

**TRANSISTOR RADIO
SECTION**



Admiral Radio

CHASSIS 6T2



SPECIFICATIONS

CIRCUIT: Superhetrodyne using six transistors and two germanium diodes.

FREQUENCY RANGE: Standard broadcast band. 535 to 1600 KC.

POWER SUPPLY: This receiver is operated from power supplied by eight, 1 1/2 volts, "C" size, flashlight batteries.

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

SPEAKERS: 4" PM and 3 1/2" PM.

BATTERY REPLACEMENT

Open the cabinet by pulling with the fingers on the top rear surface of the cabinet back. This releases the internal spring catch mechanism allowing the cabinet back to swing down on its hinges. The batteries are located inside the long cylindrical plastic case, at bottom of cabinet. The battery case is held in position by two spring clamps. Remove the battery case from the cabinet by grasping it between the thumb and fingers and pulling it free of the spring clamps. Use caution when pulling out the case to prevent undue strain on the two wire leads connected to the cap.

To remove the batteries, first remove the cap from the case by pulling back the two cap retaining springs and lifting off the cap. Invert the open end of the case a few inches over a table or any convenient surface. This allows the batteries to slide out of the case. The case holds eight "C" size batteries, four in each section. This size battery is commonly used in flashlights and is readily available at drug and hardware stores.

TRANSISTOR PORTABLE		
MODEL	COLOR	CHASSIS
521	Golden Charcoal	6T2
528	Turquoise	

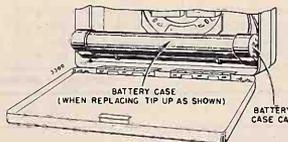


Figure 1. Rear View of Set, Cabinet Back Open.

IMPORTANT: When installing batteries refer to figure 2, or the diagram on the battery case, to make sure the batteries are being installed in the case properly. When installing cap on case, check the diagram again to make sure the cap is not reversed.

WARNING: INSTALL BATTERIES EXACTLY AS SHOWN OR BOND BY IN CORRECT POSITION. BATTERY CASE WITH LEAD ON TOP. INSTALL BATTERIES WITH CENTER CAPS TOWARD THE DIRECTIONS SHOWN. LEAD ON BATTERY CASE MUST BE INSULATED TO PREVENT SHORT CIRCUIT.

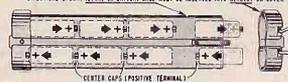


Figure 2. Battery Case, showing Correct Method for Installing Batteries.

WARNING: TURNING SET ON EITHER AFTER INSTALLING THE BATTERIES WRONG, OR REVERSING THE CAP CAN PERMANENTLY DAMAGE THE TRANSISTORS AS WELL AS OTHER PARTS OF THE RADIO. If radio does not play after installing new batteries, turn off immediately, and check for improper battery installation.

When inserting the battery case in the clips in the cabinet, tip the case up at a slight angle to insure proper closure of cabinet back.

Under normal operating conditions, battery life may be in excess of 1000 operating hours.

Batteries deteriorate more rapidly in excessive heat. Therefore, do not leave this set on or near a radiator or other source of heat. Also note that all batteries will run down with age even when not in use. It is recommended that all batteries be replaced when reception becomes weak, muffled or distorted, or radio fails to operate.

IMPORTANT! Run-down batteries should be removed IMMEDIATELY because the chemical action inside the cells will cause some batteries to leak when they are worn out. The acid which leaks from a run-down battery may damage parts of the set or the cabinet because of its corrosive action.

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

Burgess I General 914
Eveready 935 Ray-O-Vac 11P

Batteries listed above are 1 1/2 volt, "C" size flashlight batteries.

REMOVING THE CHASSIS

1. Remove Tuning knob and Volume control knob by working them forward off the shaft.
2. Open cover on rear of cabinet.
3. Remove the battery case.
4. On the front of the cabinet, loosen the two Phillips head screws adjacent the tuning shaft.
5. Loosen the hex nut that secures the Volume control to front of case.
6. Hold the printed circuit board while removing the two screws and hex nut, to prevent damage.
7. Gently lift the circuit board from within cabinet.

PARTS LIST

RESISTORS

Sym.	Description	Part No.
R4	500 ohms, 1/2 watt	50B 8-541
R5	150,000 ohms, 1/2 watt, 5%	50B 7-154
R6	470 ohms, 1/2 watt	50B 8-71
R7	4,700 ohms, 1/2 watt	50B 8-472
R8	2,200 ohms, 1/2 watt	50B 8-222
R9	24,000 ohms, 1/2 watt, 5%	50B 7-243
R10	2,700 ohms, 1/2 watt	50B 8-272
R11	1,000 ohms, 1/2 watt	50B 8-102
R12	3,900 ohms, 1/2 watt	50B 8-392
R13	220 ohms, 1/2 watt	50B 8-221
R14	3,900 ohms, 1/2 watt	50B 8-392
R15	100 ohms, 1/2 watt	50B 8-101
R20	21,000 ohms, 1/2 watt, 5%	50B 7-213
R21	8,000 ohms, 1/2 watt	50B 8-802
R22	1,000 ohms, 1/2 watt	50B 8-101
R23	100 ohms, 1/2 watt	50B 8-100
R24	8,200 ohms, 1/2 watt	50B 8-822
R25	10 ohms, 1/2 watt	50B 8-100
R26	10 ohms, 1/2 watt	50B 8-100
R27	2,000 ohms, Volume control (includes Off-On switch 81)	75C 25-9
R29	1,000 ohms, 1/2 watt	50B 8-100
R30	8,200 ohms, 1/2 watt	50B 8-822
R31	3,900 ohms, 1/2 watt	50B 8-392
R32	36,000 ohms, 1/2 watt, 5%	50B 7-363
R33	2,200 ohms, 1/2 watt (early prod.)	50B 8-222

CAPACITORS

Sym.	Description	Part No.
C1	.01 mf, 600 volts, cer. disc	65D 10-11
C2	.005 mf, 500 volts, cer. disc	65D 10-12
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	.05 mf, 30 volts, cer. disc	65B 45-6
C9	.05 mf, 30 volts, cer. disc	65B 45-6
C10	.05 mf, 30 volts, cer. disc	65B 45-6
C11	.05 mf, 30 volts, cer. disc	65B 45-6
G1	8.5 mmf, 500 volts, ceramic	ASD 6-130
C13	3.6 mmf, 500 volts, ceramic	ASD 4-113
G2	25 mf, 3 volts, elect.	87B 22-13
C14	100 mf, 15 volts, elect.	87B 32-6
C19	100 mf, 12 volts, elect.	87B 32-6
C20	10 mf, 3 volts, elect.	87B 22-6
C21	90 mf, 3 volts, elect.	87B 32-10
C22	500 mf, 500 volts, cer. disc	65D 10-128
C33	.02 mf, 500 volts, cer. disc	65D 10-37

CAPACITORS

Sym.	Description	Part No.
C30	8.2 mmf, 500 volts, cer. disc.	65D 10-128
	NPO temp. coeff.	65D 10-131
C31A	27.1 mmf, max. ant.	2A 81-21
C31B	100.1 mmf, max. ant. exp.	65B 106-3

COILS, TRANSFORMERS, Etc.

Sym.	Description	Part No.
L1	Antenna coil	69B 220-3
L2	Coil Oscillator	69B 220-2
L3	Coil Antenna Adjustment	69B 224-1
T1	Transformer, 15:1 IF	73C 100-4
T2	Transformer, 2nd IF	73C 100-5
T3	Transformer, Driver	79B 76-1
T4	Transformer, Output	Part of M1
M1	Speaker, 4" (includes output transformer T3)	78C 145-2
M2	Speaker, 3 1/2" PM	78B 144-1
S1	Switch, Off-On	Part of R27

TRANSISTORS AND DIODES

Sym.	Description	Part No.
Q1	Converter, PNP transistor	2N140
Q2	1st IF, PNP transistor	2N139
Q3	2nd IF, PNP transistor	2N139
Q4	Driver, PNP transistor	2N140 or 2N140C
Q5	Output, PNP transistor	2N141
Q6	Output, PNP transistor	2N141
CR1	AC/DC, Crystal Diode	1N2959
CR2	Detector, Crystal Diode	1N2959

If either Q5 or Q6 needs replacing, order two replacement transistors and specify that they are "Matched Pair".

MISCELLANEOUS PARTS

Description	Part No.
Battery Case End Cap (bottom)	33C 223-2
Battery Case End Cap (top; with terminals)	A587
Battery Case, Tubular (with springs)	A585
Binding Plate (Rear Antenna)	15A 1810
Clip, Battery Case Mounting	15A 10-13
Handle, Plastic (mounts to case with handle)	13B 1607
Nut, Hex, 3/4" (for mtg. handle to antenna)	2A 2-70-71

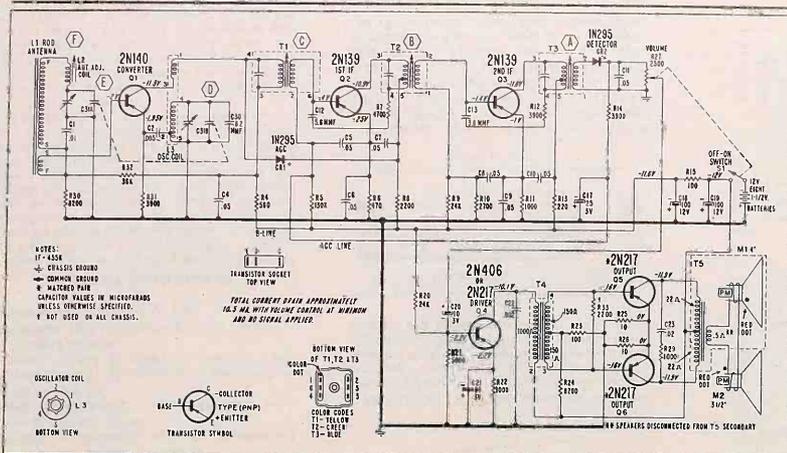
MISCELLANEOUS CHASSIS PARTS

Description	Part No.
Nut, Hex, 3/4" (mounts Volume control)	2A 2-69-71
Pin, Mtg. 25 (mounts handle to case)	2A 81-21
Retainer, Nut (antenna case)	15A 1619
Ring, Beading, Antenna Handle (triangular)	1A 25-20
Screw, 2 1/2" x 1/8" BUNS PM (for mtg. antenna)	69B 220-3
2-32 X 1/8" BILLOTS PM (for mtg. 2 1/2" PHITS PM (for mtg. antenna)	2A 201-70
Socket, Transistor	19A 135
Spring, Cone (battery case)	19A 135
Spring, Latch (Rear Antenna)	15A 151
Washer, Spring, Antenna Handle	4A 5-21
Washer, Flat, Antenna Handle	4C 119-71

CABINET PARTS

Description	Part No.
Antenna Case (with eyelet)	A553-2
Antenna Cover	15A 06-71
Black, Model 521 and 528	21D 234-6
Bearing Sleeve, Radio Antenna	21A 253
Cabinet (less handle, microphone and grille)	21A 234-1
Golden Charcoal, Model 521 and 528	21D 234-1
Turquoise, Model 528	21D 234-1
Excursion (mounts on cabinet front, around the front speaker grille)	21D 214-1
Grille, Speaker (fits on cabinet front)	34B 83-1
Handle, Hair, Tongue	34B 83-2
Black, Model 521 and 528	21D 234-1
Handle, Hair, Groove	34B 83-1
Black, Model 521 and 528	21D 234-1
Knob, Volume Control (with compression ring)	33B 276-1
Nut, Hex, Model 521 and 528	2A 2-70-71
Knob, Tuning (with compression ring)	33B 276-1
Chrome and Clear, Model 521 and 528	27A 254
Label, Volume, Rear Antenna	27A 254
Shelf, Handle Mounting	27A 255
Stud, Mounting, Volume Handle	27A 255
Support, Printed Circuit Board	15A 1814
Support, Printed Circuit Board	15A 1741

CHASSIS 6T2
MODELS 521 • 528



VOLTAGE DATA

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

TROUBLE SHOOTING HINTS

To simplify circuit tracing, as well as locating and identifying individual circuit components, refer to figures 3 and 4. Figure 4 is a photograph of the circuit components as they appear in their exact physical location. Figure 3 refers to the foil side of the printed wiring board. Schematic symbols illustrate what appears in approximately the same position on the reverse side of the board. Use

figures 3 and 4 with the schematic diagram for circuit tracing as well as voltage and resistance readings.

Refer to Service Manual S559, available from your Admiral distributor, for further general service and repair information of printed circuit wiring.

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 out thoroughly before applying to avoid any excess water from coming in contact with any of the electrical parts. Rub the surface thoroughly with the solution. 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.

ALIGNMENT PROCEDURE

- Fresh batteries should be used when making an alignment.
- Set Volume control full on.
- Connect output meter across speaker voice coil.
- Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool for IF transformers.
- Refer to "figure 4" for location of alignment points.

Step	Connection of Signal Generator	Signal Generator 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 pickup.	455 KC	Gang fully open	2nd IF 1st IF	** (A), (D) and (C) for maximum output
2	Same as "Step 1".	620 KC	Gang fully open	Oscillator Trimmer	(D) for maximum output
3	Same as "Step 1".	1400 KC	Tune in on generator signal	Antenna Trimmer	(E) for maximum output
4	Same as "Step 1".	640 KC	Tune in on generator signal	Antenna Peaking Coil	(F) for maximum output
5	Repeat "Steps 2 and 3" until no further increase in output is obtained.				

* If sufficient signal cannot be injected by this means, connect the signal generator "hot" lead to the mixer/stator plates (large fixed plate on the tuning gang) and the ground "cold" lead to the gang frame (ground).

** Remove chassis to make adjustments on IF transformers.
 Fasten chassis into cabinet before performing "Step 2".

† Make adjustment for maximum output. Then try to increase output further by "rocking" the signal generator frequency control slightly while making the adjustment.

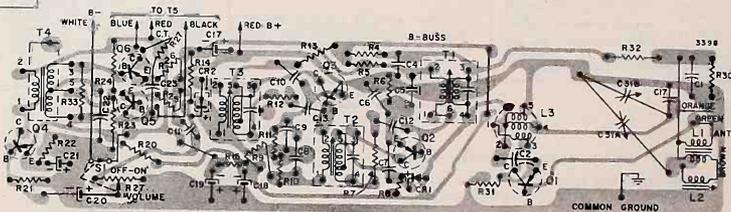


Figure 3. View of Printed Wiring Board. NOTE: Gray area represents printed wiring; black symbols and lines represent components and wiring on opposite side.

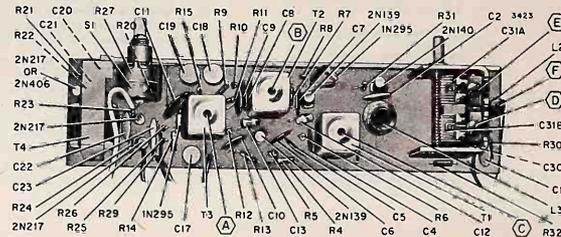


Figure 4. Top View of Chassis Showing Parts Location.

Firestone

7 TRANSISTOR PORTABLE RADIO

STOCK NO. 4-C-40

CODE NO. 1-8-71/483

TWG
CUSTOMER OPERATING INSTRUCTIONS SERVICE MANUAL AND PARTS CATALOG

TO OPERATE SET

To turn the set on, turn the on-off volume control clockwise (to right) until the switch click is heard. Turn the tuning control slowly to the desired station. Then turn volume control to the desired volume. For the more distant stations you may rotate the radio for clearer reception.

To turn radio off, turn the on-off volume control counter clockwise (to left) until switch click is heard.

BATTERY INFORMATION

This unit is designed to operate on 6 1/2 volts ordinary penlite cells such as Eveready type 915 or 1015 or Burgess type "Z". For longer life, Mallory Mercury Cells Type ZM-9 or equivalent may be used.

TO INSTALL BATTERIES

1. Move handle to rear of set.
2. Release clip on each side of cabinet.
3. Remove rear cover.
4. Slide battery holder out.
5. Be sure to observe correct polarity (see battery diagram) when inserting batteries so as to avoid possible damage to transistors.

IMPORTANT: WHEN REINSERTING BATTERY HOLDER THE CUTOUT MUST BE FACING UP. (SEE DIAGRAM INSIDE)

6. Replace cover and close clips.
Also it is recommended that all batteries be removed from case if receiver is to be out of use for lengthy periods.

EARPHONE ATTACHMENT

For private listening pleasure earphone attachment Stock No. 4-C-39 may be plugged into jack located on right hand side of receiver case.

Speakers are automatically disconnected when earphone is in use permitting you to enjoy private listening.

For Civil Defense broadcasts on the Conelrad plan tune to 640 KC or 1240 KC marked on tuning knob with Δ

Valuable Technical Information is contained inside this booklet.
Be sure to keep for future reference.

STOCK NO. 4-C-40

TECHNICAL SERVICE INFORMATION

CODE NO. 1-8-71/483

SPECIFICATIONS

Cabinet Dimensions	Width 6-5/8", Height 4-1/8", Depth 2"	Voice Coil Impedance	3.2 ohms at 400 cycles
Shipping Weight	2 pounds	Power Output	120 Milliwatts
Power Supply	6 - 1 1/2 volt penlight cells	Tuning Range	Standard Broadcast Band 540KC-1620KC
Battery Type	Eveready 915 or 1015 or equivalent	Intermediate Frequency	455KC
Loud Speakers	Two 3" P.M.	Transistor Complement	1 - 2N411 Converter 2 - 2N409 IF Amplifier 1 - R-67 Det. AVC 1 - 2N405 Audio Driver 2 - 2N306 Power Amplifier

TO REMOVE CHASSIS

1. Remove volume control knob by pulling away from case.
2. Move handle to rear.
3. Release spring clips on each side of cabinet and remove back.
4. Remove battery holder.
5. Unscrew the four chassis corner mounting screws
6. Remove one screw holding volume control bracket.
7. Slide down to bottom of case and out to clear tuning knob from case.

CAUTION: BE SURE TUNING KNOB IS COMPLETELY CLEAR OF CASE BEFORE REMOVING CHASSIS.

ALIGNMENT

ALIGNMENT INSTRUCTIONS - READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. Use battery power. Connect Output Meter across Voice Coil of Speaker.

Function	Generator Frequency	Dummy Antenna	Generator Conn.	Adjust	Remarks
1. I.F.	455KC	.1 Mfd Condenser in series with Gen. Lead	On Converter Base	T ₁ , T ₂ , T ₃	Adjust for Max. Output
2. Osc. Trimmer	1620KC		*Test Loop	C1-B	Variable Capacitor Set for Minimum capacity
3. Osc. Slug	540KC		*Test Loop	L-2 Slug	Variable Capacitor Set for maximum Capacity Adjust for Maximum Output Repeat steps 2 & 3 Tune 1400 Kc on Variable Capacitor
4. Ant. Trimmer	1400KC		*Test Loop	C1-A	Tune 1400 Kc on Var. Cds. Adjust for Maximum Output

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

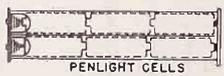
IMPORTANT: DO NOT make resistance measurements in transistor circuits unless all transistors are first removed from their sockets. Failure to do this will result in false indications and possible damage to transistors.

CODE 1-8-TW6

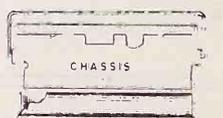
PART NO.	DESCRIPTION	FIRESTONE PRICE
250320	Plastic Cabinet Front	\$1.30
250251	Plastic Cabinet Cover	.70
272256	Volume Knob	1.10
272253	Tuning Knob	.20
760967	Handle	.05
678030	Cabinet Clips	.30
348028	Battery Holder Assembly Complete	1.00
450024	Volume Control	1.85
450024	First and Second I.F. Input Transformer	1.85
430490	Output Transformer	1.85
430490	Interstage Transformer	1.85
409008	Output Audio Transformer 1.6 ohm Sec.	3.30
455076	Speakers 3" 68 ohm	3.30
464029	Oscillator Coil	1.05
552025	Ferrite Loop	1.15
515039	.002 Mid. Cer. Disc. GMV	.30
515040	.05 Mid. Cer. Disc. 80-20% RMC 50V	.20
515040	.02 Mid. Cer. Disc. 80-20% 75V CRL	.20
581033	50 Mfd. Elect. 10V	.05
581033	5 Mfd. Elect. 10V	.35
581031	10 Mfd. Elect. 7V	.55
359011	Transistor 2N411	4.40
359010	Transistor 2N409	2.80
359008	Transistor 2N405	2.80
359015	Transistor 2N306	3.60
359017	Transistor (R-67)	1.60

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272253	Tuning Knob	.20
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678030	Cabinet Clips	.30
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552025	Ferrite Loop	1.15
515039	.002 Mid. Cer. Disc. GMV	.30
515040	.05 Mid. Cer. Disc. 80-20% RMC 50V	.20
515040	.02 Mid. Cer. Disc. 80-20% 75V CRL	.20
581033	50 Mfd. Elect. 10V	.05
581033	5 Mfd. Elect. 10V	.35
581031	10 Mfd. Elect. 7V	.55
359011	Transistor 2N411	4.40
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359008	Transistor 2N405	2.80
359015	Transistor 2N306	3.60
359017	Transistor (R-67)	1.60

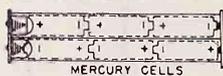
BATTERIES
 EVEREADY 915 or 1015
 BURGESS TYPE "Z"
 or equivalent
 For Longer Life
 MALLORY MERCURY CELLS
 2M-9



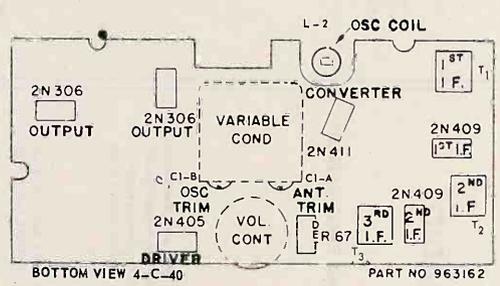
INSTALL ORDINARY PENLITE
 CELLS WITH CENTER POSTS
 AS SHOWN



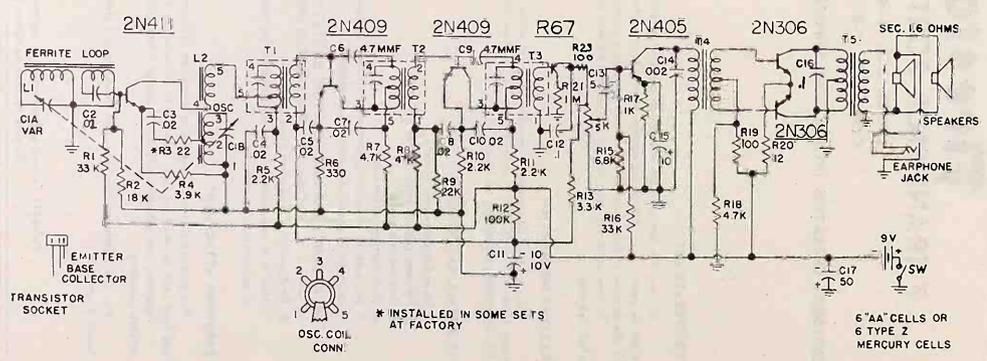
IMPORTANT
 CUTOUT MUST FACE UP WHEN BATT
 HOLDER IS PLACED IN CABINET



INSTALL MERCURY CELLS
 WITH + MARKINGS AS SHOWN



CHASSIS LAYOUT
 PART NO 963162



NOTE: All resistors are carbon 1/2W ±10%

TRANSISTORS ARE R.C.A. TYPE EXCEPT
 2N305 SYLV. & R67 TEX. INST.

