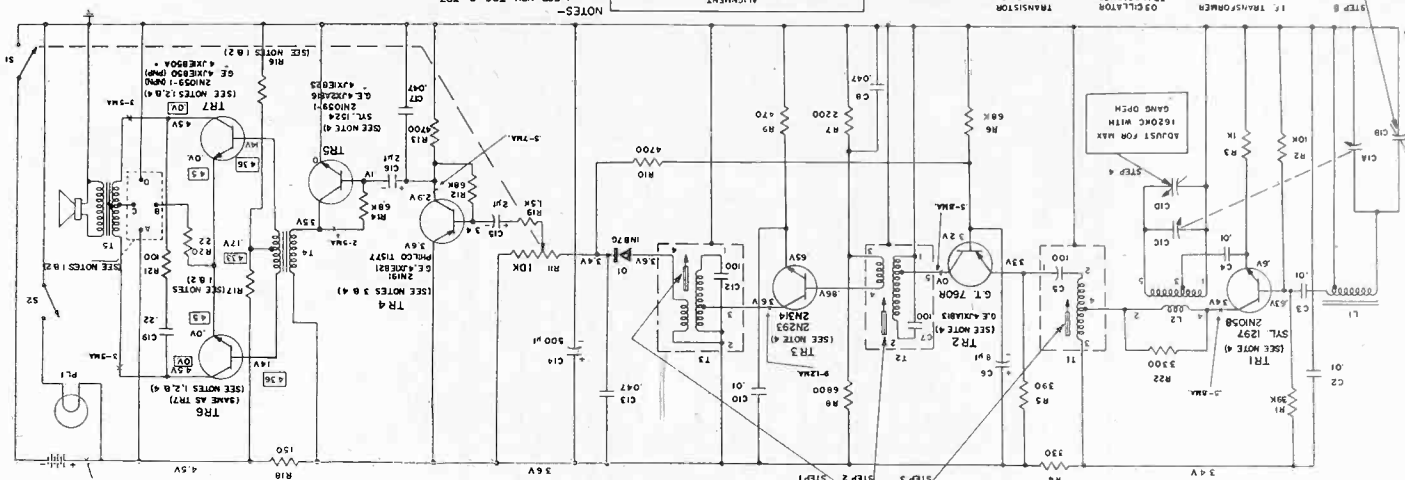
Intermittent, weak, distorted audio or motorboating is frequently caused by run-down batteries. Contact surfaces of batteries and contact springs inside battery compartment must always be clean and bright.

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.

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

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

REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RS-1022	C2,3	.01mf., 450V.....	.30
	4,10	8mf., 15V.....	1.10
RS-1592	C6	Capacitor, Tuning.....	3.60
*RS-2029	C1	2mf., 10V.....	1.20
RS-1959	C15,16	500mf., 5V.....	1.75
RS-1960	C14	.047mf., 50V.....	
	C8,17	.047mf., 200V., paper	
	C13	.22mf., 50V.....	
	C19		
RESISTOR			
RS-1355		See Notes 50 ohms, thermistor.....	.50
		1 & 2	
POTENTIOMETER			
*RS-2028	R11, S1	Control, Volume, 10K and Sw.	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.....	3.30
RS-1537	TR3	2nd I.F.....	3.15
RS-1540	TR4	1st Audio.....	2.80
RS-1549	TR5	Driver.....	1.65
RS-1549	TR6-7	Audio Output (use when TR6	1.65
	(NPN)	and TR7 are NPN).....	
RS-1542	TR6-7	Audio Output (use when TR6	3.20
	(PNP)	and TR7 are PNP).....	
RS-1811	D1	Diode (1N87C) was RED-001.....	1.90



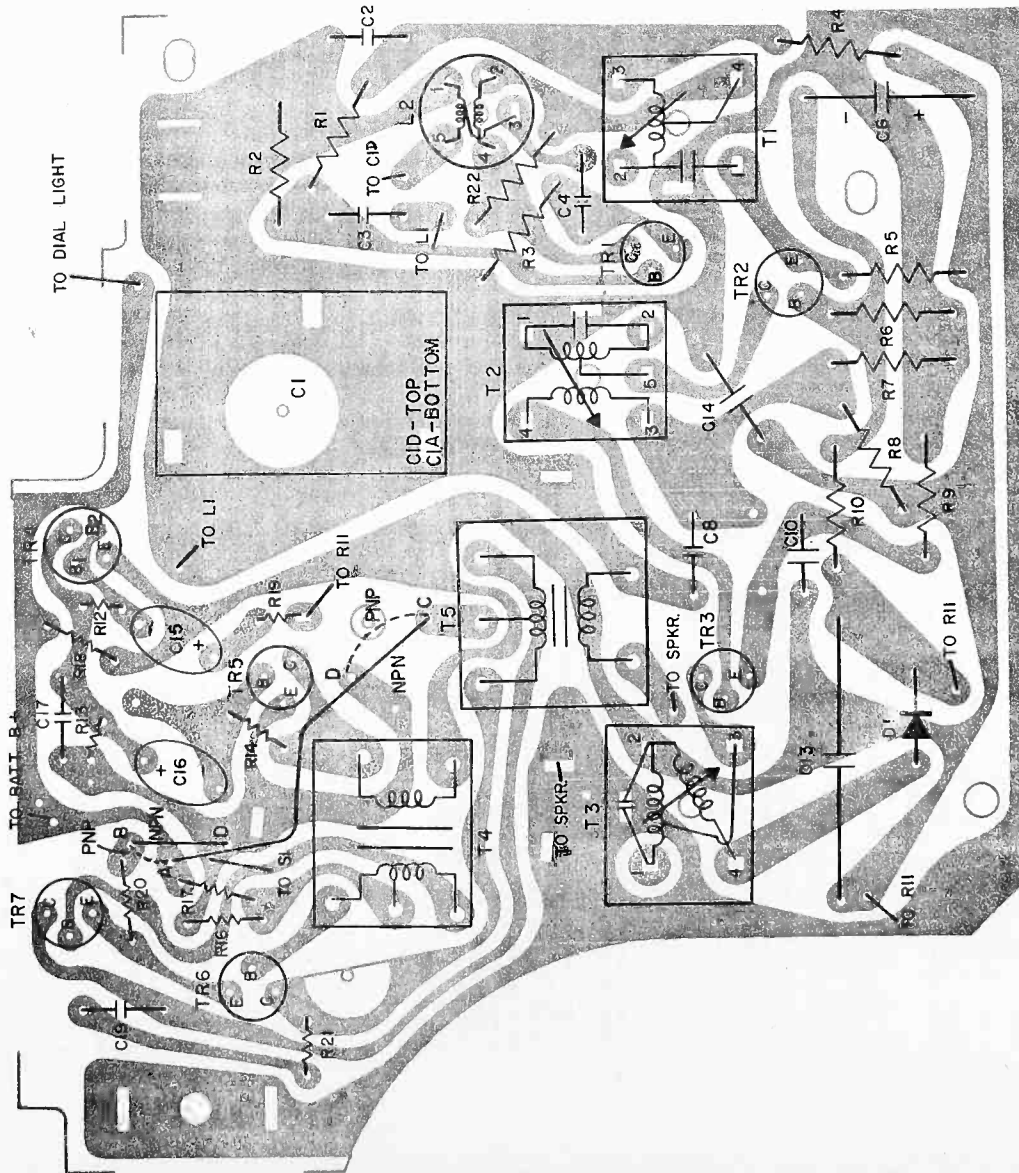
NOTES:
1. FOR NPN TR6 & TR7
A. CONNECT A LAMPER WIRE BETWEEN POINTS A & B. SEE PHANTOM WIRING A, B, C, D DIAGRAM.
B. R17 MUST BE 50 OHMS(THERMISTOR).
C. R16 MUST BE 1K.
D. R17 MUST BE 1K.
E. R18 MUST BE 1K.
2. FOR PNP TR6 & TR7
A. CONNECT A LAMPER WIRE BETWEEN POINTS A & B. SEE PHANTOM WIRING C, D, D, DIAGRAM.
B. R17 MUST BE 1K.
C. R16 MUST BE 1K.
D. R17 MUST BE 1K.
E. R18 MUST BE 1K.
3. TR7 (PNP) TRANSISTOR BASE LEAD MUST BE SOLDERED INTO B+ AS SHOWN ON PHANTOM WIRING DIAGRAM. BASE LEAD OF ALL OTHER RECOMMENDED TRANSISTORS FOR TR4 MUST BE SOLDERED INTO B+.
4. REPLACE WITH TRANSISTOR TYPES SHOWN, OR ORDER BY CATALOG NUMBER AS LISTED IN PARTS LIST.
5. UNLESS OTHERWISE NOTED.
6. CAPACITORS LESS THAN 1 MF.
7. RESISTORS ARE 1/2 WATT.
8. 1000.
9. VALUES ARE POSITIVE UNLESS OTHERWISE NOTED.
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REPLACEMENT PARTS LIST (CONT'D)		PRICE	DESCRIPTION	PRICE	DESCRIPTION	PRICE
CAT. NO.	DESCRIPTION		MISCELLANEOUS		CABINET AND APPEARANCE ITEMS	
RB-1057	Speaker, 4"	5.45	Speaker, 4"		*RB-1103	Cabinet Front, (Green), P771A.....
RS-1323	Light, Pilot, #12.....	.25	Light, Pilot, #12.....		(Assemb.)	Dial Window.....
RS-1808	Ring, Compression, (Tuning Knob).....	.03	Ring, Compression, (Tuning Knob).....			Grille Assem.....
RS-1809	Clip, Speaker Mounting.....	.10	Clip, Speaker Mounting.....		*RB-1104	Cabinet Back, (Ant. White), P770A.....
RS-1810	Fastener, Speaker Mounting.....	.24	Fastener, Speaker Mounting.....		(Assemb.)	Stud Slide Catch.....
RS-1951	Spring, Push Button.....	.05	Spring, Push Button.....			Slide Catch.....
RS-1953	Socket, Pilot Light.....	.65	Socket, Pilot Light.....		*RB-1105	Cabinet Back (Green), P771A.....
RS-1954	Battery Contact, (Neg.).....	.20	Battery Contact, (Neg.).....		(Assemb.)	Stud Slide Catch.....
RS-1955	Battery Contact, (Pos.).....	.05	Battery Contact, (Pos.).....			Slide Catch.....
RS-1956	Screw, Cabinet Lock.....	.30	Screw, Cabinet Lock.....		*RS-2003	Handle, (with insert) P770A.....
*RS-2019	Contact, Pilot Light.....	.05	Contact, Pilot Light.....		*RS-2004	Handle, (with insert) P771A.....
*RS-2020	Guide Rod.....	.05	Guide Rod.....		*RS-2005	Handle, (with insert) P771A.....
*RS-2021	Slide Catch (compartment door).....	.05	Slide Catch (compartment door).....		*RS-2006	Knob, Tuning.....
*RS-2022	Retainer, Handle Spring.....	.05	Retainer, Handle Spring.....		*RS-2007	Knob, Volume, (Brown), P770A.....
*RS-2023	Spring, Handle.....	.05	Spring, Handle.....		*RS-2008	Knob, Volume, (White), P771A.....
*RS-2024	Washer, Handle.....	.03	Washer, Handle.....		*RS-2009	Insert, (Cab. Front), P770A.....
*RS-2025	Screw, Cabinet.....	.20	Screw, Cabinet.....		*RS-2010	Insert, (Cab. Front), P771A.....
*RS-2026	Screw, 4-40 x 1/4 (Volume Knob).....	.05	Screw, 4-40 x 1/4 (Volume Knob).....		*RS-2011	Door, Battery Compartment, P770A.....
*RS-2027	Washer, (Volume Knob).....	.05	Washer, (Volume Knob).....		*RS-2012	Door, Battery Compartment, P771A.....
					*RS-2013	Grille Assem. P770A.....
					*RS-2014	Grille Assem. P771A.....
					*RS-2015	Window Dial Light.....
*RB-1102	Cabinet Front, (Ant. White) P770A.....				*RS-2016	Stud Slide Catch.....
(Assemb.)	Dial Window.....	4.90			*RS-2017	Dial Light Push Button, P770A.....
	Grille Assem.....				*RS-2018	Dial Light Push Button, P771A.....

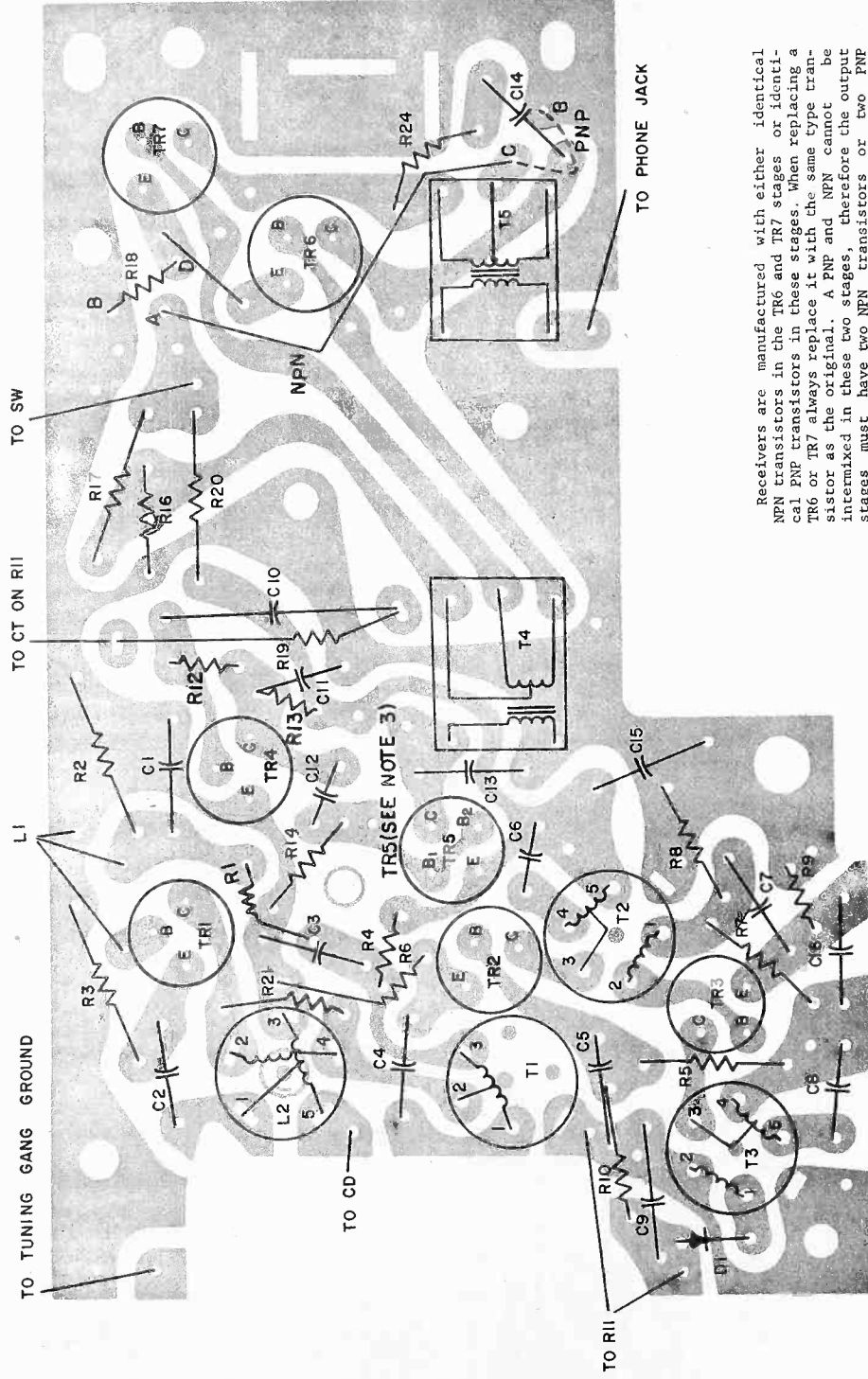
* denotes Items Not Previously Cataloged.

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.



PHANTOM WIRING DIAGRAM

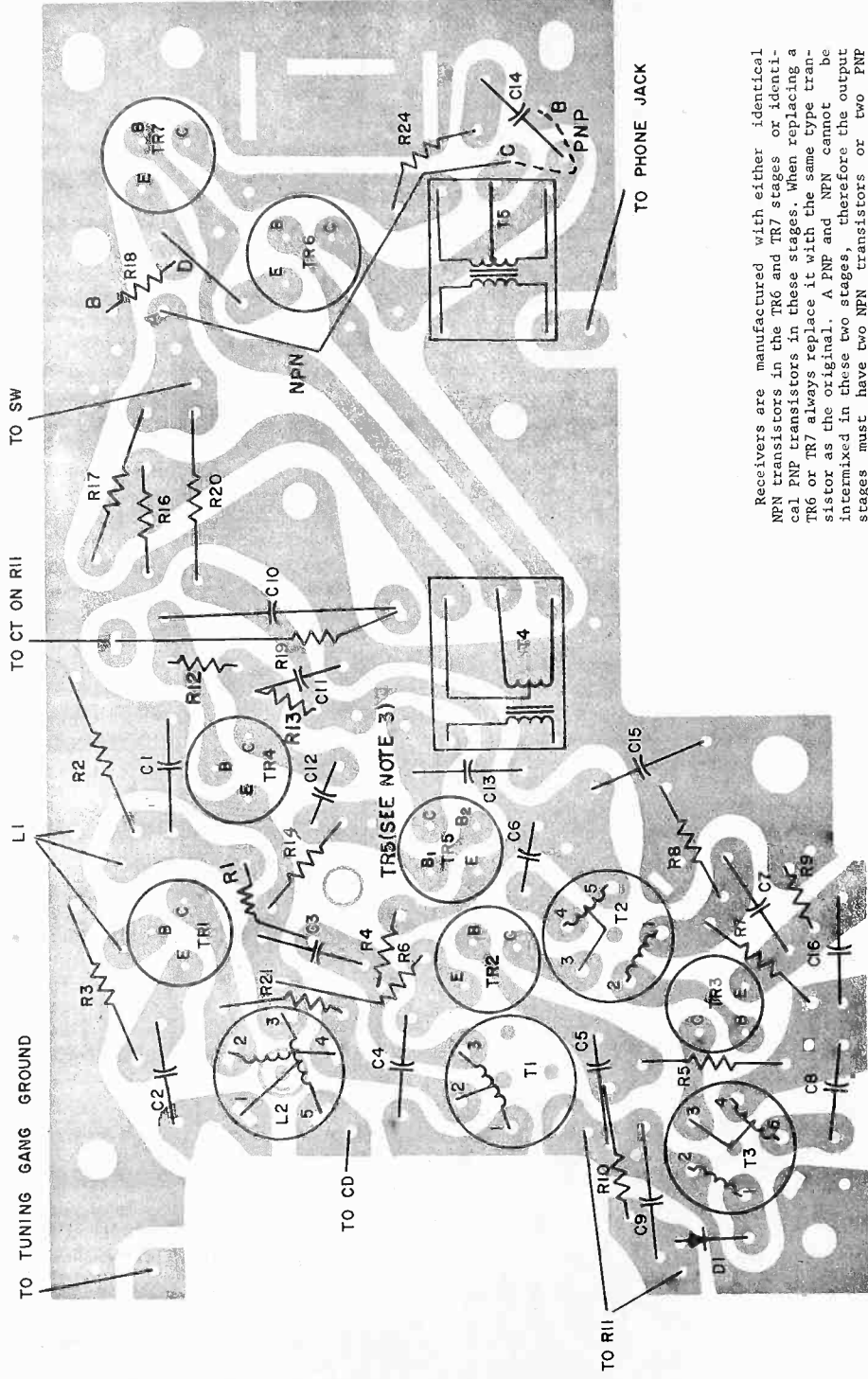


Receivers are manufactured with either identical NPN transistors in the TR6 and TR7 stages or identical PNP transistors in these stages. When replacing a TR6 or TR7 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output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

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



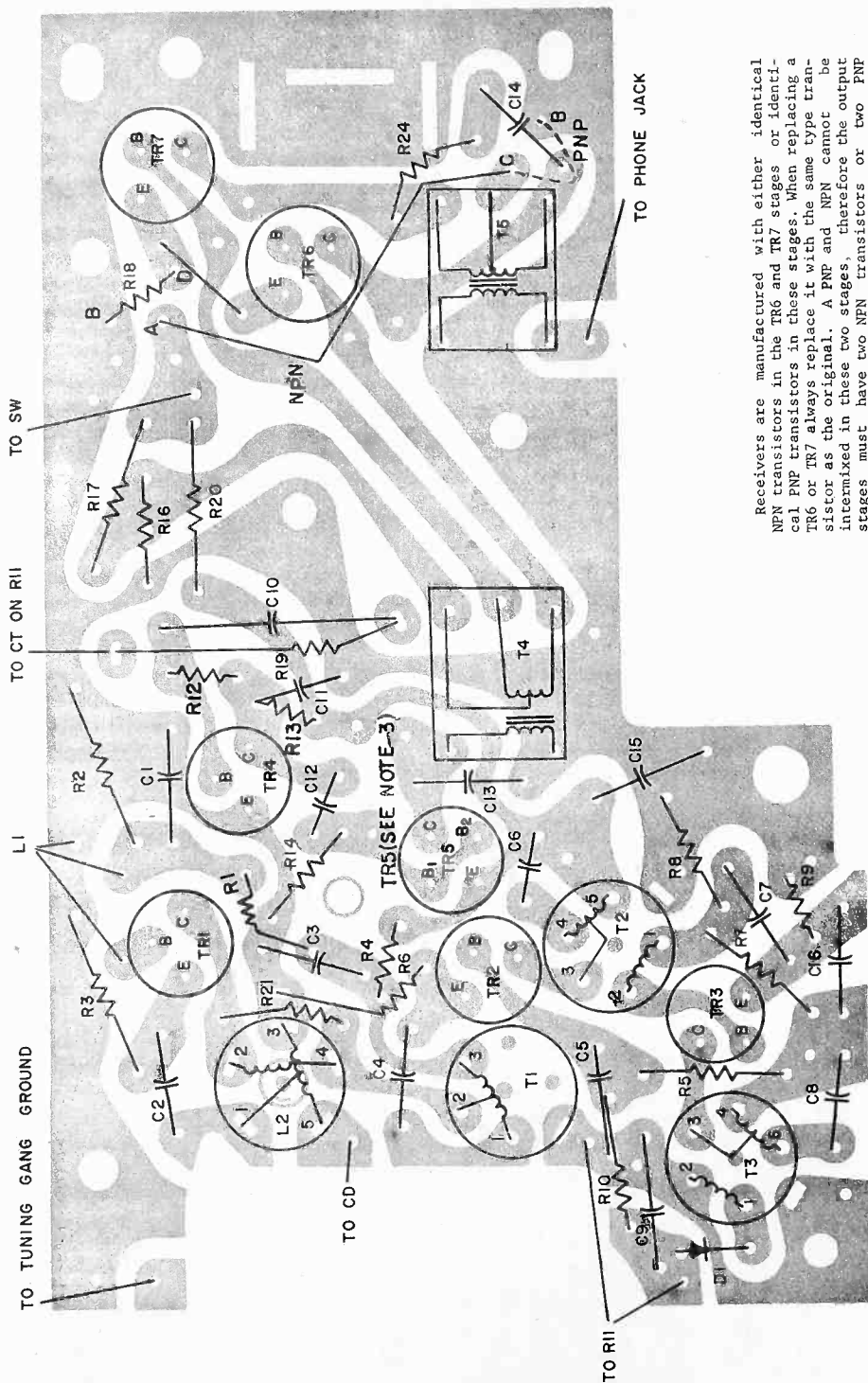
MODELS P785A, P786A, P787A



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

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



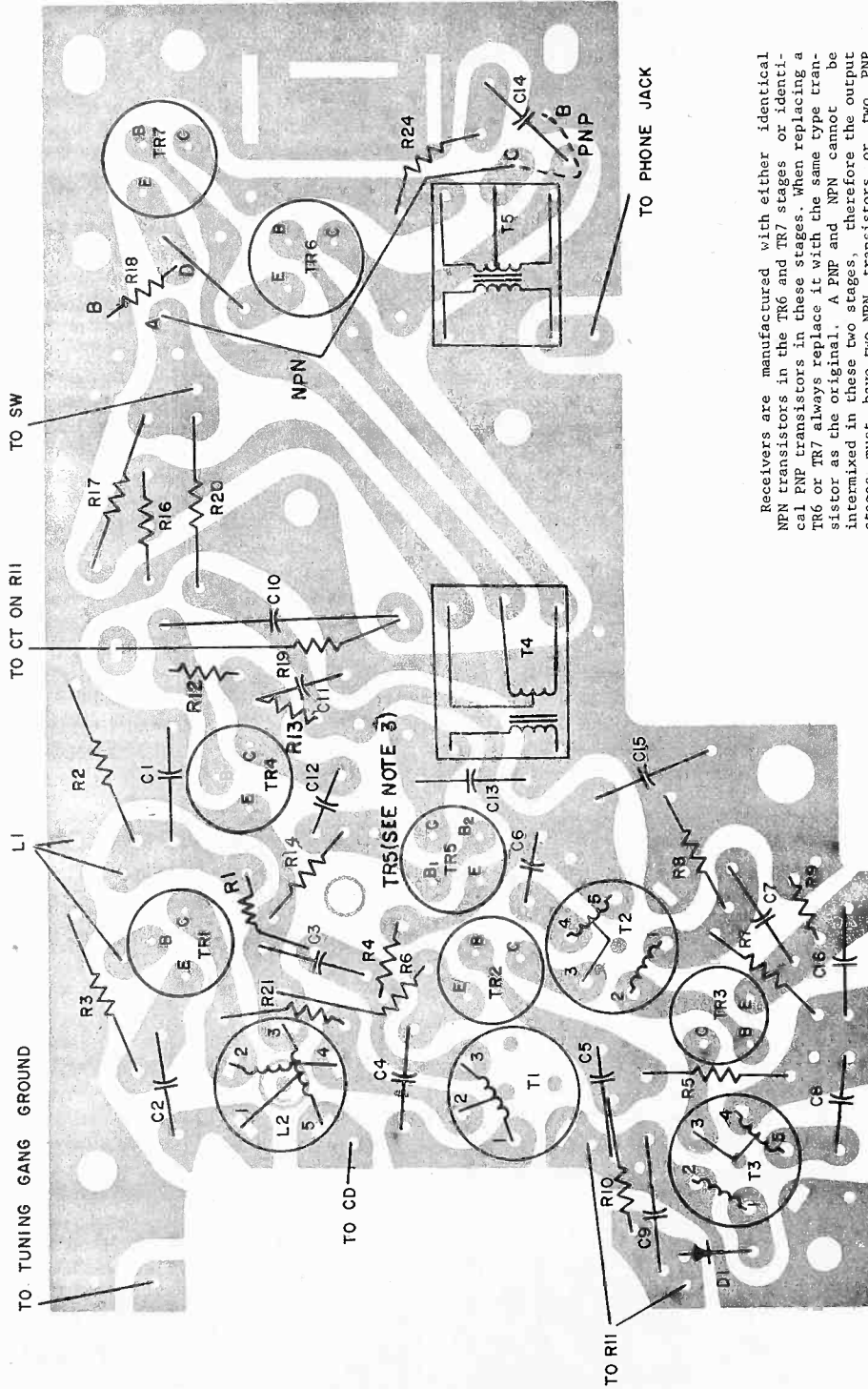


Receivers are manufactured with either identical NPN transistors in the TR6 and TR7 stages or identical PNP transistors in these stages. When replacing a TR6 or TR7 always replace it with the same type transistor as the original. A PNP and NPN cannot be intermixed in these two stages, therefore the output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

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

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

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

S-P745A-1
RADIO
MODELS
P745A, B
P746A, B

PRELIMINARY SERVICE DATA

SUPPLEMENTARY SERVICE NOTE S-P745A

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, or (3) Burgess Z, #930, or (3) Mallory M15 Mercury Cells: (3) Eveready E9, or (3) Mallory ZM9
OPERATING FREQUENCIES:	Tuning Range 540 - 1600KC. IF Frequency 455KC

GENERAL INFORMATION

The models P745A, B and P746A, B are all transistor battery operated pocket portable radios. The difference between the "A" and "B" versions is the "push point" (detent) tuning feature on the "B" version. Station frequencies are pre-set by inserting a blunt point or pencil firmly into the small hole located opposite 750KC on the tuning knob. The slight pressure applied to the pencil makes a detent in the detent insert under tuning knob. A spring attached to the bottom of knob will "fall" into a "detent" as the tuning knob is turned, thereby "locking" knob on the station frequency that was pre-set. An earphone jack for private listening is provided on the speaker end of the receiver. When the earphone is plugged in, the speaker is automatically silenced.

TO REMOVE CIRCUIT BOARD

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

TO REMOVE TUNING CAPACITOR

1. Follow steps 1 and 2 as above.
2. Remove tuning knob by unscrewing the thumbscrew in its center in a counterclockwise direction.
3. Remove the flat head screws located under tuning knob.

TO REMOVE VOLUME CONTROL

1. Follow steps 1 through 3 as above.
2. Remove on-off volume knob by unscrewing the screw in the center of the knob.
3. Remove hex nut from volume control shaft.
4. Move tuning capacitor slightly and lift out volume control.

TROUBLESHOOTING

A check of the battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the

receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions. The total receiver current drain is 15 to 20 mA. This is measured by inserting a milliammeter in series with the batteries.

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

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 4.5 volts.
2. Check battery current.
3. Check transistor collector currents.
4. Check alignment.

INTERMITTENT:

1. Check battery contacts for corrosion.
 2. Check solder connections on dip-soldered side of circuit board.
- Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. The battery terminals should be cleaned to insure positive electrical contact.

TRANSISTOR REPLACEMENT

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

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

REPLACEMENT OF COMPONENTS

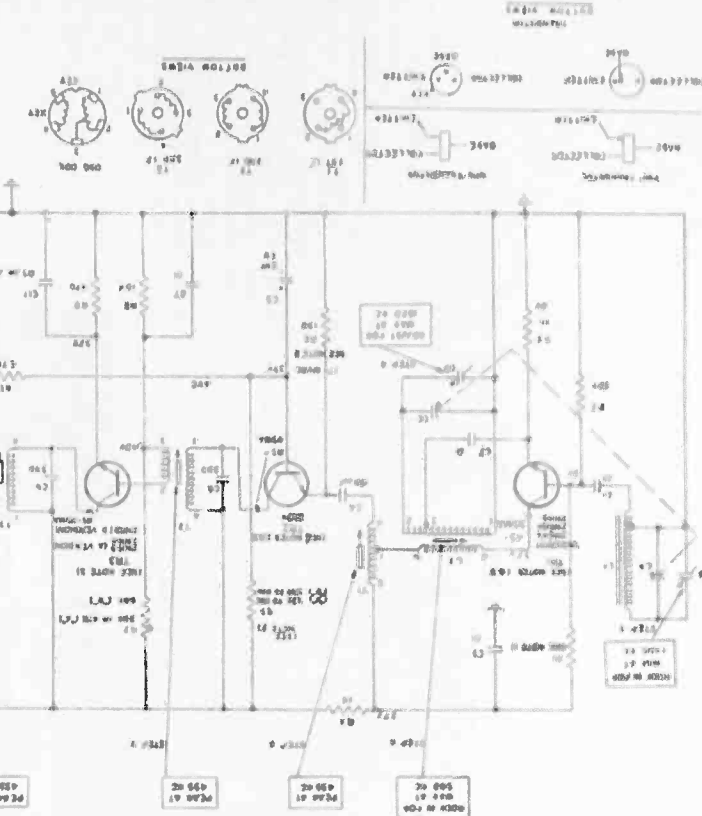
After removing a defective part, clean the mounting holes of all solder; replacement part can then be inserted more easily and a better solder connection can be accomplished. Apply a soldering iron just long enough to heat the terminal to remove the component. Too much heat may damage a component.

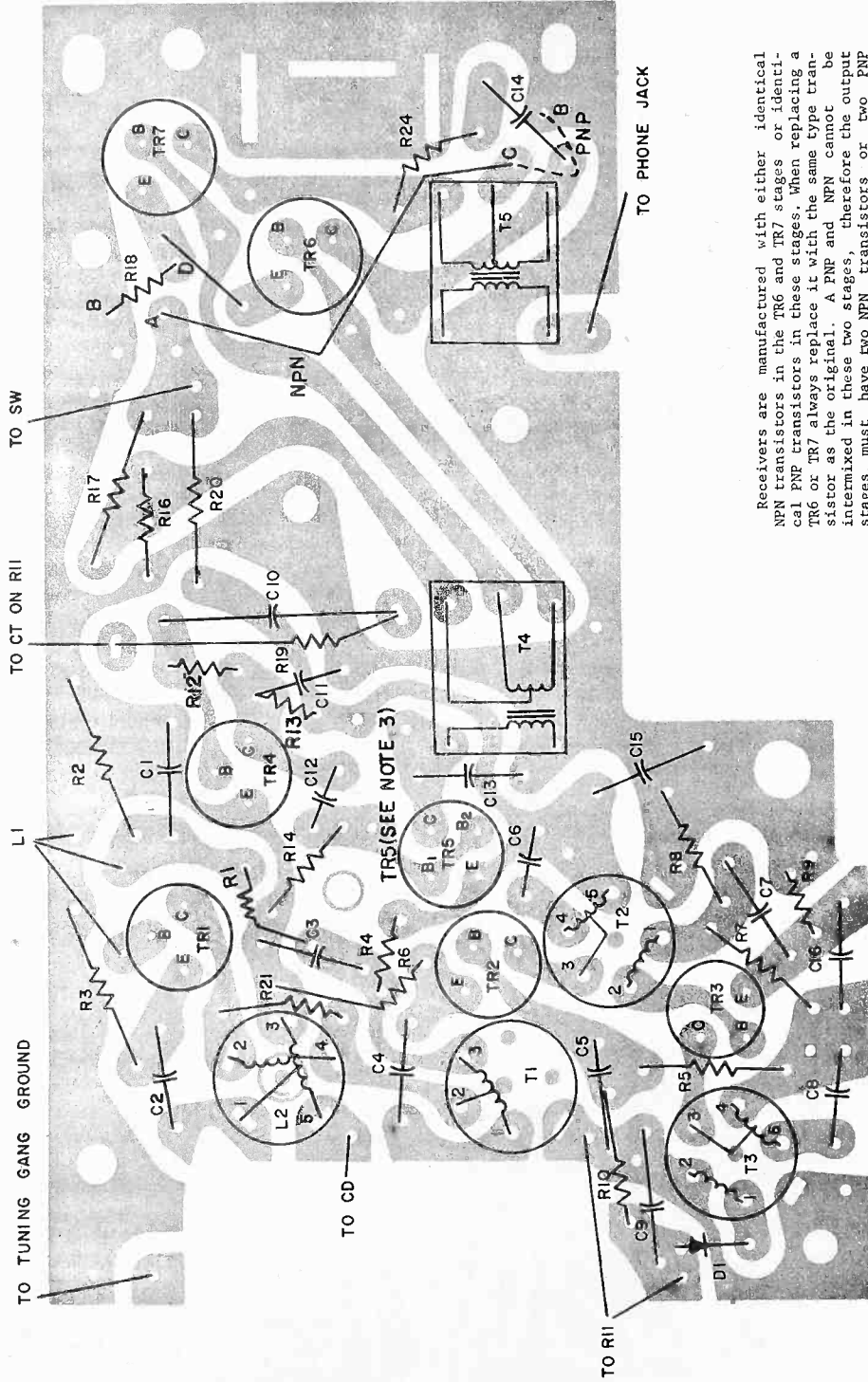
PRELIMINARY REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
*-RS-1378	CA, B, C, D	Tuning Cap. P745A, P746A	4.15
*-RS-2034	CA, B, C, D	Tuning Cap. P745B, P746B	4.10
RS-1022	CI, 7	.01mf., 450V	.30
RS-1024	CI, 10, 17, 19	.05mf., 50V	.50
RS-1047	CI, 6	32mf., 6V	1.43
*-RS-1460	CI, 12, 16, 15	32mf., 6V	1.10
*-RS-1462	C3	8mf., 6V	1.65
RS-1314	CI, 8	.003mf. 100V	.25
RS-1996	C4	150mf. 300V	.35
*-RS-2035	Co, 9	330mf. 300V	.35
	Co, 3	.01mf., 50V	.35

NOTES:
1. WIRE COLLECTION CURRENTS WITH A MILLIAMMETER INSERTED IN SERIES WITH ALL LEADS AND POSITIVE WITH RESPECT TO GROUND.
2. AFTER REPAIRING THE CHECK VOLTAGE ACROSS EACH TRANSISTOR.
3. CHECK BATTERY VOLTAGE AND BATTERY CONTACTS.
4. CHECK ON-OFF SWITCH.
5. CHECK ALL ANTENNA LEAD CONNECTIONS.
6. CHECK COIL L2.
7. CHECK BATTERY VOLTAGE FOR 4.5 VOLTS.
8. CHECK BATTERY CURRENT.
9. CHECK TRANSISTOR COLLECTOR CURRENTS.
10. CHECK ALIGNMENT.
11. CHECK BATTERY CONTACTS FOR CORROSION.
12. CHECK SOLDER CONNECTIONS ON DIP-SOLDERED SIDE OF CIRCUIT BOARD.

ALTERNATE
1. WIRE COLLECTION CURRENTS WITH A MILLIAMMETER INSERTED IN SERIES WITH ALL LEADS AND POSITIVE WITH RESPECT TO GROUND.
2. AFTER REPAIRING THE CHECK VOLTAGE ACROSS EACH TRANSISTOR.
3. CHECK BATTERY VOLTAGE AND BATTERY CONTACTS.
4. CHECK ON-OFF SWITCH.
5. CHECK ALL ANTENNA LEAD CONNECTIONS.
6. CHECK COIL L2.
7. CHECK BATTERY VOLTAGE FOR 4.5 VOLTS.
8. CHECK BATTERY CURRENT.
9. CHECK TRANSISTOR COLLECTOR CURRENTS.
10. CHECK ALIGNMENT.
11. CHECK BATTERY CONTACTS FOR CORROSION.
12. CHECK SOLDER CONNECTIONS ON DIP-SOLDERED SIDE OF CIRCUIT BOARD.





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

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

S-P745A-1
RADIO
MODELS
P745A, B
P746A, B

PRELIMINARY SERVICE DATA

SUPERSEDES SERVICE NOTE S-P745A

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, or (3) Burgess Z, #930, or (3) Mallory M15 Mercury Cells: (3) Eveready E9, or (3) Mallory ZM9
OPERATING FREQUENCIES:	Tuning Range 540 - 1600KC. IF Frequency 455KC

GENERAL INFORMATION

The models P745A, B and P746A, B are all transistor battery operated pocket portable radios. The difference between the "A" and "B" versions is the "push point" (detent) tuning feature on the "B" version. Station frequencies are pre-set by inserting a blunt point or pencil firmly into the small hole located opposite 750KC on the tuning knob. The slight pressure applied to the pencil makes a detent in the detent insert under tuning knob. A spring attached to the bottom of knob will "fall into a detent" as the tuning knob is turned, thereby "locking" knob on the station frequency that was pre-set. An earphone jack for private listening is provided on the speaker end of the receiver. When the earphone is plugged in, the speaker is automatically silenced.

TO REMOVE CIRCUIT BOARD

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

TO REMOVE TUNING CAPACITOR

1. Follow steps 1 and 2 as above.
2. Remove tuning knob by unscrewing the thumbscrew in its center in a counterclockwise direction.
3. Remove the flat head screws located under tuning knob.

TO REMOVE VOLUME CONTROL

1. Follow steps 1 through 3 as above.
2. Remove on-off volume knob by unscrewing the screw in the center of the knob.
3. Remove hex nut from volume control shaft.
4. Move tuning capacitor slightly and lift out volume control.

TROUBLESHOOTING

A check of the battery condition and total current drain of the receiver should be made first. All current measurements are made at quiescence with the

receiver turned on, volume control at maximum, tuning gang closed, and with no signal conditions. The total receiver current drain is 15 to 20 mA. This is measured by inserting a milliammeter in series with the batteries.

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

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 4.5 volts.
2. Check transistor current.
3. Check transistor collector currents.
4. Check alignment.

INTERMITTENT:

1. Check battery contacts for corrosion.
 2. Check solder connections on dip-soldered side of circuit board.
- Intermittent audio, motorboating, and poor reception is frequently caused by poor battery contact. The battery terminals should be cleaned to insure positive electrical contact.

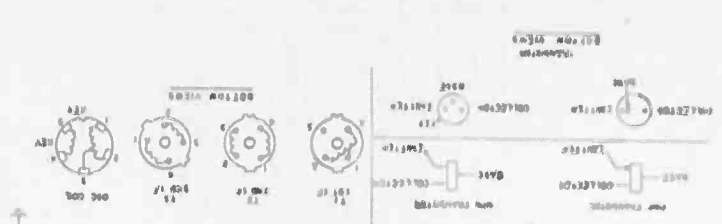
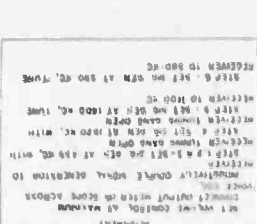
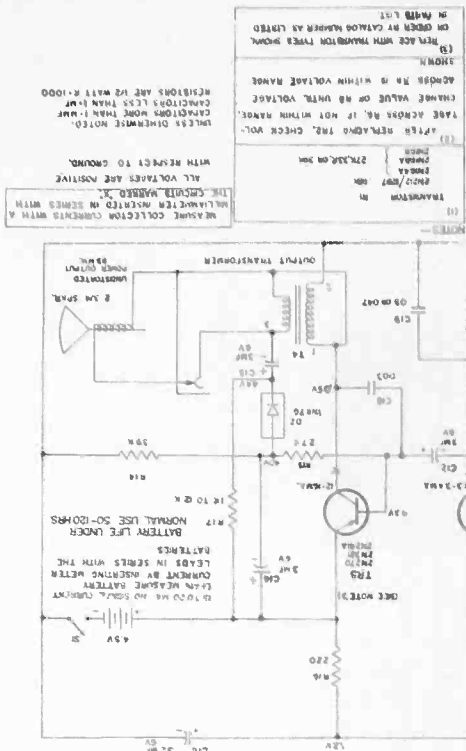
TRANSISTOR REPLACEMENT

When replacing a defective transistor, be sure to observe correct lead positions, as shown on the schematic diagram in outline form. TR5 has a "heat sink" mounted on it. It is important that the "heat sink" remain insulated from any contact with ground and all component leads.

REPLACEMENT OF COMPONENTS

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

PRELIMINARY REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION PRICE	
CAPACITORS			
*RS-1378	CA, B, C, D	Tuning Cap. P745A, P746A	4.15
*RS-2034	CA, B, C, D	Tuning Cap. P745B, P746B	4.10
RS-1022	C1, 7	01µf., 450V.	.30
RS-1024	C10, 17, 19	05µf., 50V.	.30
RS-1047	C16	32µf., 6V.	1.45
*RS-1460	C11, 12, 15, 15	3µf., 6V.	1.10
*RS-1462	C3	8µf., 6V.	1.65
RS-1314	C18	.001µf., 1000V.	.25
RS-1996	CA	150µmf., 300V.	.35
*RS-2033	Co, 9	390µmf., 1000V.	.35
	C2, 3	01µf., 50V.	.15



MEASURE COLLECTOR CURRENTS WITH A MILLIAMETER INSERTED IN SERIES WITH A TRANSISTOR. USE 50-120MHS. BATTERY LIFE UNDER NORMAL USE 50-120HRS. 1-4M WASSMANT METER CURRENT BY ASCERTAINING LEAKS IN SERIES WITH THE UNPOWERED POWER SUPPLY. 2 1/2 IN. 5PH. UNPOWERED

IF A PREPARING THE CHECK VOLTAGE ACROSS R1, IF NOT WITHIN RANGE, CHANGE VALUE OR NO VOLTAGE. REVISIONS ARE IN 1/2 INCHES. UNLESS OTHERWISE NOTED.

TRANSISTOR IN SERIES WITH A MILLIAMETER. ALL VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND.

THE CIRCUIT BOARD IS MOUNTED IN A PLASTIC CASE.

IF A PREPARING THE CHECK VOLTAGE ACROSS R1, IF NOT WITHIN RANGE, CHANGE VALUE OR NO VOLTAGE. REVISIONS ARE IN 1/2 INCHES. UNLESS OTHERWISE NOTED.

TRANSISTOR IN SERIES WITH A MILLIAMETER. ALL VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND.

THE CIRCUIT BOARD IS MOUNTED IN A PLASTIC CASE.

MODELS P745A, B, P746A, B

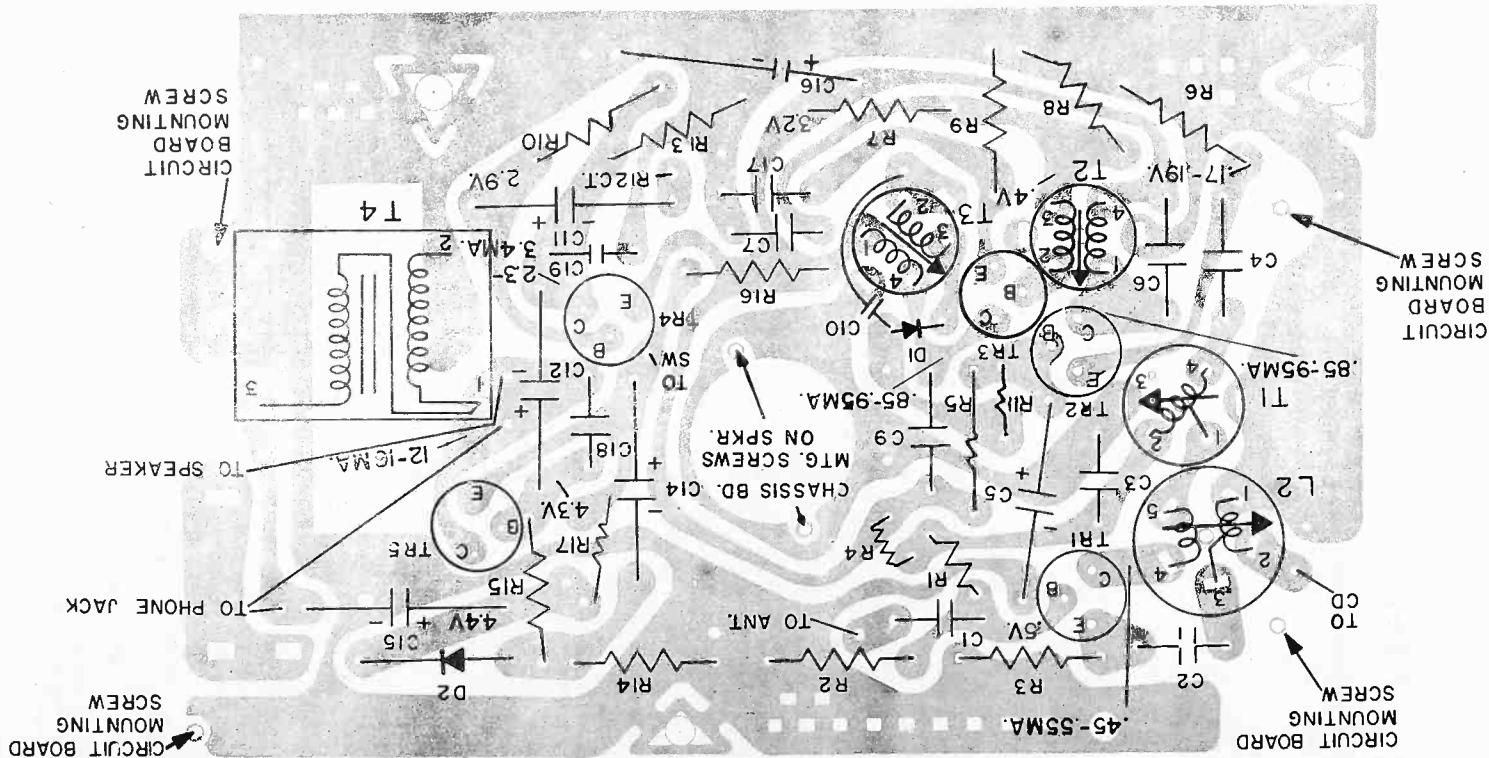
PRELIMINARY REPLACEMENT PARTS LIST (CONTINUED)

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
**RS-1379	R12, S1	POTENTIOMETER Volume Control 10k, & Sw...	2.75	**RB-1058 (Assemb.)	CABINET AND APPEARANCE ITEMS Cabinet Front, (Ebony), P745A...	3.75
**RS-1372	T4	TRANSFORMERS Transformer, Audio Output...	3.00	**RB-1002 (Assemb.)	Cabinet Back (Ant. White), P746A...	3.75
**RS-1373	L2	Coil, Oscillator	1.20	**RB-1088	Strip, Decorative	1.50
**RS-1374	T1	Transformer, 1st. I.F.	1.90	**RB-1106 (Assemb.)	Cabinet Back, (Turq.), P746A, B...	1.50
**RS-1375	T2	Transformer, 2nd. I.F.	2.10	**RB-1107 (Assemb.)	Cabinet Front, (Ant. White), P746B...	2.90
**RS-1376	T3	Transformer, 3rd. I.F.	2.10	**RS-1362	Knob (Tuning)	.50
**RS-1380	L1	Antenna	1.60	**RS-1363	Thumbscrew (Tuning Knob)	.40
RS-1533	TR1	Osc. Conv.	3.20	**RS-1364	Insert, Decorative P745A, P746A	.55
RS-1531	TR1	Osc. Conv. (2N 212/1297)	3.55	**RS-1365	Strip, Decorative	.15
RS-1547	TR2	1st. I.F.	3.15	**RS-1366	Knob, Volume, Ebony, P745A, B...	.30
RS-1538	TR3	2nd. I.F. ("A" version only)	3.05	**RS-2030	Knob, Tuning w/Insert and Detent	1.25
**RS-1553	TR3	2nd. I.F. ("B" version only)	3.05	**RS-2031	Insert, Decorative P745B, P746B...	.20
RS-1546	TR4	Audio Amplifier	2.95	**RS-2032	Insert, Detent P745B, P746B...	.25
RS-1542	TR5	Audio Output	3.20	**RS-2033	Spring, (Under Tuning Knob)	.40
RS-1811	DI, 2	Diode	1.90	**RS-2036	Insert, Tuning Knob P745B, P746B...	.40
RS-1195		MISCELLANEOUS Earphone receptacle and nut	.90			
**RS-1367 (Assemb.)		Battery Tube Support	.85			
		Battery Tube	.15			
		Contact Spring	.15			
		Retainer, Spring Contact	.45			
		Cover, Battery Contact	.01			
		Washer, Plain				
**RS-1368		Screws, (2) #4x3/8, type 25				
**RS-1369		Battery Contact Spring & Retainer				
**RS-1377		Cover, Battery Contact				
**RS-1675		Speaker, 2 3/4"				
		Screw #2-56x1/8				

*" 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 And Subject To Change Without Notice.



MOTOROLA

Service Manual

HOME RADIO
 MODEL CHASSIS
 L12G HS-728
 L12N HS-728
 POWER 8 SERIES

GENERAL INFORMATION

TYPE - Portable superheterodyne radio using a plated chassis board, six transistors and two diodes. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

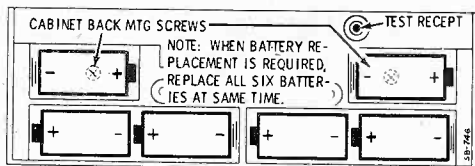
TUNING RANGE - 535 to 1620 Kc **IF** - 455 Kc

POWER SUPPLY - Operates from six 1-1/2 volt batteries; use six of the following or equivalent:

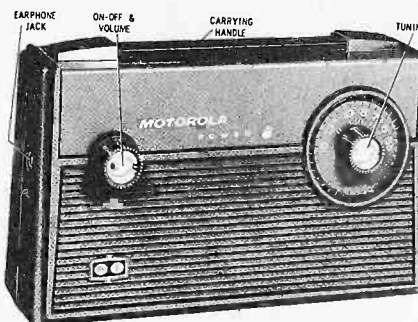
Eveready 635, Burgess 1, Ray-O-Vac 1LP

NOTE: To insure satisfactory performance, all six batteries used in this radio must be in good operating condition. Therefore, when battery replacement becomes necessary, it is recommended that all six be replaced with fresh ones.

Battery Drain -(see Service Notes)



REAR VIEW OF RADIO WITH PANEL REMOVED
SHOWING BATTERY LOCATIONS



L12 SERIES

TRANSISTOR COMPLEMENT (NOTE: Replace with same type originally used in set)

Ref. No.	Type	Function
V-1	2N411 2N486(B)	Converter
V-2	4366 2N483(B)	1st IF Amp
V-3	4367 2N483(B)	2nd IF Amp
V-4	4315 2N362(B)	Driver
V-5, V-6	2N407 2N633(B)	Power Amp

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

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

CIRCUIT DESCRIPTION

- The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
- The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
- Reference to the chassis photographs, plated chassis board wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated chassis wiring of both sides of the chassis plus location and wiring of electrical components are given. This is done in two ways; the chassis as viewed from the top (component side) and the chassis as viewed from the bottom with components as they would appear on opposite side. To further aid servicing, the plated chassis bottom locates the emitters of V-1 through V-6 by use of the letter "E" on the chassis (see PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM).

SERVICING PRECAUTIONS

- When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.
- Do not service the chassis on a metal plate because of the possibility of a short circuit.
- When making circuit resistance checks, transistor shunting paths may exist, which can, in some cases, cause erroneous readings or possible damage to transistors. Therefore, when checking resistances, it may be necessary to remove one or more transistors from associated circuits.

COMPONENT REPLACEMENT

Refer to "Plated Circuit Chassis Servicing Techniques" Manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing Motorola plated chassis.

TRANSISTOR CHECK

Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors.

REPLACEMENT PARTS LIST

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

Table with columns: Ref. No., Part No., Description, Part No., Description. Includes sections for ELECTRICAL PARTS, MECHANICAL PARTS, CABINET PARTS, and LIMITED REPLACEMENT PARTS.

CARE OF CABINET

Cabinet may be cleaned by using a soft, dry cloth; do not use any polishes.

CHASSIS REMOVAL

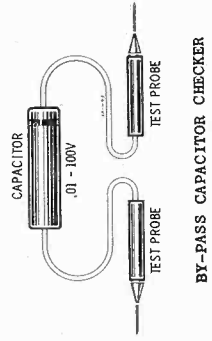
- 1. Loosen two back panel mounting screws 5 or 6 turns (a coin can be used for a screwdriver) and remove panel (if necessary, press thumb against bottom center edge; the panel will swing free, allowing easy removal).
2. To remove cabinet back, remove 2 cabinet back mounting screws located under batteries; then remove back.
3. Remove volume and tuning knobs.
4. From front of cabinet, remove 2 chassis mounting screws and volume control mounting palmnut.
5. Unscrew earphone jack mounting nut.
6. Unsolder chassis leads.
7. Remove chassis from cabinet.

TO REMOVE CABINET BACK

See Chassis Removal, steps 1 and 2.

TRANSISTOR SERVICING INFORMATION

One of the causes of weak receivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.



In transistor receiver servicing, it will be found that the causes of failure can usually be divided into two categories; the bias networks and the signal paths. These can be checked with equipment now being used to service tube type receivers. The transistors can be checked by substitution or elimination.

When a receiver is defective, the first step is to locate the defective stage. This is accomplished by checking the emitter resistor voltage drops or by injecting a signal from stage to stage. Measuring the emitter resistor voltage drops will locate defects in the bias network or transistor. Signal injecting will locate defects in the signal paths.

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

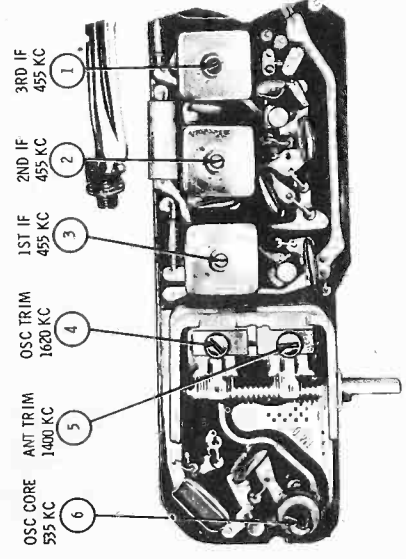
An alternate process of locating a defective stage is by injecting a signal from stage to stage. A signal generator with a 400 cycle output can be used for this purpose as it has a source of RF and audio signals for checking the respective stages. Signals are injected between the transistor base electrode of each stage and ground until the defective stage is located. Then the defective component is located by resistance measurements. This method will locate defects in stages caused by faults in the signal path in cases where the defect does not show up as a voltage reading difference. To facilitate servicing, a noise generator (see December 1957 issue of Motorola Service News or Part Number 68P641210 Noise Generator Information Sheet) has been devised to replace the signal generator as a signal source. The advantage of its use is the elimination of having to change its frequency when checking from the audio stages to the RF stages. This is accomplished by having an output waveform of such characteristic that the fundamental frequency falls in the audio range, but contains strong harmonics usable in the RF stages.

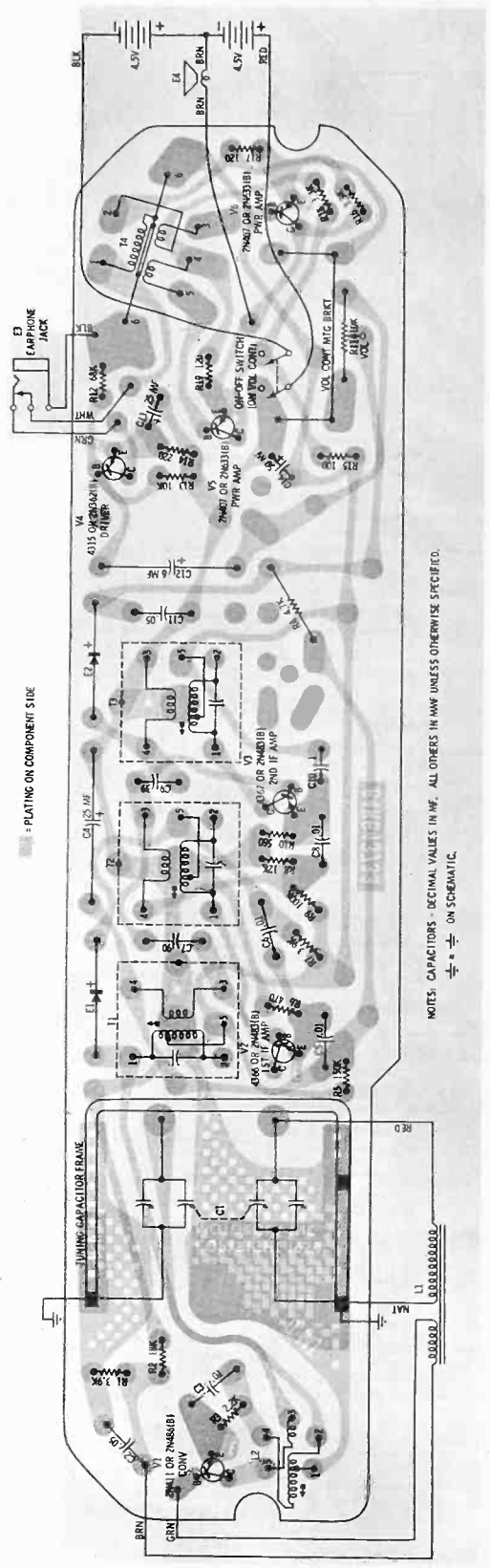
ALIGNMENT

Connect an output meter across the speaker. Set volume to maximum. Attenuate signal generator output so as not to exceed 1.3V on output meter; this prevents overloading and AGC action. Alignment should be performed with the chassis in the cabinet.

Table with columns: STEP, GENERATOR CONNECTION, GEN. FREQ. (400 cycle mod), GANG SETTING, ADJUST, REMARKS. Includes sections for IF ALIGNMENT, RF ALIGNMENT, and Radiator loop*.

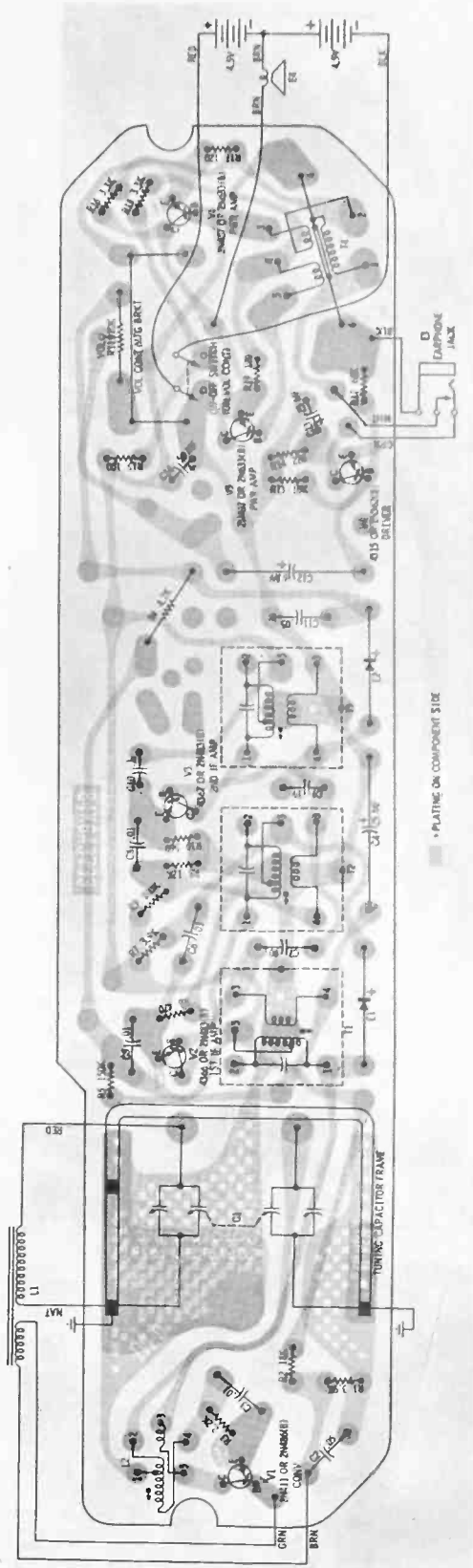
ALIGNMENT POINTS LOCATIONS



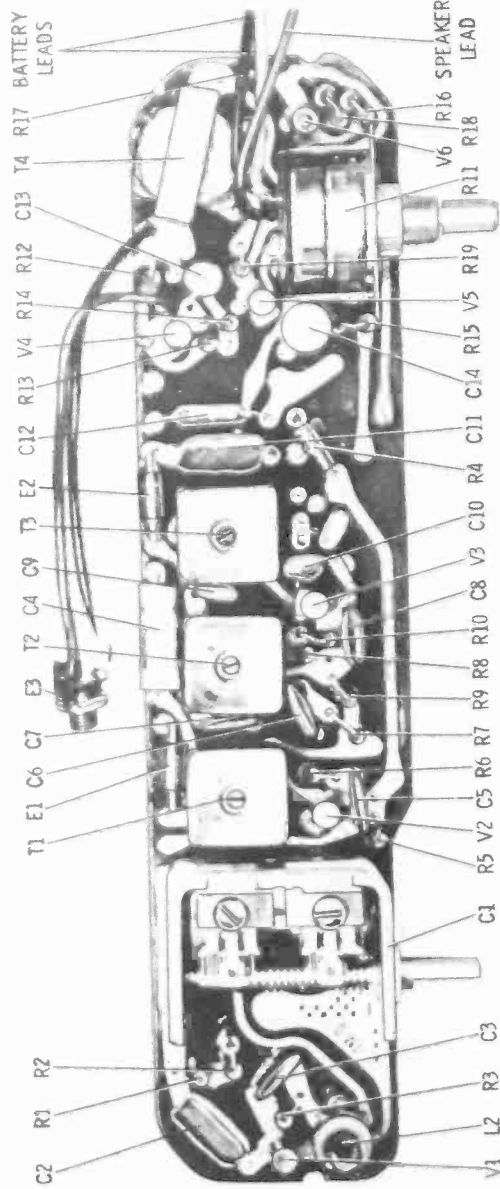


PLATED CHASSIS WIRING AS VIEWED FROM TOP (COMPONENT SIDE)

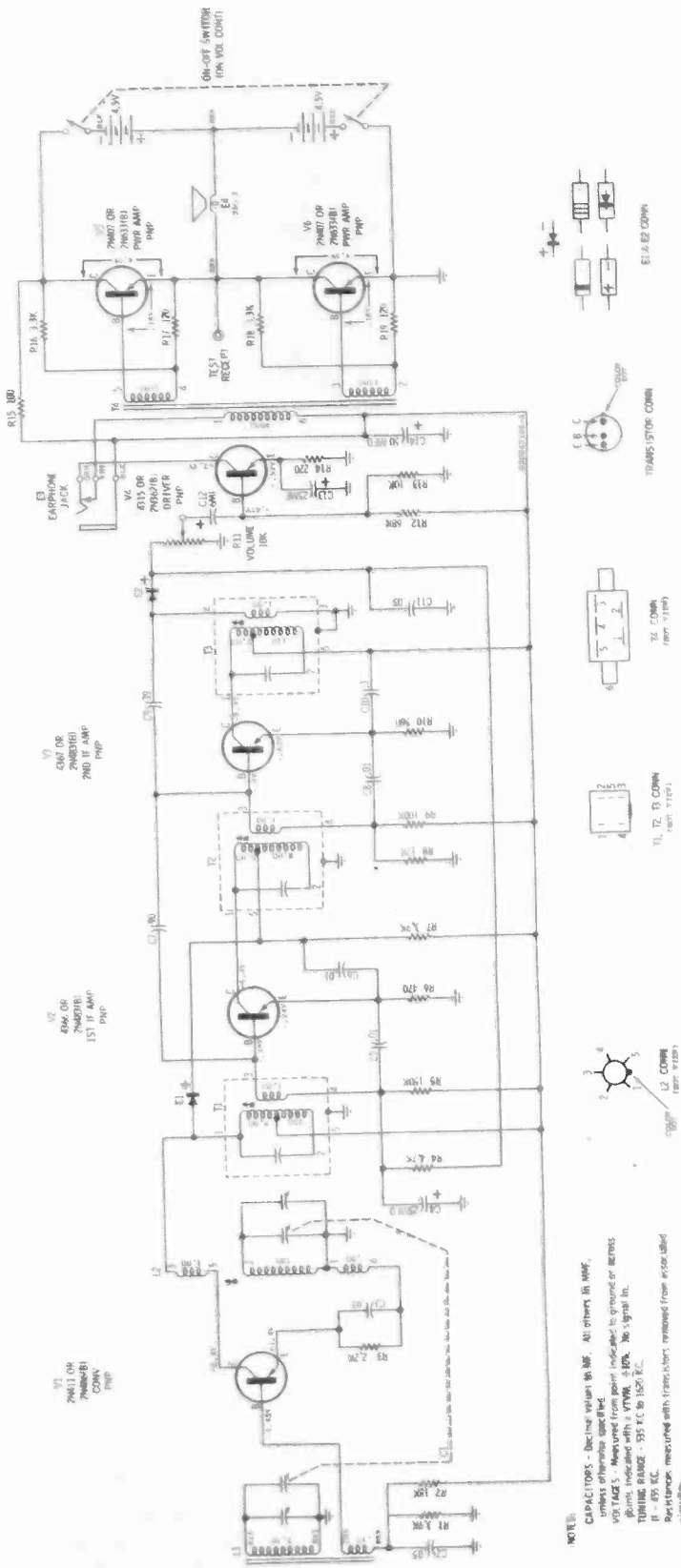
NOTES: CAPACITORS - DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
 ⚡ = ⚡ ON SCHEMATIC.



PLATED CHASSIS WIRING AS VIEWED FROM BOTTOM



PARTS LOCATIONS



SCHEMATIC DIAGRAM

MOTOROLA

Service Manual

HOME RADIO

MODEL	CHASSIS
L13S	HS-729
L13W	HS-729

POWER 9 SERIES

GENERAL INFORMATION

TYPE - Portable superheterodyne radio using a plated chassis board, seven transistors and two diodes. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - Operates from six 1-1/2 volt batteries; use six of the following or equivalent:

Eveready 635, Burgess 1, Ray-O-Vac ILP

NOTE: To insure satisfactory performance, all six batteries used in this radio must be in good operating condition. Therefore, when battery replacement becomes necessary, it is recommended that all six be replaced with fresh ones.

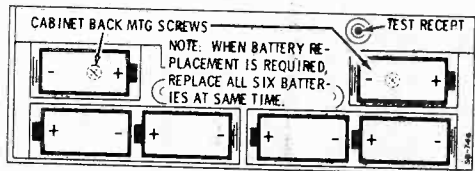
Battery Drain - (see Service Notes)



L13 SERIES

TRANSISTOR COMPLEMENT - (NOTE: Replace with same type originally used in set.)

Ref. No.	Type	Function
V-1	2N411 2N486(B)	Converter
V-2	4364 2N483(B)	1st IF Amp
V-3	4367 2N483(B)	2nd IF Amp
V-4	4315 2N362(B)	AF Amp
V-5	4315 2N362(B)	Driver
V-6, V-7	2N407 2N633(B)	Power Amp



REAR VIEW OF RADIO WITH PANEL REMOVED
SHOWING BATTERY LOCATIONS

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

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

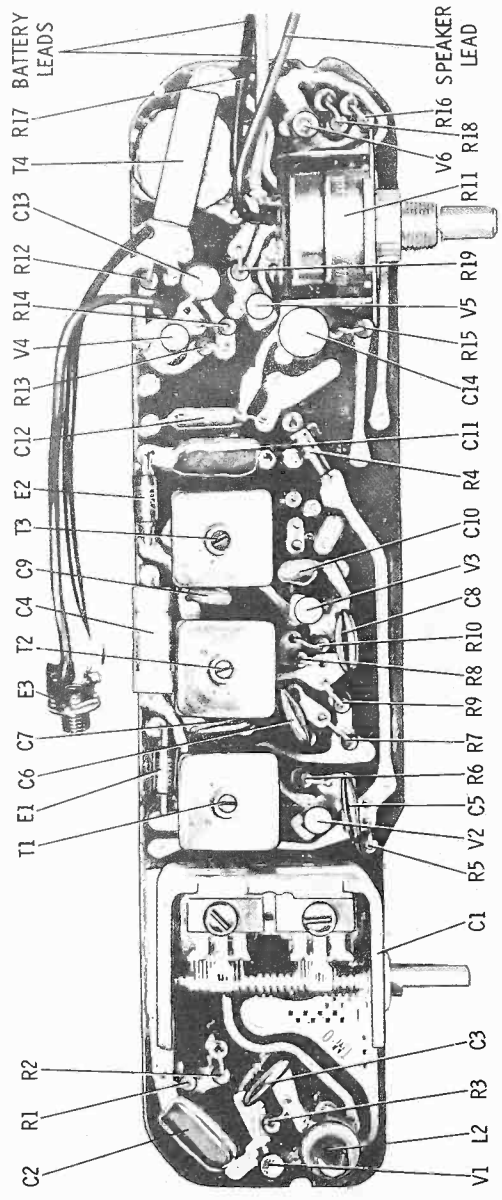
CIRCUIT DESCRIPTION

- The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
 - The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
 - Reference to the chassis photographs, plated chassis board wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.
- NOTE:** To facilitate servicing, phantom views showing plated chassis wiring of both sides of the chassis plus location and wiring of electrical components are given. This is done in two ways; the chassis as viewed from the top (component side) and the chassis as viewed from the bottom

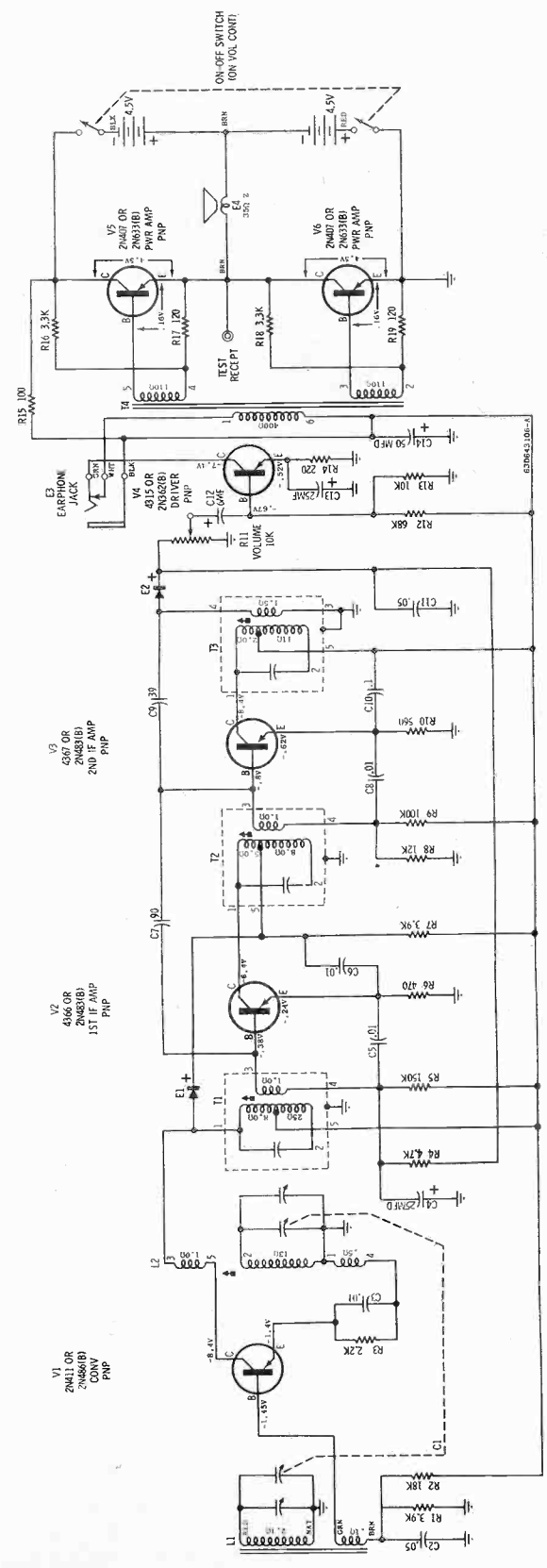
with components as they would appear on opposite side. To further aid servicing, the plated chassis bottom locates the emitters of V-1 through V-7 by use of the letter "E" on the chassis (see PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM).

SERVICING PRECAUTIONS

- When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.
- Do not service the chassis on a metal plate because of the possibility of a short circuit.
- When making circuit resistance checks, transistor shunting paths may exist, which can, in some cases, cause erroneous readings or possible damage to transistors. Therefore, when checking resistances, it may be necessary to remove one or more transistors from associated circuits.



PARTS LOCATIONS



NOTES:
 CAPACITORS - Decimal values in MF. All others in MMF, unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground or across component as indicated.
 RESISTANCES - Measured with transistors removed from associated circuitry.
 IF - 455 KC.
 T1, T2, T3 CONN (NOT VIEW)
 T4 CONN (NOT VIEW)
 E1, E2 CONN
 TRANSISTOR CONN
 E1, E2 CONN

SCHEMATIC DIAGRAM

MOTOROLA

Service Manual

HOME RADIO

MODEL	CHASSIS
L13S	HS-729
L13W	HS-729

POWER 9 SERIES

GENERAL INFORMATION

TYPE - Portable superheterodyne radio using a plated chassis board, seven transistors and two diodes. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

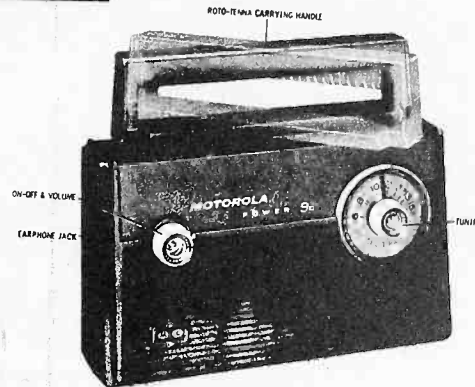
TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - Operates from six 1-1/2 volt batteries; use six of the following or equivalent:

Eveready 635, Burgess 1, Ray-O-Vac 1LP

NOTE: To insure satisfactory performance, all six batteries used in this radio must be in good operating condition. Therefore, when battery replacement becomes necessary, it is recommended that all six be replaced with fresh ones.

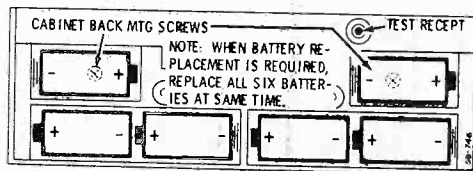
Battery Drain - (see Service Notes)



L13 SERIES

TRANSISTOR COMPLEMENT - (NOTE: Replace with same type originally used in set.)

Ref. No.	Type	Function
V-1	2N411 2N486(B)	Converter
V-2	4366 2N483(B)	1st IF Amp
V-3	4367 2N483(B)	2nd IF Amp
V-4	4315 2N362(B)	AF Amp
V-5	4315 2N362(B)	Driver
V-6, V-7	2N407 2N633(B)	Power Amp



REAR VIEW OF RADIO WITH PANEL REMOVED
SHOWING BATTERY LOCATIONS

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

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

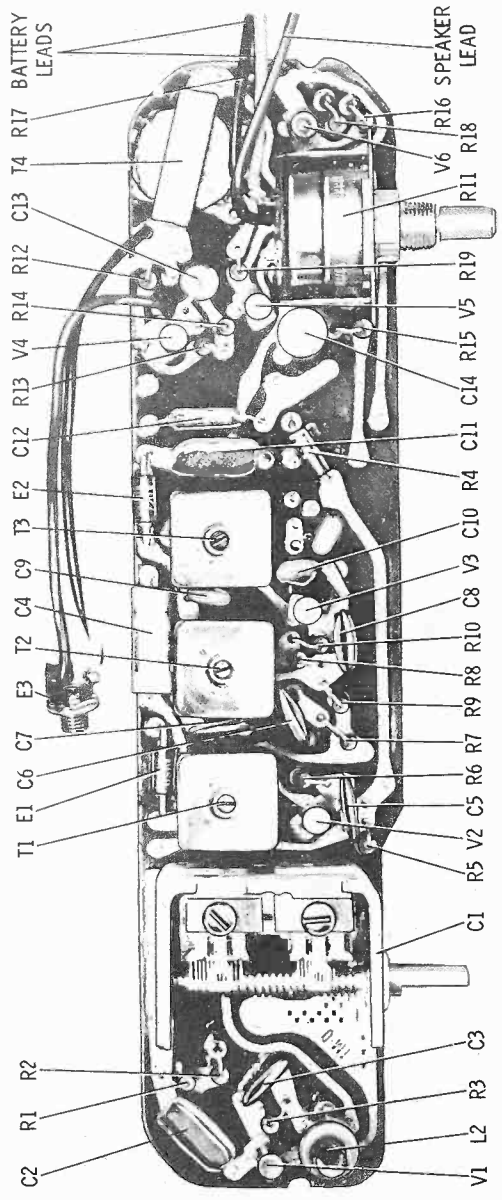
CIRCUIT DESCRIPTION

- The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
- The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
- Reference to the chassis photographs, plated chassis board wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.
NOTE: To facilitate servicing, phantom views showing plated chassis wiring of both sides of the chassis plus location and wiring of electrical components are given. This is done in two ways; the chassis as viewed from the top (component side) and the chassis as viewed from the bottom

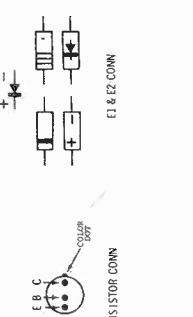
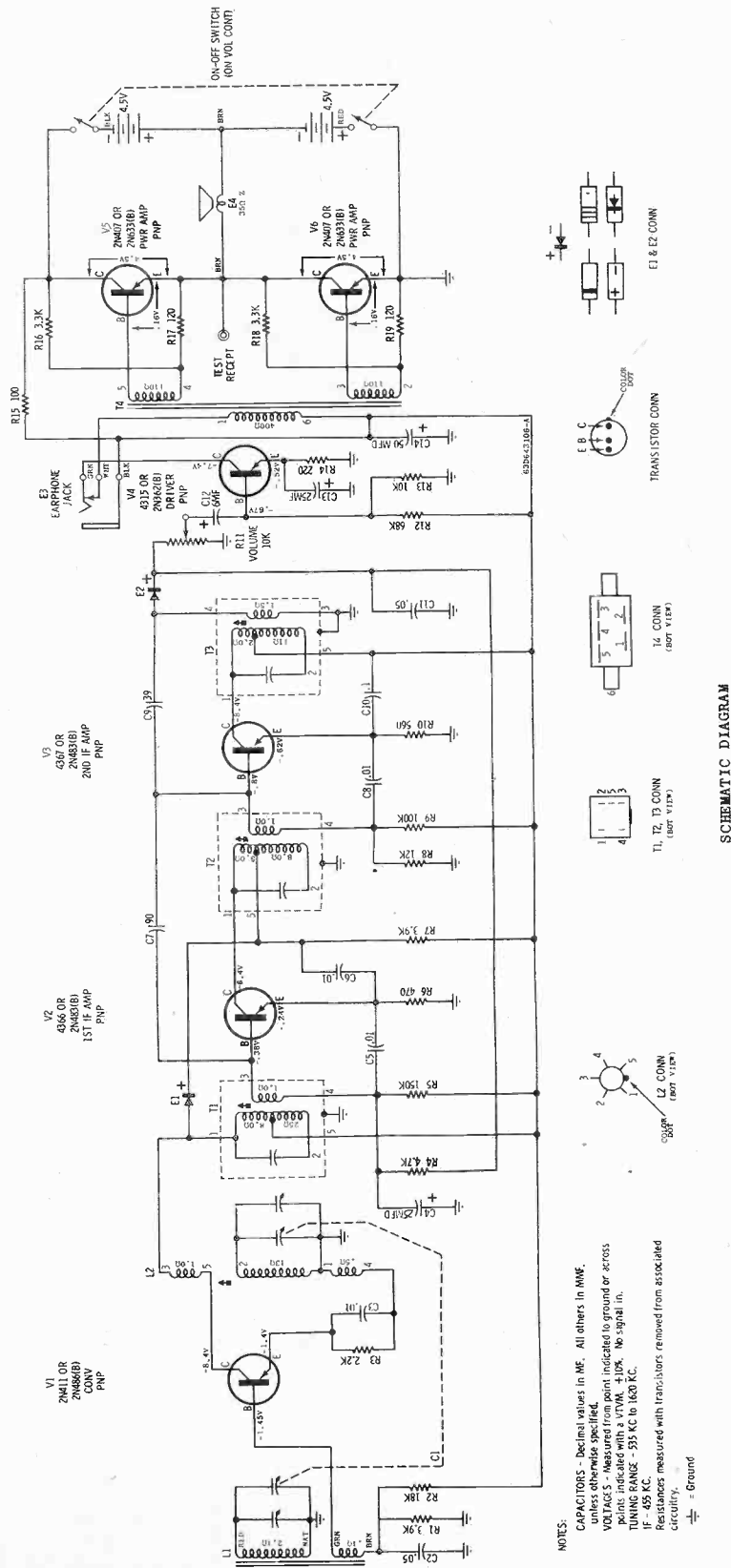
with components as they would appear on opposite side. To further aid servicing, the plated chassis bottom locates the emitters of V-1 through V-7 by use of the letter "E" on the chassis (see PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM).

SERVICING PRECAUTIONS


- When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.
- Do not service the chassis on a metal plate because of the possibility of a short circuit.
- When making circuit resistance checks, transistor shunting paths may exist, which can, in some cases, cause erroneous readings or possible damage to transistors. Therefore, when checking resistances, it may be necessary to remove one or more transistors from associated circuits.



PARTS LOCATIONS



SCHEMATIC DIAGRAM

NOTES:
 CAPACITORS - Decimal values in MF. All others in MMF, unless otherwise specified.
 VOLTAGES - Measured from point indicated by ground or across terminals indicated by + and -.
 TUNING RANGE - 535 KC to 1620 KC.
 IF - 455 KC.
 Resistances measured with transistors removed from associated circuitry.
 = Ground

MOTOROLA

Service Manual

HOME RADIO

MODEL	CHASSIS
L13S	HS-729
L13W	HS-729

POWER 9 SERIES

GENERAL INFORMATION

TYPE - Portable superheterodyne radio using a plated chassis board, seven transistors and two diodes. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - Operates from six 1-1/2 volt batteries; use six of the following or equivalent:

Eveready 635, Burgess 1, Ray-O-Vac 1LP

NOTE: To insure satisfactory performance, all six batteries used in this radio must be in good operating condition. Therefore, when battery replacement becomes necessary, it is recommended that all six be replaced with fresh ones.

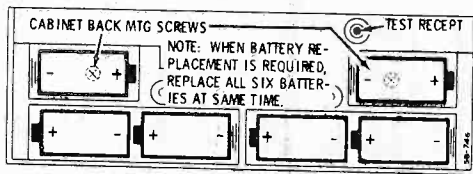
Battery Drain - (see Service Notes)



L13 SERIES

TRANSISTOR COMPLEMENT - (NOTE: Replace with same type originally used in set.)

Ref. No.	Type	Function
V-1	2N411 2N486(B)	Converter
V-2	4366 2N483(B)	1st IF Amp
V-3	4367 2N483(B)	2nd IF Amp
V-4	4315 2N362(B)	AF Amp
V-5	4315 2N362(B)	Driver
V-6, V-7	2N407 2N633(B)	Power Amp



REAR VIEW OF RADIO WITH PANEL REMOVED
SHOWING BATTERY LOCATIONS

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

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

CIRCUIT DESCRIPTION

- The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
- The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
- Reference to the chassis photographs, plated chassis board wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.
NOTE: To facilitate servicing, phantom views showing plated chassis wiring of both sides of the chassis plus location and wiring of electrical components are given. This is done in two ways; the chassis as viewed from the top (component side) and the chassis as viewed from the bottom

with components as they would appear on opposite side. To further aid servicing, the plated chassis bottom locates the emitters of V-1 through V-7 by use of the letter "E" on the chassis (see PLATED CHASSIS BOARD WIRING AS VIEWED FROM BOTTOM).

SERVICING PRECAUTIONS

- When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.
- Do not service the chassis on a metal plate because of the possibility of a short circuit.
- When making circuit resistance checks, transistor shunting paths may exist, which can, in some cases, cause erroneous readings or possible damage to transistors. Therefore, when checking resistances, it may be necessary to remove one or more transistors from associated circuits.

REPLACEMENT PARTS LIST

Part No.	Part Description	Ref.	Number	Description
C-1	Capacitor, variable, 2 gang 200V			
C-2	Capacitor, disc, .01 mf 500V			
C-3	Capacitor, electrolytic, 25 mf 10V			
C-4	Capacitor, electrolytic, .01 mf 500V			
C-5	Capacitor, cer disc, .01 mf 500V			
C-6	Capacitor, cer disc, .01 mf 500V			
C-7	Capacitor, cer disc, .01 mf 500V			
C-8	Capacitor, cer disc, .01 mf 500V			
C-9	Capacitor, cer disc, .01 mf 500V			
C-10	Capacitor, cer disc, .01 mf 500V			
C-11	Capacitor, electrolytic, 5 mf 10V			
C-12	Capacitor, electrolytic, 25 mf 6V			
C-13	Capacitor, electrolytic, 25 mf 6V			
C-14	Capacitor, electrolytic, 50 mf 15V			
C-15	Capacitor, electrolytic, 50 mf 15V			
E-1	Crystal Diode			
E-2	Crystal Diode			
E-3	Jack, earphone			
E-4	Speaker, 4", 350 Z			
L-1	(Part of Handle Assembly)			
L-2	Coil, oscillator			

Part No.	Part Description	Ref.	Number	Description
R-1	Resistor, 3900 10% 1/2W			
R-2	Resistor, 18,000 10% 1/2W			
R-3	Resistor, 2200 10% 1/2W			
R-4	Resistor, 4700 10% 1/2W			
R-5	Resistor, 450,000 10% 1/2W			
R-6	Resistor, 150,000 10% 1/2W			
R-7	Resistor, 3900 10% 1/2W			
R-8	Resistor, 12,000 10% 1/2W			
R-9	Resistor, 100,000 10% 1/2W			
R-10	Resistor, 560 10% 1/2W			
R-11	Resistor, 189543549			
R-12	Resistor, 68,000 10% 1/2W			
R-13	Resistor, 10,000 10% 1/2W			
R-14	Resistor, 270 10% 1/2W			
R-15	Resistor, 2200 10% 1/2W			
R-16	Resistor, 68,112 10% 1/2W			
R-17	Resistor, 68,127 10% 1/2W			
R-18	Resistor, 220 10% 1/2W			
R-19	Resistor, 68,626 10% 1/2W			
R-20	Resistor, 68,121 10% 1/2W			
R-21	Resistor, 68,121 10% 1/2W			
R-22	Resistor, 120 10% 1/2W			
R-23	Resistor, 120 10% 1/2W			
T-1	Transformer, 1st IF, 455 Kc			
T-2	Transformer, 2nd IF, 455 Kc			
T-3	Transformer, driver			
T-4	Transformer, driver			
V-1	48A124311 Transistor, type 2M411; PNP (converter)			
V-2	48A124366 Transistor, type 2M486(B); PNP (1st IF amp)			
V-3	48A124359 Transistor, type 2M483(B); PNP (1st IF amp)			
V-4	48A124359 Transistor, type 2M483(B); PNP (2nd IF amp)			
V-4	48A124315 Transistor, type 2M485(B); PNP (AF amp)			
V-4	48A124315 Transistor, type 2M485(B); PNP (AF amp)			

STEP	GENERATOR CONNECTION	GEN FREQ (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
1.	Radiation loop*	455 Kc	Fully opened (1620 Kc)	1, 2 & 3	Adjust for maximum.
2.	"	"	Fully closed (532 Kc)	7	Adjust for maximum.
3.	"	"	Fully opened (1620 Kc)	4	Adjust for maximum.
4.	"	"	Fully opened (1620 Kc)	4	Adjust for maximum.
5.	"	"	Tune for max	5	Adjust for maximum.
6.	"	"	"	6	Adjust for maximum.

ALIGNMENT
 Connect an output meter across the speaker. Set volume to maximum. Attenuate signal generator output so as not to exceed 1.3V on output meter at all times to prevent overloading and AGC action. Alignment should be performed with the chassis in the cabinet.

IF ALIGNMENT
 1. Radiation loop*
 2. Repeat steps A and B until osc covers required range; step B should be last adjustment.
 3. Repeat steps A and B until osc covers required range; step B should be last adjustment.
 4. Repeat steps 3 & 4 until no further increase; step 3 should be last adjustment, then cement antenna winding to core with wax. *Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver antenna. Keep radiation loop at least 12" from receiver antenna.

and millimeter connections, the meter should read 11-13 ma. If two millimeters are available, place one across each section of the switch; each meter should read 11-13 ma.

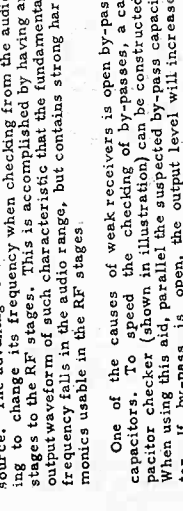
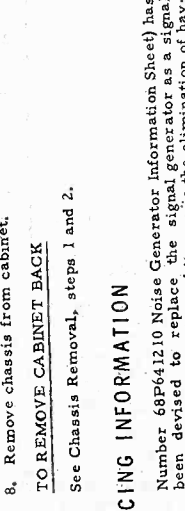
CARE OF CABINET
 Cabinet may be cleaned by using a soft, dry cloth; do not use any polishes.

CHASSIS REMOVAL
 1. Loosen two back panel mounting screws 5 or 6 turns (a coin can be used for a screwdriver) and remove panel (if necessary, press thumb against bottom center edge; the panel will swing free, allowing easy removal).
 2. To remove cabinet back, remove 2 cabinet back mounting screws located under batteries; then remove back.
 3. Remove volume, tuning and pointer knobs.
 4. From front of cabinet, remove dial scale by first removing the two dial scale mounting screws, then remove scale.
 5. Remove 2 chassis mounting screws located under dial scale and volume control mounting palnut.
 6. Unscrew earphone jack mounting nut.
 7. Unsolder chassis leads.
 8. Remove chassis from cabinet.

TO REMOVE CABINET BACK
 See Chassis Removal, steps 1 and 2.

TRANSISTOR SERVICING INFORMATION
 Number 68P641210 Noise Generator Information Sheet has been devised to replace the signal generator as a signal source. The advantage of its use is the elimination of having to change its frequency when checking from the audio stages to the RF stages. This is accomplished by having an output waveform of such characteristic that the fundamental frequency falls in the audio range, but contains strong harmonics usable in the RF stages.

One of the causes of weak receivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.



COMPONENT REPLACEMENT
 Refer to "Plated Circuit Chassis Servicing Techniques" Manual (Motorola Part No. 68P63636) for recommended tools and procedures to be used when servicing Motorola plated chassis.

TRANSISTOR CHECK
 Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors.

EMITTER RESISTOR VOLTAGES
 Voltages across the emitter resistors are provided on the schematic as an additional aid in servicing this receiver. A check of these voltages will indicate whether or not a transistor stage is functioning normally.

BATTERY DRAIN
 11-13 ma (max) with no input signal

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

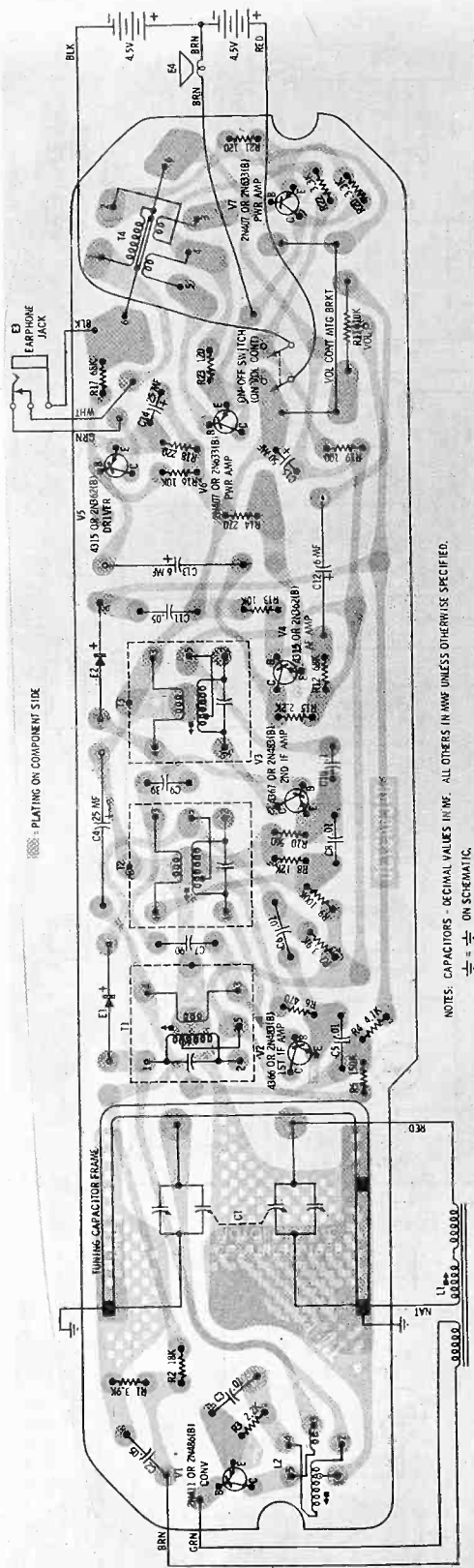
A very simple, convenient method of measuring battery drain can be made without unsoldering any connections. The only items necessary are a low resistance DC milliammeter and a jumper wire or two milliammeters. With the receiver turned off, place a milliammeter across the open terminals of one section of the switch and the jumper across the other section of the switch; the receiver is automatically turned on at the minimum volume level. The meter should read 11-13 ma; then interchange jumper wire

In transistor receiver servicing, it will be found that the causes of failure can usually be divided into two categories; the bias networks and the signal paths. These can be checked with equipment now being used to service tube type receivers. The transistors can be checked by substitution or elimination.

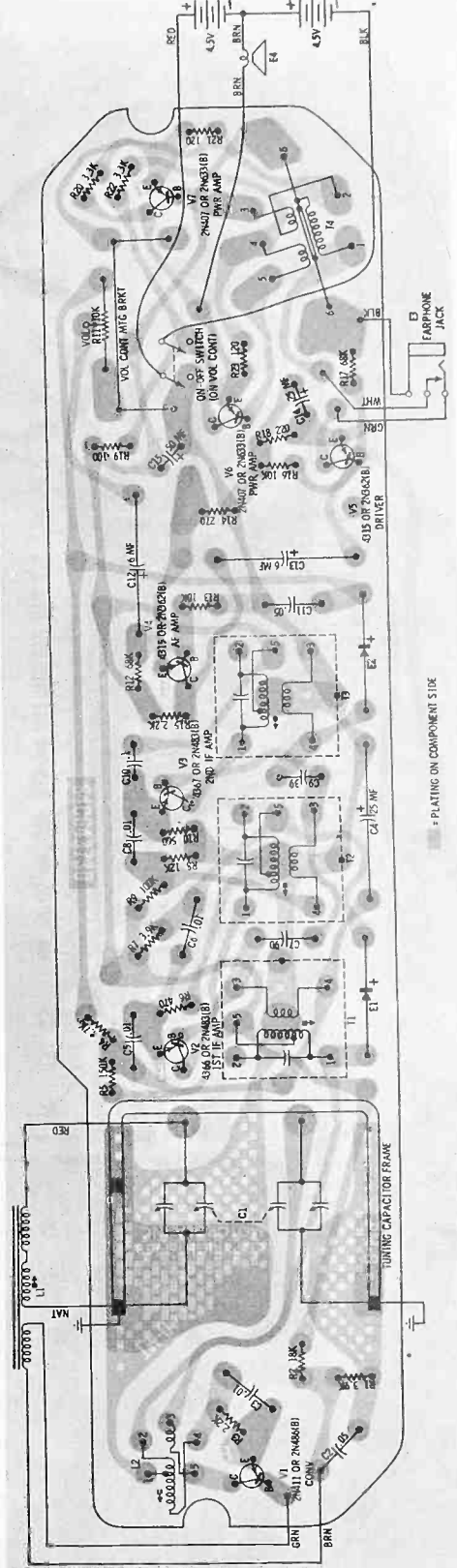
When a receiver is defective, the first step is to locate the defective stage. This is accomplished by checking the emitter resistor voltage drops or by injecting a signal from stage to stage. Measuring the emitter resistor voltage drops will locate defects in the bias network or transistors. Signal injection will locate defects in the signal paths.

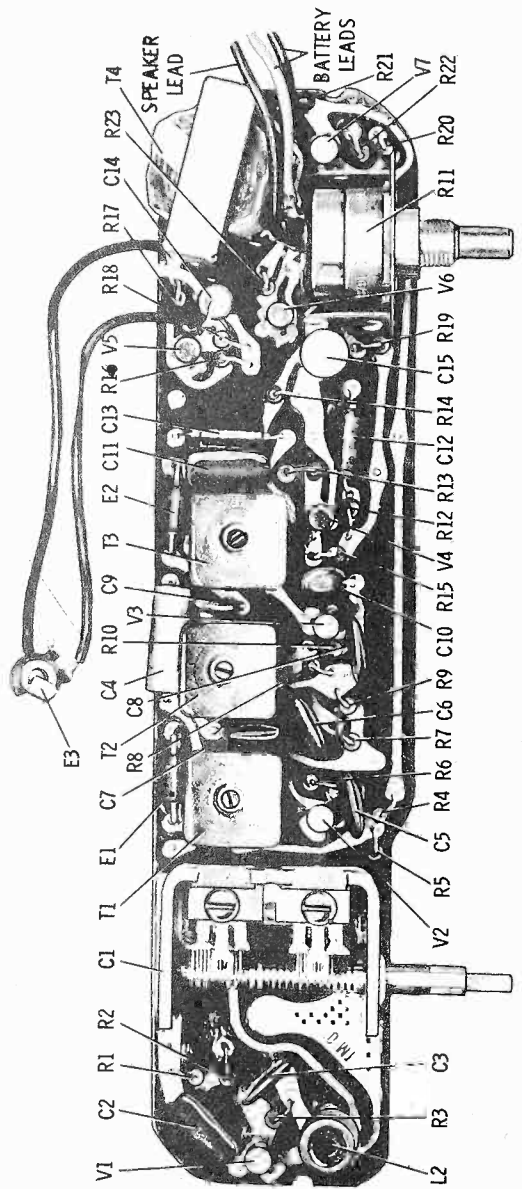
A defective stage can be located by checking the voltage drops across the emitter resistors against those values shown on the schematic. These voltage drops give an indication of the current flowing through the stage when it is properly biased. A defective component in the bias network or a defective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

An alternate process of locating a defective stage is by injecting a signal from stage to stage. A signal generator with a 400 cycle output can be used for this purpose as it has a source of RF and audio signals for checking the respective stages. Signals are injected between the transistor base electrode of each stage and ground until the defective stage is located. Then the defective component is located by resistance measurements. This method will locate defects in stages measured by faults in the signal path in cases where the defect does not show up as a voltage reading difference. To facilitate servicing, a noise generator (see December 1957 issue of Motorola Service News or Part

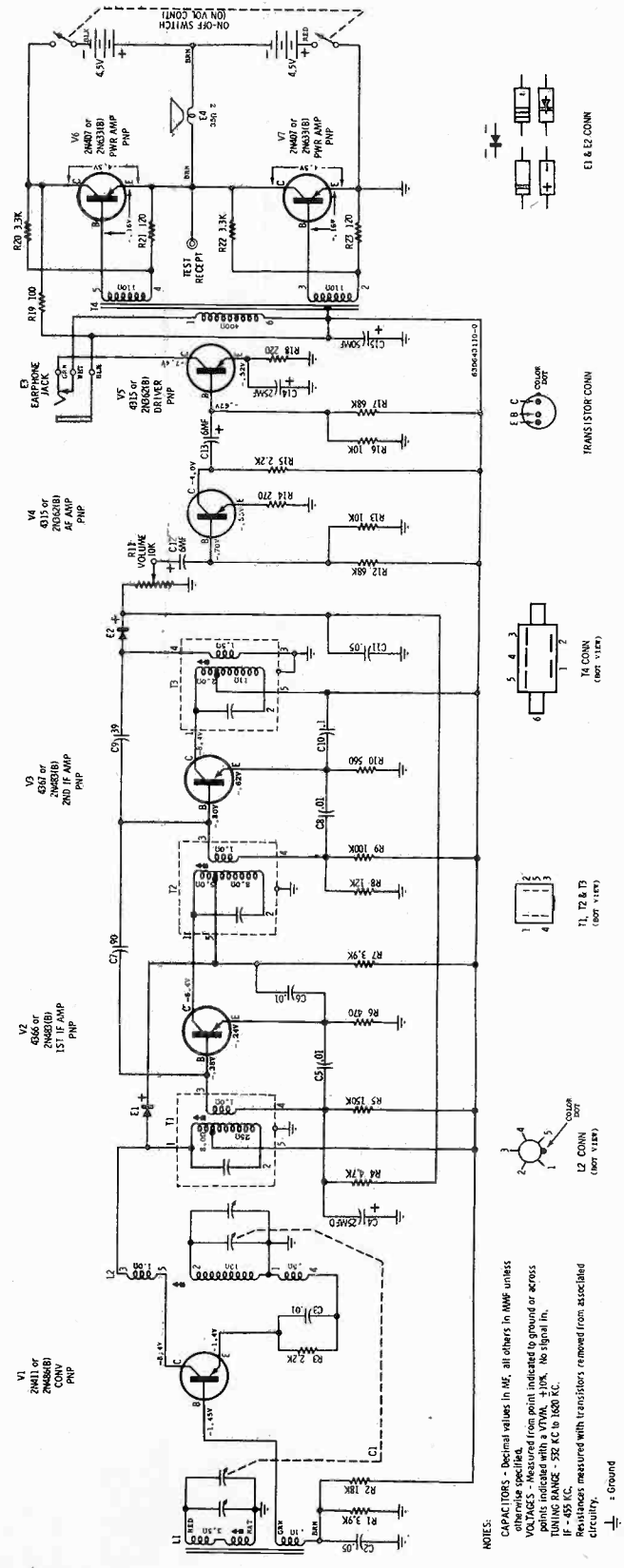


PLATED CHASSIS WIRING AS VIEWED FROM TOP (COMPONENT SIDE)





PARTS LOCATIONS

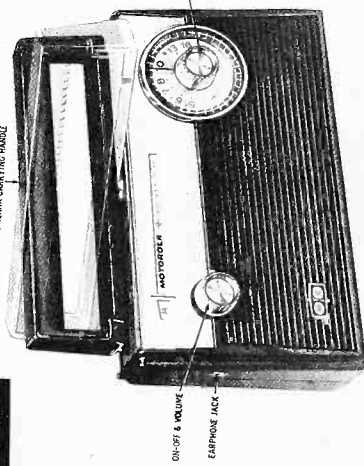


NOTES:
 CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
 VOLTAGE - (500 OHM) is indicated by ground or across points indicated with a VOM.
 TUNING RANGE - 532 KC to 1620 KC.
 IF - 455 KC.
 Resistances measured with transistors removed from associated circuitry.

SCHEMATIC DIAGRAM

MOTOROLA Service Manual

HOME RADIO
MODEL CHASSIS
L14E HS-730
RANGER 1000 SERIES



GENERAL INFORMATION

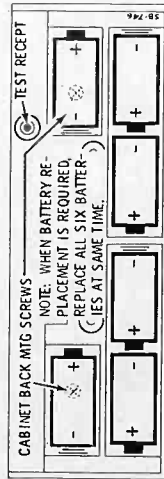
TYPE - Portable superheterodyne radio using eight transistors and a diode. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part Number 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

TUNING RANGE - 555 to 1620 Kc IF - 455 Kc

POWER SUPPLY - Operates from six 1-1/2 volt batteries; use six of the following or equivalent:
Eveready 635, Burgess 1, Ray-O-Vac 1LP

NOTE: To insure satisfactory performance, all six batteries used in this radio must be in good operating condition. Therefore, when battery replacement becomes necessary, it is recommended that all six be replaced with fresh ones.

Battery Drain - (see Service Notes)



REAR VIEW OF RADIO WITH PANEL REMOVED
SHOWING BATTERY LOCATIONS

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION

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

SERVICING PRECAUTIONS

1. When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.

2. When making circuit resistance checks, transistor shunting paths may exist, which can, in some cases, cause erroneous readings or possible damage to transistors. Therefore, when checking resistances, it may be necessary to remove one or more transistors from associated circuits.

TRANSISTOR CHECK

Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors.

EMITTER RESISTOR VOLTAGES

Voltages across the emitter resistors are provided on

L14 SERIES

TRANSISTOR COMPLEMENT (NOTE: Replace with same type originally used in set.)

Ref. No.	Type	Function
V-1	2N1107	RF amp
V-2	2N1109	Oscillator
V-3	2N1108	Mixer
V-4	2N1108 (coded red)	1st IF Amp
V-5	2N1110	2nd IF Amp
V-6	2N1111 (coded red)	Driver
V-7, 8	2N238 2N185	Power Amp

An alternate process of locating a defective stage is by

the schematic as an additional aid in servicing this receiver. A check of these voltages will indicate whether or not a transistor stage is functioning normally.

BATTERY DRAIN

12-16 ma (max) with no input signal

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

A very simple, convenient method of measuring battery drain can be made without unsoldering any connections. The only items necessary are a low resistance DC milliammeter and a jumper wire or two milliammeters. With the receiver turned off, place a milliammeter across the open terminals of one section of the switch and the jumper across the other section of the switch; the receiver is automatically turned on at the minimum volume level. The meter should read 12-16 ma; then interchange jumper wire and milliammeter connections, the meter should read 12-16 ma. If two milliammeters are available, place one across each section of the switch; each meter should read 12-16 ma.

CHASSIS REMOVAL

1. Loosen two back panel mounting screws 5 or 6 turns (a coin can be used for a screwdriver) and remove panel (if necessary, press thumb against bottom center edge; the panel will swing free, allowing easy removal).

- To remove cabinet back, remove 2 cabinet back mounting screws located under batteries; then remove back.
- Remove volume, tuning and pointer knobs.
- From front of cabinet, remove dial scale by first removing the two dial scale mounting screws, then remove scale.
- Remove 2 chassis mounting screws located under dial scale and volume control mounting nut.
- Unscrew earphone jack mounting nut.

- Unsolder chassis leads.
 - Remove chassis from cabinet.
- TO REMOVE CABINET BACK
See Chassis Removal, steps 1 and 2.

CARE OF CABINET

Cabinet may be cleaned by using a soft, dry cloth; do not use any polishes.

TRANSISTOR SERVICING INFORMATION

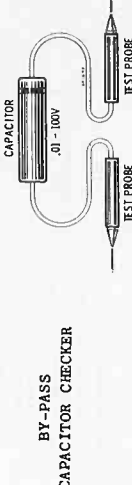
In transistor receiver servicing, it will be found that the causes of failure can usually be divided into two categories; the bias networks and the signal paths. These can be checked with equipment now being used to service tube type receivers. The transistors can be checked by substitution or elimination.

When a receiver is defective, the first step is to locate the defective stage. This is accomplished by checking the emitter resistor voltage drops or by injecting a signal from stage to stage. Measuring the emitter resistor voltage drops will locate defects in the bias network or transistor. Signal injection will locate defects in the signal paths.

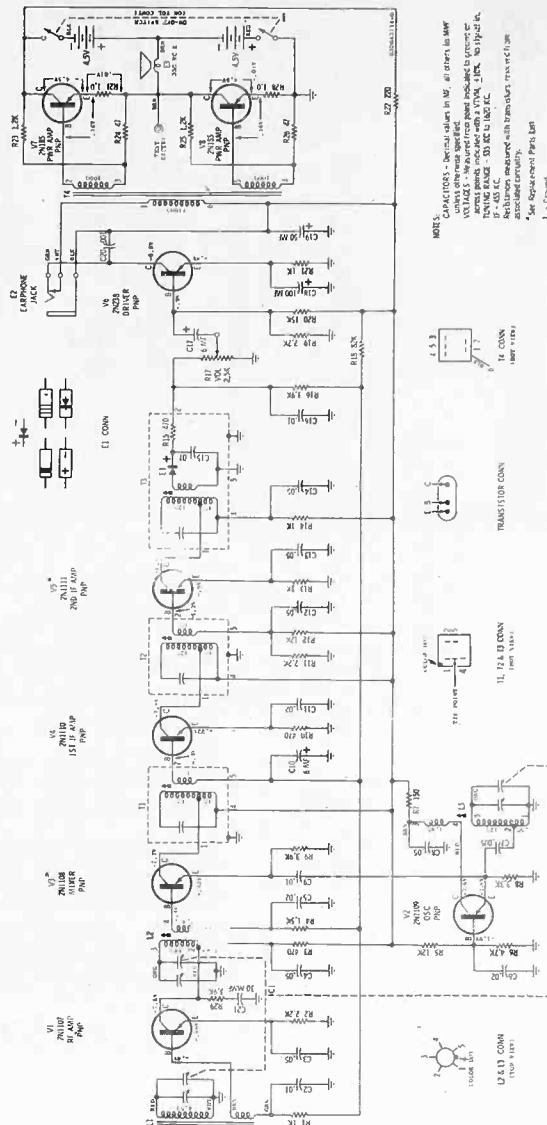
A defective stage can be located by checking the voltage drops across the emitter resistors against those values shown on the schematic. These voltage drops give an indication of the current flowing through the stage when it is properly biased. A defective component in the bias network or a defective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

injecting a signal from stage to stage. A signal generator with a 400 cycle output can be used for this purpose as it has a source of RF and audio signals for checking the respective stages. Signals are injected between the transistor base electrode of each stage and ground until the defective stage is located. Then the defective component is located by resistance measurements. This method will locate defects in stages caused by faults in the signal path in cases where the defect does not show up as a voltage reading difference. To facilitate servicing, a noise generator (see December 1957 issue of Motorola Service News or Part Number 68P641210 Noise Generator Information Sheet) has been devised to replace the signal generator as a signal source. The advantage of its use is the elimination of having to change its frequency when checking from the audio stages to the RF stages. This is accomplished by having an output waveform of such characteristic that the fundamental frequency falls in the audio range, but contains strong harmonics usable in the RF stages.

One of the causes of weak receivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.



BY-PASS
CAPACITOR CHECKER



SCHEMATIC DIAGRAM

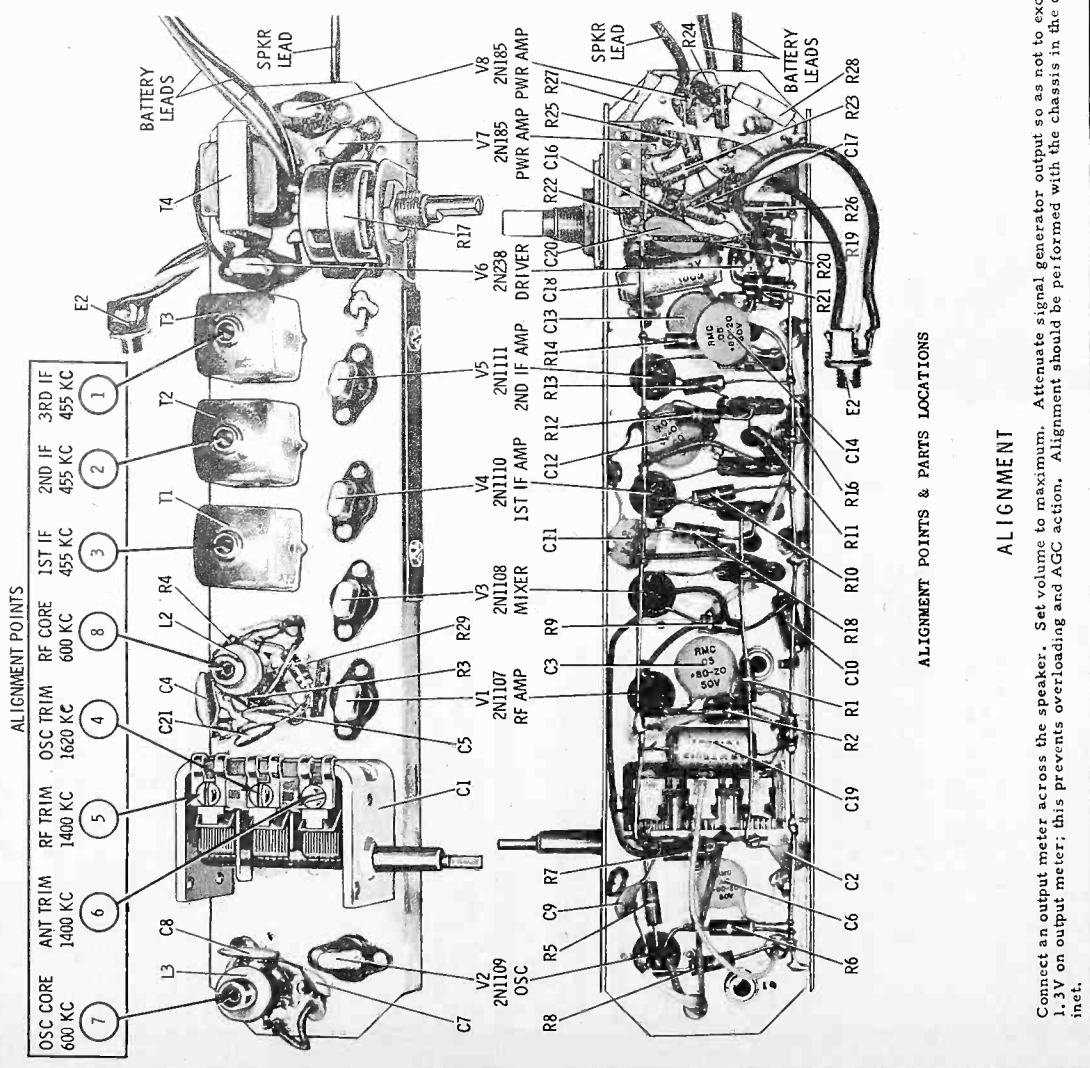
REPLACEMENT PARTS LIST

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

Ref. No.	Part Number	Description
T-1	*24D643618	Transformer, 1st IF: 455 Kc
T-2	*24D643618	Transformer, 2nd IF: 455 Kc
T-3	*24K643619	Transformer, 3rd IF: 455 Kc
T-4	*25B643569	Transformer, driver
V-1	*48A124346	Transistor, type 2N1107: PNP (RF amp)
V-2	*48A124349	Transistor, type 2N1109: PNP (osc)
V-3	*48A124347	Transistor, type 2N1108: PNP (mixer)
V-4	*48A124350	Transistor, type 2N1110: PNP (1st IF amp)
V-5	*48A124352	Transistor, type 2N1111: PNP (2nd IF amp)
V-6	*48A124380	Transistor, type 2N238: PNP (driver)
V-7,8	*48A124379	Transistor, type 2N185: PNP (per amp)
MECHANICAL PARTS		
	*25121771	Nut, hex: 3/8-32 (vol cont mtg)
	552815	Rivet (transistor socket mtg)
	*99749377	Socket, transistor
CABINET PARTS		
	*13C644597	Bezel
	43K643371	Bushing, threaded (handle mtg)
	*17G44067	Cabinet back: smoke (L14E)
	42B64374	Decorative back: chrome (L14E)
	42B64374	Clip, battery contact
	43C643547	Disc, decorative: nickel (handle mtg)
	*17G44062	Handle Assembly: nickel; incl L1 (L14E)
	*38B644001	Knob, on-off & vol: chrome (L14E)
	*38B64368	Knob, pointer
	43E64375	Lockwasher: 3/8 (handle mtg)
	43E64375	Lockwasher: 3/8 (handle mtg)
	13B643475	Medallion (Use 1M128076 adhesive - See LIMITED REPLACEMENT PARTS)
	2A640134	Nut, earphone jack mtg
	2A635708	Nut, speed (spr mtg)
	287051	Nut, speed (spr mtg)
	287051	Paint: 3/8-32 (chassis mtg - On-off & vol cont side)
	*16K644852	Panel, battery compartment: smoke (L14E)
	*3K644778	Scale, dial battery compartment panel mtg
	35129498	Screw, machine: 6-32 x 5/16 (cabinet back mtg)
	35129498	Screw, machine: 6-32 x 9/16 (gang mtg)
	35129645	Screw, tapping: 2 x 3/16 (dial scale mtg)
	41A643784	Spring, battery contact (with right-angle bend)
	41A643786	Spring, battery contact (without right-angle bend)
	29K643984	Terminal, pin (test recept)
	4A637176	Washer, bearing: nickel (handle mtg)
	4K601456	Washer, "C" (battery compartment panel screw ret)
LIMITED REPLACEMENT PARTS		
Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required. Adhesive, medallion (2 oz. jar)		
*32B643570 Gasket, bezel		

*New Item, Appears in any List for First Time

Ref. No.	Part Number	Description
ELECTRICAL PARTS		
C-1	*19B643228	Capacitor, variable: 3 gang
C-2	*21K129478	Capacitor, cer disc: .01 mf 50V
C-3	*21K129480	Capacitor, cer disc: .02 mf 50V
C-4	*21K129479	Capacitor, cer disc: .02 mf 50V
C-5	*21K129479	Capacitor, cer disc: .02 mf 50V
C-6	*21K129479	Capacitor, cer disc: .02 mf 50V
C-7	*21K129481	Capacitor, cer disc: .02 mf 50V
C-8	*21K129480	Capacitor, cer disc: .05 mf 50V
C-9	*21K129480	Capacitor, cer disc: .01 mf 50V
C-10	*21K129479	Capacitor, cer disc: .01 mf 50V
C-11	*21K129480	Capacitor, cer disc: .02 mf 50V
C-12	*21K129480	Capacitor, cer disc: .05 mf 50V
C-13	*21K129480	Capacitor, cer disc: .05 mf 50V
C-14	*21K129480	Capacitor, cer disc: .05 mf 50V
C-15	*21K129478	Capacitor, cer disc: .01 mf 50V
C-16	*23K636769	Capacitor, electrolytic: 6 mf 10V
C-17	*23K636769	Capacitor, electrolytic: 100 mf 3V
C-18	*23K636769	Capacitor, electrolytic: 50 mf 12V
C-19	*23K636769	Capacitor, electrolytic: 50 mf 12V
C-20	*21R410127	Capacitor, cer disc: .001 mf 500V
C-21	*21R410127	Capacitor, cer disc: .001 mf 500V
C-22	*21R410127	Capacitor, cer disc: .001 mf 500V
C-23	*21R410127	Capacitor, cer disc: .001 mf 500V
E-1	48K640754	Crystal Diode (inside T3)
E-2	9K641326	Jack, earphone
E-3	*50K644578	Speaker, PH: 4"; 35Ω Z
L-1	*24B643632	Part of Handle Assembly
L-2	*24B643632	Coil, RF
L-3	*24B643632	Coil, osc
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	6K121301	10,000 10% 1/2W
R-2	6R6069	2200 10% 1/2W
R-3	6K127633	470 10% 1/2W
R-4	6K127513	1500 10% 1/2W
R-5	6K119933	12,000 10% 1/2W
R-6	6K127513	1500 10% 1/2W
R-7	6K124757	150 10% 1/2W
R-8	6K121725	3300 10% 1/2W
R-9	6K121931	3900 10% 1/2W
R-10	6K127633	470 10% 1/2W
R-11	6K127633	470 10% 1/2W
R-12	6K127633	470 10% 1/2W
R-13	6K121301	10,000 10% 1/2W
R-14	6K121301	10,000 10% 1/2W
R-15	6K121301	10,000 10% 1/2W
R-16	6K121301	10,000 10% 1/2W
R-17	6K121301	10,000 10% 1/2W
R-18	6K121301	10,000 10% 1/2W
R-19	6R6069	2200 10% 1/2W
R-20	6K119934	15,000 10% 1/2W
R-21	6K121301	10,000 10% 1/2W
R-22	6K127513	1500 10% 1/2W
R-23	6K127513	1500 10% 1/2W
R-24	6K127513	1500 10% 1/2W
R-25	6K119925	1200 10% 1/2W
R-26	6K127513	47 10% 1/2W
R-27	*17A643639	Wirewound: 10 10% 1/2W
R-28	*17A643639	Wirewound: 10 10% 1/2W
R-29	6K121301	3900 10% 1/2W
R-30	6K121301	3900 10% 1/2W

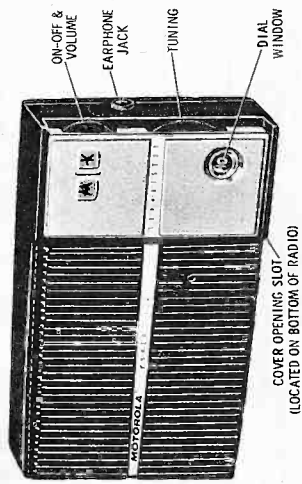


STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
1.	Radiation loop*	455 Kc	Fully opened (1620 Kc)	1, 2 & 3	Adjust for maximum.
2.	Radiation loop*	1620 Kc	Fully opened (1620 Kc)	4	Adjust for maximum.
3.	"	1400 Kc	Tune for max	5 & 6	"
4.	"	600 Kc	"	7 & 8	Adjust for maximum while rocking gang.
5.	Repeat steps 2, 3, and 4 until no further increase; step 3 should be last adjustment.				

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver antenna. Keep radiation loop at least 12" from receiver antenna.

MOTOROLA Service Manual

HOME RADIO
MODELS CHASSIS
 X12A HS-732
 X12E HS-732
POWER EIGHT SERIES



POWER SUPPLY - Operates from four 1-1/2 volt batteries; use four of the following or equivalent:
 Burgess 930, Eveready 1015, Mallory M15 or ZM-9, Ray-O-Vac 7LP or 7R Battery Drain - 7-10 ma (max) with no input signal.

TRANSISTOR COMPLEMENT - (Note: Replace with same type originally used in set)

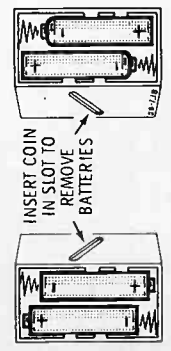
Ref. No.	Type	Type	Function
V-1	2N1108	2N1108 (coded red)	Converter
V-2	2N1110	2N1110	1st IF amp
V-3	2N1111	2N1111 (coded red)	2nd IF amp
V-4	2N238(D)	2N238(F)	Driver
V-5, 6	2N238(E)	2N238(F)	Power amp

GENERAL INFORMATION

TYPE - Pocket portable superheterodyne radio using a plated chassis board, six transistors and two diodes. An earphone jack is provided on side of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

Chassis HS-732-1 differs from chassis HS-732-2 in the transistor types used (see TRANSISTOR COMPLEMENT).

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc



INSTALL 4 FLASHLIGHT BATTERIES THIS WAY 2 ON EACH SIDE

INSTALL 4 MERCURY BATTERIES THIS WAY 2 ON EACH SIDE

INSTALLATION OF FLASHLIGHT OR MERCURY BATTERIES

CIRCUIT DESCRIPTION

- The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
- The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
- Reference to the chassis photographs, plated chassis board wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing wiring of both sides of the plated chassis board plus location and wiring of electrical components are given. This is done in two ways; the chassis as viewed from the top (component side) and the chassis as viewed from the bottom with components as they would appear on opposite side.

SERVICING PRECAUTIONS

- When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, causing excessive current to flow through the transistor, allowing permanent damage.
- Do not service the chassis on a metal plate because of the possibility of a short circuit.

until chassis is free of chassis retainers (C & D) at top and bottom of cabinet; then lift up chassis at speaker end of cabinet until it clears the chassis retainers (C&D - see CHASSIS REMOVAL detail).

- Lift chassis up until it is slightly above speaker, then slide chassis over speaker so that the chassis is free of chassis retainers (E & F) below earphone jack.
- From under chassis, loosen speaker mounting screws until speaker mounting brackets are loose enough so that the speaker can be removed.
- Lift chassis, speaker, and battery holder out of cabinet.
- Before replacing chassis, mount speaker, then insert tuning gang end of chassis into cabinet, spread points A & B of cabinet, then lower other end of chassis into place under chassis retainers C & D (make certain battery leads are dressed under and away from antenna).
- Place battery holder back into the cabinet slots as originally found.

CARE OF CABINET

Cabinet may be cleaned by using a soft, dry cloth; do not use any polishes.

TRANSISTOR CHECK

Substituting a known good transistor for a suspected one

TRANSISTOR SERVICING INFORMATION

In transistor receiver servicing, it will be found that the causes of failure can usually be divided into two categories; the bias networks and the signal paths. These can be checked with equipment now being used to service tube type receivers. The transistors can be checked by substitution or elimination.

When a receiver is defective, the first step is to locate the defective stage. This is accomplished by checking the emitter resistor voltage drops or by injecting a signal from stage to stage. Measuring the emitter resistor voltage drops will locate defects in the bias network or transistor. Signal injection will locate defects in the signal paths.

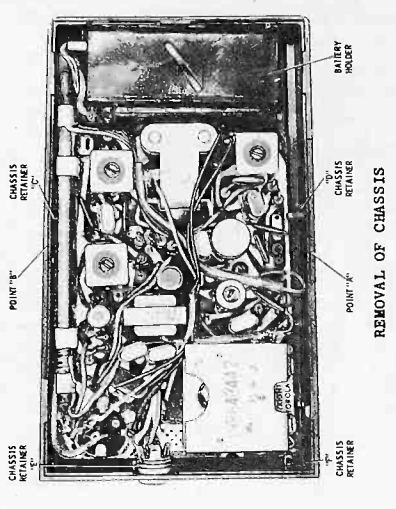
A defective stage can be located by checking the voltage drops across the emitter resistors against those values shown on the schematic. These voltage drops give an indication of the current flowing through the stage when it is properly biased. A defective component in the bias network or a defective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

An alternate process of locating a defective stage is by injecting a signal from stage to stage. A signal generator with a 400 cycle output can be used for this purpose as it has a source of RF and audio signals for checking the respective stages. Signals are injected between the transistor base electrode of each stage and ground until the defective stage is located. Then the defective component is located by resistance measurements. This method will locate defects in stages caused by faults in the signal path in cases where the defect does not show up as a voltage reading difference. To facilitate servicing, a noise generator (see December, 1957 issue of Motorola Service News or Part Number 68P441210 Noise Generator Information Sheet) has been devised to replace the signal generator as a signal source. The advantage of its use is the elimination of having to change its frequency when checking from the audio stages to the RF stages. This is accomplished by having an output waveform of such characteristic that the fundamental

is the simplest and most positive method of checking transistors.

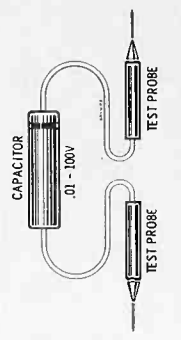
EMITTER RESISTOR VOLTAGES

Voltages across the emitter resistors are provided on the schematic as an additional aid in servicing this receiver. A check of these voltages will indicate whether or not a transistor stage is functioning normally.

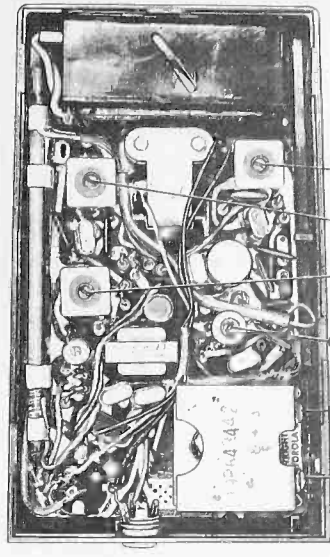


frequency falls in the audio range, but contains strong harmonics usable in the RF stages.

One of the causes of weak receivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.

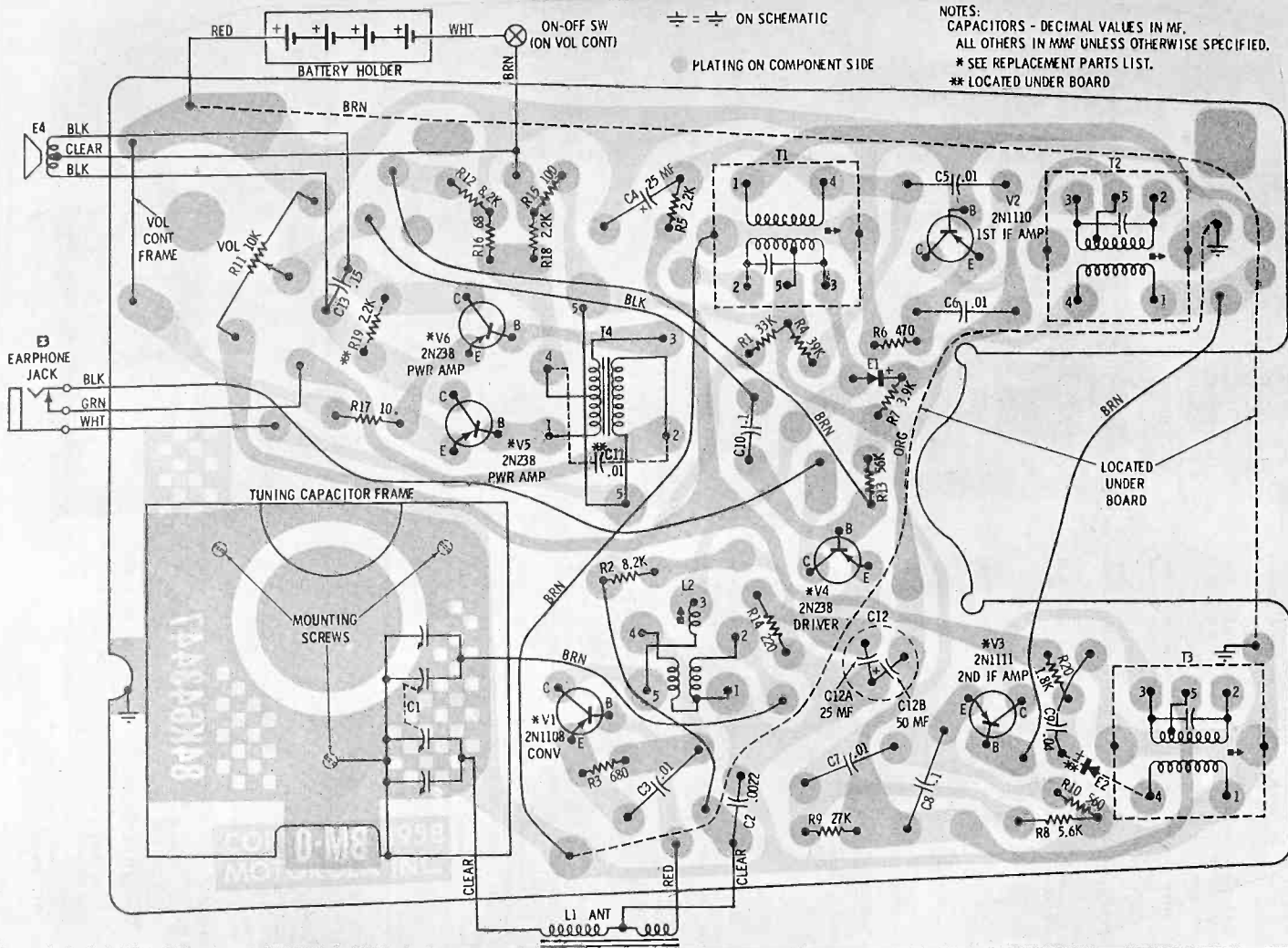


BY-PASS CAPACITOR CHECKER



ALIGNMENT POINT LOCATIONS

CHASSIS HS-732



NOTES:
CAPACITORS - DECIMAL VALUES IN MF.
ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
* SEE REPLACEMENT PARTS LIST.
** LOCATED UNDER BOARD

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

REPLACEMENT PARTS LIST

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

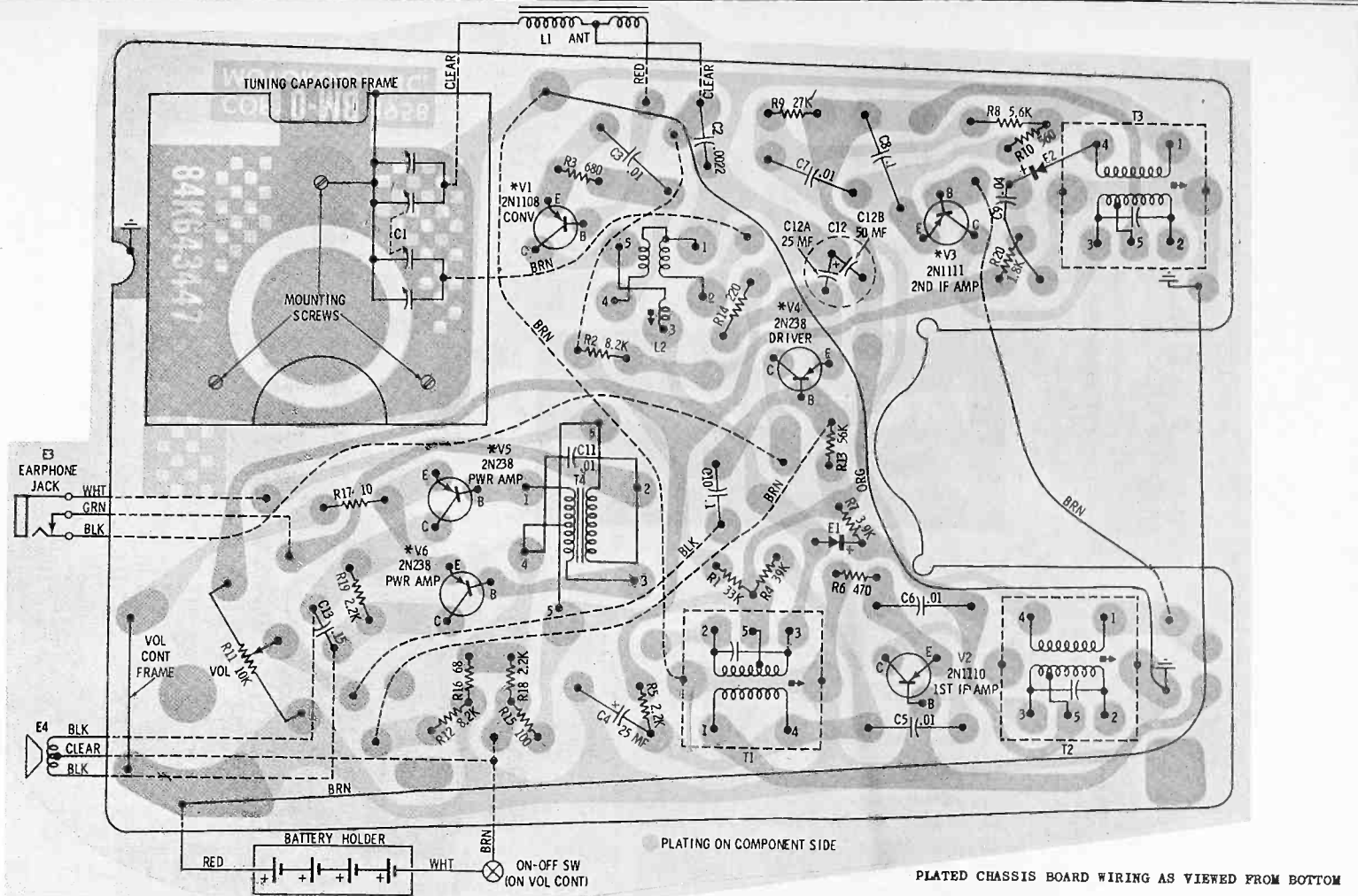
Ref. Part No.	Part Number	Description
C-1	*19B64342	Capacitor, variable: 2 gang
C-2	*21B129489	Capacitor, cer disc: .0022 mf 50V
C-3	*21K640366	Capacitor, cer disc: .01 mf 10V
C-4	*2K637758	Capacitor, electrolytic: 25 mf 3V
C-5	*21K640366	Capacitor, cer disc: .01 mf 10V
C-6	*21K640366	Capacitor, cer disc: .01 mf 10V
C-7	*81L29561	Capacitor, mylar: .1 mf (.08 in some sets) 50V
C-8	*21B635389	Capacitor, cer disc: .04 mf 10V
C-9	*21B635389	Capacitor, cer disc: .04 mf 10V
C-10	*21K121946	Capacitor, mylar: .1 mf 50V
C-11	*21K121946	Capacitor, mylar: .1 mf 50V
C-12	*23B639917	Capacitor, electrolytic: 25-.50mf/10V
E-1	*48K640754	Crystal Diode
E-2	*48K640754	Crystal Diode
E-3	*50B639916	Speaker, magnetic: 2-3/4"; 3000 Z at 1 Kc
L-1	*24K643975	Ferrite antenna
L-2	*24K643917	Coil, osc
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	*61L27632	33,000 10% 1/2W
R-2	*61L19931	8200 10% 1/2W
R-3	*6R6040	680 10% 1/2W
R-4	*61L27635	29,000 10% 1/2W
R-5	*61L27633	470 10% 1/2W
R-6	*61L27633	3900 10% 1/2W
R-7	*61L27633	3900 10% 1/2W
R-8	*61L27635	5600 10% 1/2W
R-9	*61L27635	27,000 10% 1/2W
R-10	*38E60094	660 10% 1/2W
R-11	*38E60094	8200 10% 1/2W
R-12	*61L19931	8200 10% 1/2W
R-13	*61L27541	56,000 10% 1/2W
R-14	*61L27099	220 10% 1/2W
R-15	*6R6326	100 10% 1/2W
R-16	*61L24668	10 10% 1/2W
R-17	*61L24668	10 10% 1/2W
R-18	*6R6069	2200 10% 1/2W
R-19	*6R6069	2200 10% 1/2W
R-20	*61L24425	1800 10% 1/2W
T-1	*24C543727	Transformer, 1st IF: 455 Kc
T-2	*24C543727	Transformer, 2nd IF: 455 Kc
T-3	*24K643279	Transformer, driver
T-4	*24K643049	Transformer, driver
V-1	*48A124347	Transistor, type 2N1108: PNP (converter - HS-732-1)
V-2	*48A124346	Transistor, type 2N1108 (coded red): PNP
V-3	*48A124350	Transistor, type 2N1110: PNP (1st IF - HS-732-1 & HS-732-2)
V-4	*48A124351	Transistor, type 2N1111: PNP (2nd IF - HS-732-1)
*New Item, Appears in any List for First Time		
LIMITED REPLACEMENT PARTS		
Note: The volume of replacement on the following parts is small; consequently, it is suggested that ordering be done only in 100's.		
*138B43394 Lens, tuning (part of escutcheon)		
*24C543727 Transformer, 2nd IF: 455 Kc		
*24L2121 Nut, nickel: 1/4-32 (E3 mtg)		
*487616 Washer, flat: 1/2 (E3 mtg)		
*1V643454 Cabinet Back: Gray (X12A)		
*1V643455 Cabinet Back: Smoke (X12E)		
*1V644556 Cabinet Front: Gray; incl medallion (X12A)		
*1V644557 Cabinet Front: Smoke; incl medallion (X12E)		
*24E43395 Escutcheon: incl tuning lens		
*36R643396 Knob, volume		
*138B43394 Lens, tuning (part of escutcheon)		
*24C543727 Transformer, 2nd IF: 455 Kc		
*24L2121 Nut, nickel: 1/4-32 (E3 mtg)		
*487616 Washer, flat: 1/2 (E3 mtg)		

ALIGNMENT

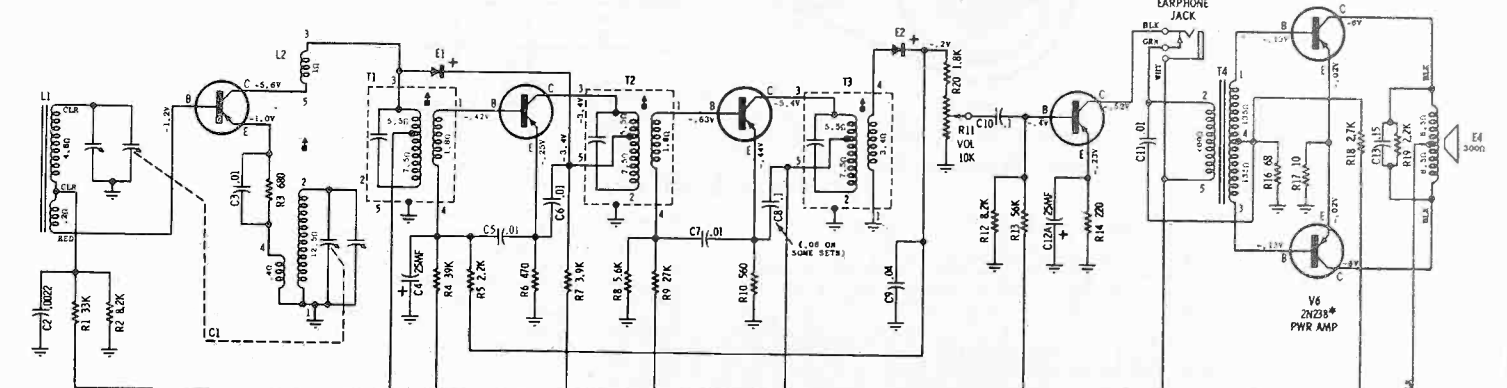
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
1.	IF ALIGNMENT Ant. section of gang thru .1 mf & ground	455 Kc	Fully open	1, 2 & 3	Adjust for maximum.
2.	RF ALIGNMENT Radiation loop*	1620 Kc	Fully open	4	Adjust for maximum.
3.	Radiation loop*	1400 Kc	Tune for max	5	Adjust for maximum.
4.	Radiation loop*	530 Kc	Fully closed	6	Adjust for maximum.
5.	Radiation loop*	1620 Kc	Fully open	4	Adjust for maximum.
6.	Repeat steps 4 and 5 until oscillator covers required range; step 5 should be last adjustment.				
7.	Radiation loops*	1400 Kc	Tune for max	5	Adjust for maximum.
8.	Radiation loops*	600 Kc	Tune for max	6	Adjust for maximum while rocking gang*

NOTE: Do not perform the following steps unless the oscillator core has been tampered with or associated components have been replaced. BEFORE PROCEEDING, SET OSCILLATOR TRIMMER 1/4 TURN FROM ITS TIGHT POSITION.

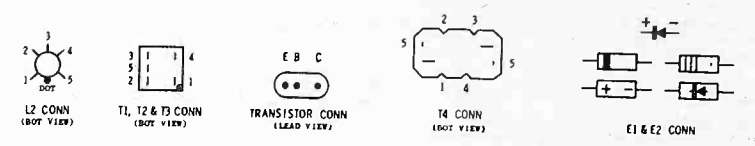
*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep loops at least 12" apart. **If large adjustment is required, it will be necessary to repeat steps 4 through 8.



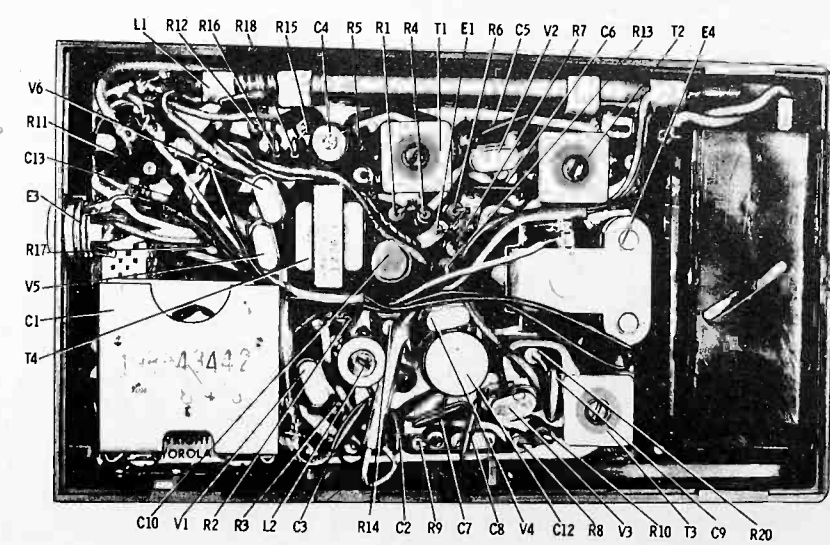
- V1 2N1108* CONV
- V2 2N1110 1ST IF AMP
- V3 2N1111* 2ND IF AMP
- V4 2N238* DRIVER
- V5 2N238* PWR AMP
- V6 2N238* PWR AMP



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



SCHEMATIC DIAGRAM



PARTS LOCATION

RADIO PAGE 26-14 MOTOROLA

MOTOROLA

Service Manual

HOME RADIO

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

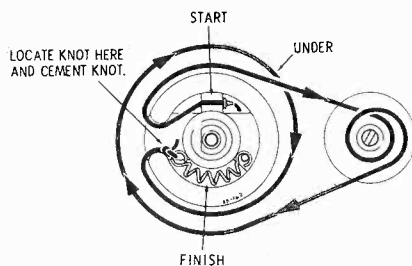
GENERAL INFORMATION

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

POWER SUPPLY - Operates from one nine-volt battery; use one of the following or an equivalent type:

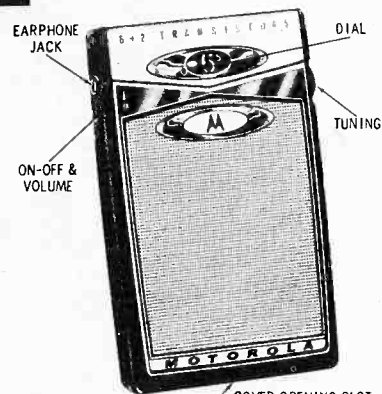
Eveready 216, Burgess 2U6, Ray-O-Vac 1604

Battery Drain - (see Service Notes)



GANG SET TO LOW END (532 KC).