960103

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CODE 1-8-TW6

PART NO.	DESCRIPTION	FIRESTONE PRICE
250320	Plastic Cabinet Front	\$1.30
250251	Plastic Cabinet Cover	.70
272256	Volume Knob	.10
272253	Tuning Knob	.10
670670	Handle	.20
670630	Volume Control	.05
368028	Battery Holder, Assembly Complete	1.30
450024	Volume Control	1.30
450025	First and Second IF Input Transformer	1.85
430490	Third IF Output Transformer	1.85
430500	Interstage Audio Transformer	1.85
450028	Output Audio Transformer 1.6 ohm Sec.	1.85
450029	Speakers 3" - .68 oz.	3.30
464029	P. Oscillator Coil	.75
550225	1000 MFD. Cer. Disc. 50V	1.05
550226	.05 MFD. Cer. Disc. 80-20% BMC 50V	.15
515039	.02 MFD. Cer. Disc. 80-20% 75V CRL	.30
515040	4.7 MFD. Cer. Disc. -10%	.30
581033	50 MFD. Elect. 10V	.05
581034	5 MFD. Elect. 10V	.55
359011	10 MFD. Elect. 7V	.55
359010	Transistor 2N409	4.40
359008	Transistor 2N405	4.20
359015	Transistor 2N306	3.60
359017	Transistor (R-67)	1.60

BATTERIES
EVEREADY 915 or 1015
BURGESS TYPE "Z"
or equivalent
For Longer Life
MALLORY MERCURY CELLS
2M-9



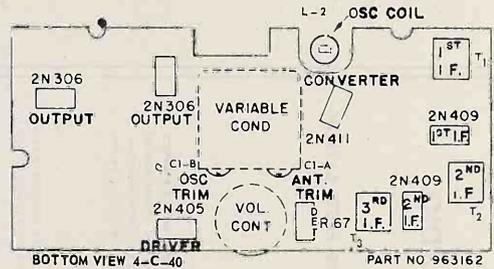
PENLIGHT CELLS
INSTALL ORDINARY PENLITE
CELLS WITH CENTER POSTS
AS SHOWN



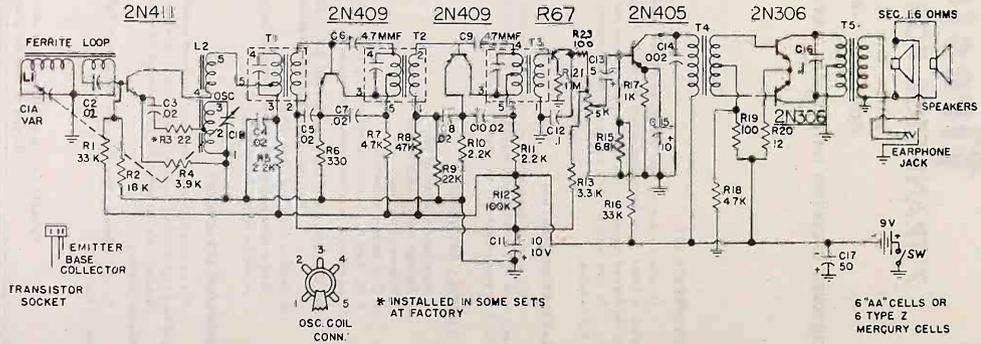
IMPORTANT
CUTOUT MUST FACE UP WHEN BATT
HOLDER IS PLACED IN CABINET



MERCURY CELLS
INSTALL MERCURY CELLS
WITH + MARKINGS AS SHOWN



CHASSIS LAYOUT



NOTE: All resistors are carbon 1/2W 5% tol

TRANSISTORS ARE 9V A TYPE EXCEPT 2N306 51LV, & R67 TEX. INST

960103

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PRELIMINARY SERVICE DATA

S-P745A
COVERS
MODELS
P745A
P746A

SPECIFICATIONS	
CABINET:	Plastic, P745A, Ebony P746A, Ant. White and Turquoise
ELECTRICAL RATING:	4.5 Volt D. C.
BATTERIES:	Carbon Pen-Light Cells: (3) Eveready #1015, #915, or (3) Burgess Z, #930, or (3) Mallory M5 Mercury Cells: (3) Eveready E9, or (3) Mallory ZM9
OPERATING FREQUENCIES:	Tuning Range 540 - 1600KC. IF Frequency 455KC
TRANSISTOR COMPLEMENT:	TR1 Osc. Conv. 2N164A or 2N168A TR2 1st. I. F. 2N94 TR3 2nd. I. F. 2N159 TR4 Audio Ampl. 2N265 TR5 Audio Output 2N241A
GERMANIUM DIODES:	D1 AVC 1N87 D2 Audio Bias Rectifier 1N87

GENERAL INFORMATION

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

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 bottom. (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 thumbcrew 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 mls. 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 with emery cloth 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

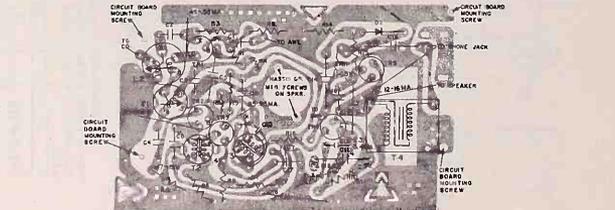
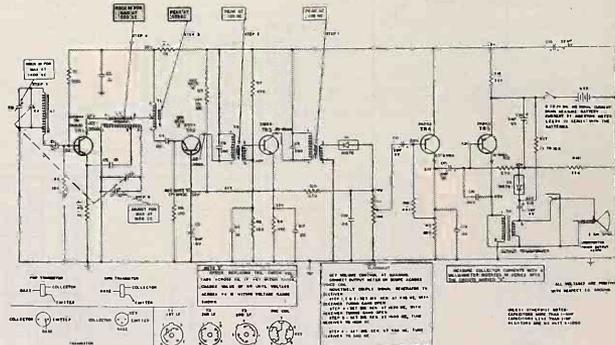
After removing a defective part, clean the mounting holes of all solder; replacement part can then be inserted more easily and a better solder connection can be accomplished. Apply a soldering iron just long enough to heat the terminal to remove the component. Too much heat may damage a component.

PRELIMINARY REPLACEMENT PARTS LIST - P745A, P746A

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
n-RS-1378	CA, B, C, D	Tuning Capacitor.....	4.15
RS-1022	C1, 3	.01mf., 450V.....	.30
	C2, 7	.01mf., 50V.....	
	C4	150mf., 300V.....	
n-RS-1462	C5	8mf., 6V.....	1.65
	C6, 9	390mf., 300V.....	
RS-1024	C10, 17, 19	.05mf., 50V.....	.50
	C18	.003mf., 100V.....	
n-RS-1453	C16	32mf., 6V.....	1.45
n-RS-1460	C11, 12, 14, 15	3mf., 6V.....	1.10

PRELIMINARY REPLACEMENT PARTS LIST - P745A, P746A CONTINUED

CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
n-RS-1379	R12, S1	POTENTIOMETER	2.75	n-RS-1058	CABINET & APPEARANCE ITEMS	
COILS - TRANSFORMERS				(Assemb.)		
n-RS-1372	TR	Transformer, Audio Output	3.00	n-RS-1059	Cabinet Back, (Ebony).....	3.50
n-RS-1375	L2	Coil, Oscillator.....	1.20		Insert, Decorative.....	
n-RS-1374	T1	Transformer, 1st. I. F.....	2.10		Strip, Decorative.....	
n-RS-1375	T2	Transformer, 2nd. I. F.....	2.10	n-RS-1061	Cabinet Front (Ant. White), P745A	
n-RS-1376	T3	Transformer, 3rd. I. F.....	2.10	(Assemb.)	Cabinet Back (Turquoise).....	3.50
n-RS-1380	L1	Antenna.....	1.40		Insert, Decorative.....	
MISCELLANEOUS				(Assemb.)		
RS-1195		Earphone receptacle and nut.....	.70	n-RS-1362	Knob (Tuning).....	.50
RS-1357		Battery Tube Support.....	.35	n-RS-1363	Thumbcrew (Tuning Knob).....	.10
(Assemb.)		Battery tube.....		n-RS-1364	Insert, Decorative.....	.55
		Contact Spring.....		n-RS-1365	Strip, Decorative.....	.15
		Retainer, Spring Contact.....	.85	n-RS-1366	Knob, Volume, Ebony, P745A.....	.15
		Cover, Battery Contact.....		n-RS-1358	Knob, Volume, Turq., P746A.....	.15
		Weather, Flat.....		"n" Denotes Items Not Previously Catalogued.		
n-RS-1368		Battery Contact Spring & Retainer.....	.45	All Parts Not Listed by Catalog Number Are Catalog		
n-RS-1369		Cover, Battery Contact.....	.15	Items, Obtainable From Radio Parts Jobbers.		
n-RS-1377		Speaker, 2 3/4".....	.75	Prices are Suggested List Prices and Subject To		
				Change Without Notice.		



COMPONENT WIRING DIAGRAM

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(340-1600 KC., 455 KC., 1-F.)

ER-S-P715
COVERS
MODEL S
P715-P716
P715B-P716B
P715D-P716D

SPECIFICATIONS	
BATTERIES:	(a) Carbon Pen-light cells; 2 Eveready #915 or 2 Mallory M13, or 2 Burgess #Z (b) Mercury Cells; 2 Eveready #E9 or Mallory #ZM9 (c) Rechargeable Cells; 2 Gould-National nickel-cadmium, AA cells, supplied with GE charger kit.
TUNING RANGE: I.F. FREQUENCY:	540 - 1620 KC 455 KC
POWER OUTPUT:	Undistorted 100 Milliwatts Maximum 130 Milliwatts with 3 volts input.

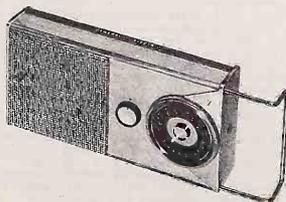
TO REMOVE CHASSIS FROM CASE

- Remove the end cap on the speaker end of the radio the same as you would to change the batteries. Do not unsolder the wire attached to the end cap, but unsolder the wire from the chassis bracket to the case.
- With a pair of longnose pliers, straighten the metal tab holding the speaker grille in place.
- Remove the speaker grille by folding it toward the handle end of the case.
- Using care, pull out the speaker and unsolder the two leads.
- Remove the volume knob by pulling it off. Turn the screw in the center of the tuning knob in a counterclockwise direction to remove it, then pull off the tuning knob.
- Remove the two screws by the speaker hole and pull out the handle.
- Take out the screw near the tuning shaft hole, also the screw on the end cap, handle end.
- Slide the chassis toward the handle end about 1/4 inch to gain access to the loop connections.
- Unsolder the 3 loop connections. Be sure to observe lead color coding.
- Continue to slide the chassis out in this direction. Let the end cap with the wire attached follow the chassis through the case.

NOTE: Do not remove the loop unless it is found to be defective as this will affect the alignment of the receiver.

Earphone jack catalogue number RJ5-230 has a small mounting stud and RS-1195 has a large mounting stud. If it becomes necessary to replace the earphone jack, replace with jack having the same size stud. Jack RS-1195 also has a third terminal which is ground, cut this terminal off to prevent it from shorting out any adjacent components.

Intermittent battery contacts will cause motorboating, intermittent audio and poor reception. Check the positive battery contact spring to be certain it is making firm contact with the battery. If the set contains Gould National rechargeable batteries, examine the positive battery caps for corrosion; if corrosion is evident, polish battery contacts with emery cloth. Some rechargeable batteries have a brass cap over the positive contact. Discard this cap and check for corrosion on the positive battery contact.

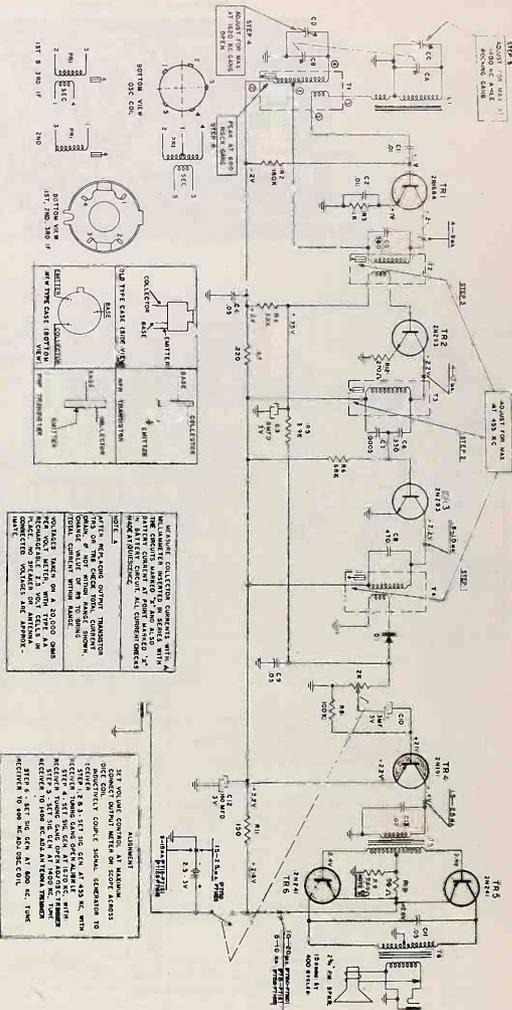


REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
n-RCE-260	C3	Elect. Cap. 8MFD 3V.....	1.45
n-RCE-261	C10	Elect. Cap. 3MFD 3V.....	1.45
n-RS-1459	C12	Elect. Cap. 100MFD 3V.....	1.10
n-RCT-105	CA, B, C, D	Tuning Gang.....	5.15
n-RCW-3184	C1, 2	.01 MFD.....	.20
n-RCW-3304	C4, 9, 11	.05MFD.....	.50
n-RCW-3310	C13	.02MFD.....	.35
n-RCW-3311	C5, 6	200MMF.....	.40
n-RS-1335	C5	.360MMF P715D, P716D.....	.55
n-RS-1336	C6	.330MMF P715D, P716D.....	.55
n-RCW-3312	C7	.001MFD.....	.20
n-RS-1337	C7	.0005MFD P715D, P716D.....	.25
n-RCW-3313	C8	.470MMF.....	.70
RESISTORS			
n-RS-1194	R-10	120 ohms. Cur. Var. P715A, B P716A, B.....	.35
n-RS-1333	R-10	50 ohms. Cur. Var. P715D, P716D.....	.50
COILS & TRANSFORMERS			
n-RLC147	T1	Oscillator Coil.....	1.30
n-RLI-072	L1	Loop.....	1.40
n-RTL-211	T2	I. F. Trans. 1st. P715A, B P716A, B.....	1.65
n-RS-1334	T2	I. F. Trans. 2nd. P715D, P716D.....	2.15
n-RTL-212	T3	I. F. Trans. 2nd. P715A, B P716A, B.....	1.35
n-RS-1333	T3	I. F. Trans. 2nd. P715D, P716D.....	1.75
n-RTL-213	T4	I. F. Trans. 3rd. P715A, B P716A, B.....	1.65
n-RTL-210	T5	Driver Transformer.....	3.65
n-RTL-206	T6	Output Transformer.....	3.70

	R4	R5	R8	R9	R10	R11	R12	R6	R7
P715-P716	120K	4.7K	2.0K	1800	120	800	830	200	.001
P715B-P716B	120K	4.7K	68K	1000	68	100	220	200	.001

All components in the above schematic were used in Models P715D-P716D. Components used in other receivers in this series, that differ from the P715-P716D are listed below.



GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
(840-1600 KC., 455 KC., I-F.)
Supersedes Service Note S-P750A

ER-S-P750A
COVERS
MODEL
P750A

SPECIFICATIONS	
CABINET:	Leather - P750A, Ginger
ELECTRICAL RATING:	3 Batteries: Eveready #950, or A100, Burgess #2R, or equivalent
POWER OUTPUT:	Undistorted: 225 milliwatts Maximum: 350 milliwatts

GENERAL INFORMATION

The model P750A, is an all transistor battery operated portable radio with leather cabinet. The B+ is supplied by three 1 1/2 volt flashlight type batteries producing the total B+ of 4.5 volts. Use saddle soap to clean the leather portion of the cabinet.

CHASSIS REMOVAL

1. Remove knobs.
2. Remove the batteries.
3. Remove the 5 screws holding chassis to the cabinet.
4. Lift circuit board out from circuit board springs. (When replacing chassis, slide the antenna edge of circuit board under circuit board holder retaining clips.)

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 16 to 18 mils. This is measured by inserting a milliammeter in series with the batteries.

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

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

NO RECEPTION:

1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil 12.

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.



P750A

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 to insure positive electrical contact.

After the set has been signed 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

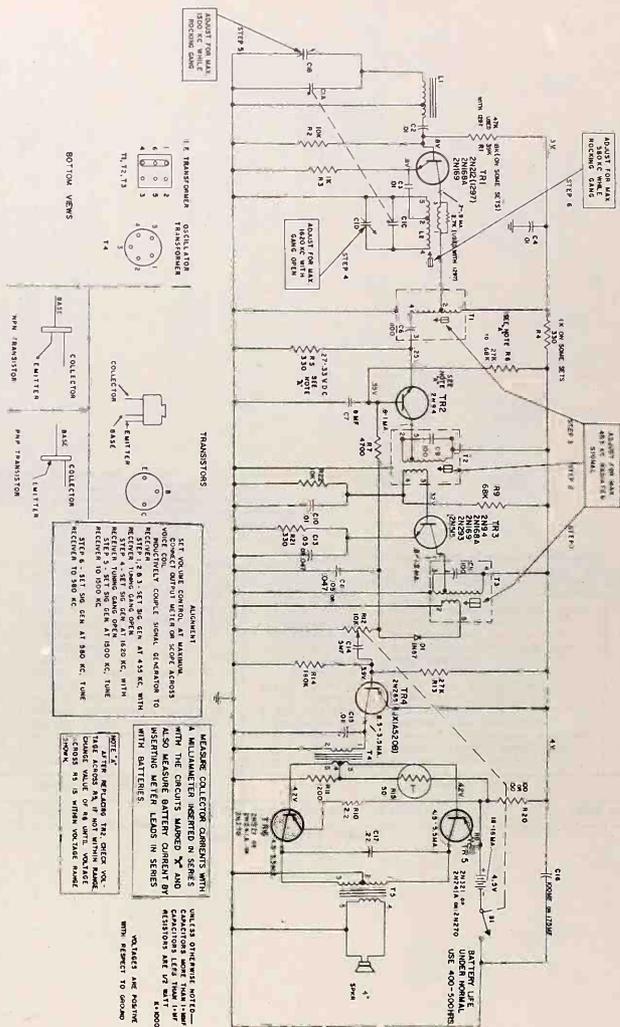
When measuring voltages at the transistor lead terminals, be sure to observe correct voltage polarities as shown on the schematic.

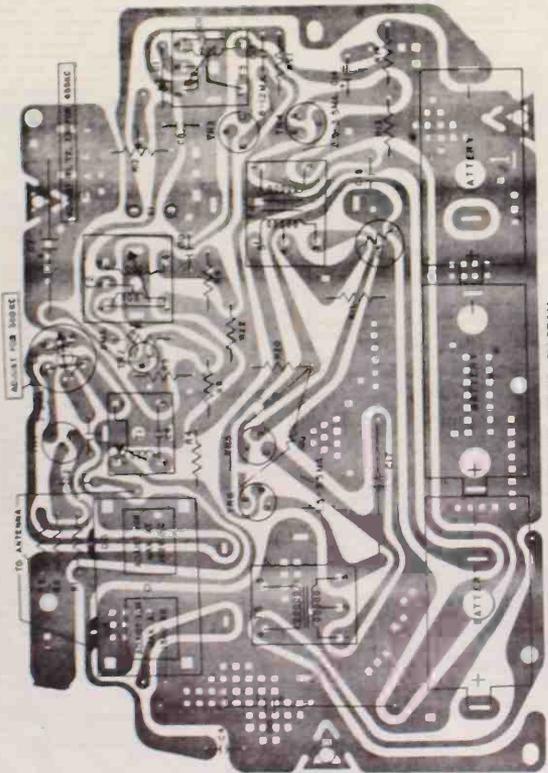
When replacing a defective transistor, be sure to observe correct lead positions, as shown on schematic diagram in outline form.

REPLACEMENT OF COMPONENTS

After removing a defective part, clean the mounting holes of all solder; the 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.