DIAL STRINGING DETAIL



X11 SERIES

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

TRANSISTOR COMPLEMENT

Ref. No.	Type	Function
V-1	2S-52	Converter
V-2	2S-53	1st IF amp
V-3	2S-53	2nd IF amp
V-4	2S-54	Driver
V-5, V-6	2S-56	Power amp

SERVICE NOTES

means that when ohmmeter tests are applied to a circuit, ohmmeter readings may not agree with numerical values of resistors, etc., because of the shunting paths transistors and diodes offer. Likewise, reversal of ohmmeter leads may give completely different readings because transistors and diodes are rectifiers; similarly, electrolytics in set will affect readings - depending on ohmmeter battery polarity. Low voltage high-capacity electrolytics can be damaged by reversing the supply voltage polarity or applying some potential above their voltage rating. Do not use a VTVM that uses more than 3 volts for measuring resistance or you may damage transistors and electrolytics.

EMITTER RESISTOR VOLTAGES

Voltages across the emitter resistors are provided on the schematic and the printed circuit board wiring diagram as an additional aid in servicing this receiver. A check of these voltages will indicate whether or not a transistor stage is functioning normally.

The current values in each stage will vary slightly even with transistors of the same type, so the values stated are average values.

• TROUBLESHOOTING PROCEDURE

When servicing this receiver, regardless of the symptom encountered, it is advisable to check battery voltage before troubleshooting is begun. If the radio does not operate or operates very weakly, use the following troubleshooting chart before attempting to remove or replace components. Many faults can be localized by the use of this chart.

CIRCUIT DESCRIPTION

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

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

NOTE: To facilitate servicing, the printed circuit board wiring diagram is shown from the conduction side of the chassis with the components on the opposite side "phantomed" in. To further aid servicing, the base, emitter and collector voltages are included.

SERVICING PRECAUTIONS

1. When servicing this radio, probing with a screwdriver (checking for "clicks" from various points) must be avoided, because the transistors are susceptible to damage from this type of check. If the transistor BASE electrode is shorted to certain points in the circuit, the BASE bias will be altered, allowing excessive current to flow through the transistor, causing permanent damage.

2. Do not service the chassis on a metal plate because of the possibility of a short circuit.

RESISTANCE CHECKS

Unlike vacuum tubes, transistors and germanium diodes will conduct even though no power is applied to set. This

CHASSIS REMOVAL

- 1. Remove cabinet back by inserting a coin into the cover opening slot (located on bottom of radio) and twisting until cabinet back is free.
2. Remove 2 chassis mounting screws (see PARTS LOCATION photo).
3. Unscrew earphone jack mounting nut and remove spacer.
4. Remove cardboard strip (located under battery).
5. Unsolder speaker leads.
6. Slide chassis to tuning knob side of cabinet and pull up on volume knob side.
7. When replacing chassis, make certain leads are dressed properly against chassis and are away from speaker.

CARE OF CABINET

Cabinet may be cleaned by using a soft, dry cloth; do not use any polishes.

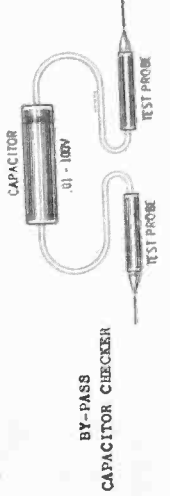
TRANSISTOR SERVICING INFORMATION

In transistor receiver servicing, it will be found that the causes of failure can usually be divided into two categories: the bias networks and the signal paths. These can be checked with equipment now being used to service tube type receivers. The transistors can be checked by substitution or elimination.

When a receiver is defective, the first step is to locate the defective stage. This is accomplished by checking the emitter resistor voltage drops or by injecting a signal from stage to stage. Measuring the emitter resistor voltage drops will locate defects in the bias network or transistor. Signal injecting will locate defects in the signal paths.

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

An alternate process of locating a defective stage is by injecting a signal from stage to stage. A signal generator with a .400 cycle output can be used for this purpose as it has a source of RF and audio signals for checking the respective stages. Signals are injected between the transistor base electrode of each stage and ground until the defective stage is located. Then the defective component is located by resistance measurements. This method will locate defects in stages caused by faults in the signal path in cases where the defect does not show up as a voltage reading difference. To facilitate servicing, a noise generator (see December 1957 issue of Motorola Service News or Part Number 68P641210 Noise Generator Information Sheet) has been devised to replace the signal generator as a signal source. The advantage of its use is the elimination of having to change its frequency when checking from the audio



No Reception

- 1. Check battery voltage and battery drain.
2. Check on-off switch (on vol cont).
3. Check antenna lead connections.
4. Check for dead oscillator - measure DC voltage at emitter of V-1; then short oscillator tank circuit (lugs 3 & 5 on L-2); if emitter voltage changes (1/2 of .1 volt or more), oscillator is working; no voltage increment means a dead oscillator.
5. Check emitter resistor voltage drops to localize defective stage.
Weak Audio
1. Check battery voltage and current drain.
2. Check emitter resistor voltage drops to localize defective stage.
3. Check alignment.

TRANSISTOR CHECK

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

COMPONENT REPLACEMENT

Component replacement for this radio is comparable to that of other transistor radios and, generally, techniques which apply to these radios are applicable to this receiver. To facilitate replacement and to prevent damage to the printed circuit board, use a soldering iron of 35 watts or less; since some adjacent areas on the printed board are physically close to each other, the diameter of the soldering iron tip should be 3/16" or less to prevent solder shorts across these areas. If possible, use miniature tools (twizzle, etc.) and a soldering brush to further facilitate removal. For component replacement, use the techniques outlined below. NOTE: Caution must be re-emphasized on use of the soldering iron with this chassis. Do not use a soldering pot to remove components.

Resistors, Transistors and Capacitors - In assembly, the ends of the leads are bent over and placed against the conduction side of the printed board, then soldered; therefore, before attempting to remove these components, first unsolder the leads while simultaneously straightening the ends of the leads. Transformers - The driver and output stage transformers can be easily removed by first unsoldering all transformer leads, then unsoldering and straightening the mounting lugs prior to transformer removal. The IF transformers should first have their mounting lugs unsoldered then apply heat to the inner connecting lugs while "straddling" the iron across adjacent lugs while loosening the transformer (use caution with the soldering iron to prevent any possible damage).

Oscillator Coil - Unsolder each lug using the same method outlined under Resistor, Transistor and Capacitor Replacement, then remove coil. When replacing, make certain the coil is seated flush against the chassis. Volume Control & Gains - Remove the two mounting screws then unsolder, individually, each connecting lug.

BATTERY DRAIN

4 to 6 ma (max) with no input signal

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

stages to the RF stages. This is accomplished by having an checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.

One of the causes of weakreceivers is open by-pass capacitors. To speed the checking of by-passes, a capacitor checker (shown in illustration) can be constructed. When using this aid, parallel the suspected by-pass capacitor. If by-pass is open, the output level will increase. When checking in the audio section, an increase may not occur but the pitch of the sound will change.

REPLACEMENT PARTS LIST

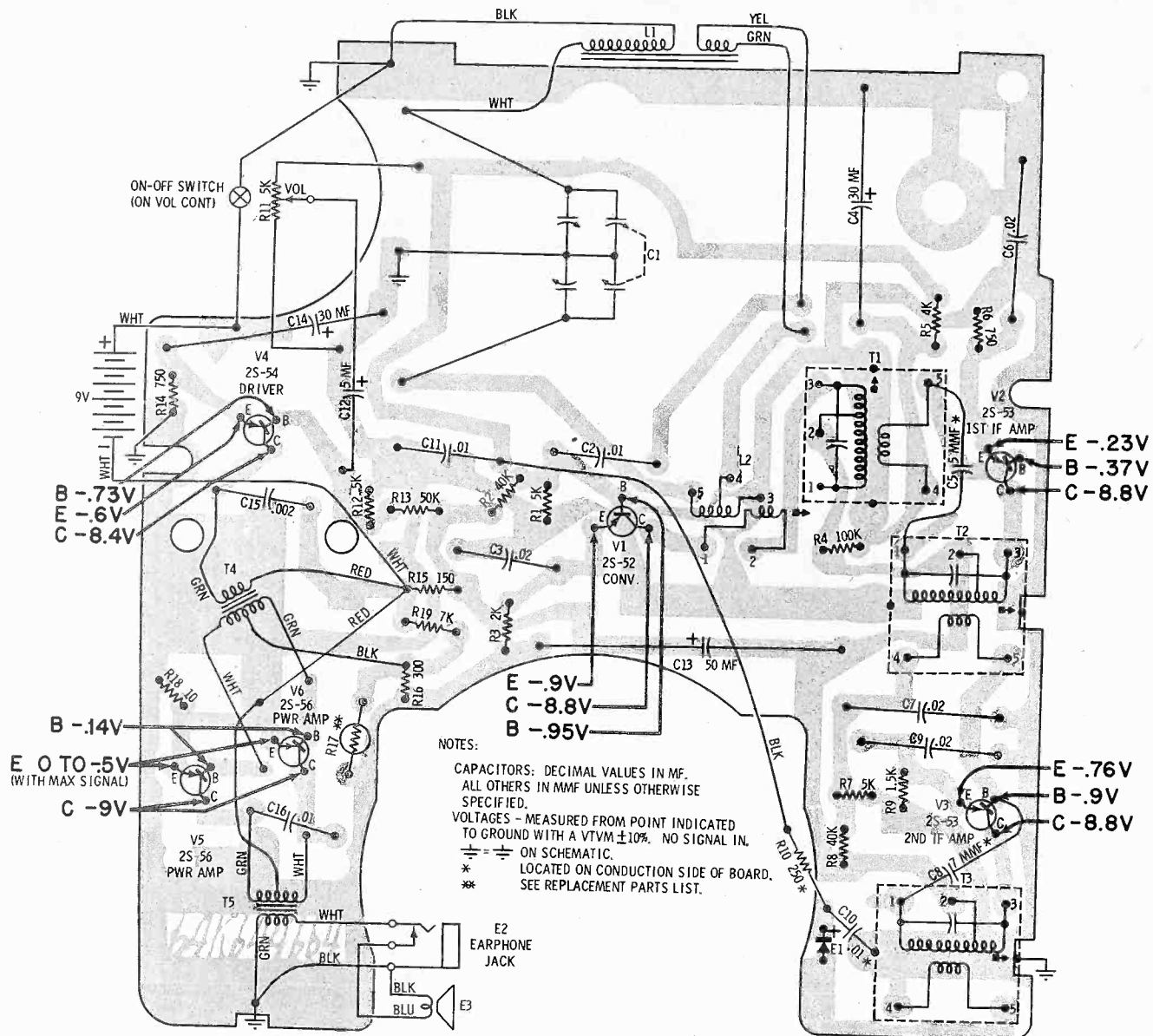
NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been selected for reliability and applicability to the specific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

Table with columns: Ref. No., Description, Part Number. Sections include ELECTRICAL PARTS, MECHANICAL PARTS, CABINET PARTS, and LIMITED REPLACEMENT PARTS. Lists various electronic components like capacitors, resistors, transistors, and mechanical parts with their part numbers and descriptions.

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

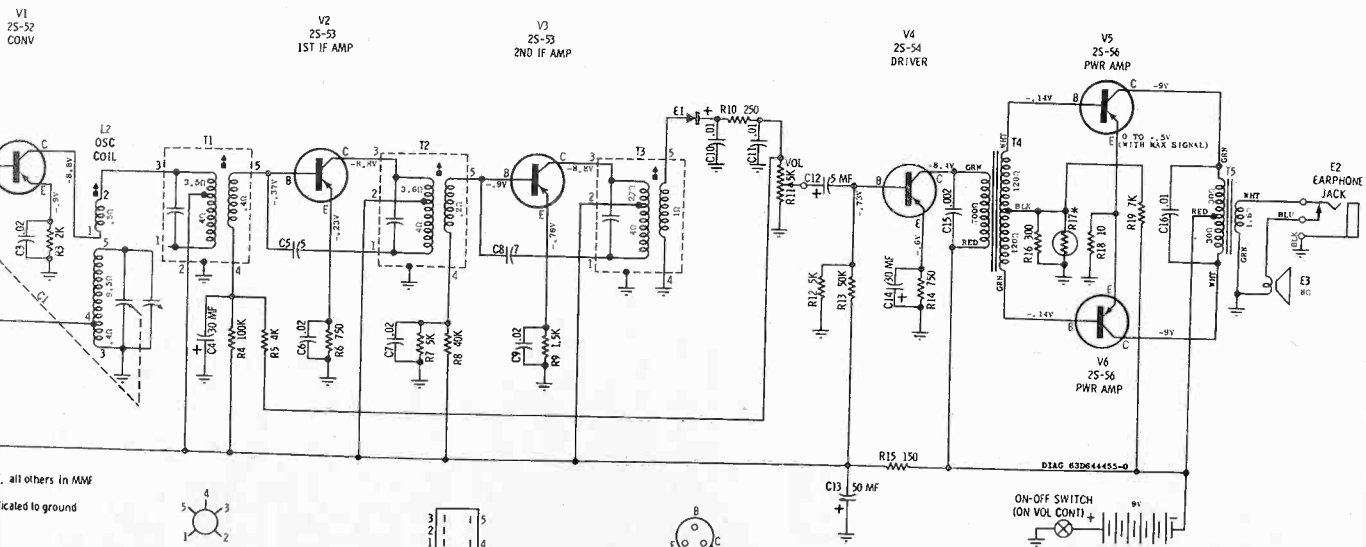
ACCESSORY ITEM (Not Supplied with Radio)

13K645008 Case, carrying

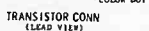
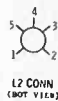


PRINTED CIRCUIT BOARD WIRING DIAGRAM

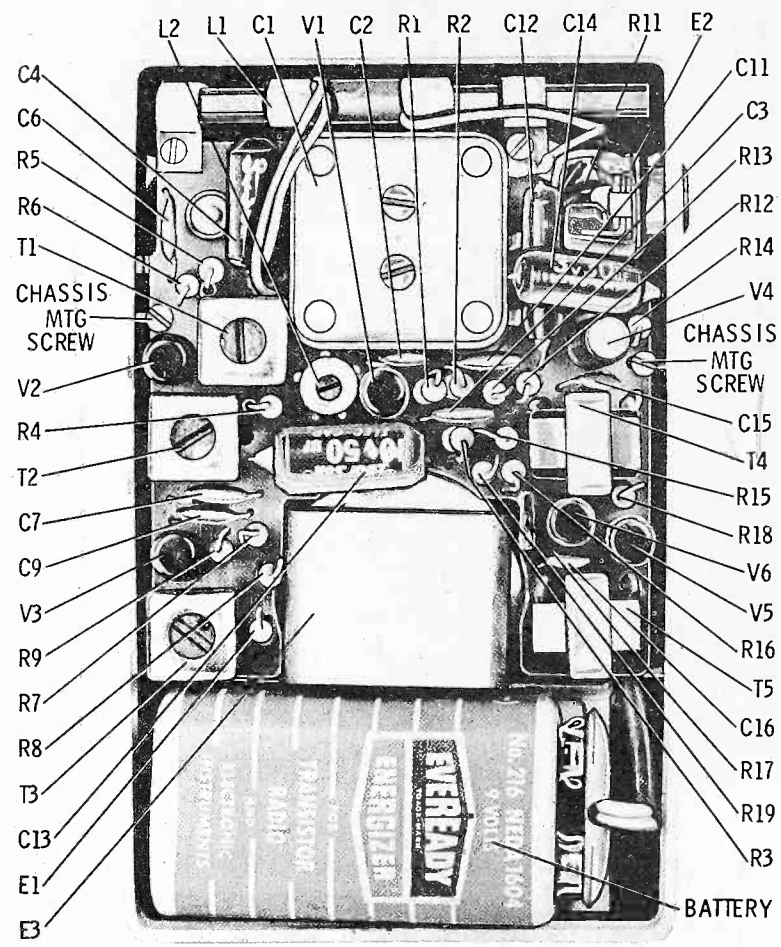
NOTES:
 CAPACITORS: DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
 VOLTAGES - MEASURED FROM POINT INDICATED TO GROUND WITH A VTVM $\pm 10\%$. NO SIGNAL IN.
 * ON SCHEMATIC, LOCATED ON CONDUCTION SIDE OF BOARD. SEE REPLACEMENT PARTS LIST.
 **



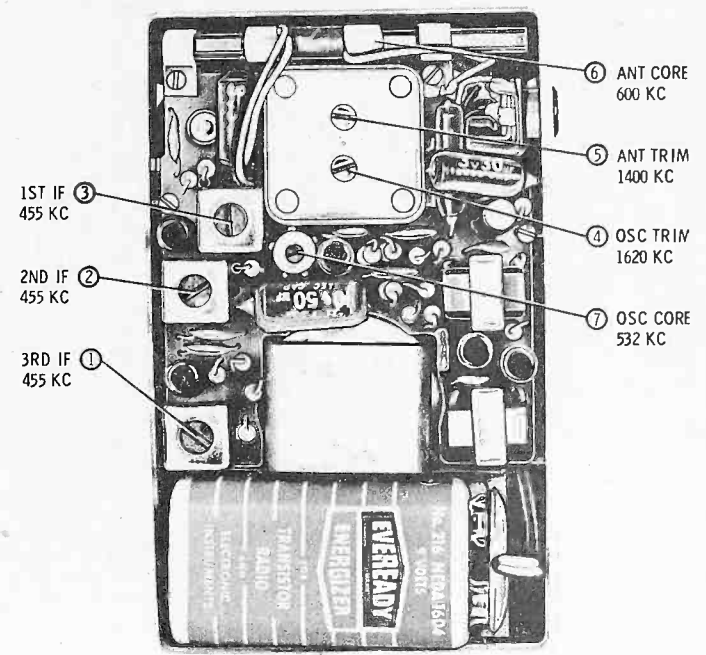
NOTES:
 CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM $\pm 10\%$. No signal in.
 TUNING RANGE - 532 KC to 1620 KC.
 IF - 455 KC.
 Resistances measured with transistors removed from associated circuitry.
 * See Replacement Parts List.



SCHEMATIC DIAGRAM



PARTS LOCATION



ALIGNMENT POINTS LOCATION

ALIGNMENT

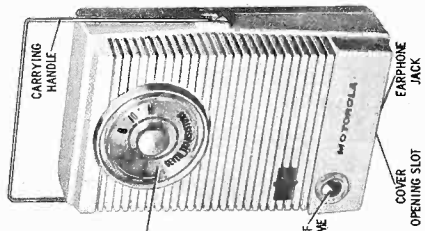
Connect an output meter across the speaker. Set volume to maximum. Attenuate signal generator output so as not to exceed .68V on output meter at all times to prevent overloading and AGC action. Alignment should be performed with the chassis in the cabinet.

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

*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver antenna. Keep radiation loop at least 12" from receiver antenna.

**In some sets, this adjustment is performed from the bottom of the chassis.

HOME RADIO
 MODELS CHASSIS
 7X25P HS-678
 7X25W HS-678
 POWER-9 SERIES



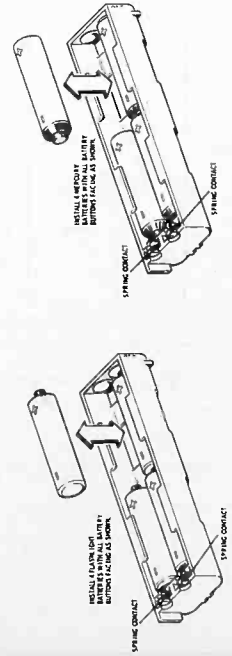
MOTOROLA Service Manual

GENERAL INFORMATION

TYPE - Pocket portable superheterodyne radio using a plated panel chassis, seven transistors, and two diodes. An earphone jack is provided on bottom of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488) is available through Motorola Dealers or Distributors.

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

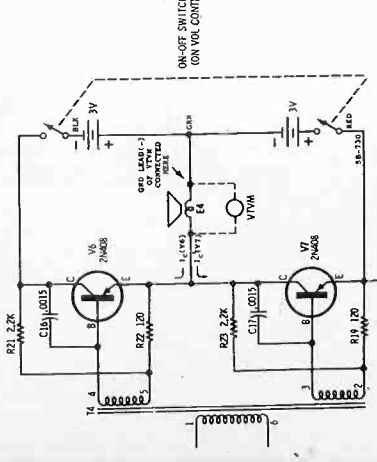
POWER SUPPLY - Operates from four 1-1/2 volt batteries; use four of the following or equivalent:
 Standard Flashlight Types - Eveready 1015, Ray-O-Vac 7LP or 7R, Burgess 930, Mallory M15
 Mercury Type - Mallory ZM-9
 Battery Drain - See Service Notes



FLASHLIGHT BATTERY INSTALLATION MERCURY BATTERY INSTALLATION

SERVICE NOTES

OUTPUT STAGE CIRCUIT DESCRIPTION
 The output stage of this receiver consists essentially of a transistorized class B, push-pull circuit in a common emitter type configuration (see PARTIAL SCHEMATIC DIAGRAM).



PARTIAL SCHEMATIC DIAGRAM

7X25 SERIES

TRANSISTOR COMPLEMENT-

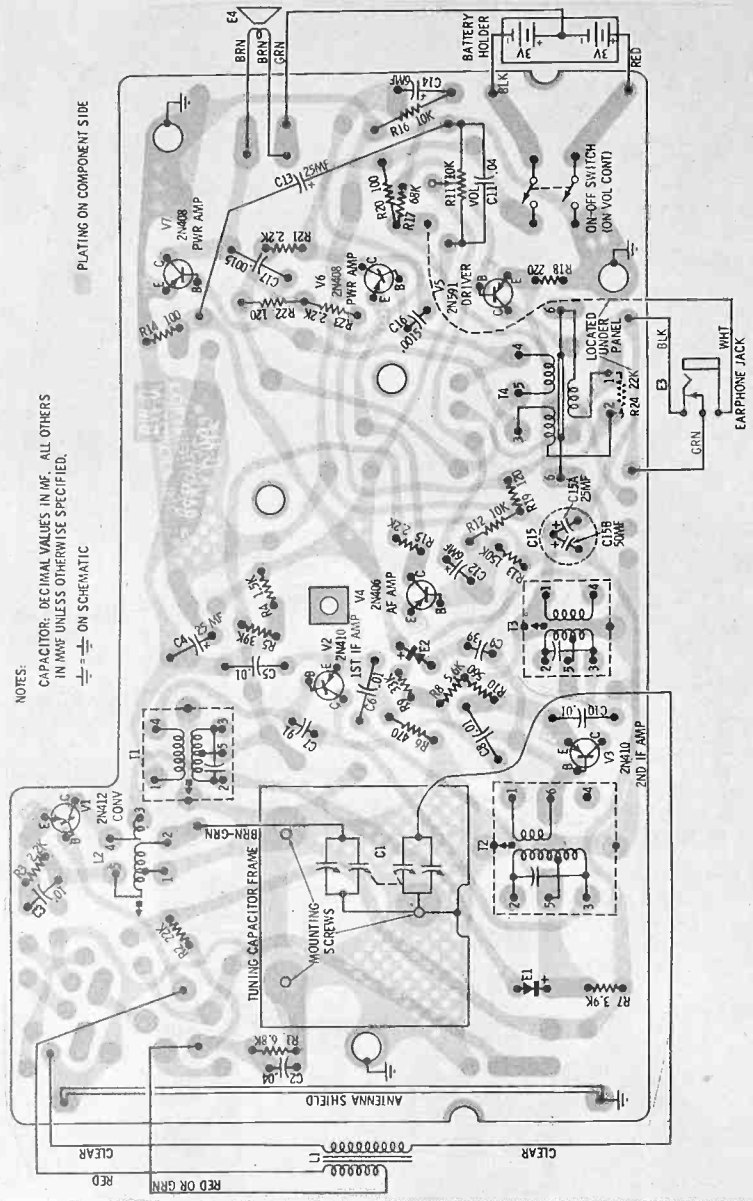
Ref. No.	Type	Function
V-1	2N412	Converter
V-2	2N410	1st IF amp
V-3	2N410	2nd IF amp
V-4	2N406	AF amp
V-5	2N591	Driver
V-6	2N408	Power amp
V-7	2N408	Power amp

GRAM, Features include: elimination of the output transformer, a split-battery supply (E-4 then becomes a common load for V-6 and V-7), and separate bias networks for each transistor (for V-6, R-21 and R-22 form the bias network; for V-7, R-19 and R-23 are used). Degenerative feedback capacitors C-16 and C-17 improve overall tonal response.

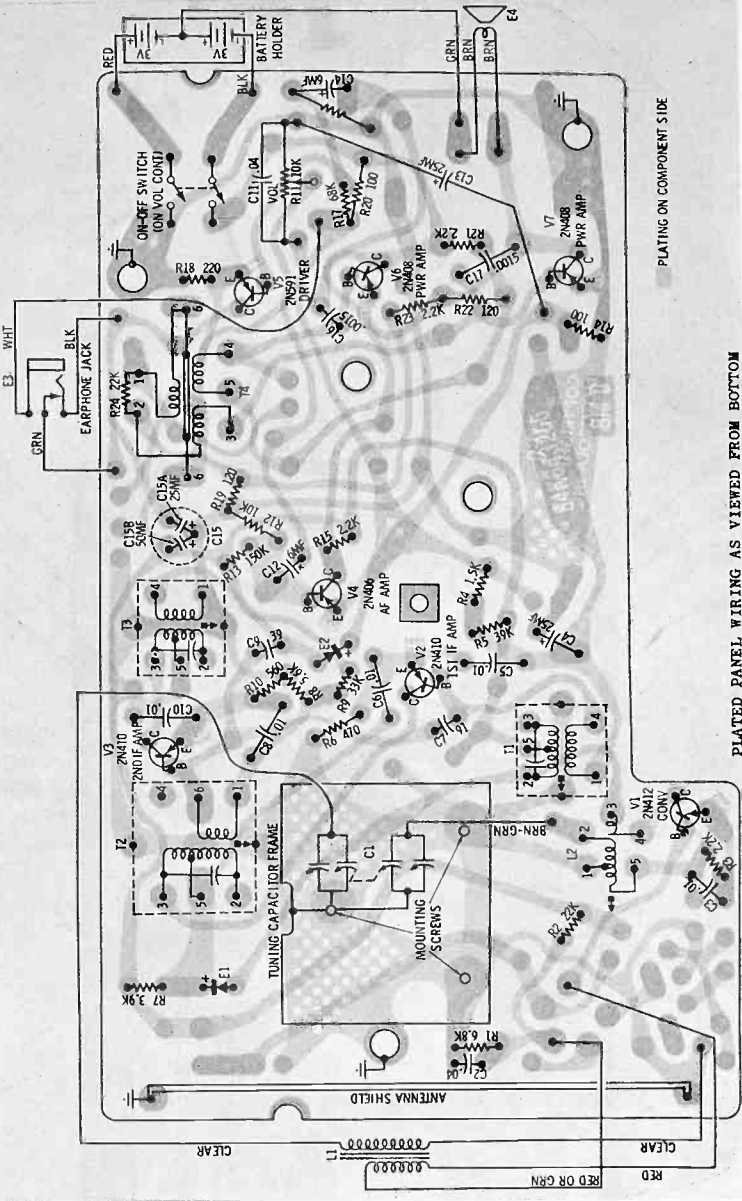
Inspection of the partial schematic diagram reveals that during proper operation (correct bias, battery voltage, etc.), the DC collector currents of V-6 and V-7 flow opposite to each other (through E-4) and, therefore, cancel (see I_c and I_c'). A DC probe connected across E-4 under this condition and in the manner indicated on the partial schematic, would read approximately 0 volts (with no input signal); a slight positive or negative voltage (bias network or battery differences). If one of the transistors or its associated circuitry were malfunctioning, a positive or negative voltage would appear across E-4 (due to unbalanced signal). For example, if there were no collector current flowing through V-6, a positive voltage (with VTVM connected as shown) would appear across E-4; if V-7 were inoperative (no collector current) a negative voltage would appear across E-4. These voltage relationships can be used as an aid in servicing this receiver.

CIRCUIT DESCRIPTION

1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)



PLATED PANEL WIRING AS VIEWED FROM BOTTOM

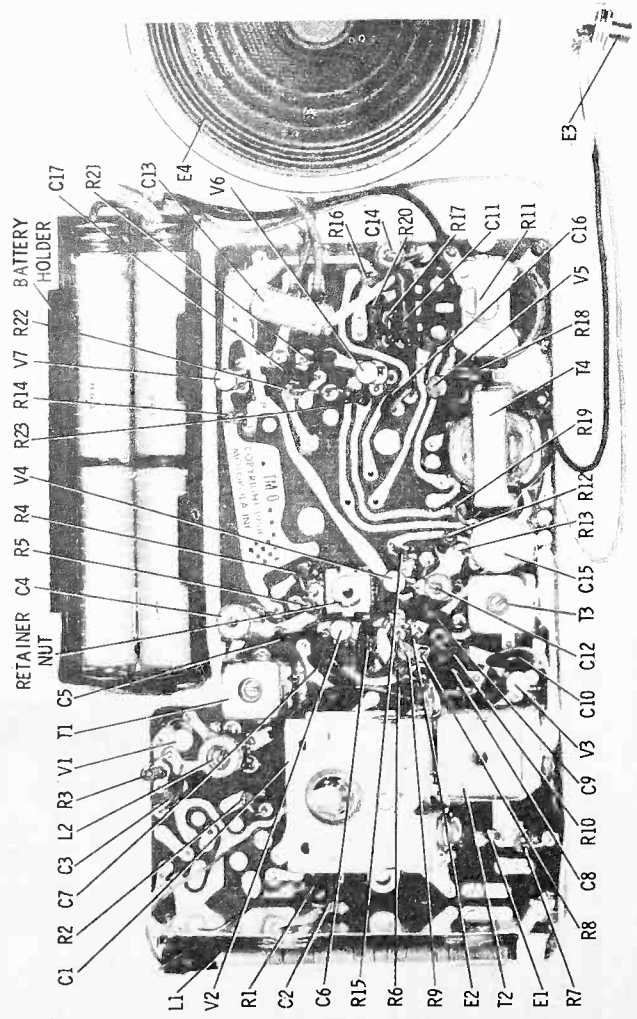
NOTES:
 CAPACITOR: DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
 ON SCHEMATIC

ALIGNMENT

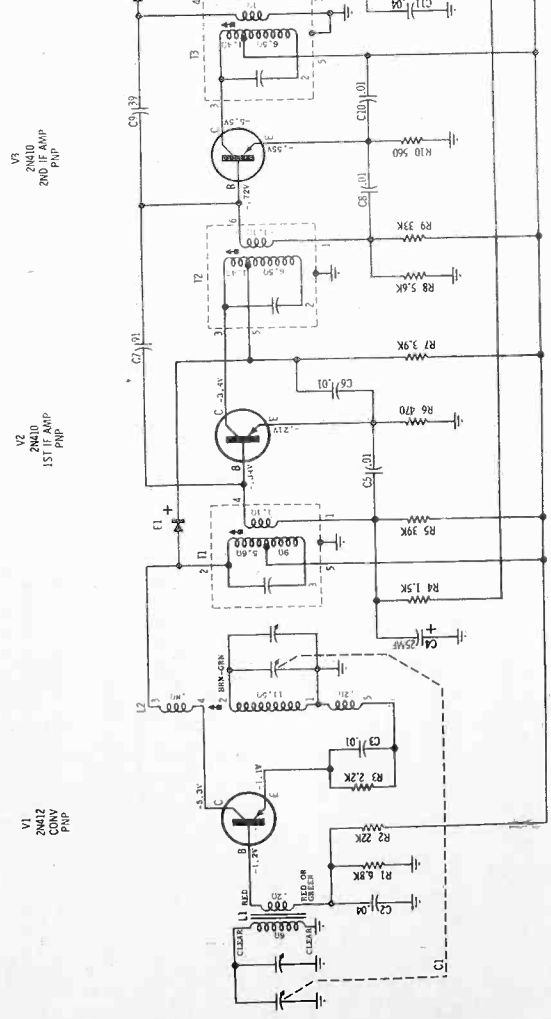
Connect an output meter across the speaker. Set volume to maximum. Attenuate signal generator output to maintain 1.4 volts on output meter at all times to prevent overloading and AGC action.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
1.	IF ALIGNMENT Radiation loop*	455 Kc	Fully open	1, 2 & 3	Adjust for maximum.
2.	RF ALIGNMENT Radiation loop*	1620 Kc	Fully open	4	Adjust for maximum.
3.	" Radiation loop*	1400 Kc	Tune for max	5	"
NOTE: Do not perform the following steps unless the oscillator core has been lapped with or associated components have been replaced. BEFORE PROCEEDING, SET OSCILLATOR TRIMMER 1/8 TURN FROM ITS TIGHT POSITION AND ANT TRIMMER 3/8 TURN FROM TIGHT POSITION.					
4.	Radiation loop*	600 Kc	Tune for max	6	Adjust for maximum while rocking gang.
5.	"	1620 Kc	Fully open	4	Adjust for maximum.
6.	Repeat steps 4 and 5 until oscillator covers required range; step 5 should be last adjustment.				
7.	Radiation loop*	1400 Kc	Tune for max	5	Adjust for maximum.

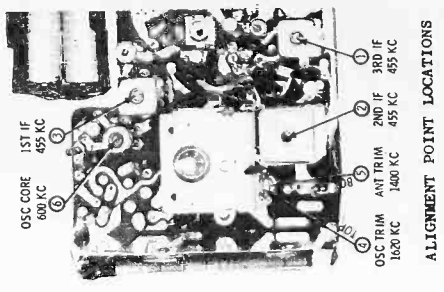
*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver antenna. Keep radiation loop at least 12" from receiver antenna.



PARTS LOCATIONS



SCHEMATIC DIAGRAM



ALIGNMENT POINT LOCATIONS

NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTS INDICATED FROM POINT INDICATED TO GROUND OR ACROSS POINTS INDICATED WITH A V(TW), 4.10% NO SIGNAL IN *No signal!
TUNING RANGE - 535 KC TO 1620 KC.
IF - 455 KC.
Resistor measurements with transistors removed from associated circuitry.
⊕ = Ground

MOTOROLA Service Manual

HOME RADIO
 MODELS CHASSIS
 5P21B HS-633
 5P21N HS-633
 5P21R HS-633

SUPERSEDES 5P21 SERIES SERVICE MANUAL PART NO. 68P641270

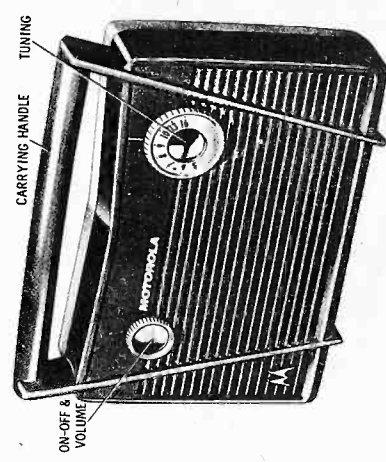
GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable superheterodyne radio with "Volumatic", a plated circuit chassis using a modular component, four miniature type tubes and a selenium rectifier.

POWER SUPPLY - Operates from 120V AC/DC or from one each of the following batteries:
 7-1/2V "A" - Eveready 707, Burgess D5, Ray-O-Vac No. 26 or equivalent
 90V "B" - Eveready 479, Burgess P60, General 176, Ray-O-Vac 214 or equivalent

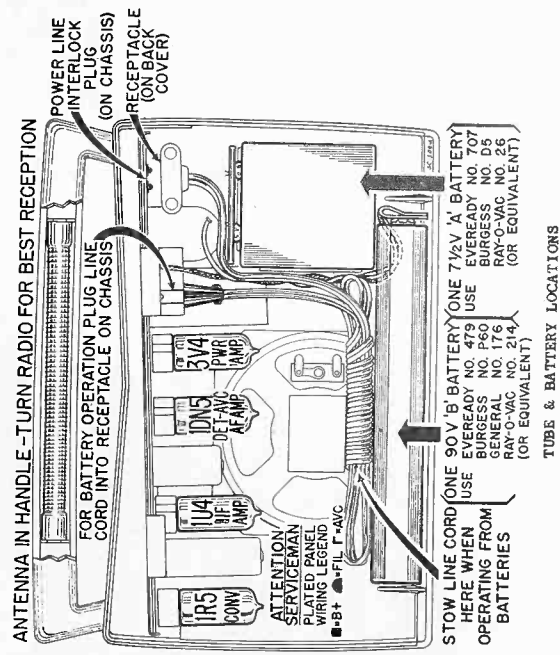
TUBE COMPLEMENT - IR5 Converter
 1U4 IF amp
 1DN5 Det.-AFC-AF amp
 3V4 Power amp

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc



SERVICE NOTES

- USE OF ISOLATION TRANSFORMER**
 The chassis of this receiver is connected directly to the power line. When servicing this chassis from AC, an isolation transformer should be inserted between the power line and the receiver.
- TO REMOVE CHASSIS FROM CABINET**
1. Pull the control knobs from front of radio.
 2. Remove the volume control mounting palmnut and the machine screws under tuning knob of radio.
 3. Unsolder speaker leads.
 4. Unsolder antenna leads.
 5. Remove chassis from cabinet.
- CIRCUIT DESCRIPTION**
1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are placed on both sides of the chassis base, thereby replacing the usual connecting wires and making wiring more uniform.
 2. The metal plating extends through all the holes on the chassis, connecting circuits on the front with those on the rear.
 3. Reference to the schematic diagram, plated wiring diagram and to chassis will permit the circuit to be traced easily.
 4. The use of modular construction permits simpler chassis layout and servicing of the radio.
- SAFETY PRECAUTIONS**
1. Do not service the chassis on a metal plate because of the possibility of a short circuit.
 2. Use caution when handling the chassis with power applied because all high voltage leads are exposed.
- COMPONENT REPLACEMENT**
 Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.



ALIGNMENT

Use an isolation transformer between the power line and radio; if not available, connect low side of signal generator to B through a .1 mf capacitor. Connect an output meter across the speaker voice coil. Set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading the receiver. Use an insulated 3/32" hex alignment tool for osc core adjustment and a fibre screwdriver for all other adjustments.

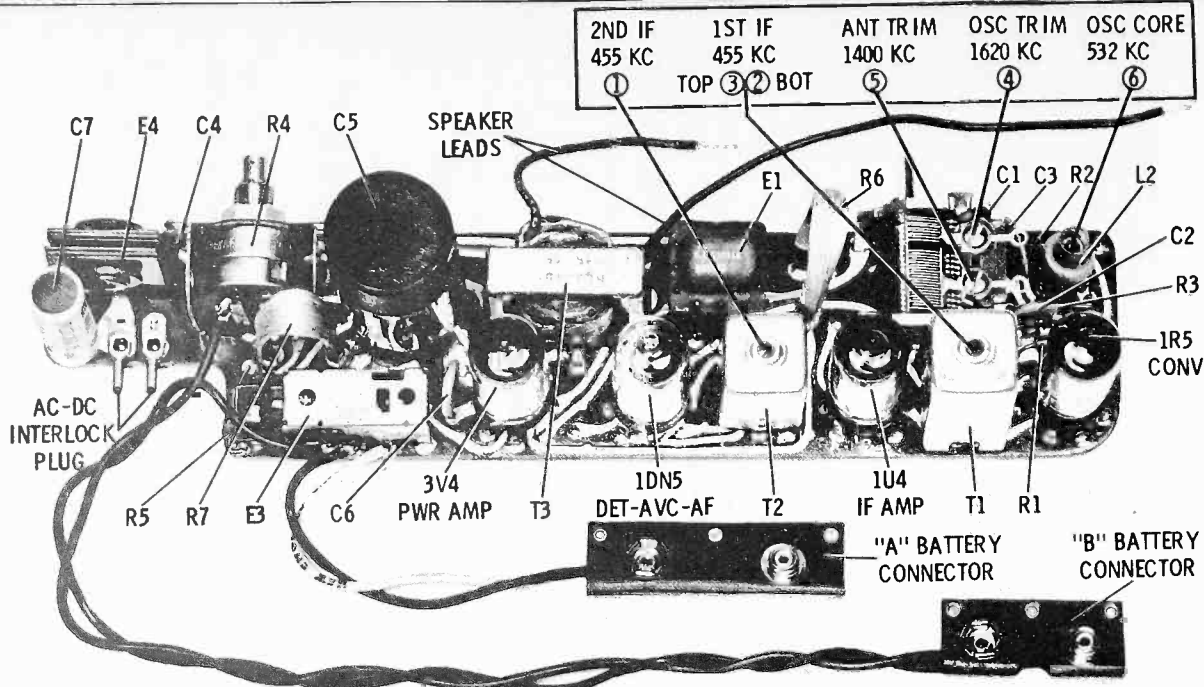
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Conv grid (pin 6) thru .1 mf & B-	455 Kc	Fully open	1, 2 & 3	Adjust for maximum
RF ALIGNMENT					
2.	Conv grid (pin 6) thru .1 mf & B-	1620 Kc	Fully open	4	Adjust for maximum
3.	Radiation loop*	1400 Kc	Tune for maximum	5	With radio installed in cabinet, adjust for maximum
NOTE: Do not perform steps 4, 5, 6 & 7 unless the oscillator core has been tampered with or associated components have been replaced.					
4.	Conv grid (pin 6) thru .1 mf & B-	1620 Kc	Fully open	4	Adjust for maximum
5.	"	532 Kc	Fully closed	6	Adjust for maximum
6.	Repeat steps 4 & 5 until no further increase; step 4 should be last adjustment.				
7.	Radiation loop*	1400 Kc	Tune for maximum	5	With radio installed in cabinet, adjust for maximum

*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver antenna.

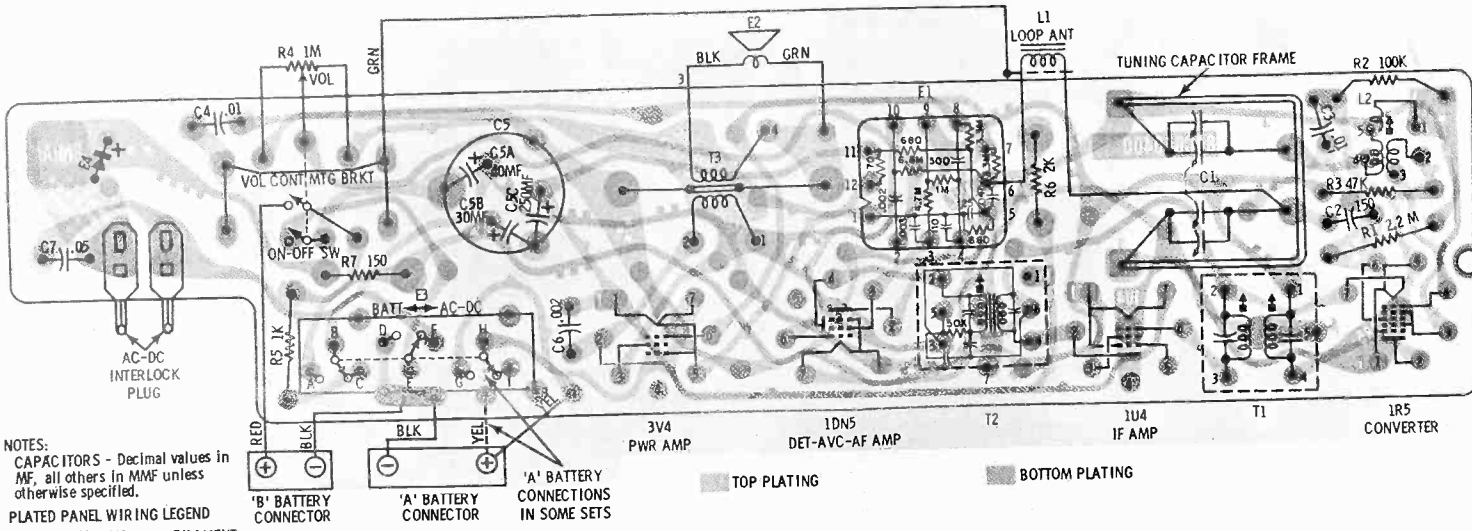
REPLACEMENT PARTS LIST

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

Ref. No.	Part Number	Description	Part No.	Description
ELECTRICAL PARTS				
C-1	198640133	Capacitor, variable: 2 gang	1V640451	Plated Panel Board: less all components
C-2	218533472	Capacitor, cer disc: 150 mf 500V	5S124451	Rivet, shrouding (tube socket center)
C-3	218533471	Capacitor, cer disc: .01 mf 500V	9K634502	Socket, tube: 7 pin min
C-4	218533471	Capacitor, cer disc: .01 mf 500V	CABINET PARTS	
C-5	238640066	Capacitor, electrolytic: 30-40mf/150V; 250mf/10V	43V742706	Bushing, insulating (mounts line cord to cab)
C-6	218633268	Capacitor, cer disc: .002 mf 500V	16K640358	Cabinet Back: Antique White; less arsite washer (SP21B & SP21R)
C-7	8K121288	Capacitor, paper tub: .05 mf 400V	16K640357	Cabinet Front: Antique White; less arsite washer (SP21B & SP21R)
E-1	31C639914	Modular Component	1V640528	Cabinet Front & Handle assembly: Turquoise; incl ant & medallion (SP21N)
E-2	50C640208	Speaker, PM: 4"; 3.2 ohm VC	1V640529	Cabinet Front & Handle assembly: Brown; incl ant & medallion (SP21N)
E-3	40K639490	Switch, power (line to battery change over)	1V6-0530	Cabinet Front & Handle assembly: Red; incl knob, volume: Antique White (SP21B & SP21R)
E-4	48K631295	Selenium Rectifier: 65 ma	36C640303	Knob, tuning: Antique White (SP21B & SP21R)
L-1	24K640825	See Cabinet Front & Handle Assembly	36K640305	Knob, volume: Antique White (SP21B & SP21R)
L-2		Coil, osc	38K640306	Knob, volume: Antique White (SP21B & SP21R)
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.				
R-1	6K127001	2.2 meg 10% 1/2W	30K640158	Line Cord (SP21B & SP21R)
R-2	6K122313	100,000 20% 1/2W	29K690089	Lug, clinch (mounts cab stop cord to cab)
R-3	6K121687	47,000 20% 1/2W	13K6-0262	Medallion: Gold (SP21B & SP21R)
R-4	6K121301	1000 Ohm 1/2W	38K640362	Medallion: Antique White (SP21N)
R-5	17K633148	Wirewound: 2000 5% 6W	35128070	Mount: 3/8-32 (vol. cont. tag to cab)
R-6	65K639999	Fuse Resistor: special; 150	38128311	Screw, tapping: 6 x 5/8 (line cord tag)
T-1	24K639271	Transformer, let IF: 455 Kc	38128451	Screw, tapping: 6 x 3/8 (mounts clinch lug)
T-2	25K639271	Transformer, let IF: 455 Kc	44K630277	Washer, arsite (mounts spkr to cab)
T-3	25K640646	Transformer, output	44K631066	Washer, arsite (holds line cord in place)
MECHANICAL PARTS				
	31K639919	"A" Battery Connector: Strip	Note: The volume of replacement on the following part is seal, consequently, it is suggested that ordering be done only when necessary.	
	31K640079	"B" Battery Connector: Strip		
	29K655682	Contact, male (line cord to chassis connector)		

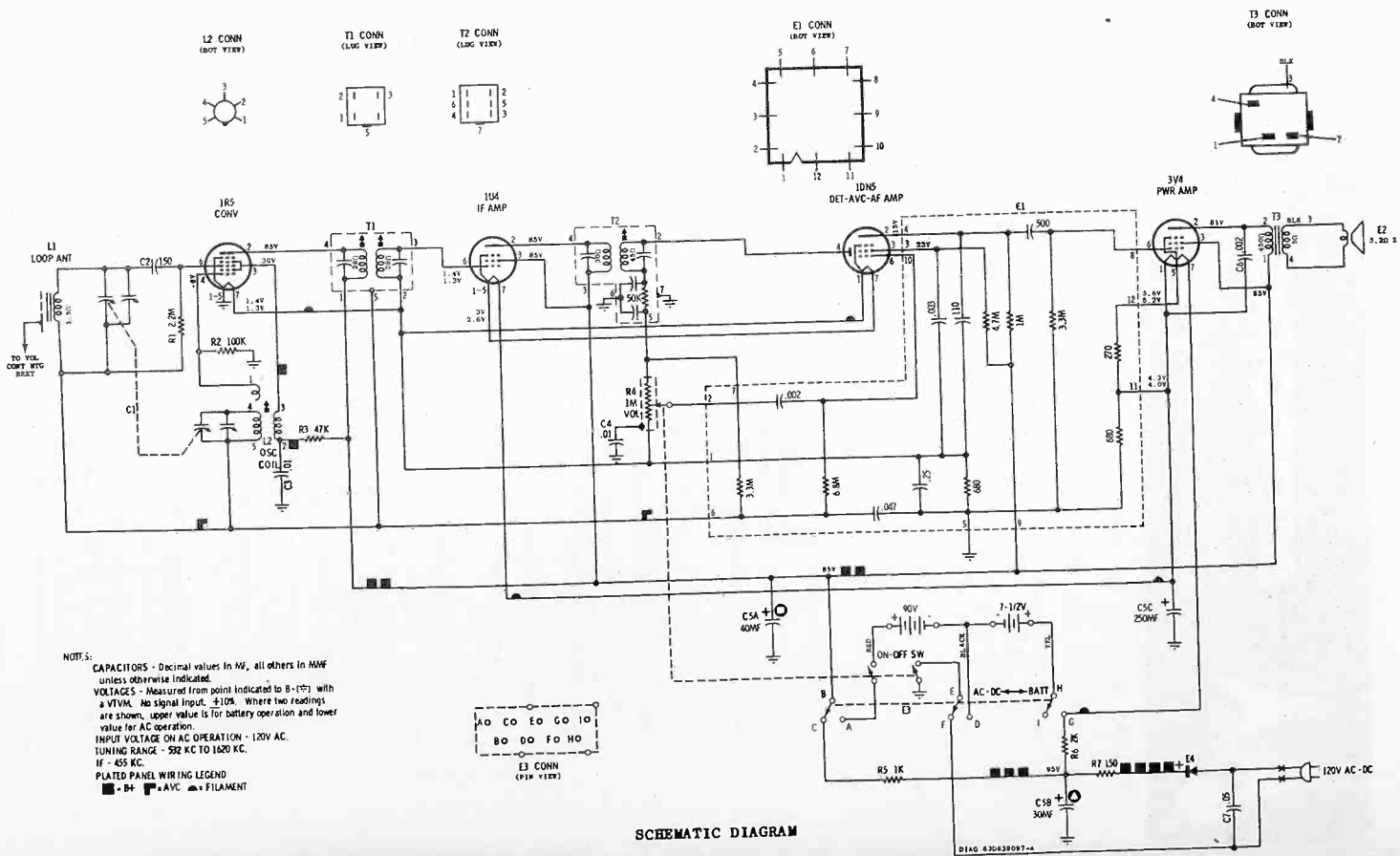


ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
PLATED PANEL WIRING LEGEND
■ = B+ ■ = AVC ● = FILAMENT

PLATED PANEL WIRING

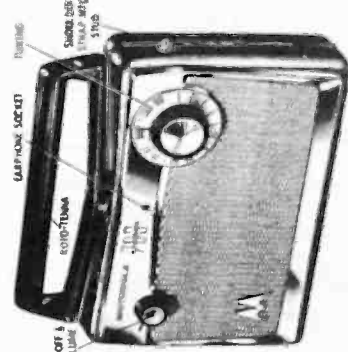


SCHEMATIC DIAGRAM

MOTOROLA Service Manual

SUPERSEDES 6P25 SERIES SERVICE MANUAL PART NO. 68P640467

HOME RADIO
MODELS CHASSIS
6P25E HS-637
6P25N HS-637
6P25S HS-637



GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable superheterodyne radio with "Volumatic", a plated circuit chassis using modular components, five miniature type tubes and a selenium rectifier. These radios have an earphone socket provision; insertion of earphone automatically disconnects speaker. A 16 ohm earphone for this radio (Motorola Part No. 50D640709 or 50D641487) is available through Motorola dealers.

POWER SUPPLY - Operates from 120V AC/DC or from one each of the following batteries:
9V "A" - Eveready 276, Burgess D6, General 166, Ray-O-Vac 1603 or equivalent
90V "B" - Eveready 479, Burgess P60, General 176, Ray-O-Vac 214 or equivalent

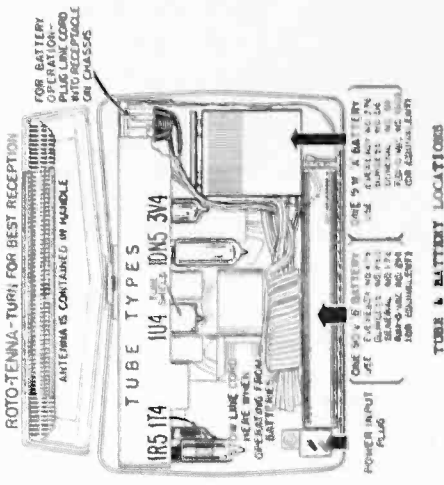
TUBE COMPLEMENT - 1T4 RF amp
1N3 Converter
1U4 IF amp
1DN5 Det.-AVC.-AF amp
3V4 Power amp

SERVICE NOTES

- connecting wires and making wiring more uniform.
 - The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
 - Reference to the schematic diagram, plated panel wiring diagram, and to chassis, will permit the circuit to be traced easily.
 - The use of modular construction permits simpler chassis layout and servicing of the radio.
- SAFETY PRECAUTIONS**
- Do not service the chassis on a metal plate because of the possibility of a short circuit.
 - Use caution when handling the chassis with power applied because all high voltage leads are exposed.

COMPONENT REPLACEMENT

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P14534) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.

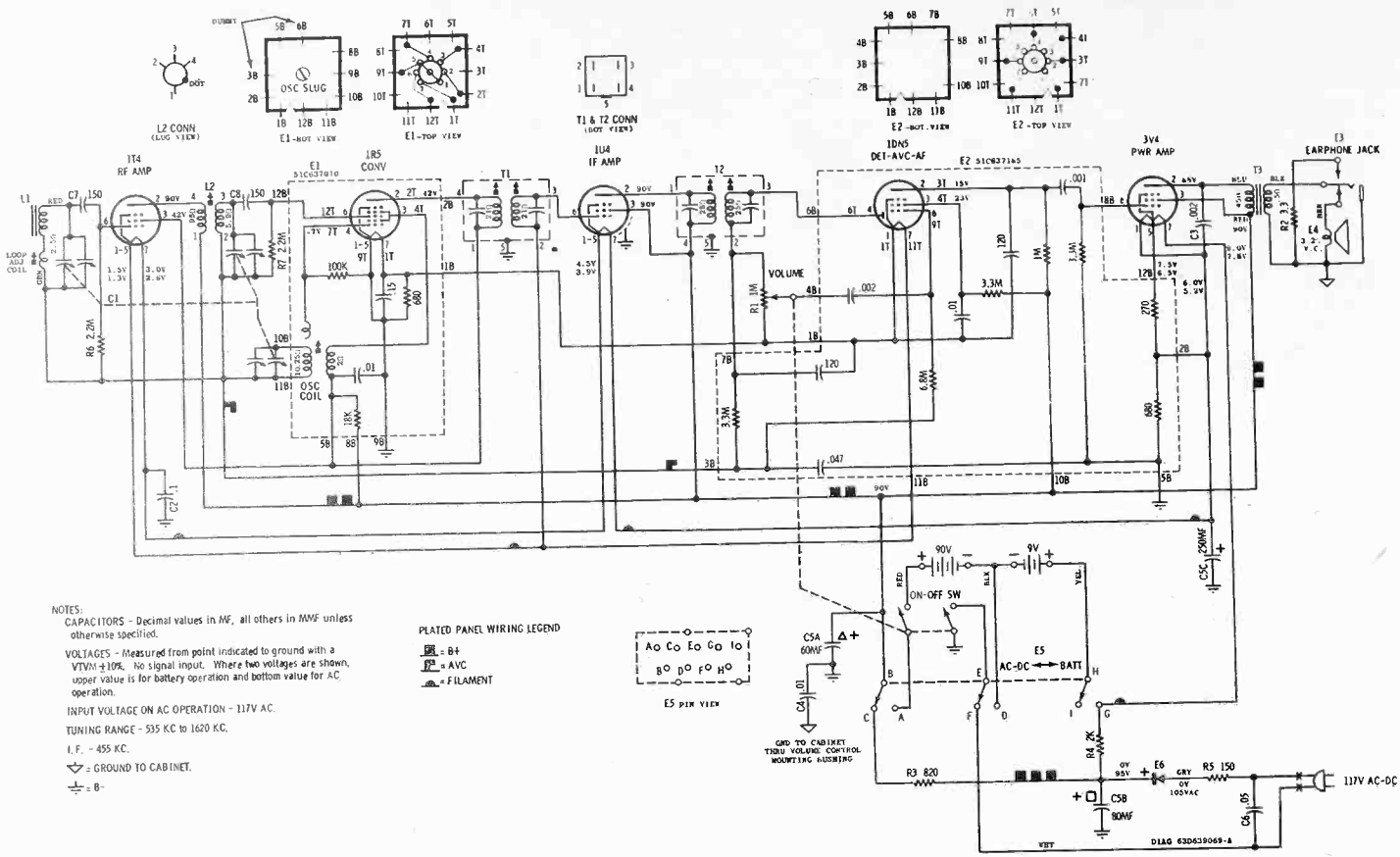


REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set in addition to part number and description of part. Electronic parts of questionable quality are not recommended. The components listed in this Service Manual have been selected for reliability and availability in the specific circuit involved. For maximum reliability, select parts that are available in quantities of 1000 parts per lot.

Part No.	Description	Part No.	Description
1-1	1R5 1T4	1-1	1R5 1T4
1-2	1U4	1-2	1U4
1-3	1DN5	1-3	1DN5
1-4	3V4	1-4	3V4
1-5	1N3	1-5	1N3
1-6	100K	1-6	100K
1-7	500K	1-7	500K
1-8	1M	1-8	1M
1-9	5M	1-9	5M
1-10	10M	1-10	10M
1-11	50M	1-11	50M
1-12	100M	1-12	100M
1-13	500M	1-13	500M
1-14	1000M	1-14	1000M
1-15	1000M	1-15	1000M
1-16	1000M	1-16	1000M
1-17	1000M	1-17	1000M
1-18	1000M	1-18	1000M
1-19	1000M	1-19	1000M
1-20	1000M	1-20	1000M
1-21	1000M	1-21	1000M
1-22	1000M	1-22	1000M
1-23	1000M	1-23	1000M
1-24	1000M	1-24	1000M
1-25	1000M	1-25	1000M
1-26	1000M	1-26	1000M
1-27	1000M	1-27	1000M
1-28	1000M	1-28	1000M
1-29	1000M	1-29	1000M
1-30	1000M	1-30	1000M
1-31	1000M	1-31	1000M
1-32	1000M	1-32	1000M
1-33	1000M	1-33	1000M
1-34	1000M	1-34	1000M
1-35	1000M	1-35	1000M
1-36	1000M	1-36	1000M
1-37	1000M	1-37	1000M
1-38	1000M	1-38	1000M
1-39	1000M	1-39	1000M
1-40	1000M	1-40	1000M
1-41	1000M	1-41	1000M
1-42	1000M	1-42	1000M
1-43	1000M	1-43	1000M
1-44	1000M	1-44	1000M
1-45	1000M	1-45	1000M
1-46	1000M	1-46	1000M
1-47	1000M	1-47	1000M
1-48	1000M	1-48	1000M
1-49	1000M	1-49	1000M
1-50	1000M	1-50	1000M

CHASSIS HS-637



NOTES:
 CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM $\pm 10\%$. No signal input. Where two voltages are shown, upper value is for battery operation and bottom value for AC operation.
 INPUT VOLTAGE ON AC OPERATION - 117V AC.
 TUNING RANGE - 535 KC to 1620 KC.
 I. F. - 455 KC.
 ∇ - GROUND TO CABINET.
 \oplus - B-

PLATED PANEL WIRING LEGEND

 B+
 AVC
 FILAMENT

SCHEMATIC DIAGRAM

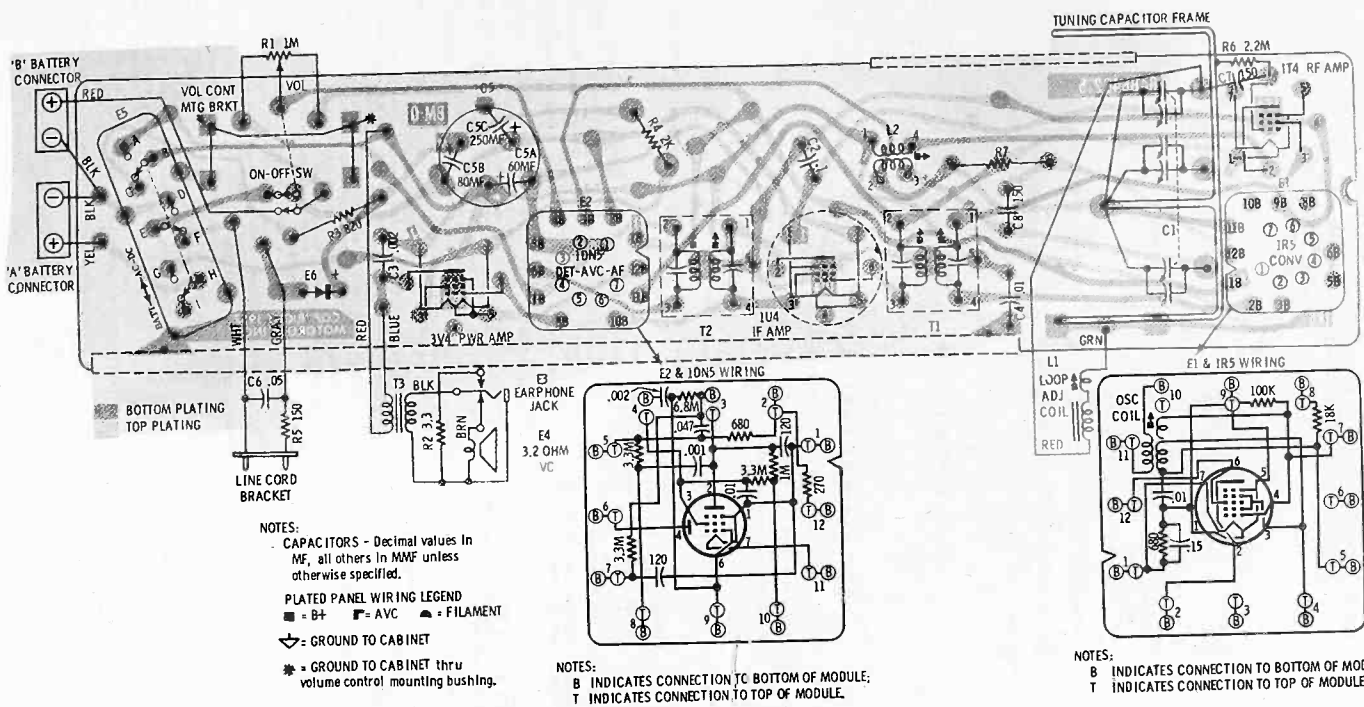
ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across the speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading the receiver. Use an insulated 3/32" hex alignment tool for RF core (9) adjustment, and a fibre screwdriver for all other adjustments except as noted **.

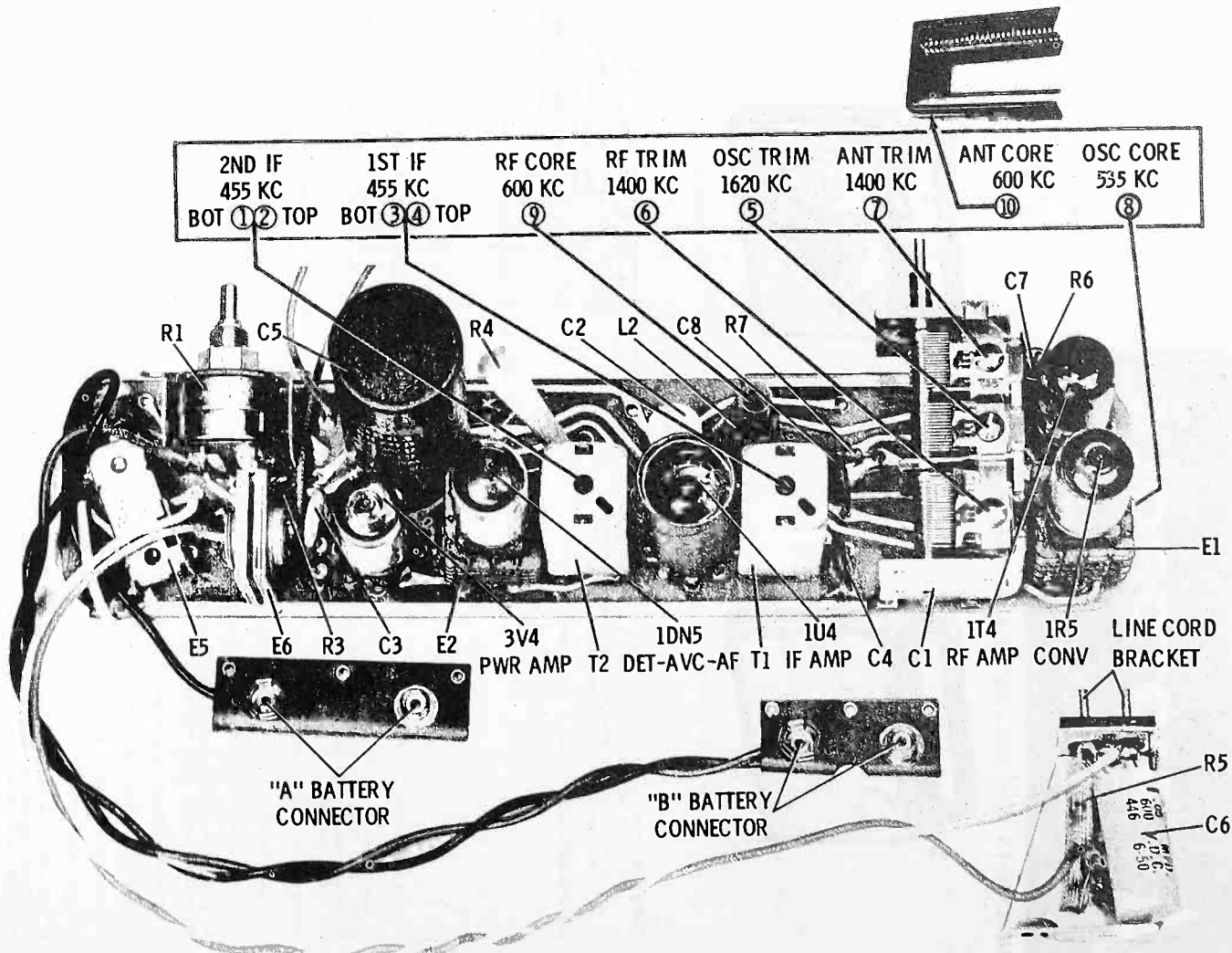
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	1R5 grid (pin 6 of 1R5, 12B on module E-1) thru .1 mf & B-.	455 Kc	Fully opened	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	"	1620 Kc	Fully opened	5	Adjust for maximum.
3.	1T4 grid (pin 6) thru .1 mf & B-.	1400 Kc	Tune for max	6	Adjust for maximum.
4.	Radiation loop*	1400 Kc	Tune for max	7	With radio installed in cabinet, adjust for maximum.
NOTE: Do not perform the following steps unless the antenna, RF or oscillator cores have been tampered with or associated components have been replaced.					
5.	1R5 grid (pin 6 of 1R5, 12B on module E-1) thru .1 mf & B-.	1620 Kc	Fully opened	5	Adjust for maximum.
6.	"	535 Kc	Fully closed	8	Adjust for maximum.
7.	Repeat steps 5 and 6 until oscillator covers required range; step 5 should be last adjustment.				
8.	1T4 grid (pin 6) thru .1 mf & B-.	1400 Kc	Tune for max	6	Adjust for maximum.
9.	"	600 Kc	Tune for max	9	Adjust for maximum.
10.	Repeat steps 8 and 9 until no further increase; step 8 should be last adjustment.				
11.	Radiation loop*	1400 Kc	Tune for max	7	With radio installed in cabinet, adjust for maximum.
12.	Radiation loop*	600 Kc	Tune for max	10**	With radio installed in cabinet, adjust for maximum. **
13.	Repeat steps 11 & 12 until no further increase; step 11 should be last adjustment.				

*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver antenna.
 **Two kinds of antenna core adjusting slugs are used in the antenna handles. Handles that have green, white, yellow or no color dot next to the core adjusting hole require a 5/64" hex alignment tool for adjustment; handles that have a red or lilac color dot require a thin fibre screwdriver.

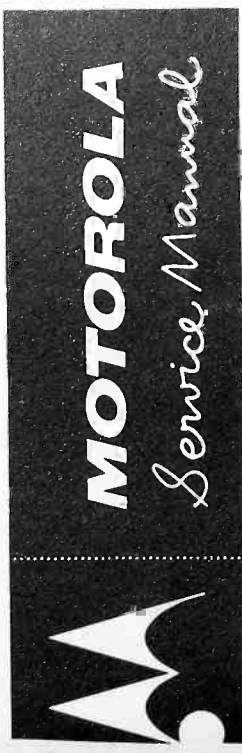
©John F. Rider



PLATED PANEL WIRING



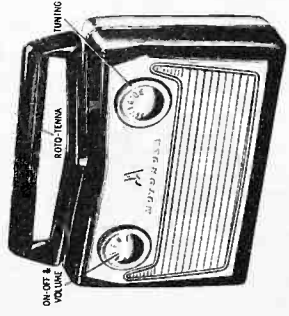
ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



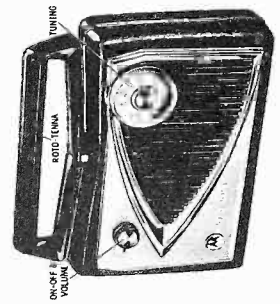
SUPERSEDES 5P22-1 & 5P23-1 SERIES SERVICE MANUAL PART NO. 68P641271

HOME RADIO

- MODELS CHASSIS
 5P22GW-1 HS-647
 5P22RW-1 HS-647
 5P22S-1 HS-647
 5P23E-1 HS-647
 5P23PN-1 HS-647
 5P23WB-1 HS-647



5P22-1 SERIES



5P23-1 SERIES

GENERAL INFORMATION

TYPE - Three-power (AC/DC, Battery) portable superheterodyne radio with "Volumatic", a plated circuit chassis using a modular component, four miniature type tubes and a selenium rectifier.

TUBE COMPLEMENT - 1R5 Converter
 1U6 IF amp
 1D5S Det-AVC-AF amp
 3V4 Power amp

POWER SUPPLY - Operates from 120V AC/DC or from one each of the following batteries:
 D5, Eveready 707, Burgess D5, Ray-O-Vac 26 or equivalent
 90V "B" - Eveready 479, Burgess P60, General 176, Ray-O-Vac 214 or equivalent

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

SERVICE NOTES

USE OF ISOLATION TRANSFORMER
 The chassis of this receiver is connected directly to the power line. When servicing this chassis from AC, an isolation transformer should be inserted between the power line and the receiver.

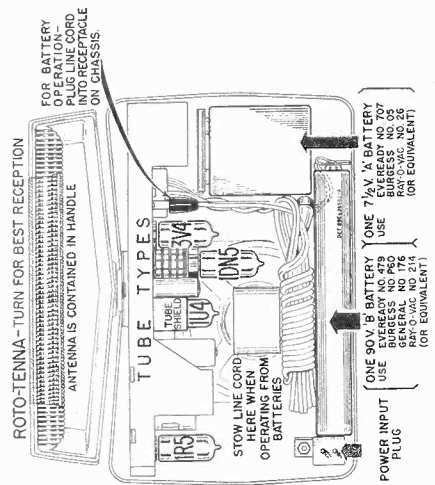
TO REMOVE CHASSIS FROM CABINET

1. Open rear cover and remove the line cord bracket.
2. Pull the control knobs from front of radio.
3. Remove the volume control mounting palmnut and the machine screws under tuning knob of radio.
4. Unsolder chassis lead that goes to speaker.
5. Unsolder antenna leads.
6. Remove chassis from cabinet.