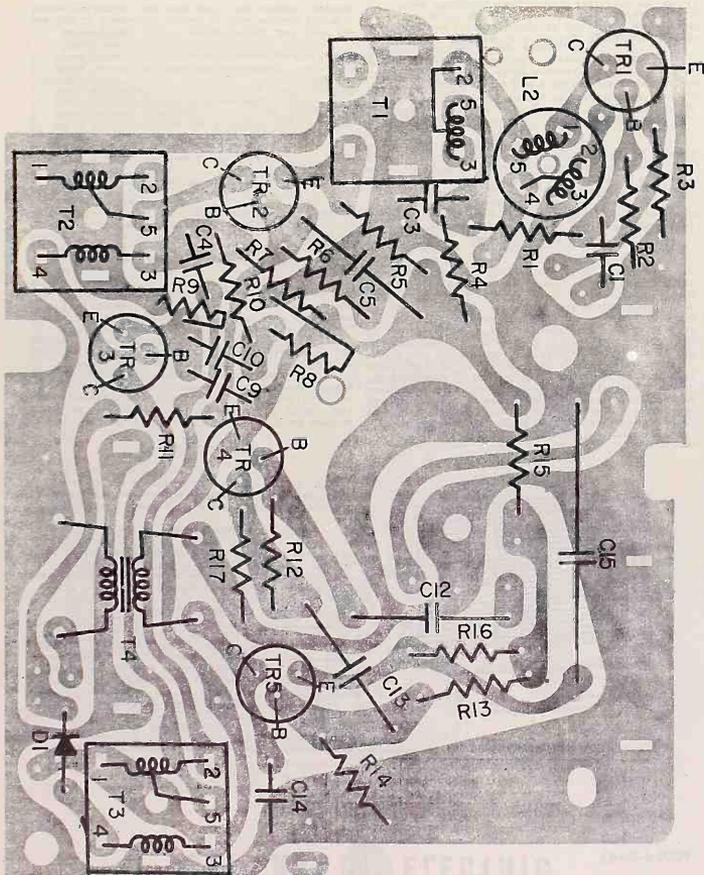
R15 is a thermistor (temperature compensating resistor) and regulates the current flow to the output transistors. After replacing R15, allow it to reach ambient temperature before turning the radio on.





COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST						
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
CAPACITORS						
*RS-1423	C1	Capacitor, Tuning.....	4.45	RB-1057	Speaker, 4"	5.45
	C2, 3, 4			RS-1186	Clamp, Antenna.....	.15
RS-1022	C7	.01mf., 50V.....	.30	RS-1320	Clip, IF Mgr.....	.05
RCE-225	C7	.05mf., 10V.....	1.65	*RS-1341	Clip, Battery (Pos. End), with	
RS-1024	C8, 13	.05mf., 50V.....	.30		Clamp & Rivet.....	.30
	C14	5mf., 10V.....		*RS-1342	Clip Battery (Neg. End), with	
	C16	100mf., 10V. or 175mf., 6V.			Clamp & Rivet.....	.30
	C17	.22mf., 100V.....		*RS-1343	Battery Clamp Holder, with	
RESISTORS						
*RS-1355	R15	50 ohms, thermistor.....	.50	*RS-1344	Clamp & Rivets.....	.40
POTENTIOMETER						
*RS-1347	R12, R1	Control, Volume 10K & 5W.....	1.85	*RS-1345	Bracket, Antenna (A.M.).....	.50
COILS & TRANSFORMERS						
*RS-1348	T1	Transformer, 1st. I.F.....	1.75	RMC-095	Ring, Tubular.....	.10
*RS-1349	T2	Transformer, 2nd. I.F.....	1.95	RMS-272	Ring, Compression (for Knobs).....	.05
*RS-1350	T3	Transformer, 3rd. I.F.....	1.95	CABINET & APPEARANCE ITEMS		
*RS-1351	EL	Coil, Oscillator.....	1.20	*RB-1059	Cabinet (Leather).....	6.50
*RS-1352	T4	Transformer, Input.....	2.75	*RS-1381	Grills, Nameplate, & Medallion.....	1.65
*RS-1353	T3	Transformer, Output.....	2.40	*RS-1382	Nameplate.....	.25
*RS-1386	L1	Antenna.....	1.90	*RS-1383	Medallion.....	.25
TRANSISTORS & DIODES						
RS-1531	TR1	2N12/1297 (on some sets).....	3.55	*RS-1384	Knob, Direct Tuning.....	.85
RS-1533	TR1, TR3	2N168A (on some sets).....	3.20	*RS-1385	Knob, Volume.....	.85
RS-1536	TR1, TR3	2N169 (on some sets).....	3.05	*RS-1419	Knob, Vernier Tuning.....	.25
RS-1547	TR2, TR3	2N94 (TR3 on some sets).....	3.15	* Denotes Parts Not Previously Cataloged.		
RS-1534	TR3	2N315 (on some sets).....	3.15	All Parts Not Listed by Catalog Numbers Are Common		
RS-1537	TR3	2N293 (on some sets).....	3.15	Items, Obtainable From Radio Parts Jobbers.		
RS-1546	TR4	2N765/4X1A520B.....	2.95	Prices Are Suggested List Prices And Subject To		
RS-1542	TR3, TR4	2N741A, 2N770, or 2N321.....	3.20	Change Without Notice.		
RED-001	D1	1N87, Diode Detector.....	1.90			



PARTS LIST (CONT'D)					
GAT. NO.	DESCRIPTION	PRICE	GAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS			CABINET & APPEARANCE ITEMS		
Δ-RS-1821	Crystal Diode, (was RED008)	1.90	*RB-1082	Cabinet Front, Back, Grille, Insert	4.95
RS-1195	Jack, Earphone	.90	*RS-1573	Knob, Tuning	.50
RS-1363	Screw, Tuning Knob	.40	*RS-1574	Insert	.35
*RS-1578	Ball, Handle	.05	*RS-1575	Grille Assem.	1.20
*RS-1580	Screw, Cabinet Lock	.10	*RS-1576	Knob, Volume	.35
*RS-1589	Battery Contact Assem.	.35	*RS-1577	Handle	.60
*RS-1594	Clip, U type	.05			
*RB-1083	Speaker, 3.2 ohms 3 1/2"	4.99			

* Denotes Parts Not Previously Cataloged.

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

All Parts Not Cataloged Are Common Items, Obtainable From Radio Parts Jobbers.

Δ¹ Denotes part used in former radio/phonograph models. You may have it stocked under number shown in parenthesis. Please change your records to the new number with two-letter prefix.

GENERAL ELECTRIC

SERVICE MANUAL
FOR
TRANSISTOR RADIO RECEIVERS
 (540-1600 KC, 488 KC, 1-FA)
 Supersedes Service Note S-P760A

ER-S-P760A
 COVERS
 MODELS
 P760A
 P761A

SPECIFICATIONS	
CABINET:	Plastic - Beige, P760A; Green, P761A
ELECTRICAL RATING:	4 Batteries; Eveready #950 or A100, Burgess #28, or equivalent
POWER OUTPUT:	Undistorted: 80 milliwatts Maximum: 150 milliwatts

GENERAL INFORMATION

The models P760A and P761A are all transistor battery operated portable radios.
 The B+ is supplied by four 1 1/2 volt flash - light 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 7 screws holding chassis to cabinet.

TROUBLESHOOTING

A check of battery conditions 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 components are defective.

A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring so that a millimeter 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.

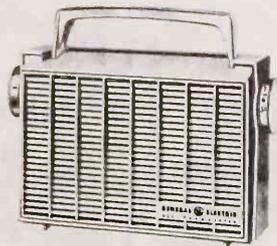
WEAK AUDIO:

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



P760A, P761A

and holding springs inward to increase their tension. Oxidation may occur on the contacts of the batteries. 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.

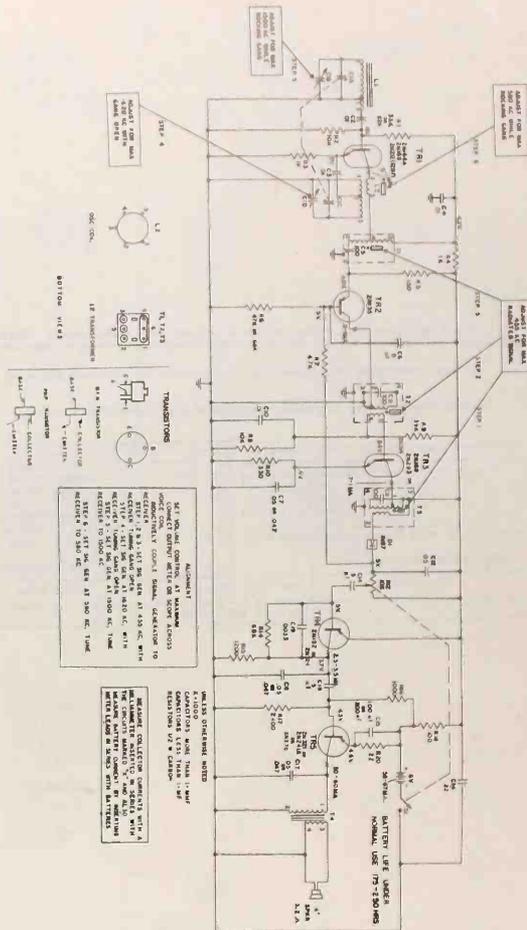
When replacing a defective transistor be sure to observe correct lead positions, as shown on the schematic diagram in outline form. When replacing TR2, mount carefully so that the transistor casing does not touch other circuit components.

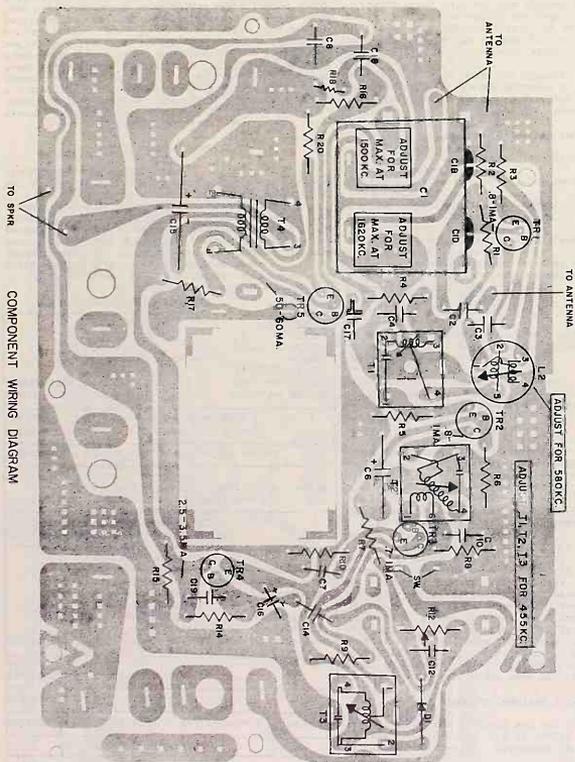
REPLACEMENT OF COMPONENTS

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 components. Too much heat may damage a component.

After completing a soldering operation, inspect and clean the plated circuit of any excess solder that may short or bridge across nearby copper plated wiring.

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





COMPONENT WIRING DIAGRAM

REPLACEMENT PARTS LIST							
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE	
CAPACITORS				MISCELLANEOUS			
*RS-1346	C1	Capacitor, Tuning.....	3.55	RS-1188	Clamp, Antenna.....	.05	
	C2, 3, 4, 10	.01mf., 450V.		RS-1320	Battery Clip & Clamp (Pos.)	.04	
	C6	8mf., 10V.		*RS-1361	Battery Clip & Clamp (Pos.)	.30	
	C7, 12	.05mf., 450V.			(Right Cent. Batt.).....		
	CB 17	.047mf., or .05mf., 450V.		*RS-1342	Battery Clip & Clamp (Neg.)	.30	
	C14, 18	5mf., 10V.			(Left Center Batt.).....		
	C15	100mf., or 200mf., 3V.		*RS-1344	Bracket, Antenna, (L.H.).....	.90	
	C16	.22mf., 100V.		*RS-1345	Bracket, Antenna, (R.H.).....	.70	
	C19	.0033mf., 450V.		*RS-1393	Clip (Pos.) (Left Battery).....	.20	
				*RS-1394	Clip & Clamp (Pos.) (Right Batt.)	.30	
COILS AND TRANSFORMERS				CABINET AND APPEARANCE ITEMS			
*RS-1424	T1	Transformer, 1st. I.F.....	4.82	*RS-1060	Cabinet Front, Beige (P760A)		
*RS-1425	T2	Transformer, 2nd. I.F.....	4.85	(Assemb.)	Cabinet Back, Beige.....	4.50	
*RS-1426	T3	Transformer, 3rd. I.F.....	4.10		Grille Pad.....		
*RS-1427	L2	Coil, Oscillator.....	1.37		Cabinet Clasp (2).....		
*RS-1428	T4	Transformer, Output.....	2.46		Cabinet Hinge (2).....		
*RS-1429	L1	Antenna.....	4.82	*RS-1061	Cabinet Front, Green, (P761A)		
				(Assemb.)	Cabinet Back, Green.....	4.50	
					Grille Pad.....		
POTENTIOMETER				TRANSISTORS AND DIODES			
RS-1347	R12, S1	Control, Volume, 10K & Sw.	1.85	RS-1533	TR1	2N166A (on some sets).....	3.20
				RS-1538	TR1, TR3	2N169 (TR1 on some sets).....	3.05
				RS-1531	TR1	2N171/1297 (on some sets).....	3.55
				RS-1539	TR2	2N135 or 4JX1A813.....	3.30
				RS-1537	TR3	2N293 or 2N314.....	3.15
				RS-1541	TR4	2N192 or 2N324.....	2.90
				RS-1542	TR5	2N270, 2N321 or 2N241A.....	3.20
				RED-001	D1	1N87, Diode Detector.....	1.90

* Denotes Parts Not Previously Cataloged.

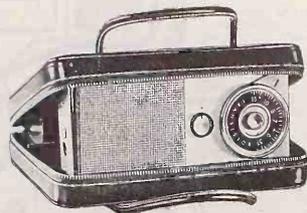
All Parts Not Listed by Catalog Numbers Are Common Items, Obtainable From Parts Jobbers.



ER-S-PI5A
COVERS
MODELS
P715C
P15A



P715C



P15A

These charging units can be used with all G. E. transistor radios having a recharging jack and using 2 rechargeable 1.2 volt batteries.

In the early production of the P715C charging units, the charging transformer had an output of 2.7 volts A.C. However, in the later production P715C and all of the P15A chargers this transformer has an output of 12 volts A.C. and uses a 220 ohm 1 watt series dropping resistor.

If it becomes necessary to replace the charging transformer, only the type catalog number RTC-006 with the 12 volt A.C. output, should be used. All RTC-006 transformers will be supplied with the 220ohm dropping resistor. The resistor should be connected in the circuit as shown in the schematic diagram.

For quickly checking the output of the charger a simple test item can be constructed in a couple of minutes. Take a charging jack-and-bracket assembly (cat. no. RS-1433) and solder a 170 or 180 ohm resistor between the jack terminal and the bracket frame.) With the charger plugged into the jack and connected to a 105 to 120 volt AC supply the voltage across the 170 to 180 ohm resistor must be greater than 2.5 volts D.C.

Rechargeable cells that remain in a discharged condition may accumulate corrosion on the terminal. This corrosion acts as a high resistance in series with the charger when attempting to recharge the batteries.

Batteries in this condition may never become fully charged creating the illusion of a faulty charger. It is necessary therefore, to clean the terminals with fine emery cloth before attempting to recharge the batteries.

Normal recharging time for a set of rechargeable batteries is 14 to 16 hours. However, this time may vary depending upon the condition of the batteries when the recharge begins.

CAUTION

Make sure the batteries are installed in the correct position. IF RECHARGEABLE BATTERIES ARE INSTALLED IN THE REVERSE POSITION THEY WILL BE RUINED DURING RECHARGE.

TROUBLE SHOOTING

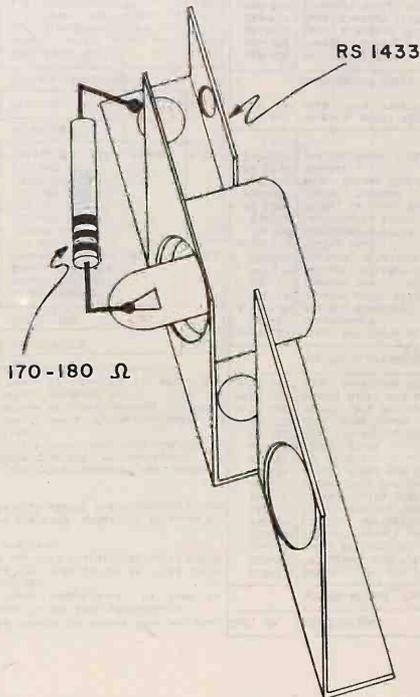
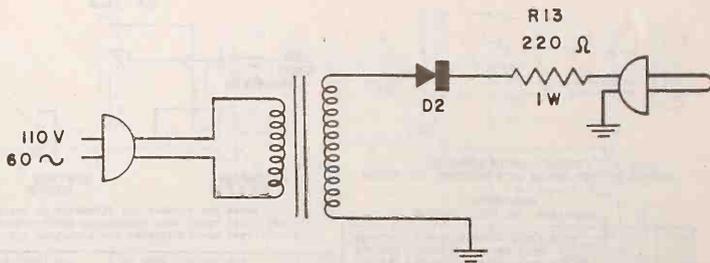
When checking the charger output as previously described, if less than 2.5 Volts D. C. make the following checks:

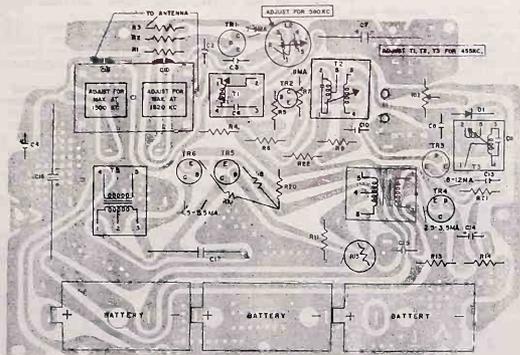
1. Check output voltage of the transformer.
 - (a) If the charging unit uses the 220 ohm resistor, the transformer output should be 12 Volts A. C.
 - (b) If the 220 ohm resistor is not used in unit the transformer output should be 2.7 Volts A. C.
2. Check solder connections on terminal board and at charger plug.
3. Check the 220 ohm resistor by unsoldering one end and substituting one of proper resistance.
4. Check diode D2 also by substitution.

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
RAF-009		Trim Strip P715C.....	.50
RAH-007		Charger Housing P715C.....	.60
RAJ-075		Charger Case Assem. P715C.....	4.50
RJB-083		Terminal Strip.....	.05
RTC-006		Transformer.....	2.80
RWL-043		Cord, Power.....	.90
RS-1008		Battery, 1 Nickel Cad.....	4.25
RS-1111		Plate, Identification P715C.....	.30
RS-1198		Housing, Charger P15A.....	.70
RS-1199		Plug, Charger Assembly.....	1.00
RS-1200		Plate, Identification P15A.....	.30
RB-1095		Case, Charger P15A.....	17.85
RS-1653	D2	1WS2 Diode.....	2.00

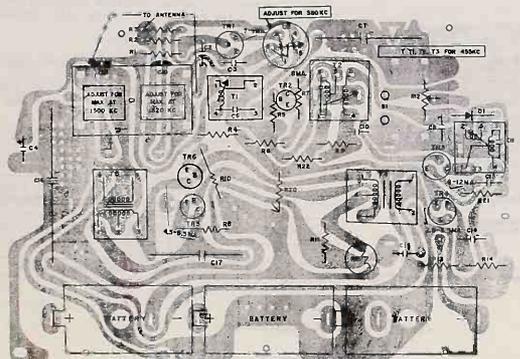
All components not cataloged are common types obtainable from radio parts jobbers. Refer to schematic for symbols and values.

PRICES ARE SUGGESTED LIST PRICES AND ARE SUBJECT TO CHANGE WITHOUT NOTICE.





COMPONENT WIRING DIAGRAM (EARLY PROD)



COMPONENT WIRING DIAGRAM (LATE PROD)

REPLACEMENT PARTS LIST						
CAT. NO.	SYMBOL	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
CAPACITORS						
RS-1022	C2, 3, 4	.01mf., 450V.	.30	RB-1057	Speaker, 4"	5.45
RS-1024	10, 15	.05mf., 50V.	.50	RS-1065	Brace, Handle, L.H.	.75
RS-1346	C1	Tuning Capacitor.	3.55	RS-1066	Brace, Handle, R.H.	.75
RS-1458	C16	175mf., 5V.	1.55	RS-1067	Screw, Handle.	.10
RCE-225	C7	8mf., 10V.	1.65	RS-1072	Pad, Grille, (Black Paper)	.05
	C14	5mf., 10V.		RS-1073	Resistor, Handle.	.05
	C17	.22mf., 100V.		RS-1074	Clip, Friction.	.05
RESISTORS						
RS-1351	R15	50 ohms, thermistor.	.50	RS-1075	Catch, Cabinet.	.05
POTENTIOMETER						
RS-1347	R12, S1	Volume Control, 10K & Sw.	1.85	RS-1088	Screw, #6x5/16, type 25.	.03
TRANSISTORS & DIODES						
RS-1531	TR1	2N212/1297 (on some sets).	3.55	RS-1089	Screw, #6-32x1/8 P.H.	.05
RS-1533	TR1, TR3	2N168A (on some sets).	3.20	RS-1188	Clamp, Antenna.	.15
RS-1538	TR1, TR3	2N169 (on some sets).	3.05	RS-1341	Battery Clip, Clamp & Rivet, (Pos. End)	.30
RS-1547	TR2, TR3	2N94 (TR3 on some sets).	3.15	RS-1342	Battery Clip, Clamp & Rivet, (Neg. End)	.30
RS-1534	TR3	2N515 (on some sets).	3.15	RS-1343	Battery Clamp Holder, Clamps & Rivets.	.40
RS-1537	TR3	2N293 (on some sets).	3.15	RS-1344	Bracket, Antenna, (R.H.)	.90
RS-1546	TR4	2N265/A, JN1550B.	2.95	RS-1345	Bracket, Antenna, (L.H.)	.70
RS-1542	TR5, TR6	2N241A, 2N270, or 2N321.	3.00	RS-1456	Wall Hanger Button.	.10
RED-001	D1	1N87, Diode Detector.	1.90	RHC-095	Ring, Tubular.	.10
				RMS-272	Ring, (Compression) (for knobs).	.05
COILS & TRANSFORMERS						
RS-1348	T1	Transformer, 1st I.F.	1.75	CABINET & APPEARANCE ITEMS		
RS-1349	T2	Transformer, 2nd I.F.	1.95	*-RB-1055	Cabinet Front, (Tan), P725B.	6.45
RS-1350	T3	Transformer, 3rd I.F.	1.95	(Assemb.)	Cabinet Back, (Tan)	
RS-1351	L2	Coil, Oscillator.	1.20		Pad, Grille.	
RS-1352	T4	Transformer, Input.	2.75		Grille.	
RS-1353	T5	Transformer, Output.	2.40	*-RB-1056	Cabinet Front, (Turq.), P726B.		6.45
*-RS-1354	L1	Antenna.	2.40	(Assemb.)	Cabinet Back, (Turq.)	
					Pad, Grille.	
					Grille.	
					Catch, Cabinet, (2).	
				RS-1061	Hinges, Cabinet, (2).	2.10
				RS-1062	Grille.	
				RS-1063	Nameplate.	.25
				RS-1064	Handle, (Brown), P725B.	.95
				RS-1066	Handle, (Ant. White), P726B.	.95
				RS-1068	Knob, Tuning, (Brown), P725B.	.75
				RS-1069	Knob, Tuning, (Ant. White), P726B.	.75
				RS-1070	Knob, Volume, (Brown), P725B.	.85
				RS-1071	Knob, Volume, (Ant. White), P726B.	.85

* - Denotes Parts Not Previously Cataloged.