CIRCUIT DESCRIPTION

1. The circuit of this chassis is conventional - there are no built-in resistors or capacitors. Leads are plated on both sides of the chassis base, thereby replacing the usual

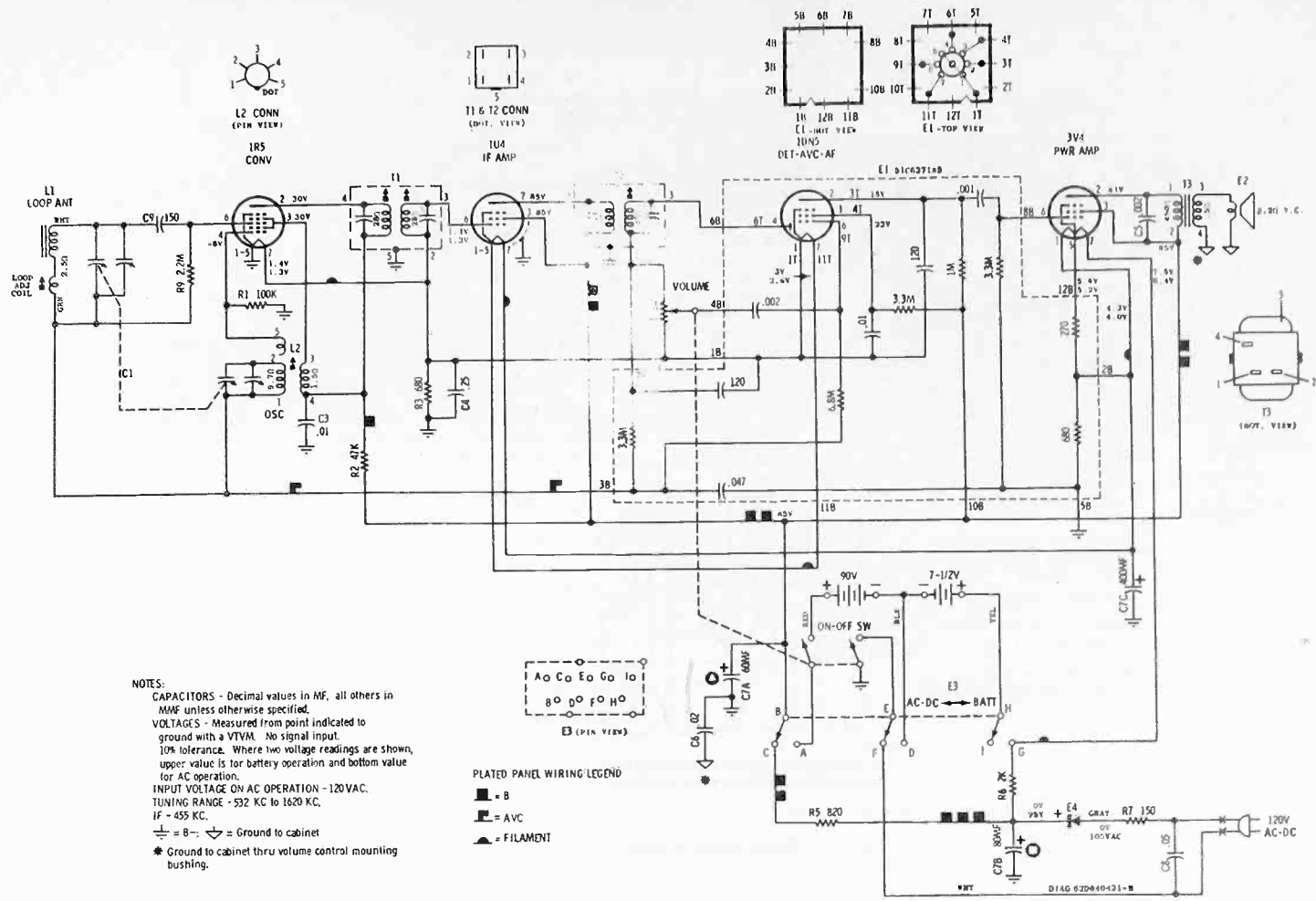
1. Do not service the chassis on a metal plate because of the possibility of a short circuit.
 2. Use caution when handling the chassis with power applied because all high voltage leads are exposed.
- COMPONENT REPLACEMENT**
 Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636536) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.



REPLACEMENT PARTS LIST

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

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
ELECTRICAL PARTS					
C-1	19K637013	Capacitor, variable: 2.5Kc	9K634502	Socket, tube: 7 pin min (without tube shield clip)	
C-2	21K533471	Capacitor, cer disc: .01 mf 500V	CABINET PARTS		
C-3	21K533471	Capacitor, cer disc: .01 mf 100V	7C637208	Bracket, cover latch & handle mtg	
C-4	21K533471	Capacitor, cer disc: .025 mf 100V	43K637183	Bushing, handle mtg	
C-5	21K63268	Capacitor, cer disc: .002 mf 500V	1V640213	Bushing, handle mtg	
C-6	8K122301	Capacitor, paper tub: .02 mf 400V	1V640318	Cabinet: Glacier Green - Bone White; Incl escutcheon (SP22GW-1)	
C-7	23B636161	Capacitor, electrolytic: 60-80mf/150v;	1V640319	Cabinet: Adobe Red 1 - Bone White; Incl escutcheon (SP22RW-1)	
C-8	8K125139	Capacitor, paper tub: .05 mf 600V	1V640236	Cabinet: Natural Linen (Wheat); Incl escutcheon (SP23WB-1)	
C-9	21K127652	Capacitor, cer disc: 150 mfd 500V	1V640254	Cabinet: Navy Blue (SP23E-1)	
E-1	51C639165	Nonlinear Component	1V640255	Cabinet: Carnation Pink & Beige (SP23PW-1)	
E-2	54K37423	Resistor, 500 ohms 1/2W	1V640256	Cabinet: Bone White (SP23WB-1)	
E-3	40K638490	Switch, power (line to battery change-over)	13G640307	Escutcheon: Beige (SP22GW-1 & SP22RW-1)	
E-4	48K631295	Selenium Rectifier: 65 ma	13G640059	Escutcheon: Brown (SP22S-1)	
L-1	24G637271	Part of Handle Assembly	5A640238	Eyelet, escutcheon mtg (SP23-1 Series)	
L-2	24G637270	Coil, osc	1V640213	Bushing, handle mtg (SP23E-1, SP23PW-1)	
R-1	6K122313	100,000 20% 1/2W	1V640214	Handle Assembly: Brown; Incl ant (SP22RW-1, SP22S-1 & SP23PW-1)	
R-2	6K121897	47,000 20% 1/2W	3K640338	Knob, tuning: Beige (SP22GW-1 & SP22RW-1)	
R-3	6K121897	47,000 20% 1/2W	3K640339	Knob, tuning: Beige (SP22GW-1 & SP22RW-1)	
R-4	18K637180	Volume Control & Switch: 1 meg	3K640340	Knob, volume: Gold (SP23E-1, SP23PW-1 & SP23WB-1)	
R-5	6K121302	820 10% 1/2W	3K640341	Lockwasher, int: 3/8 (handle mtg)	
R-6	17B633148	Wirewound: 2000 5% 6W	29K730154	Lug, spade (spkr to line cord brkt conn)	
R-7	65A633275	Fuse Resistor: special; 150 ohms	2K636235	Palmnut: 9-32 x 11/32 (line cord brkt mtg)	
R-8	6K127001	2.2 meg 10% 1/2W	25K636236	Pin: 9-32 x 1/2 (line cord brkt mtg)	
T-1	24K637271	Transformer, 1st IF: 455 Kc	41A637680	Spring, cover latch (holds cover latch brkt in place when front & rear cab sections are closed)	
T-2	24K637272	Transformer, 2nd IF: 455 Kc	4A637176	Washer, (handle mtg)	
T-3	25B637155	Transformer, output	MECHANICAL PARTS		
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.					
Note: The volume of replacement on the following parts is small, consequently, it is suggested that ordering be done only as required.					
Channel, chassis mtg 7A636816					
Insulator, chassis 14K639545					



SCHMATIC DIAGRAM

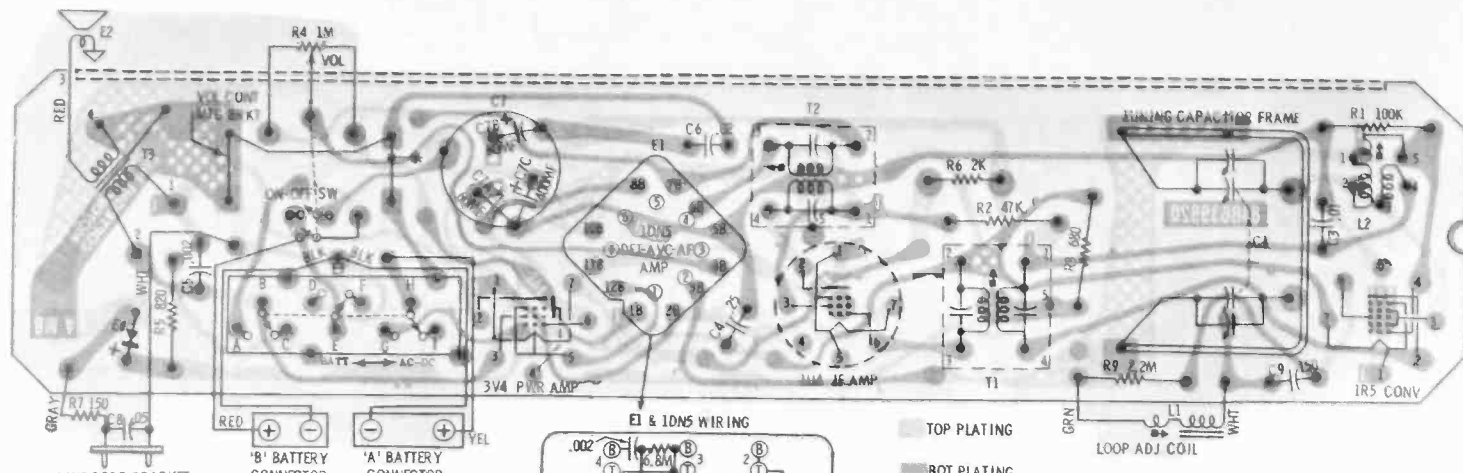
ALIGNMENT

NOTE: When aligning this receiver, it will be necessary to connect a jumper from the volume control mounting bracket to the speaker frame; this is necessary to complete the speaker circuit. Use an isolation transformer between the power line and radio; if not available, connect low side of signal generator to B- through a .1 mf capacitor. Connect an output meter across the speaker voice coil. Set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading the receiver. Use an insulated 3/32" hex alignment tool for osc core adjustment and a fibre screwdriver for all other adjustments, except as noted **.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Conv grid (pin 6) thru .1 mf & B-	455 Kc	Fully open	1, 2, & 3	Adjust for maximum.
RF ALIGNMENT					
2.	Conv grid (pin 6) thru .1 mf & B-	1620 Kc	Fully open	4	Adjust for maximum.
3.	Radiation loop*	1400 Kc	Tune for maximum	5	With radio installed in cabinet, adjust for maximum.
NOTE: Do not perform steps 4, 5 & 6 unless the oscillator core has been tampered with or associated components have been replaced.					
4.	Conv grid (pin 6) thru 1. mf & B-	1620 Kc	Fully open	4	Adjust for maximum.
5.	"	532 Kc	Fully closed	6	Adjust for maximum.
6.	Repeat steps 4 & 5 until no further increase; step 4 should be last adjustment.				
7.	Radiation loop*	1400 Kc	Tune for maximum	5	With radio installed in cabinet, adjust for maximum.
8.	Radiation loop*	600 Kc	Tune for maximum	7**	With radio installed in cabinet, adjust for maximum.**
9.	Repeat steps 7 & 8 until no further increase; step 7 (trimmer 5) should be last adjustment.				

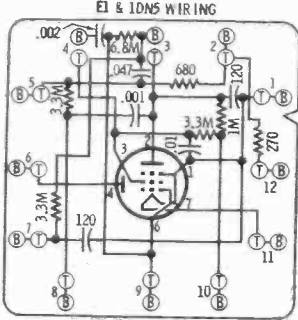
*Connect generator output across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver antenna.
 **Two kinds of antenna core adjusting slugs are used in the antenna handles. Handles that have green, white, yellow or no color dot next to the core adjusting slug require a 5/64" hex alignment tool for adjustment; handles that have a red or lilac color dot require a thin fibre screwdriver.

CHASSIS HS-647



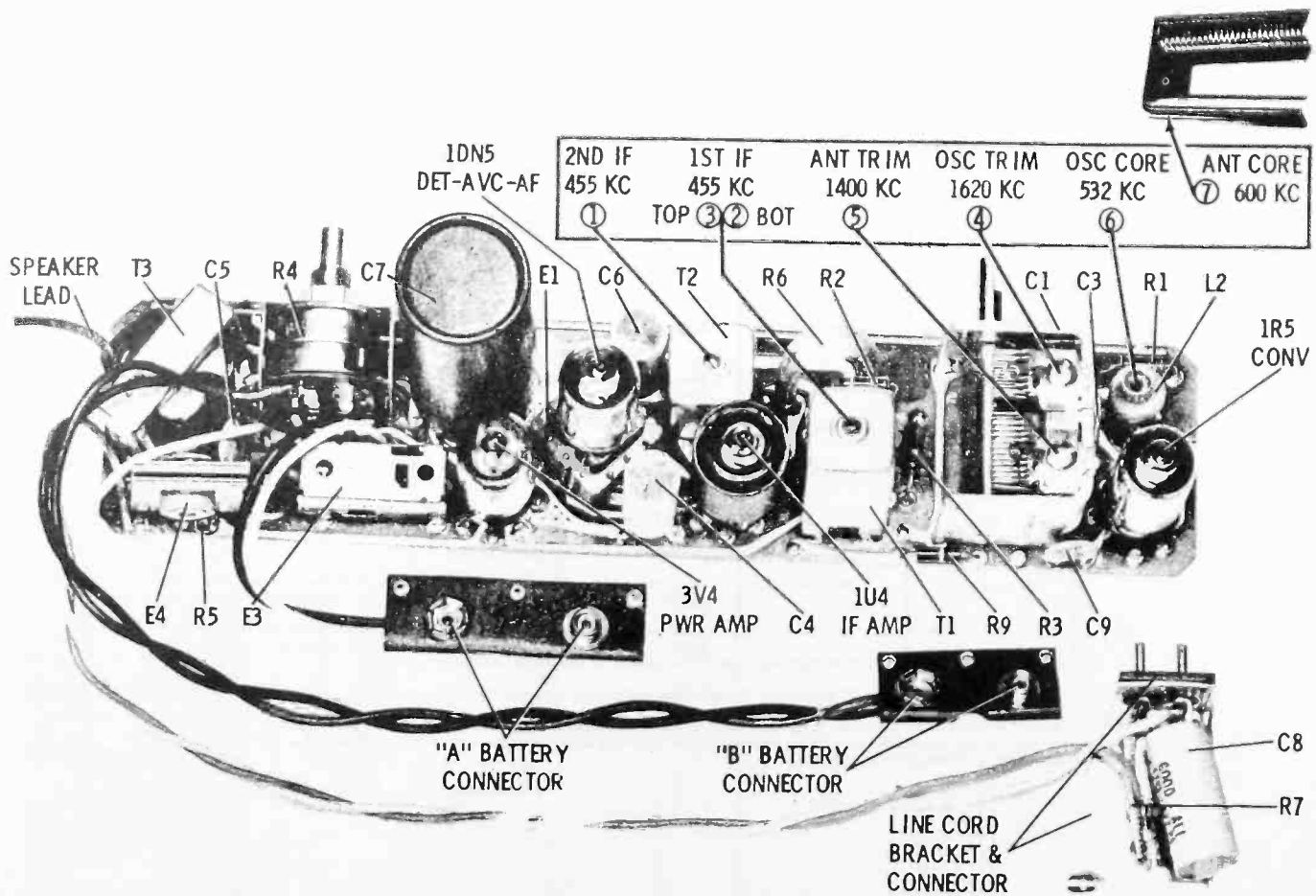
NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.

PLATED PANEL WIRING LEGEND
 ■ = B+ ■ = AVC ▲ = FILAMENT
 ▽ = GROUND TO CABINET
 * = GROUND TO CABINET thru volume control mounting bushing



NOTES:
B INDICATES CONNECTION TO BOTTOM OF MODULE;
T INDICATES CONNECTION TO TOP OF MODULE.

PLATED PANEL WIRING



ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS

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SUPPLEMENT TO 3H24, 3H25 SERIES SERVICE MANUAL PART NO. 68P640463

HOME RADIO
SUPPLEMENT NO. 1

MODEL	CHASSIS
3H24B-3	HS-713
3H24S-3	HS-713
3H24B-4	HS-601
3H24S-4	HS-601
3H25B-2	HS-602
3H25M-2	HS-602
3H25B-3	HS-602
3H25M-3	HS-602

GENERAL INFORMATION

This supplement covers general information and replacement parts list for added Models 3H24-3, 3H24-4, 3H25-2 & 3H25-3 series Hi-Fi phonographs. For service information, chassis photos, schematic diagram, etc., refer to 3H24, 3H25 series Service Manual (Motorola Part Number 68P640463).

TYPE - Portable (3H24-3, 3H24-4) and table (3H25-2, 3H25-3) Hi-Fi phonographs containing four-speed automatic record changers (wired for stereophonic operation) and multiple speaker systems. A right channel stereo output jack is provided on the rear of the cabinet for connecting to the appropriate Motorola Stereo Conversion Kit, HK-31 or HK-39 (see STEREO CONVERSION). These models differ from each other in the type of record changer used and in cabinet design. Model 3H25-3 series includes a stereophonic cartridge; all other models include monaural cartridges.

CHASSIS - Chassis HS-713 differs from HS-601 & HS-602 in that the impedance of the output transformer secondary has been changed to 8 ohms and the value of R-1 to 220,000 ohms. For schematic diagram of chassis HS-601 & HS-602, refer to Service Manual Part No. 68P640463.

STEREO CONVERSION - These models may be converted to stereophonic operation by the addition of Motorola Stereo Conversion Kit, HK-31 or HK-39, which contains the second channel amplifier, cabinet and speakers, and stereo-

phonic cartridge. Model 3H25-3 series contains a changing type jack which automatically separates the two channels (with plug inserted) for stereophonic operation or parallels them (with plug disconnected) for monaural operation.

RECORD CHANGER (All of the record changers used in these models have extra tone arm leads, jacks, etc., for use with stereophonic cartridges).

Model	Record Changer Type	Cartridge Type
3H24-3 series	VM18RC*	Monaural
3H24-4 series	BM18RC**	Monaural
3H25-2 series	VM18RC***	Monaural
3H25-3 series	VM18RC*** or VM19RC*	Stereo

*Refer to VM18RC-VM19RC Record Changer Service Manual (Motorola Part No. 68P641046) for service information and changer operation.

**Refer to BM18RC-DM18RC Record Changer Service Manual and supplements (Motorola Part Nos. 68P646513, 68P637523, 68P639040 and 68P643039) for service information and changer operation.

***Refer to VM18RC-VM19RC Record Changer Service Manual (Motorola Part Nos. 68P634962, 68P639038 and 68P644017) for service information and changer operation.

SUPPLEMENTARY REPLACEMENT PARTS LIST

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

Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the correct Motorola parts replacement.

Ref. No.	Part Number	Description
HS-713 ELECTRICAL PARTS		
C-1	8R121002	Capacitor, paper tub: .01 mf 400V
C-2	21K10938	Capacitor, cer disc: 100 mf 500V
C-3	21K121836	Capacitor, cer disc: .002 mf 500V
C-4	8R121770	Capacitor, paper tub: .02 mf 400V
C-5	21K121838	Capacitor, cer disc: .002 mf 500V
C-6	8R121866	Capacitor, paper tub: .02 mf 400V
C-7	22K63858	Capacitor, electrolytic: 40-40-40uF/350V
E-1	50K842060	Speaker, PW: 8"; 8Ω VC (3H24-3, 3H24-4 Series)
E-2	50C642154	Speaker, PW: 4"; 8Ω VC (3H24-3, 3H24-4 Series)
E-3	50C842134	Speaker, PW: 4"; 8Ω VC (3H24-3, 3H24-4 Series)
E-4	50C834473	Speaker, PW: 8"; 3, 2Ω VC (3H25-2, 3H25-3 Series)
E-5	50C834444	Speaker, PW: 4"; 8Ω VC (3H25-2, 3H25-3 Series)
E-6	50C834446	Speaker, PW: 4"; 8Ω VC (3H25-2 Series)
E-7	65R125595	Bulb, pilot light: 21W47; CY
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	8K122322	220,000 10% 1/2W
R-2	18A838447	Control, volume: 2 meg
R-3	8K122445	1800 10% 1/2W
R-4	8K122322	220,000 10% 1/2W
R-5	8K121299	47,000 10% 1/2W
R-7	18A838447	Control, bass: 2 meg
R-8	18A838447	Control, treble: 2 meg
R-9	8K119932	10,000 10% 1/2W
R-10	8K121847	4700 10% 1/2W
R-11	8K121279	470,000 10% 1/2W
R-12	8K121279	470,000 10% 1/2W
R-13	6R489037	330 10% 1/2W

Ref. No.	Part Number	Description
R-14	6K125146	470 10% 1/2W
R-15	6K119931	2700 10% 1/2W
R-16	6K125534	100,000 10% 1/2W
T-1	25C81640	Transformer, output
T-2	25C83883	Transformer, power

HS-713 MECHANICAL PARTS

43A721334	Bushing, line cord (see Part 43K721460 set)
227051	Pinout: 3/8-32 (cast stg)
9A703469	Receptacle, 1 pin (phone input)
9A705018	Receptacle, 4 pin (phone out)
43K721440	Reinforce, line cord (use with 43A721334 bushing)
18A890416	Shell & insulator (for 9A890416 ret)
9A839683	Socket, pilot light
9A119482	Socket, tube: 9 pin oct
9A701063	Socket, tube: octal
9A837733	Socket, tube: 7 pin oct

CABINET PARTS (3H24-3 SERIES)

17K42204	Assembly, cabinet bottom: blue (3H24B-3)
17K42206	Assembly, cabinet bottom: tan (3H24S-3)
17K42204	Assembly, cabinet cover: blue (3H24B-3)
17K42204	Assembly, cabinet cover: tan (3H24S-3)
17K40691	Assembly, changer board
75K83844	Dumper, lower
*75K840699	Dumper, upper
*55K42120	Catch, cover
13K838755	Grille, cab

Ref. No.	Part Number	Description
*55B42078	Handle (white)	
55C93800	Hinge, left hand	
55K938402	Hinge, right hand	
9K838956	Jack, ext spkr (incl locknut & washer)	
36C838435	Knob, control	
30B833247	Line Cord & Plug	
2X536607	Locknut (ext spkr jack)	
13K838557	Medallion, Hi-Fi	
257005	Nut, hex: #8-32 (spkr stg)	
2A638988	Nut, speed: overlay stg	
2K838497	Nut, speed: medallion stg	
21E31277	Nut, speed (pilot light rod stg)	
13D839118	Overlay, grille: aluminum	
28K835591	Plug, linecord	
28K839682	Plug, phone	
9A842235	Receptacle, phone	
42K839620	Retainer, 4SRPM spindle	
*55129109	Rivet, catch stg	
*55129108	Rivet, chassis support brkt stg	
55129111	Rivet, handle stg	
*55129107	Rivet, receipt stg	
55129110	Rivet, stud stg	
47K838508	Rod, pilot light	
3K834157	Screw, machine: #8-32 (spkr stg)	
39128253	Screw, tapping: #4 x 3/4 (chassis shield stg - top)	
39127866	Screw, tapping: #6 x 3/8 (chassis shield & spindle ret stg)	
39129103	Screw, tapping: #8 x 1/2 (hinge ret)	
39127947	Screw, tapping: #8 x 7/8; brass (motorboard stg - rear)	
39127941	Screw, wood: #8 x 1; brass (motorboard block stg)	
39127946	Screw, wood: #8 x 1-1/4; brass (motorboard stg - top center)	
41A839649	Spring, hinge ret	
*46A42121	Stud, catch latch	
4K834887	Washer, countersunk (changer board stg)	
4K839648	Washer, cup (hinge ret)	
4K838608	Washer (ext spkr jack)	
4A839652	Washer, flat (hinge)	
4K839102	Washer (pilot light rod)	
*4A841597	Washer, rubber	

Ref. No.	Part Number	Description
48A41596	Washer, spring (handle & stud stg)	

CABINET PARTS (3H24-4 SERIES)

Note: The following parts are in addition to Cabinet Parts (Model 3H24 Series) in Service Manual Part No. 68P640463 - for complete Replacement Parts List, refer to this manual.

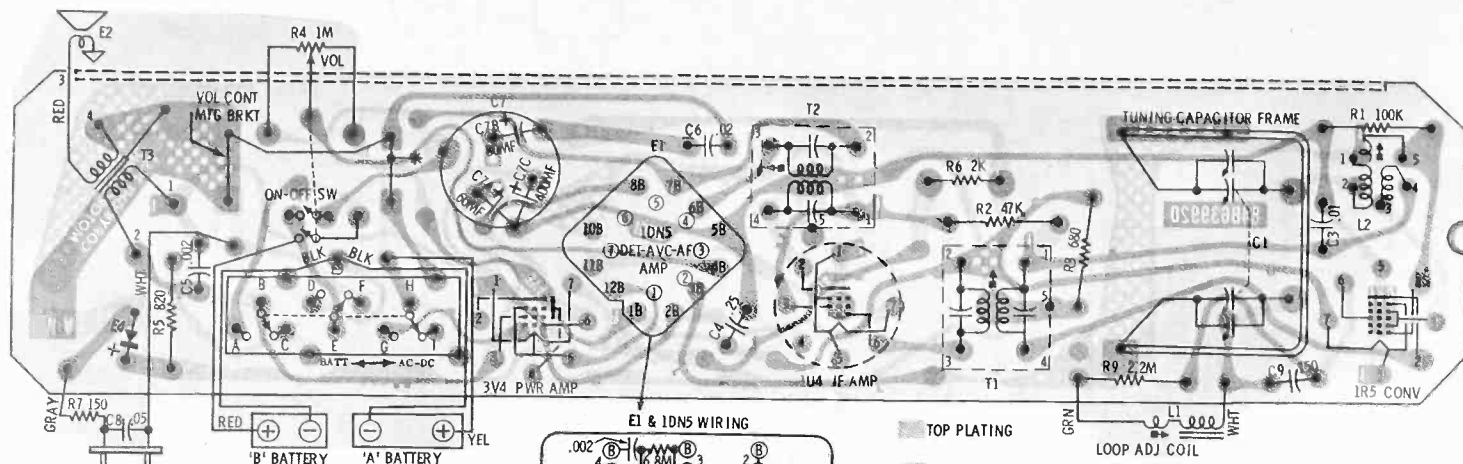
1A842716	Bracket & Receptacle (bot of record changer)
30A842693	Lead, tone arm (grn & wht)
28K839682	Plug, phone
9A842238	Receptacle, phone (riveted to cab bot)
55129107	Rivet (phone recept ret)
437625	Washer (phone recept ret)

CABINET PARTS (3H25-2, 3H25-3 SERIES)

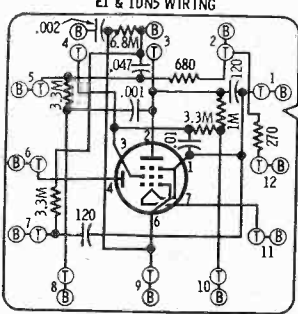
17K639799	Cabinet: Brndia Oak (3H25B-2, 3H25M-3); incl medallion
*17K639790	Cabinet: Mahogany (3H25B-3, 3H25M-3); incl medallion
30K842861	Cable, double plug: 12" (3H25-3 Series)
30K842878	Cable, single plug: 14" (3H25-3 Series)
30K842892	Cable, single plug: 20" (3H25-3 Series)
42A638434	Clip, speed; medallion stg
35K838409	Grille Cloth (3H25B-2, 3H25M-3)
35K838408	Grille Cloth (3H25B-3, 3H25M-3)
98B32531	Jack, ext spkr (incl locknut & washer)
36K839306	Knob, control: bass
36K839307	Knob, control: treble
36K839306	Knob, control: volume
18K838363	Leg, brass: individual
10K838362	Leg, brass: set of 4
2K838407	Locknut, ext spkr jack
12C838399	Medallion, Hi-Fi
28119913	Nut, hex: #8-32 (spkr stg)
2K831277	Nut, speed: pilot light rod ret
28K839682	Plug, phone
8A22182	Receptacle, phone
9A850836	Receptacle, aborting type phone (3H25-3 Series)
47A722193	Rod, pilot light
3K834892	Screw, special: bottom cover stg
4K838608	Washer, ext spkr jack
4K839102	Washer, pilot light rod ret

*New Item, Appears in any List for First Time

CHASSIS HS-647

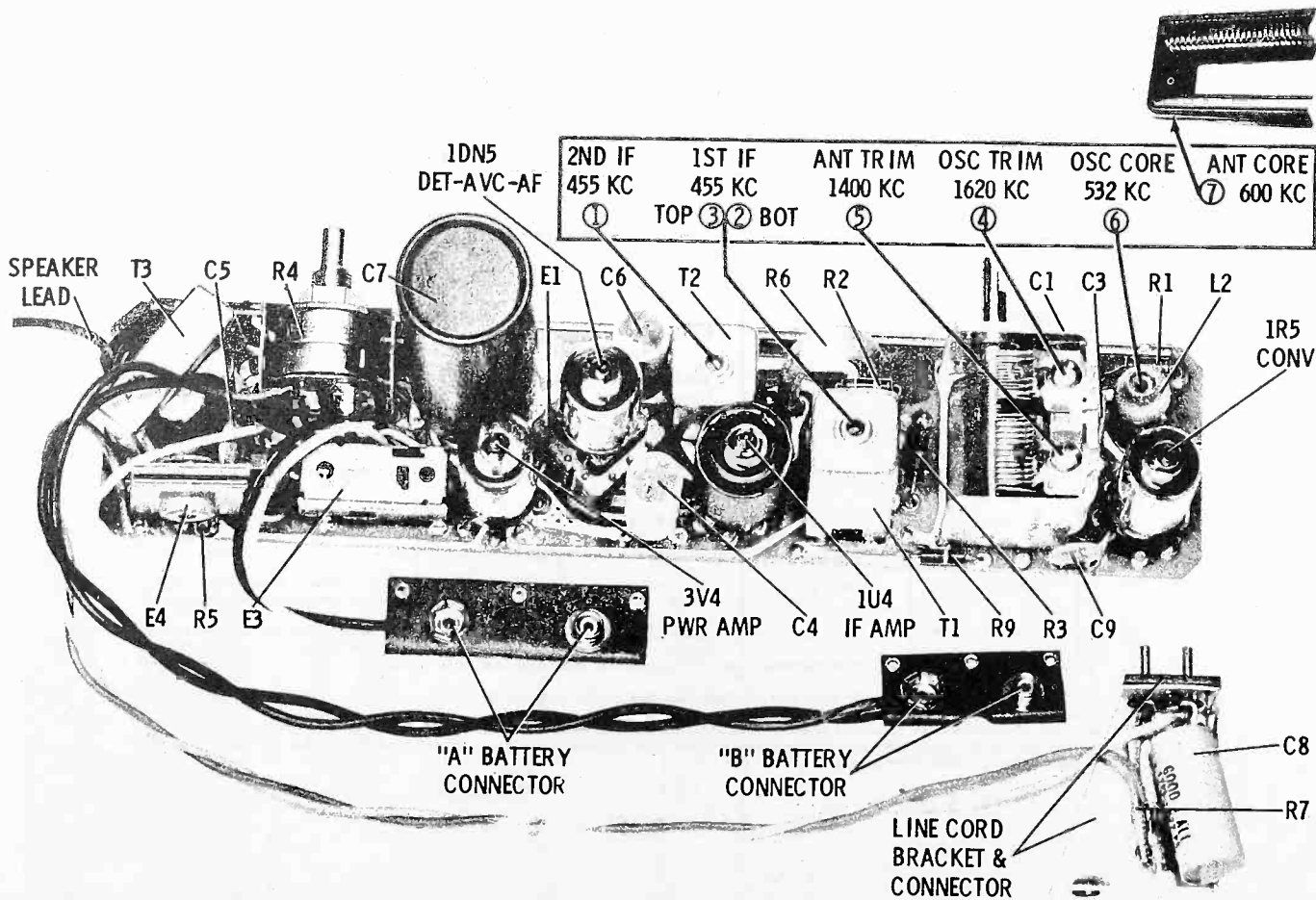


NOTES:
 CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
 PLATED PANEL WIRING LEGEND
 □ = B+ □ = AVC □ = FILAMENT
 ▽ = GROUND TO CABINET
 * = GROUND TO CABINET thru volume control mounting bushing



NOTES:
 B INDICATES CONNECTION TO BOTTOM OF MODULE,
 T INDICATES CONNECTION TO TOP OF MODULE.

PLATED PANEL WIRING



ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



SUPPLEMENT TO 3H24, 3H25 SERIES SERVICE MANUAL PART NO. 68P640463

HOME RADIO
SUPPLEMENT NO. 1

MODEL	CHASSIS
3H24B-3	HS-713
3H24S-3	HS-713
3H24B-4	HS-601
3H24S-4	HS-601
3H25B-2	HS-602
3H25M-2	HS-602
3H25B-3	HS-602
3H25M-3	HS-602

GENERAL INFORMATION

This supplement covers general information and replacement parts list for added Models 3H24-3, 3H24-4, 3H25-2 & 3H25-3 series HI-FI phonographs. For service information, chassis photos, schematic diagrams, etc., refer to 3H24, 3H25 series Service Manual (Motorola Part Number 68P640463).

TYPE - Portable (3H24-3, 3H24-4) and Table (3H25-2, 3H25-3) HI-FI phonographs containing four-speed automatic record changers (wired for stereophonic operation) and multiple speaker systems. A right channel stereo output jack is provided on the rear of the cabinet for connecting to the appropriate Motorola Stereo Conversion Kit, HK-31 or HK-39 (see STEREO CONVERSION). These models differ from each other in the type of record changer used and in cabinet design. Model 3H25-3 series includes a stereophonic cartridge; all other models include monaural cartridges.

CHASSIS - Chassis HS-713 differs from HS-601 & HS-602 in that the impedance of the output transformer secondary has been changed to 8 ohms and the value of R-1 to 220,000 ohms. For schematic diagram of chassis HS-601 & HS-602, refer to Service Manual Part No. 68P640463.

STEREO CONVERSION - These models may be converted to stereophonic operation by the addition of Motorola Stereo Conversion Kit, HK-31 or HK-39, which contains the second channel amplifier, cabinet and speakers, and stereo-

phonic cartridge. Model 3H25-3 series contains a shorting type jack which automatically separates the two channels (with plug inserted) for stereophonic operation or parallels them (with plug disconnected) for monaural operation.

RECORD CHANGERS (All of the record changers used in these models have output tone arm leads, jacks, etc., for use with stereophonic cartridges).

Model	Record Changer Type	Cartridge Type
3H24-3 series	VM18RC*	Monaural
3H24-4 series	BR3RC**	Monaural
3H25-2 series	VM18RC***	Monaural
3H25-3 series	VM18RC*** or VM18RC*	Stereo

*Refer to VM18RC-VM18RC Record Changer Service Manual (Motorola Part No. 68P641046) for service information and changer operation.

**Refer to BR3RC-BR3RC Record Changer Service Manual and supplements (Motorola Part Nos. 68P616513, 68P637523, 68P637040 and 68P643079) for service information and changer operation.

***Refer to VM18RC-VM18RC Record Changer Service Manual (Motorola Part Nos. 68P634942, 68P635038 and 68P644012) for service information and changer operation.

SUPPLEMENTARY REPLACEMENT PARTS LIST

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

Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimum call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description
HS-713 ELECTRICAL PARTS		
C-1	82121002	Capacitor, paper tub: .01 mf 400V
C-2	218419038	Capacitor, cer disc: 100 mf 300V
C-3	21K121836	Capacitor, cer disc: .002 mf 500V
C-4	82121770	Capacitor, paper tub: .02 mf 400V
C-5	21K121838	Capacitor, cer disc: .002 mf 500V
C-6	82121366	Capacitor, paper tub: .02 mf 400V
C-7	238638559	Capacitor, electrolytic: 40-40-40mf/350V
E-1	50K642060	Speaker, PM: 8"; 16Ω VC (3H24-3, 3H24-4 Series)
E-2	50C642154	Speaker, PM: 4"; 8Ω VC (3H24-3, 3H24-4 Series)
E-3	50C642154	Speaker, PM: 4"; 8Ω VC (3H24-3, 3H24-4 Series)
E-4	50C634473	Speaker, PM: 8"; 3, 2Ω VC (3H25-2, 3H25-3 Series)
E-5	50C636446	Speaker, PM: 4"; 8Ω VC (3H25-2, 3H25-3 Series)
E-6	50C636446	Speaker, PM: 4"; 8Ω VC (3H25-2, 3H25-3 Series)
E-7	658125595	Bulb, pilot light: #1847; 6V
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.		
R-1	8K122322	220,000 10% 1/2W
R-2	18A638447	Control, volume: 2 meg
R-3	8K122445	1800 10% 1/2W
R-4	8K122322	220,000 10% 1/2W
R-5	8K121299	47,000 10% 1/2W
R-7	18A638447	Control, bass: 2 meg
R-8	18A638447	Control, treble: 2 meg
R-9	8K119932	10,000 10% 1/2W
R-10	8K121847	4700 10% 1/2W
R-11	8K121279	470,000 10% 1/2W
R-12	8K121279	470,000 10% 1/2W
R-13	8K488037	330 10% 2W

Ref. No.	Part Number	Description
R-14	8K128166	470 10% 2W
R-15	82119921	8200 10% 1/2W
R-16	8K128534	100,000 10% 1/2W
T-1	238641560	Transformer, output
T-2	23C638832	Transformer, power

HS-713 MECHANICAL PARTS

43A721314	Bushing, line cord (use with 43E721462 ret)
287051	Pin: 3/8-32 (semi stg)
86703449	Receptacle, 1 pin (phone input)
98490518	Receptacle, 4 pin (phone sw)
43E721460	SA Line cord (use with 43A721314 bushing)
18A890016	Shell & insulator (for 98490518 recept)
98539653	Socket, pilot light
92119823	Socket, tube: 9 pin sta
98701065	Socket, tube: octal
98K52773	Socket, tube: 7 pin sta

CABINET PARTS (3H24-3 SERIES)

17642304	Assembly, cabinet bottom: blue (3H24B-3)
17642304	Assembly, cabinet bottom: tan (3H24S-3)
17642304	Assembly, cabinet cover: blue (3H24B-3)
17642304	Assembly, cabinet cover: tan (3H24S-3)
17646081	Assembly, changer board
75K638844	Stumper, lower
*75K640898	Stumper, upper
*55K642120	Clutch, cover
176638750	Grille, emb

Ref. No.	Part Number	Description
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68K41396 Washer, spring (handle & stud stop)

CABINET PARTS (3H24-4 SERIES)

Note: The following parts are in addition to Cabinet Parts (Model 3H24 Series) in Service Manual Part No. 68P640463 - for complete Replacement Parts List, refer to this manual.

1A642716	Bracket & Receptacle (bot of record changer)
30A842683	Lead, tone arm (gro & slit)
28K639662	Plug, phone
9A842323	Receptacle, phone (riveted to cab bot)
52129107	Rivet (phone recept ret)
487625	Washer (phone recept ret)

CABINET PARTS (3H25-2, 3H25-3 SERIES)

17643978	Cabinet: Swedish Oak (3H25B-2, 3H25M-3); incl medallion
*17643979	Cabinet: Mahogany (3H25B-2, 3H25M-3); incl medallion
30K642861	Cable, double plug: 12" (3H25-3 Series)
30K642874	Cable, single plug: 36" (3H25-3 Series)
30K642892	Cable, single plug: 30" (3H25-3 Series)
42A638434	Clip, speed: medallion stg
35K638409	Grille Cloth (3H25B-2, 3H25M-3)
35K638408	Grille Cloth (3H25B-3, 3H25M-3)
98632531	Jack, ext spkr (incl locknut & washer)
38K639306	Knob, control: bass
38K639307	Knob, control: treble
38K639306	Knob, control: volume
18K638363	Leg, brass: individual
10638362	Leg, brass: set of 4
28K638607	Locknut, ext spkr jack
12C638398	Medallion, HI-FI
23119913	Nut, hex: #8-32 (sprk stg)
2K631277	Nut, speed: pilot light rod ret
28K639662	Plug, phone
9A22182	Receptacle, phone
9A620926	Receptacle, shorting type phone (3H25-3 Series)
47A722183	Rod, pilot light
38K64492	Screw, special: bottom cover stg
4K639102	Washer, ext spkr jack
4K639102	Washer, pilot light rod ret

Ref. No.	Part Number	Description
*538642078	Handle (white)	
55K638400	Ring, left hand	
55K638402	Ring, right hand	
9K638956	Jack, ext spkr (incl locknut & washer)	
36C638435	Knob, control	
30B633247	Line Cord & Plug	
2K536607	Locknut (ext spkr jack)	
13K638557	Medallion, HI-FI	
257005	Nut, hex: #8-32 (sprk stg)	
2A838898	Nut, speed: overlay stg	
2K638497	Nut, speed (medallion stg)	
2K531277	Nut, speed (pilot light rod stg)	
13D639118	Overlay, grille: aluminum	
28K635591	Plug, linecord	
28K639662	Plug, phone	
9A842235	Receptacle, phone	
42K599620	Retainer, 4SRM spindle	
*55129109	Rivet, catch stg	
*55129108	Rivet, chassis support brkt stg	
55129111	Rivet, handle stg	
*55129107	Rivet, recept stg	
38129110	Rivet, stud stg	
47K638508	Rod, pilot light	
3K631457	Screw, machine: #8-32 (sprk stg)	
35128253	Screw, tapping: #4 x 3/4 (chassis shield stg - top)	
35127866	Screw, tapping: #6 x 3/8 (chassis shield & spindle ret stg)	
35129103	Screw, tapping: #8 x 1/2 (hinge ret)	
35127947	Screw, tapping: #8 x 7/8; brass (motorboard stg - rear)	
35127941	Screw, wood: #8 x 1; brass (motorboard block stg)	
35127946	Screw, wood: #8 x 1-1/4; brass (motorboard stg - top center)	
41A639649	Spring, hinge ret	
*46A642121	Stud, catch latch	
4K638887	Washer, countersunk (changer board stg)	
4K639648	Washer, cup (hinge ret)	
4K638608	Washer, flat (bunge)	
4K639102	Washer (pilot light rod)	
*4A641597	Washer, rubber	

*New Item, Appears in any List for First Time



12333 West Olympic Blvd.
Los Angeles 64

SERVICE MANUAL

Manual BC-64
Dec. 20, 1958

MODEL 6RT2 PERSONAL TRANSISTOR RADIO



Model 6RT2 (plastic)

DESCRIPTION:

Model 6RT2 is an all transistor, battery powered, superheterodyne radio receiver, with either a plastic or leather case. The antenna is a ferroloop mounted on the chassis. There are two controls, the tuning knob, and the volume control with on-off switch. Six semi-conductors are used: five transistors and one diode.

An earphone jack is provided; the earphone should be of low impedance (about 15 ohms) such as Packard-Bell earphone assembly EP-1 (part number 10615).

SPECIFICATIONS:

DIMENSIONS:

3 1/8" h by 6 1/2" w by 1 3/4" dp

WEIGHT:

1 1/8 lb

BATTERY DATA:

One nine-volt battery is required. The following single batteries may be used: RCA VS305, Mallory 1602, Eveready 246, Burgess 2N6.

Six Penlite cells of 1 1/2 volts each may be used. These are placed in an adapter furnished with the receiver. Directions for installation are on inside of receiver case.

Approximate battery life: Single cell, 100 hrs, Penlite cells, 60 hrs.

POWER OUTPUT:

Undistorted: 70 milliwatts
Maximum: 115 milliwatts

TUNING FREQUENCY RANGE:

535 to 1620 kc

SPEAKER:

Permanent magnet dynamic, cone diameter 2 3/4 in., impedance 12 ohms at 1000 cycles, magnet 0.68 oz Alnico V.

DC RESISTANCE MEASUREMENTS:

1st I-F Coil:

Primary, 4.0 ohms
Secondary, 1.0 ohms

2nd I-F Coil:

Primary, 3.8 ohms total, 2.2 ohms tap (tm 3 to tm 5)

Secondary, 1.6 ohms

Oscillator Coil:

Primary, 0.8 ohms
Secondary, 6.3 ohms

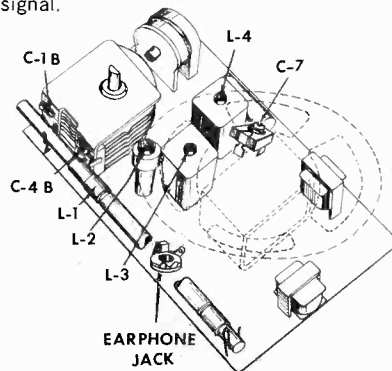
Ferroloop antenna:

Primary, 1.4 ohms
Secondary, 0.1 ohms

ALIGNMENT:

Alignment is accomplished by following the steps listed below. Connect output meter to speaker voice coil. Connect test oscillator across antenna section of variable capacitor (C-1) for step one. Ground lead of generator goes to chassis. For other steps, couple generator loosely to ferroloop with three or four turns of wire.

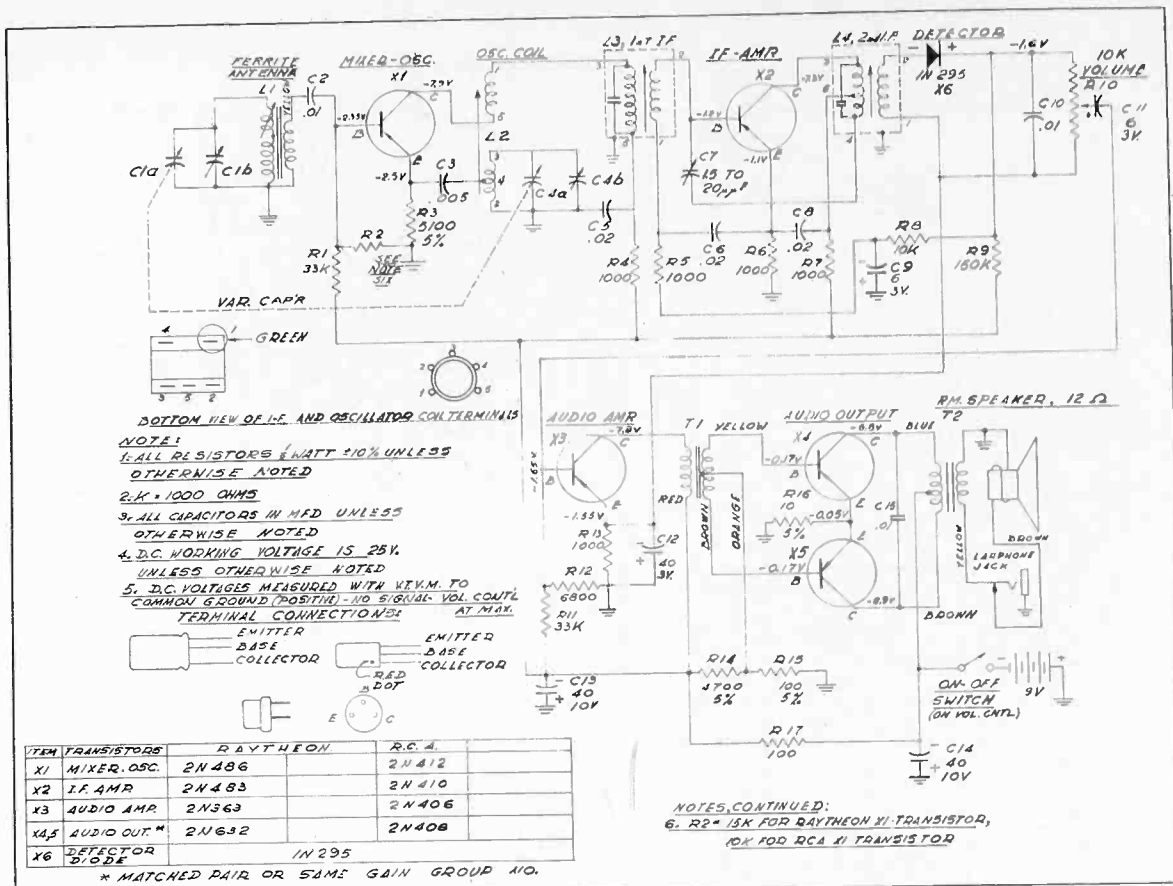
Each adjustment should be made using a minimum input signal.



Adjustments, Model 6RT2

Leave speaker in place; adjust
L-2, L-3, & L-4 from rear.

MODEL 6RT2



Schematic, 6RT2 Transistor Radio.

Step 1. Preset I-F amplifier neutralizer capacitor C-7 by turning completely clockwise (maximum capacity) then back one eighth of a turn (45 degrees). See note after step seven.

Step	Connect Test Oscillator To	Test Oscillator Frequency	Radio Dial Setting	Adjust
2.	Variable, antenna section	455 kc	535 kc	L-3 & L-4 for MAX
3.	Couple to antenna	600 kc	600 kc	L-2 (osc) for MAX
4.	Couple to antenna	1620 kc	1620 kc	C-4B for MAX
5.	Repeat steps two and three and check calibration at low end of dial (535 kc)			
6.	Couple to antenna	1500 kc	Tune to test osc. signal	C-1B for MAX
7.	Couple to antenna	600 kc	600 kc	L-1 (antenna) for MAX

NOTE: Optimum setting of neutralizing capacitor C-7 depends upon parameters X-2 and L-4. If, after alignment, regeneration occurs on stations near the high end of the dial, capacity of C-7 should be decreased (ccw). Too low a value, however, will result in loss of sensitivity. If it has been necessary to change the setting of C-7 more than 45 degrees after completing the alignment, then the I-F adjustment (step two) should be repeated.

REPLACEABLE PARTS

REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER	73035
C-1 (a & b)	Variable, 2-section, w/ trimmers	23551	73033-1
C-2	Ceramic disc, .01 mfd, 5/16" dia	23612A	73013-1
C-3	Ceramic disc, .005 mfd, 1/4" dia	23611	73001-1
C-4	Listed with C-1		73013
C-5	Ceramic disc, .02 mfd, 3/8" dia	23613A	
C-6	Same as C-5		
C-7	Trimmer, 1/2 mfd to 20 mmf	23437	
C-8	Same as C-5		
C-9	Electrolytic, 6 mfd, 3 volts	24149C	
C-10	Same as C-2		
C-11	Same as C-9		
C-12	Electrolytic, 40 mfd, 3 volts	24150C	
C-13	Electrolytic, 40 mfd, 10 volts	24151C	
C-14	Same as C-13		
C-15	Same as C-2		

CAPACITORS

Working voltage of ceramic disc capacitors: 25 v minimum. Tolerance of ceramic disc capacitors, +80%, -20%.

TRANSFORMERS

T-1	Audio driver, 8000 to 6000 ohms	89494B
T-2	Audio output, 1400 to 12 ohms	89485C

TRANSISTORS & DIODES

REFERENCE SYMBOL	FUNCTION	MANUFACTURER & MFR'S PART NUMBER
X-1	Oscillator & Mixer	Raytheon 2N486 RCA 2N412
X-2	I-F amplifier	Raytheon 2N483 RCA 2N410
X-3	Audio amplifier	Raytheon 2N363 RCA 2N406
X-4	Audio output	Raytheon 2N632 RCA 2N408
X-5	(Matched pair or same gain)	
X-6	Diode detector, 1N295	Packard-Bell #72028

MISCELLANY

DESCRIPTION	PACKARD-BELL NUMBER
Battery: See BATTERY DATA under SPECIFICATIONS.	
Board, printed circuit	14170C
Case (plastic)	21158C
Front panel is part number 47084B	
Case, leather, used w/	
Cover, chassis	21168
Cover, speaker	34101
Container assembly for Penlite Cells	34091
Clip, antenna	10637
Earphone assembly, Model EP-1 (15 ohms impedance)	28213C
Jack, for earphone	10615
Knob, volume	51004
Knob, tuning	52222A
Plug, battery, receiver	52264
Plug, battery, battery container	66051A
Shield, speaker baffle (plastic)	78218
Shield, battery compartment (plastic)	78219
Spacer, battery container (plastic)	82112
Spacer, battery container (leather)	82097
Speaker, 2 3/4", 12-ohms	83119D

CONTROLS

R-10	10,000 ohms, volume, w/ switch	25051B
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COILS

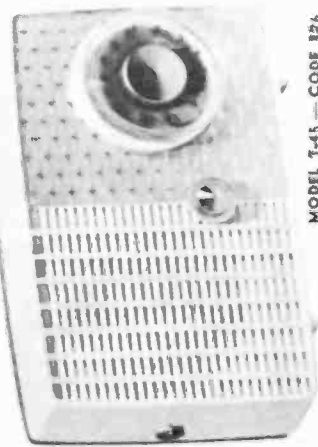
L-1	Loop, ferrite	29356D
L-2	Oscillator coil	29239B
L-3	1st I-F	29094C
L-4	2nd I-F	29095C

RESISTORS

R-1	33,000 ohms, 10% All 1/2 watt	73043
R-2	When transistor X-1 is mfd by RCA: 10,000 ohms, part number 73037 When transistor X-1 is mfd by Raytheon: 15,000 ohms, part number 73039	
R-3	5100 ohms, 5%	73080-1
R-4	1000 ohms, 10%	73025
R-5	Same as R-4	
R-6	Same as R-4	
R-7	Same as R-4	
R-8	10,000 ohms, 10%	73037
R-9	150,000 ohms, 10%	73051
R-10	See CONTROLS	
R-11	Same as R-1	

PHILCO TRANSISTOR RADIO
SERVICE MANUAL

MODEL T-45 CODE 126



MODEL T-45 — CODE 126

ALIGNMENT PROCEDURE

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

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .275 volts.

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

SPECIFICATIONS

CIRCUIT—Four transistor superheterodyne with diode detector.

AUDIO OUTPUT—25 milliwatts.

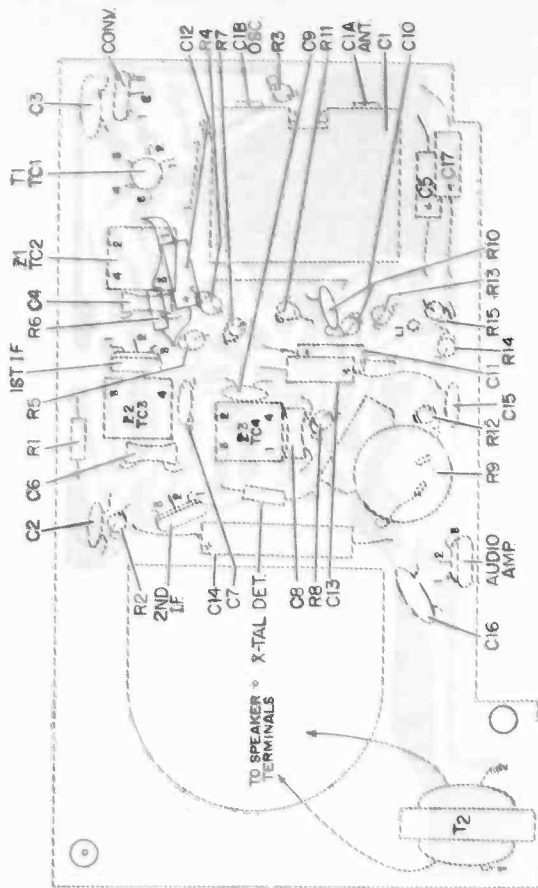
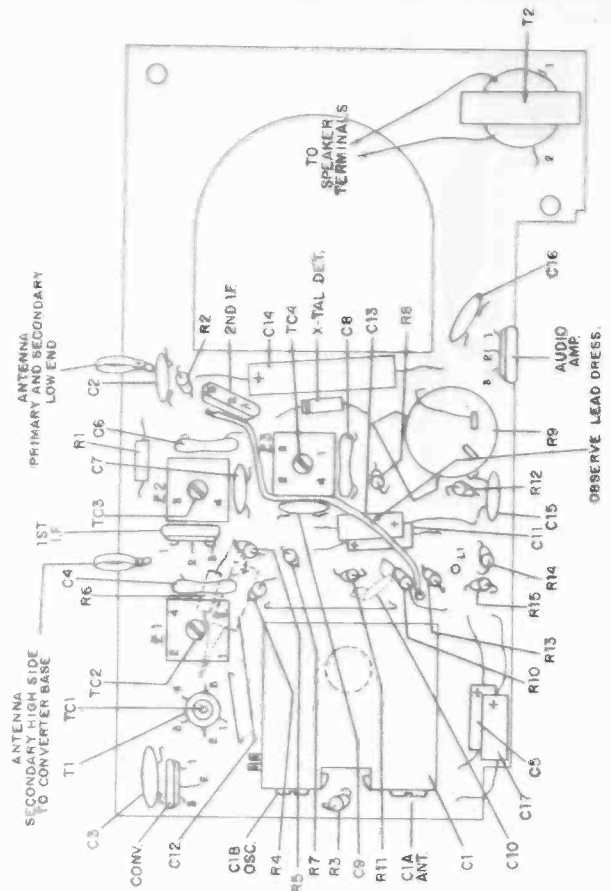
BATTERY VOLTAGE AND TYPE—6.0 volts from 4 penlight cells, type "AA", P-15, or mercury type "AA", P-9.

FREQUENCY COVERAGE—535 to 1620 KC.

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

CABINET—Styrene cabinet.

SPEAKER—2-3/4 in. pm., 14 ohm voice coil. Jack provided for optional private listening attachment.



ALIGNMENT CHART

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

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

REPLACEMENT PARTS LIST — MODEL T-45, CODE 126

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang	31-2788-2	R12	Resistor, output base, 4700 ohms	66-24783-0
C2	Condenser, antenna tank, .008 mfd, ceramic disc	30-1262-1	R13	Resistor, B+ droppings, 220 ohms	66-12283-0
C3	Condenser, oscillator coupling, .008 mfd ceramic disc	30-1262-1	R14	Resistor, output base bias, 1000 ohms	66-21083-0
C4	Condenser, 1st IF tank, 470 mmf, mica	30-1262-1	R15	Resistor, output emitter bias, 47 ohms	66-04783-0
C5	Condenser, electrolytic, avc by-pass, 40 mfd, 5 w.v.	30-1264-18	R16	Resistor, private listening, 22 ohms, on J1	66-02283-0
C6	Condenser, 2nd IF coupling, 390 mmf, mica	30-2588-4	S1	Switch, on-off	Part of R9
C7	Condenser, 2nd IF tank, 4700 mmf, ceramic	30-1264-19	T1	Oscillator transformer	32-4669-5
C8	Condenser, 3rd IF tank, 390 mmf, mica	30-1264-19	T2	Output transformer	32-8819-1
C9	Condenser, IF by-pass, .008 mfd, ceramic disc	30-1262-1	XTAL	Crystal diode, 2nd det. type IN60A	34-8022-3
C10	Condenser, 2nd detector by-pass, .02 mfd, ceramic	30-1272-11	Z1	Transformer, 1st IF	32-4760-1
C11	Condenser, electrolytic, audio coupling, 1 mfd, 6 w.v.	30-2591-8	Z2	Transformer, 2nd IF	32-4760-2
C12	Condenser, electrolytic, by-pass, 1 mfd, 6 w.v.	30-2591-8	Z3	Transformer, 3rd IF	32-4760-3
C13	Condenser, electrolytic, audio coupling, 5 mfd, 6 w.v.	30-2591-7		Printed Panel	54-5535
C14	Condenser, electrolytic, battery by-pass, 100 mfd, 6 w.v.	30-2588-4			
C15	Condenser, IF by-pass, .01 mfd, ceramic disc	30-1238-2			
C16	Condenser, Hi Cut, .0015 mfd, ceramic disc	30-1262-8			
C17	Condenser, electrolytic, output by-pass, 40 mfd, 6 w.v.	30-2588-3			
J1	Jack, private listening	42-1975-4			
LA1	Antenna assembly	32-4761-1			
LS1	Speaker	36-1664-5			
R1	Resistor, antenna tank, 15,000 ohms	66-31583-0			
R2	Resistor, converter base bias, 4700 ohms	66-24783-0			
R3	Resistor, converter emitter, 2200 ohms	66-22283-0			
R4	Resistor, AVC filter, 35000 ohms	66-33883-0			
R5	Resistor, 2nd IF base, 2200 ohms	66-22283-0			
R6	Resistor, 2nd IF base, 27K to 390K ohms	See Notes			
R7	Resistor, audio droppings, 1000 to 5600 ohms	See Notes			
R8	Resistor, 2nd detector, 100 ohms	66-11083-0			
R9	Resistor, volume control, 10,000 ohms	33-5583-5			
R10	Resistor, AVC delay, 3300 ohms	66-23383-0			
R11	Resistor, 2nd IF audio load, 560 ohms	66-15683-0			

TRANSISTORS

Description	Service Part No.
Converter — 2N252	34-6011-1
1st IF — 2N253	34-6011-2
Reflex (2nd IF) — R186, Transistor — Resistor Kit (See Notes)	32-4-8003
Audio — 2N185	34-6001-17

CABINET PARTS

Description	Service Part No.
Cabinet, Ivory and Terra Cotta	51-0002-6
Cabinet, Ivory and Turquoise	51-0002-7
Back, Cabinet, Terra Cotta	54-6639-2
Back, Cabinet, Turquoise	54-6639-5
Contact, battery	28-12319
Knob, tuning	54-6624-10
Knob, volume	54-6660-1
Overlay, cabinet	54-6981-1
Overlay, dial	54-6981-1
River, cabinet spring	28-12320-1
Spring, battery	28-12320-1
Spring, battery	28-12320-2
Spring, cabinet	28-11955

When transistor R186 is defective, kit number 32-4-8003 must be ordered. This kit contains a R186 transistor and two resistors (R6 and R7) properly matched. All three components must be replaced.

The stage may be checked as follows:

The value of R6 is selected to allow the 2nd IF transistor collector to draw 2 milliamps. This is checked by measuring the voltage across R11, the 560 ohm collector return resistor. This voltage should be 1.12 volts, with a tolerance of approximately ± 12 volts. The value of R6 falls within the limits of 27K to 390K.

All resistors are 1/2 watt, 10%, carbon.

Coil resistances read with coil in circuit.
Voice coil impedance = 14 ohms.
Voltages measured to ground with a 20,000 ohms/volt meter under no signal condition.

PRIVATE LISTENING JACK TERMINAL LEADS

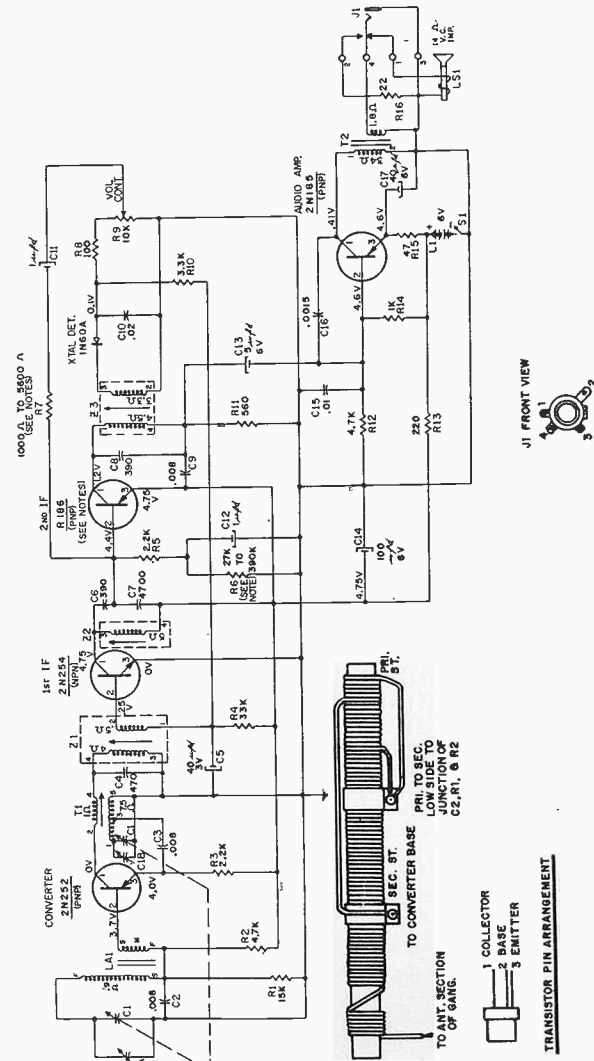
- Terminal 1—Brown lead to speaker.
- Terminal 2—One end of R16, P.L. shunt resistor.
- Terminal 3—Black ground lead to on-off switch and other end of R16.
- Terminal 4—Green lead of T2.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.275 volts. Normally, the transistors should be the last item suspected.

SCHEMATIC NOTES

Due to 2nd IF transistor variations the values of resistors R6 and R7 must be selected, within limits, for optimum performance.

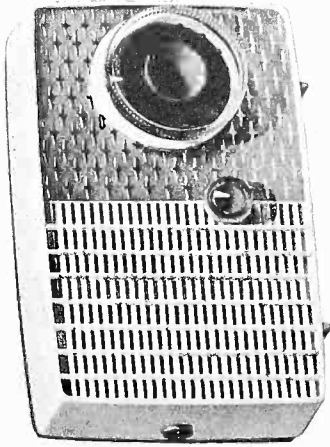


Schematic Diagram of Model T-45 — Code 126



PHILCO TRANSISTOR RADIO SERVICE MANUAL

MODEL T-45 — CODE 124



MODEL T-45 — CODE 124

ALIGNMENT PROCEDURE

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

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .275 volts.

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

SPECIFICATIONS

CIRCUIT—Four transistor superheterodyne with diode detector.

AUDIO OUTPUT—25 milliwatts.

BATTERY VOLTAGE AND TYPE—6.0 volts from 4 penlight cells, type "AA", P-15, or mercury type "AA", P-9.

FREQUENCY COVERAGE—535 to 1620 KC.

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

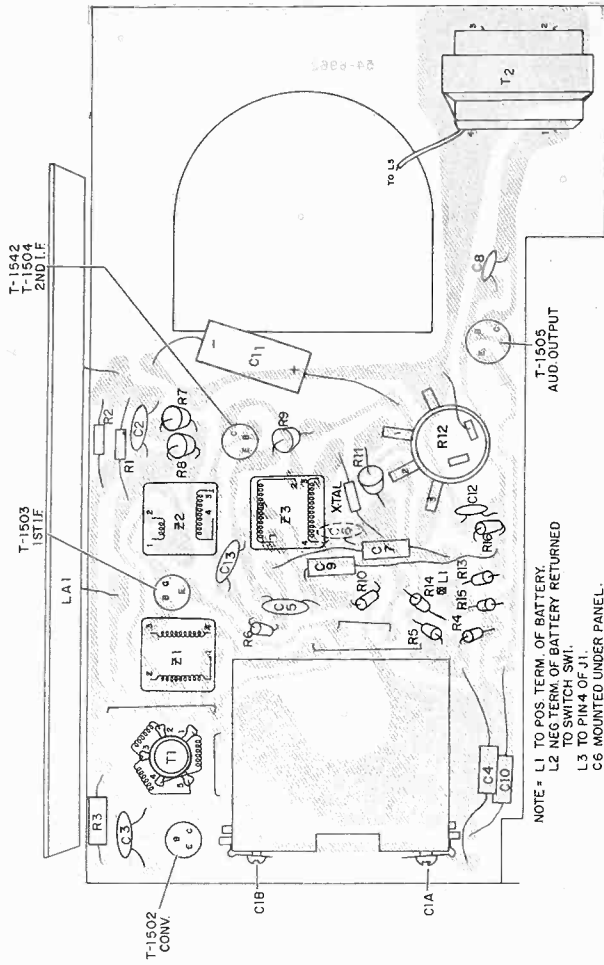
CABINET—Styrene cabinet.

SPEAKER—2.3/4 in. pm., 14 ohm voice coil. Jack provided for optional private listening attachment.

ALIGNMENT CHART

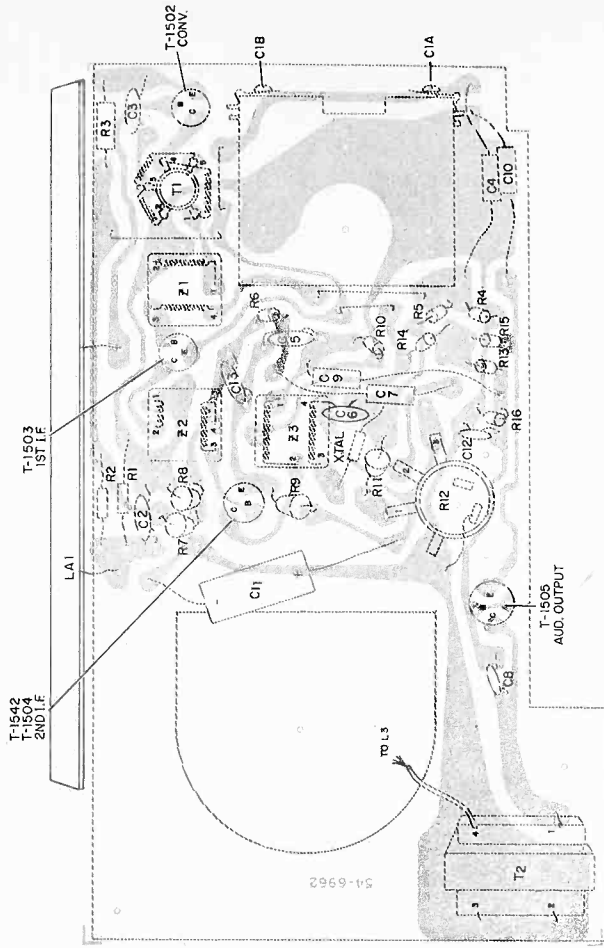
STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Panel must be removed from cabinet. Connect signal generator through a .1 uf condenser to antenna section of gang. Use the least generator signal necessary to give an output indication.	455 KC	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd IF Z2—2nd IF Z1—1st IF
2	Use radiating loop (See note 1 below).	1620 KC	1620 KC (gang fully open)	Pre-set C2A (Ant.) 1/2 turn from tight. Adjust for maximum output.	C1B—osc. trimmer
3	Same as step 2.	1400 KC	1400 KC	Adjust for maximum output.	C1A—ant. trimmer
4	Same as step 2. Panel MUST be re-mounted in cabinet.	600 KC	600 KC	Adjust for maximum output. Rock tuning gang while making in this adjustment.	T1—osc. core
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 2.				

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



Composite Top View

NOTE - L1 TO POS. TERM. OF BATTERY.
L2 TO SWITCH SW1.
L3 TO PIN 4 OF J1.
C6 MOUNTED UNDER PANEL.
R17 MOUNTED ON J1.



Composite Bottom View

REPLACEMENT PARTS LIST — MODEL T-45, CODE 124

Reference Symbol	Description	Service Part No.
C1	Capacitor, tuning gang	31-2788-2
C2	Capacitor, antenna tank, .008 mfd, ceramic disc	30-1262-1
C3	Capacitor, oscillator coupling, .0047 mfd, ceramic disc	30-1262-2
C4	Capacitor, electrolytic, avc by-pass, 10 mfd, 6 w.v., .30-2591-9	30-1262-1
C5	Capacitor, I-F by-pass, .008 mfd, ceramic disc	30-1262-1
C6	Capacitor, 2nd detector I-F by-pass, .02 mfd, disc	30-1272-11
C7	Capacitor, electrolytic, audio feedback to 2nd I-F, 1 mfd, 6 w.v.	30-2591-11
C8	Capacitor, hi-cut, .0015 mfd, disc	30-1262-8
C9	Capacitor, electrolytic, audio coupling, 5 mfd, 6 w.v., 30-2591-10	30-2591-10
C10	Capacitor, electrolytic, output by-pass, 40 mfd, 6 w.v.	30-2588-3
C11	Capacitor, electrolytic, battery by-pass, 100 mfd, 6 w.v.	30-2588-4
C12	Capacitor, I-F by-pass, output base, .01 mfd, disc	30-1272-2
C13	Capacitor, by-pass, .008 mfd, ceramic disc	30-1262-1
J1	Jack, private listening	42-1975-4
LA1	Antenna assembly	32-4761-2
LS1	Speaker, early production	36-1664-5
	later production	36-1664-7
R1	Resistor, antenna tank, 12,000 ohms	66-31283-0
R2	Resistor, converter base bias, 18,000 ohms	66-31883-0
R3	Resistor, converter emitter bias, 2200 ohms	66-22283-0
R4	Resistor, 1st I-F base bias, 68,000 ohms	66-36883-0
R5	Resistor, avc network, 4700 ohms	66-24783-0
R6	Resistor, audio feedback network, 470 ohms	66-14783-0
R7	Resistor, base bias, 2nd I-F, 2200 ohms	66-22283-0
R8	Resistor, 2nd I-F base, 18,000 to 33,000 ohms	See Notes
R9	Resistor, emitter bias, 2nd I-F, 22 ohms	66-02283-0
R10	Resistor, 2nd I-F audio load, 560 ohms	66-15683-0
R11	Resistor, 2nd detector, 100 ohms	66-11083-0
R12	Resistor, volume control, 10,000 ohms	33-5583-5
R13	Resistor, base bias output stage, 1000 ohms	66-21083-0
R14	Resistor, battery supply filter, 180 ohms	66-11883-0

TRANSISTORS

Reference Symbol	Description	Service Part No.
Converter	T-1502	34-6000-21
1st I-F	T-1503	34-6000-22
2nd I-F (reflex)	T-1504	34-6000-24
Audio output	T-1505	34-6001-24

CABINET PARTS

Reference Symbol	Description	Service Part No.
Cabinet	ivory and terra cotta	51-0002-6
Cabinet	ivory and turquoise	51-0002-7
Back, cabinet	terra cotta	54-6639-2
Back, cabinet	turquoise	54-6639-3
Contact, battery		28-12319
Knob, tuning		54-6624-10
Knob, volume		54-6660-1
Overlay, cabinet		54-6980
Overlay, dial		54-6981-1
Rivet, cabinet spring		2W-36671
Spring, battery		28-12320-1
Spring, battery		28-12320-2
Spring, cabinet		28-11955

SCHMATIC NOTES

As shown on the schematic, the 2nd I-F stage uses one of two transistors as original equipment. These options are to facilitate production schedules. For replacement purposes, only one type is indicated in the parts list for this stage. This type should be ordered regardless of the original used.

CAUTION—Due to 2nd I-F transistor variations, the value of resistor R8 must be selected, within limits for optimum performance. When transistor T-1504 (or T-1542) is defective and must be replaced, resistor R8 must also be changed unless the original provides the proper resistor operating characteristics. Failure to select the proper resistor can shorten the life of the transistor or seriously affect receiver operation.

The value of R8 is selected to allow the 2nd I-F transistor collector to draw 2 milliamps and will be between 18,000 to 33,000 ohms. This is checked by measuring the voltage across R10, the 560-ohm collector return resistor. This voltage should be 1.12 volts, with a 10% tolerance (± 1.2 volt).

All resistors are 1/2 watt, 10%, carbon, except R8 which is 5%. Coil resistances read with coil in circuit. Voice coil impedance = 14 ohms. Voltages measured to ground with a 20,000 ohms/volt meter under no signal conditions.

PRIVATE LISTENING JACK TERMINAL LEADS

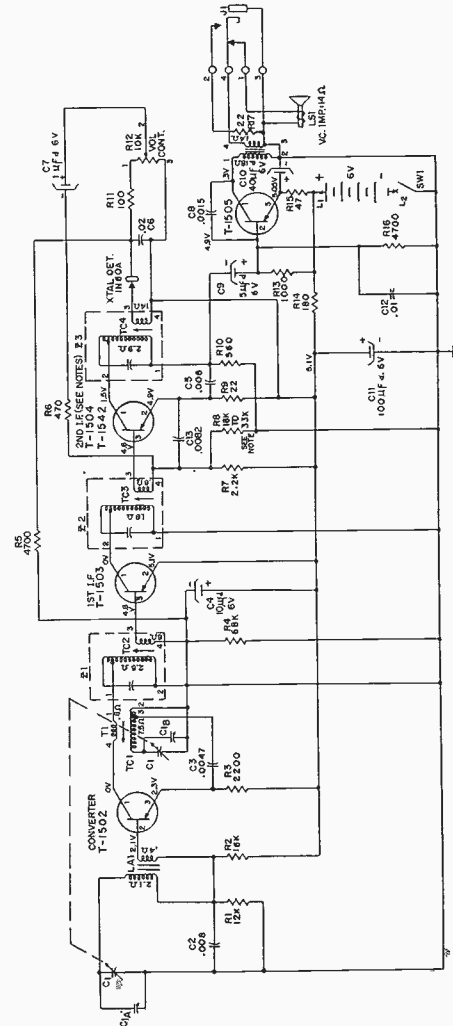
- Terminal 1—Red lead to speaker.
- Terminal 2—One end of R17, P.L. shunt resistor.
- Terminal 3—Red ground lead to on-off switch and other end of R17.
- Terminal 4—Brown lead of T2.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.275 volts. Normally, the transistors should be the last item suspected.

PANEL (CHASSIS) REMOVAL

1. Remove the following—Tuning and volume control knobs, cabinet back, batteries, two tri-mount fasteners at speaker end of panel, battery contact and retaining board, and the private listening jack from its cabinet mounting position.
2. Open the ground connection from the on-off switch to the speaker.
3. Remove the panel from the cabinet by first lifting up on the speaker end of the panel.



Schematic Diagram of Model T-45 — Code 124

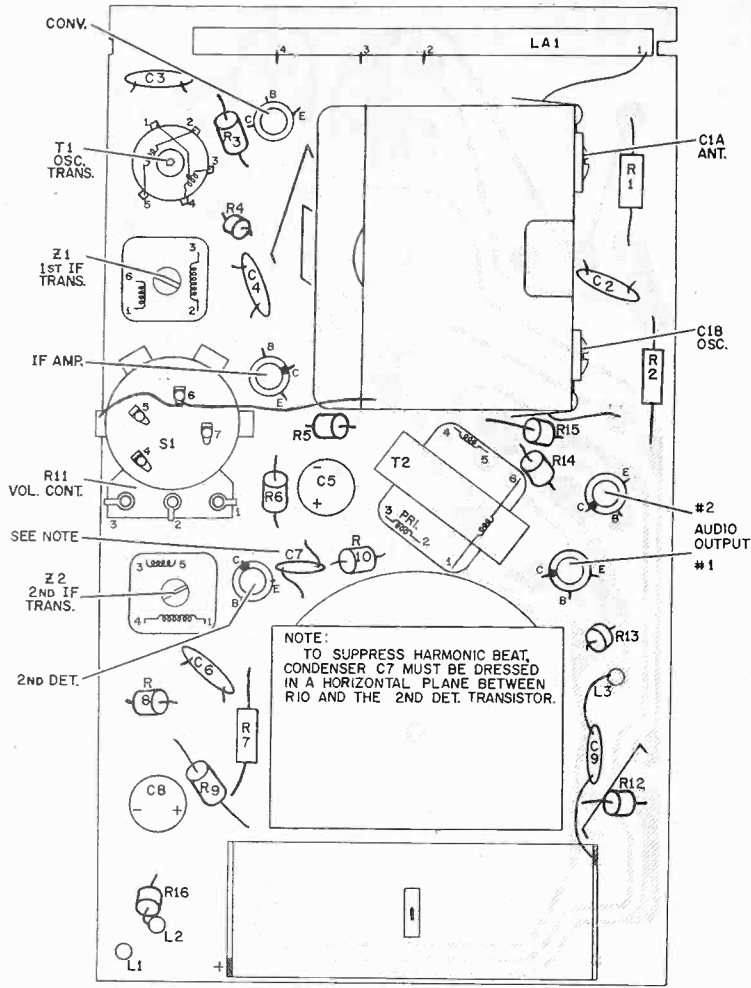


Figure 1. Printed Wiring Panel—Component Side Showing Parts Location and Alignment Points

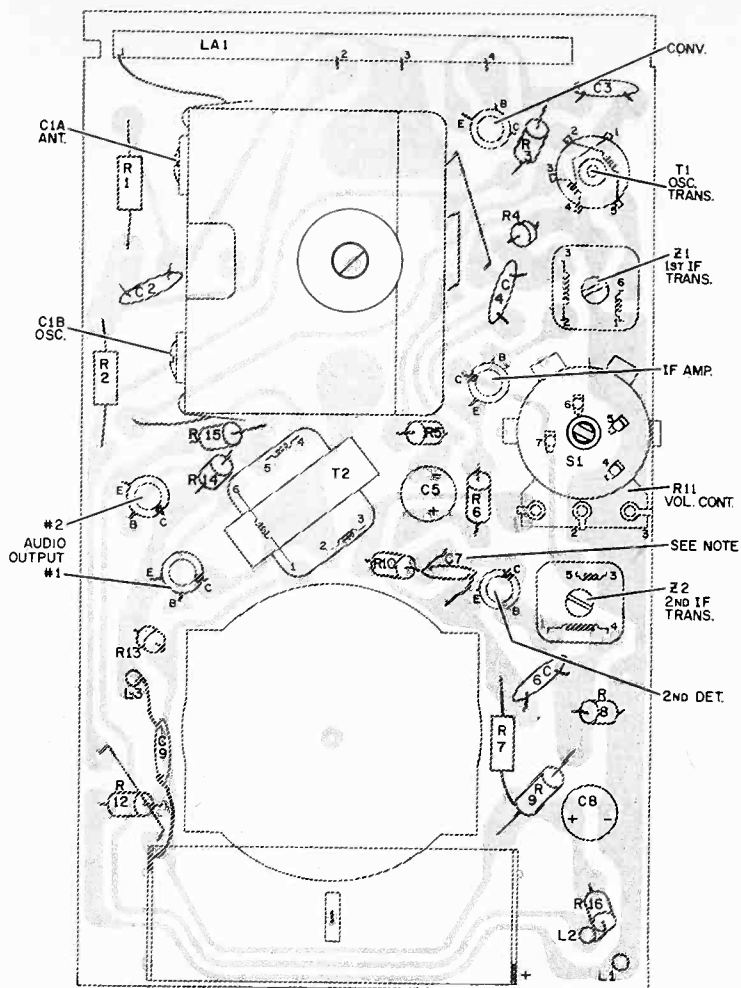
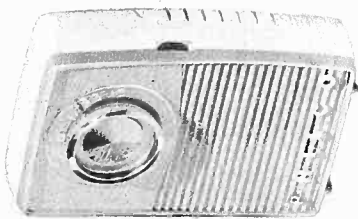


Figure 2. Printed Wiring Panel—Under Side Showing Parts Location



PHILCO TRANSISTOR RADIO SERVICE MANUAL

MODEL T-50



MODEL T-50

ALIGNMENT PROCEDURE

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

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

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

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

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

SPECIFICATIONS

CIRCUIT—Five transistor superheterodyne.

AUDIO OUTPUT—25 milliwatts.

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

FREQUENCY COVERAGE—535 to 1620 KC.

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

CABINET—Styrene cabinet.

SPEAKER—2 1/4 in. pm., 100 ohm voice coil. Jack provided for optional private listening attachment.

ALIGNMENT CHART

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

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

REPLACEMENT PARTS LIST

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang	31-2788-3	R13	Resistor, output emitter, 100 ohms	66-1108340
C2	Condenser, converter base by-pass, .01 mfd, disk	30-1272-2	R14	Resistor, output base, 1800 ohms	66-2188340
C3	Condenser, osc. coupling, .01 mfd, disk	30-1272-2	R15	Resistor, output emitter, 100 ohms	66-1108340
C4	Condenser, IF base to emitter, .025 mfd, disk	30-1272-4	R16	Resistor, supply filter, 100 ohms	66-1108340
C5	Condenser, electrolytic, AVC by-pass, 25 mfd, 6 volt	30-2599-36	S1	Switch, on-off	Part of R11
C6	Condenser, 2nd detector base to emitter, .01 mfd, disk	30-1272-2	T1	Transformer, oscillator	32-4669-6
C7	Condenser, 2nd detector by-pass, .025 mfd, disk	30-1272-4	T2	Transformer, audio driver	32-8911-1
C8	Condenser, electrolytic, supply filter, 25 mfd, 6 volt	30-2599-36	T1460	Transistor, IF amp.	34-6000-19
C9	Condenser, output filter, .02 mfd, disk	30-1272-11	T1504	Transistor, converter	34-6000-23
J1	Jack, private listening	42-1975-4	T1618	Transistor, 2nd Detector	34-6000-35
LA1	Antenna, magnecore	76-10982	T1624	Transistor, matched pair, audio output	34-6013
LS1	Speaker	36-1684-1	Z1	Transformer, 1st IF	32-4775-4
R1	Resistor, converter base bias, 22,000 ohms	66-238340	Z2	Transformer, 2nd IF	32-4775-5
R2	Resistor, converter base bias, 3300 ohms	66-238340		Printed Panel	54-6968
R3	Resistor, converter emitter, 680 ohms	66-1688240			
R4	Resistor, IF base bias, 22,000 ohms	66-3228340			
R5	Resistor, IF base bias, 2200 ohms	66-2228340			
R6	Resistor, IF emitter, 220 ohms	66-1228340			
R7	Resistor, AVC delay, 100 ohms	66-1108340			
R8	Resistor, 2nd det. base bias, 39,000 ohms	66-3398340			
R9	Resistor, 2nd det. base bias, 1800 ohms	66-2188340			
R10	Resistor, 2nd det. IF filter, 33 ohms	66-0338340			
R11	Volume Control, 30,000 ohms, with switch	33-5583-10			
R12	Resistor, output base, 1800 ohms	66-2188340			

CABINET PARTS

Description	Service Part No.
Cabinet	54-6956
Cabinet front, aqua	54-6955
Cabinet front, terra cotta	54-6955-1
Door, battery compartment	54-6957
Contact, battery, 2 used	28-12770
Contact spring, battery	28-12771
Knob, tuning	54-6959
Knob, volume	54-6958
Private listening unit	326-8006

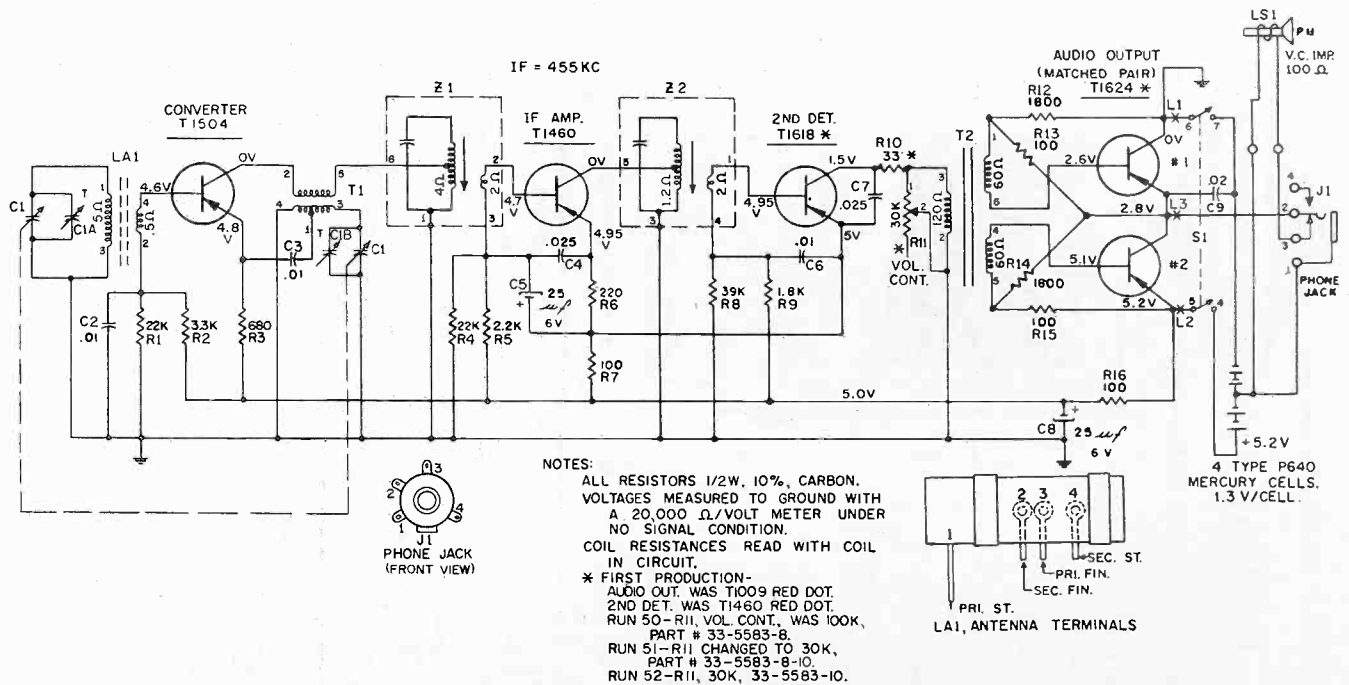


Figure 3. Schematic Diagram of Philco Transistor Portable Model T-50

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 1.0 volts. Normally, the transistor should be the last item suspected.

PANEL LEAD CONNECTIONS

Black lead from negative battery contact to switch lug #7.
 Bare wire from switch lug #6 to ground tab of volume control and to frame of gang.
 Red lead from positive battery contact to switch lug #4.
 Red lead from switch lug #5 to L2.
 Yellow lead from voltage supply center-tap to J1, lug #1.
 Orange lead from J1, lug #1, to speaker.
 Orange lead from J1, lug #3, to speaker.
 Brown lead from J1, lug #2 to panel L3.

PHILCO PORTABLE RADIO SERVICE MANUAL

TRANSISTOR MODEL T-60, CODE 124

SPECIFICATIONS T-60, CODE 124

- CIRCUIT**—Six transistor superheterodyne, with diode detector.
- CABINET**—Plastic, personal portable cabinet. Leather carrying case optional.
- FREQUENCY COVERAGE**—535 to 1620 KC.
- INTERMEDIATE FREQUENCY**—455 KC.
- ANTENNA**—Self-contained magnecor, high-impedance loop.
- SPEAKER**—2 3/4 in. pm., 15 ohm voice coil impedance. Jack provided for optional private listening attachment, part number 42-1975-4.
- BATTERY SUPPLY**—2 penlight cells, in 3 volt supply center tapped at 1 1/2 volts. Battery type "AA" P-15 or mercury type "AA", P-9.

ALIGNMENT PROCEDURE

- GENERAL**—Allow the test equipment to warm up for fifteen minutes before starting the alignment procedure.
- OUTPUT INDICATOR**—Connect the output indicator (a 1000-ohm-per-volt, a-c voltmeter, or an oscilloscope) across the voice-coil terminals.
- SIGNAL GENERATOR**—Use an AM r-f signal generator. Connect the ground lead to chassis, and connect the output lead as indicated in the alignment chart.
- OUTPUT LEVEL**—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .6 volt.
- RADIO CONTROLS**—Set the volume control to maximum. Set the tuning control as indicated

in the alignment chart. During alignment of the radio, the batteries should be in the same position with respect to the chassis and the loop antenna as they normally are in the cabinet.

SERVICE NOTES

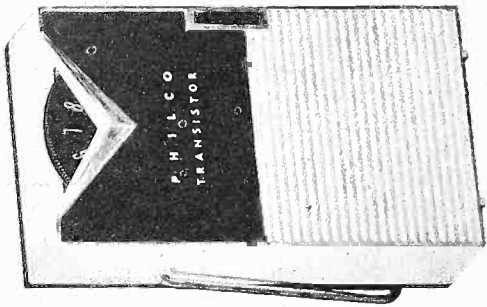
- When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below .6 volt.
- Normally, the transistors should be the last item suspected. If C9 opens serious audio oscillation will result.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR CONNECTION TO RADIO	DIAL SETTING	RADIO	
			DIAL SETTING	SPECIAL INSTRUCTIONS
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given. Z3—3rd i-f Z2—2nd i-f Z1—1st i-f
2	Use radiating loop. (See NOTE 1 below)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output. CIB—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output. CIA—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.			

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

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Model T-60, Code 124

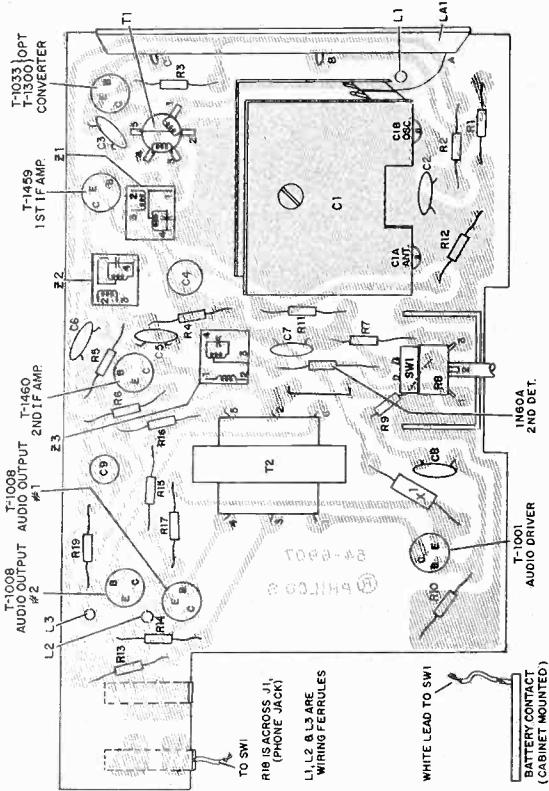


Figure 1 — Component Panel Top View—Showing Parts Location and Tuning Adjustments

TERMINAL LUG IDENTIFICATION

- L1—Lead from CIB trimmer capacitor to lug 1 of T1.
- L2—Orange lead from switch SW1 lug 1.
- L3—Green lead from phone jack.

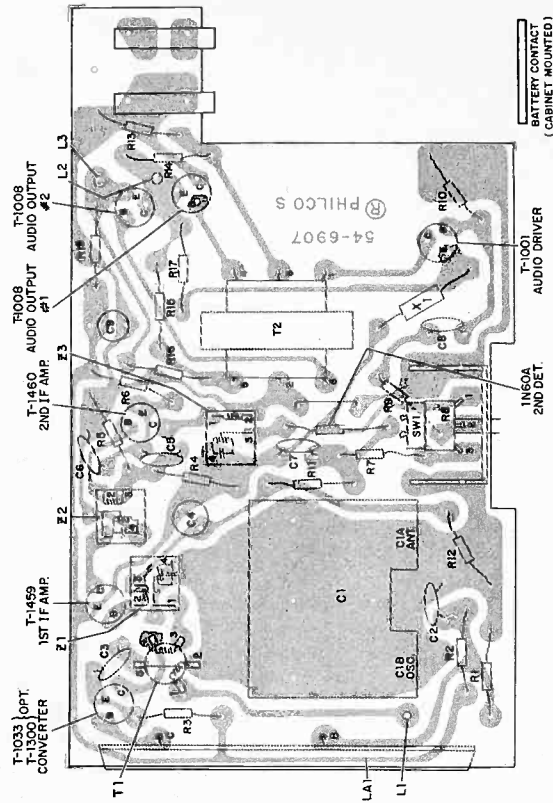


Figure 2 — Component Panel Bottom View—Showing Parts Location

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REPLACEMENT PARTS LIST - MODEL T-60, CODE 124

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, variable tuning, gang	31-2782-1	SW1	Switch, on-off	Part of R8
C2	Condenser, converter base by-pass, .01 mfd, disc	30-1272-2	T1	Transformer, oscillator	32-4889-2
C3	Condenser, oscillator coupling, .01 mfd, disc	30-1272-2	T2	Transformer, audio driver	32-8885-1
C4	Condenser, electrolytic, avc filter, 10 mfd	30-2599-8	X1	Choke, 1st audio emitter, 400 μ h	32-4608-1
C5	Condenser, 2nd IF base by-pass, .01 mfd, disc	30-1272-2	Z1	Transformer, 1st IF	32-4775-1
C6	Condenser, 2nd IF emitter by-pass, .01 mfd, disc	30-1272-2	Z2	Transformer, 2nd IF	32-4775-2
C7	Condenser, detector filter, .01 mfd, disc	30-1272-2	Z3	Transformer, 3rd IF	32-4775-3
C8	Condenser, audio coupling, .47 mfd	30-1274-3	T1033	Transistor, converter	34-6000-3
C9	Condenser, electrolytic, B+ filter, 150 mfd	30-2599-19	T1459	Transistor, 1st I-F ampl.	34-6000-18
J1	Jack, private listening	42-1875-4	T1460	Transistor, 2nd I-F ampl.	34-6001-19
LA1	Antenna, coll. magnecore	78-10946-1	T1001	Transistor, audio driver	34-6001-18
LS1	Speaker, 2 3/4 in. Pm., 15 ohms impedance	36-1664-6	T1008	Transistors, audio output, matched pair	34-8009
R1	Resistor, converter bias, 3900 ohms	66-2398340	1N60A	Crystal diode, 2nd detector	34-8022-3
R2	Resistor, converter emitter, 1500 ohms	66-2156340		Printed panel	34-8907
R3	Resistor, converter emitter, 560 ohms	66-1568340			
R4	Resistor, 2nd I-F bias, 3300 ohms	66-2398340			
R5	Resistor, 2nd I-F bias, 6800 ohms	66-2889340			
R6	Resistor, 2nd I-F emitter, 330 ohms	66-1338340			
R7	Resistor, detector filter, 470 ohms	66-1478340			
R8	Volume Control, 15,000 ohms with on-off switch	33-5583-7			
R9	Resistor, 1st audio base, 330 ohms	66-1338340			
R10	Resistor, audio driver base, 150,000 ohms	66-4158340			
R11	Resistor, avc filter, 47,000 ohms	66-3478340			
R12	Resistor, avc load, 82,000 ohms	66-3828340			
R13	Resistor, audio output No. 1 base bias, 1000 ohms	66-2108340			
R14	Resistor, audio output No. 1 bias, 100 ohms	66-1108340			
R15	Resistor, audio output No. 2 base bias, 1000 ohms	66-2108340			
R16	Resistor, audio output No. 2 bias, 100 ohms	66-1108340			
R17	Resistor, feedback, 1200 ohms	66-2128340			
R18	Resistor output load, phone jack, 33 ohm	66-0338340			
R19	Resistor, B+ filter, 82 ohms	66-0828340			

CABINET PARTS

Description	Service Part No.
Cabinet front kit, ivory and grey	424-8006
Insert, cabinet, ivory and grey	54-5451-1
Knob, tuning, ivory and grey	54-6911-1
Knob, volume, ivory and grey	54-6912-1
Cabinet front kit, black	424-8006-1
Insert, cabinet, black	54-5451-2
Knob, tuning, black	54-6911-2
Knob, volume, black	54-6912-2
Handle	28-12724
Spring, battery contact, short, panel	28-12718-1
Spring, battery contact, long, panel	28-12718-2
Contact, battery center tap	28-12717
Private listening unit	326-8008

PRINTED-WIRE PANEL REMOVAL

To remove the printed-wire panel assembly for service purposes proceed as follows:

1. Remove the snap-on back of the cabinet and the batteries.
2. Remove the tri-mount fastener next to the battery clips.
3. Carefully spread the sides of the cabinet to free the panel from each of the 4 slotted cabinet supports.
4. Withdraw the panel assembly by sliding it toward the speaker end of the cabinet to free the tuning knob.

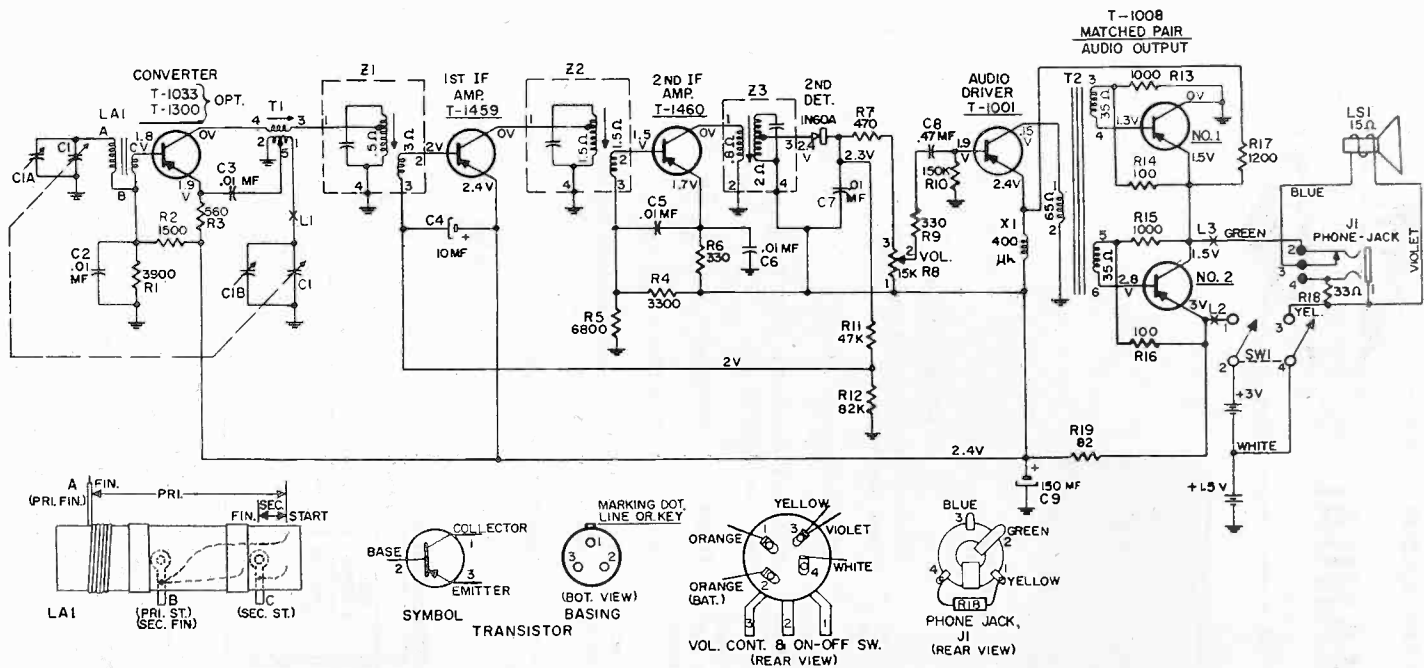


Figure 3 - Schematic Diagram of Philco Transistor Portable Model T-60, Code 124

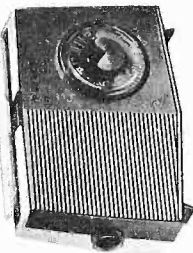
TRANSISTOR OPTIONS

As shown on the schematic, the converter stage uses one of two transistors as original equipment. These options are to facilitate production schedules.

For replacement purposes only one type is indicated in the parts list for this stage. This type should be ordered regardless of the original used.

PHILCO TRANSISTOR RADIO SERVICE MANUAL

MODEL T-65



MODEL T-65

ALIGNMENT PROCEDURE

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

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .7 volt.

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

SPECIFICATIONS

CIRCUIT—Six transistor superheterodyne plus crystal diode detector.

AUDIO OUTPUT—0.1 watt.

BATTERY VOLTAGE AND TYPE—3.0 volts from 2 standard "D" cells.

FREQUENCY COVERAGE—535 - 1620 KC.

INTERMEDIATE FREQUENCY—455 KC.

ANTENNA—Self-contained magnetor, high-impedance loop in "Scan-tenna" handle.

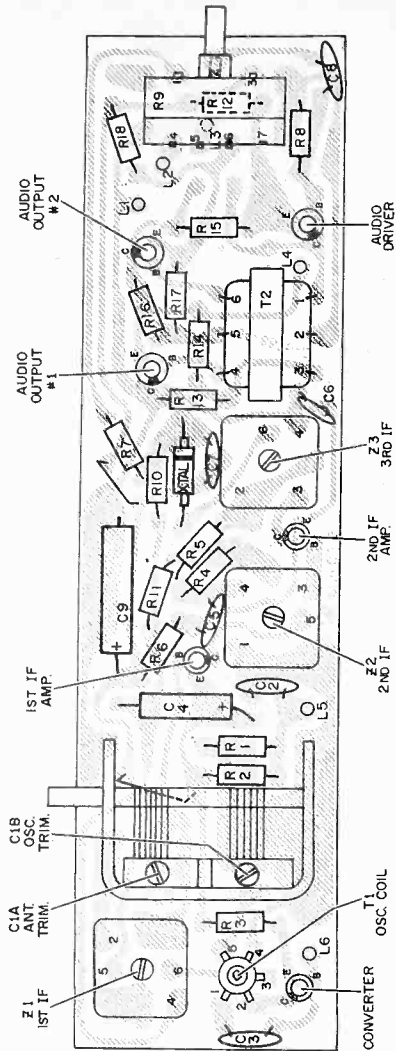
CABINET—Plastic portable.

SPEAKER—3½" pm., 9 ohm voice coil.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-µf condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd i-f pri. Z2—2nd i-f pri. Z1—1st i-f sec. (Bottom Core) Z1—1st i-f pri. (Top Core)
2	Use radiating loop. (See NOTE 1 below.)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

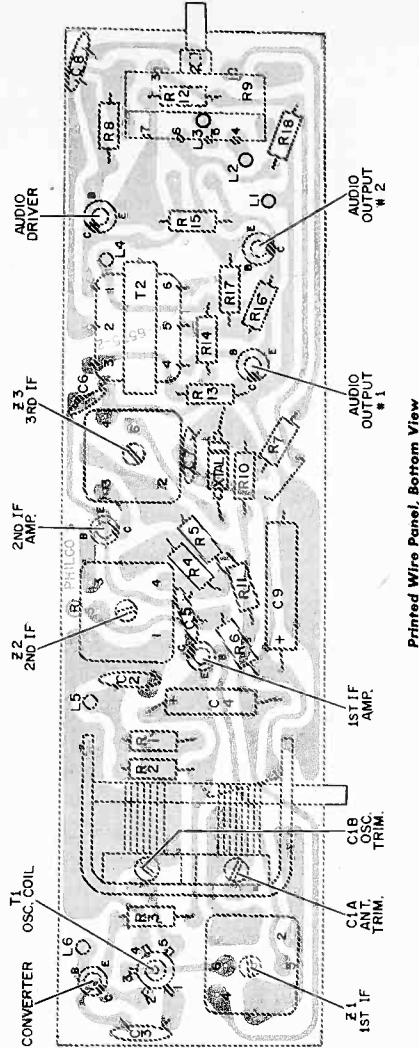
NOTE 1: Use a 6-to-8-turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.



Printed Wire Panel, Component Side View Showing Parts Location and Alignment Points

WIRING TERMINAL LUG IDENTIFICATION

- L1 Black lead, battery ground.
- L2 Orange lead, 1.5V battery.
- L3 Red lead, 3.0V battery.
- L4 Green lead, low side of primary to speaker lug, lead #2.
- L5 Red antenna lead, low side of secondary, lead #3.
- L6 Red antenna lead, high side of secondary, lead #4.
- Antenna lead, high side of primary to ant. section of gang, lead #1.
- Antenna lead, low side of primary to gang ground lug, lead #2.
- Orange lead from speaker to terminal #7 of S1.



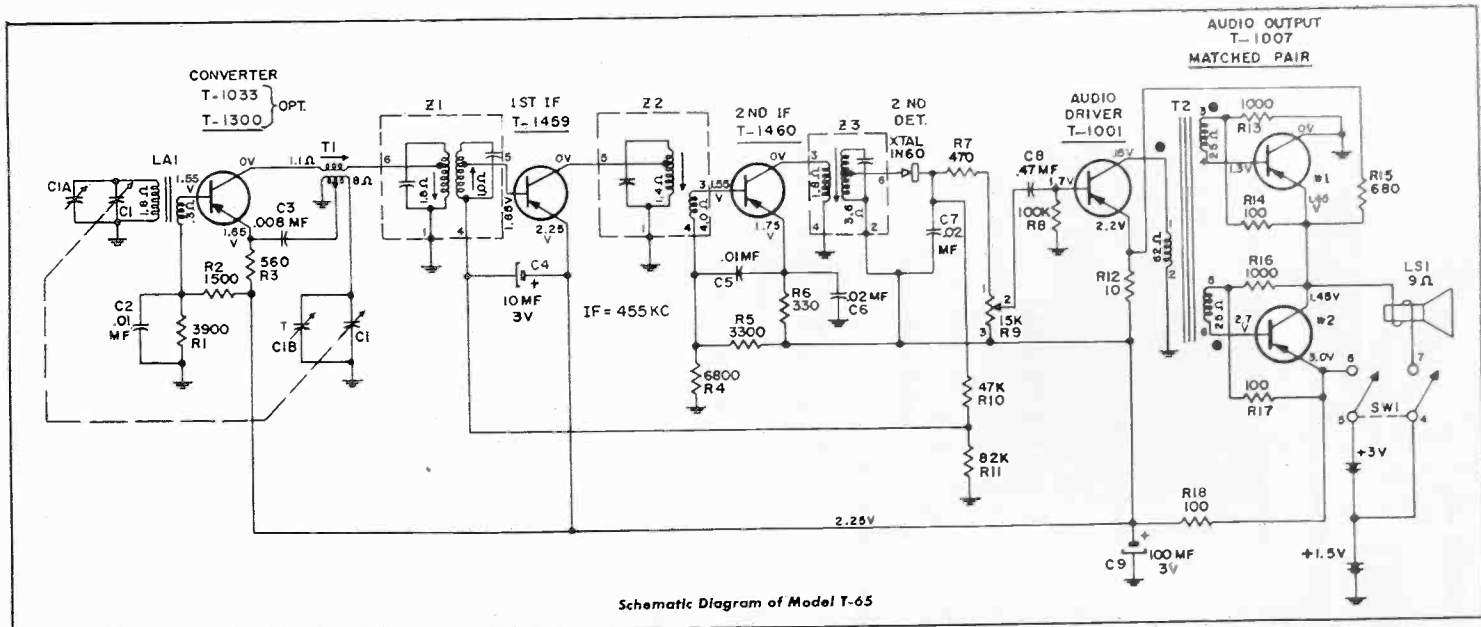
Printed Wire Panel, Bottom View

REPLACEMENT PARTS LIST — MODEL T-65

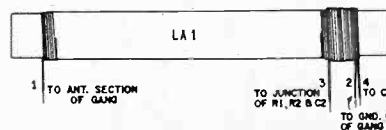
Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang	31-2783-12	R9	Volume control, 15,000 ohms, with switch	33-5575-14
C2	Condenser, converter base by-pass, .01 mfd, disk	30-1272-2	R10	Resistor, AVC filter, 47,000 ohms	66-3478340
C3	Condenser, osc. coupling, .008 mfd, disk	30-1262-1	R11	Resistor, AVC load and diode bias, 82,000 ohms	66-3828340
C4	Condenser, electrolytic, AVC by-pass, 10 mfd, 3V	30-2588-1	R12	Resistor, 1st audio emitter, 10 ohms	66-0108240
C5	Condenser, 2nd I-F base by-pass, .01 mfd, disk	30-1272-2	R13	Resistor, audio output bias, 1000 ohms	66-2108340
C6	Condenser, 2nd I-F emitter by-pass, .02 mfd, disk	30-1272-3	R14	Resistor, audio output bias, 100 ohms	66-1108340
C7	Condenser, 2nd detector I-F by-pass, .02 mfd, disk	30-1272-3	R15	Resistor, audio feedback, 680 ohms	66-1688240
C8	Condenser, audio coupling, .47 mfd, disk	30-1274-3	R16	Resistor, audio output bias, 1000 ohms	66-2108340
C9	Condenser, electrolytic, supply filter, 100 mfd, 3V	30-2588-2	R17	Resistor, audio output bias, 100 ohms	66-1108340
LA1	Antenna, magnecore	32-4668-9	R18	Resistor, supply filter, 100 ohms	66-1108340
LS1	Speaker, 3 1/2-inch, 9 ohm V.C.	36-1652-1	SW1	Switch, on-off	Part of R9
R1	Resistor, converter bias, 3900 ohms	66-2398340	T1	Transformer, oscillator	32-4669-2
R2	Resistor, converter bias, 1500 ohms	66-2158340	T2	Transformer, audio interstage	32-8838-2
R3	Resistor, converter emitter, 560 ohms	66-1568340	T-1033	Transistor, converter	34-6000-3
R4	Resistor, 2nd I-F bias, 6800 ohms	66-2688340	T-1459	Transistor, 1st I-F	34-6000-18
R5	Resistor, 2nd I-F bias, 3300 ohms	66-2338340	T-1460	Transistor, 2nd I-F	34-6000-19
R6	Resistor, 2nd I-F emitter, 330 ohms	66-1338340	T-1001	Transistor, 1st audio	34-6001-16
R7	Resistor, 2nd detector filter, 470 ohms	66-1478340	T-1007	Transistor, audio output, matched pair	34-6008
R8	Resistor, 1st audio bias, 100,000 ohms	66-4108340	XTAL	Crystal diode, type 1N60	324-0006-3
			Z1	Transformer, 1st I-F	32-4738-6
			Z2	Transformer, 2nd I-F	32-4738-7
			Z3	Transformer, 3rd I-F	32-4738-8
				Printed Wiring Panel	54-6575-2

CABINET AND MISCELLANEOUS PARTS

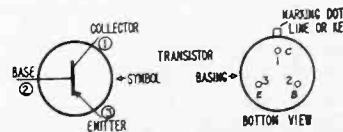
Description	Service Part No.	Description	Service Part No.
Cabinet and trim, ivory and turquoise	424-8007	Handle, top and bottom shells	425-0045
Cabinet and trim, ivory and gold	424-8007-1	Knob, tuning	54-6292-5
Back, cabinet, turquoise	54-6939-2	Knob, volume	54-6421-1
Back, cabinet, gold	54-6939-3	Screw, back retaining	W2509-5FA63
Bearing, "Scan-tenna" mtg.	28-12746	Screw, "Scan-tenna" limit	W2537-19FA3
Dial plate	28-12260	Spring, handle	28-12743
Hairpin, handle retaining	W2648-1FA3	Spring, battery center contact	28-12250



Schematic Diagram of Model T-65



* VOLTAGES READ UNDER NO SIGNAL CONDITIONS WITH A 20,000 PER VOLT METER. COIL RESISTANCES READ WITH COIL CONNECTED IN THE CIRCUIT.



SERVICE NOTES

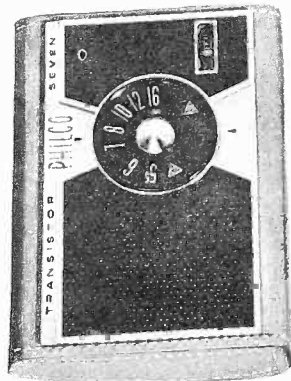
When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.4 volts. Normally, the transistors should be the last item suspected.

TRANSISTOR OPTIONS

As shown on the schematic, the first stage may use either

of two transistors as original equipment. This option is to facilitate production.

For replacement purposes only one type is indicated in the parts list. This type should be ordered regardless of the original used.



PHILCO PORTABLE RADIO SERVICE MANUAL

TRANSISTOR MODEL T-75, CODE 124

SPECIFICATIONS

- CIRCUIT**—Seven transistor superheterodyne.
- CABINET**—Leather, personal portable cabinet.
- FREQUENCY COVERAGE**—535 to 1620 KC.
- INTERMEDIATE FREQUENCY**—455 KC.
- ANTENNA**—Self-contained magnecor, high-impedance loop.
- SPEAKER**—2-3/4 in. pm., 8 ohm voice coil impedance. Jack provided for optional private listening attachment, part number 326-8006.
- BATTERY SUPPLY**—2 standard "D" cells, in 3 volt supply center tapped at 1-1/2 volts. Battery type P-907 or P-920 (metal clad).

MODEL T-75, CODE 124

ALIGNMENT PROCEDURE

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

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .6 volt.

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

During alignment of the radio, the batteries should be in the same position with respect to the chassis and the loop antenna as they normally are in the cabinet.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below .6 volts.

Normally, the transistors should be the last item suspected.

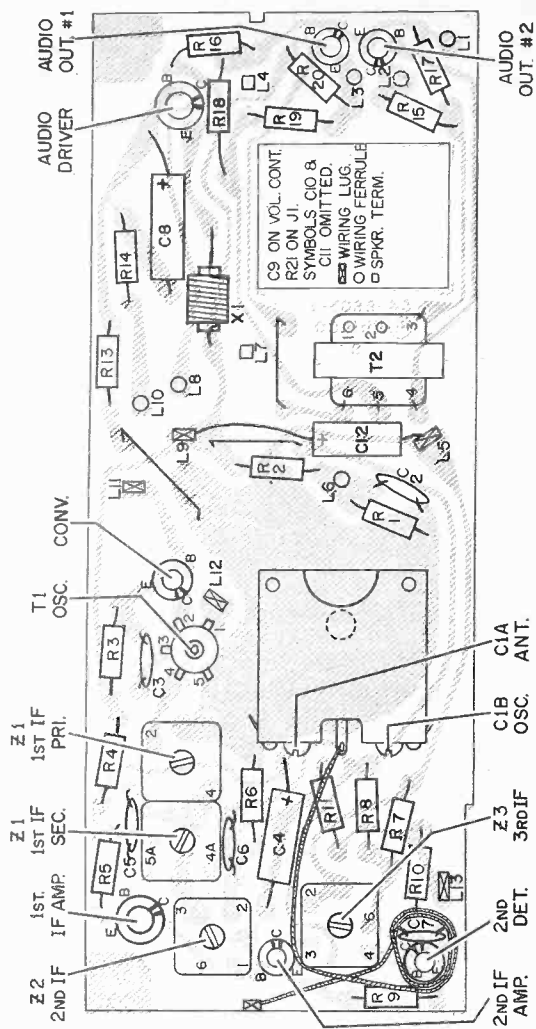
If C12 opens serious audio oscillation will result.

Dress of black lead from top, center, frame lug of gang to end ground lug is important to reduce beat. See base layout for lead dress.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	TC5—3rd i-f pri. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri.
2	Use radiating loop. (See NOTE 1 below)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	TC1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output. Chassis MUST be properly mounted in cabinet.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

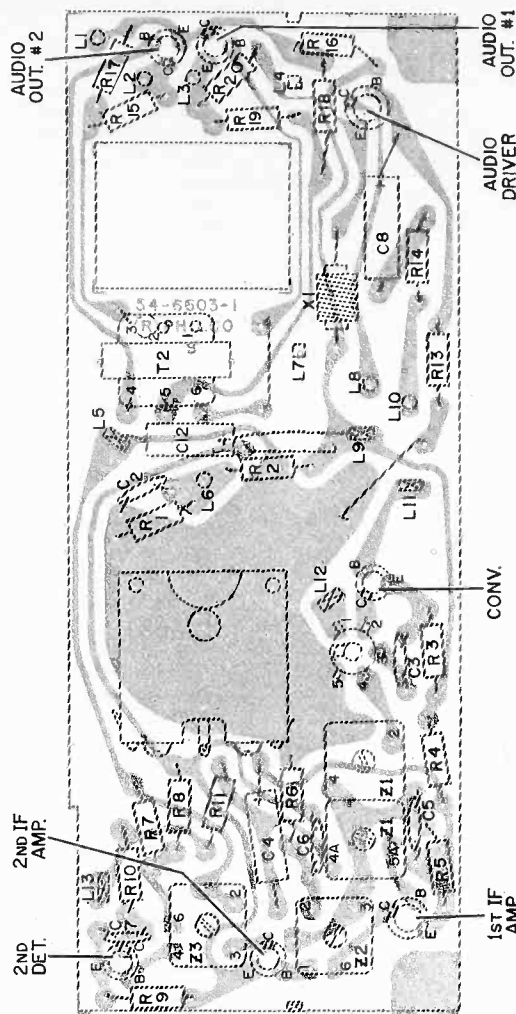
NOTE 1. Use a 6-10-8-urn, 6-inch-diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.



Printed Wiring Panel—Component Side Showing Parts Location and Tuning Adjustments

TERMINAL LUG IDENTIFICATION

- L1 Yellow lead to terminal #1 of J1 and yellow lead to speaker lug #L4.
- L2 Black lead to frame ground lug adjacent to L5.
- L3 Red lead to switch lug #1.
- L4 Speaker voice coil terminal, yellow lead to L1.
- L5 Panel ground. Black leads from gang frame and T2 (#1), bare wire to frame ground lug and ground end of C12.
- L6 Antenna (LA1) secondary finish.
- L7 Speaker voice coil terminal, green lead to terminal #3 of J1.
- L8 Red lead of T2 to driver collector.
- L9 B+ end of C12.
- L10 Green lead to arm of volume control, R12.
- L11 Antenna (LA1) secondary to converter base.
- L12 Lead to oscillator section of gang.
- L13 Yellow lead to top of volume control.



Printed Wiring Panel—Foil Side Showing Parts Location

MODEL T-75

REPLACEMENT PARTS LIST—MODEL T-75, CODE 124

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, variable tuning gang	31-2782	R18	Resistor, output bias, 680 ohms, 5%	66-1688240
C2	Condenser, converter base by-pass, .008 mfd. disk	30-1262-1	R19	Resistor, output bias, 86 ohms, 5%	66-0568240
C3	Condenser, oscillator coupling, .008 mfd. disk	30-1262-1	R20	Resistor, supply filter, 82 ohms	66-0828240
C4	Condenser, AVC filter, electrolytic, 10 mfd	30-2588-1	R21	Resistor, output load, 33 ohms	66-0338240
C5	Condenser, 1st IF emitter by-pass, .008 mfd. disk	30-1262-1	S1	Switch, on-off	Part of R12
C6	Condenser, 2nd IF base by-pass, .008 mfd. disk	30-1272-1	T1	Transformer, oscillator	32-4668-4
C7	Condenser, detector filter, .02 mfd. disk	30-1238-5	T2	Transformer, audio driver	32-5838-1
C8	Condenser, audio coupling, electrolytic, 1 mfd	30-2591-8	X1	Choke, 1st audio emitter, 400 μh	32-4685-1
C9	Condenser, IF filter, .01 mfd. disk	30-1238-2	Z1	Transformer, 1st IF	32-4708-9
C12	Condenser, supply filter, electrolytic, 100 mfd	30-2588-2	Z2	Transformer, 2nd IF	32-4708-10
J1	Jack, private listening	42-1975-4	Z3	Transformer, 3rd IF	32-4708-11
LA1	Antenna, coil, magnecore	32-4668-7		Printed panel	54-6803-1
LS1	Speaker, 8 ohms impedance	38-1684-4	T-1033	Transistor, converter and 2nd detector, 2 used	34-6000-3
R1	Resistor, converter bias, 6800 ohms	66-2680340	T-1232	Transistor, 2nd IF amplifier	34-6000-11
R2	Resistor, converter bias, 2200 ohms	66-2228340	T-1233	Transistor, 1st IF amplifier	34-6000-12
R3	Resistor, converter emitter, 330 ohms	66-1338340	T-1001	Transistor, audio driver	34-6001-16
R4	Resistor, 1st IF emitter, 1000 ohms	66-2108340	T-1008	Transistor, audio output, matched pair	34-6008
R5	Resistor, 1st IF bias, 820 ohms	66-1828340			
R6	Resistor, 2nd IF bias, 47,000 ohms	66-2478340			
R7	Resistor, detector bias, 4700 ohms	66-2478340			
R8	Resistor, detector bias, 270 ohms	66-1278340			
R9	Resistor, detector emitter, 82 ohms	66-0828340			
R10	Resistor, detector filter, 330 ohms	66-1338340			
R11	Resistor, AVC filter, 4700 ohms	66-2478340			
R12	Volume control, 2000 ohms with on-off switch	33-5553-3			
R13	Resistor, 1st audio bias, 82,000 ohms	66-3828340			
R14	Resistor, 1st audio coupling, 330 ohms	66-1338340			
R15	Resistor, output bias, 680 ohms, 5%	66-1688240			
R16	Resistor, audio feedback, 680 ohms	66-1688340			
R17	Resistor, output bias, 56 ohms, 5%	66-0568240			

CABINET PARTS

Description	Service Part No.
Cabinet	31-0043
Contact and lug assembly, battery, center	76-10438
Contact and lug assembly, battery, end	76-10882
Grille, cab. front	28-12636
Insert, right hand	28-12637
Insert, left hand	28-12638
Knob, tuning	34-6836-1
Knob, volume	34-6835-1
Spring, battery contact, negative	28-10941-1

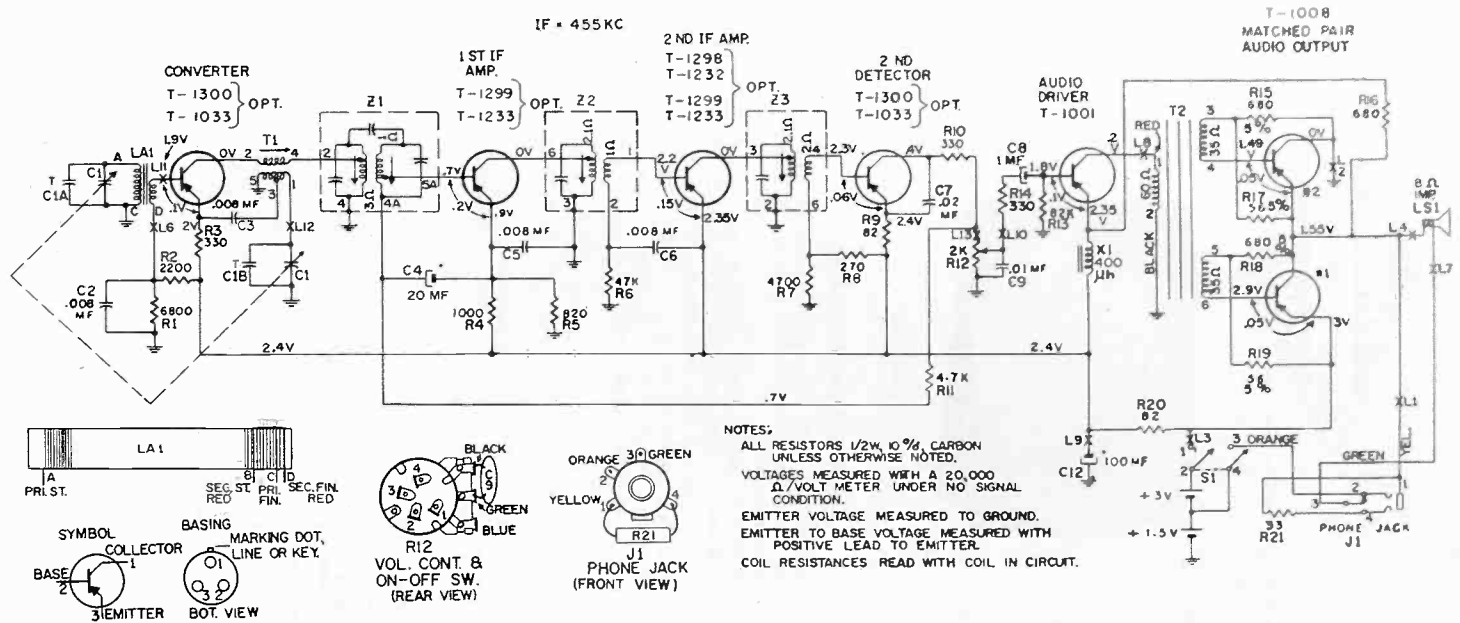


Figure 2—Schematic Diagram of Philco Transistor Portable Model T-75, Code 124

TRANSISTOR OPTIONS

As shown on the schematic, each of the first four stages may use any one of several transistors as original equipment. These options are to facilitate production schedules.

For replacement purposes only one type is indicated in the parts list for each stage. This type should be ordered regardless of the original used.

PHILCO TRANSISTOR RADIO SERVICE MANUAL

MODEL T-78
CODES 124 and 126

SPECIFICATIONS

- CIRCUIT**—Seven transistor superheterodyne.
- AUDIO OUTPUT**—0.2 watts.
- BATTERY VOLTAGE AND TYPE**—6.0 volts from 4 standard "D" cells.
- FREQUENCY COVERAGE**—535 to 1620 KC.
- INTERMEDIATE FREQUENCY**—455 KC.
- ANTENNA**—Self-contained magnecor, high-impedance loop.
- CABINET**—The T-78 has a genuine top grain cabinet with a gold-finished plastic handle and gold-colored metal grill.
- SPEAKER**—4-in. pm., 3.2 ohm voice coil.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.4 volts.
Normally, the transistors should be the last item suspected.
The dress (position) of condenser C8 may be helpful in reducing harmonic whistle when encountered. C8 may be bent over toward R14 and the detector transistor. In sets where C8 is in this bent position, do not disturb.

ALIGNMENT PROCEDURE

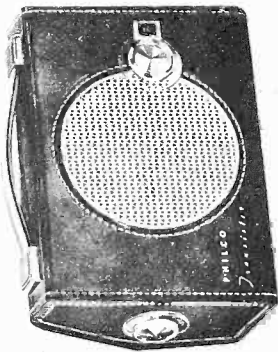
GENERAL—Allow the test equipment to warm up for fifteen minutes before starting the alignment procedure.
OUTPUT INDICATOR—Connect the output indicator (a 1000-ohm-per-ohm, a-c voltmeter, or an oscilloscope) across the voice-coil terminals.
SIGNAL GENERATOR—Use an AM r-f signal generator. Connect the ground lead to chassis, and connect the output lead as indicated in the alignment chart.
OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .4 volt.
RADIO CONTROLS—Set the volume control to maximum. Set the tuning control as indicated in the alignment chart.

ALIGNMENT CHART

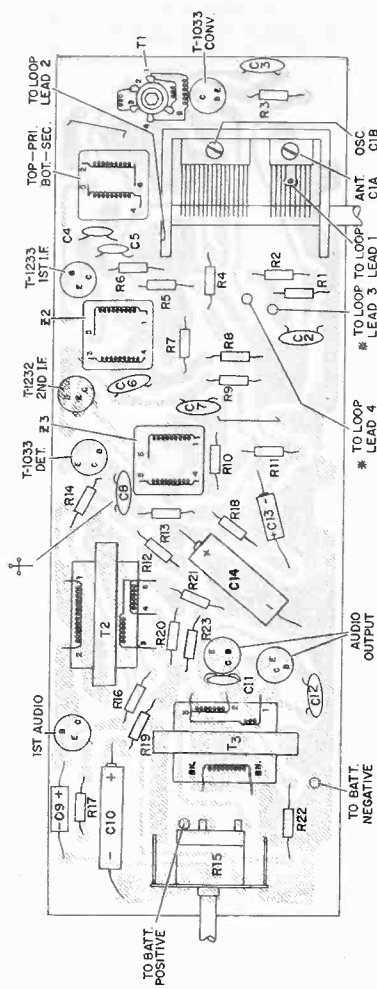
STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd i-f pri. Z2—2nd i-f pri. Z1—1st i-f sec. (Bottom Core) Z1—1st i-f pri. (Top Core)
2	Use radiating loop. (See NOTE 1 below).	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

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

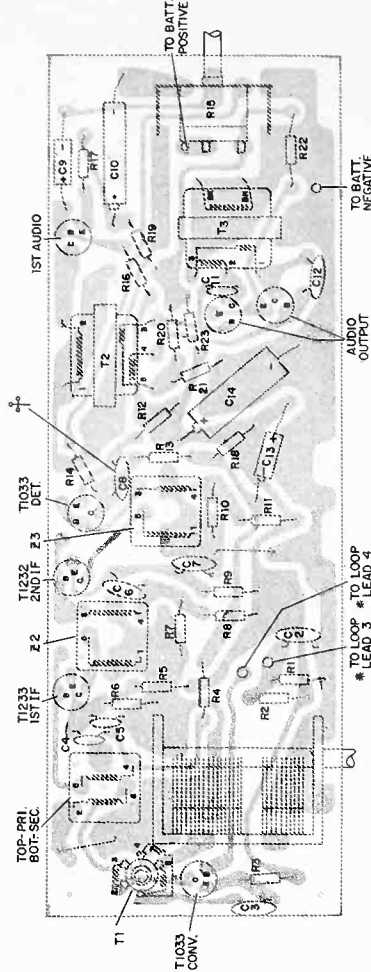
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Model T-78



Top View, PW Panel



Bottom View, PW Panel

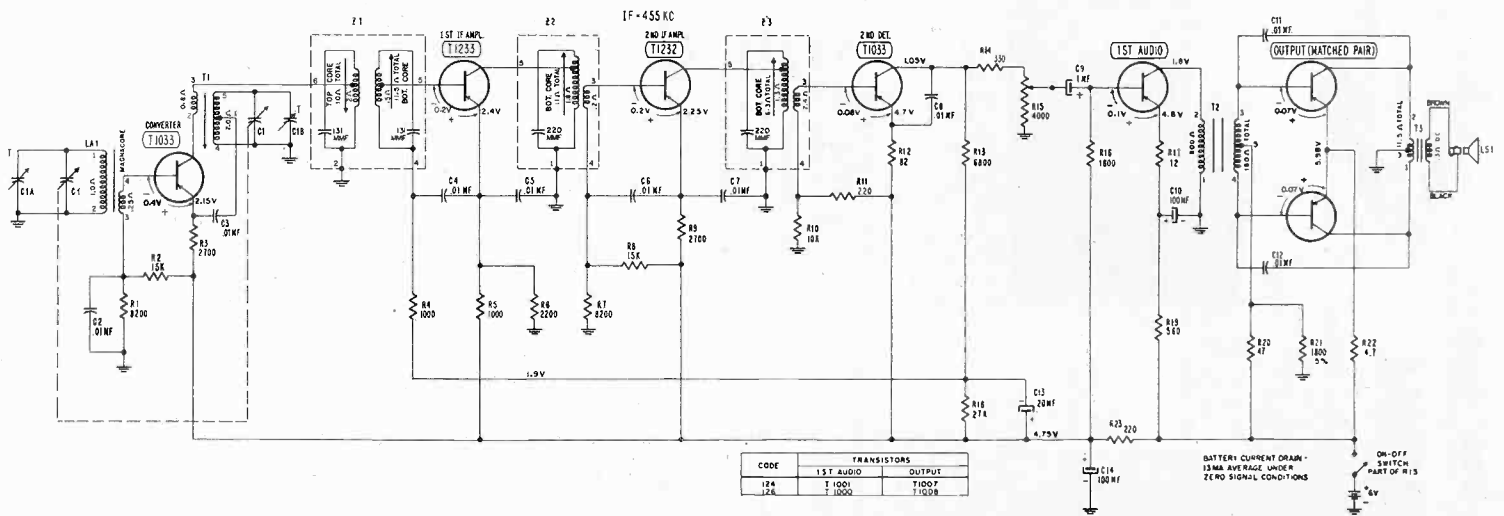
* LOOP LEADS 3 & 4—DRESS BETWEEN EDGE OF PRINTED PANEL AND MASONITE FRONT PLATE. CONNECT TO TIE LUGS INDICATED ON FOIL SIDE OF PANEL.
o-o SEE "SERVICE NOTES" ON FRONT PAGE FOR DRESS OF C8.

REPLACEMENT PARTS LIST — MODEL T-78

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, tuning gang	31-2790-4	R18	Resistor, A-G-C delay, 27,000 ohms	66-3278340
C2	Condenser, mixer base by-pass, .01 mfd.	30-1262	R19	Resistor, 1st audio emitter B+ de-coupling, 560 ohms	66-1568340
C3	Condenser, oscillating coupling, .01 mfd.	30-1262	R20	Resistor, output bias, 47 ohms, 10%	66-0478340
C4	Condenser, 1st I-F base, .01 mfd.	30-1262	R21	Resistor, output bias, 1800 ohms, 5%	66-2188240
C5	Condenser, 1st I-F emitter by-pass, .01 mfd.	30-1262	R22	Resistor, audio output emitter, 4.7 ohms	66-9478360
C6	Condenser, 2nd I-F base, .01 mfd.	30-1262	R23	Resistor, B+ filter, 220 ohms	66-1228340
C7	Condenser, 2nd I-F emitter by-pass, .01 mfd.	30-1262	T1	Transformer, oscillator	32-4669-2
C8	Condenser, 2nd detector I-F filter, .01 mfd.	30-1262	T2	Transformer, audio driver	32-8813
C9	Condenser, electrolytic, 1st audio coupling, 1 mfd.	30-2591-5	T3	Transformer, audio output	32-8812-1
C10	Condenser, 1st audio emitter de-coupling, 100 mfd, 6 W.V.D.C.	30-2588-4	T1033	Transistor, converter and 2nd detector, 2 used	34-6000-3
C11	Condenser, audio feedback, .01 mfd.	30-1262	T1233	Transistor, 1st I-F amplifier	34-6000-12
C12	Condenser, audio feedback, .01 mfd.	30-1262	T1232	Transistor, 2nd I-F amplifier	34-6000-11
C13	Condenser, electrolytic, A.G.C. filter, 20 mfd, 6 W.V.D.C.	30-2588-1		Transistor, 1st audio, code 124, T1001	34-6001-16
C14	Condenser, electrolytic, filter, 100 mfd, 6 W.V.D.C.	30-2588-4		Transistor, 1st audio, code 126, T1000	34-6001-15
LA1	Magnecor antenna	32-4668-1		Transistors, output, matched pair, code 124, T1007	34-6008
LS1	Speaker	36-1654-20		Transistors, output, matched pair, code 126, T1008	34-6009
R1	Resistor, converter bias, 8200 ohms	66-2828340	Z1	Transformer, 1st I-F	32-4738-1
R2	Resistor, converter bias, 15,000 ohms	66-3158340	Z2	Transformer, 2nd I-F	32-4738-2
R3	Resistor, converter emitter, 2700 ohms	66-2278340	Z3	Transformer, 3rd I-F	32-4738-3
R4	Resistor, A-G-C de-coupling, 1000 ohms	66-2108340		Printed wiring panel	54-6497
R5	Resistor, 1st I-F emitter, 1000 ohms	66-2108340		Battery bracket and spring contact assy., end of panel	76-10141
R6	Resistor, 1st I-F emitter return, 2200 ohms	66-2228340		Battery bracket	28-11942
R7	Resistor, 2nd I-F bias, 8200 ohms	66-2828340		Battery contact	28-9117-10
R8	Resistor, 2nd I-F bias, 15,000 ohms	66-3158340			
R9	Resistor, 2nd I-F emitter, 2700 ohms	66-2278340			
R10	Resistor, detector bias, 10,000 ohms	66-3108340			
R11	Resistor, detector bias, 220 ohms	66-1228340			
R12	Resistor, detector emitter, 82 ohms	66-0828340			
R13	Resistor, A-G-C filter, 6800 ohms	66-2688340			
R14	Resistor, detector filter, 330 ohms	66-1338340			
R15	Volume control, with on-off switch, 4000 ohms	33-5575-10			
R16	Resistor, 1st audio bias, 1800 ohms	66-2188340			
R17	Resistor, 1st audio emitter, 12 ohms	66-0128340			

CABINET PARTS

Cabinet—Briarwood	51-0080
Knob, tuning	54-6959-1
Knob, volume	54-6959-2
Dial	54-5458
Seal, Plastic, Speaker to Panel	54-5423
Panel, front	54-5446
Bracket, panel mtg.	28-12813
Bracket, mtg.	28-11280-2



Schematic Diagram of Model T-78

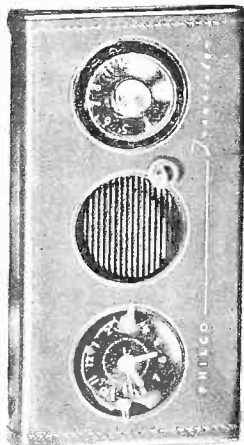
— PHILCO TRANSISTOR - CLOCK RADIO
SERVICE MANUAL



MODEL TC-47

SPECIFICATIONS

- CIRCUIT**—Four transistor superheterodyne with diode detector.
- AUDIO OUTPUT**—25 milliwatts.
- BATTERY VOLTAGE AND TYPE**—6.0 volts from 4 penlight cells, type "AA," P-15, or mercury type "AA," P-9.
- FREQUENCY COVERAGE**—535 to 1620 KC.
- ANTENNA**—Self-contained magnecor, high-impedance loop.
- CABINET**—Leather cabinet.
- SPEAKER**—2 3/4 in. pm., 14 ohm voice coil. Jack provided for optional private listening attachment.
- TIMER**—Westclox Automatic PMBT-1 battery operated timer.
- TIMER BATTERY VOLTAGE**—1.5 volts from one standard "D" cell.



MODEL TC-47

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

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

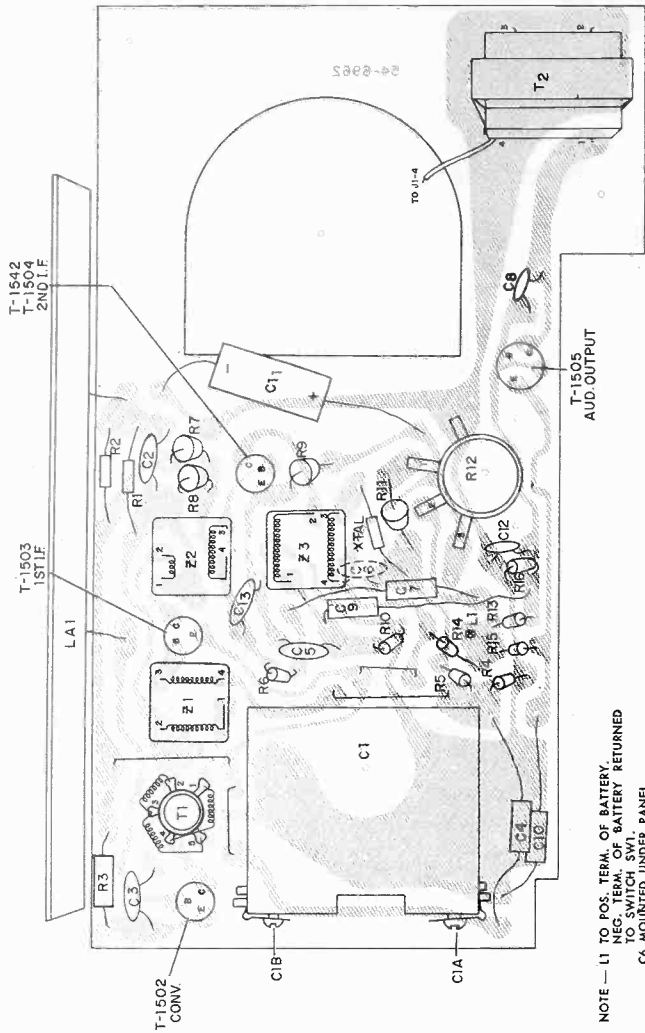
OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .275 volts.

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

ALIGNMENT CHART

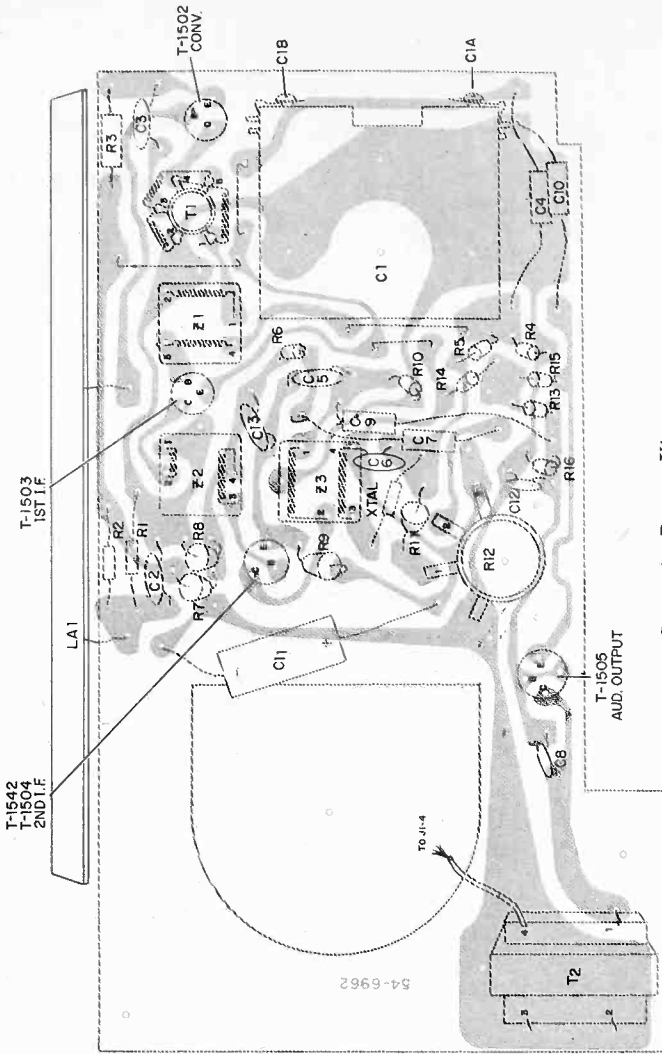
STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Panel must be removed from cabinet. Connect signal generator through a .1 uf condenser to antenna section of gang. Use the least generator signal necessary to give an output indication.	455 KC	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd IF Z2—2nd IF Z1—1st IF
2	Use radiating loop (See note 1 below).	1620 Kc	1620 KC (gang fully open)	Pre-set C1A (Ant.) 1/2 turn from light. Adjust C1B for maximum output.	C1B—osc. trimmer
3	Same as step 2.	1400 KC	1400 KC	Adjust for maximum output.	C1A—ant. trimmer
4	Same as step 2. Panel MUST be re-mounted in cabinet.	600 KC	600 KC	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always step on step 2.				

NOTE 1. Use a 6-10-8 turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.



Composite Top View

NOTE—11 TO POS. TERM. OF BATTERY. NEG. TERM. OF BATTERY RETURNED TO SWITCH SW1. C6 MOUNTED UNDER PANEL. R17 MOUNTED ON J1.



Composite Bottom View

PRIVATE LISTENING JACK TERMINAL LEADS

- Terminal 1—Red lead to speaker.
- Terminal 2—One end of R17, P.L. shunt resistor.
- Terminal 3—Red ground lead to on-off switch and other end of R17.
- Terminal 4—Brown lead of T2.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.275 volts.
Normally, the transistors should be the last item suspected.

SCHEMATIC NOTES

As shown on the schematic, the 2nd I-F stage uses one of two transistors as original equipment. These options are to facilitate production schedules. For replacement purposes, only one type is indicated in the parts list for this stage. This type should be ordered regardless of the original used.
CAUTION—Due to 2nd I-F transistor variations, the value of resistor R8 must be selected, within limits for

optimum performance. When transistor T-1504 (or T-1542) is defective and must be replaced, resistor R8 must also be changed unless the original provides the proper resistor operating characteristics. Failure to select the proper resistor can shorten the life of the transistor or seriously affect receiver operation.

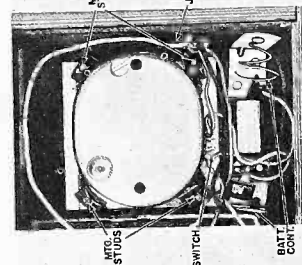
The value of R8 is selected to allow the 2nd I-F transistor collector to draw 2 milliamps and will be between 18,000 to 33,000 ohms. This is checked by measuring the voltage across R10, the 560-ohm collector return resistor. This voltage should be 1.12 volts, with a 10% tolerance ($\pm .12$ volt).

All resistors are $\frac{1}{2}$ watt, 10%, carbon, except R8 which is 5%. Coil resistances read with coil in circuit. Voice coil impedance = 14 ohms. Voltages measured to ground with a 20,000 ohms/volt meter under no signal conditions.

PANEL (CHASSIS) REMOVAL

1. Remove the following—Tuning and volume control knobs, batteries, two trimount fasteners at speaker end of panel, battery contact and retaining board.
2. Open the positive battery terminal lead from L1 tie lug on panel. Open the speaker connections.
3. Remove the panel from the cabinet by first lifting up on the speaker end of the panel.

REMOVAL OF TIMER AND TIMER COMPONENTS



TC-47 TIMER — REAR VIEW

TIMER REMOVAL

1. Remove the following—Timer knobs and timer battery.
2. Disconnect the leads from the timer switch.
3. Remove the four speed nuts from the timer mounting studs and remove the timer and dial assembly. Crystal can also be removed at this point.

NOTE: During timer removal operations, protect the timer crystal by laying the cabinet front on a soft material.

TIMER HANDS

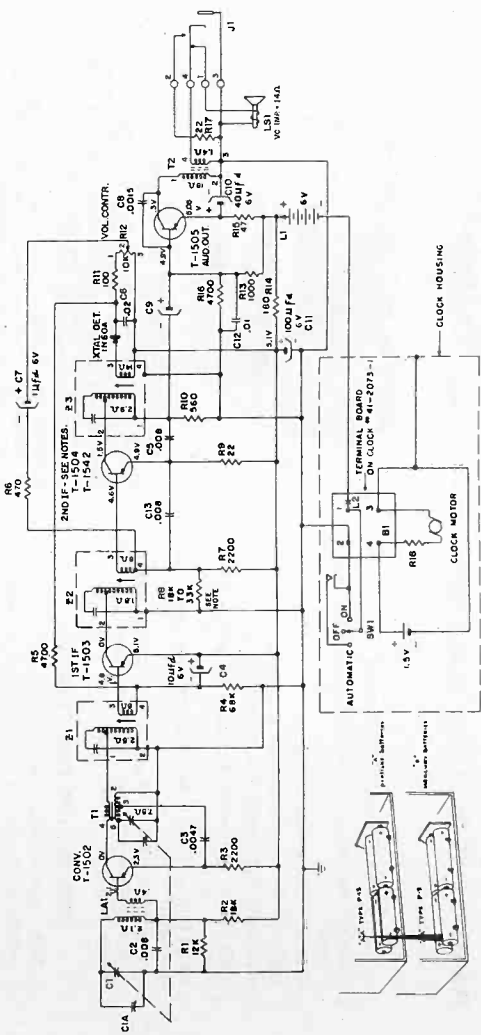
The timer hands are removed from their concentric shafts by a steady pull, removing the outer sweep hand first.