All Parts Not Listed by Catalog Numbers are Common Items, Obtainable From Radio Parts Jobbers.

Prices are Suggested List Prices and Subject to Change Without Notice.

SERVICE MANUAL

AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 572A

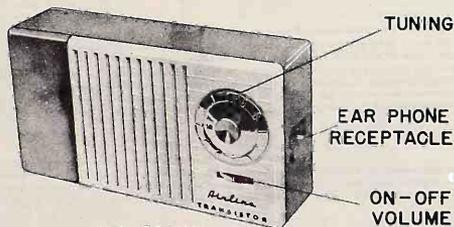
Airline
TRANSISTOR
RADIO

MODEL BR-1102A

SERIAL No. 75X

6Z-5149B*

WARDS TRANSISTOR RADIO



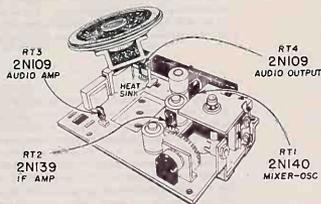
Model BR-1102A
Turquoise and White

SPECIFICATIONS

Power Supply	9 volts D.C.
Frequency Range	540 to 1600 KC
Intermediate Frequency	455 KC
Selectivity	At 1000 KC, 70 KC at 1000 X signal
Sensitivity (2.mw ref)	800 u.v. per meter
Power Output	20 m. w.
Speaker	2-3/4" PM, V.C. impedance-15 ohms
Cabinet	6-1/4" width, 1-3/4" depth, 3-3/8" height

TRANSISTOR COMPLEMENT

RT1	2N140	Oscillator-Mixer
RT2	2N139	1st. IF Amplifier
RT3	2N109	Audio Amplifier
RT4	2N109	Audio Output
	CK-706A	Crystal Detector



Top Chassis View

SERVICE LETTER REMINDER

Record number of Service Letters below that apply to models listed in this manual.

REMOVING CHASSIS FROM CASE

1. Remove battery.
2. Remove tuning knob stud by turning counterclockwise and remove tuning knob.
3. Remove case cover mounting screw located behind tuning knob and remove case cover.
4. Remove three chassis mounting screws.
5. Carefully remove chassis from case allowing battery cable to slip through battery compartment hole.

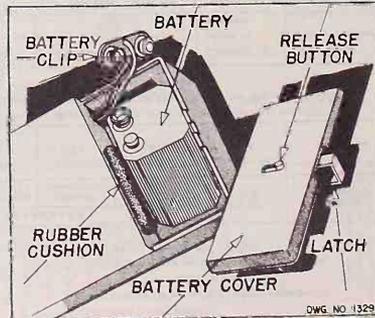
BATTERY REPLACEMENT

Since the receiver is small and compact, not every 9 volt battery will fit in the space provided. Listed below are five available types to be used for replacement.

WARDS	NO-92
BURGESS	NO-2N6
EVEREADY	NO-246
OLIN	NO-1707
RCA	VS-305

Approximately 100 hours performance can be experienced with the above batteries before replacement is required. Battery replacement should be performed when the sound output is noticed to be muffled or distorted with a decrease in total output or if a voltage measurement shows less than 6 volts. The battery voltage should be measured with the receiver turned on after at least 5 minutes of operation.

When battery replacement is necessary, remove battery cover by pushing release button upward, grasp latch and pull up and away from case. Remove old battery and un-snap battery cable. Snap battery cable on replacement battery and insert into case. Be sure rubber cushion is between battery and side wall of case to prevent battery movement. Insert battery cover in place and push latch down.



BATTERY LOCATION

OWG. NO. 1329

M O N T G O M E R Y W A R D

TRANSISTOR SERVICING

The following information is presented as a guide to servicing transistor radios:

VOLTAGE READINGS

Because of the low battery potential, it is suggested that a VTVM be used to measure all circuit voltages. Voltage readings will vary with the strength of the signal being received, the battery voltage, and the type voltmeter being used. The voltage readings indicated on the schematic diagram were measured with a VTVM, no signal input, and with a battery voltage of 9 volts. Voltage readings will also vary with a change of transistors. The transistors conductivity varies to one transistor to another, therefore, voltage readings will differ. All voltage readings will be negative with respect to chassis due to the PNP type transistor employed.

BATTERY REPLACEMENT

The battery should be the first component checked when the radio is presented for service, since the battery voltage decreases with use and age. The battery voltage should be checked at the battery cable connections with the receiver turned on, and after at least five minutes of operation. Batteries have a tendency to reactivate (recharge) when not in use, and a true test of the batteries capabilities can not be determined until sufficient current has been drawn from the battery. If the battery is found to be dead, the receiver should be checked for a short circuit before the replacement battery is installed. Disconnect battery and measure resistance with an ohmmeter at the battery cable connections. Ohmmeter will indicate approximately 1700 ohms with positive lead to chassis, approximately 400 ohms with negative lead to chassis and approximately 4000 ohms with all transistors out of circuit with either meter lead to chassis. Battery replacement should be performed when the sound output is noticed to be muffled or distorted with a decrease in total output.

OHMMETER READINGS

When using an ohmmeter to check continuity and resistance readings, caution must be observed. It is important to know the internal battery voltage of the ohmmeter as damage could result due to excessive voltage being applied to the ohmmeter. It is also important to know the battery polarity of the meter leads. Incorrectly placing the ohmmeter leads across a lytic capacitor with a low working voltage may damage the capacitor due to excessive reverse current. If the meter battery voltage is greater than 12 volts, the high frequency transistor rating will be exceeded and may be damaged. A diode action will be experienced when attempting to check the resistance readings with the transistors in the circuit. It is advisable to remove all transistors from their sockets before making ohmmeter checks.

SOLDERING

Caution must be observed when using a soldering iron as excessive heat may easily damage a transistor. The transistors must be removed from their sockets before soldering at the socket pins. Heat may also damage other components such as 1/4 watt resistors. Therefore, dissipate the heat to the component by grasping the component lead with a pair of long nose pliers. A low wattage small diameter tip iron is suggested.

TRANSISTORS

If a transistor is suspected of being defective, substitution will be the only reliable check. Checking resistance readings of a transistor with an ohmmeter will indicate only a shorted or open transistor. When inserting a transistor in its socket, make sure the transistor's leads line up with the socket holes. Illustrations on the schematic diagram show the spacing between transistor's leads and the transistor sockets. Audio transistors have a red dot on the body of the transistor adjacent to the collector lead for identifying purposes. The red dot must line up with a paint dot on the chassis when the transistor is inserted into the socket. If a transistor substitution is made in the RF or IF circuit, realignment may be necessary. This is due to the difference in operating characteristics from one transistor to another.

COMPONENT REPLACEMENT

An important consideration is component replacement. Miniature as well as close tolerance components are used throughout the radio, therefore, all components must be replaced with exact duplicate parts.

TROUBLE SHOOTING

Trouble in a transistor radio can easily be isolated by using a signal generator and listening to the speaker. Circuit tracing from the base of the output stage back through the receiver to the antenna, should quickly reveal which stage is not functioning properly. When injecting the signal, use a 50 mfd lytic, negative to base, in the audio circuit; a .5 mfd capacitor in the IF or RF stages and inductive coupling to the antenna.

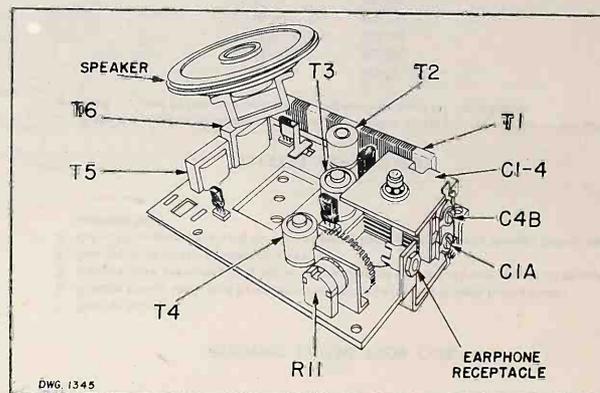
Caution must be observed not to accidentally short the collector circuit to the chassis, as damage to the transistor may result. Also, the practice of deliberately shorting a circuit to chassis to determine if voltage is present or to listen for a click in the speaker, must be avoided for the same reason.

ALIGNMENT PROCEDURE

- NOTES: 1. Remove chassis from case.
2. Connect 9 volt battery.
3. Use output meter with 15 ohms impedance.
4. Turn volume control to maximum.
5. Signal generator output at 100 microvolts, 30% modulation at 400 cycles.

CIRCUIT	SIGNAL GENERATOR			GROUND SIDE	OUTPUT METER	GANGED CAPACITY	ADJUST FOR MAXIMUM OUTPUT ON METER
	FREQUENCY	COUPLING CAPACITY	CIRCUIT CONNECTION				
I.F.	455KC	.5MF	To Base of RT1	To Chassis	Connect in place of speaker	-----	T3, T4
Repeat above step two or three times for best results, keeping generator output in all cases as low as possible to prevent overloading of audio.							
Osc.	1620KC	.5MF	To Base of RT1	To Chassis	Connect in place of speaker	Open Gang (Fully clockwise)	C4B
Caution: Too high an output from signal generator may cause setting of trimmer on a spurious response.							
D.c.	535KC	.5MF	To Base of RT1	To Chassis	Connect in place of speaker	Closed Gang (Fully counter-clockwise)	T2
Osc.	1620KC	.5MF	To Base of RT1	To Chassis	Connect in place of speaker	Open Gang (Fully clockwise)	C4B
Ant.	1400KC	Connect 3 turn loop to generator and place near T1.			Connect in place of speaker	Ganged Condenser should be rocked	C1A

Check for alignment and dial calibration at 1000KC and 600KC.



REPLACEMENT PARTS LISTS

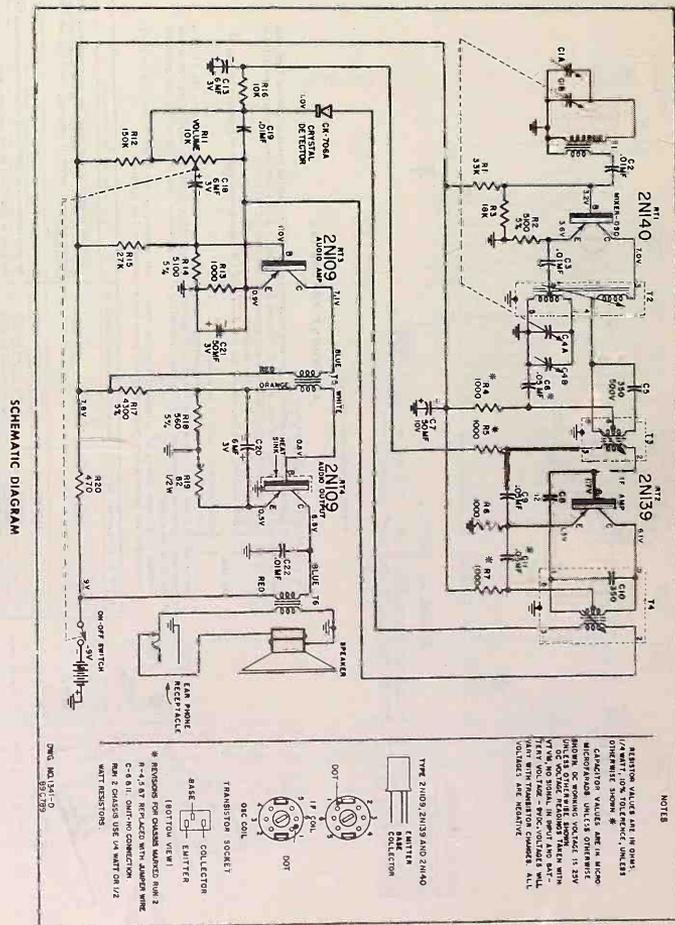
REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
RESISTORS					
R1		33K ohm, 1/4 watt, 10%	T4	13B-26382	2nd IF Transformer
R2		5100 ohm, 1/4 watt, 5%	T5	12C-26467	Input Transformer
R3		18K ohm, 1/4 watt, 10%	T6	12C-26539	Output Transformer
R4-5-6-7	10A-26383	1000 ohm, 1/4 watt, 10%	MISCELLANEOUS		
R11		On-off Volume control-10K ohm	44A-26374		Earphone receptacle
R12		150K ohm, 1/4 watt, 10%	2D-26377		Volume control bracket
R13		1000 ohm, 1/4 watt, 10%	32F-26445		Volume knob screw
R14		5100 ohm, 1/4 watt, 5%	18A-26777		2-3/4" P.M. Speaker
R15		27K ohm, 1/4 watt, 10%	14A-26469		Battery Cable
R16		10K ohm, 1/4 watt, 10%	2M-26376		Antenna spring clip
R17		4300 ohm, 1/4 watt, 5%	15B-24912		Transistor socket-large
R18		560 ohm, 1/4 watt, 5%	43D-27661		Heat sink clip
R19	23X10X820K	82 ohm, 1/2 watt, 10%	A2M-24947		Mounting clip (Transistor sockets)
R20		470 ohm, 1/4 watt, 10%	B48A-26593		Insulator (IF & Osc. osc. coils)
CAPACITORS					
C1AB-C4AB	8A-26659	Tuning condenser	CABINET PARTS		
C2-3	8G-26457	.01 mfd, 25 volt, ceramic	116A068		Case
C5	8H1-274	350 mmf, 500 volt, 5% mica	2C-26505		Handle Plate
C6	8G-26459	.05 mfd, 25 volt, ceramic	116A067		Retainer Pin
C7	8C-26454	50 mfd, 10 volt, lyric	116A066		Case cover
C8	8C-26766	12 mmf, 5%	15A1129		Battery cover assy
C9	8G-26459	.05 mfd, 25 volt, ceramic	3M-26400		Tuning knob
C10	8G-26459	350 mmf (Incl. in T4)	5B-27470		On-off volume knob
C11	8G-26455	.05 mfd, 25 volt, ceramic	25M-26538		Rubber cushion
C12	8C-26455	6 mfd, 3 volt, lyric	* TRANSISTOR		
C13	8C-26455	6 mfd, 3 volt, lyric	RT1	2N-140	
C18	8G-26457	.01 mfd, 25 volt, ceramic	RT2	2N-139	
C19	8C-26455	6 mfd, 3 volt, lyric	RT3	2N-109	
C20	8C-26455	6 mfd, 3 volt, lyric	RT4	2N-109	
C21	8C-26453	50 mfd, 3 volt, lyric		19C1980	Crystal detector (CK706 or 1N295)
C22	8G-26879	.01 mfd, 25 volt, ceramic	* Transistors are to be purchased from manufacturer of radio.		
TRANSFORMERS					
T1	13E-26452	Rod Antenna			
T2	51B2660	Oscillator coil			
T3	13A-26380	1st, IF Transformer			

NOTE: All chassis marked "Run 2" include the following changes:

Ref. No.	Part No.	Description	Change
R-4,5,7		Resistor (1000 Ohm 10% 1/4 Watt)	Delete these resistors and replace with jumper wire.
C-6,11	8G-26459	Capacitor (.05 mfd, 25V, Ceramic)	Omit, no connection

Some Run 2 chassis used 1/2 watt resistors in place of 1/4. In all Run 2 chassis for replacement parts either 1/2 or 1/4 watt resistors may be used.

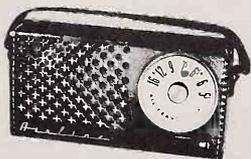
Use universal parts where part numbers are not shown. Order from (LRS).



SERVICE MANUAL

AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 575A
Airline
TRANSISTOR RADIO
MODEL
GTM 1108A
SERIAL NO.
75X
Form No. 622-576B



MODEL GTM 1108A

TAN

ELECTRICAL SPECIFICATIONS

Frequency range 540 to 1600 KC
Intermediate Frequency 455 KC

Transistor Complement

1 2N252	Converter
1 2N253	1st IF Amp.
1 2N254	2nd IF Amp.
1 1N87G or 1N295	Diode Detector
1 2N238	Audio Driver
1 2N291	Audio Output

Power Output

Undistorted 035 watts
Maximum 060 watts

Loudspeaker 2 1/2" PM

Power Supply:

Wards - 62-96	RCA-VS-300
Eveready-226	Burgess PG

Average Current Drain 17 ma.

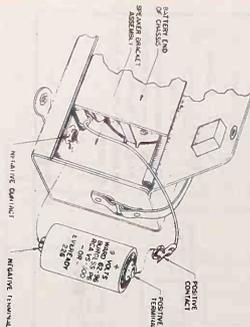
GENERAL DESCRIPTION

This Airline transistor radio is a five transistor portable broadcast superheterodyne receiver. A jack is provided for private earphone connection. It replaces the loudspeaker when a miniature plug is inserted through the hole in the back of the cabinet. This silences the speaker and allows the user to listen under conditions of high ambient noise, or situations in which operation of the speaker is undesirable. The receiver is housed in a leatherette case with carrying strap.

The receiver employs five junction type transistors. The converter, audio driver, and audio output transistors are of the PNP type, while the IF amplifiers employ NPN type transistors. The converter stage is an autodyne type mixer-oscillator. A tuned, high "Q" ferrite-core coil is used as an antenna. Two stages of IF amplification are used. The gain of the 1st IF amplifier is controlled by an Automatic Gain Control circuit.

A crystal diode functions as a detector and AGC source. The driver amplifies the audio signal and capacity couples it to the audio signal transistor. The audio output stage is operated Class "A". The speaker is a 2 1/2" PM type.

Figure 4 Battery Installation

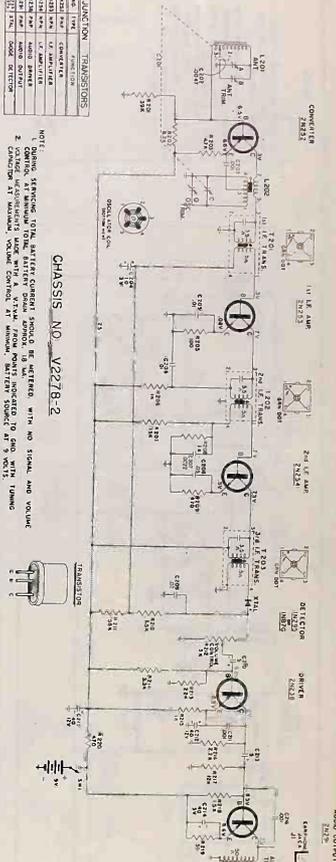


STEP	Frequency Setting	Control Component Output to:	Adjust for maximum
(1)	455 KC	loosely couple to L201	Remove speaker socket Assy. Set trim potentiometer fully open and adjust T202, T207, and T201 in order indicated. Readjust potentiometer output if necessary for T207 and T201 adjustment.
(2)	1620 KC	loosely couple to L201	Replace speaker inductance; adjust oscill. detector "Q".
(3)	1400 KC	loosely couple to L201	Set trim condensers to 1000 KC and adjust trimmer. Be sure pins to 600 KC and adjust oscillator pins.
(4)	600 KC	loosely couple to L201	
(5)	Repeat steps 2 & 3. Check volume control. Volume control knob rotation will reverse the full range of volume band.		

The following is required for aligning:

1. A signal generator capable of covering frequencies of 455 KC and the entire broadcast band with provisions for modulation. The test signal is injected by forming a 4 or 5 turn loop of wire, connecting it across the signal generator output cable and placing near antenna loop L201.
2. A trimmer potentiometer connected across voice coil.
3. A filter (singing test set snags) fits the slot in the IF transformer core to prevent chipping of the slot.
4. Set the volume control to maximum.
5. Keep the output of the signal generator low enough to just give an indication on the VTVM or output meter. Peak is broad or double peaking occurs when rocking the IF slug adjustment, the signal generator output is excessive. Slight further detuning of the generator loop or decreasing the generator output is necessary. Slight further detuning of the generator loop or decreasing the generator output is necessary. Be sure during IF alignment that the hand or any objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.

Figure 1 Schematic Diagram



ALIGNMENT PROCEDURE

CHASSIS NO. V227B-2

NOTE: The IF transformer is a standard 455 KC unit with a 100 ohm voice coil. The IF transformer is a standard 455 KC unit with a 100 ohm voice coil. The IF transformer is a standard 455 KC unit with a 100 ohm voice coil.

BOARD REMOVAL

1. Remove the screw located in the center of the tuning knob. Turn dial to the high frequency end and remove the screw by turning it in a counter clockwise direction while gripping knob.
2. Open the back cover and remove battery.
3. Remove the mounting screw located at the tuning condenser end of the printed board.

4. Hold the radio in the palm of the hand with the open side up. Grip the printed board with the other hand and slide it down towards the tuning capacitor end of the cabinet, until the speaker bracket is free of the metal lip. Now raise this end of the board over metal lip and slide it out of the cabinet.
5. When replacing screw on dial knob, do not strain tuning condenser. Turn knob to low frequency end and grip knob while tightening screw.

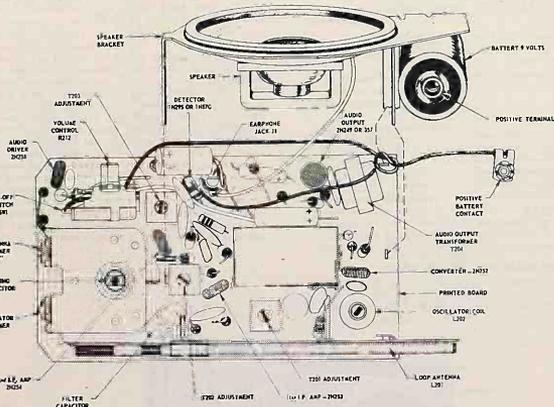


Figure 2 Top View Parts Layout

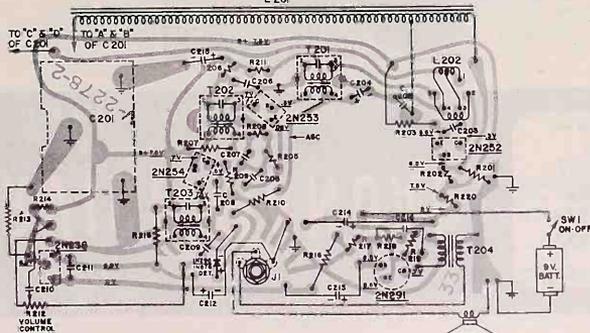


Figure 3 Bottom View of Printed Board Showing Top Components Symbolically

PARTS LIST

Ref. No.	Part No.	Description			
CAPACITORS:					
C201	330V005M01	Variable gang condenser	R219	39	0.5
C202		0047 mf 500 v Ceramic	R220	470	0.5
C203	215V300N15	001 mf 30 v Ceramic			10% Carbon
C204	218V012M11	10 mf 3 v Electrolytic			10% Carbon
C205	215V300N11	.01 mf 30 v Ceramic	TRANSFORMERS AND COILS		
C206	215V300N12	.01 mf 30 v Ceramic	L201	310V012M02	Antenna - Iron Core loop
C207		0022 mf 500 v Ceramic	L202	330V026M01	Oscillator coil
C208	215V303M03	.05 mf 25 v Ceramic	T204	235V014M01	1st IF transformer
C209	215V303M04	.02 mf 25 v Ceramic	T202	235V014M01	2nd IF transformer
C210	218V012M09	5 mf 12 v Electrolytic	T203	235V014M02	3rd IF transformer
C211	215V300N15	.001 mf 30 v GMV Ceramic	T204	430V034M01	Output transformer
C212	218V012M01	40 mf 12 v Electrolytic	TRANSISTORS AND DIODE		
C213	218V012M09	5 mf 12 v Electrolytic	297V008M01	2N252 Transistor - converter	
C214	218V012M02	40 mf 3 v Electrolytic	297V002M04	2N253 Transistor - 1st IF	
C215	218V012M01	40 mf 12 v Electrolytic	297V002M05	2N254 Transistor - 2nd IF	
C216	215V300N15	.001 mf 30 v GMV Ceramic	297V004M01	2N238 Transistor - audio driver	
			297V009M01	2N291 Transistor - audio output	
			296V002M01	1N295 or 1N87G crystal diode - detector	
RESISTORS					
					MISCELLANEOUS
R201	39 k	0.5	10% Carbon	754V008M01	Jack (J1) - for earphone
R202	8.2 k	0.5	10% Carbon	270V024M01	Switch on-off (SW1 - part of R212)
R203	4.7 k	0.5	10% Carbon	770V109M02	Bracket - Volume control mounting
R205	100	0.5	10% Carbon	778V018M01	Bracket - Speaker mounting (includes battery negative terminal - less speaker)
R206	1 k	0.5	20% Carbon	513V014M01	Cabinet - leatherette
R207	15 k	0.5	10% Carbon	754V007M01	Connector assembly - battery positive terminal
R208	1 k	0.5	10% Carbon		Knob - tuning
R209	470	0.5	10% Carbon	550V033M02	Knob - on/off volume
R210	1.5 k	0.5	10% Carbon	550V017M01	Screw - dial knob
R211	56 k	0.5	10% Carbon	761V804M01	Speaker - 2 1/2" PM
R212	5 k	0.5	10% Carbon	570V004M01	Washer - tuning knob
R213	22 k	0.5	10% Carbon	763V000M03	
R214	3.3 k	0.5	10% Carbon		
R215	1 k	0.5	10% Carbon		
R216	2.2 k	0.5	10% Carbon		
R217	12 k	0.5	10% Carbon		
R218	1.5 k	0.5	10% Carbon		

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

SUGGESTED SERVICING HINTS

Make all voltage measurements with a VTVM and with tuning capacitor set for maximum capacity and the volume control at minimum. Battery current should be monitored at all times and should be approximately 17 milliamperes. Battery voltage should be at nine volts.

The battery should be the first component checked when servicing. A weak battery can cause a decrease in gain and distortion. Check the battery potential with battery in receiver and set turned on.

If all other circuit components have been checked and a faulty transistor is suspected, replacement of the transistor

is the surest check. It is not advisable to check transistors with an ohmmeter as damage to them can result. Transistors should not be soldered or unsoldered in the circuit when voltage is applied to the circuit.

When removing components from the printed board, including transistors, care must be taken to avoid damaging the board.

Replacement of an IF transistor usually will have no effect on the overall alignment. In some cases IF alignment may be affected. For proper IF alignment procedure refer to the section on alignment.

SERVICE MANUAL

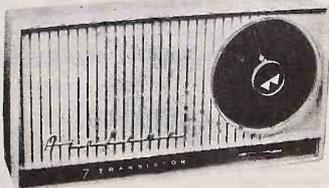
AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 577A

Airline
TRANSISTOR RADIO
MODEL

GTM 1109A
SERIAL NO.
75X

Form No. 62-Z-5786*



MODEL GTM 1109A white - turquoise

GENERAL DESCRIPTION

This Airline transistor radio is a seven transistor portable broadcast superheterodyne receiver. A jack is provided for private earphone connection. It replaces the loudspeaker when a miniature plug is inserted through the hole in the back of the receiver. This silences the speaker and allows the user to listen under noisy conditions, or situations in which operation of the speaker is undesirable. The receiver is housed in an unbreakable plastic case and the back cover is removed by loosening the coin-slot screw on the back. The receiver employs seven junction type transistors. The converter, audio driver and audio output transistors are of the PNP type, while the IF amplifiers and detector employ NPN type transistors. The converter stage is an autodyne type mixer-oscillator. A tuned, high "Q" ferrite-core coil is used as an antenna. Two stages of IF amplification are used. The gain of the 1st IF amplifier is controlled by an Automatic Gain Control circuit.

A transistor functions as a power detector and AGC source. In addition to detecting the IF signal it also provides gain at audio frequencies. The driver stage amplifies the audio signal and transformer couples it to the two audio output transistors. These transistors are operated in push-pull with out-of-phase audio signals fed to the base of each transistor. Each transistor is operated class "B" and the alternate halves of the audio signal are combined in the output transformer and coupled to the 2 1/4" PM speaker.

ELECTRICAL SPECIFICATIONS

Frequency range	540 to 1600 KC
Intermediate Frequency	455 KC
Sensitivity	200uv per meter, 50mw output approx.
Selectivity	8 KC at 6db bandwidth
Transistor Complement	
1 2N252	Converter
1 2N253	1st IF Amp.
1 2N254	2nd IF Amp.
1 880 or 2N94	Transistor Detector
1 2N238 or 310	Audio Driver
2 2N185 (matched pair)	Audio Output
Power Output	
Undistorted .....	.075 watts
Maximum .....	.140 watts
Loudspeaker	2 1/4" PM Round
Voice Coil Impedance	12 ohms
Power Supply:	
Wards - 62-96	RCA-VS - 300
Eveready - 226	Buggess P6
Average current Drain (no signal)	6.5ma.
Approximate Battery Life	75 hours

BOARD REMOVAL

1. Remove the screw located in center of the tuning knob. Turn the dial to the high frequency end and grip the tuning knob with one hand. Remove the screw by turning it in a counter clockwise direction. Do not cause any undue strain on the tuning capacitor.
2. Remove back of cabinet by loosening coin-slot screw on back. Remove the 1/2" self tapping screw located at tuning condenser end of board.

3. Hold radio in the palm of the hand with the open back side up. Grip the board with the other hand and slide it down toward the tuning capacitor end of the cabinet until the upper end of the speaker bracket is free of the plastic lip. Now raise this end of the bracket over lip and slide it out of the cabinet.
4. To insert the board into the cabinet, use the reverse procedure, being careful to lock the speaker bracket under both recesses provided in the cabinet front.

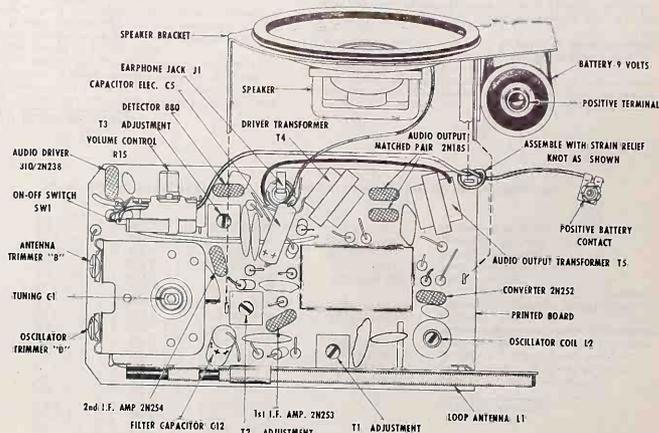


Figure 3 Top View Ports Layout

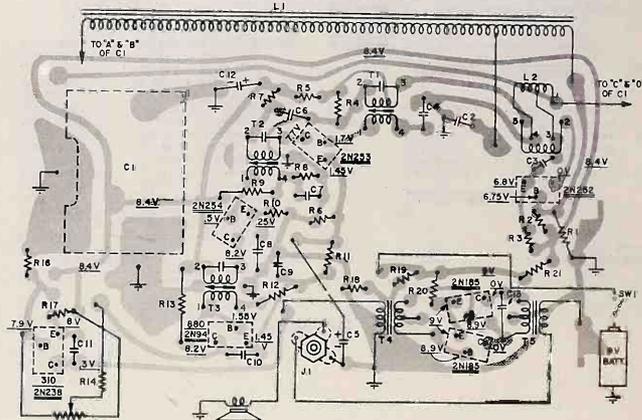


Figure 4 Bottom View of Printed Board Showing Top Components Symbolically

SERVICE MANUAL

AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 580A

Airline
TRANSISTOR
RADIO
MODEL HA-1111A
SERIAL No.
75X

Form No. 628-582B*



Model HA-1111A
Turquoise and White

SPECIFICATIONS

Power Supply	9 volts D.C.
Frequency Range	540 to 1620 KC
Intermediate Frequency	455 KC
Sensitivity	Avg. (5 uv ref.) 1500 uv per meter
Selectivity	At 1000 KC, 30 KC at 10 X signal
Power Output	Maximum 50 m.w.
	Undistorted 20 m.w.
Speaker	Round 2 3/4" PM, V.C. impedance-15 ohms
	magnet weight 0.65 oz. Alnico 5
Cabinet	6 1/4" width, 1 3/4" depth, 3 3/8" height

TRANSISTOR COMPLEMENT

1	2N252	Oscillator-Mixer
2	2N308	1st IF Amplifier
3	2N238	Audio Amplifier
4	2N185	Audio Output

SERVICE LETTER REMINDER

Record number of Service Letters below that apply to models listed in this manual.

REMOVING CHASSIS FROM CASE

1. Remove the battery.
2. Remove tuning knob by pulling straight out from the case.
3. Remove the screw located at the end of the case and remove the case cover.
4. Remove the two screws located one each side at the base of the volume on-off control.
5. Carefully remove the chassis from the case allowing the battery cable to slip through the battery compartment hole.

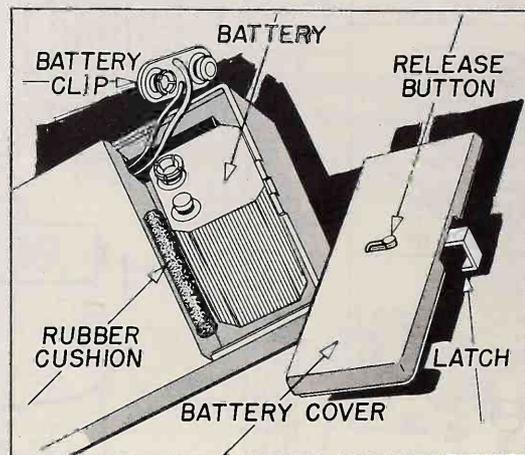
BATTERY REPLACEMENT

Since the receiver is small and compact, not every 9 volt battery will fit in the space provided. Listed below are four available types to be used for replacement.

WARDS	NO-92
BURGESS	NO-2N6
EVEREADY	NO-246
RCA	VS-305

Approximately 100 hours performance can be experienced with the above batteries before replacement is required. Battery replacement should be performed when the sound output is noticed to be muffled or distorted with a decrease in total output or if a voltage measurement shows less than 6 volts. The battery voltage should be measured with the receiver turned on after at least 5 minutes of operation.

When battery replacement is necessary, remove the battery cover by pushing the release button upward, grasp the latch and pull up and away from the case. Remove the old battery and un-snap the battery cable. Snap the battery cable on to the replacement battery and insert it into the case. Be sure the rubber cushion is between the battery and side wall of the case to prevent battery movement. Insert the battery cover in place and push the latch down.



DWG. NO. 092-102765

FIG. 1 BATTERY LOCATION

MONTGOMERY WARD

TRANSISTOR SERVICING

VOLTAGE READINGS

Because of the low battery potential, it is suggested that a VTVM be used to measure all circuit voltages. Voltage readings will vary with the strength of the signal being received, the battery voltage, and the type voltmeter being used. The voltage readings indicated on the schematic diagram were measured with a VTVM, no signal input, and with a battery voltage of 9 volts. Voltage readings will also vary with a change of transistors. The transistors conductivity varies from one transistor to another; therefore, voltage readings will differ. All voltage readings will be positive with respect to the negative terminal.

BATTERY REPLACEMENT

The battery should be the first component checked when the radio is presented for service, since the battery voltage decreases with use and age. The battery voltage should be checked at the battery cable connections with the receiver turned on, and after at least five minutes of operation. Batteries have a tendency to reactivate (recharge) when not in use, and a true test of the battery's capabilities can not be determined until sufficient current has been drawn from the battery. If the battery is found to be dead, the receiver should be checked for a short circuit before the replacement battery is installed. Disconnect the battery and measure resistance with an ohmmeter at the battery cable connections. The ohmmeter will indicate approximately 1700 ohms with positive lead to chassis, approximately 400 ohms with negative lead to chassis and approximately 4000 ohms with all transistors out of the circuit with either meter lead to chassis. Battery replacement should be performed when the sound output is noticed to be muffled or distorted with a decrease in total output.

OHMMETER READINGS

When using an ohmmeter to check continuity and resistance readings, caution must be observed. It is important to know the internal battery voltage of the ohmmeter as damage could result due to excessive voltage being applied to the ohmmeter. It is also important to know the battery polarity of the meter leads. Incorrectly placing the ohmmeter leads across a lytic capacitor with a low working voltage may damage the capacitor due to excessive reverse current. If the meter battery voltage is greater than 12 volts, the high frequency transistor rating will be exceeded and may be damaged. A diode action will be experienced when attempting to check the resistance readings with the transistors in the circuit. It is advisable to remove all transistors from their sockets before making ohmmeter checks.

SOLDERING

Caution must be observed when using a soldering iron as excessive heat may easily damage a transistor. If a component is replaced which must be soldered to the transistor socket, remove the transistor. When attempting any soldering, a low wattage small diameter tip iron is suggested. Heat may also damage other components, therefore, dissipate the heat by grasping the component lead with a long nose pliers.

TRANSISTORS

If a transistor is suspected of being defective, substitution will be the only reliable check. Checking resistance readings of a transistor with an ohmmeter will indicate only a shorted or open transistor. When inserting a transistor in its socket, make sure the transistor's leads line up with the socket holes. Illustrations on the schematic diagram show the spacing between transistor leads and the transistor sockets. If a transistor substitution is made in the RF or IF circuit, realignment may be necessary. This is due to the difference in operating characteristics from one transistor to another.

COMPONENT REPLACEMENT

An important consideration is component replacement. Miniature as well as close tolerance components are used throughout the radio; therefore, all components must be replaced with exact duplicate parts.

TROUBLE SHOOTING

Trouble in a transistor radio can easily be isolated by using a signal generator and listening to the speaker. Circuit tracing from the base of the output stage back through the receiver to the antenna, should quickly reveal which stage is not functioning properly. When injecting the signal, use a 50 mfd lytic, negative to base, in the audio circuit; a .5 mfd capacitor in the IF or RF stages and inductive coupling to the antenna.

Caution must be observed not to accidentally short the collector circuit to the chassis, as damage to the transistor may result. Also, the practice of deliberately shorting a circuit to chassis to determine if voltage is present or to listen for a click in the speaker, must be avoided for the same reason.

ALIGNMENT PROCEDURE

- NOTES:
1. Remove chassis from case.
 2. Connect 9 volt battery.
 3. Use output meter with 15 ohms impedance.
 4. Turn volume control to maximum.
 5. Signal generator output at 100 microwolts, 30% modulation at 400 cycles.

SIGNAL GENERATOR							
CIRCUIT	FREQUENCY	COUPLING CAPACITY	CIRCUIT CONNECTION	GROUND SIDE	OUTPUT METER	GANGED CAPACITY	ADJUST FOR MAXIMUM OUTPUT ON METER
I. F.	455KC	.5MFD	To Base of Q1	To Chassis	Connect in place of speaker	-----	T3, T4
Repeat above step two or three times for best results, keeping generator output in all cases as low as possible to prevent overloading of audio.							
Obs.	1630KC	.5MFD	To Base of Q1	To Chassis	Connect in place of speaker	Open Gang (Fully clockwise)	C12A
Caution: Too high an output from signal generator may cause setting of trimmer on a spurious response.							
	1620KC	.5MFD	To Base of Q1	To Chassis	Connect in place of speaker	Closed Gang (Fully counter-clockwise)	T2
	1620KC	.5MFD	To Base of Q1	To Chassis	Connect in place of speaker	Open Gang (Fully clockwise)	C12A
Ant.	1400KC	Connect 3 turn loop to generator and place near T1.			Connect in place of speaker	Ganged Condenser should be rocked	C1A
Check for alignment and dial calibration at 1000KC and 600KC.							

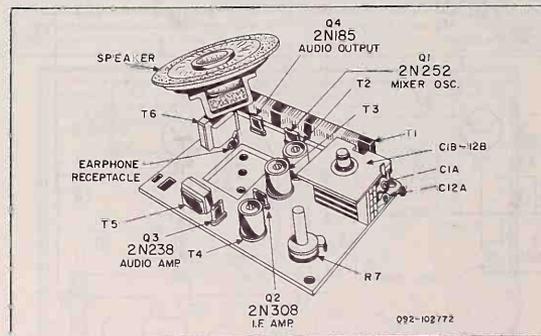


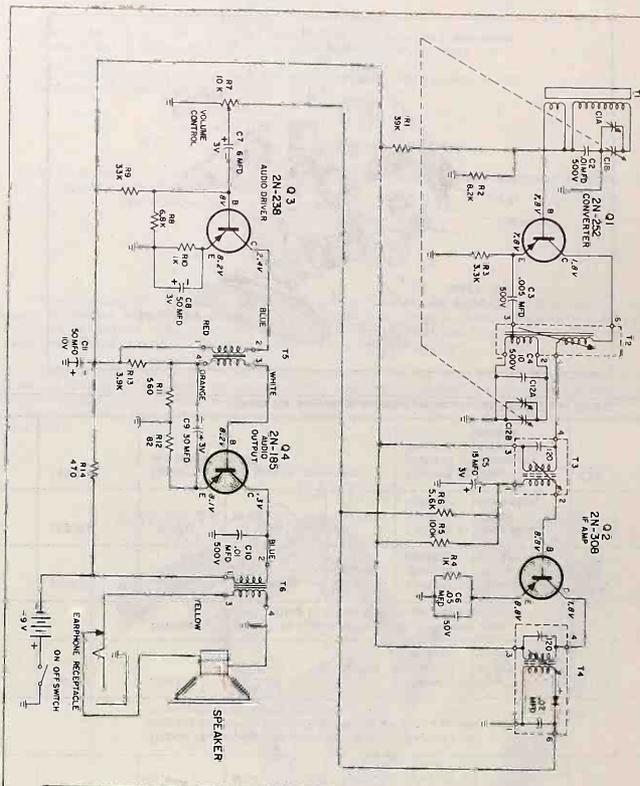
FIG. 2 CHASSIS VIEW

PARTS LIST

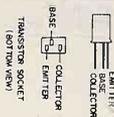
Ref. No.	Part No	Description	Ref. No.	Part No.	Description
TRANSFORMERS			RESISTORS (CONT)		
T1	257-300002	Antenna Rod Assembly	R8	.....	6,800 ohm
T2	251-200007	Oscillator Coil	R9	.....	33,000 ohm
T3	250-200002	Transformer, I. F.	R11	.....	560 ohm
T4	250-200003	Transformer, Diode	R12	.....	82 ohm
T5	255-300009	Transformer, Audio Input	R13	.....	3,900 ohm
T6	255-300010	Transformer, Audio Output	R14	.....	470 ohm
CAPACITORS			MISCELLANEOUS		
C1A,B, 12A,B C2, 10	248-300001	Variable (Gang)	206-300007	.....	Socket, Sub-Min (3 Prong)
C3	.....	.01 mfd 20% 500V. Cer. Disc.	036-200085	.....	Receptacle, Earphone
C4	.....	.005 mfd. 20% 500V. Cer. Disc.	285-200006	.....	Speaker 2-3/4" P. M.
C5	.....	10 mmf 10% 500V. Cer. Tub.	287-200007	.....	Battery Cable Ass'y.
C6	245-200011	15 mfd +100-20% 3V., lytic	329-400001	.....	Printed Circuit Board
C7	.....	.05 mfd +80-20% 50V., Cer. Disc.	276-200018	.....	Clip, Antenna Mounting
C8	.....	6 mfd +100-20% 3V., lytic	CABINET PARTS		
C9	.....	50 mfd. +100-20% 3V., lytic	316-400004	.....	Portable Case (Tourquoise)
C11	.....	30 mfd. +100-20% 3V., lytic	215-300059	.....	Knob, Indicator
		10V., lytic	215-200058	.....	Knob, (Vol. ON-OFF)
			241-940016	.....	Battery Cover Heat Seal Assembly
			316-300005	.....	Case, Cover (White)
			216-100004	.....	Sponge Rubber Filler (1" x 5/8 Dia.)
			216-100003	.....	Sponge Rubber Filler (2" x 3/8 Dia.)
			116-100066	.....	Battery Cover (White)
			241-940017	.....	Clip & Stud Staking Assembly
			*TRANSISTORS		
R1	.....	39,000 ohm	Q1	312-300002	Converter (2N252)
R2	.....	8,200 ohm	Q2	312-300003	I. F. Amplifier (2N308)
R3	.....	3,300 ohm	Q3	312-300004	Audio Driver (2N238)
R4, 10	.....	1,000 ohm	Q4	312-300005	Audio Output (2N185)
R5	.....	100,000 ohm	*Transistors are to be purchased from manufact- urer of radio.		
R6	.....	5,600 ohm			
R7	225-200011	Volume Control and switch, 10,000 ohms			

Use Universal Parts where part numbers are not shown. Order from (LRS).