DIAL REMOVAL

Remove hands, then open dial clamping tabs and remove dial.

REPLACEMENT PARTS LIST — MODEL TC-47

Reference Symbol	Description	Service Part No.
C1	Capacitor, tuning gang	31-2788-2
C2	Capacitor, antenna tank, .005 mid, ceramic disc	30-1262-1
C3	Capacitor, oscillator coupling, .0047 mid, ceramic disc	30-1262-2
C4	Capacitor, electrolytic, avc by-pass, 10 mid, 6 w.v.	30-2591-9
C5	Capacitor, I-F by-pass, .005 mid, ceramic disc	30-1262-1
C6	Capacitor, 2nd detector I-F by-pass, .02 mid, disc	30-1272-11
C7	Capacitor, electrolytic, audio feedback to 2nd I-F, 1 mid, 6 w.v.	30-2191-11
C8	Capacitor, hi-cut, .0015 mid, disc	30-1262-8
C9	Capacitor, electrolytic, audio coupling, 5 mid, 6 w.v.	30-2391-10
C10	Capacitor, electrolytic output by-pass, 40 mid, 6 w.v.	30-2388-3
C11	Capacitor, electrolytic, battery by-pass, 100 mid, 6 w.v.	30-2588-4
C12	Capacitor, I-F by-pass, output base, .01 mid, disc	30-1272-2
C13	Capacitor, by-pass, .008 mid, ceramic disc	30-1262-1
L1	Jack, private listening	42-1975-4
LA1	Antenna assembly	36-1664-7
LS1	Speaker	66-31283-0
R1	Resistor, antenna tank, 12,000 ohms	66-31283-40
R2	Resistor, converter base bias, 18,000 ohms	66-31283-40
R3	Resistor, converter emitter bias, 2200 ohms	66-22283-40
R4	Resistor, 1st I-F base bias, 68,000 ohms	66-36683-40
R5	Resistor, 1st I-F base bias, 68,000 ohms	66-24783-40
R6	Resistor, agc network, 4700 ohms	66-14783-40
R7	Resistor, audio feedback network, 470 ohms	66-22283-40
R8	Resistor, base bias, 2nd I-F, 2200 ohms	66-22283-40
R9	Resistor, 2nd I-F base, 18,000 to 33,000 ohms	66-15683-40
R10	Resistor, emitter bias, 2nd I-F, 22 ohms	66-1083-40
R11	Resistor, 2nd detector, 100 ohms	66-11083-40
R12	Resistor, volume control, 10,000 ohms	33-5583-16
R13	Resistor, base bias output stage, 1000 ohms	66-21083-40
R14	Resistor, battery supply filter, 180 ohms	66-11883-40
R15	Resistor, emitter bias, output stage, 47 ohms	66-04783-40
R16	Resistor, base bias, output stage, 4700 ohms	66-24783-40
R17	Resistor, private listening, 22 ohms, on J1	66-02283-40
R18	Resistor, timer motor	Part of Timer
SW1	Switch, on-off-Automatic	Part of Timer
T1	Oscillator transformer	32-4668-7
T2	Audio output transformer	32-8819-3
XTAL	Crystal diode, 2nd det., type 1N60A	34-8022-3
Z1	Transformer, 1st I-F	32-4708-12
Z2	Transformer, 2nd I-F	32-4708-13
Z3	Transformer, 3rd I-F	32-4708-14
	Printed Panel	34-8962
Converter T1502		34-6000-21
1st I-F T1503		34-6000-22
2nd I-F (reflex) T1504		34-6000-24
Audio output T1505		34-6000-24
Cabinet, white		51-0056-2
Cabinet, brown		51-0056-1
Cabinet, front, brown		54-6979-2
Contact, battery		28-12319
Knob, timer (2 used)		54-5428-1
Knob, tuning		54-6624-16
Knob, volume		54-6660-2
Nut, private listening jack		W1679-1
Spring, battery contact		28-12320-1
Spring, battery contact		28-12320-2
Timer, Weatlox PMBT-1, battery operated		41-2073-1
Contact, battery (2 used)		28-12725
Crystal, timer		54-5425
Dial, timer		28-12738-1
Hand, alarm set		28-12571-6
Hand, hour		28-12571-4
Hand, minute		28-12571-3
Hand, sweep		28-12571-5
Spring, battery contact		28-10961



Schematic Diagram of Model TC-47

PHILCO TRANSISTOR - CLOCK RADIO SERVICE MANUAL

TRANSISTOR MODEL T-1000 CLOCK RADIO

SPECIFICATIONS T-1000

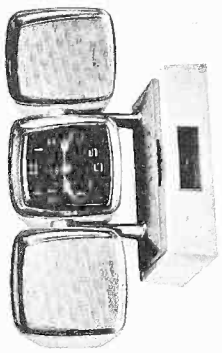
- CIRCUIT—Six transistor superheterodyne, with diode detector.
- CABINET—Plastic with gold trim.
- FREQUENCY COVERAGE—535 to 1620 KC.
- INTERMEDIATE FREQUENCY—455 KC.
- ANTENNA — Self-contained magnetic, high-impedance loop.
- SPEAKERS — Two, 4 inch pin, 16 ohm voice coil impedance.
- BATTERY SUPPLY — Radio; 2 standard D cells in 3 volt supply center tapped at 1½ volts. Timer; 1 D cell supply. Battery type, "A" P-920.

PRINTED WIRE PANEL REMOVAL

1. With set on its back, remove base panel.
 2. Remove panel mounting screw indicated on figure 2.
 3. Disengage panel from brackets and gently pull (from set, (note that tuning knob is a push on type)).
- NOTE: When reinserting panel, first position the tuning knob and hold from above.

TIMER REMOVAL

1. Remove the following: timer knobs and timer battery.
 2. Remove bezel mounting screw and carefully take off bezel and timer crystal.
 3. After removing the 2 timer mounting screws, disconnect the leads from the timer switch.
- Timer Hands—The timer hands are removed from their concentric shafts by a steady pull, removing the outer sweep hand first.
- Dial Removal—Remove hands, then open dial clamping tabs and remove dial.



ALIGNMENT PROCEDURE

GENERAL—It is necessary to remove the printed panel for IF alignment and oscillator coil core adjustments. Oscillator and antenna padder condensers, located under the nameplate on the right and left respectively, can be adjusted without removing the PW panel.

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .6 volt.

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

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below .6 volt.

Normally, the transistors should be the last item suspected. If C9 opens serious audio oscillation will result.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd i-f Z2—2nd i-f Z1—1st i-f
2	Use radiating loop. (See NOTE 1 below)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

NOTE 1. Use a 6-10-8 turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.

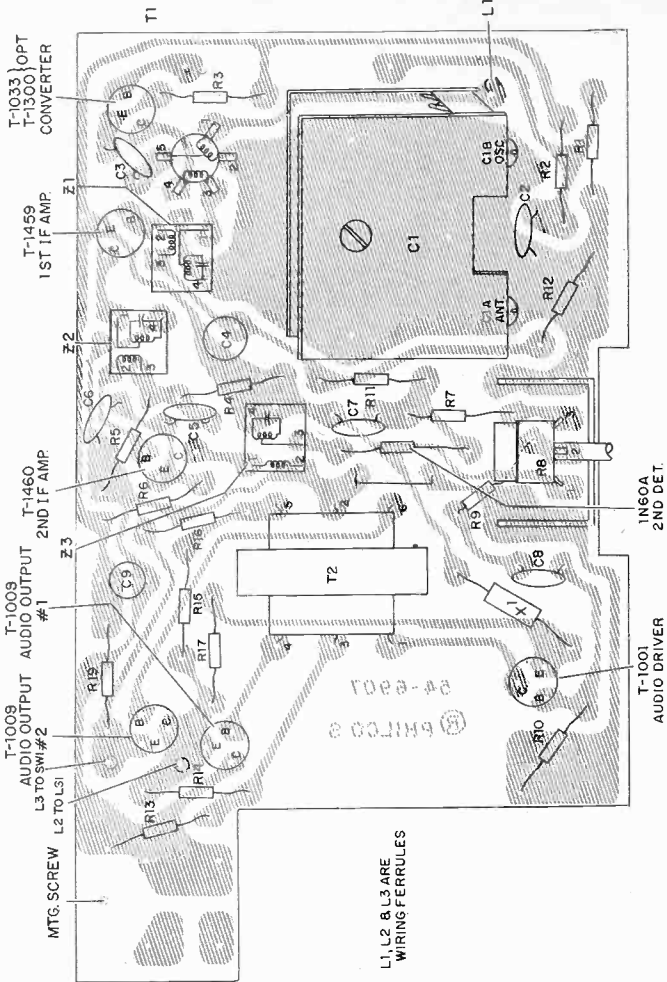


Figure 1 — Component Panel Top View — Showing Parts Location and Tuning Adjustments

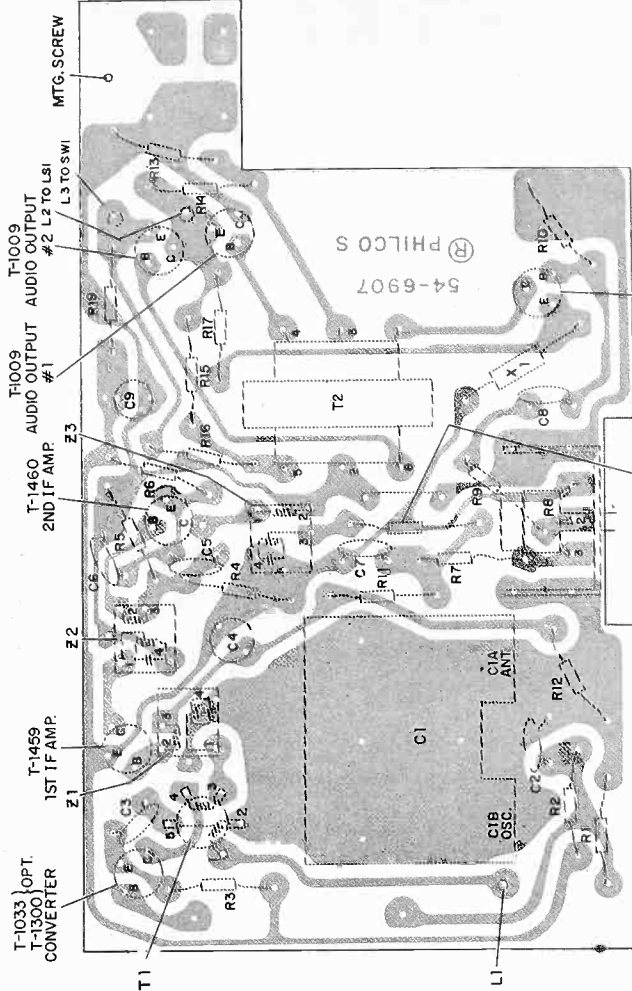


Figure 2 — Component Panel Bottom View — Showing Parts Location

MODEL T-1000

REPLACEMENT PARTS LIST - MODEL T-1000

Quantity	Description	Part No.	Quantity	Description	Part No.
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, audio output	20-1000-1
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-2
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-3
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-4
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-5
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-6
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-7
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-8
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-9
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-10
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-11
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-12
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-13
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-14
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-15
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-16
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-17
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-18
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-19
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-20
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-21
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-22
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-23
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-24
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-25
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-26
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-27
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-28
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-29
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-30
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-31
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-32
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-33
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-34
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-35
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-36
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-37
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-38
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-39
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-40
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-41
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-42
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-43
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-44
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-45
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-46
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-47
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-48
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-49
1	Resistor, 100K 1/2W 5%	20-100K	1	Transformer, 100:100 10W	20-1000-50

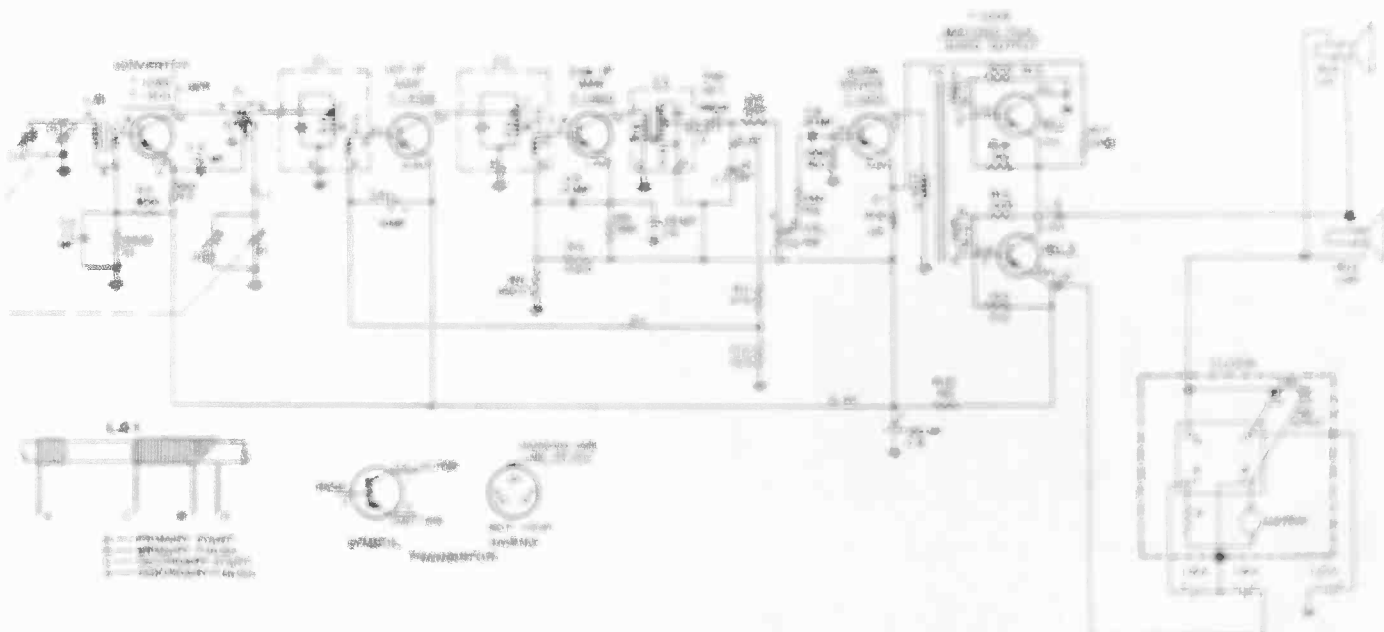
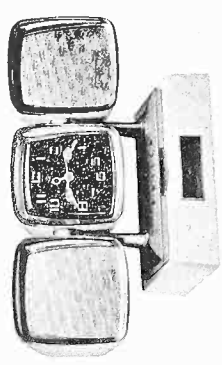
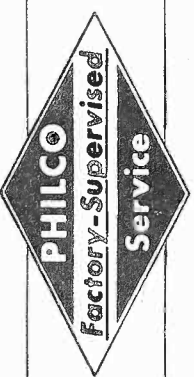


Figure 3 - Schematic Diagram of Philco Transistor Portable Model T-1000

TRANSISTOR OPTIONS

As shown in the schematic, the converter stage uses one of two transistors as original equipment. These options are for facilitate production flexibility. For replacement purposes only one type is indicated in the parts list for this stage. This type should be selected regardless of the original used.



PHILCO TRANSISTOR - CLOCK RADIO
SERVICE MANUAL

TRANSISTOR MODEL T-1000 CLOCK RADIO

SPECIFICATIONS T-1000

CIRCUIT—Six transistor superheterodyne, with diode detector.
CABINET—Plastic with gold trim.
FREQUENCY COVERAGE—535 to 1620 KC.
INTERMEDIATE FREQUENCY—455 KC.
ANTENNA — Self-contained magnetic, high-impedance loop.
SPEAKERS — Two, 4 inch pm, 16 ohm voice coil impedance.
BATTERY SUPPLY — Radio; 2 standard D cells in 3 volt supply center tapped at 1½ volts. Timer; 1 D cell supply. Battery type, "A" P-920.

PRINTED WIRE PANEL REMOVAL

1. With set on its back, remove base panel.
 2. Remove panel mounting screw indicated on figure 2.
 3. Disengage panel from brackets and gently pull from set, (note that tuning knob is a push on type).
- NOTE:** When re-inserting panel, first position the tuning knob and hold from above.

TIMER REMOVAL

1. Remove the following; timer knobs and timer battery.
 2. Remove hexel mounting screw and carefully take off bezel and timer crystal.
 3. After removing the 2 timer mounting screws, disconnect the leads from the timer switch.
- Timer Hands**—The timer hands are removed from their concentric shafts by a steady pull, removing the outer sweep hand first.
- Dial Removal**—Remove hands, then open dial clamping tabs and remove dial.

ALIGNMENT PROCEDURE

GENERAL—It is necessary to remove the printed panel for IF alignment and oscillator coil core adjustments. Oscillator and antenna paddler capacitors, located under the nameplate on the right and left respectively, can be adjusted without removing the PW panel.

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

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .6 volt.

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

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below .6 volt.

Normally, the transistors should be the last item suspected. If C9 opens serious audio oscillation will result.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a 1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd i-f Z2—2nd i-f Z1—1st i-f
2	Use radiating loop. (See NOTE 1 below)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

NOTE 1. Use a 6-10-8 turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.

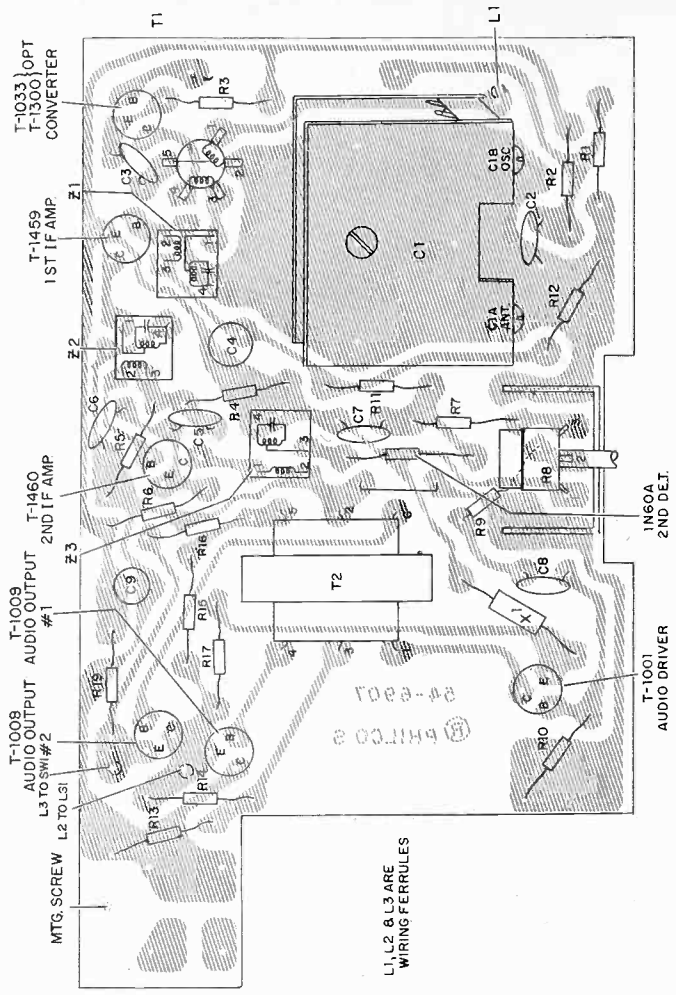


Figure 1 — Component Panel Top View — Showing Parts Location and Tuning Adjustments

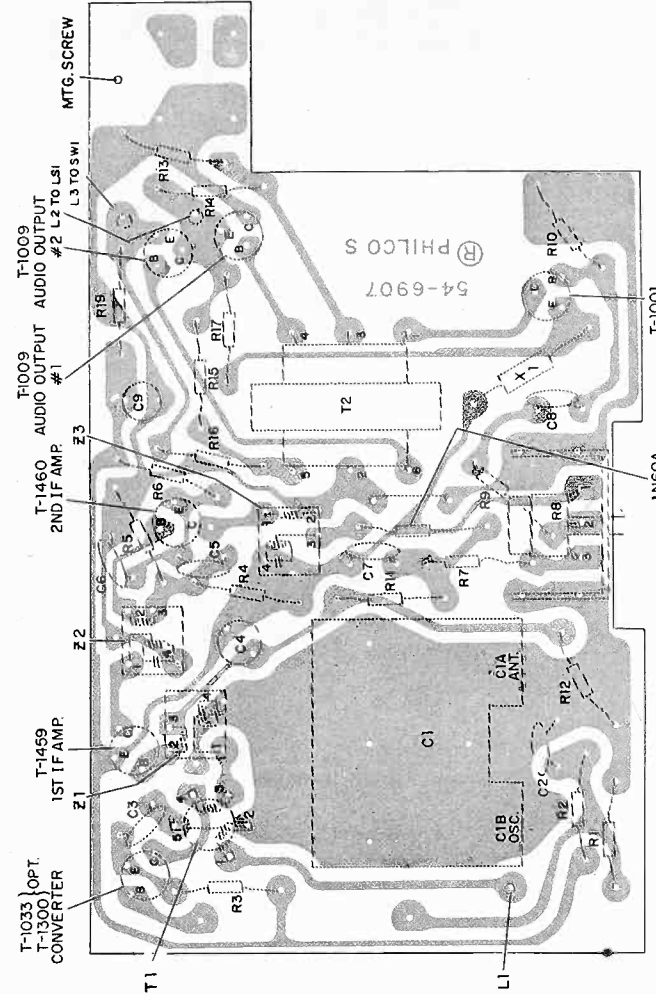


Figure 2 — Component Panel Bottom View — Showing Parts Location

REPLACEMENT PARTS LIST — MODEL T-1000

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.		
C1	Condenser, variable, tuning, gang	31-2782-2	T2	Transformer, audio driver	32-8885-1		
C2	Condenser, converter base by-pass, .01 mfd, disc	30-1272-2	X1	Choke, 1st audio emitter, 400 uh	32-4685-1		
C3	Condenser, oscillator coupling, .01 mfd, disc	30-1272-2	Z1	Transformer, 1st IF	32-4775-1		
C4	Condenser, electrolytic, avc filter, 10 mfd.	30-2599-8	Z2	Transformer, 2nd IF	32-4775-2		
C5	Condenser, 2nd IF base by-pass, .01 mfd, disc	30-1272-2	Z3	Transformer, 3rd IF	32-4775-3		
C6	Condenser, 2nd IF emitter by-pass, .01 mfd, disc	30-1272-2	T1033	Transistor, converter	34-6000-3		
C7	Condenser, detector filter, .01 mfd, disc	30-1272-2	T1459	Transistor, 1st I-F ampl.	34-6000-18		
C8	Condenser, audio coupling, .47 mfd	30-1279-4	T1460	Transistor, 2nd I-F ampl.	34-6000-19		
C9	Condenser, electrolytic, B+ filter, 150 mfd	30-2599-19	T1001	Transistor, audio driver	34-6001-16		
LA1	Antenna, coil, magnecore	32-4668-10	T1009	Transistors, audio output, matched pair	34-6010		
LS1	Speaker, 4 in. Pm., 16 ohms impedance	36-1673-7	1N60A	Crystal diode, 2nd detector	34-8022-3		
LS2	Speaker, 4 in. Pm., 16 ohms impedance	36-1673-7		Printed panel	54-6907		
R1	Resistor, converter bias, 3900 ohms	66-2398340	CABINET PARTS				
R2	Resistor, converter bias, 1500 ohms	66-2158340					
R3	Resistor, converter emitter, 560 ohms	66-1568340				Reference Symbol	Service Part No.
R4	Resistor, 2nd I-F bias, 3300 ohms	66-2338340				Base, bubble mtg.	28-12847
R5	Resistor, 2nd I-F bias, 6800 ohms	66-2688340				Bezel	28-12850
R6	Resistor, 2nd I-F emitter, 330 ohms	66-1338340				Bottom	54-5466
R7	Resistor, detector filter, 470 ohms	66-1478340				Clock	41-2073-2
R8	Volume Control, 15,000 ohms	33-5563-9				Crystal, clock	54-5473-2
R9	Resistor, 1st audio base, 330 ohms	66-1338340				Grille, speaker	28-12852-1
R10	Resistor, audio driver base, 150,000 ohms	66-4158340				Housing, lower (ivory)	54-5465-2
R11	Resistor, avc filter, 47,000 ohms	66-3478340				Housing, upper (ebony)	54-5464-1
R12	Resistor, avc load, 82,000 ohms	66-3828340				Housing, upper (ivory)	54-5464-2
R13	Resistor, audio output No. 1 base bias, 1000 ohms	66-2108340				Knob, volume (ebony)	54-6912
R14	Resistor, audio output No. 1 bias, 100 ohms	66-1108340				Knob, tuning	54-5475-1
R15	Resistor, audio output No. 2 base bias, 1000 ohms	66-2108340				Knob, clock	54-5428-2
R16	Resistor, audio output No. 2 bias, 100 ohms	66-1108340				Knob, volume (ivory)	54-6912-2
R17	Resistor, feedback, 1200 ohms	66-2128340				Nameplate	76-11681
R18	Resistor, B+ filter, 82 ohms	66-0828340				Spring	28-12841
SW1	Switch, on-off	Part of Clock				Stanchion	28-12848
T1	Transformer, oscillator	32-4669-2				Stanchion, back	28-12849

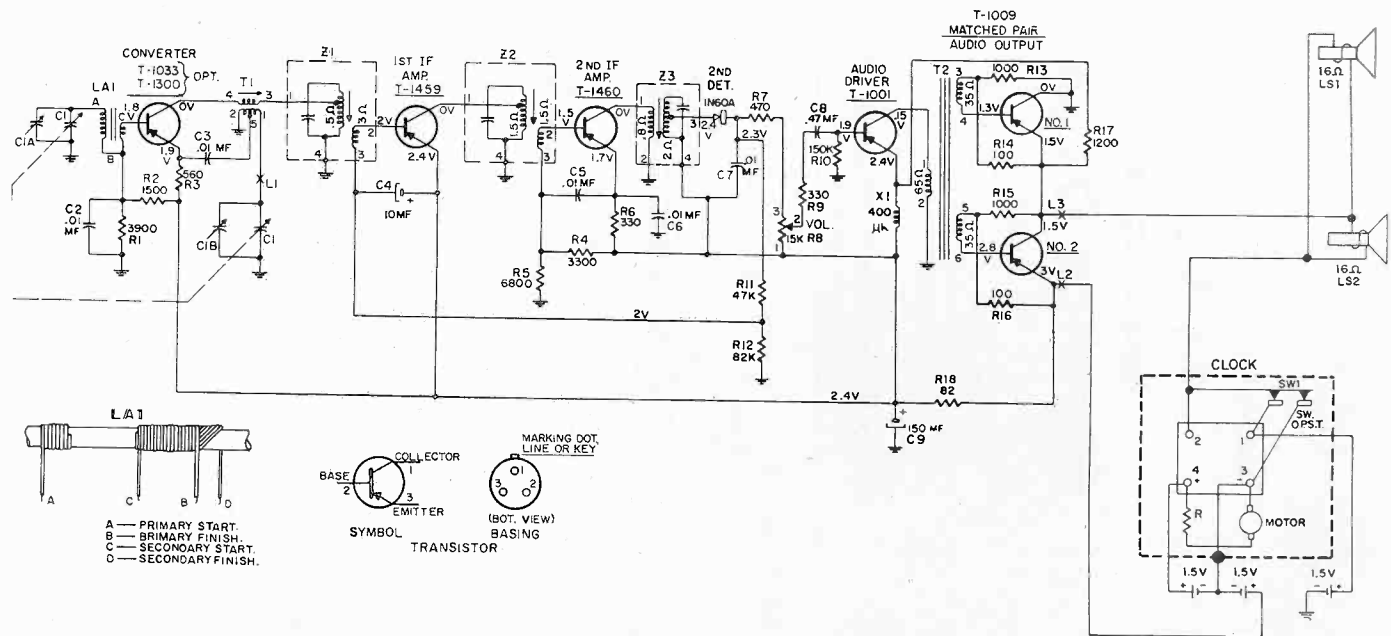


Figure 3 — Schematic Diagram of Philco Transistor Portable Model T-1000

TRANSISTOR OPTIONS

As shown on the schematic, the converter stage uses one of two transistors as original equipment. These options are to facilitate production schedules.

For replacement purposes only one type is indicated in the parts list for this stage. This type should be ordered regardless of the original used.

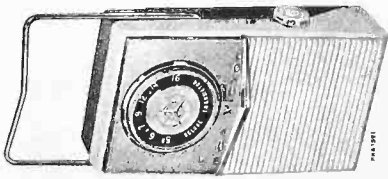


Battery-Operated Personal Radio
T-1 SERIES
Chassis No. RC-1189
SERVICE DATA

— 1959 No. 5 —

PREPARED BY COMMERCIAL SERVICE
 RCA SERVICE COMPANY
 CAMDEN 8, N. J.

RADIO CORPORATION OF AMERICA
 RCA VICTOR RADIO AND "VICTROLA" DIVISION



T-1 Series—The "RIO"
 Model T-1JE—Charcoal and Champagne White
 Model T-1EN—Champagne White and Monterey Red
 Model T-1EH—Champagne White and Bermuda Turquoise

SPECIFICATIONS

TUNING RANGE 540-1,600 kc

INTERMEDIATE FREQUENCY 455 kc

TRANSISTOR COMPLEMENT

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

A crystal diode is used as 2nd detector.
 A crystal diode is used as overload diode.

BATTERY

Three type No. VS-035 1½ volts each
 Current consumption (with no signal) Approx. 8 ma
 Useful life (intermittent service) Approx. 100 hours

DESCRIPTION

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

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED. THE SERVICE HINTS GIVEN ON PAGE 2 SHOULD BE CAREFULLY READ BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SERVICE HINTS

General Information

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

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

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

Check to make sure that every cell is inserted in the right direction (top inward).

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

3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).

4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.

5. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.

6. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).

7. D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.

8. Interchanging transistors in the I-F stages may necessitate readjustment.

ALIGNMENT PROCEDURE

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

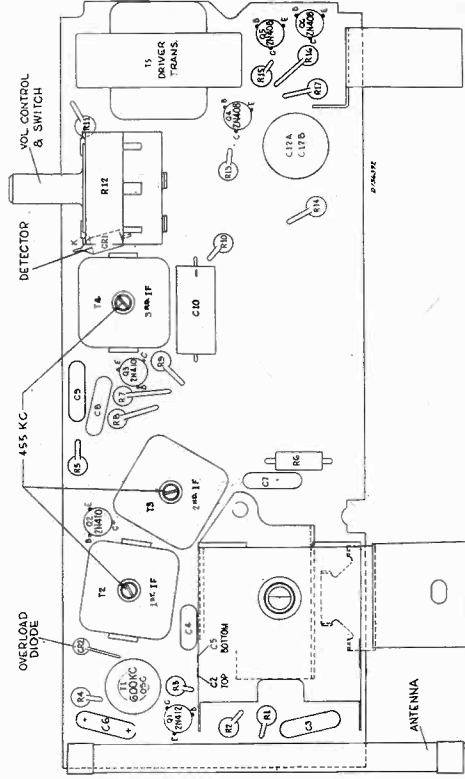
Connect output meter across voice coil.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang stator thru .01 mf	455 kc	Quiet point near 1800 kc	T4 3rd I-F T3 2nd I-F T2 1st I-F
2			Repeat Step 1	
3		1620 kc	Gang fully open	Oscillator trimmer C5
4	Short wire placed near antenna for radiated signal	1400 kc	1400 kc rock gang	Antenna trimmer C2
5		600 kc	600 kc rock gang	T1 esc. coil
6			Repeat Steps 3, 4 and 5	

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

EARPHONE CONNECTION

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



Chassis Components
 View from
 Back Side

CHASSIS RC-1189, T-1 Series

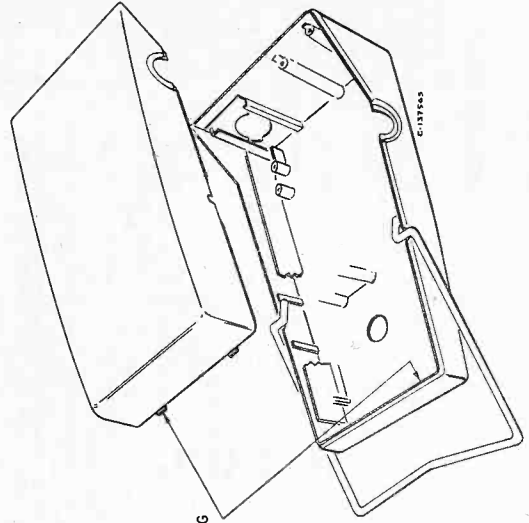
REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
C1A, C1B	108161	CAPACITORS: Variable tuning capacitor Included with C1A ceramic, 0.05 mfd, +100 -20%, 100 v ceramic, 0.01 mfd, ±20%, 100 v Included with C1B ceramic, 0.05 mfd, +100 -20%, 100 v ceramic, 0.05 mfd, +100 -20%, 100 v ceramic, 0.05 mfd, +100 -20%, 100 v ceramic, 0.03 mfd, ±20%, 100 v electrolytic, 10 mf, 10 v Included in Speaker Assembly electrolytic, 100/100 mf, 10/10 v Rectifier—Crystal diode Antenna—Ferrite rod antenna RESISTORS: Fixed composition, unless otherwise specified 22,000 ohm, ±10%, 1/2 w 6,800 ohm, ±10%, 1/2 w 2,200 ohm, ±10%, 1/2 w 1,000 ohm, ±10%, 1/2 w 470 ohm, ±10%, 1/2 w 1,000 ohm, ±10%, 1/2 w 6,800 ohm, ±10%, 1/2 w 330 ohm, ±10%, 1/2 w 47,000 ohm, ±10%, 1/2 w 15,000 ohm, ±10%, 1/2 w Volume control, with "On-Off" switch (S1) 220 ohm, ±10%, 1/2 w 47 ohm, ±10%, 1/2 w 5,400 ohm, ±10%, 1/2 w 100 ohm, ±10%, 1/2 w 5,400 ohm, ±10%, 1/2 w Included with R12 Transformer—Oscillator coil Transformer—Ist. IF transformer	T3	108158	Transformer—2nd IF transformer
C2	105715		T4	108159	Transformer—3rd IF transformer
C3	105716		T5	108164	Transformer—Driver transformer
C4	105715			108170	Circuit-printed circuit board chassis assembly—includes tuning capacitor, I.F. transformer and oscillator coil, driver transformer and transistors
C5	105715			105671	SPEAKER ASSEMBLY
C6	105715			108163	Capacitor—paper, 0.33 mf, ±20%, 200 v Speaker—1 1/2" W speaker complete with cone (130 ohm, C.T., P.C.)
C7	108168				
C8	108168				
C9	108168				
C10	108168				
C11	108168				
C12A, C12B	108151		J1	MISCELLANEOUS	
CR1, CR2	108145		108135	Jack—Earphone jack	
L1, L2	108145		108135	Cabinet—Plastic cabinet—charcoal/champagne white—for Model T1E	
			108135	Cabinet—Plastic cabinet—bermuda turquoise/champagne white—for Model T1E	
			108135	Cabinet—Plastic cabinet—monterey red/champagne white—for Model T1E	
			108135	Cabinet—Plastic cabinet—monterey red/champagne white—for Model T1E	
			108135	Cap—Battery cap—charcoal—for Model T1E	
			108135	Cap—Battery cap—bermuda turquoise—for Model T1E	
			108135	Cap—Battery cap—monterey red—for Model T1E	
			108135	Contact—Negative contact spring for battery	
			108135	Contact—Positive contact clip for battery	
			108135	Gramma—Speaker mounting grammat	
			108135	Handle—Carrying handle	
			108135	Knob—Tuning knob	
			108135	Knob—Volume control knob—charcoal—for Model T1E	
			108135	Knob—Volume control knob—bermuda turquoise—for Model T1E	
			108135	Knob—Volume control knob—monterey red—for Model T1E	
			108135	Spring—Contact spring, for battery cap	
			108135	Spring—Retaining spring for knobs	
			108135	Washer—Flat washer for tuning knob	
			108135	Washer—Flat washer for volume control knob	

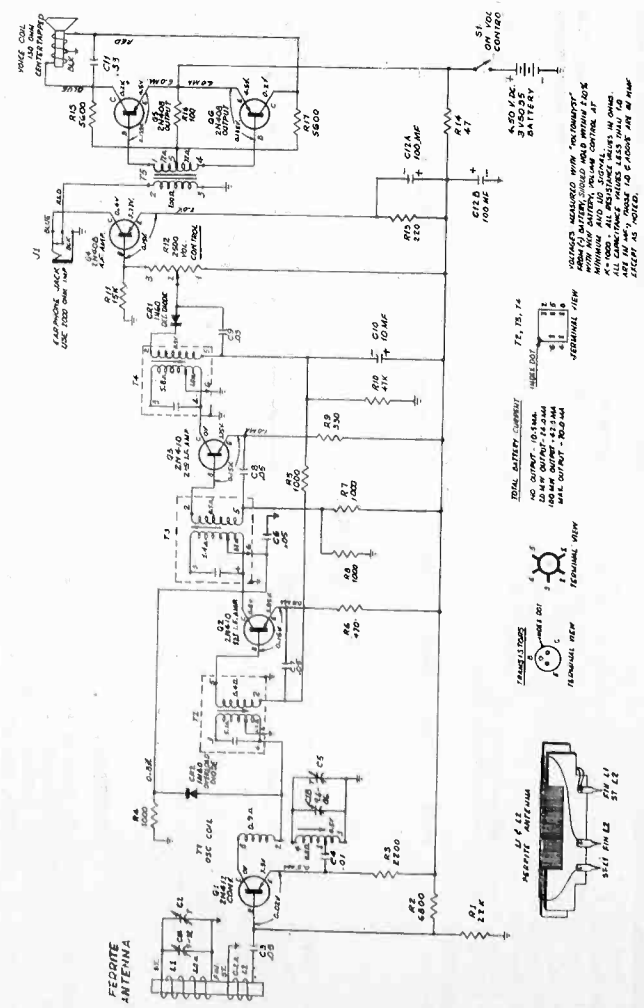
APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

NOTE

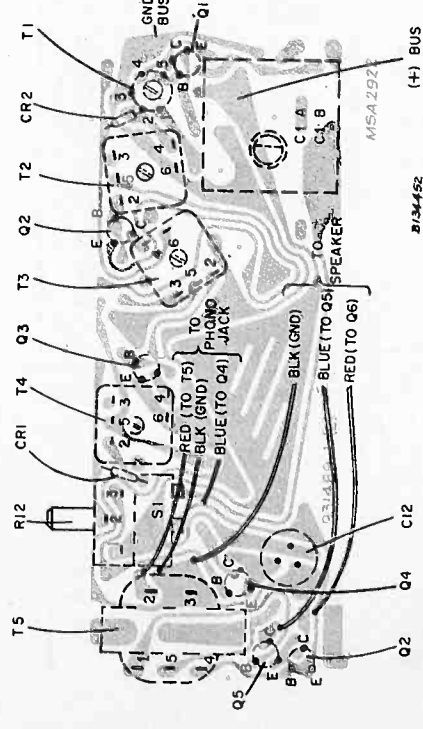
- TO PROVIDE DETENTING ACTION FOR THE HANDLE, IT MUST BE INSTALLED WITH THE BENT ENDS DOWN—AS SHOWN.
- USE CARE IN REMOVING KNOB. CASE MAY BE DAMAGED BY PRYING KNOB OFF FROM OUTSIDE. LOOSEN BOARD AND PULL GANG OUT OF KNOB.



IN ASSEMBLING CASE, INSERT TABS FIRST.



Schematic Diagram



Chassis Wiring and Components View from Wiring Side

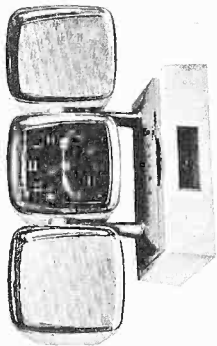
The assembly represented above is viewed from the wiring side of the board.
 The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.
 Component replacement, when necessary, should be made following the Volume VI—Issue 6—Dated August 25, 1955.

— PHILCO TRANSISTOR - CLOCK RADIO
SERVICE MANUAL



TRANSISTOR MODEL T-1000 CLOCK RADIO

- SPECIFICATIONS T-1000**
 CIRCUIT—Six transistor superheterodyne, with diode detector.
 CABINET—Plastic with gold trim.
 FREQUENCY COVERAGE—535 to 1620 KC.
 INTERMEDIATE FREQUENCY—455 KC.
 ANTENNA — Self-contained magnecor, high-impedance loop.
 SPEAKERS — Two, 4 inch pm., 16 ohm voice coil impedance.
 BATTERY SUPPLY — Radio; 2 standard D cells in 3 volt supply center tapped at 1½ volts. Timer; 1 D cell supply. Battery type, "A" P-920.



ALIGNMENT PROCEDURE

GENERAL—It is necessary to remove the printed panel for IF alignment and oscillator coil core adjustments. Oscillator and antenna paddler condensers, located under the nameplate on the right and left respectively, can be adjusted without removing the PW panel.
OUTPUT INDICATOR—Connect the output indicator, (a 1000-ohm per volt ac voltmeter, or an oscilloscope) directly across the voice coil terminals.
SIGNAL GENERATOR—Use an AM r-f signal generator. Connect the ground lead to chassis, and connect the output lead as indicated in the alignment chart.
OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .6 volt.
RADIO CONTROLS—Set the volume control to maximum. Set the tuning control as indicated.

SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below .6 volt.
 Normally, the transistors should be the last item suspected. If C9 opens serious audio oscillation will result.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd i-f Z2—2nd i-f Z1—1st i-f
2	Use radiating loop. (See NOTE 1 below)	600 kc.	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
3	Same as step 2.	1620 kc.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.				

NOTE 1. Use a 6-10-8 turn, 6-inch diameter loop made up of insulated wire. Connect to generator terminals, and place about one foot from radio loop.

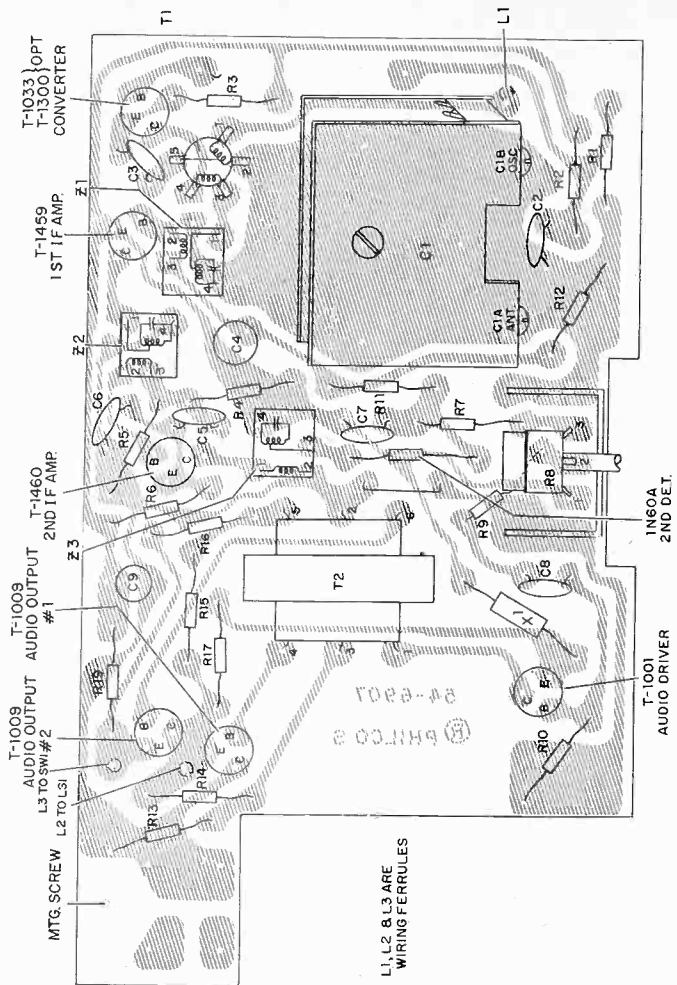


Figure 1 — Component Panel Top View — Showing Parts Location and Tuning Adjustments

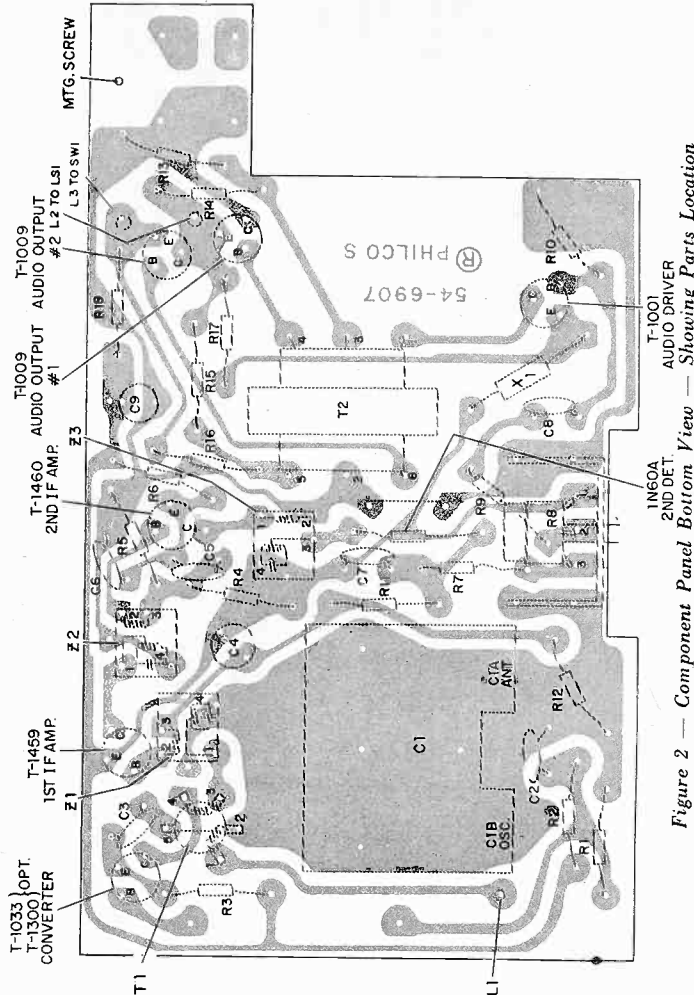


Figure 2 — Component Panel Bottom View — Showing Parts Location

MODEL T-1000

REPLACEMENT PARTS LIST — MODEL T-1000

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, variable, tuning, gang	31-2782-2	T2	Transformer, audio driver	32-8885-1
C2	Condenser, converter base by-pass, .01 mfd, disc	30-1272-2	X1	Choke, 1st audio emitter, 400 uh	32-4685-1
C3	Condenser, oscillator coupling, .01 mfd, disc	30-1272-2	Z1	Transformer, 1st IF	32-4775-1
C4	Condenser, electrolytic, avc filter, 10 mfd	30-2599-8	Z2	Transformer, 2nd IF	32-4775-2
C5	Condenser, 2nd IF base by-pass, .01 mfd, disc	30-1272-2	Z3	Transformer, 3rd IF	32-4775-3
C6	Condenser, 2nd IF emitter by-pass, .01 mfd, disc	30-1272-2	T1033	Transistor, converter	34-6000-3
C7	Condenser, detector filter, .01 mfd, disc	30-1272-2	T1459	Transistor, 1st I-F ampl.	34-6000-18
C8	Condenser, audio coupling, .47 mfd	30-1279-4	T1460	Transistor, 2nd I-F ampl.	34-6000-19
C9	Condenser, electrolytic, B+ filter, 150 mfd	30-2599-19	T1001	Transistor, audio driver	34-6001-16
LA1	Antenna, coil, magnecore	32-4668-10	T1009	Transistors, audio output, matched pair	34-6010
LS1	Speaker, 4 in. Pm., 16 ohms impedance	36-1673-7	1N60A	Crystal diode, 2nd detector	34-8022-3
LS2	Speaker, 4 in. Pm., 16 ohms impedance	36-1673-7		Printed panel	54-6907
R1	Resistor, converter bias, 3900 ohms	66-2398340	CABINET PARTS		
R2	Resistor, converter bias, 1500 ohms	66-2158340	Reference Symbol	Description	Service Part No.
R3	Resistor, converter emitter, 560 ohms	66-1568340		Base, bubble mtg.	28-12847
R4	Resistor, 2nd I-F bias, 3300 ohms	66-2338340		Bezel	28-12850
R5	Resistor, 2nd I-F bias, 6800 ohms	66-2688340		Bottom	54-5466
R6	Resistor, 2nd I-F emitter, 330 ohms	66-1338340		Clock	41-2073-2
R7	Resistor, detector filter, 470 ohms	66-1478340		Crystal, clock	54-5473-2
R8	Volume Control, 15,000 ohms	33-5563-9		Grille, speaker	28-12852-1
R9	Resistor, 1st audio base, 330 ohms	66-1338340		Housing, lower (ivory)	54-5465-2
R10	Resistor, audio driver base, 150,000 ohms	66-4158340		Housing, upper (ebony)	54-5464-1
R11	Resistor, avc filter, 47,000 ohms	66-3478340		Housing, upper (ivory)	54-5464-2
R12	Resistor, avc load, 82,000 ohms	66-3828340		Knob, volume (ebony)	54-6912
R13	Resistor, audio output No. 1 base bias, 1000 ohms	66-2108340		Knob, tuning	54-5475-1
R14	Resistor, audio output No. 1 bias, 100 ohms	66-1108340		Knob, clock	54-5428-2
R15	Resistor, audio output No. 2 base bias, 1000 ohms	66-2108340		Knob, volume (ivory)	54-6912-2
R16	Resistor, audio output No. 2 bias, 100 ohms	66-1108340		Nameplate	76-11681
R17	Resistor, feedback, 1200 ohms	66-2128340		Spring	28-12841
R18	Resistor, B+ filter, 82 ohms	66-0826340		Stanchion	28-12848
SW1	Switch, on-off	Part of Clock		Stanchion, back	28-12849
T1	Transformer, oscillator	32-4669-2			

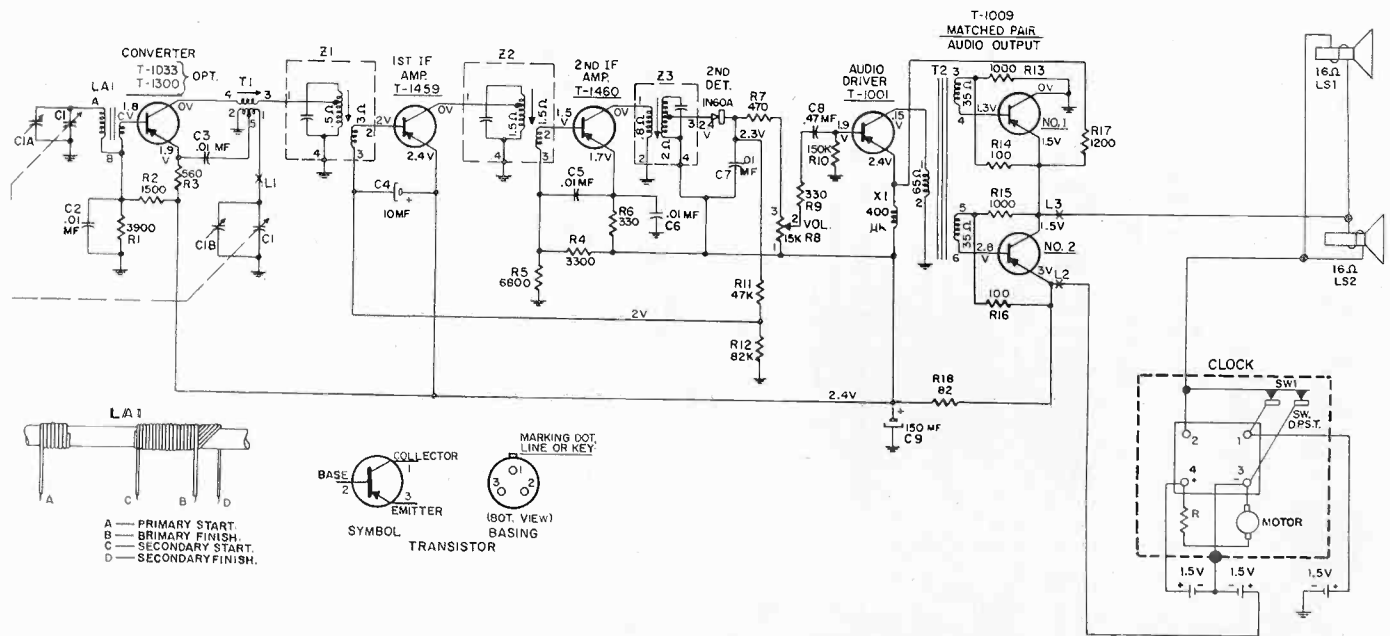
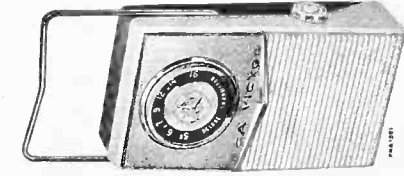


Figure 3 — Schematic Diagram of Philco Transistor Portable Model T-1000

TRANSISTOR OPTIONS

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For replacement purposes only one type is indicated in the parts list for this stage. This type should be ordered regardless of the original used.



RCA VICTOR

Battery-Operated Personal Radio

T-1 SERIES

Chassis No. RC-1189

SERVICE DATA

— 1959 No. 5 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY

CAMDEN 8, N. J.

RADIO CORPORATION OF AMERICA

RCA VICTOR RADIO AND "VICTROLA" DIVISION

T-1 Series—The "RIO"

- Model T-1JE—Chateau and Champagne White
- Model T-1EN—Champagne White and Monterey Red
- Model T-1EH—Champagne White and Bermuda Turquoise

SPECIFICATIONS

TUNING RANGE	540-1,600 kc
INTERMEDIATE FREQUENCY	455 kc
TRANSISTOR COMPLEMENT	
(1) Type 2N412	Converter
(2) Type 2N410	1st I-F Amp.
(3) Type 2N410	2nd I-F Amp.
(4) Type 2N408	Audio Driver
(5) Type 2N408	Push-pull Output
(6) Type 2N408	Push-pull Output
A crystal diode is used as 2nd detector.	
A crystal diode is used as overload diode.	
BATTERY	
Three type No. VS-035	1 1/2 volts each
Current consumption (with no signal)	Approx. 8 ma
Useful life (intermittent service)	Approx. 100 hours

DESCRIPTION

The "RIO" is a pocket style radio receiver using six transistors instead of vacuum tubes. A superheterodyne circuit is used consisting of: converter, two stages of i-f amplification, crystal diode detector, audio driver and push-pull class-B output. A 3 1/2" speaker is used for normal listening; a jack for ear-phone connection is provided, which silences the speaker, when use is desired without disturbing nearby persons.

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED. THE SERVICE HINTS GIVEN ON PAGE 2 SHOULD BE CAREFULLY READ BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SERVICE HINTS

General Information

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

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

1. When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be approximately 4 1/2 volts with new batteries. The receiver can be expected to operate if the total battery voltage checks between 3 volts and 4 1/2 volts with the proper polarity.

Check to make sure that every cell is inserted in the right direction (top inward).

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

3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal, the corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).

4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.

5. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.

- Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).
- D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.
- Interchanging transistors in the I-F stages may necessitate readjustment.

ALIGNMENT PROCEDURE

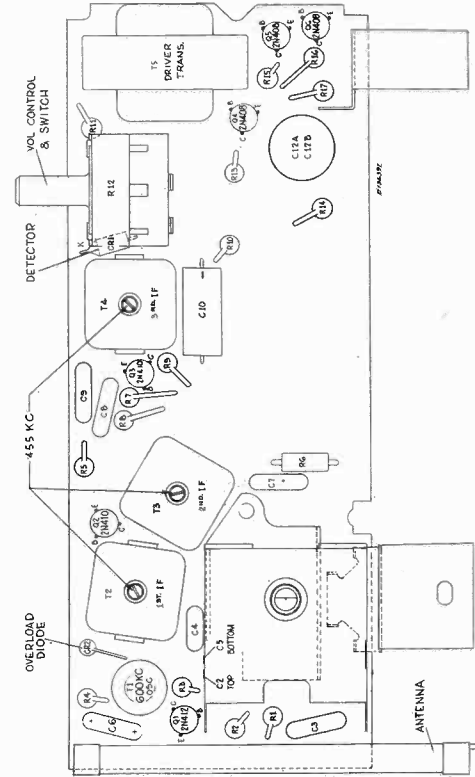
Test Oscillator—For all alignment operations, connect the low side of the test oscillator to the "common positive" wiring and keep the oscillator output as low as possible to avoid AVC action.

Connect output meter across voice coil.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang selector thru .01 mf	455 kc	Quiet point 1600 kc	T4 3rd I-F T3 2nd I-F T2 1st I-F
2			Repeat Step 1	
3		1620 kc	Gang fully open	Oscillator trimmer C5
4	Short wire placed near antenna for radiated signal	1400 kc	1400 kc rock gang	Antenna trimmer C2
5		600 kc	600 kc rock gang	T1 osc. coil
6			Repeat Steps 3, 4 and 5	

Antenna trimmer is located on front section of gang.

Oscillator trimmer is located on rear section of gang.



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

Chassis Components
View from
Back Side

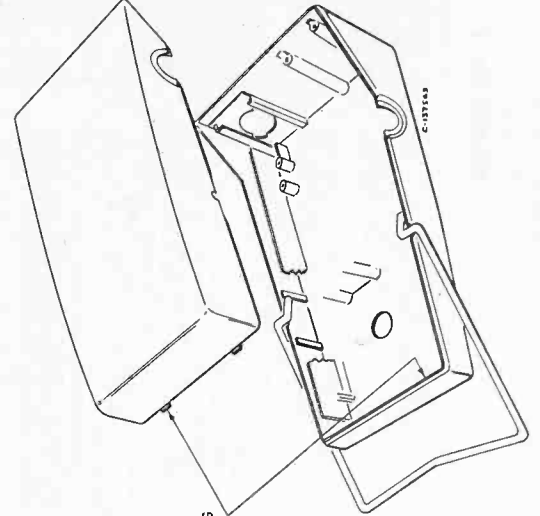
REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
C1A, C1B	108161	CHASSIS ASSEMBLY RC-1189 CAPACITORS: variable tuning capacitor included with C1A ceramic, 0.05 mfd., +100 -20%, 100 v ceramic, 0.01 mfd., ±20%, 100 v included with C1B ceramic, 0.05 mfd., +100 -20%, 100 v ceramic, 0.05 mfd., +100 -20%, 100 v ceramic, 0.03 mfd., ±20%, 100 v electrolytic, 10 mfd., 10 v included in Speaker Assembly electrolytic, 100/100 mfd., 10/10 v Rectifier—Crystal diode Antenna—Ferrite rod antenna RESISTORS: Fixed composition, unless otherwise specified 22,000 ohm, ±10%, 1/2 w 6,800 ohm, ±10%, 1/2 w 2,200 ohm, ±10%, 1/2 w 1,000 ohm, ±10%, 1/2 w 470 ohm, ±10%, 1/2 w 1,000 ohm, ±10%, 1/2 w 6,800 ohm, ±10%, 1/2 w 330 ohm, ±10%, 1/2 w 47,000 ohm, ±10%, 1/2 w 15,000 ohm, ±10%, 1/2 w Volume control, with "On-Off" switch (S1) 220 ohm, ±10%, 1/2 w 47 ohm, ±10%, 1/2 w 5,600 ohm, ±10%, 1/2 w 100 ohm, ±10%, 1/2 w 5,600 ohm, ±10%, 1/2 w included with R12 Transformer—Oscillator coil Transformer—1st IF transformer	T3	108158	Transformer—2nd IF transformer
C2	105715		T4	108159	Transformer—2nd IF transformer
C3	105716		T5	108144	Transformer—Driver transformer
C4	105715		C11	108170	Circuit—Right channel chassis assembly including tuned oscillator coil—less antenna, transformer and transistors
C5	105715			105471	SPEAKER ASSEMBLY
C6	105715			108163	Capacitor—paper, 0.33 mfd., ±20%, 200 v
C7	108168			108163	Speaker—3 1/2" PM, speaker complete with cone (130 ohm, C.T., V.C.)
C8	108168			103635	MISCELLANEOUS
C9	108114		J1	Y7646	Jack—Earphone jack
C10	108114			Y7646	Cabinet—Plastic cabinet—charcoal/champagne white—for Model T1E
C12A, C12B	108151		Y7647	Cabinet—Plastic cabinet—bermuda turquoise/champagne white—for Model T1EH	
CR1, CR2	108145		Y7648	Cabinet—Plastic cabinet—bermuda turquoise/champagne white—for Model T1EH	
L1, L2	108145		108210	Cap—Battery cap—charcoal—for Model T1E	
R1	108162		108155	Cap—Battery cap—bermuda turquoise—for Model T1EH	
R2			108211	Cap—Battery cap—monterey red—for Model T1EN	
R3			108153	Contact—Negative contact spring for battery	
R4, R5			108152	Contact—Positive contact clip for battery	
R6			108150	Grammel—Speaker mounting grammet	
R7			108167	Handle—Carrying handle	
R8			108154	Knob—Tuning knob	
R9			108208	Knob—Volume control knob—charcoal—for Model T1E	
R10			108144	Knob—Volume control knob—bermuda turquoise—for Model T1EH	
R11			108209	Knob—Volume control knob—monterey red—for Model T1EN	
R12			108154	Spring—Conical spring, for battery cap	
R13			108169	Spring—Retaining spring for knobs	
R14			108334	Washer—Felt washer for tuning knob	
R15			104222	Washer—Felt washer for volume control knob	
R16					
R17					
S1					
T1					
T2					

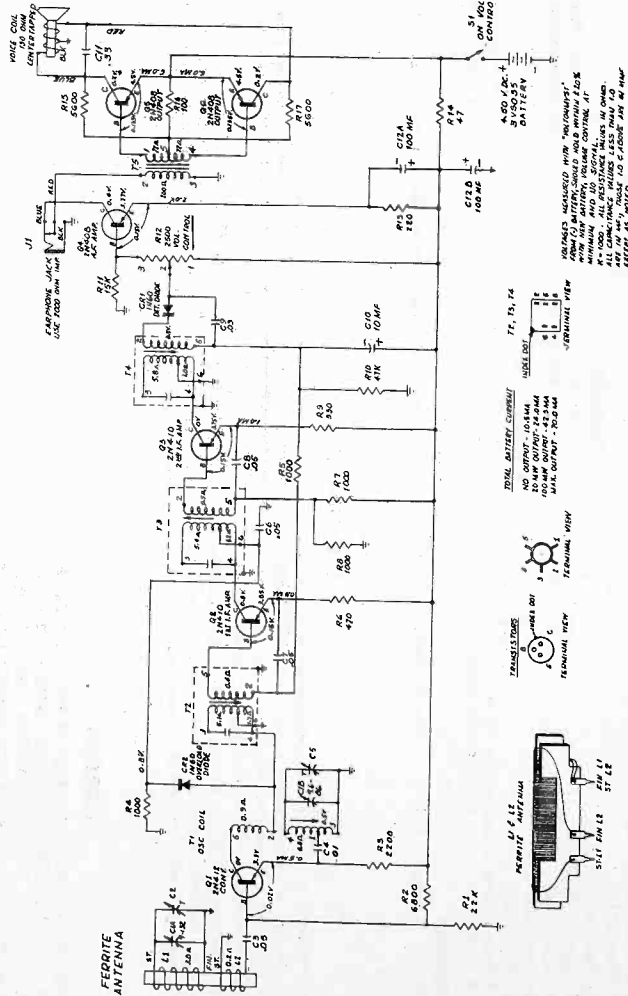
APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

NOTE

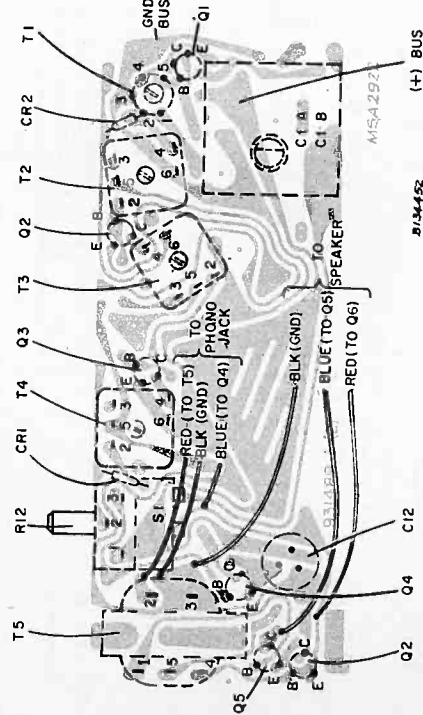
- 1 TO PROVIDE DETENTING ACTION FOR THE HANDLE, IT MUST BE INSTALLED WITH THE BENT ENDS DOWN—AS SHOWN.
- 2 USE CARE IN REMOVING KNOB. CASE MAY BE DAMAGED BY PRYING KNOB OFF FROM OUTSIDE. LOOSEN BOARD AND PULL GANG OUT OF KNOB.



IN ASSEMBLING CASE, INSERT TABS FIRST.



Schematic Diagram



Chassis Wiring and Components View from Wiring Side

The assembly represented above is viewed from the wiring side of the board.
 The printed wiring, on the rear side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.
 Component replacement, when necessary, should be made following the Volume VI—Issue 6—Dated August 25, 1955.



RCA VICTOR

Battery-Operated Personal Radio

PT-1 SERIES

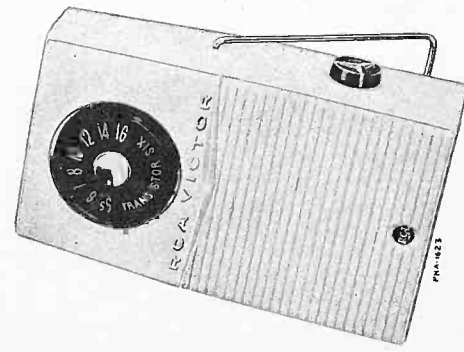
Chassis No. RC-1189B

SERVICE DATA

— 1959 No. 14 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
CAMDEN 8, N. J.

FOR
RADIO CORPORATION OF AMERICA
RCA VICTOR RADIO AND "VICTROLA" DIVISION



PT-1 — The "Havana"
Moonmist Gray

SPECIFICATIONS

TUNING RANGE	540-1,600 kc
INTERMEDIATE FREQUENCY	455 kc
TRANSISTOR COMPLEMENT	
(1) Type 2N412	Converter
(2) Type 2N410	1st I-F Amp.
(3) Type 2N410	2nd I-F Amp.
(4) Type 2N408	Audio Driver
(5) Type 2N408	Push-pull Output
(6) Type 2N408	Push-pull Output
A crystal diode is used as 2nd detector.	
A crystal diode is used as overload diode.	
POWER OUTPUT	
Undistorted	150 milliwatts
Maximum	225 milliwatts
WEIGHT	
Approximately 1 1/2 pounds including batteries.	
LOUDSPEAKER	
Size and type	3 1/2" P.M.
Voice coil impedance	130 ohm center-tapped
POWER OUTPUT	
Undistorted	150 milliwatts
Maximum	225 milliwatts
WEIGHT	
Approximately 1 1/2 pounds including batteries.	

DESCRIPTION

The "Havana" is a pocket style radio receiver using six transistors instead of vacuum tubes. A superheterodyne circuit is used consisting of: converter, two stages of i-f amplification, crystal diode detector, audio driver and push-pull class-B output. The 3 1/2" speaker utilizes a 130 ohm center-tapped voice coil. Due to the low impedance output of the transistors an output transformer is not necessary with this arrangement.

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED. THE SERVICE HINTS GIVEN ON PAGE 2 SHOULD BE CAREFULLY READ BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SERVICE HINTS

6. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).
7. D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmyst®.
8. Interchanging transistors in the I-F stages may necessitate readjustment.

ALIGNMENT PROCEDURE

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

Connect output meter across voice coil.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang stator thru .01 mf	455 kc	Quiet point near 1,600 kc	T4 3rd I-F T3 2nd I-F T2 1st I-F
2		Repeat Step 1		Oscillator trimmer C5
3		1,620 kc	Gang fully open	Antenna trimmer C2
4	Short wire placed near antenna for radiated signal	1,400 kc	1,400 kc signal	T1 osc. coil
5		600 kc	600 kc signal	
6		Repeat Steps 3, 4 and 5		

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

General Information

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

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

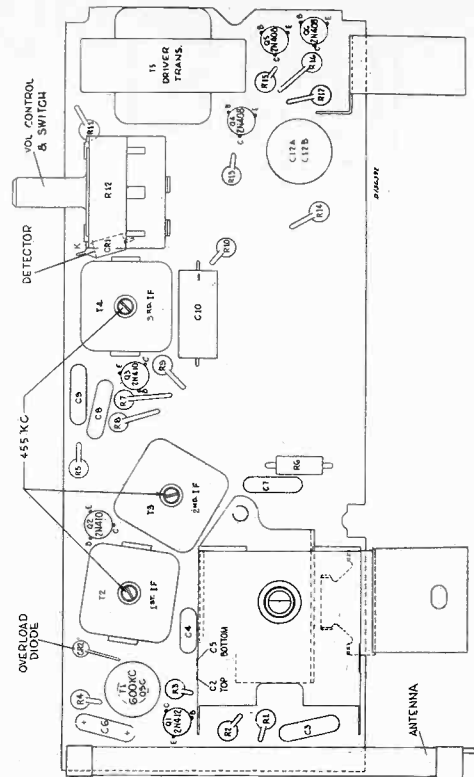
When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be approximately 4 1/2 volts with new batteries. The receiver can be expected to operate if the total battery voltage checks between 3 volts and 4 1/2 volts with the proper polarity.

Check to make sure that every cell is inserted in the right direction (top inward).
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons explained above, continuity measurements can be misleading.

3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes) and the EMITTER is the common terminal (corresponding to cathode of tubes).

4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.

5. Transistors and the "Security Sealed Circuit" board can be damaged by excessive heat. Whenever soldering is necessary on the "Security Sealed Circuit" board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.



Chassis Assembly — View from Component Side

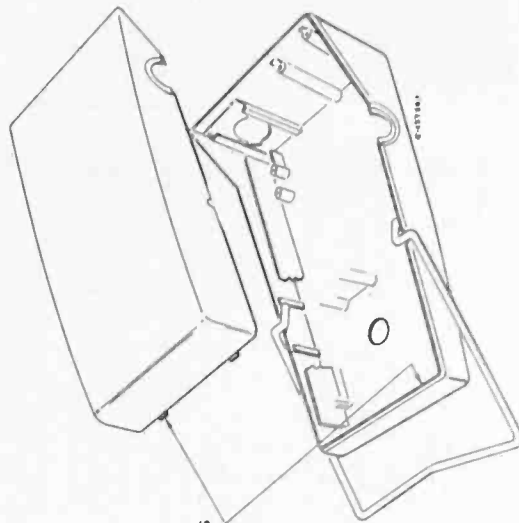
REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
C1A, C1B	108161	CHASSIS ASSEMBLY RC-1189B	R14		47 ohm, ±10%, 1/2 w
C2	105715	Variable tuning capacitor, 2 sec. 8.8/131.1 mmf, 7.7/78.1 mmf	R15		5,600 ohm, ±10%, 1/2 w
C3	105716	Part of C1A	R16		100 ohm, ±10%, 1/2 w
C4	105715	ceramic, 0.05 mf, ±100 -20%, 100 v	R17		5,600 ohm, ±10%, 1/2 w
C5	105716	Part of C1B	S1	108160	Part of R12
C6 to C8	108148	ceramic, 0.05 mf, ±100 -20%, 100 v	T1	108157	Transformer—Oscillator coil
C9	108114	ceramic, 0.03 mf, ±20%, 100 v	T2	108158	Transformer—1st IF transformer
C10	108148	electrolytic, 10 mf, 10 v, 100 v	T3	108159	Transformer—2nd IF transformer
C11	108151	Part of Speaker Assembly	T4	108164	Transformer—Driver transformer
C12A, C12B	101615	electrolytic, 100/100 mf, 10/10 v	T5	108170	Circuit—Security Sealed Circuit—chassis assembly—antenna, tuning capacitor, volume control, driver transformer and transistors
CR1, CR2	108163	Rectifier—Crystal diode	C11		SPEAKER ASSEMBLY
L1, L2	108165	Antenna—ferrite rod antenna			Capacitor—paper, 0.33 mf, ±20%, 200 v (130 ohm C.T., V.C.)
R1		RESISTORS — Fixed, composition, unless otherwise specified			Speaker—3/4" PM speaker; complete with cone (130 ohm C.T., V.C.)
R2	22,000 ohm, ±10%, 1/2 w				MISCELLANEOUS
R3	6,800 ohm, ±10%, 1/2 w				Cabinet—Moontist Gray
R4	2,200 ohm, ±10%, 1/2 w				Cap—Battery cap
R5, R6	1,000 ohm, ±10%, 1/2 w				Contact—"Negative" contact spring for battery
R7	470 ohm, ±10%, 1/2 w				Contact—"Positive" contact clip for battery
R8	1,000 ohm, ±10%, 1/2 w				Gramme—Speaker mounting gramme
R9	6,800 ohm, ±10%, 1/2 w				Handle—Carrying handle
R10	330 ohm, ±10%, 1/2 w				Knob—Tuning knob
R11	47,000 ohm, ±10%, 1/2 w				Knob—Volume control knob
R12	15,000 ohm, ±10%, 1/2 w				Spring—Canical spring—for battery cap
R13	220 ohm, ±10%, 1/2 w				Spring—Knob retaining spring
					Washer—Fall washer—for tuning knob
					Washer—Fall washer—for volume knob

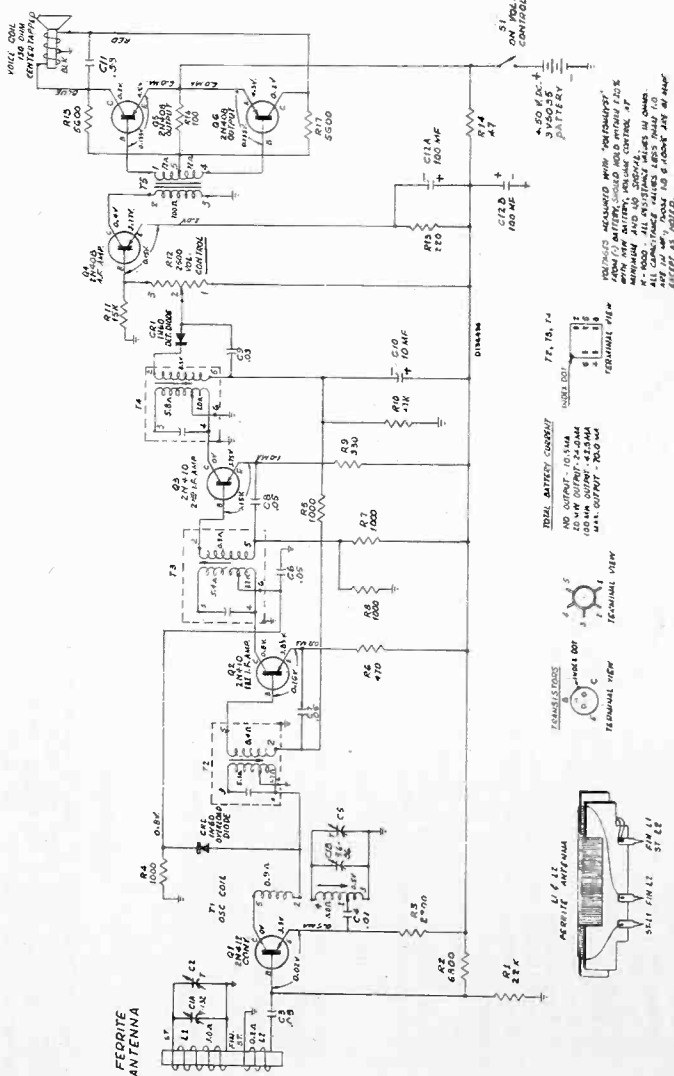
APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS

NOTE

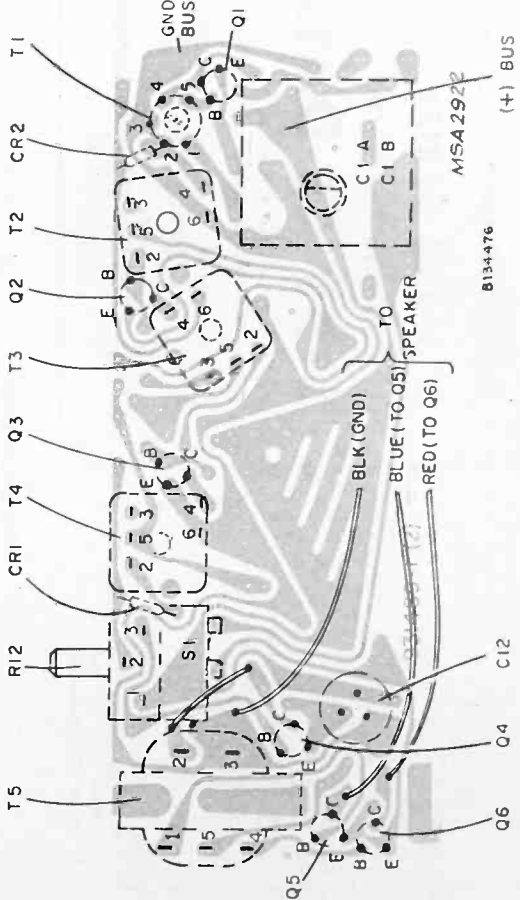
- 1 TO PROVIDE DETENTING ACTION FOR THE HANDLE, IT MUST BE INSTALLED WITH THE BENT ENDS DOWN—AS SHOWN.
- 2 USE CARE IN REMOVING KNOB. CASE MAY BE DAMAGED BY PRYING KNOB OFF FROM OUTSIDE. LOOSEN BOARD AND PULL GANG OUT OF KNOB.