SCHEMATIC DIAGRAM MODEL HA 1111A



SHE. NO. 088-400935-B



TYPE 2N-185, 2N-184, 2N-232, 2N-508



1ST IF COIL

RED DOT

GREEN DOT

2ND IF COIL

000 COIL

NOTES

RESISTOR VALUES ARE IN OHMS, 1/2 WATT
OR TOLERANCE, UNLESS OTHERWISE
SHOWN.

CAPACITOR VALUES ARE IN MICRO MICROFARADS
UNLESS OTHERWISE SHOWN.

DIODES ARE 1N4001 UNLESS OTHERWISE
SPECIFIED.

TRANSISTOR VALUES ARE IN MICRO MICROFARADS
UNLESS OTHERWISE SHOWN.

NO SIGNAL SHOULD BE TAKEN FROM THE
ANTENNA POINTS UNLESS OTHERWISE SPECIFIED.

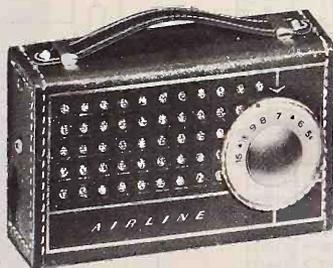
9-VDC. VOLTAGES WILL VARY WITH THROUGH
RESISTANCE TO THE NEGATIVE TERMINAL OF
BATTERY.

SERVICE MANUAL

AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 582A

Airline
TRANSISTOR RADIO
MODEL
GEN-1106A
SERIAL NO. 75X
FORM NO. 627-5838



MODEL GEN-1106A TAN

ELECTRICAL SPECIFICATIONS

FREQUENCY RANGE.....540 to 1600 KC
INTERMEDIATE FREQUENCY.....455 KC

TRANSISTOR AND DIODE COMPLEMENT

1 2N140.....Converter
1 2N139.....1st IF Amp.
1 2N139.....2nd IF Amp.
1 1N295.....Diode Detector
1 2N109.....Audio Driver
2 2N109 (Matched Pair).....Audio Output

POWER OUTPUT

Undistorted......08 Watts
Maximum......12 Watts

LOUDSPEAKER......234" PM
VOICE COIL IMPEDANCE.....16 Ohms at 400 Cycles

POWER SUPPLY—USE ONE OF THE FOLLOWING BATTERIES:

Wards—62-96.....RCA-VS—300
Eveready—226.....Burgess P6

SENSITIVITY—500 microvolts per meter for .025 watt output.

SELECTIVITY—4.5 KC broad at 2 times signal at 1000 KC.
I.F. Base Sensitivity at 455 KC (with loop disconnected from condenser) coupled to converter base..... about 10 to 15 microvolts.

Battery Current drains at 400 cycles, 30% modulation

AUDIO OUTPUT	CURRENT DRAIN
.010 Watts	6.6 Milliampères
.025 Watts	16.0 Milliampères
.050 Watts	20.0 Milliampères
.100 Watts	26.0 Milliampères
.135 Watts	29.0 Milliampères

SERVICE LETTER REMINDER

Record numbers of Service Letters below that apply to models listed in this manual.

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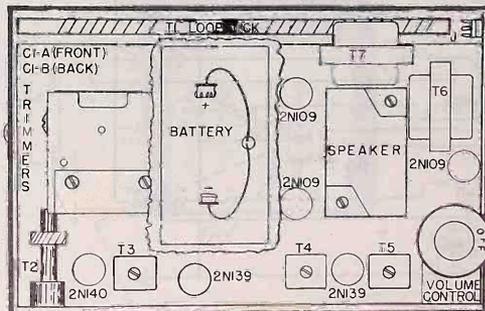
ALIGNMENT PROCEDURE

The following is required for aligning:

1. A signal generator capable of covering frequencies of 455 KC and the entire broadcast band with provisions for modulation. The test signal is injected by forming a 4 or 5 turn loop of wire, connecting it across the signal generator output cable and placing near antenna loop T1.
2. VTVM or output meter connected across voice coil.
3. A fiber aligning tool that snugly fits the slot in the I.F. transformer cores to prevent chipping of the slot.
4. Set the volume control to maximum.
5. Keep the output of the signal generator low enough to just give an indication on the VTVM or output meter. If the peak is broad or double peaking occurs when rocking the IF slug adjustment, the signal generator output is excessive. Either further decoupling of the generator loop or decreasing the generator output is necessary.

Caution—Be sure during IF alignment that the hand or any objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.

STEP	FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO:	ADJUST FOR MAXIMUM
(1)	455 KC	loosely couple to T1.	Set gang condenser fully open and adjust T5, T4 and T3 in order indicated. Reduce generator output if necessary for T5 and T4 adjustments.
(2)	1640 KC		Adjust oscillator trimmer "C1-B."
(3)	535 KC	loosely couple to T1	Set Gang Condenser fully closed. Adjust T2 Slug to locate generator signal. The low end should be 535 KC. If off more than 5 KC, it may be adjusting the slug within the oscillator. If oscillator slug is adjusted, step 2 must be repeated.
(4)	1400 KC		Set gang condenser to 1400 KC and adjust antenna trimmer "B".
(5)	600 KC		Set gang to 600 KC and adjust oscillator slug.
(6)	Repeat steps 2 & 3. Check the frequency range to insure that receiver will receive the full broadcast band.		
(7)	Tracking is checked at 600 and 1000 KC by bringing into close proximity of the loop a piece of ferrite rod, then a piece of brass. In either case, the output meter should show a decrease. An increase in output meter reading indicates a mistrack condition, which may be corrected by adjusting the turns of wire on the antenna rod. If adjustment on antenna rod is made, step 4 must be repeated.		



CHASSIS—FRONT VIEW

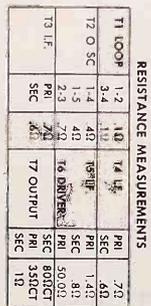
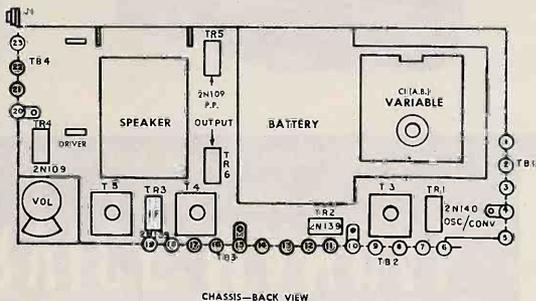
M O N T G O M E R Y W A R D

PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
RESISTORS		
R1,R9		2.2 K Ohms 1/2 Watt
R2,R10,R16		33 K Ohms 1/2 Watt
R3,R12		1 K Ohms 1/2 Watt
R4		10 K Ohms 1/2 Watt
R5		12 K Ohms 1/2 Watt
R6,R10,R15		150 K Ohms 1/2 Watt
R7,R17		470 Ohms 1/2 Watt
R8		390 Ohms 1/2 Watt
R13		1200 Ohms 1/2 Watt
R14,SW1	E2520	2.5 K Ohm Volume Control w/SPST Switch
R18		100 Ohms 1/2 Watt
R19		8.2 K Ohms 1/2 Watt
CONDENSERS		
C1A,C1B	E3520	Tuning Gang
C2,C4,C6,C7,C9,C10		.02 mfd. GMV Discop
C11,C13,C16		See Ref. No. T2—Part No. E6128
C3		
C5,C14	E3216	4 mfd. 6 Volts
C8	E3331	91 mmf. 5% Discop
C12	E3332	39 mmf. 5% Discop.
C15	E3215	100 mfd. 10 Volts

REF. NO.	PART NO.	DESCRIPTION
TRANSFORMERS AND COILS		
T1	E6019	Antenna Loop (Ferrite Core)
T2	E6128	Oscillator Coil (with C-3, .01 mfd. Condenser)
T3	E6215	1st. I.F. Transformer
T4	E6216	2nd. I.F. Transformer
T5	E6217	3rd. I.F. Transformer
T6	E1116	Interstage Audio Transformer
T7	E1115	Output Transformer
MISCELLANEOUS		
J1	E1019	Speaker, P.M., 2 3/4"
	E636	Phone Jack
	E4924	Hex Nut for Phone Jack
	E189	Battery Clip, Female
	E1810	Battery Clip, Male
	E5059	Knob, Tuning
	E5054	Knob, Volume
	E7032	Cabinet with Handle
	E7613	Insulator, Battery
	E7614	Shield, Fishpaper
	E2628	Transistor Sockets, 3 pin.
	E4317	Socket Retaining Ring
	E4316	Loop Retainer Clip

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

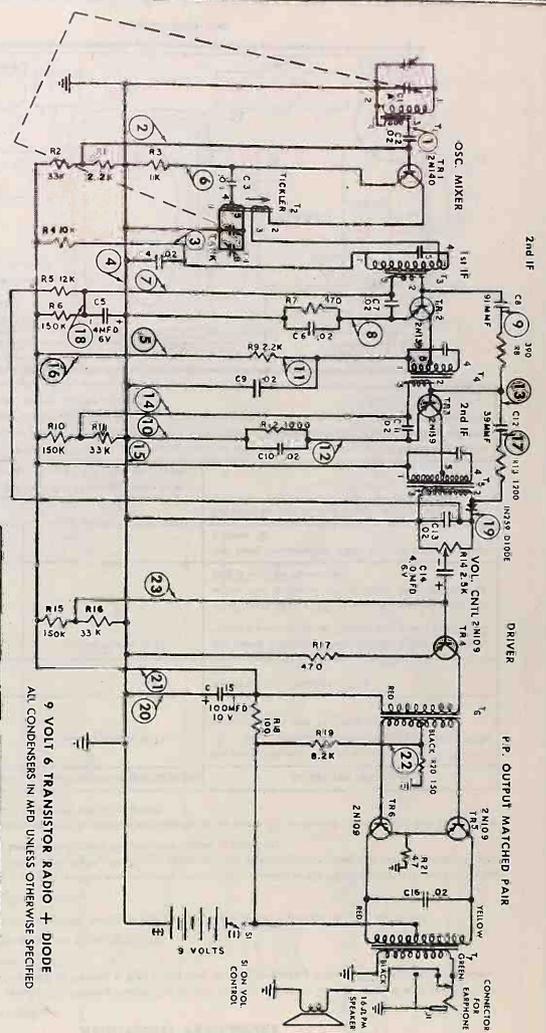


MODEL GEN-1106A

TERM #	RESISTANCE	VOLTAGE
1	0	0
2	2K	.57
3	17K	0
4	0	0
5	0	8.5
6	1K	.65
7	14K	.4
8	470	.4
9	24K	0
10	0	7
11	8K	0
12	1K	7.0

TERM #	RESISTANCE	VOLTAGE
13	29K	7
14	29K	0
15	19	8.5
16	6K	0
17	12K	0
18	14K	.55
19	1	0
20	1	0
21	5K	8.5
22	150	.15
23	20K	.85

VOLTAGE READING TAKEN WITH 90 VOLTS IN RCA SHIELDING.



SERVICE MANUAL

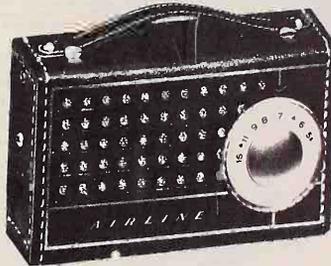
AND REPAIR PARTS
FOR REPAIR SERVICE DEPARTMENT

MANUAL 582B

*Airline*TRANSISTOR RADIO
MODEL

GEN-1112A

FORM NO. 622-51825*



MODEL GEN-1112A TAN TEXON

Service information on Model GEN-1112A is identical to that of Model GEN-1106A (covered in Service Manual 582A) with the exception of the transistors and cabinet. These parts are listed below.

The cabinet part number is E7032—Texon Cabinet.

The following transistors are being used in Model GEN-1112A: 2N405, 2N407, 2N109, and 2N411.

M O N T G O M E R Y W A R D



UPPERSEDES 8X26 SERIES PRELIMINARY SERVICE MANUAL PART NO. 68P643065

GENERAL INFORMATION

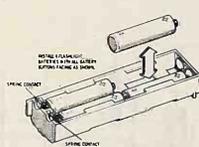
TYPE - Pocket portable superheterodyne radio using a plated panel chassis, eight transistors, and two diodes. An earphone jack is provided on bottom of radio; insertion of earphone automatically disconnects speaker for private listening. A 2000 ohm accessory earphone (Motorola Part No. 50K640710 or 50K641488)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

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

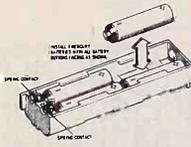
POWER SUPPLY - Operates from four 1-1/2 volt batteries; use four of the following or equivalent:

Standard Flashlight Types - Eveready 1015, Ray-O-Vac 7LP or 7R, Burgess 930

Mercury Type - Mallory ZM-5
Battery Drain - 18 ms (max) - With no input signal.



FLASHLIGHT BATTERY INSTALLATION



MERCURY BATTERY INSTALLATION

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 connecting wires and making wiring more uniform.

2. The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.

3. Reference to the chassis photographs, plated panel wiring diagrams, schematic diagram, and to chassis will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated panel 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 panel bottom locates the emitters of V-1 through V-8 by use of the letter "E" on the panel (see PLATED PANEL WIRING AS VIEWED FROM BOTTOM).

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 ground (either directly or through any other path) 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.

3. 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 circuit chassis.

TRANSISTOR CHECK

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

HOME RADIO

MODELS CHASSIS
8X26E HS-679
8X26S HS-679

POWER-10 SERIES

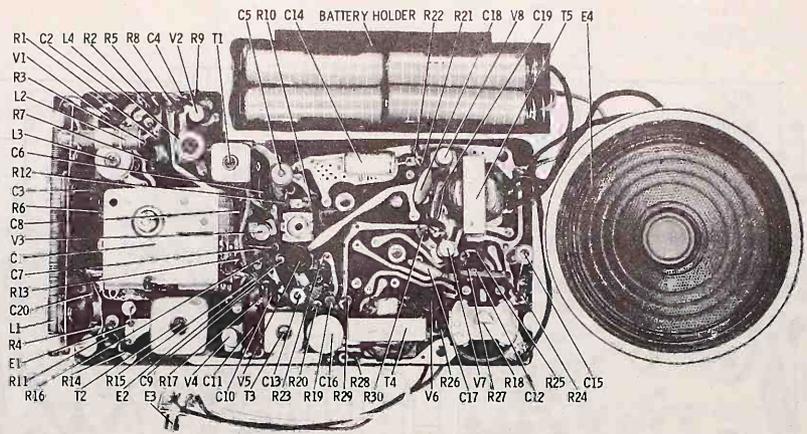


8X26 SERIES

TRANSISTOR COMPLEMENT -

Ref. No.	Type	Function
V-1	2N544	RF amp
V-2	2N411	Converter
V-3	2N409	1st IF amp
V-4	2N409	2nd IF amp
V-5	4315	AF amp
V-6	4315	Driver
V-7	2N407	Power amp
V-8	2N407	Power amp

SERVICE NOTES



PARTS LOCATIONS



L3 & L4 CONN (807-1129)
V7 2W64 AF AMP PWP



T1 & T3 CONN (807-1129)
V7 2W61 CONV PWP



T2 CONN (807-1129)
V3 2W69 1S1 IF AMP PWP



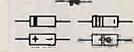
T4 & T5 CONN (807-1129)
V4 2W60 2ND IF AMP PWP



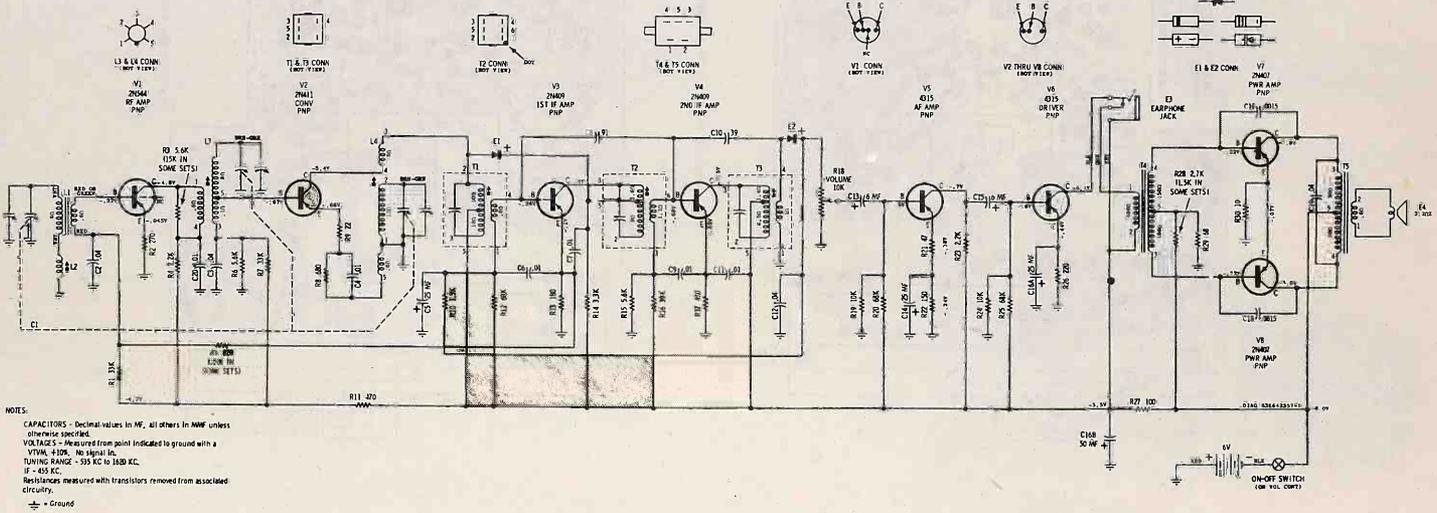
T1 CONN (807-1129)
V5 6S15 AF AMP PWP



V2 THRU V8 CONN (807-1129)
V6 6S15 DRIVER PWP



E1 & E2 CONN
V7 2W60 PWR AMP PWP



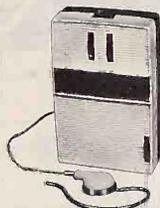
NOTES:
 CAPACITORS - Decimal values in MF, all others in MUF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM, 450V. No signal in.
 TUNING RANGE - 535 KC to 1650 KC.
 IF - 455 KC.
 Resistances measured with transformers removed from associated circuitry.
 ⊕ = Ground

SCHEMATIC DIAGRAM

— PHILCO TRANSISTOR RADIO

SERVICE MANUAL

MODEL T-3 — CODES 132, 134, 136 & 138



MODEL T-3

SPECIFICATIONS

CIRCUIT—Three transistor T.R.F. with reflexed audio and crystal detector.

BATTERY VOLTAGE AND TYPE—2.6 volts from 2 type P-630 mercury cells.

FREQUENCY MINIMUM COVERAGE—550 to 1550 KC.

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

CABINET—Plastic, shirt-pocket type.

EARPHONE—Private listening unit only.

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 V.T.V.M. using the low voltage AC range or a calibrated oscilloscope) across the ear phone terminals.

SIGNAL GENERATOR—Use an AM r-f signal generator. Radiate the signal to the radio antenna. 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 the radio antenna.

OUTPUT LEVEL—During alignment, attenuate the signal-generator output so as to maintain the output level at 0.63 volts.

RADIO CONTROLS—Set the volume control to maximum. Set the antenna tuning knob (the right-hand knob with the dial scale) to 600 KC. Without moving the antenna tuning, adjust the RF tuning knob to the mid-position of its fine-tuning range. DO NOT DISTURB the radio tuning once it is set.

Step #1—Set generator to 600 KC. Adjust the core of T1 (the 1st RF transformer) for peak. Rock the generator — NOT the radio tuning — and adjust for maximum.

Step #2—Set generator to 600 KC. Adjust the core of T2 (the 2nd RF transformer) for maximum. This transformer is very broad; there will be only a slight peak. The core may not extend above the top of the can.

REPLACEMENT PARTS LIST

NOTE: Part numbers may not be identical with those on factory parts; also, the electrical values of some replacement items may differ from the values indicated in the schematic diagram and parts list. The values substituted in any case are so chosen that operation will be either unchanged or improved. When ordering replacements, use only the "Service Part No."

Resistors are 1/2 watt, 10%, carbon unless otherwise noted.