IN ASSEMBLING CASE, INSERT TABS FIRST.



Schematic Diagram



Chassis Wiring and Components—View from Wiring Side

The assembly represented above is viewed from the wiring side of the board. The "Security Sealed Circuit" on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the procedure outlined in RCA Radio and Victor Service Tips Volume VI—Issue 6—Dated August 21, 1955.

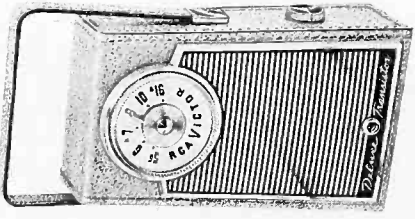
RCA VICTOR

Battery-Operated Personal Radio

T-2 SERIES

Chassis No. RC-1189

SERVICE DATA



T-2 Series—The "MONACO"
Model T2-E—Antique White
Model T2-J—Charcoal
Model T2-K—Saddle Tan

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

SPECIFICATIONS

TUNING RANGE	540-1,600 kc
INTERMEDIATE FREQUENCY	455 kc
TRANSISTOR COMPLEMENT	
(1) Type 2N412.....	Converter
(2) Type 2N410.....	1st I-F Amp.
(3) Type 2N410.....	2nd I-F Amp.
(4) Type 2N408.....	Audio Driver
(5) Type 2N408.....	Push-pull Output
(6) Type 2N408.....	Push-pull Output
A crystal diode is used as 2nd detector.	
A crystal diode is used as overload diode.	
BATTERY	
Three "C" size cells.....	Long Life RCA Type VS-335 or Standard RCA Type VS-035
Current consumption (with no signal).....	Approx. 8 ma
Useful life (intermittent service—VS-035).....	Approx. 100 hours
LOUDSPEAKER	
Size and type.....	3 1/2" P.M.
Voice coil impedance.....	130 ohm center-tapped
Provision is made for connection of a 2000 ohm impedance earphone if desired. RCA earphone accessory Number RK-219A is recommended.	
POWER OUTPUT	
Undistorted.....	150 milliwatts
Maximum.....	225 milliwatts
TUNING DRIVE RATIO	6:1 Planetary (3 turns)
DIMENSIONS	
Height.....	6 1/16"
Width.....	4 1/16"
Depth.....	2 1/4"
WEIGHT	
Approximately 1 1/2 pounds including batteries.	

DESCRIPTION

The "MONACO" is a pocket style radio receiver using six transistors instead of vacuum tubes. A superheterodyne circuit is used consisting of: converter, two stages of i-f amplification, crystal diode detector, audio driver and push-pull class-B output. A 3 1/2" speaker is used for normal listening; a jack for earphone connection is provided, which silences the speaker, when use is desired without disturbing nearby persons.

A "Security Sealed Circuit" chassis is used to obtain light weight and compact size. The complete receiver including batteries weighs approximately 1 1/2 pounds. The case is made of simulated leather.

The receiver is powered by three "C" size dry cells (RCA Type VS-035). The batteries are replaceable upon removal of a cap at the bottom of the case. Expected useful life of the batteries is in excess of 100 hours with intermittent service.

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED. THE SERVICE HINTS GIVEN ON PAGE 2 SHOULD BE CAREFULLY READ BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SERVICE HINTS

General Information

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

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

1. When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be approximately 4 1/2 volts with new batteries. The receiver can be expected to operate if the total battery voltage checks between 3 volts and 4 1/2 volts with the proper polarity.

2. Check to make sure that every cell is inserted in the right direction (top inward).

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

4. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with the conventional vacuum tube radio. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).

5. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.

6. Transistors and the printed circuit board can be damaged by excessive heat. Whenever soldering is necessary on the printed circuit board use a soldering iron which is both HOT AND CLEAN. This minimizes the amount of heat which will be radiated from the point of soldering.

6. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).

7. D-c voltage measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmms®.

8. Interchanging transistors in the I-F stages may necessitate realignment.

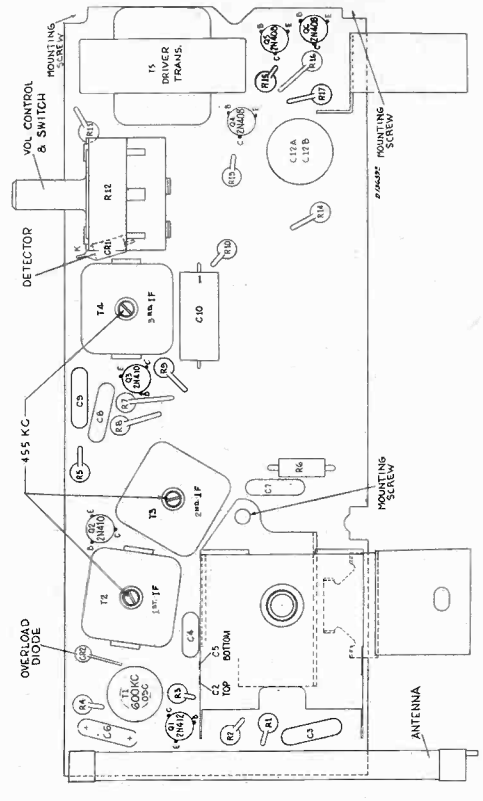
ALIGNMENT PROCEDURE

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

Connect output meter across voice coil.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang stator thru .01 mf.	455 kc	Quiet point near 1600 kc	T4 3rd I-F point near 72 1st I-F
2			Repeat Step 1	
3		1620 kc	Gang fully open	Oscillator trimmer C5
4	Short wire placed near antenna for radiated signal	1400 kc	1400 kc rock gang	Antenna trimmer C2
5		600 kc	600 kc rock gang	T1 osc. coil
6			Repeat Steps 3, 4 and 5	

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



Chassis Layout — View from Component Side

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

CAUTION

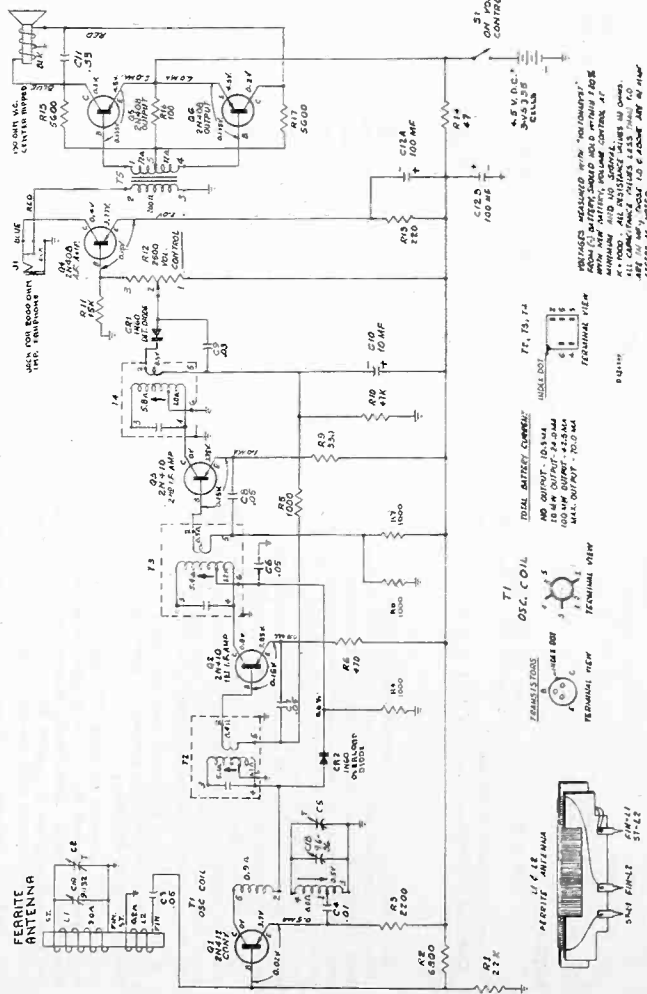
Damage can result from trying to pull or pry the tuning knob off from the front. To remove—remove the three chassis mounting screws, grasp the tuning capacitor and pull it out of the knob.

NOTE—The chassis must be loosened to remove the battery holder. When replacing the battery holder make sure that it is pushed down against the bottom of the case.

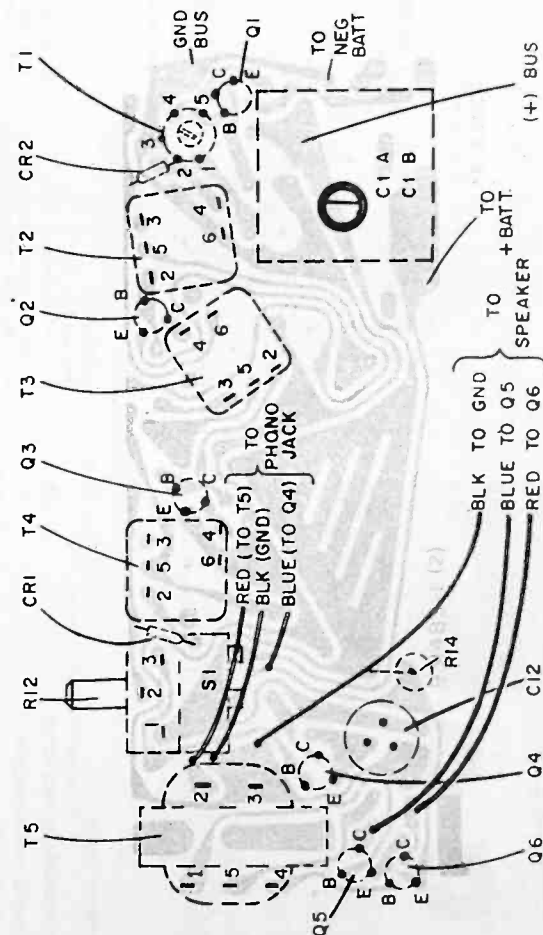
REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
C1A, C1B	108277	CHASSIS ASSEMBLY RC-1189-A	J1	108163	SPEAKER ASSEMBLY
C2	105715	variable tuning capacitor			Speaker—3/4" PM speaker—complete with cone—(130 ohm, C.T., V.C.)
C3	105716	ceramic, 0.05 mf, ±10%, 100 v			MISCELLANEOUS
C4	105715	ceramic, 0.01 mf, ±20%, 100 v			Jack—Earphone jack
C5	105715	trimmer, part of C1B			Cabinet—Antique white—for Model T2-E
C4 to C8	105715	ceramic, 0.05 mf, ±10%, 100 v			Cabinet—Charcoal—for Model T2-J
C9	108168	ceramic, 0.03 mf, ±20%, 100 v			Cabinet—Saddle tan—for Model T2-K
C10	105114	electrolytic, 10 mf, 10 v			Cap—Battery cap—charcoal—for Model T1-J
C11	108151	paper, 0.33 mf, ±20%, 200 v			Cap—Battery cap—parachute—for Model T1-E
C12A, C12B	101615	electrolytic, 100/100 mf, 10/10 v			Cap—Battery cap—saddle tan—for Model T1-K
CR1, CR2	101615	Rectifier—Crystal diode			Cap—Handle end cap (1 set of 2)
L1, L2	108165	Antenna—Ferrite rod antenna			Clip—Battery contact clip—positive
R1		RESISTORS: Fixed, composition, 1/2 watt, unless otherwise specified			Contact—Contact plate for conical spring
R2	72,000 ohm, ±10%				Case—Battery case
R3	4,800 ohm, ±10%				Dial—Tuning dial
R4	2,200 ohm, ±10%				Escutcheon—for cabinet front
R5	1,000 ohm, ±10%				Fastener—for mounting cabinet front escutcheon (1 set of 2)
R6	470 ohm, ±10%				Grammet—Speaker mounting grammet
R7	1,000 ohm, ±10%				Handle—Carrying handle—for Model T2-E
R8	4,800 ohm, ±10%				Handle—Carrying handle—for Model T2-J
R9	330 ohm, ±10%				Handle—Carrying handle—for Model T2-K
R10	47,000 ohm, ±10%				Hardware—Drive screw and stud—for mounting handle
R11	15,000 ohm, ±10%				Knob—Dial pointer
R12	220 ohm, ±10%				Knob—Tuning control knob
R13	47 ohm, ±10%				Knob—Volume control knob—for Model T2-E
R14	47 ohm, ±10%				Knob—Volume control knob—for Model T2-J
R15	5,400 ohm, ±10%				Knob—Volume control knob—for Model T2-K
R16	100 ohm, ±10%				Retainer—Retaining washer for handle contact
R17	5,400 ohm, ±10%				Spring—Conical spring for battery case—negative contact
T1	101140	Transformer—Oscillator coil			Spring—Flat bronze spring—for battery case
T2	101157	Transformer—1st IF transformer			Spring—Retaining spring—for tuning knob
T3	101158	Transformer—2nd IF transformer			Spring—Retaining spring—for volume control knob
T4	101159	Transformer—3rd IF transformer			Washer—Felt washer—for dial face
T5	101164	Transformer—Driver transformer			Washer—Felt washer—for volume control knob
	101170	Circuit—"Security Sealed Circuit" chassis assembly, 1st antenna tuning capacitor, volume control, driver transformer and transistors			Washer—Spring washer—for handle drive screw (1 set of 2)

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



Schematic Diagram



Chassis Wiring and Components—View from Wiring Side

The assembly represented above is viewed from the wiring side of the board and wiring on the rear side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.

Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victoria Service Tip" Volume VI—Issue 6—Dated August 25, 1953.



Battery-Operated Clock-Radio

TC-1 SERIES

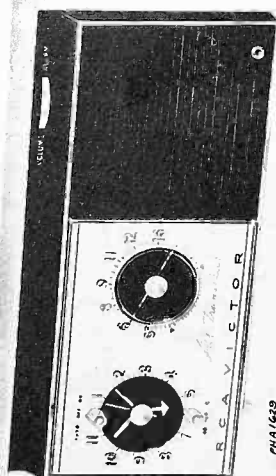
Chassis No. RC-1196

SERVICE DATA

— 1959 No. 20 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY

A DIVISION OF
RADIO CORPORATION OF AMERICA
CAMDEN 8, N. J.



RA11629

TC-1 Series—The "Tribune"
Model TC-1E—Champagne White
Model TC-1FE—Nelson and Champagne White
Model TC-1JE—Charcoal and Champagne White

SPECIFICATIONS

TUNING RANGE Conelrad frequencies marked 540-1,600 kc

INTERMEDIATE FREQUENCY 455 kc

TRANSISTOR COMPLEMENT

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

Type IN60 Crystal Diode 2nd Detector
Type IN60 Crystal Diode Overload Diode

BATTERY

Three "C" size cells Long Life RCA Type VS335 or Standard RCA Type VS035
Current consumption (no signal) Approx. 8 ma.
Useful life (intermittent service—VS035) Approx. 100 hours

DESCRIPTION

The "Tribune" is a battery-operated personal-type clock-radio using six transistors and two crystal diodes in a superheterodyne "Security Sealed Circuit." The circuit embodies a converter, two stages of IF amplification, an overload diode, a detector diode, an audio driver, and a class-B push-pull output stage. All components except the speaker, clock, antenna and jack are mounted on one side of an insulation plane; the connections are contained on the opposite side of the plate.

The two-piece "Impac" case completely encloses the radio and clock, using a molded plastic hood instead of the conventional back cover. The chassis, clock speaker, antenna and jack are mounted on the molded plastic case front.

A 3 1/2" direct-drive speaker is used for normal listening, and a jack, which silences the speaker, is provided for personal listening with an earphone.

The radio is powered by three "C" size dry cells and the clock-timer is powered by a 1.3 volt nickel-cadmium cell. The nickel-cadmium cell is automatically recharged by the radio battery and will continue to operate the clock for approximately five days after the radio cells are exhausted.

The clock-timer features a clock controlled switch which will: (1) turn on the radio, OR sound a buzzer alarm, at a preset time up to eleven hours in advance (AUTO), and (2) turn the

OPERATION

TO SET THE TIME:
Pull the ALARM-TIME-SET knob, on the back, and turn it in a counterclockwise direction to set the time.

TO USE THE RADIO:
Turn the AUTO-OFF-ON switch knob to ON. Tune in a station with the TUNING dial and adjust the loudness with the VOLUME-ALARM control. Turn the AUTO-OFF-ON switch to OFF when through listening.

TO WAKE UP TO RADIO:
Set the Alarm (red) hand of the clock to the desired time by turning the ALARM-TIME-SET knob clockwise. Tune in a station and adjust the loudness as described above. Turn the AUTO-OFF-ON switch to AUTO. The radio will then turn ON at the preset time. To silence the radio turn the AUTO-OFF-ON switch to OFF.

TO WAKE UP TO BUZZER:
Set the Alarm as described above. Turn the VOLUME-ALARM control to the extreme right until a click is heard (ALARM). The buzzer alarm will then sound at the preset time.

TO PLAY RADIO AFTER BUZZER HAS SOUNDED:
Rotate the VOLUME-ALARM control to the left. Tune in a station and adjust volume as described above. Leave switch on AUTO. To silence buzzer or radio turn AUTO-OFF-ON switch to OFF.

TO GO TO SLEEP TO RADIO:
Set the SLEEP (60-30.0) knob to the length of time it is desired that the radio play. Tune in a station and adjust volume as previously described. Do not turn AUTO-OFF-ON switch to ON. Radio will play and automatically turn OFF at the expiration of the preset time.

The sleep and wake-up functions may be combined by operating both switches (AUTO and SLEEP).

IMPORTANT

THE PROCEDURE TO BE USED IN SERVICING TRANSISTOR RADIOS IS VERY MUCH THE SAME AS USED WITH VACUUM TUBE RADIOS ALTHOUGH CERTAIN PRECAUTIONS MUST BE OBSERVED REFER TO THE SERVICE HINTS AND SERVICE DATA 1957-NO. 11 AND 1958-NO. 7 BEFORE ATTEMPTING TO SERVICE THIS RADIO RECEIVER.

SERVICE HINTS

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

It is possible to damage a transistor when testing circuit continuity. To avoid transistor damage and misleading continuity indications, remove the transistor from the chassis before making continuity tests of its circuit.

1. When the receiver is inoperative, the first thing to do is check the batteries. The voltage at the two battery lead terminals, with the receiver turned on, should be between 3 volts and 4 1/2 volts with the proper polarity.
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. Continuity measurements can be misleading.
3. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery current increases noticeably with increased signal input. See current specifications on schematic diagram.
4. Oscillator injection voltage can be measured at the emitter terminal of Q1 with the use of an oscilloscope or R-F type of VTVM. The injection voltage should be approximately 0.12 volts r.m.s. (0.34 v. peak to peak) in the middle of the tuning range (near 1000 kc).

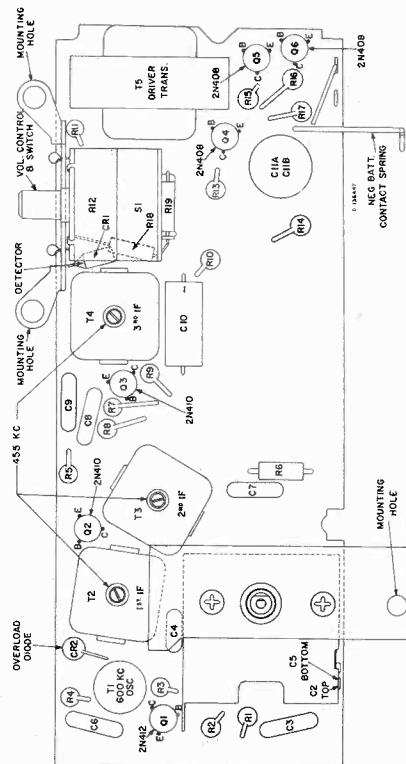
ALIGNMENT PROCEDURE

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

Connect output meter across voice coil.
Turn volume control to maximum.

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	Antenna gang stator thru .01 ml.	455 kc	Quiet point near 1,600 kc	T4 1st I-F T3 2nd I-F T2 1st I-F
2			Repeat Step 1	
3		1,620 kc	Gang fully open	Oscillator trimmer C5
4	Short wire placed near antenna for radiated signal	1,400 kc	1,400 kc rock gang	Antenna trimmer C2
5		600 kc	600 kc rock gang	T1 osc. coil
6			Repeat Steps 3, 4 and 5	

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



EARPHONE CONNECTION

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

Chassis Assembly
View from
Component Side

RC-1196, TC-1 Series

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
T4	108159	Transformer—3rd IF transformer Transformer—Driver transformer Circuit—Security Sealed Circuit chassis assembly—less antenna tuning capacitor, volume control, driver transformer and transistor	T4	108159	Transformer—3rd IF transformer Transformer—Driver transformer Circuit—Security Sealed Circuit chassis assembly—less antenna tuning capacitor, volume control, driver transformer and transistor
T5	108170		T5	108170	
C12	108163	SPEAKER ASSEMBLY Speaker—3W, 8Ω transformer, complete with cone (130 ohm, C.I., V.C.) Capacitor—film, 0.33 mf, ±10%, 50 v DC	C12	108163	SPEAKER ASSEMBLY Speaker—3W, 8Ω transformer, complete with cone (130 ohm, C.I., V.C.) Capacitor—film, 0.33 mf, ±10%, 50 v DC
J1	108307		J1	108307	
L1, L2	108316	MISCELLANEOUS Jack—Earphone jack Antenna—Ferrite rod antenna Backplate—For control dial—for Model TC-1E and TC-1FE Battery—Nickel-cadmium rechargeable clock battery (1.3 volt) Cabinet—Champagne White—for Model TC-1E Cabinet—Charcoal/Champagne White—for Model TC-1FE Cabinet—Melon/Champagne White—for Model TC-1E Contact—Negative contact—for radio battery Contact—Positive contact—for radio battery Dial—Clock and radio control dial—for Model TC-1E Dial—Clock and radio control dial—for Model TC-1E, TC-1FE Door—Battery retainer door Grommet—Speaker mounting grommet Knob—Clock timer function knob Knob—Volume control knob Nut—Retaining nut—for earphone jack Pointer—Tuning indicator	L1, L2	108316	MISCELLANEOUS Jack—Earphone jack Antenna—Ferrite rod antenna Backplate—For control dial—for Model TC-1E and TC-1FE Battery—Nickel-cadmium rechargeable clock battery (1.3 volt) Cabinet—Champagne White—for Model TC-1E Cabinet—Charcoal/Champagne White—for Model TC-1FE Cabinet—Melon/Champagne White—for Model TC-1E Contact—Negative contact—for radio battery Contact—Positive contact—for radio battery Dial—Clock and radio control dial—for Model TC-1E Dial—Clock and radio control dial—for Model TC-1E, TC-1FE Door—Battery retainer door Grommet—Speaker mounting grommet Knob—Clock timer function knob Knob—Volume control knob Nut—Retaining nut—for earphone jack Pointer—Tuning indicator
R1	108308		R1	108308	
R2	108308	R2	108308		
R3	108308	R3	108308		
R4, R5	108308	R4, R5	108308		
R6	108308	R6	108308		
R7	108308	R7	108308		
R8	108308	R8	108308		
R9	108308	R9	108308		
R10	108308	R10	108308		
R11	108308	R11	108308		
R12	108308	R12	108308		
R13	108308	R13	108308		
R14	108308	R14	108308		
R15	108308	R15	108308		
R16	108308	R16	108308		
R17	108308	R17	108308		
R18	108308	R18	108308		
R19	108308	R19	108308		
R20	108308	R20	108308		
S1	108308	S1	108308		
T1	108160	CHASSIS ASSEMBLY RC-1196 CAPACITORS Variable, tuning Included with CIA ceramic, 0.05 mf, +100% -20%, 100 v ceramic, 0.01 mf, ±20%, 100 v Included with CIB ceramic, 0.05 mf, +100% -20%, 100 v ceramic, 0.03 mf, ±20%, 100 v electrolytic, 10 mf, 10 v Included in Speaker Assembly Rectifier—Crystal diode RESISTORS—Fixed, composition, 1/2 watt, unless otherwise specified 22,000 ohm, ±10% 6,800 ohm, ±10% 2,200 ohm, ±10% 1,000 ohm, ±10% 470 ohm, ±10% 1,000 ohm, ±10% 330 ohm, ±10% 47,000 ohm, ±10% 15,000 ohm, ±10% 20 ohm, ±10% 47 ohm, ±10% 100 ohm, ±10% 6,800 ohm, ±10% 12,000 ohm, ±10% 100 ohm, ±10% 2,200 ohm, ±10% Switch—Volume-Alarm switch—part of volume control (V.O.) Switch—ON-OFF switch—part of clock timer Transformer—Oscillator coil Transformer—1st IF transformer Transformer—2nd IF transformer	T1	108160	CHASSIS ASSEMBLY RC-1196 CAPACITORS Variable, tuning Included with CIA ceramic, 0.05 mf, +100% -20%, 100 v ceramic, 0.01 mf, ±20%, 100 v Included with CIB ceramic, 0.05 mf, +100% -20%, 100 v ceramic, 0.03 mf, ±20%, 100 v electrolytic, 10 mf, 10 v Included in Speaker Assembly Rectifier—Crystal diode RESISTORS—Fixed, composition, 1/2 watt, unless otherwise specified 22,000 ohm, ±10% 6,800 ohm, ±10% 2,200 ohm, ±10% 1,000 ohm, ±10% 470 ohm, ±10% 1,000 ohm, ±10% 330 ohm, ±10% 47,000 ohm, ±10% 15,000 ohm, ±10% 20 ohm, ±10% 47 ohm, ±10% 100 ohm, ±10% 6,800 ohm, ±10% 12,000 ohm, ±10% 100 ohm, ±10% 2,200 ohm, ±10% Switch—Volume-Alarm switch—part of volume control (V.O.) Switch—ON-OFF switch—part of clock timer Transformer—Oscillator coil Transformer—1st IF transformer Transformer—2nd IF transformer
T2	108156		T2	108156	
T3	108156		T3	108156	

CLOCK MECHANISM
If clock mechanism repair becomes necessary, remove the clock from the radio. The RCA Victor Distributor in your area will advise you of the address of the nearest authorized service station for clock mechanisms. Repair facilities and replacement parts are available at these authorized service stations.

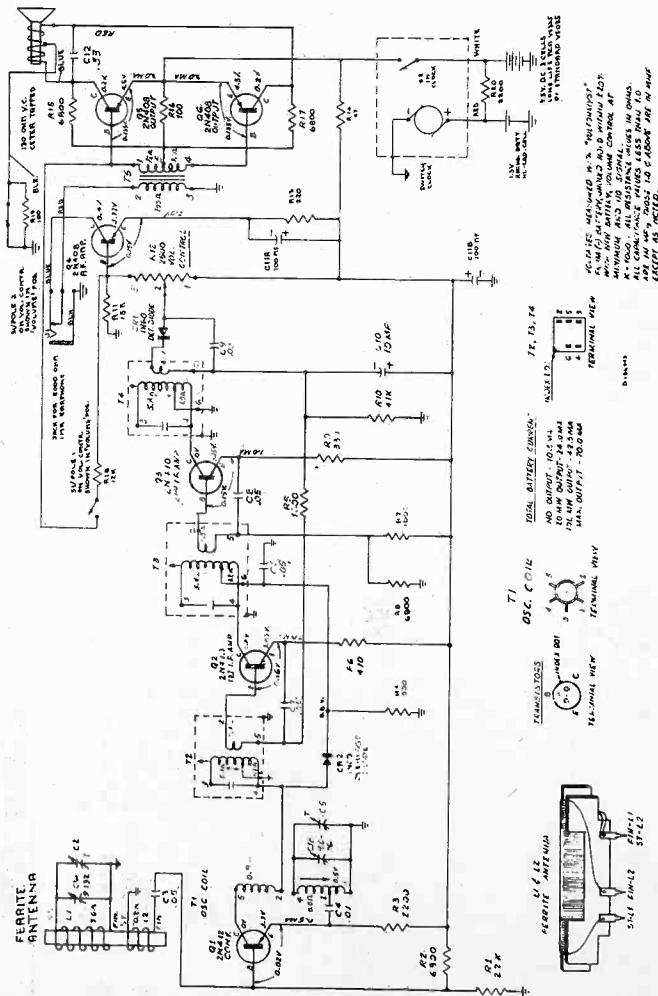
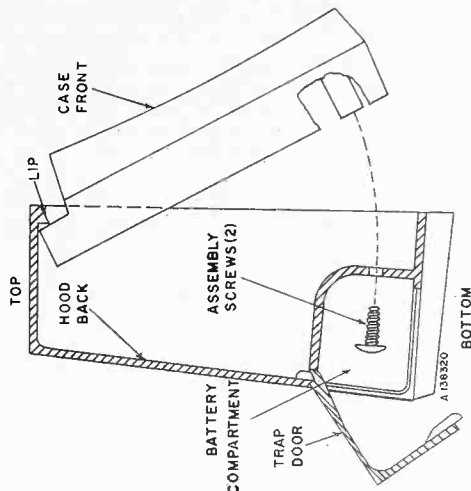
BATTERY INSTALLATION

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

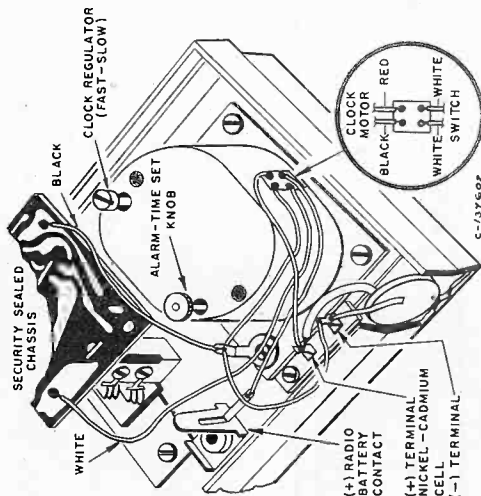
ACCESS TO CHASSIS

The two sections of the case are held together at the bottom by two screws inside the battery compartment and at the top by a lip molded into the hood.
To open the case: Remove the two screws in the battery compartment and swing the case apart at the bottom.
To reassemble the case: Place the top of the case front behind the lip in the top of the hood. Swing the bottom of the case front into the hood, making sure that the top of the front remains in back of the lip at the top of the hood. Check that the negative contact spring has entered the battery compartment through the slot in the compartment wall. Replace the two screws in the battery compartment.

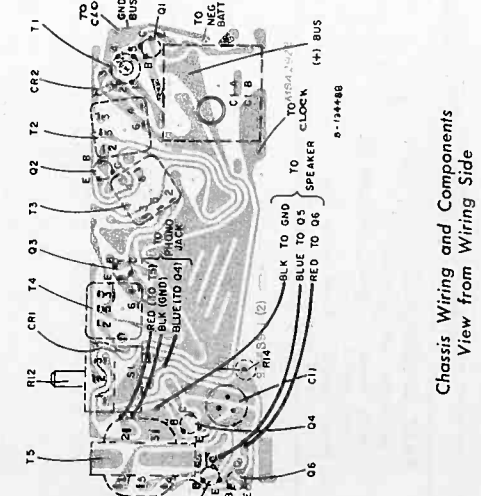
APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS



Schematic Diagram



Clock Connections



Chassis Wiring and Components View from Wiring Side

The assembly represented above is viewed from the wiring side of the board. The printed wiring, on the near side of the board, is presented in a "phenom" view superimposed on the component layout of the reverse side. Component replacement, when necessary, should be made following the techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI—Issue 5—Dated August 25, 1955.

Silverstone TECHNICAL MANUAL — PORTABLE RADIO NO. 528.53650 CHASSIS

HOW TO ORDER REPLACEMENT PARTS

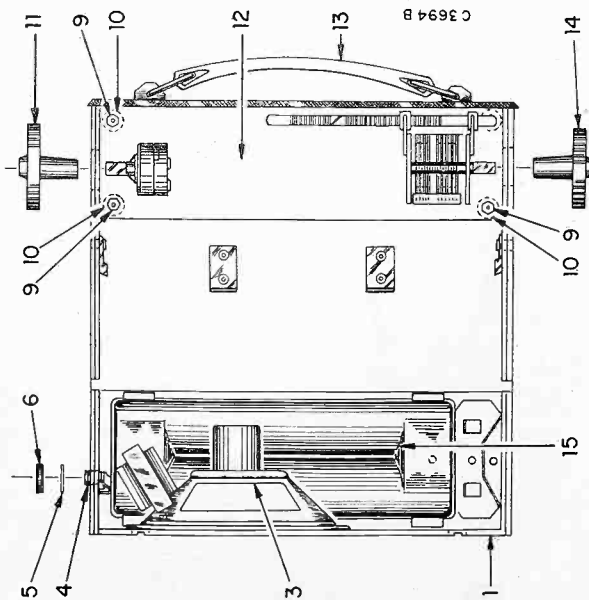
WHERE TO ORDER:
Order from any Sears, Roebuck and Co., U.S.A. or Simpsons-Sears Limited, Canada, Retail or Mail Order Store. Prices are available upon application.

PART ORDERS MUST CONTAIN:

1. Part Number and Description.
2. Chassis Number — found on a metal plate on each chassis.
3. Model Number — found on the back inside, or bottom of cabinet.

USED IN MODEL:

217



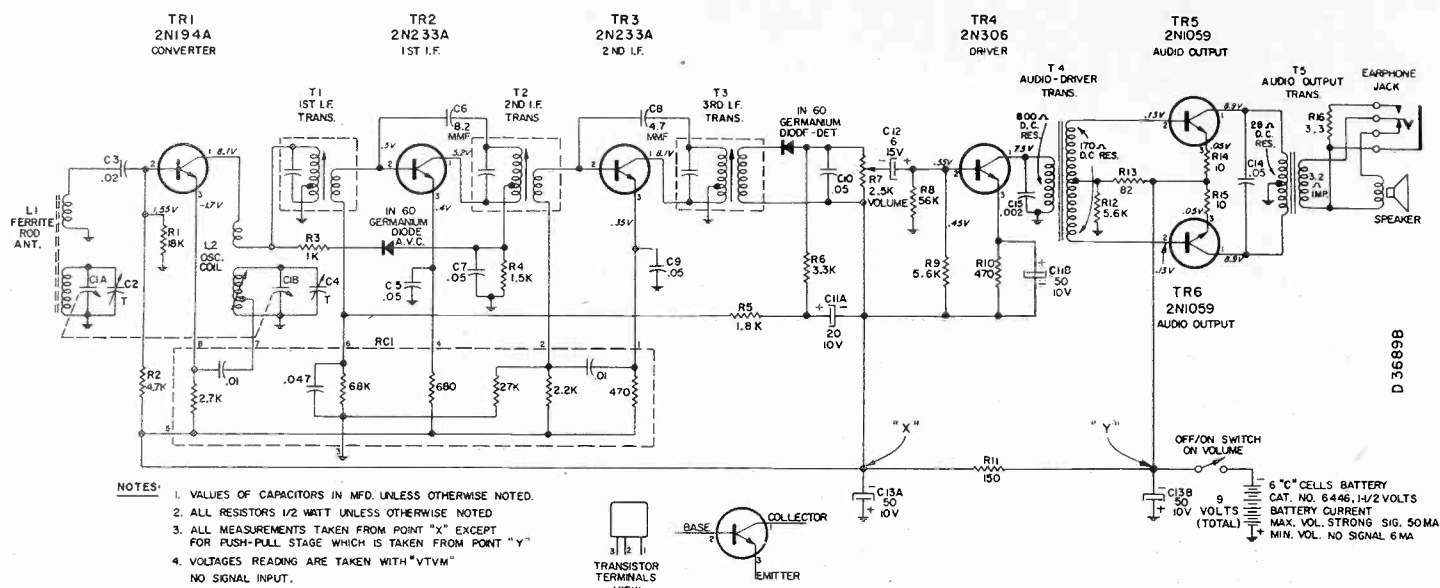
Exploded View of Cabinet

PARTS LIST — CABINET

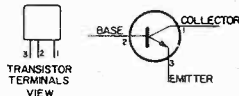
KEY NO.	PART NUMBER	DESCRIPTION	KEY NO.	PART NUMBER	DESCRIPTION
1.	38-3099	Owners Manual	10.	77-53-0	Spacer, Chassis (4)
3.	38-3173-1	Service Data Sheet	11.	52-1248-0	Knob, Volume
	42-94-1	Cabinet, Leatherette	*		Chassis
	33-413-4	Speaker, PM (4" w/Trans)	12.	28-166-1	Pad, Sponge Rubber (Chassis Protector) (2)
	22-138-2	Speed Nut (4)	13.	49-525	Handle
	84-7617	Earphone Jack Assembly (inc. Items 4, 5, 6)	14.	52-1249-0	Knob, Tuning
4.	45-8-1	Earphone Jack	15.	84-9069	Housing, Plastic Battery (Less Separator)
5.	58-510	Flatwasher (1/2 x .265 x .15)		84-9005	Case, Battery Housing
6.	22-182-2	Nut, Knurled (1/4-32 x 7/16)		84-9007	Cover, Battery Housing
9.	56-116	Nut, Hex (6-32 x 1/4) (4)		77-59-0	Separator, Battery

* Not Supplied as a Repair Part.

SEARS, ROEBUCK AND CO. U.S.A., and SIMPSONS-SEARS LIMITED



- NOTES:**
1. VALUES OF CAPACITORS IN MFD. UNLESS OTHERWISE NOTED.
 2. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE NOTED.
 3. ALL MEASUREMENTS TAKEN FROM POINT "X" EXCEPT FOR PUSH-PULL STAGE WHICH IS TAKEN FROM POINT "Y".
 4. VOLTAGES READINGS ARE TAKEN WITH "VTVM" NO SIGNAL INPUT.



Schematic Diagram

CHASSIS 528. 53650

PARTS LIST - RADIO CHASSIS

Schematic Location	Part Number	Description
CAPACITORS		
C1 A & B	19-83-2	Variable Tuning
C2T	*	(Part of L1)
C3	20-130-0	Disc., .02 mfd., 30VDC
C4T	*	(Part of L2)
C5, C7	20-136-0	Disc., .05 mfd., 30VDC
C6	15-829131	Disc., 8.2 mmfd.
C8	15-479131	Disc., 4.7 mmfd.
C9, C10, C14	20-140-0	Disc., .05 mfd., 30VDC
C11 A & B	18-97-5	Electrolytic, 20-50 mfd. @ 10V
C12	18-84-5	Electrolytic, 6 mfd., 15V
C13 A & B	18-96-5	Electrolytic, 50-50 mfd. @ 10V
C15	15-20216	Disc. .002 mfd., G.P.
RESISTORS		
(All Resistors 1/2 W, 10%, unless otherwise noted)		
R1	63-18301	18K ohm
R2	63-47201	4.7K ohm
R3	63-10201	1K ohm
R4	63-15201	1.5K ohm
R5	63-18201	1.8K ohm
R6	63-33201	3.3K ohm
R7	24-356-0	2.5K ohm, Volume Control (Inc. Off/On Switch)
R8	63-56301	56K ohm

Schematic Location	Part Number	Description
RESISTORS (cont'd)		
R9, R12	63-56201	5.6K ohm
R10	63-47101	470 ohm
R11	63-15101	150 ohm
R13	63-82001	82 ohm
R14, R15	63-10001	10 ohm
R16	60-33901	3.3 ohm
RC1	13-34-3	Couplate
TRANSFORMERS & COILS		
T1	10-113-2	Transformer, 1st I.F.
T2	10-114-2	Transformer, 2nd I.F.
T3	10-115-2	Transformer, 3rd I.F.
T4	80-102-1	Transformer, Audio Driver
T5	80-101-1	Transformer, Audio Output (mounted on speaker)
L1	82-153-0	Antenna, Ferrite Rod
L2	10-53-4	Coil, Oscillator
MISCELLANEOUS CHASSIS PARTS		
	33-413-4	Speaker (Inc. T5) 4" P.M.
	45-16-0	Plug, Battery Connector
	11-1530	Bracket, Antenna Mtg. (2)
	25-20-1	Printed Board (less tubes)
* Not supplied as a repair part.		

RADIO CHASSIS NO. 528.53650

ALIGNMENT PROCEDURE

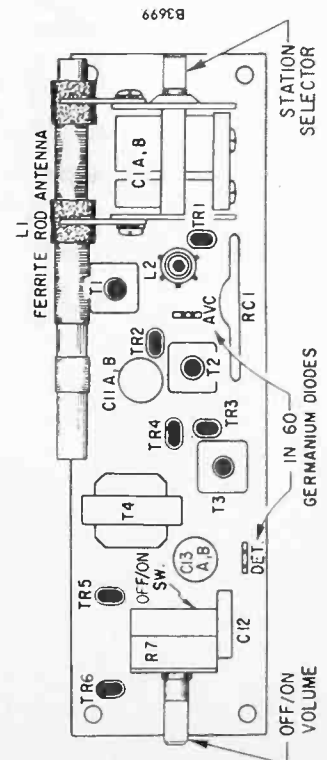
PRELIMINARY:

- NOTE:** When servicing this receiver, use battery, Catalog No. 6446 or equivalent only, otherwise damage to the transistors may result.
- Output meter reading to indicate 0.05 watt across voice coil.....0.4 volt
 Generator ground lead connection.....Common ground
 Generator modulation.....30%, 400 cycles
 Position of volume control.....Fully on

ALIGNMENT NOTES:

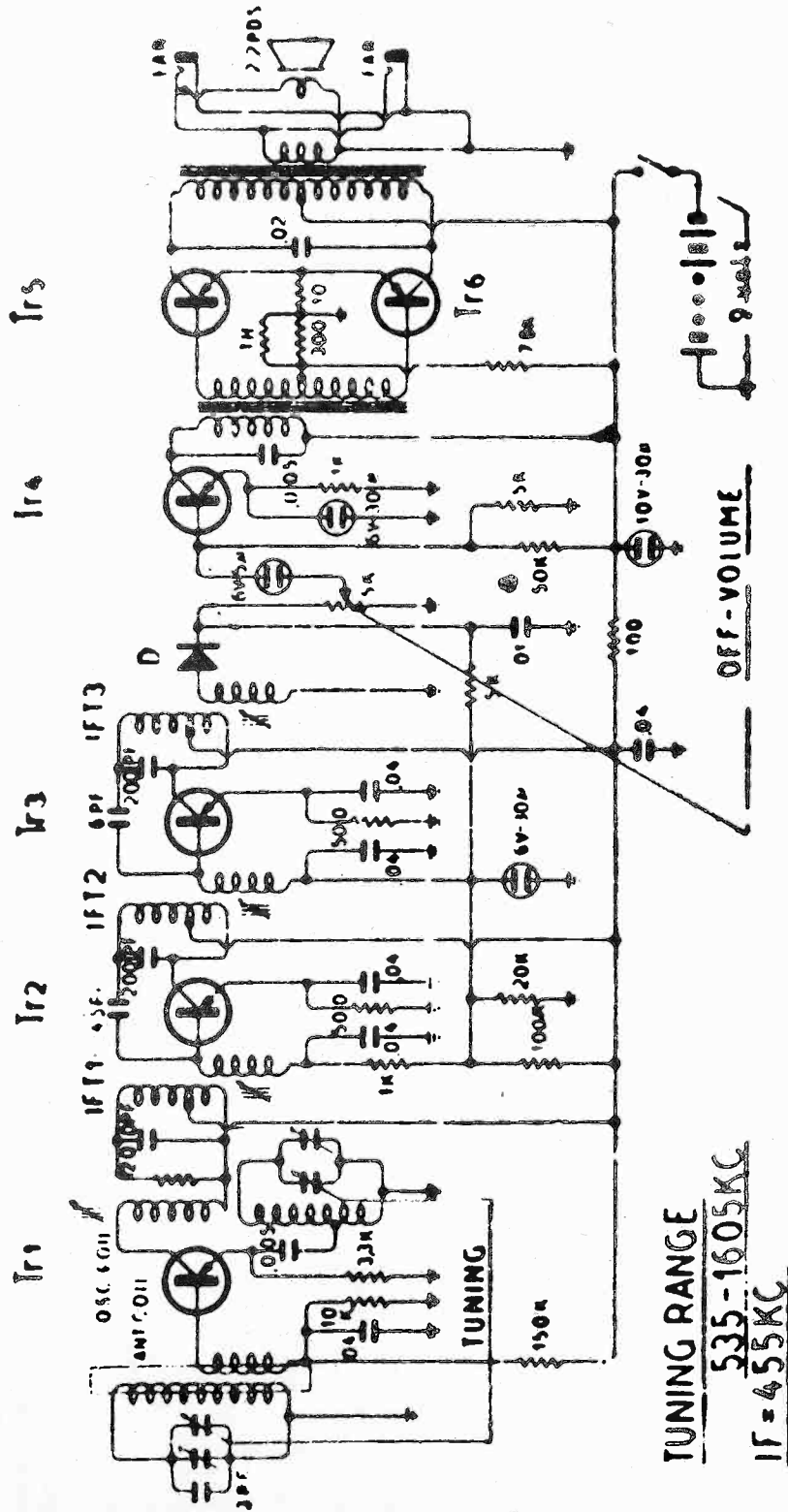
- The alignment must be done in the order given below.
- While making the adjustments below, keep the volume control set for maximum output and the signal generator output attenuated to avoid AVC action.

Step	Position of Tuner	Generator Frequency	Dummy Antenna	Generator Connection	Adjustment for Max. Output	Function
1	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T3	3rd I.F.
2	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T2	2nd I.F.
3	open	455 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	T1	1st I.F.
4	open	1610 Kc.	0.1 mfd.	Base of Converter (Pin 2 TR1)	C4T	Oscillator Trimmer
5	closed	532 Kc.	P. 1 mfd.	Base of Converter (Pin 2 TR1)	L2	Oscillator Coil
6	Repeat steps 4 & 5 until no further changes occur.					
7	1400 Kc.	1400 Kc.	Hazelitine Test Loop		C2T	Antenna Trimmer



Top View of Chassis

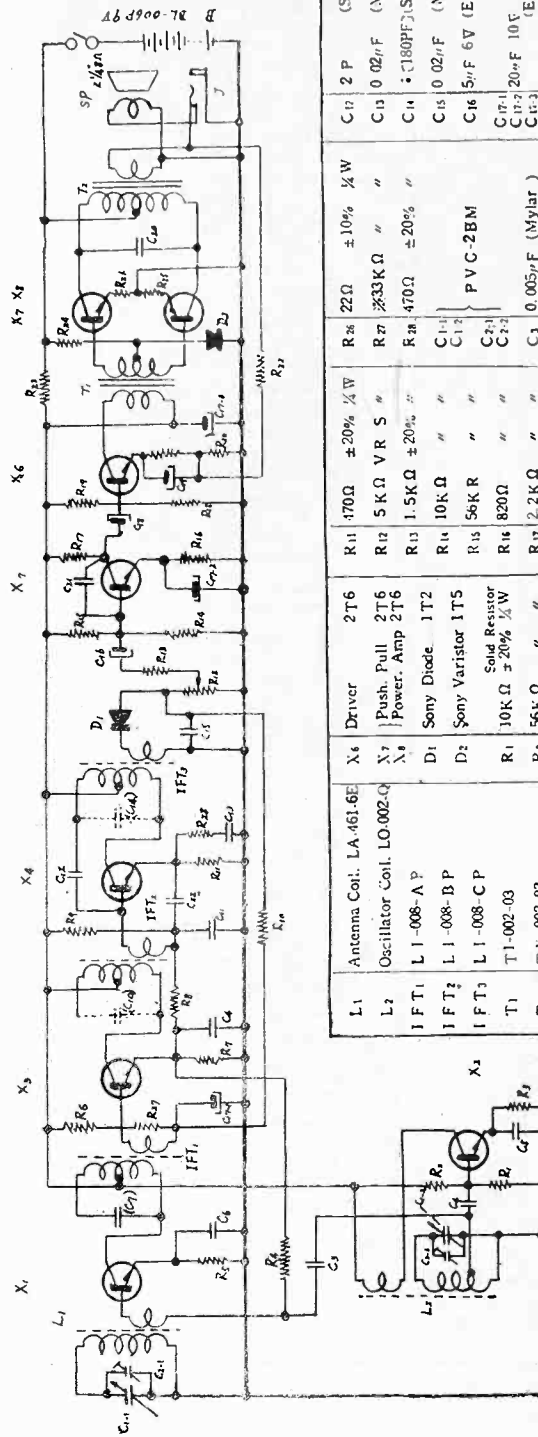
SCHEMATIC DIAGRAM MODEL 6-TRS



TUNING RANGE
535-1605 KC
IF = 455 KC

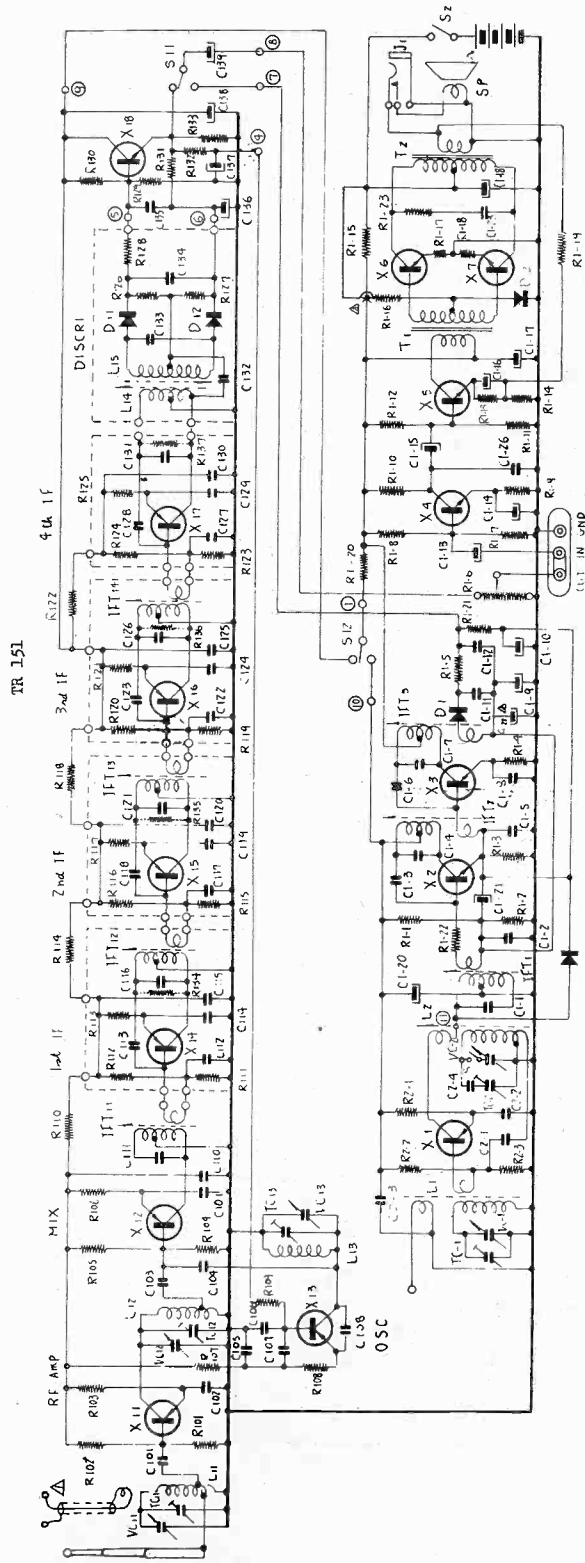
MODEL 6-TRS

Sony Radio TR-86

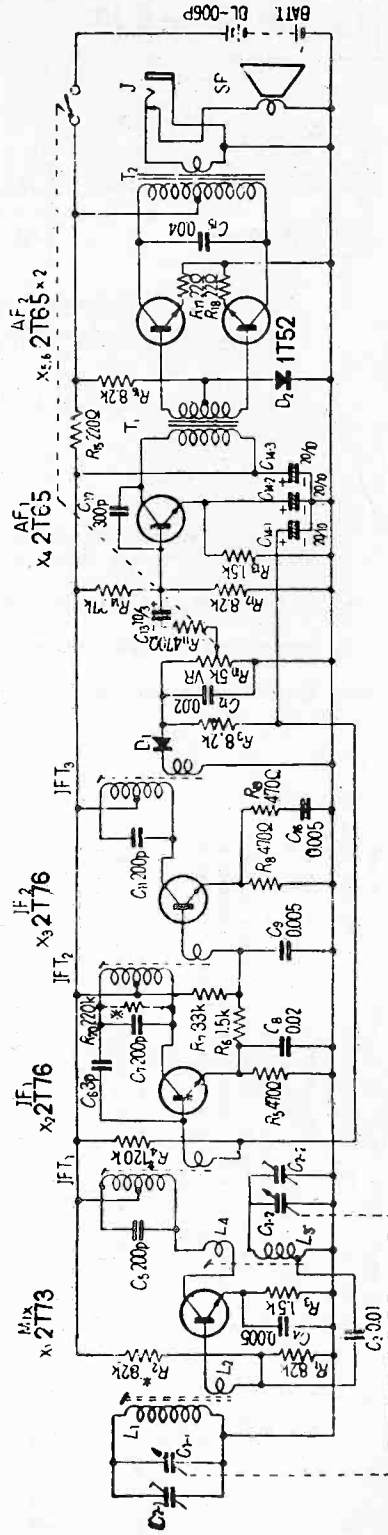


L1	Antenna Coil. LA-461.6E	X6	Driver	2T6	R11	470Ω	±20% 1/4W	R26	22Ω	±10% 1/4W	C17	2P	(Styrol.)
L2	Oscillator Coil. LO-002-Q	X7	Push. Pull	2T6	R12	5KΩ	VR S	R27	33KΩ	"	C18	0.02μF	(Mylar)
IFT1	L1-008-A P	X8	Power. Amp	2T6	R13	1.5KΩ	±20%	R28	470Ω	"	C19	180PF	(Styrol.)
IFT2	L1-008-B P	D1	Sony Diode	1T2	R14	10KΩ	"	C20	PVC-2BM	"	C20	0.02μF	(Mylar)
IFT3	L1-008-C P	D2	Sony Varistor	1T5	R15	56KΩ	"	C21	"	"	C21	5μF	6V (Electrolytic)
T1	T1-002-03	R1	Solid Resistor	"	R16	820Ω	"	C22	"	"	C22	20μF	10V (Electrolytic)
T2	TX-002-03	R2	"	"	R17	2.2KΩ	"	C3	0.005μF	(Mylar)	C18	5μF	6V (Electrolytic)
SP	2 1/2" Permanent Dynamic Speaker. V.C. 8Ω	R3	"	"	R18	10KΩ	"	C4	0.01μF	"	C19	30μF	3V (Electrolytic)
J	Earphone Jack.	R4	"	"	R19	56KΩ	"	C5	0.005μF	"	C20	0.05μF	(M.P.S.)
B	Battery. BL-006P (9V)	R5	"	"	R20	5Ω	±10%	C6	0.01μF	"	C21	0.001μF	(Mylar)
X1	Sony Transistor	R6	"	"	R21	680Ω	±20%	C7	180PF	(Styrol.)	C22	0.02μF	(Mylar)
X2	Mixer. 2T7	R7	"	"	R22	220Ω	"	C8	"	"	C9	0.02μF	(Mylar.)
X3	IF Amp. 2T7	R8	"	"	R23	220Ω	"	C9	0.02μF	(Mylar.)	C10	180PF	(Styrol.)
X4	IF Amp. 2T7	R9	"	"	R24	5.6KΩ	"	C10	180PF	(Styrol.)	C11	0.001μF	(Mylar)
X5	AF Amp. 2T6	R10	"	"	R25	22Ω	±10%	C11	0.001μF	(Mylar)			

⊗ - To be adjusted. ⊕ - Mounted inside IFT.



SONY TR-610



L1	L2	Ant. coil	R4	120 K Ω	R16	8.2 K Ω	C8	0.02 μ F	
L3	L4	Osc. coil	R5	470 Ω	R17	22 Ω	C9	0.005 μ F	
IFT1	IFT2	002-AP	R6	1.5 K Ω	R18	22 Ω	C10	200 pF	
IFT2	IFT3	002-BP	R7	33 K Ω	R19	470 Ω	C11	0.02 μ F	
IFT3	T1	002-CP	R8	470 Ω	R20	220 K Ω	C12	10 μ F	
T1	T2	Input Transformer	R9	8.2 K Ω	C1	} Tuning Condenser	C13	20 μ F	
T2	J	Output Transformer	R10	VR 5 K Ω	C2		"	C14-1	"
J	S.P.	Earphone Jack	R11	470 Ω	C3		0.01 μ F	C14-2	"
S.P.	R1	2 1/4" Dynamic Speaker	R12	8.2 K Ω	C4		0.005 μ F	C14-3	0.04 μ F
R1	R2	8.2 K Ω	R13	1.5 K Ω	C5	200 pF	C15	0.005 μ F	
R2	R3	82 K Ω	R14	27 K Ω	C6	3 pF	C16	300 pF	
R3		1.5 K Ω	R15	220 Ω	C7	200 pF	C17		

COMPLETE SERVICE INFORMATION

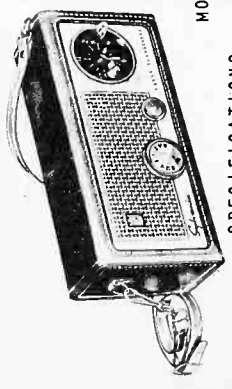
CHASSIS 1-616-2

for

CHASSIS: 1-616-2
MODELS: 3406 SERIES



SYLVANIA HOME ELECTRONICS, a division of Sylvania Electric Products Inc., Service Dept., Batavia, N.Y.



MODEL 3406

SPECIFICATIONS

- FREQUENCY RANGE.....540 KC to 1650 KC
- IF FREQUENCY.....455 KC
- SPEAKER.....3" PM
- POWER SUPPLY (RADIO).....9 Volts
- (6-1.5 V size "C" Batteries)
- POWER SUPPLY (CLOCK).....1.5 Volts
- (1-1.5 V size "D" Battery)

TRANSISTOR COMPLEMENT

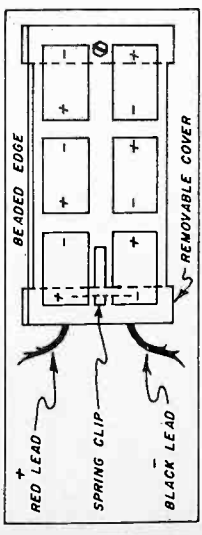
- Converter.....2N212
- Oscillator.....2N193
- 1st IF Amplifier.....2N94
- 2nd IF Amplifier.....2N94
- AF Amplifier.....2N35
- AF Output Amplifier.....2N214
- AF Output Amplifier.....2N214
- Detector.....Crystal Diode
- (Part of 3rd IF Transformer)

BATTERY INSTALLATION

Use 1½ volt flashlight batteries only. Observe proper polarity to prevent damage to receiver.

Radio:

Release cover by depressing spring clips. Install six (6) "C" size batteries in large holder as illustrated.



Install a single "D" size battery in com-

partment at lower left corner of case. Note: proper polarity is indicated on compartment.

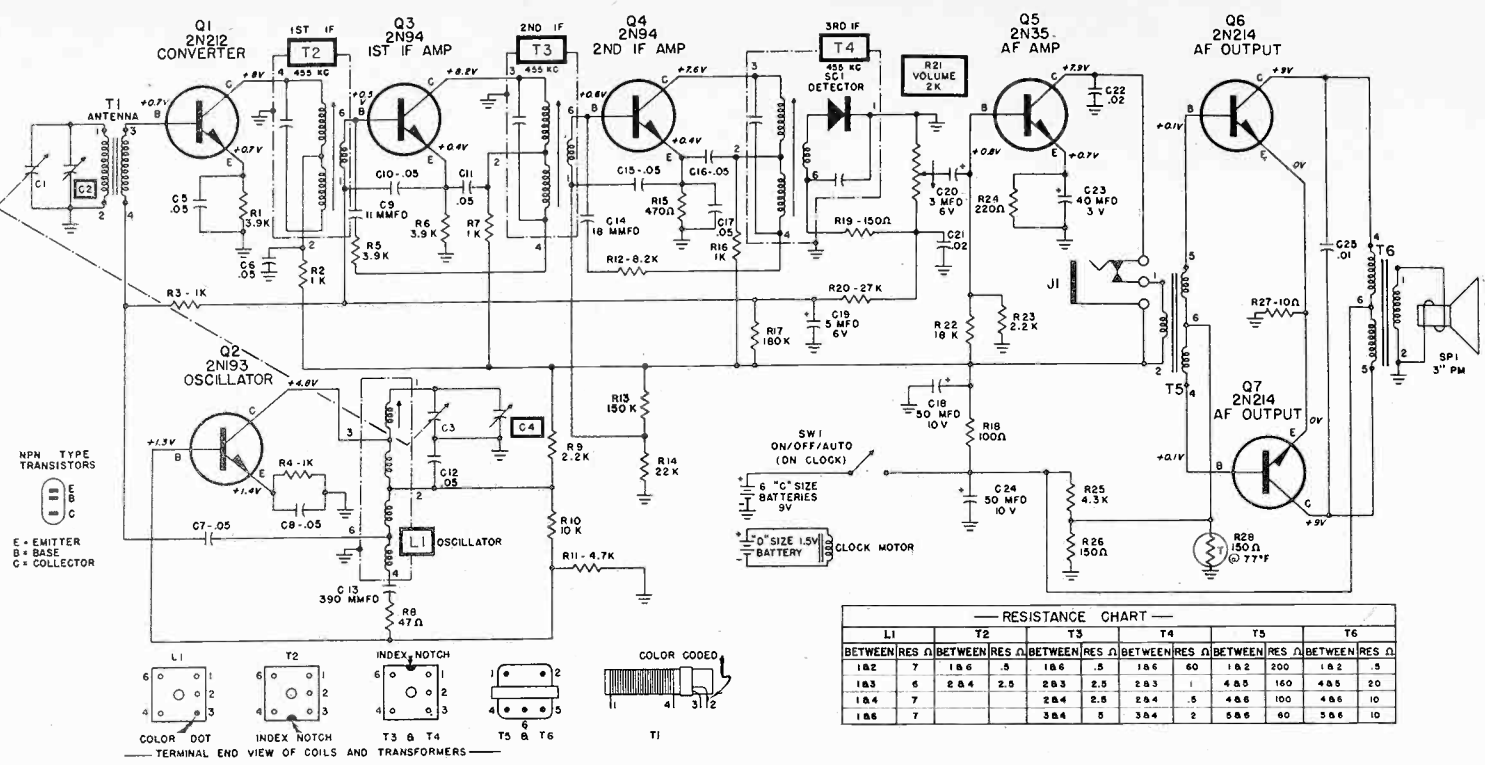
Caution: to prevent damage, always remove discharged batteries.

CHASSIS REMOVAL

1. Remove volume and tuning knobs by pulling straight out.
2. Unsnap buttons securing back flap, lift flap and remove large battery case as far as leads permit.
3. Remove four (4) nuts and insulating washers securing chassis to case, (2) located left edge of board, (1) located center of board and (1) located lower right corner of board. Remove chassis from case. (Speaker and clock lead lengths permit removal of chassis from case without unsoldering. If necessary to remove chassis from case completely, identify all leads, unsolder speaker leads at speaker, clock leads at terminals on chassis.
4. To replace chassis, reverse the above procedure, making certain all leads unsoldered are soldered at correct terminals and insulating washers in place.

CLOCK REMOVAL

1. Remove clock control knobs by pulling straight out.
2. Unsnap buttons securing back flap, lift flap and remove clock battery ("D" size) from case as far as leads permit.
3. Remove four (4) speed nuts securing clock to case and remove clock.
4. Identify and unsolder leads from clock.
5. To replace clock, reverse the above procedure. Make certain leads are soldered at correct terminals.



RESISTANCE CHART

T1		T2		T3		T4		T5		T6	
BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω	BETWEEN RES Ω
1B2	7	1B6	5	1B6	5	1B6	60	1B2	200	1B2	5
1B3	5	2B4	2.0	2B3	2.5	2B3	1	4B5	160	4B5	20
1B4	7			2B4	2.5	2B4	.5	4B6	100	4B6	10
1B6	7			3B4	5	3B4	2	5B6	60	5B6	10

SCHEMATIC NOTES:

1. VOLTAGES MEASURED TO NEGATIVE "B" USING SYLVANIA "POLYMER" BATTERY VOLTAGE WITH RECEIVER OPERATING 9V. RECEIVER TUNED TO LOCAL STATION.
2. VOLTAGES SHOWN ARE AVERAGE READINGS. VARIATIONS MAY BE NOTED DUE TO NORMAL PRODUCTION TOLERANCES.
3. COIL AND TRANSFORMER RESISTANCES ARE AVERAGE VALUES AND ARE TAKEN WITH COMPONENTS CONNECTED IN CIRCUIT.
4. T2, T3, T4 ARE BIFILAR. T5, T6 PRIMARIES ONLY ARE BIFILAR.
5. INTERMEDIATE FREQUENCY 455 KC.
6. ⚡ DESIGNATES NEGATIVE "B".

REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
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CAPACITORS

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
C1, C2		SEE "MISC. ELECTRICAL PARTS"	R15		470 OHM - 20% - 1/4W
C3, C4		SEE "MISC. ELECTRICAL PARTS"	R16		1.000 OHM - 20% - 1/4W
C5	169-0054	.05 MFD - 50V - CERAMIC	R17		180,000 OHM - 10% - 1/4W
C6	169-0054	.05 MFD - 50V - CERAMIC	R18		100 OHM - 20% - 1/4W
C7	169-0054	.05 MFD - 50V - CERAMIC	R19	189-0075	150 OHM - 20% - 1/10W
C8	169-0054	.05 MFD - 50V - CERAMIC	R20		27,000 OHM - 10% - 1/4W
C9	166-0011	11 MMFD - 10% - CERAMIC	R21	152-0038	2.000 OHM - VOLUME CONTROL
C10	169-0054	.05 MFD - 50V - CERAMIC	R22		18,000 OHM - 10% - 1/4W
C11	169-0054	.05 MFD - 50V - CERAMIC	R23		2.200 OHM - 10% - 1/4W
C12	169-0054	.05 MFD - 50V - CERAMIC	R24		220 OHM - 20% - 1/4W
C13		390 MMFD - 10% - 300V - MICA	R25		4.300 OHM - 10% - 1/4W
C14	168-0022	18 MMFD - 10% - CERAMIC	R26		150 OHM - 10% - 1/4W
C15	169-0054	.05 MFD - 50V - CERAMIC	R27	189-0076	150 OHM - 20% - 1/4W
C16	169-0054	.05 MFD - 50V - CERAMIC			
C17	169-0054	.05 MFD - 50V - CERAMIC			
C18	161-1039	50 MFD - 10V - ELECTROLYTIC			
C19	161-1038	5 MFD - 6V - ELECTROLYTIC			
C20	161-1037	3 MFD - 6V - ELECTROLYTIC			
C21	169-0056	.02 MFD - 50V - CERAMIC			
C22	169-0055	.02 MFD - 50V - CERAMIC			
C23	161-1036	40 MFD - 3V - ELECTROLYTIC			
C24	169-1039	50 MFD - 10V - ELECTROLYTIC			
		.01 MFD - 500V - CERAMIC			

COILS AND TRANSFORMERS

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
L1	113-0038	COIL - OSCILLATOR			
T1	581-0011	ANTENNA - IRON CORE			
T2	121-0029	TRANSFORMER - 1ST IF			
T3	122-0029	TRANSFORMER - 2ND IF			
T4	122-0030	TRANSFORMER - 3RD IF			
T5	143-0056	TRANSFORMER - DRIVER			
T6	143-0077	TRANSFORMER - OUTPUT			

RESISTORS

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
R1		3.900 OHM - 10% - 1/4W			
R2		1.000 OHM - 20% - 1/4W			
R3		1.000 OHM - 20% - 1/4W			
R4		1.000 OHM - 20% - 1/4W			
R5		3.900 OHM - 10% - 1/4W			
R6		3.900 OHM - 10% - 1/4W			
R7		1.000 OHM - 20% - 1/4W			
R8		47 OHM - 20% - 1/4W			
R9		2.200 OHM - 10% - 1/4W			
R10		10,000 OHM - 10% - 1/4W			
R11		4.700 OHM - 10% - 1/4W			
R12		8.200 OHM - 10% - 1/4W			
R13		150,000 OHM - 10% - 1/4W			
R14		22,000 OHM - 10% - 1/4W			

CHASSIS PARTS

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
J1	412-0049	SOCKET - TRANSISTORS			
	419-0026	SOCKET - EARPHONE			
	489-0036	STOP - VOLUME CONTROL			

MISCELLANEOUS ELECTRICAL PARTS

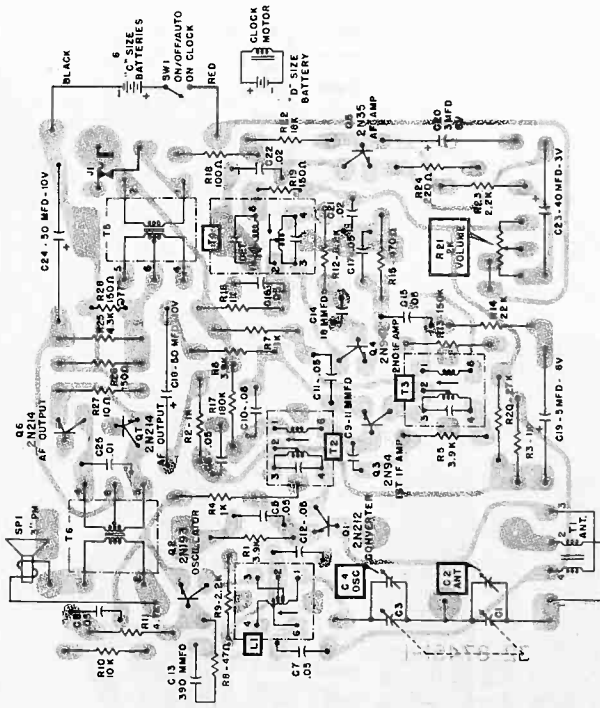
SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
C1	170-0025	VARIABLE TUNING CAPACITOR			
C2		ANTENNA GANG			
C3		ANTENNA TRIMMER			
C4		OSCILLATOR GANG			
SC1		OSCILLATOR TRIMMER			
SW1		DETECTOR - NOT REPLACEABLE			

ALIGNMENT PROCEDURE

PRELIMINARY INSTRUCTIONS

1. Remove chassis from case as outlined under "Chassis Removal" procedure.
2. Allow receiver and signal generator several minutes warm-up time.
3. Set signal generator for an amplitude modulated RF output signal.
4. Maintain signal generator output at lowest usable level.
5. Use an audible check only.
6. Adjust volume control to full volume.

STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST FOR MAXIMUM VOLUME
1.	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - radiate signal to receiver through a loop consisting of several turns of wire in series with a 150 Ohm resistor. Set generator frequency at 455 KC.	In order shown T4, T3, T2. Repeat for optimum performance.
2.	Set dial to approximately 1650 KC.	SIGNAL GENERATOR - radiated to receiver as in step 1. Set generator frequency at 1650 KC.	C4 (oscillator trimmer)
3.	Set dial to a frequency between 1400 KC and 1500 KC.	SIGNAL GENERATOR - radiated to receiver as in step 1. Set generator to a frequency corresponding to receiver dial (until signal is heard) through receiver speaker.)	C2 (antenna trimmer)
4.	Set dial to 600 KC.	SIGNAL GENERATOR - radiated to receiver as in step 1. Set generator to 600 KC and tune for maximum volume.	L1 (oscillator coil) while simultaneously rocking the tuning capacitor through the 600 KC position.

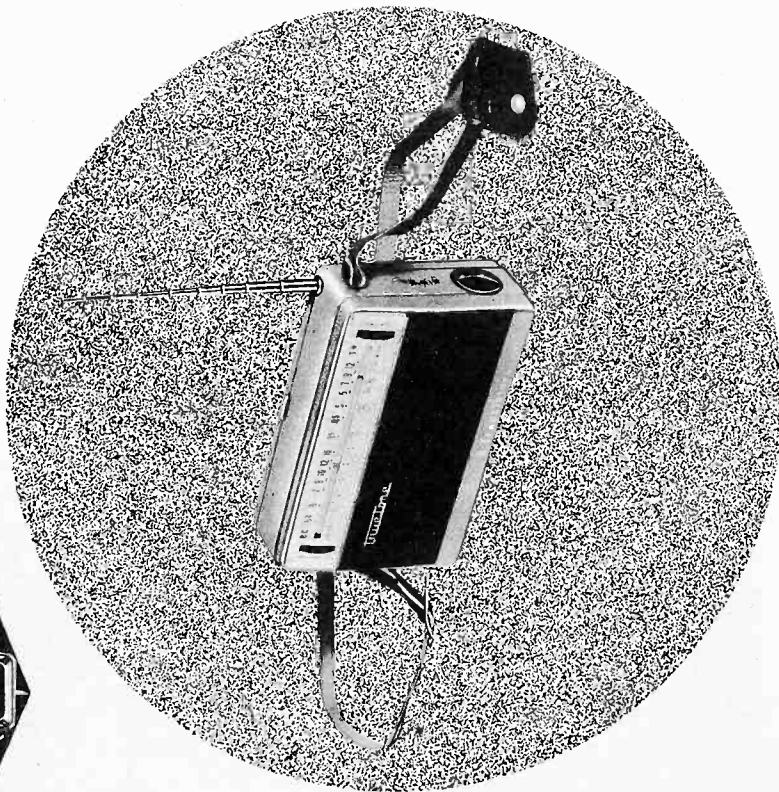


Heavy shaded areas indicate bottom foil.

Manual No. 10-497

Truetone
8 TRANSISTOR 2 BAND
PORTABLE RADIO

INSTALLATION, OPERATING and SERVICE INSTRUCTIONS



MODEL NO. DC3050

WESTERN AUTO SUPPLY CO.

MODEL NO. DC3050 SERVICE INSTRUCTIONS

TWO BAND RECEIVER

GENERAL DESCRIPTION & ELECTRICAL SPECIFICATIONS:

The Truetone "Eight Transistor" Portable is, as its name implies, a 2-band radio receiver using eight transistors of the latest type for best performance. Especially, a drift transistor of excellent quality is adopted to the Oscillator stage.

The receiver uses a superheterodyne circuit, designed on a printed circuit board, and consists of: (1) a mixer stage, a separate oscillator stage, two (2) stages of I.F. amplification, a diode detection stage, an audio amplification stage, audio driver stage and a push-pull class "B" output stage. An automatic gain control is used on the 1st and 2nd I.F. stages. A ferrite rod antenna provides high signal pickup of standard broadcast waves & excellent image rejection. A telescope antenna provides high signal pickup of short waves. The I.F. transformers are of permeability designed for high gain and maximum stability.

The receiver uses a battery pack of six (6) standard 1 1/2 volt "Penlite" batteries.

For good reception, the life of the batteries is approximately 60 hours, when the receiver is used about 2 hours per day. For private listening, two earphone sockets are provided for insertion of earphone. When an earphone is inserted to the front socket, the speaker is automatically disconnected.

Insertion of an earphone to the rear socket gives sounds from both the speaker and the earphone.

BATTERY DRAIN: 12 MA(No signal)

Tuning Range: BC: To tune through 535 - 1640 KC
SHORT WAVE BAND: To tune through 3.9 - 12 MC

I. F. STAGES: 455 KC

LOUD SPEAKER: 3" P.M. Alnico V

VOICE COIL IMPEDANCE: 8.5 ohms at 400cps

TRANSISTOR COMPLEMENT:

- 2593 - Mixer
- 2592 - Oscillator
- 2545 - 1st I.F.
- 2553 - 2nd I.F.
- 2554 - Audio Amp.
- 2554 - Audio Driver
- 2-2556 - (Matched) P.P. Output

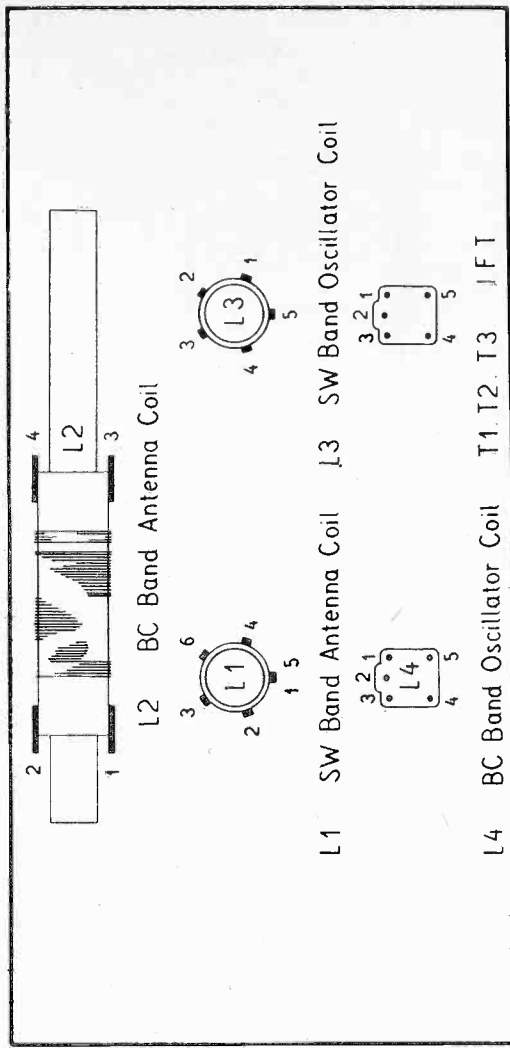
BATTERY COMPLEMENT: (six) Standard 1 1/2 volt "Penlite" cells, such as WIZARD 3B6710, Eveready 915, Burgess Z or Mercury batteries such as Wizard 3B6810, RCA VS-034, Mallory M15R, Eveready E9E or equivalent.

WARNING: Old or exhausted batteries may damage the radio. Remove batteries from cabinet if your radio is to stand unused for a long period of time.

REMOVAL OF PRINTED CIRCUIT BOARD FROM CABINET:

1. Pull out band selector knob.
2. Open rear cover and remove the 2 screws which hold the printed board to cabinet.
3. Lift the printed board out of cabinet.

Unsold speaker leads and earphone leads, if servicing requires removal of the board from cabinet.



MODEL NO. DC3050 PARTS PRICE LIST

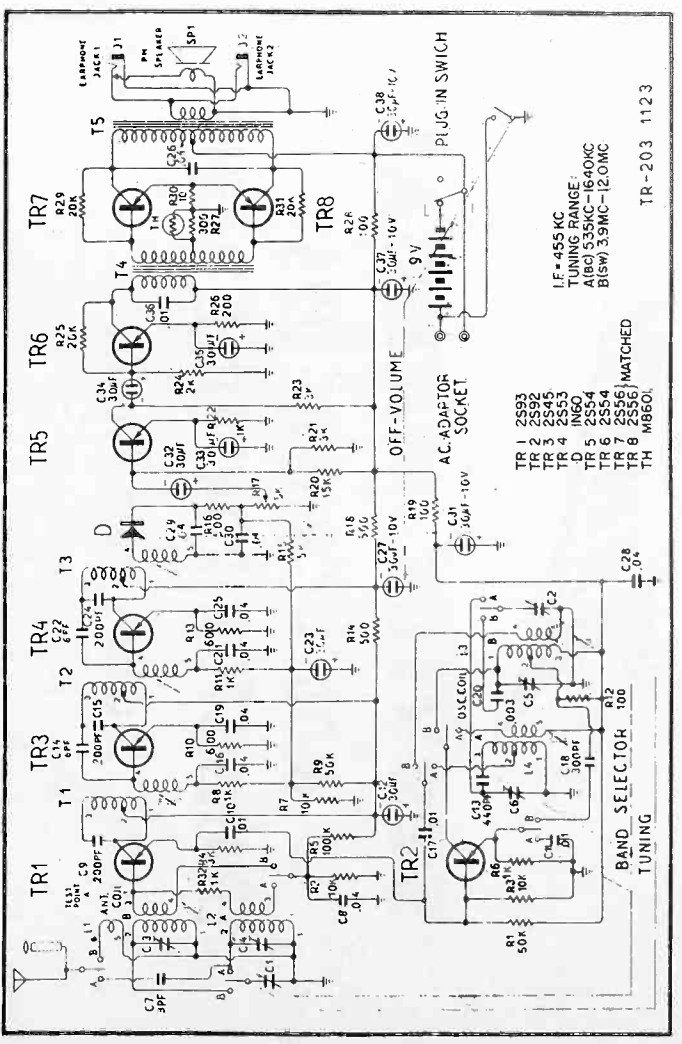
Table with columns: Ref. No., Part No., Description, Approximate Selling Price. Includes sections for RESISTORS, CAPACITORS, COILS AND TRANSFORMERS, MISCELLANEOUS, and CAPACITOR.

MODEL NO. DC3050 ALIGNMENT INSTRUCTIONS

Should it become necessary at any time to check the alignment of this receiver, proceed as follows: 1) Connect an output meter across the speaker voice coil lugs. 2) Set volume control for maximum. 3) Attenuate signal generator output to provide no more than .4 volts on output meter to prevent overloading.

Table with columns: STEP, Set Band Selector To, Set Receiver Dial To, Adjust Test Oscillator Frequency To, TEST OSCILLATOR (Use Dummy Antenna In Series With Output Of Signal Generator Consisting Of: 05 mfd Condenser), Attach Output of Signal Generator To, Refer to Fig. 2 for location of Alignment Adjustments.

SCHEMATIC WIRING DIAGRAM





SERVICE MANUAL

MODEL "ROYAL 275"

TRANSISTOR PORTABLE RADIO

CHASSIS 7CI40ZI & 7CT40Z2

GENERAL

These transistor portable chassis are conventional superheterodyne receivers using an individual mixer and oscillator to produce the 455Kc intermediate frequency. Chassis 7CT40Z1 & 7CT40Z2 are virtually identical except for different transistors and a few other parts. The parts marked by asterisks on the chassis wiring and component drawing apply only to chassis 7CT40Z2. The first and second intermediate frequency amplifiers are conventional. A (103-19) is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis uses a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

Power Supply Four Zenith type Z-8 or Z-9 1 1/2 volt batteries or four 1 1/2 volt penlite batteries
 Frequency Range 540 to 1600 KC
 Intermediate Frequency 455 KC
 Sensitivity Approximately 185 microvolts/meter for 50 milliwatts output
 Power Output Undistorted 100 milliwatts
 Power Output Maximum 180 milliwatts
 Speaker 2 3/4 inch P.M.
 Alnico V-Voice Coil Impedance 15 ohms at 400 cycles
 Accessory Earphone B39-24 impedance 15 ohms at 1000 cycles

PRINTED CIRCUIT SERVICING

Servicing printed circuit sets is, in general, much the same as servicing ordinary receivers. However, certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
 2. Sharp wire cutters.
 3. Small stiff glue brush (for solder removal).
 4. Pencil type soldering iron with a small tip (25 watts or less).
- WARNING:** Excessive heat may damage the printed circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.
5. Tin leads on component before soldering.
 6. Use only EUTECTIC solder 63% tin 37% lead. This solder has an extremely low melting point.
 7. Metal pick (soldering aid).

COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or I.F. transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the printed wiring. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of printed circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.

CHASSIS PARTS Chassis 7CT40Z1

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2364	C12,20	Variable capacitor mtg. bracket	.10
22-2726		50 mfd. electrolytic - 6 V. (2 used)	1.50
22-2728	C2	.05 mfd. ceramic disc - 25 V.	.60
22-3034	C18	.001 mfd. ceramic disc - 25 V.	.45
22-2729	C16	16 mfd. electrolytic - 3 V.	.25
22-2871	C11	3 mfd. electrolytic - 12 V.	1.50
22-2884	C3,7	.02 mfd. ceramic disc - 25 V.	1.50
22-2885	9,10	.02 mfd. ceramic disc - 25 V.	.25
22-2998	C14	1 mfd. mylar - 50 V.	.35
22-3010	C13,19	.01 mfd. ceramic disc - 25 V. (2 used)	.45
22-3011		2 section variable capacitor	4.25
22-3156	C5	8 mfd. ceramic disc - 500 V.	.25
22-3165	C6,8	.05 mfd. ceramic disc - 25 V. (4 used)	.35
27-257		Paper disc	.03
44-34	J1	Miniature jack	.35
49-891	SP1	2 3/4" P.M. speaker	.90
54-74		2-56 x 3/16 hex. nut (1 used on ea. 112-1048)	.03
54-417		1/4-32 x 3/8 hex. nut - brass (1 mts. ea. 44-34 & 63-4602)	.10
63-1701		10 ohm 1/2W Ins. 10%	.17
63-1744		100 ohm 1/2W Ins. 20%	.17
63-1747		120 ohm 1/2W Ins. 10%	.17
63-1758		220 ohm 1/2W Ins. 20%	.17
63-1765		330 ohm 1/2W Ins. 20%	.17
63-1771		470 ohm 1/2W Ins. 10%	.17
63-1786		1000 ohm 1/2W Ins. 20%	.17
63-1806		3300 ohm 1/2W Ins. 10%	.17
63-1810		3900 ohm 1/2W Ins. 10%	.17
63-1813		4700 ohm 1/2W Ins. 10%	.17
63-1827		10 K ohm 1/2W Ins. 10%	.17
63-1841		22 K ohm 1/2W Ins. 10%	.17
63-1855		47 K ohm 1/2W Ins. 10%	.17
63-1876		150 K ohm 1/2W Ins. 10%	.17
63-4602	R1	3 contact socket (7 used)	2.05
78-1067		Battery contact spring (2 used)	.15
80-1075		Battery contact spring (2 used)	.10
80-1247		Battery contact spring	.03
80-1317		Polyethylene strip (battery pull-out)	.03
83-3178		.095 x 1/4 x 1/32 bakelite washer (1 used on ea. 112-1048)	5.00
93-1270		Driver transformer	3.50
95-1518	T4	Audio output transformer	3.50
95-1519	T5	1st I.F. transformer	3.50
95-1600	T2	2nd I.F. transformer	3.50
95-1601	T3	3rd I.F. transformer	3.50
95-1602	T6	Oscillator transformer	.75
95-1675	X1	Crystal diode	.03
103-19		6-32 x 1/4 bind hd. mach. screw (joins 49-891 & S-46795)	.03
112-1016		2-56 x 1/4 bind hd. mach. screw (2 used on S-46795)	.03
112-1048		4-40 x 3/16 rd. hd. mach. screw - lock washer att. (used on S-46794)	.03
113-6		4-40 x 5/32 hex. hd. mach. screw - lock washer att. (2 join 12-2364 & 22-2924)	.03
113-69		Transistor - output (match pair)	5.60
121-19		Transistor - driver	3.15
121-52		Transistor - oscillator	4.05
121-53			

CABINET PARTS Models Royal 275B, F, J & Y

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-8		1 1/2 volt battery (use 4)	
Z-9		Mercury cell	
14-2743		Plastic cabinet - rear - Royal 275Y	
14-2744		Plastic cabinet - rear - Royal 275F	
14-2747		Plastic cabinet - rear - Royal 275B	
14-2748		Plastic cabinet - rear - Royal 275J	
16-1582		Packing carton	
36-243		Cabinet handle	
46-2237		Tuning control knob	
57-2764		Escutcheon	
97-2765		Emblem plate	
97-525		Grille cloth - Royal 275Y	
110-385		Grille cloth - Royal 275F	
110-356		Grille cloth - Royal 275B	
110-357		Grille cloth - Royal 275J	
110-358		6-20 x 3/8 phils. pan hd. self-tap. screw (2 used on 7CT40Z1)	.03
112-773		4-24 x 7/32 phils. pan hd. self-tap. screw - flat washer att. (2 used on 57-2764)	.05
112-1239		6-32 x 7/16 mach. screw (2 used on ea. 14-2743, 14-2744 & 14-2747)	.03
112-1252		Knob clamping ring (part of S-46804)	.03
188-204		Knob clamping ring (part of S-46811)	.03
188-209		Speaker gasket	
196-335		Instruction book	
202-1474		Knob & ring assembly (volume)	
S-46804		Front cabinet - Royal 275Y	
S-46811		Dial scale & bushing assembly	
S-47045		Front cabinet - Royal 275F	
S-47047		Front cabinet - Royal 275B	
S-47049		Front cabinet - Royal 275J	

PARTS USED ON 7CT40Z2 ONLY

PART NO.	DIA. NO.	DESCRIPTION	PRICE
22-3156	C21	8 mmf. 500 V.	
22-3157	CS	12 mmf. 500 V.	
95-1586	T3	3rd I.F. transformer	
95-1594	T1	1st I.F. transformer	
95-1595	T2	2nd I.F. transformer	
95-1690	T6	Oscillator transformer	
121-61		Transistor - output (matched pair)	
121-62		Transistor - mixer	
121-64		Transistor - driver	
121-65		Transistor - oscillator	
121-73		Transistor - 1st I.F.	
121-74		Transistor - 2nd I.F.	
S-46800	L1	Resistor - 6800 ohm 1/2W Ins. 10%	
		Antenna assembly	

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

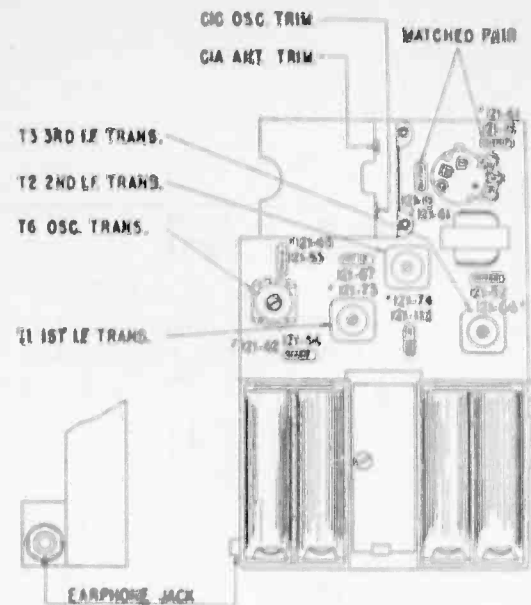
MODEL ROYAL 275

ALIGNMENT PROCEDURE

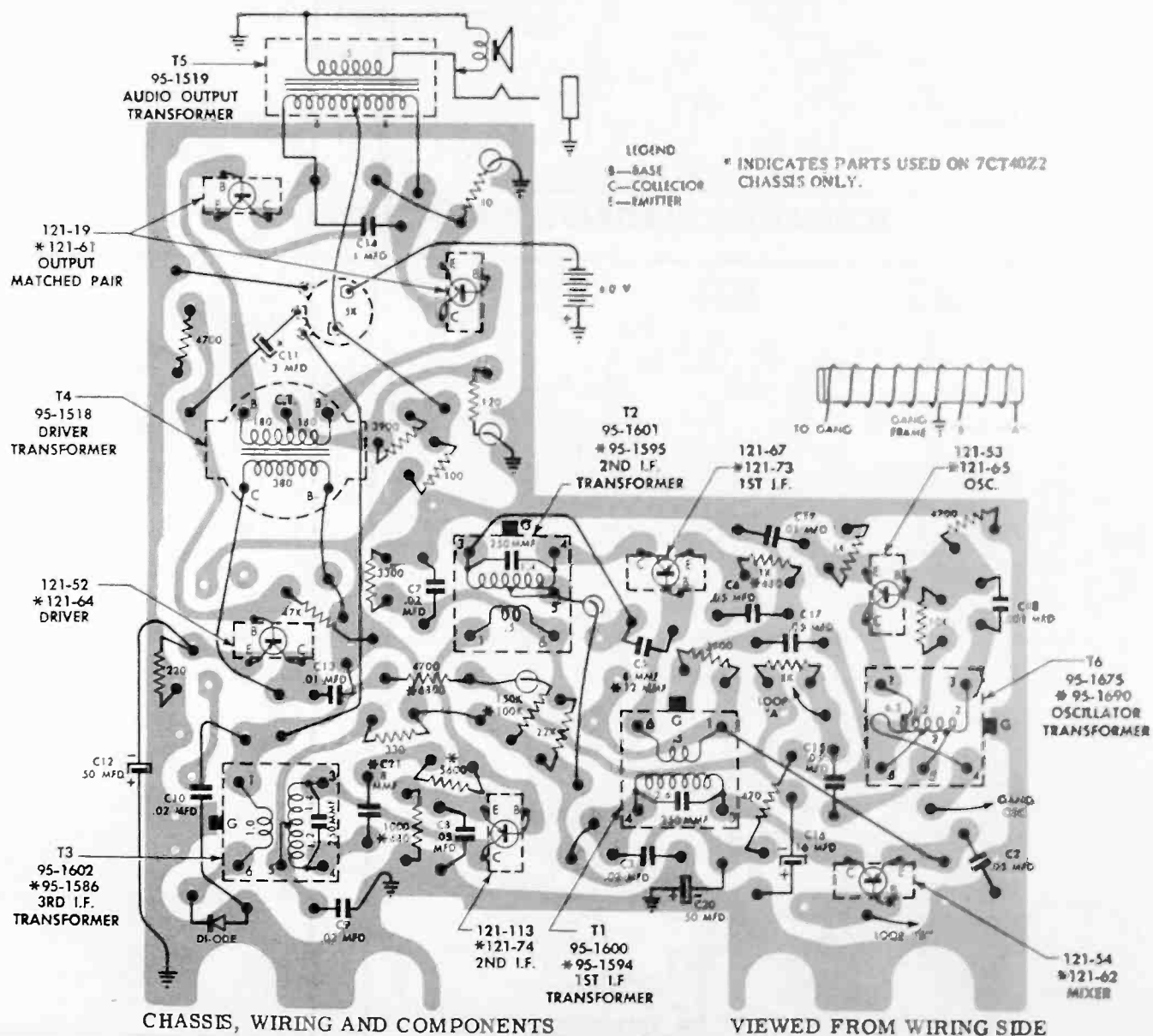
Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose	
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment	
2	1620 KC		—	Gang wide open.	C1C	Set Oscillator to dial scale.	
3	535 KC		—	Gang Closed	Adjust slug in T ₆	Set Oscillator to dial scale.	
4	REPEAT STEPS 2 & 3		—	—	—	—	—
5	1260 KC		—	—	1260 KC	C1A	Align loop ant.

CHASSIS INFORMATION CHART

Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
6CT40Z1	Black	Black 102-5702	Zenith RETMA Type	121-54 2N252 PNP	121-53 R119 PNP	121-67 2N309 PNP	121-113 2N308 PNP	103-19 1N87G	121-52 R120 PNP	121-19 R16 Matched Pair PNP PNP	Texas Instrument
*6CT40Z2	Red	Red 102-5727	Zenith RETMA Type	121-62 2N411 PNP	121-65 2N409 PNP	121-73 2N409 PNP	121-74 2N409 PNP	103-19 1N87G	121-64 2N407 PNP	121-61 2N407 Matched Pair PNP PNP	R.C.A.

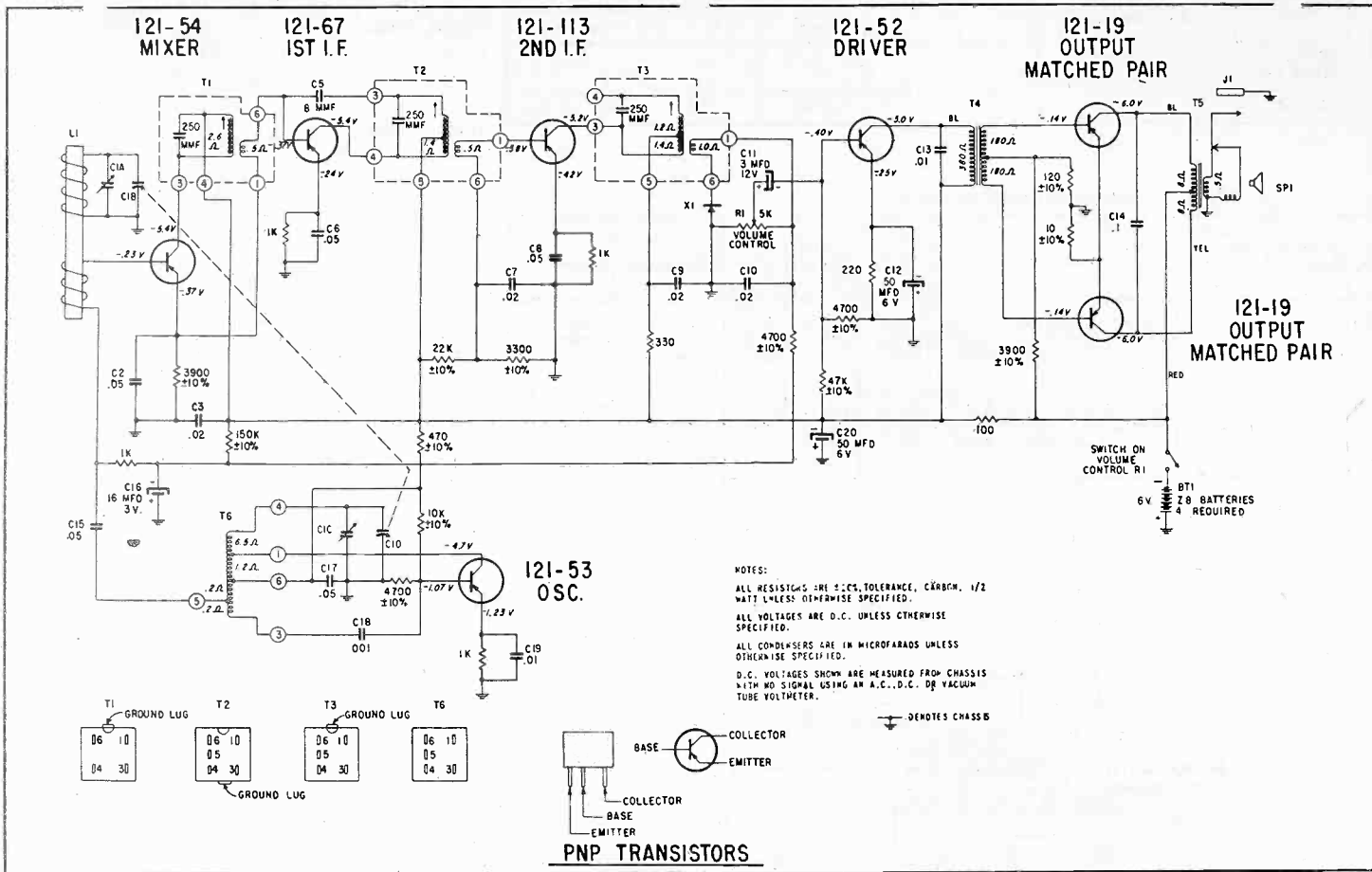


TRANSISTOR & TRIMMER LAYOUT FOR CHASSIS 7CT40Z1 & 7CT40Z2

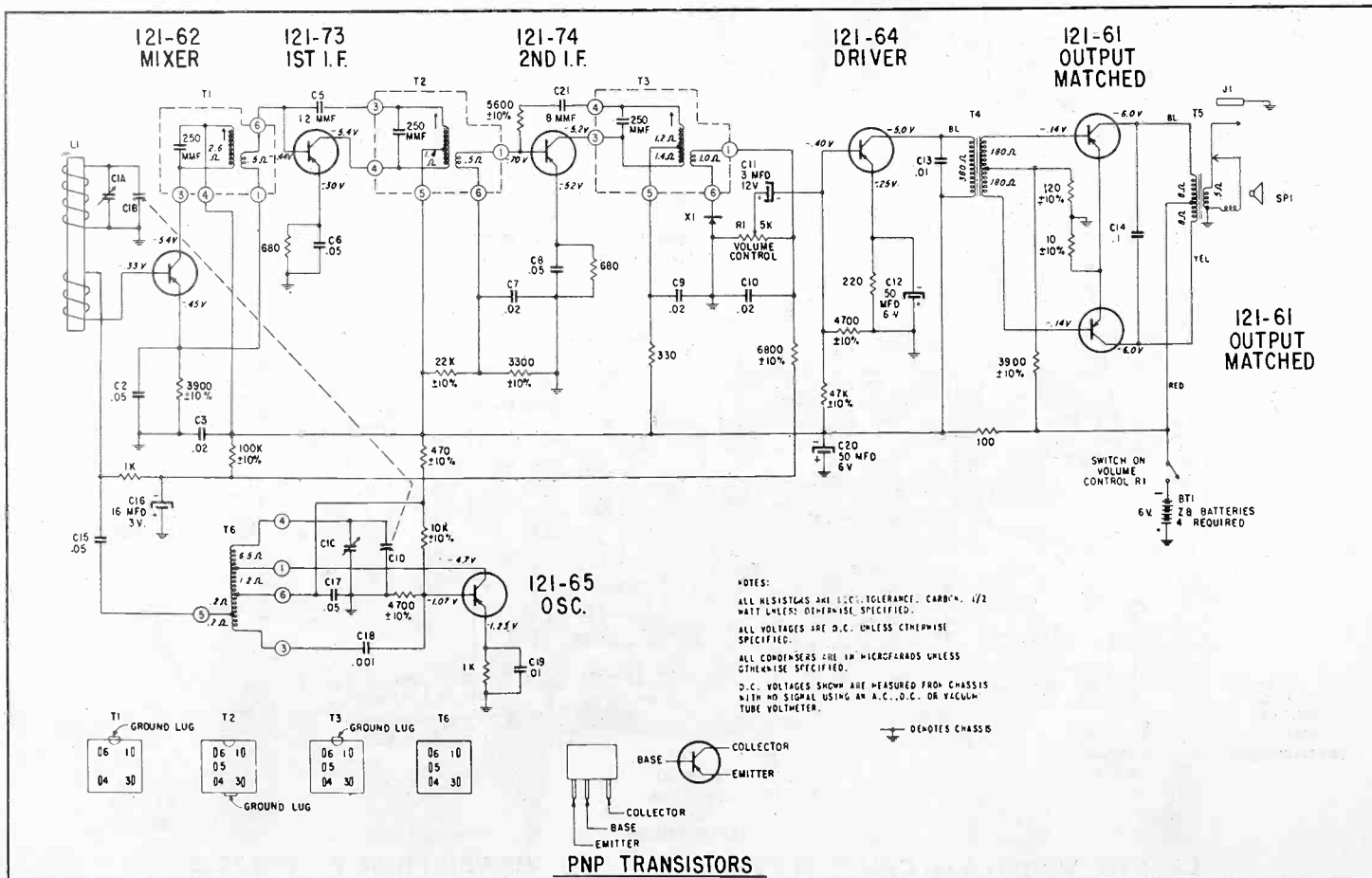


CHASSIS, WIRING AND COMPONENTS

VIEWED FROM WIRING SIDE



SCHEMATIC DIAGRAM FOR 7CT40Z1



SCHEMATIC DIAGRAM FOR 7CT40Z2

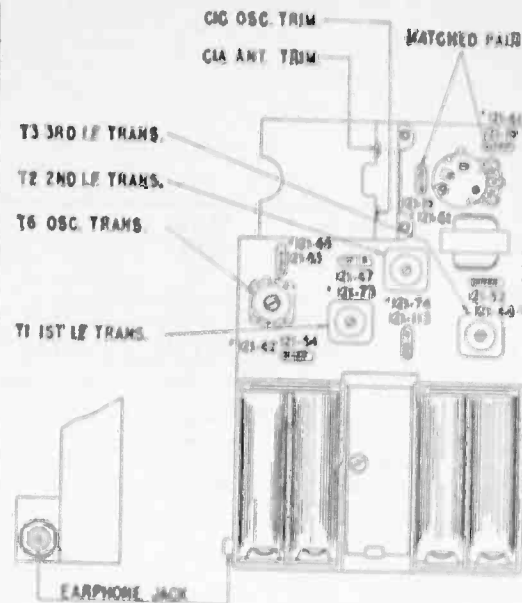
MODEL ROYAL 275

ALIGNMENT PROCEDURE

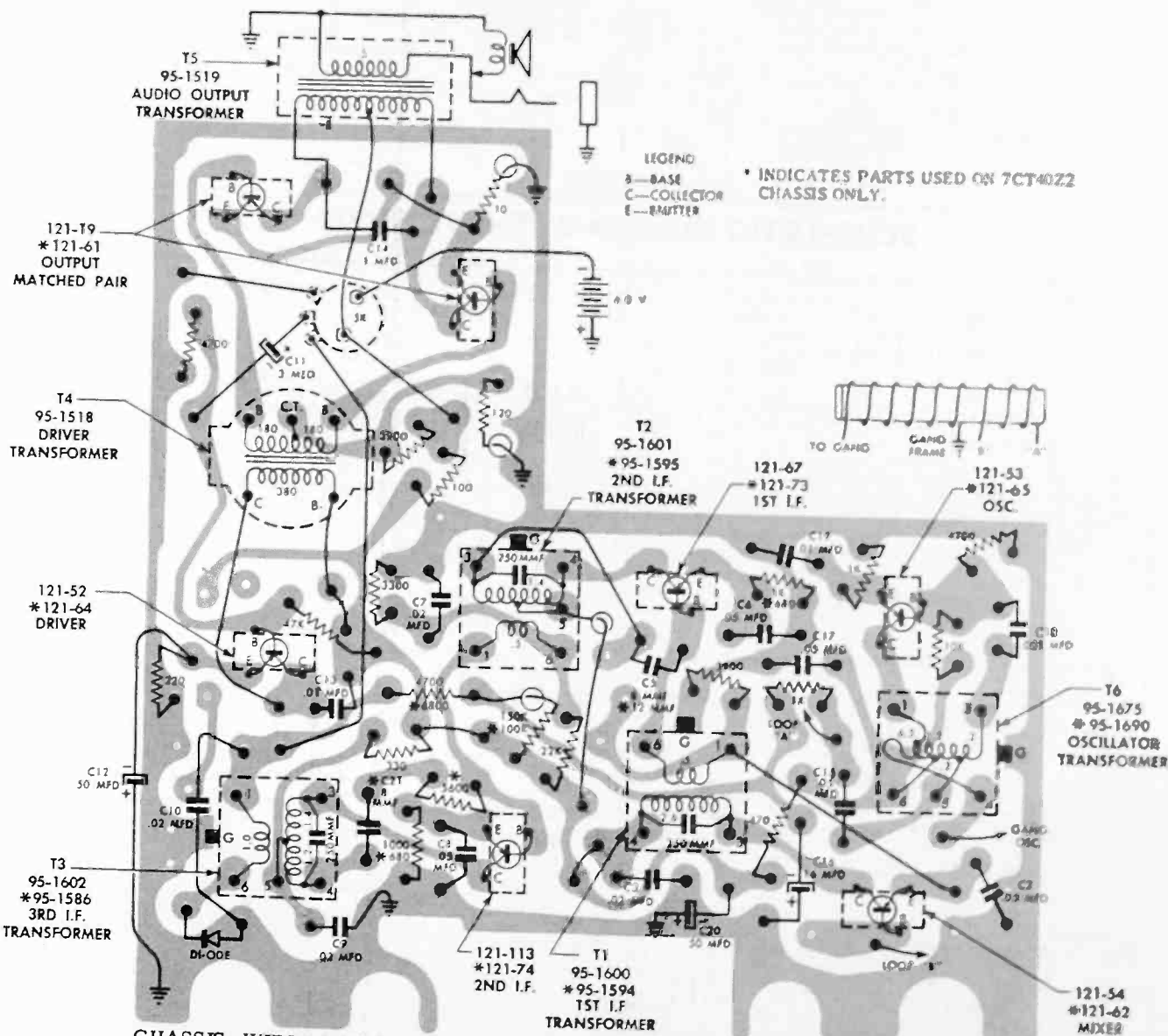
Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose	
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment	
2	1620 KC		—	Gang wide open.	CIC	Set Oscillator to dial scale.	
3	535 KC		—	Gang Closed	Adjust slug in T6	Set Oscillator to dial scale.	
4	REPEAT STEPS 2 & 3		—	—	—	—	—
5	1260 KC		—	—	1260 KC	CIA	Align loop ant.

CHASSIS INFORMATION CHART

Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
6CT40Z1	Black	Black 102-5702	Zenith RETMA Type	121-54 2N252 PNP	121-53 RT19 2N309 PNP	121-67 2N309 PNP	121-113 2N308 PNP	103-49 1N87G	121-52 R120 PNP	121-19 R16 Matched Pair PNP	Texas Instrument
*6CT40Z2	Red	Red 102-5727	Zenith RETMA Type	121-62 2N411 PNP	121-65 2N409 PNP	121-73 2N409 PNP	121-74 2N409 PNP	103-19 1N87G	121-64 2N407 PNP	121-61 2N407 Matched Pair PNP	R.C.A.

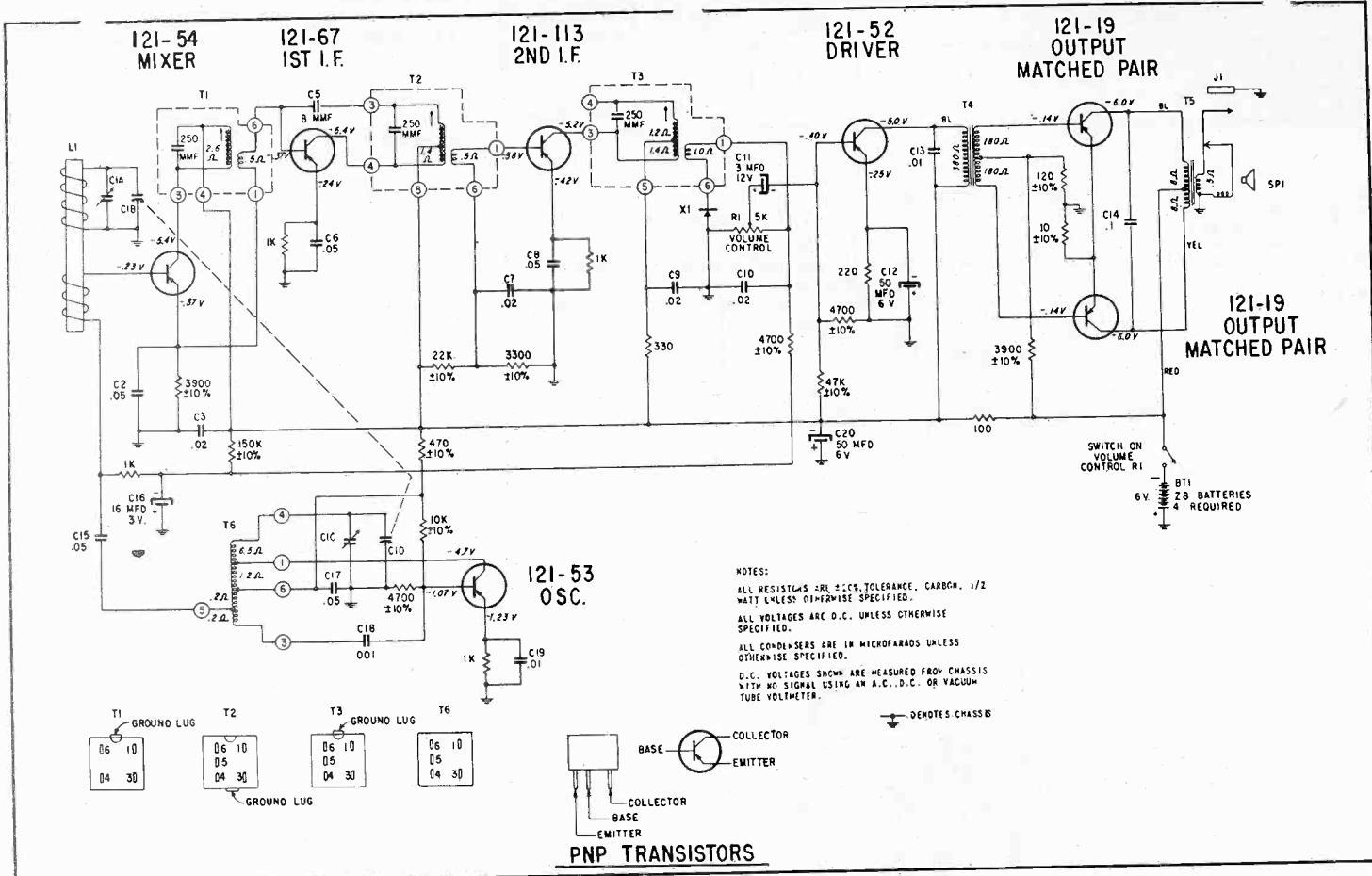


TRANSISTOR & TRIMMER LAYOUT FOR CHASSIS 7CT40Z1 & 7CT40Z2

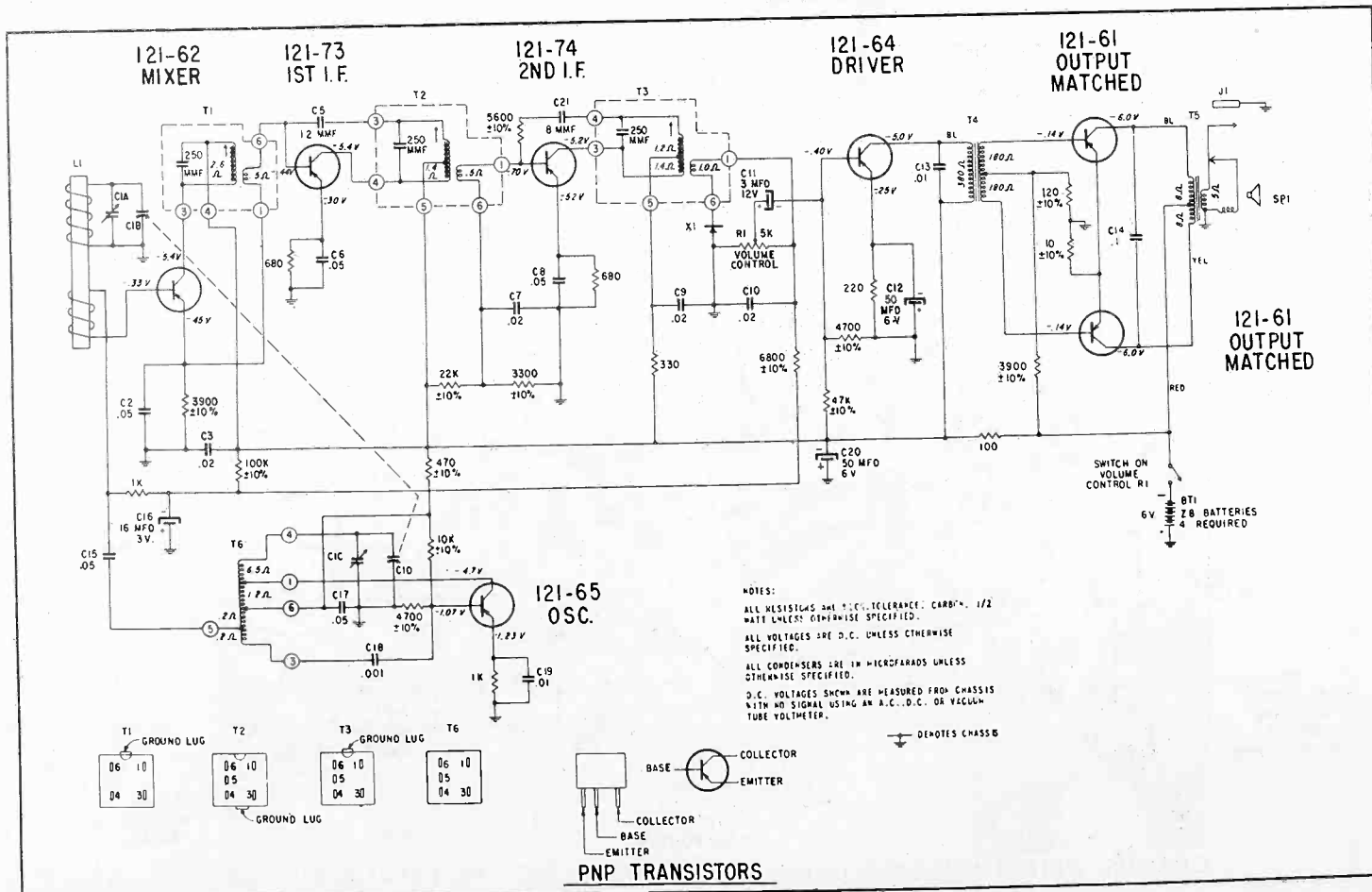


CHASSIS, WIRING AND COMPONENTS

VIEWED FROM WIRING SIDE



SCHEMATIC DIAGRAM FOR 7CT40Z1



SCHEMATIC DIAGRAM FOR 7CT40Z2

MODEL ROYAL 275

CHASSIS PARTS Chassis 6CT41Z1			
PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2506		Chassis support bracket	.10
12-2507		Transformer mtg. bracket (part of 49-839)	.10
22-14	C2	.0047 mfd. ceramic disc - 500 V.	.25
22-17	C15,16	.001 mfd. ceramic disc - 1 K V (2 used)	.25
22-2726	C14,17	50 mfd. electrolytic - 6 V. (2 used)	1.50
22-2871	C4	16 mfd. electrolytic - 3 V.	1.50
22-2884	C12	3 mfd. electrolytic - 12 V.	1.50
22-2885	C6,7,8,9,13	.02 mfd. ceramic disc - 25 V. (5 used)	.25
22-3080	C3	.005 mfd. ceramic disc - 25 V.	.25
22-3165	C5,10,11	.05 mfd. ceramic disc - 25 V. (3 used)	.35
22-3183	C1A,B,C,D	2 section variable	
24-815		Battery cover	.25
44-34	J1	Miniature jack	.90
49-839	SP1	4" P.M. speaker	5.00
54-347		6-32 "KEPS" nut (used with 114-49)	.05
54-417		1/4-32 x 3/8 hex. nut - brass (1 mts. ea. 63-4094 & 95-1685)	.10
63-1722		33 ohm 1/2W Ins. 10%	.17
63-1744		100 ohm 1/2W Ins. 20%	.17
63-1747		120 ohm 1/2W Ins. 10%	.17
63-1765		330 ohm 1/2W Ins. 20%	.17
63-1772		470 ohm 1/2W Ins. 20%	.17
63-1779		680 ohm 1/2W Ins. 20%	.17
63-1786		1000 ohm 1/2W Ins. 20%	.17
63-1799		2200 ohm 1/2W Ins. 10%	.17
63-1803		2700 ohm 1/2W Ins. 10% (2 used)	.17
63-1810		3900 ohm 1/2W Ins. 10%	.17
63-1813		4700 ohm 1/2W Ins. 10%	.17
63-1817		5600 ohm 1/2W Ins. 10%	.17
63-1831		12 K ohm 1/2W Ins. 10%	.17
63-1834		15 K ohm 1/2W Ins. 10% (2 used)	.17
63-1841		22 K ohm 1/2W Ins. 10%	.17
63-1873		120 K ohm 1/2W Ins. 10%	.17
63-1876		150 K ohm 1/2W Ins. 10%	.17
63-1877		150 K ohm 1/2W Ins. 20%	.17
63-4035	R1	Volume control & switch	2.05
63-4094		Volume control & switch	
63-4530		4.7 ohm 1/2W Ins. 20%	.17
78-1067		3 contact socket (6 used)	.30
80-1094		Spiral contact spring (2 part of S-40140)	.15
83-2697		1 lug miniature terminal strip (part of S-42779)	.05
94-295		Spacer bushing (used with 125-47)	.05
95-1518	T4	Driver transformer	5.00
95-1601	T2	2nd I.F. transformer	3.50
95-1602	T3	3rd I.F. transformer	3.50
95-1685	T5	Audio output transformer	
95-1686	T6	Oscillator transformer	
95-1687	T1	1st I.F. transformer	
103-19	X1,2	Crystal diode (2 used)	.75

CHASSIS PARTS Chassis 6CT41Z1			
PART NO.	DIA. NO.	DESCRIPTION	PRICE
113-10		6-32 x 3/16 x 1/4 hex. hd. mach. screw (2 used on 22-3183)	.03
114-26		8-18 x 1/4 x 1/4 hex. hd. self-tap. screw (1 joins 12-2506 & S-47356 & 4 mt. 49-839)	.03
114-49		6-32 x 5/8 x 1/4 hex. hd. mach. screw (used on 49-839)	.03
114-180		6-20 x 1/4 x 1/4 hex. hd. self-tap. screw (2 used on S-47355)	.03
114-614		8-18 x 1/4 hex. washer hd. self-tap. screw (2 used on S-47356)	.04
121-19		Transistor - output (matched pair)	5.60
121-54		Transistor - mixer	4.05
121-67		Transistor - 2nd I.F.	3.85
121-113		Transistor - 1st I.F.	
121-120		Transistor - driver	
125-47		Rubber grommet	.03
S-40140		Contact spring & strip assembly	.50
S-42779		Volume control mtg. bracket	.20
S-47355	L1	Antenna	
S-47356		Chassis mtg. bracket	

CABINET PARTS Model Royal 675L			
PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-7		Dry cell battery - 1 1/2 volt (use 4)	
14-2811		Portable cabinet	
16-1621		Packing carton	
46-1670		Dial knob	.15
46-2154		Volume control knob	.25
46-2155		Tuning knob	.15
54-345		1/4-32 x 3/8 hex. nut - brass (used on 83-2889)	.03
54-450		Thread forming palnut (6 used on 57-2793)	.03
57-1725		Emblem plate	.25
57-2793		Escutcheon	
80-1093		Retaining spring (2 part of S-47367)	.10
83-2489		Rubber strip (chassis)	
83-2858		Felt strip (emblem cushion)	.03
83-2889		Chassis cover strip	.15
83-2919		Volume control cover strip	.10
110-311		Grille cloth	.20
112-1165		6-20 x 5/16 phil. pan hd. self-tap. screw (4 mt. 6CT41Z1)	.03
114-248		6-20 x 5/16 x 1/4 hex. hd. self-tap. screw (2 join S-40162 & S-47367)	.03
166-118		Rubber bumper	
188-204		Knob clamping ring (used on 46-2154)	.03
188-209		Knob clamping ring	.03
202-1512		Instruction book	
S-40162		Battery cover & spring assembly	.60
S-47367		Battery housing	

Prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.



SERVICE MANUAL

MODEL "ROYAL 950" ALL TRANSISTOR CLOCK RADIO

CHASSIS 7AT46Z1

GENERAL

This transistor portable chassis is a conventional super-heterodyne receiver. It has an individual mixer and oscillator to produce the 455 Kc intermediate frequency. The first and second intermediate frequency amplifiers are conventional. A 103-24 is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class 'B' push-pull output stage. As you can see from the chart, the chassis uses a pair of matched transistors in the final output stage and therefore should one transistor fail, both transistors must be replaced simultaneously as chances are they will not perform properly unless so matched.

Power Supply Six Zenith type Z-8 or Z-9 1 1/2 volt batteries or six 1 1/2 volt penlite batteries
 Frequency Range 540 to 1600 KC
 Intermediate Frequency 455 KC
 Sensitivity Approximately 500 microvolts/meter for 50 milliwatts output
 Power Output Undistorted 100 milliwatts
 Power Output Maximum 180 milliwatts
 Speaker 3 1/2 Inch P.M.
 Alnico V Voice Coil Impedance 3.2 ohms at 400 cycles
 Accessory Earphone B39-24 impedance 15 ohms at 1000 cycles

CLOCK ASSEMBLY

The complete clock assembly 172-2B should be returned to the factory for repairs. Although the clock is a standard Swiss movement, repair parts are only available at our factory at this time.

PRINTED CIRCUIT SERVICING

Servicing "printed" circuit sets is, in general, much the same as servicing ordinary receivers. However,

certain tools and techniques are well suited for this type of work. The following items are especially useful:

1. Good pair of long-nose pliers.
2. Sharp wire cutters.
3. Small stiff glue brush (for solder removal).
4. Pencil type soldering iron with a small tip (25 watts or less).

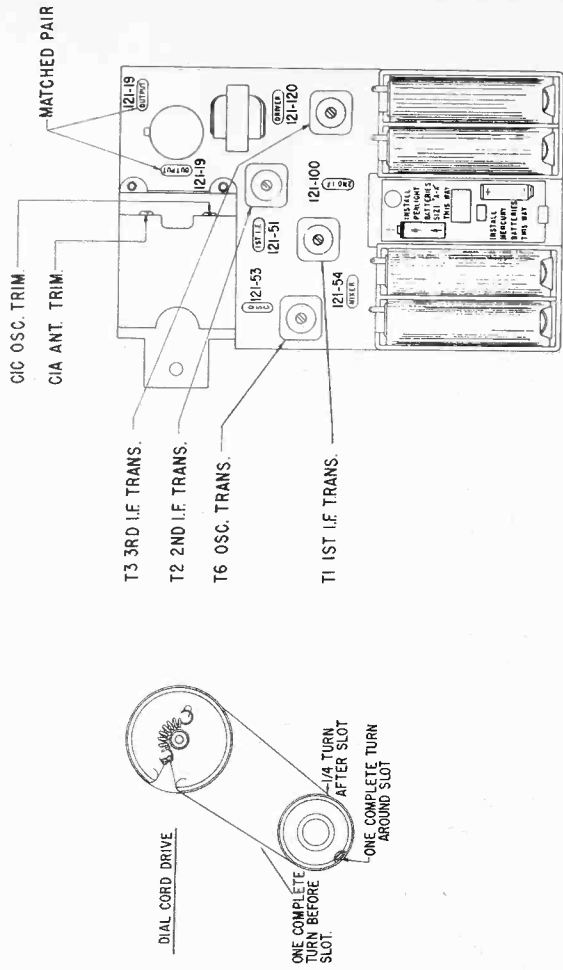
WARNING: Excessive heat may damage the "printed" circuit during component replacement if a soldering pencil, iron or gun of higher wattage rating is used.

5. Tin leads on component before soldering.
6. Use only EUTECTIC solder 63% tin 37% lead.
7. This solder has an extremely low melting point.
7. Metal pick (soldering aid).

COMPONENT REPLACEMENT

Resistors and capacitors should be replaced by clipping out the defective part and neatly soldering in the new part. If a unit, such as the oscillator coil or IF transformer, is to be removed heat the mounting lugs with a pencil type soldering iron and move them away from the soldered connection with a long-nose pliers or metal pick. Continue heating the lugs and brush away the molten solder with a small stiff glue brush. Remove the defective unit by lifting it off the chassis. Before inserting the new unit, be certain that the lug holes are open and free from solder. Forcing a lug against a solder filled lug hole may break the bond between the chassis base and the "printed" wiring. It is, therefore, necessary to exercise care when replacing units.

An open or damaged section of "printed" circuit wiring can be replaced by soldering a short jumper wire across the points to be connected.



TRANSISTOR & TRIMMER LAYOUT FOR CHASSIS 7AT46Z1

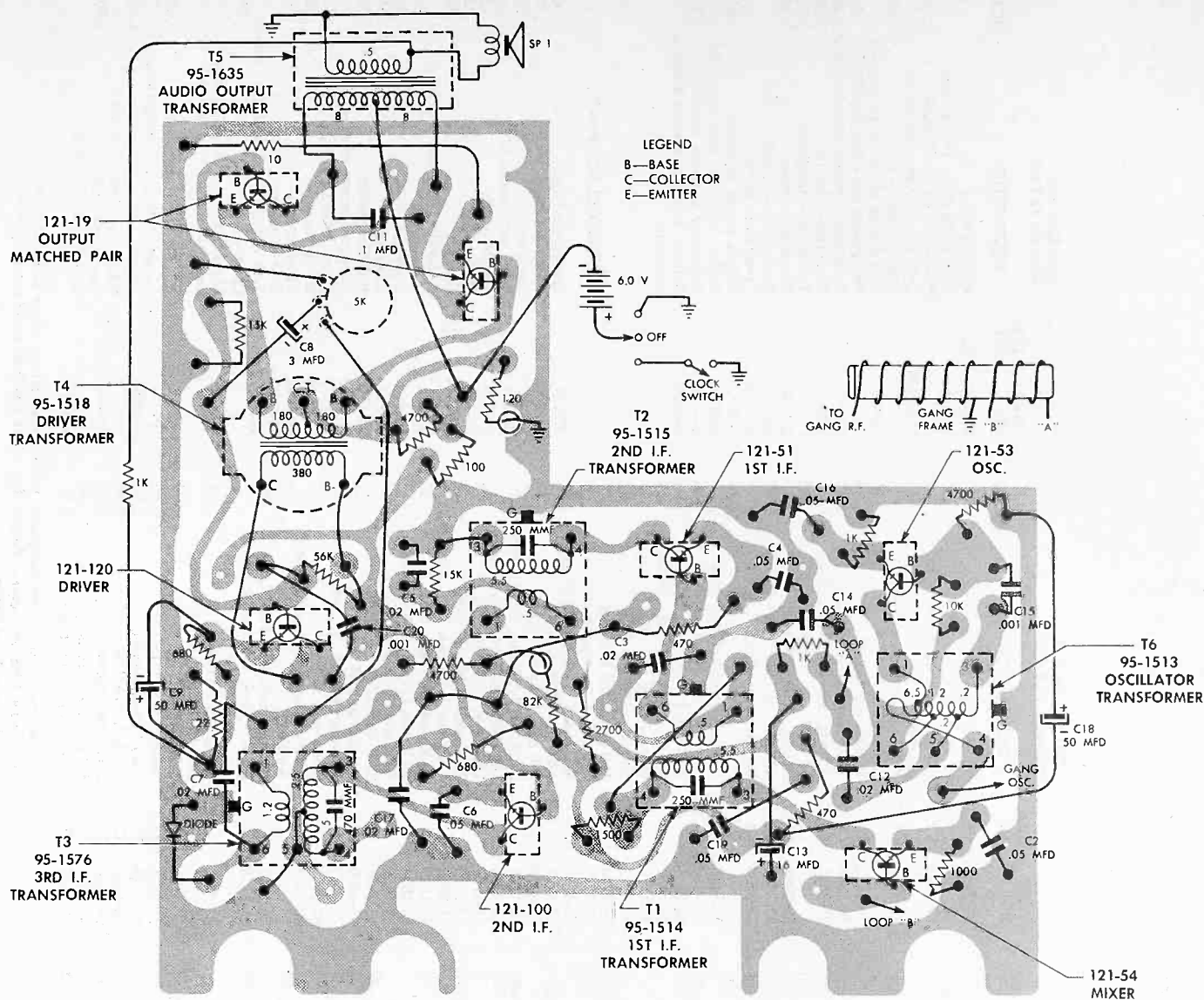
ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose
1	455 KC	ONE TIGHTLY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment
2	1620 KC			Gang wide open.	C1C	Set Oscillator to dial scale.
3	535 KC			Gang Closed	Adjust slug in T6	Set Oscillator to dial scale.
4	REPEAT STEPS 2 & 3					
5	1200 KC			1260 KC	C1A	Align loop ant.

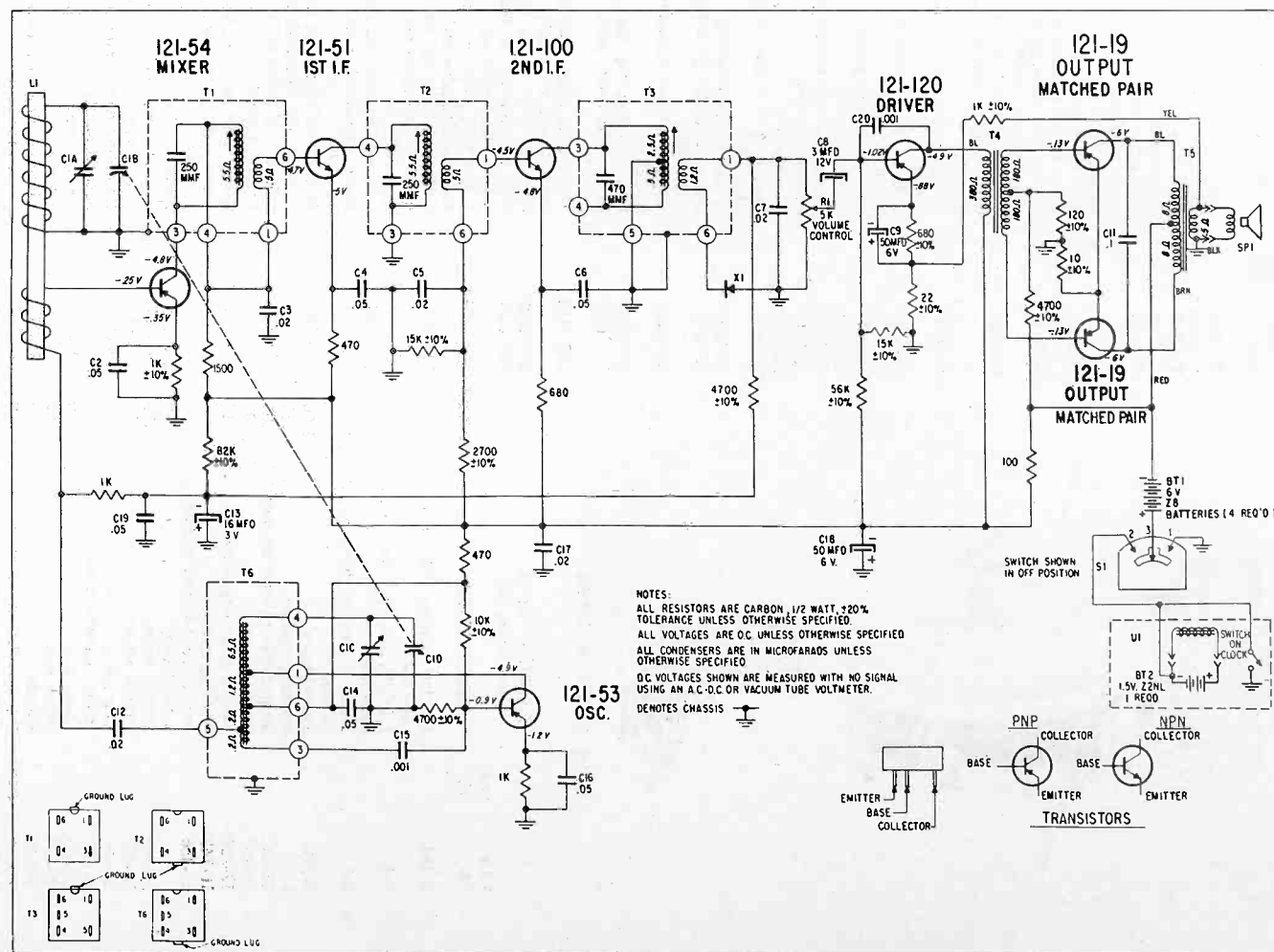
CHASSIS INFORMATION CHART

Chassis Color Dot	Chassis Layout Label Color	Transistor Part No.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
Red	Black 102-5710	Zenith RETMA Type	121-54 2N252 PNP	121-53 R119 PNP	121-51 2N254 NPN	121-100 5028 NPN	103-24	121-120 R119 PNP	121-19 R15 Matched Pair PNP	Texas Instrument

MODEL ROYAL 950 MODEL ROYAL 950

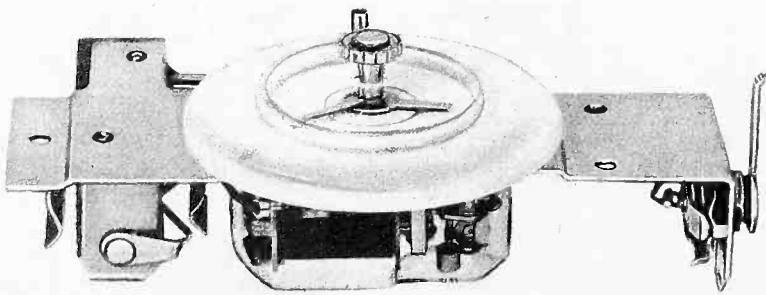


CHASSIS, WIRING AND COMPONENTS - VIEWED FROM WIRING SIDE



CABINET PARTS
Model Royal 950

PART NO.	DIA. NO.	DESCRIPTION	PRICE
57-2583		Radio door	8.50
57-2584		Trim plate (speaker)	8.50
57-2585		Trim plate (clock)	8.50
57-2693		Support plate (handle)	
69-316		4-40 x 1/8 phils. rd. hd. mach. screw - flatwasher att. (1 used on ea. 19-336 & 12-2674)	.05
69-319		6-32 x 1/4 phils. rd. hd. mach. screw (2 mt. chassis & 3 mt. 6-71)	.03
69-331		4-40 x 3/16 phils. rd. hd. mach. screw (2 mt. S-44462)	.03
69-332		6-32 x 1/4 phils. rd. hd. mach. screw - flatwasher att. (2 mt. 49-866)	.03
69-333		6-32 x 9/16 phils. rd. hd. mach. screw	.03
69-334		2-56 x 1/4 phils. pan hd. mach. screw (2 used)	.03
76-972		Bearing support plate	.60
80-1296		Torsion spring	.20
83-3096		Protective strip (3 used)	.30
83-3108		Protective strip	.10
86-322		Terminal lug	.03
93-389		Lockwasher (1 used on ea. 112-1228)	.03
93-1233		Stainless steel washer	.03
93-1305		Corprene washer (1 used on ea. 112-1228)	
94-1004		Spacer bushing (1 used on ea. 69-318)	.10
97-516		Chassis cover mtg. stud	.45
112-1007		8-32 x 3/16 mach. screw (used on 24-917)	.10
112-1191		4-40 x 3/16 phils. pan hd. mach. screw (used on 7-516)	.03
112-1228		Shoulder screw (2 mt. 12-2671)	.25
112-1232		6-32 x 5/16 phils. rd. hd. mach. screw - flatwasher att.	.03
112-1235		4-40 x 5/32 phils. rd. hd. mach. screw - flatwasher att.	.03
113-104		6-32 x 1/4 phils. rd. hd. mach. screw - lockwasher att. (3 used on chassis)	.03
113-105		6-32 x 9/32 phils. rd. hd. mach. screw - lockwasher att. (4 used on 24-919)	.03
113-109		8-32 x 5/16 phils. pan hd. mach. screw - split lockwasher att.	.03
113-112		6-32 x 3/16 phils. rd. hd. mach. screw (3 used)	.03
113-117		6-32 x 9/16 phils. rd. hd. mach. screw - lockwasher att. (2 used on 36-219)	.03
138-196		Speaker grille	1.25
149-217		Magnet (door latch)	.75
166-88		Polyethylene bumper (3 used)	.05
188-147		Retaining ring/retains bearing support shaft)	.03
188-232		Knob clamping ring (1 part of ea. S-46890)	.03
188-234		Clamping ring (part of S-47447)	.05
202-1490		Instruction book	.40
S-44462		Hinge lever & bracket assembly	
S-46890		Control knob & ring assembly (2 used)	
S-47375		Antenna	
S-47376		Mtg. strip & staple assembly	
S-47447		Pointer disc. & ring assembly	



172-2B CLOCK ASSEMBLY

CABINET PARTS
Model Royal 950

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-2NL		1 1/2 V. battery 'D' cell (use one)	
Z-8		1 1/2 V. battery 'AA' cell (use four)	
or Z-9		1 1/2 V. battery - Mercury cell batt. kit No. 17	
4-791		Swivel base	2.00
6-71		Housing bearing	.85
12-2671		Magnetic latch mtg. bracket	.05
12-2674		Latch lever	.05
12-2689		Switch cover mtg. bracket	.10
16-1490		Packing carton	
19-336		Spring clip (4 used on 26-615 & 3 on 26-616)	.05
24-919		Bottom cover	2.00
24-932		Switch cover	.35
24-978		Top cover	
24-983		Radio chassis cover	
26-615		Clock dial	1.50
26-616		Radio dial	1.50
36-219		Handle	1.00
49-866		3 1/2" P.M. speaker	5.00
54-79		6-32 x 1/4 x 3/32 hex. hd. brass nut	
56-398		Door hinge pin (2 used on 57-2583)	.10
57-2445		Emblem plate	.30
57-2581		Bearing plate	.10
57-2582		Magnetic latch mtg. plate	.05

John F. Rider

CHASSIS PARTS
Chassis 7A146Z1

PART NO.	DIA. NO.	DESCRIPTION	PRICE
22-2726	C9,18	50 mfd. electrolytic - 6 V. (2 used)	1.50
22-2728	C2,4	.05 mfd. ceramic disc - 25 V. (2 used)	.60
22-2729	C15,20	.001 mfd. ceramic disc - 25 V. (2 used)	.25
22-2871	C13	16 mfd. electrolytic - 3 V.	1.50
22-2884	C8	3 mfd. electrolytic - 12 V.	1.50
22-2885	C3,5,12,17	.02 mfd. ceramic disc - 25 V. (4 used)	.25
22-2998	C11	.1 mfd. mylar - 50 V.	.35
22-3033	C7	.02 mfd. ceramic disc - 25 V.	.45
22-3094	C1A,B,C,D	2 section variable	4.75
22-3165	C6,14,16,19	.05 mfd. ceramic disc - 25 V.	.35
54-74		2-56 x 3/16 hex. nut (2 used)	.10
54-417		1/4-32 x 3/8 hex. nut - brass	.17
63-1701		10 ohm 1/2W Ins. 10%	.17
63-1715		22 ohm 1/2W Ins. 10%	.17
63-1744		100 ohm 1/2W Ins. 20%	.17
63-1747		120 ohm 1/2W Ins. 10%	.17
63-1772		470 ohm 1/2W Ins. 20%	.17
63-1778		680 ohm 1/2W Ins. 20%	.17
63-1779		680 ohm 1/2W Ins. 20%	.17
63-1785		1000 ohm 1/2W Ins. 10%	.17
63-1786		1000 ohm 1/2W Ins. 20%	.17
63-1793		1500 ohm 1/2W Ins. 20%	.17
63-1813		2700 ohm 1/2W Ins. 10%	.17
63-1834		4700 ohm 1/2W Ins. 10%	.17
63-1827		10 K ohm 1/2W Ins. 10%	.17
63-1834		15 K ohm 1/2W Ins. 10%	.17
63-1859		56 K ohm 1/2W Ins. 10%	.17
63-1866		82 K ohm 1/2W Ins. 10%	.17
63-4400	R1	Volume control	1.40
78-1067		3 contact socket (7 used)	.30
80-209		Drive cord spring	.03
80-1075		Battery contact spring (2 part of S-46831)	.15
80-1247		Battery contact spring (2 used)	.10
83-3178		Polyethylene strip (battery pull-out - part of S-46831)	.03
86-237		Connector terminal	.03
93-1270		Bakelite washer (used on 112-1048)	.03
95-1513	T6	Oscillator transformer	2.00
95-1514	T1	1st I.F. transformer	3.50
95-1515	T2	2nd I.F. transformer	3.50
95-1518	T4	Driver transformer	5.00
95-1576	T3	3rd I.F. transformer	3.50
95-1635	T5	Audio output transformer	3.50

CHASSIS PARTS
Chassis 7A146Z1

PART NO.	DIA. NO.	DESCRIPTION	PRICE
103-24	X1	Crystal diode	.75
112-761		2-32 x 1/4 phils. rd. hd. self-tap. screw (2 mt. 22-3094)	.03
112-1048		2-56 x 1/4 binding hd. mach. screw (2 mt. S-46831)	.03
114-602		4-24 x 3/16 rd. hd. mach. screw - lockwasher att. (mts. S-44299)	.03
121-19		Transistor - output (matched pair)	5.30
121-51		Transistor - 1st I.F.	3.60
121-53		Transistor - oscillator	3.05
121-54		Transistor - mixer	3.95
121-100		Transistor - 2nd I.F.	
121-120		Transistor - driver	
S-24419		Strip & staple assembly	.05
S-44298		Pulley, bracket & stud assembly	.80
S-44306		Drive cord & eyelet assembly	.15
S-46831		Battery housing, bracket & spring assembly	

BATTERY CLOCK PARTS

27-252		Background disc	.90
46-1969		Clock set knob	.50
54-447		Lock nut (part of 172-1)	.20
54-457		Minute hand	.15
59-339		Hour hand	.20
80-1234		Contact	.20
83-3227		Absorption pad (part of S-44224)	.04
86-33		Terminal	.03
86-199		Terminal	.03
93-1326		Bakelite washer	.03
93-1371		Phosphor bronze washer	.03
93-1377		Lockwasher (2 used)	.03
93-1383		Steel washer	.03
94-1030		Alarm spacer	
94-1039		Brass bushing	
112-1172		0-48 x .120 flat hd. self-tap. screw (3 used)	.05
172-2B		Clock assembly, including movement, timer, dial face, alarm switch, etc.	.05
194-40		Insulator	
S-43687		Crystal & knob assembly (alarm set)	1.50
S-44224		Battery retainer, terminal & bracket assembly	2.00
S-46507		Switch contact spring	

All prices shown are suggested U.S.A. retail prices which include U.S.A. Federal Manufacturers' Excise Tax where applicable and are subject to change without notice.

John F. Rider