Reference Symbol	Description	Service Part No.
C1	Condenser, antenna tuning, 15-170 ufd. — Part of 78-10529	
C2	Condenser, 1st r-f tuning, 12,170 ufd. — Part of 78-10529	
C3	Condenser, antenna shunt, 4.7 ufd. ceramic	20-1511-5
C4	Condenser, 1st r-f signal return, .01 ufd. disk	30-1575-2
C5	Condenser, neutralization, 22 ufd. ceramic	62-025409011
C6	Condenser, 1st r-f emitter, .01 ufd. disk	30-1575-2
C7	Condenser, 2nd r-f emitter, .01 ufd. disk	30-1575-2
C8	Condenser, diode bypass, .02 ufd. disk	30-1274-3
C9	Condenser, radio coupling, .45 ufd. disk	30-1274-3
C10	Condenser, audio coupling, 1 ufd., 6VDC, electrolytic	30-2591-5
C11	Condenser, output collector, .005 ufd. disk	30-1274-1
L&I	Antenna coil, magnecor	30-4766-1
R1	Resistor, 1st r-f base return, 33,000 ohms	66-32884-6
R2	Resistor, reflex collector, 1800 ohms	66-31834-0
R3	Resistor, 2nd r-f bias, 100,000 ohms	66-41084-0
R4	Resistor, 2nd r-f bias, 22,000 ohms	66-32834-0
R5	Volume control, 5000 ohms	35-5585-4
R6	Resistor, audio base, with transistor T-0038, code 132, 1 megohm	66-51034-0
	with transistor T-0038, code 134, 470,000 ohms	66-44783-0
	with transistor T-0040, code 136, 220,000 ohms	66-42383-0
	with transistor T-0041, code 138, 180,000 ohms	66-41383-0
S1	Switch, off-on	Part of R5
T1	Transformer, 1st r-f	32-4785-2
T2	Transformer, 2nd r-f	34-8600-18
T1-132S	Transformer, 1st r-f	34-8600-18
T1-136S	Transformer, 2nd r-f	34-8600-17
T-0038	Transistor, audio, code 132 only	34-8600-18
T-0039	Transistor, audio, code 134 only	34-8600-17
T-0040	Transistor, audio, code 136 only	34-8600-21
T-0041	Transistor, audio, code 138 only	34-8600-21
XTAL	Crystal diode, 2nd detector, type 1N60A	54-9851
	Printed Panel	

MISCELLANEOUS PARTS

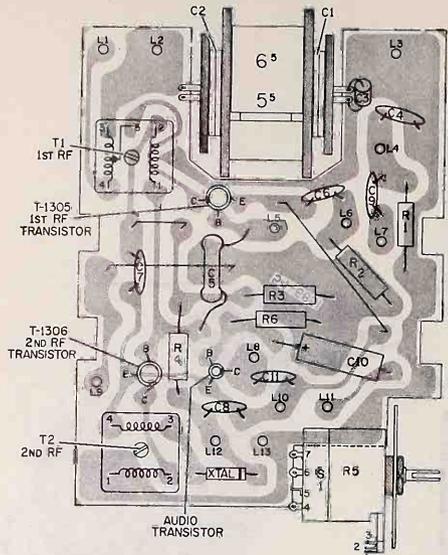
Description	Service Part No.
Cabinet	51-0007
Contact battery	38-12077
Ear phone and cord assy.	326-8007
Cord and plug only	41-4276
Knob, volume	54-6682-1
Knob and capacitor assy., includes C1, C2 and the two tuning knobs in a matched assy.	78-10529
Memphis	54-5361-1
Spring, battery, 2 used	78-12570

PHILCO TRANSISTOR RADIO MODEL T-3 — CODES 132, 134, 136 & 138

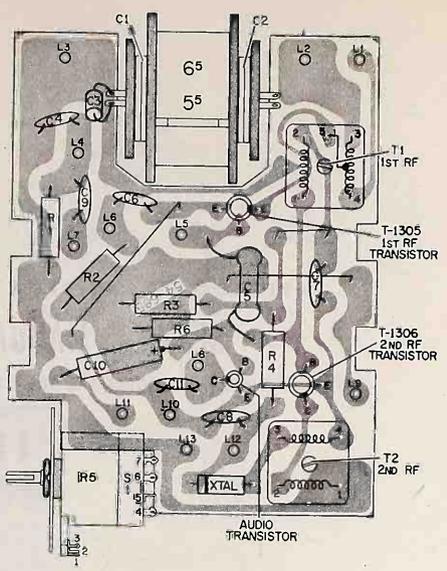
PR-3296

CODES 132, 134, 136, 138

©John F. Rider



Composite Panel View, Component Side, Showing Parts Placement.



Composite Panel View, Foil Side Showing Parts Placement.

PANEL-WIRE TERMINAL IDENTIFICATION

- L1 Orange lead from r-f tuning, C2, to T1 lug 4.
- L2 Black lead from r-f tuning, C2, to T1 lug 3 and red jumper to terminal 6.
- L3 Orange lead from ant. tuning, C1, and plain lead from bottom of ant. pri. (LA1) to panel ground.
- L4 Red lead from bottom of ant. sec. (LA1) to junction of R1, C4 and C5.
- L5 Red lead from top of ant. sec. (LA1) to 1st r-f base.
- L6 Red jumper from terminal 2, black jumper to terminal 11 and junction of C6 and R2.
- L7 Yellow lead to arm of volume control (R5).
- L8 Earphone lead to audio collector.
- L9 Black lead from battery, -1.3 volts.
- L10 Red lead from switch S1 lug 7, +1.3 volts.
- L11 Black jumper from terminal 6 to C10, the 1uf audio coupling.
- L12 Orange lead to top of volume control, R5 lug 1.
- L13 Black lead from switch, S1, lug 6 to panel ground.

AUDIO TRANSISTOR - CODE VARIATIONS

The only differences between the four codes are the audio transistor type and the value of the audio base resistor. These value differences are indicated in the chart above.

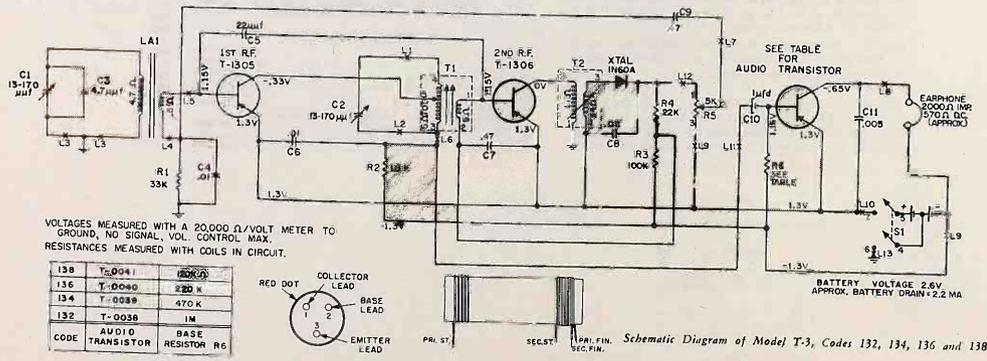
SHIELDING

To suppress possible regeneration, the leads of T1 are shielded by wrapping a small piece of aluminum tape around the can so as to cover the cut-outs. When replacing be careful not to cause shorts.

NOTES

All resistors 1/2 watt, carbon.
 All condenser values in ufd unless otherwise stated.
 Voltages measured with a V.T.V.M. from point indicated to ground, under "No Signal" condition, with volume control

at minimum and 2.6 volts from the battery supply.
 *Audio collector voltage may vary between -.6 and -1.0 volt depending upon the transistor.
 Coil resistances measured with coil in the circuit.



528.53400

MODEL
NUMBER
9222

PARTS LIST
for
Silvertone[®]

TRANSISTOR
PORTABLE RADIO

SILVERTONE RADIO RECEIVER CHASSIS NUMBER 528.53400

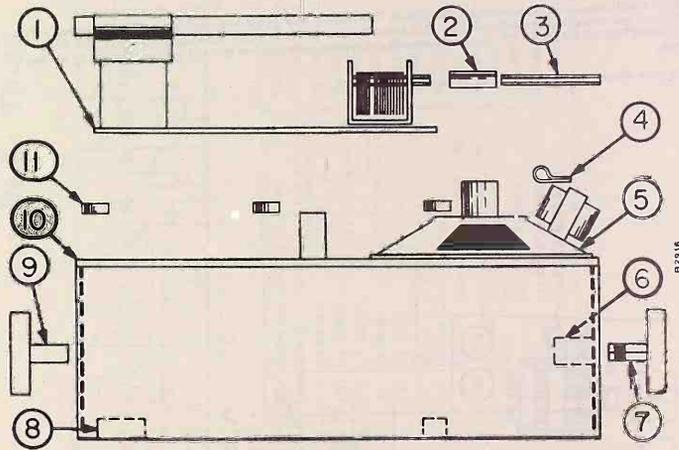


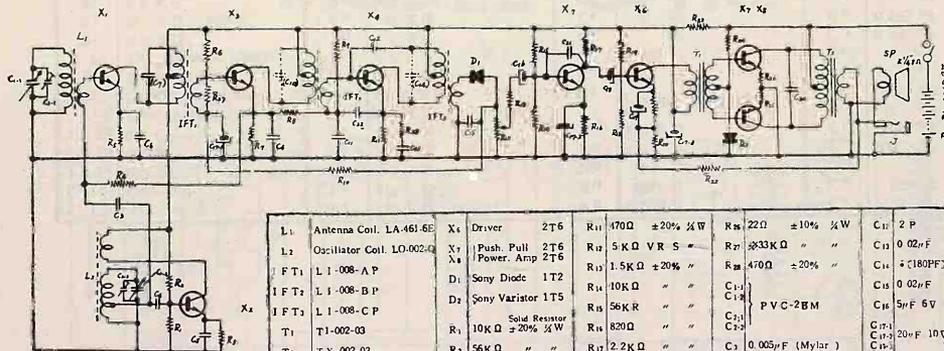
Fig. 1. Exploded View of Cabinet Parts

CABINET PARTS LIST

Key No.	Part No.	Description
1.	*	Chassis, Radio
2.	39-25-0	Coupling, Tuning Shaft
3.	39-153-3	Shaft, Tuning
4.	22-102-3	Retainer, Cable Clamp
5.	33-377-4	Speaker (Inc. T5)
6.	11-1380	Bracket, Shaft Support
7.	52-1117-0	Knob, Tuning
8.	28-175-1	Pad, Rubber (4)
9.	52-1118-0	Knob, Off/On-Volume
10.	42-64-1	Cabinet, Leather
11.	77-29-0	Spacer, Chassis (3)
	33-2660	Book, Instruction

*Not supplied as a Repair Part. See page 3 for complete breakdown of parts.

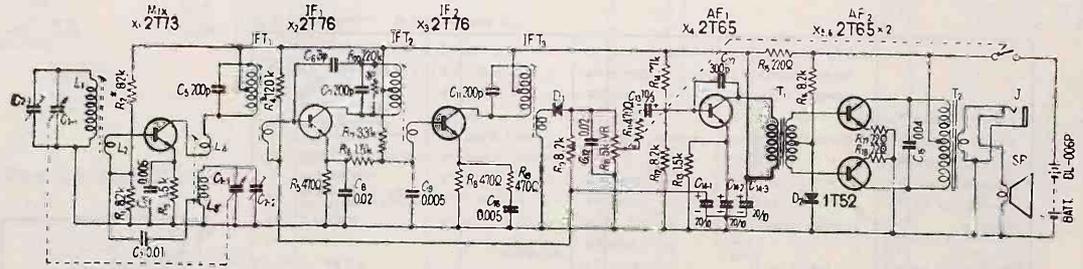
Sony Radio TR-86



L ₁	Antenna Coil. LA-461-6E	X ₅	Driver	2T6	R ₁₁	470Ω ±20% 1/4W	R ₂₀	22Ω ±10% 1/4W	C ₁₁	2P (Styrol)
L ₂	Oscillator Coil. LO-002-4	X ₆	Push-Pull	2T6	R ₁₂	5KΩ VR S	R ₂₁	333KΩ "	C ₁₂	0.02μF (Mylar)
IFT ₁	L1-008-A-P		Power. Amp	2T6	R ₁₃	1.5KΩ ±20% "	R ₂₂	470Ω ±20% "	C ₁₃	180PF (Styrol)
IFT ₂	L1-008-B-P	D ₁	Sony Diode	1T2	R ₁₄	10KΩ "	C ₁₄	0.02μF (Mylar)	C ₁₅	5μF 5V (Electrolytic)
IFT ₃	L1-008-C-P	D ₂	Sony Variator	1T5	R ₁₅	56KΩ "	C ₁₅	PVC-2BM	C ₁₆	5μF 5V (Electrolytic)
T ₁	T1-002-03	R ₁	Solid Resistor		R ₁₆	820Ω "	C ₁₆		C ₁₇	20μF 10V Brock Electrolytic
T ₂	TX-002-03	R ₂	56KΩ "		R ₁₇	2.2KΩ "	C ₁₇	0.005μF (Mylar)	C ₁₈	5μF 6V (Electrolytic)
SP	2 1/2" Permanent Dynamic Speaker. V.C. 8Ω	R ₃	2.2KΩ "		R ₁₈	10KΩ "	C ₁₈	0.01μF ()	C ₁₉	30μF 3V (Electrolytic)
J	Earphone Jack.	R ₄	2.2KΩ "		R ₁₉	56KΩ "	C ₁₉	0.005μF ()	C ₂₀	0.05μF (M.P.S.)
B	Battery. BL-006P (9V)	R ₅	820Ω ±10% "		R ₂₀	5Ω ±10% "	C ₂₀	0.01μF ()	C ₂₁	0.001μF (Mylar)
X ₁	Oscillator. 2T7	R ₆	82KΩ ±20% "		R ₂₁	680Ω ±20% "	C ₂₁	180PF (Styrol)	C ₂₂	0.02μF (Mylar)
X ₂	Mixer. 2T7	R ₇	470Ω "		R ₂₂	220Ω "	C ₂₂			
X ₃	1F Amp. 2T7	R ₈	820Ω "		R ₂₃	220Ω "	C ₂₃	0.02μF (Mylar)		
X ₄	1F Amp. 2T7	R ₉	22KΩ "		R ₂₄	5.6KΩ "	C ₂₄	180PF (Styrol)		
X ₅	AF Amp. 2T6	R ₁₀	7.5KΩ "		R ₂₅	22Ω ±10% "	C ₂₅	0.001μF (Mylar)		

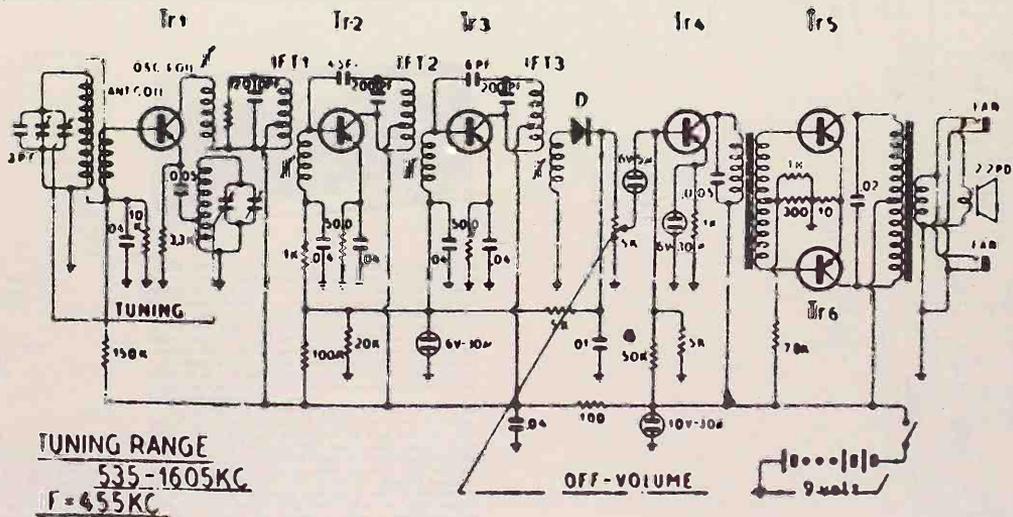
⊗ - To be adjusted. ⊕ - Mounted inside IFT.

SONY TR-610



L ₁ L ₂	Ant. coil	R ₄	120 KΩ adjust	R ₁₆	8.2 KΩ	C ₈	0.02 μF
L ₃ L ₄	Osc. coil	R ₅	470 Ω	R ₁₇	22 Ω	C ₉	0.005 μF
I.F.T ₁	002-AP	R ₆	1.5 KΩ	R ₁₈	22 Ω	C ₁₀	
I.F.T ₂	002-BP	R ₇	33 KΩ	R ₁₉	470 Ω	C ₁₁	200 pF
I.F.T ₃	002-CP	R ₈	470 Ω	K ₂₀	220 KΩ	C ₁₂	0.02 μF
T ₁	Input Transformer	R ₉	8.2 KΩ	C ₁	} Tuning Condenser	C ₁₃	10 μF 3 V
T ₂	Output Transformer	R ₁₀	VR 5 KΩ	C ₂		C ₁₄₋₁	20 μF 10 V
J	Earphone Jack	R ₁₁	470 Ω	C ₃	C ₁₄₋₂	"	
S. P.	2 1/4" Dynamic Speaker	R ₁₂	8.2 KΩ	C ₄	C ₁₄₋₃	"	
R ₁	8.2 KΩ	R ₁₃	1.5 KΩ	C ₅	C ₁₅	0.04 μF	
R ₂	82 KΩ adjust	R ₁₄	27 KΩ	C ₆	C ₁₆	0.005 μF	
R ₃	1.5 KΩ	R ₁₅	220 Ω	C ₇	C ₁₇	300 pF	

SCHEMATIC DIAGRAM MODEL 6-TRS





Westinghouse

RADIO SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
PITTSBURGH, PA.



MODELS

H-685P8
(White & Brown)

H-686P8
(White & Pink)

CHASSIS V-2396-1

SPECIFICATIONS

Frequency Range 540 to 1600KC
Intermediate Frequency 455KC

Transistor Complement:

1 2N252 Mixer
1 R-227 Oscillator
1 2N308 1st IF Amp.
1 2N309 2nd IF Amp.
1 R-242 Detector
1 2N402 Audio Driver
2 2N60, 2N61, 0060 or 0061 Audio Output

Power Output:

Undistorted 0.120 Watts
Maximum 0.200 Watts

Loudspeaker 3" FM

Radio Battery Current Drain (no signal) 9ma.

Clock Battery Current Drain 1ma.

Radio Batteries: (four 1½ Volt Batteries)

Flashlight Batteries: Mercury Batteries:
Eveready 915 or 1015 Mallory ZM-9
Ray-O-Vac 7LP or 7R Eveready E9
Burgess Z or 930
Mallory M15

Clock Batteries: (one 1½ Volt Battery) "D" size

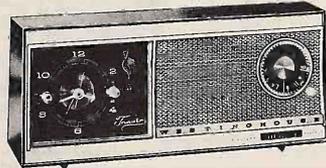
Eveready 950 General 912
Burgess 2R Olin 1550
Ray-O-Vac 2LP

BATTERY INFORMATION

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

BATTERY INSTALLATION

This receiver utilizes four pen-light size batteries for clock operation and one flashlight "D" size battery for clock operation. The radio will normally operate up to 400 hours on one set of batteries (Mercury type) and clock will operate up to 1 year on one flashlight battery.



To replace radio batteries insert a coin into slot between battery cover (see figure 4, page 4) and receiver case. Turn coin in slot and pull cover down and out from receiver case. Pull battery holder out from its compartment. Install four 1½ volt pen-light batteries into holder. Use either flashlight or mercury type batteries. Mercury batteries give much longer battery life and are placed in holder with buttons in opposite direction to those of flashlight type batteries. Be sure batteries are in holder correctly before turning radio on. Refer to sketch and label on battery holder. Slide battery holder back into its original position as indicated on battery holder and replace cover.

To replace clock battery insert a coin into slot (on bottom of receiver case) between battery cover and case. Turn coin in slot and pull cover out from receiver case. Install 1½ volt flashlight type battery into battery holder with battery button (positive terminal) contacting the spring contact. If battery is not in holder correctly clock will not operate. Slide battery cover back into original position.

IMPORTANT: Worn-out batteries should be removed as soon as they become defective. Otherwise radio may be damaged by worn out battery swelling or corroding. Also remove batteries before storing radio for long period of time.

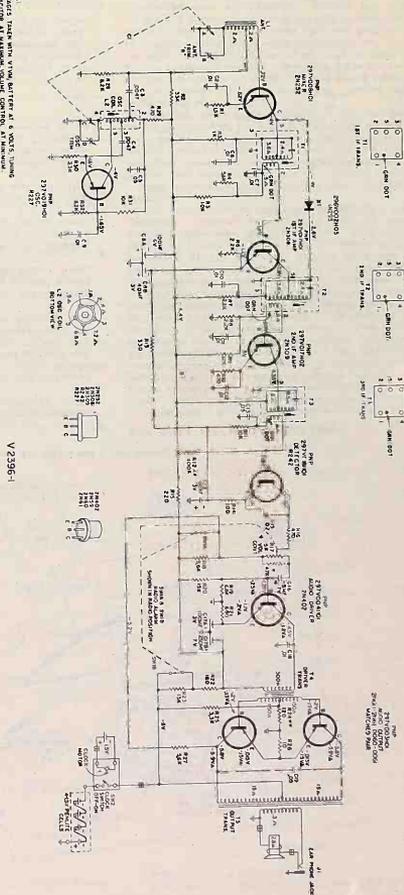
CLOCK SERVICE INFORMATION

All service on the clock used in these receivers should be referred to one of the Westinghouse authorized clock service stations listed at the end of this service manual.

Do not forward the complete radio receiver to the clock service station. The clock should be removed from the receiver as described under "Clock Removal" and forwarded to the authorized service station.

Figure 1 - Schematic Diagram

NOTICE: THIS SET IS A BATTERY OPERATED UNIT. CONNECTION AT A SERVICE STATION SHOULD BE MADE TO THE BATTERY OPERATED UNIT. THE BATTERY OPERATED UNIT SHOULD BE KEPT IN A SAFE PLACE TO PREVENT ACCIDENTS. THE BATTERY OPERATED UNIT SHOULD BE KEPT IN A SAFE PLACE TO PREVENT ACCIDENTS. THE BATTERY OPERATED UNIT SHOULD BE KEPT IN A SAFE PLACE TO PREVENT ACCIDENTS.



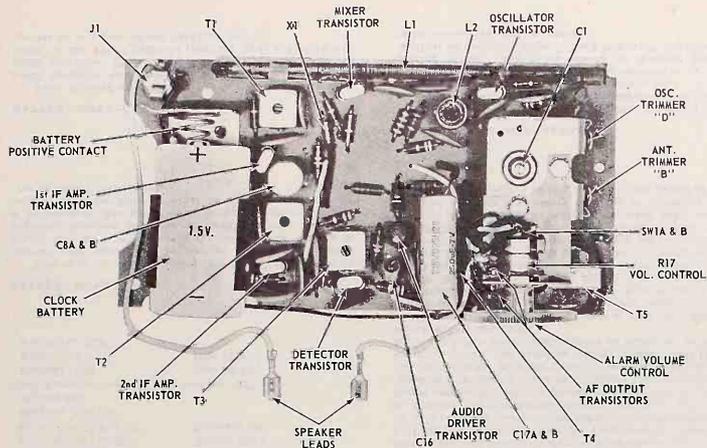


Figure 2 - Top view of printed circuit board.

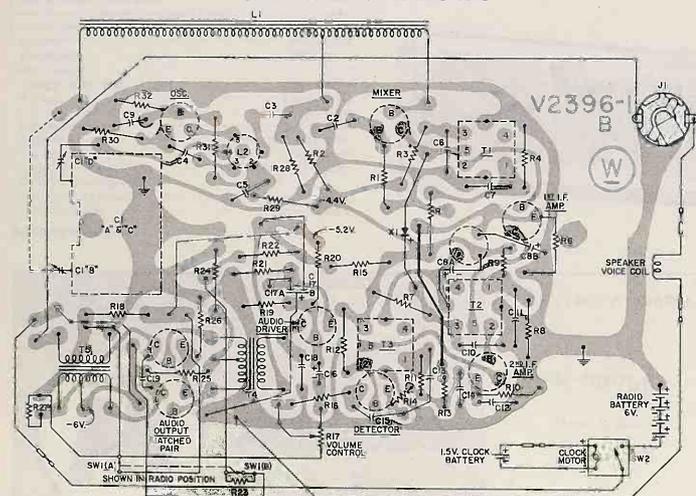


Figure 3 - Bottom view of printed circuit board with components shown symbolically.

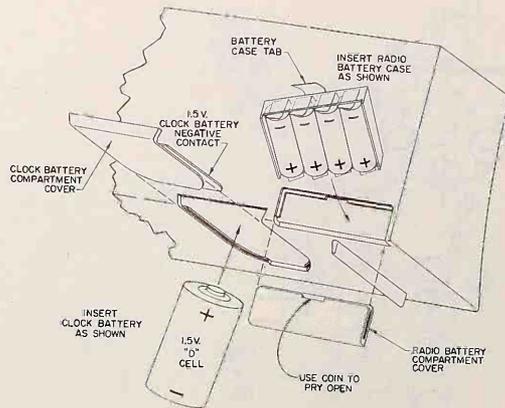


Figure 4 - Radio and Clock battery installation.

CHASSIS REMOVAL

1. Remove the screw located in the center of the cabinet rear. Remove the two screws on the underside of the cabinet.
2. Separate the cabinet front from the cabinet back to expose the radio chassis for servicing. If it is necessary to have complete access to all the components then proceed with steps 3 through 7.
3. Remove the three 1/8" hex head screws which mount the printed circuit board to the cabinet front (through fiber stand-offs).
4. Unsolder the black wire going from the radio battery holder contact (under clock case) to the printed circuit board chassis ground at the printed circuit board connection.
5. Remove the spade connector leads from the speaker, clock battery contact (positive side) and the printed circuit board terminal next to the audio output transformer (T5).
6. Remove the tuning knob and dial as follows. Slip a loop of string under the tuning dial and pull the dial and tuning knob up and out of the cabinet front.
7. Separate the printed circuit board chassis from the cabinet rear. To operate the chassis it will be necessary to re-connect the speaker and radio battery leads. To replace the chassis into the cabinet follow the reverse of the above procedure.

CLOCK REMOVAL

1. Remove the printed circuit board from the cabinet as described under "Chassis Removal". NOTE: It is necessary to remove the printed circuit board to provide clearance for removal of the two clock mounting nuts located under the edge of the printed circuit board.
2. Unsolder the four wires from the terminals on the underside of the clock case.
3. Remove the four 5/16" nuts securing the clock to the cabinet front.
4. Remove the clock control knobs. Remove the clock from the cabinet front. To replace the clock use the reverse of this procedure (solder wires to clock terminals as shown in figure 3).

NEW RADIO CIRCUITRY OPERATION

Oscillator - A separate transistor is used to develop the local oscillator signal. Oscillations are developed by in-phase signal feedback from the collector to emitter through capacitor C4. The tap on the oscillator coil determines the amount of feedback. The base of the transistor is placed at RF ground through capacitor C9. Resistors R31 and R32 form the divider network to develop the correct base voltage. The oscillator injection voltage is obtained from a tap on the oscillator coil (L2) and coupled to the base of the mixer transistor through capacitor C3 and part of the antenna (L1).

AGC - The gain of the first IF amplifier is controlled by AGC. Part of the emitter bias current for this transistor (see figure 1) flows from the -4.4 volt B- line through R12, secondary of T3, R11, R13 and R6 to ground. A fixed negative 1.2 volts bias appears on the emitter of the first IF amplifier transistor (with no signal). When the detector transistor conducts, current flows from the collector to emitter of the detector transistor, through R14, R13, R6 to ground.

The detector current is in the same direction as the emitter bias current of the first IF amplifier transistor. As the signal level at the detector increases, the detector conduction increases and the emitter bias on the first IF amplifier becomes less positive with respect to the base. Hence as the signal level at the detector increases, the first IF amplifier forward bias is reduced and the gain of the stage is decreased.

To increase the range of the AGC control voltage and prevent possible overloading on a very strong signal, a diode (X1) is connected from the low side of T2 to the collector of the mixer transistor. With no signal being received the diode is reverse biased (-2.8 volts on cathode and -4 volts on anode provides 1.2 volts reverse bias) and does not conduct.

When a signal is received, the first IF amplifier emitter voltage becomes more negative reducing the gain of the transistor. As the emitter-to-collector current decreases, the voltage on the collector increases toward the B- line voltage (-4.4 volts). If it were possible to completely cut off the transistor, -4.4 volts would appear on the collector.

As the signal received increases in strength, the diode reverse bias becomes less. As the diode approaches zero

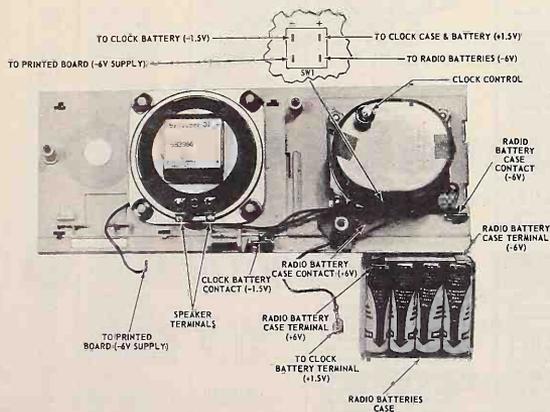


Figure 5 - Rear view of cabinet front with printed circuit chassis removed.

bias the high back resistance of the diode will decrease. On very strong signals the collector voltage will exceed 4 volts and forward bias the diode. The diode then becomes a low resistance in series with capacitor C10. The resistance of diode X1 and capacity of C10 will now be in shunt with the primary of T1, lowering its "Q" and reducing the amount of IF signal coupled to the first amplifier stage.

Alarm Operation - When the user of this radio rotates the radio-volume control to the extreme left until a click is heard (SW1A and SW1B open) the radio operates as an alarm

ALIGNMENT REQUIREMENTS

Signal Generator - Use a generator providing modulated 455KC and AM broadcast frequencies. Connect a 4 or 5 turn loop of wire across output cable. Place the loop near the ferrite core antenna of the receiver. To increase or decrease the amount of signal coupled to the receiver move the loop closer or further from the antenna. Keep the output of the generator low enough to just give an indication on the VTVM or output meter to avoid AVC action. Keep the volume control set at maximum.

Indicator - Connect a VTVM or output meter across the voice coil.
Receiver - Set the volume control to maximum. During step 1 the chassis must be removed from the cabinet front. During steps 2, 3, 4 and 5 the chassis must be attached to the cabinet front. Also during the last four steps, be sure that the hand or any objects on the bench do not come in close contact with the antenna loop or detuning will occur and alignment will be incorrect.

Alignment Tool - Use a fiber aligning tool that snugly fits the slot in the ferrite cores of the IF transformers to prevent chipping of the slot.

ALIGNMENT PROCEDURE CHART

Step	Loosely couple modulated signal to:	Generator Frequency	CI Setting	Adjust for maximum:
1.	Loop L4	455KC	Maximum	T3, T2 and T1 in order. Reduce generator output if necessary for T2 and T1 adjustments.
2.	Loop L4	1625KC	Minimum	Oscillator trimmer "D"
3.	Loop L1	1400KC	1400KC	RF trimmer "B"
4.	Loop L1	600KC	600KC	Oscillator coil, L2, if necessary
5.	Repeat steps 2, 3 & 4 until no further change is noted			

AUTHORIZED (Westclox) CLOCK SERVICE REPAIR STATIONS (see page 1 - Clock Service Information)

ALABAMA		MINNESOTA	
Birmingham	Cliff's Watch Repair 244-45 Brown-Mark Bldg.	St. Paul	Empire Clock Co., Inc. 492 N. Robert St.
ARIZONA		MISSOURI	
Phoenix	Smith's Clock & Watch Shop 1512 N. 7th Ave.	Kansas City	Thompson Clock Service 4416 Main St.
CALIFORNIA		NEW YORK	
Los Angeles 15	Hayco Electric 947 So. Grand Ave. Appliance Service	Albany 6	Julien's Clock Shop, Inc. 114 Bradford St. Brooklyn 17
San Francisco 5	Schloss Mfg. Co. 540 Mission St.	New York 22	Greenhill & Rogers 670 Lexington Ave. Brooklyn 15
CONNECTICUT		Buffalo 9	Shields Bros. 1410 Main St.
Hartford 3	Armin's Swiss-American Watch Hospital 6 American Row	NEBRASKA	
Bridgeport	Bridgport Watch Hospital, Inc. 918 Main St.	Omaha 2	Harry A. Hansen Co. 807 Kilpatrick Bldg.
Fairfield	Fairfield Center Jewelers 1498 Post Road	NORTH CAROLINA	
COLORADO		Charlotte 5	J. F. Collins 1610 Central Ave.
Denver 2	Denver Dial Company, Inc. 235 University Bldg.	OHIO	
DISTRICT OF COLUMBIA		Cincinnati	Ken-Hav Elec. Clock Service 408 Main St. Cleveland 15
Washington D.C.	Auto Clock Shop 1105 21st St. N.W.	Columbus 15	DeMers Authorized Service 101 E. Broad St. Dayton 3
FLORIDA		Dayton 3	Croo Time Shop 1700 E. 3rd St.
Miami 37	Electric Clock 3101 N.W. 7th Ave. - Box 263 Service	OKLAHOMA	
Tampa	Brodie-Edwards, Inc. 3123 E. Broadway	Tulsa 3	TREK of Time 220 E. Fourth St. Oklahoma City
GEORGIA		Oklahoma City	House of Time 1326 N.W. 23rd St.
Rossville	Dayle May Inc. 101 Chickamauga Ave.	OREGON	
Atlanta	Bowers Watch & Clock Repair 1584 Piedmont Ave. N.E.	Portland	Alder Street Clock Shop 251 S.W. Alder St.
ILLINOIS		PENNSYLVANIA	
Eglin	M.J. Silbert & Co. Stewart & Dundee Aves.	Philadelphia 6	The Precision Instrument 106-08 S. 7th St. Service
Chicago 2	M.J. Silbert & Co. 55 E. Washington St.	Pittsburgh 19	Time Service Co. 504 Court Place
IOWA		RHODE ISLAND	
Cedar Rapids	Schafer Clock Service 216 3rd St. S.E.	Providence	Mr. Edwin Olson 7 Dyer St.
NEW JERSEY		TENNESSEE	
Newark	Robert Halpern 368 Washington St.	Memphis 14	Tolbert Auto Clock & Speedometer Service 1791 Lamar Ave.
KENTUCKY		Nashville	Young-Neal Company 315 4th Ave. N.
Louisville	H.C. Korfhage Co. 412 Norton Bldg.	TEXAS	
LOUISIANA		Amarillo	Harris Clock Service 1409 S. Harrison St. Dallas 1
Shreveport	Leonard's 320-322 Ward Bldg.	Houston 6	Arnold Elec. Co. 1827 W. Alabama St.
New Orleans	Southern Time Service 931 Canal St.	Fort Worth	Walton's Speedometer Repair 1515 W. 7th Dallas
MAINE		Dallas	Dubham Watch Repair Service 512 S. Akard San Antonio
Portland	The Watch Shop 238 Cumberland Ave.	San Antonio	Aztec Jewelry Company 241 W. Commerce St.
MARYLAND		VIRGINIA	
Baltimore 1	Jewelers Service Co. 108 W. Fayette St.	Richmond 19	George S. Richardson 304 E. Main St.
MASSACHUSETTS		WASHINGTON	
Boston 8	Boston Clock Service 44 Bromfield St.	Spokane	Harry's Elec. Clock Hospital 175 S. Post St.
MICHIGAN		WISCONSIN	
Detroit 5	Hanning Clock Service 13417 Grafton Avenue Center	Oshkosh	Miller Clock Service 431 Bowen St.
		Milwaukee 6	Schreiber Clock Service 623 N. 2nd St. Rm. 730 OR 1612 Center St.

PARTS LIST

When ordering parts, specify part number, description of part and model number. Do not order by model number alone. Where applicable, prices include Federal Excise Tax. Prices are subject to change without notice.

MODEL PARTS

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
†		513V037H01		Cabinet shell, back, brown, H-685P8	2.95
†		513V037H02		Cabinet shell, back, pink, H-686P8	2.95
†		650V014H01		Clock	.15
†		558V197H01		Cover, radio batteries, brown, H-685P8	.15
†		558V197H02		Cover, radio batteries, pink, H-686P8	.85
†		787V156H01		Cover, clock battery, brown, H-685P8	.85
†		787V157H01		Cover, clock battery, pink, H-686P8	.85
†		558V198H01		Crystal, clock	.60
†		588V195H01		Dial, clock	.40
†		555V037H01		Escutcheon	1.30
†		558V199H01		Front, cabinet	2.10
†		787V195H01		Holder Assy., radio batteries (includes battery contacts)	1.15
†		781V272H01		Holder, clock battery support	.30
†		754V008H01		Jack, earphone	.72
†		550V107H01		Knob, clock	.25
†		550V104H01		Knob, volume	.25
†		550V044H01		Knob Assy., tuning (includes compression spring)	.50
†		550V045H01		Knob Assy., AM dial (includes compression spring)	.50
†		761V009H2B		Screw, self-tapping hex head (mounts chassis to cabinet front)	.05
†		785V074H02		Spacer (mounts chassis to cabinet front)	.10
†		570V058H01		Speakers, 3" PM	5.25

CHASSIS PARTS

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
†	C1	350V026H01		Capacitor, variable	Tuning	3.75
†	C2	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	Mixer emitter	.20
†	C3	215V300H04	R2CC62Y5472M	Capacitor, .0047 mf, ceramic	Ant. coupling	.25
†	C4	215V300H04	R2CC62Y5472M	Capacitor, .0047 mf, ceramic	Osc. emitter	.25
†	C5	215V303H03		Capacitor, .05 mf, ceramic	Osc. collector	.40
†	C6	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	1st IF amp.	.20
†	C7	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	1st IF amp.	.20
†	C8A	218V025H29		Capacitor, 100 mf, 6V., elect.	Supply filter	1.75
†	C8B			Capacitor, 40 mf, 3V., elect.	1st IF amp.	.20
†	C9	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	Osc. base	.20
†	C10	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	2nd IF amp.	.20
†	C11	R2CC63Z52103P	215V111A03	Capacitor, .04 mf, ceramic	2nd IF amp.	.20
†	C12	R2CC63Z52103P	215V111A03	Capacitor, .01 mf, ceramic	2nd IF amp.	.20
†	C13	215V303H03		Capacitor, .05 mf, ceramic	Detector base	.40
†	C14	218V012H02		Capacitor, 40 mf, 3V., elect.	Detector	1.35
†	C15	215V303H04		Capacitor, .02 mf, 30V., ceramic	Detector	.22
†	C16	218V012H14		Capacitor, 5 mf, 7V., elect.	Audio driver	.95
†	C17A	218V025H28		Capacitor, 100 mf, 3V., elect.	Audio driver	1.75
†	C17B			Capacitor, 250 mf, 7V., elect.	Audio driver	1.75
†	C18	215V308H05		Capacitor, .01 mf, ceramic	Audio driver	.15
†	C19	215V303H03		Capacitor, .05 mf, ceramic	Audio output	.40
†	L1	310V046H01		Loop	Antenna	2.15
†	L2	230V074H01		Coil	Oscillator	1.00
†	R0	RC20AE152K	250V221A52	Resistor, 1.5K ohms	Mixer emitter	.05
†	R2	RC20AE355K	250V223A33	Resistor, 35K ohms	Mixer base	.05
†	R3	250V21A07	RC20AE102K	Resistor, 1K ohms	1st IF amp.	.05
†	R4	250V225A62	RC20AE562K	Resistor, 5.6K ohms	1st IF amp.	.06
†	R5	RC20AE103K	250V221A03	Resistor, 10K ohms	1st IF amp.	.05
†	R6	RC20AE222K	250V222A22	Resistor, 2.2K ohms	1st IF amp.	.05
†	R7	RC20AE222K	250V222A22	Resistor, 2.2K ohms	1st IF amp.	.05
†	R8	RC20AE222K	250V222A22	Resistor, 2.2K ohms	2nd IF amp.	.05
†	R9	RC20AE123K	250V221A23	Resistor, 1.2K ohms	2nd IF amp.	.05
†	R10	250V224A71	RC20AE471K	Resistor, 470 ohms	2nd IF amp.	.06
†	R11	RC20AE102K	250V221A03	Resistor, 10K ohms	Detector base	.05
†	R12	250V222A24	RC20AE224K	Resistor, 220K ohms	Detector base	.12
†	R13	RC20AE331K	250V223A31	Resistor, 330 ohms	1st IF amp.	.05
†	R14	250V221A01	RC20AE101K	Resistor, 100 ohms	Detector	.05
†	R15	RC20AE221M	250V232A21	Resistor, 220 ohms	Supply filter	.05
†	R16	RC20AE123K	250V221A23	Resistor, 1.2K ohms	Detector	.05
†	R17	270V066H02		Control, 2.5K ohms (includes SW1A & B)	Volume alarm control	2.00
†	R18	250V225A62	RC20AE562K	Resistor, 5.6K ohms	Alarm circuit	.06
†	R19	RC20AE682J	250V216A82	Resistor, 6.8K ohms	Audio driver	.10

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
	R20	RC20AE153J	250V221A53	Resistor, 15K ohms	Audio driver	.11
	R21	RC20AE681J	250V216A81	Resistor, 680 ohms	Audio driver	.10
	R22	250V221A81	RC20AE181K	Resistor, 180 ohms	Audio driver	.17
	R23	RC20AE153J	250V221A53	Resistor, 15K ohms	Audio output	.06
	R24	RC20AE121K	250V221A21	Resistor, 120 ohms	Audio output	.06
	R25	RC20AE332K	250V223A32	Resistor, 3.3K ohms	Audio output	.06
	R26	RC20AE100K	250V221A00	Resistor, 10 ohms	Audio output	.05
	R27	250V225A62	RC20AE562K	Resistor, 5.6K ohms	Audio output	.06
	R28	RC20AE822K	250V228A22	Resistor, 8.2K ohms	Mixer base	.05
	R29	250V224A71	RC20AE471K	Resistor, 470 ohms	Oscillator	.06
	R30	RC20AE332K	250V223A32	Resistor, 3.3K ohms	Oscillator	.05
	R31	RC20AE103K	250V221A03	Resistor, 10K ohms	Oscillator	.05
	R32	RC20AE822K	250V228A22	Resistor, 8.2K ohms	Oscillator	.05
†	SW1A			Switch		
†	SW1B	270V066H02		Switch (part of R17)	Radio-Alarm switch	2.00
†	T1	235V045H01		Transformer	1st IF	2.25
†	T2	235V045H01		Transformer	2nd IF	2.25
†	T3	235V041H03		Transformer	3rd IF	2.45
†	T4	430V061H02		Transformer	Audio driver	2.80
†	T5	430V073H01		Transformer	Audio output	2.70
†	X1	296V002H01		Crystal diode, 1N295 or 1N87G	AGC overload	1.25
†		297V017H01		Transistor, 2N308	1st IF amp.	5.60
†		297V017H02		Transistor, 2N309	2nd IF amp.	5.60
†		297V008H01		Transistor, 2N252	Mixer	8.15
†		297V019H01		Transistor, R-227	Oscillator	4.50
†		297V018H01		Transistor, R-242	Detector	5.60
†		297V004H01		Transistor, 310, 2N238 or 2N402	Audio driver	6.75
†		297V003H01		Transistors, matched pair, 2N60, 2N61, 0060 or 0061	Audio output	13.50

Resistors are 1/2 watt, 10% unless otherwise specified.
 † New part listed for the first time in Westinghouse Television or Radio service information.
 *Price furnished on request.



SERVICE MANUAL

MODEL "ROYAL 200"

ALL TRANSISTOR PORTABLE RADIO

CHASSIS 7AT48Z, 7AT48Z2 & 7AT48Z4

GENERAL

These transistor portable chassis are conventional superheterodyne receivers using an individual mixer and oscillator to produce the 455 KC intermediate frequency. The first and second intermediate frequency amplifiers are conventional. It is necessary to use neutralization in the IF amplifier stages as in circuits using a triode tube. A 1N87G germanium diode is used as the diode detector and AVC voltage source. This is then followed by a driver stage and a class "B" push-pull output stage. As you can see from the chart, the chassis use matched transistor pairs 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.....Carbon Penlite Batteries 6 volts D.C. approx. life 100 hrs.
Mercury Batteries..... 5.36 volts D.C. approx. life 400 hrs.

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..... 150 milliwatts
Speaker 3 1/2 inch P.M.
Alcovo V Voice Coil Impedance 32 ohms at 400 cycles
Accessory Earphone..... B39-24 (Impedance 15 ohms at 400 cycles)

CHASSIS IDENTIFICATION

The "Royal 200" seven transistor portable has been produced with three basic chassis. This expedient was necessary to enable us to produce sufficient quantities by using transistors from many sources.

Chassis 7AT48Z, 7AT48Z2 and 7AT48Z4 use identical circuitry, however, they use transistors from different sources. The transistor and trimmer layout and schematic illustrate chassis 7AT48Z. The chassis information chart supplies the necessary information on transistors used in chassis 7AT48Z2 and 7AT48Z4. Transistors for specific functions are interchangeable, for example in chassis 7AT48Z the mixer transistor is 121-92 or 121-62 or 121-63 can also be used.

The output transistors are also interchangeable but only as matched pairs. Chassis 7AT48Z uses a matched pair of (121-96) transistors, which can be replaced with a matched pair of (121-61) or a matched pair of (121-84).

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.

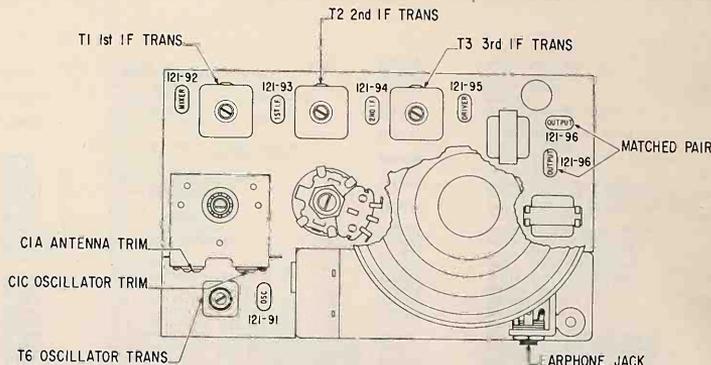
5. Tin leads on component before soldering.
6. Use only EUTECTIC solder 63% tin 37% lead. This solder has an extremely low melting point.

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 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 7AT48Z

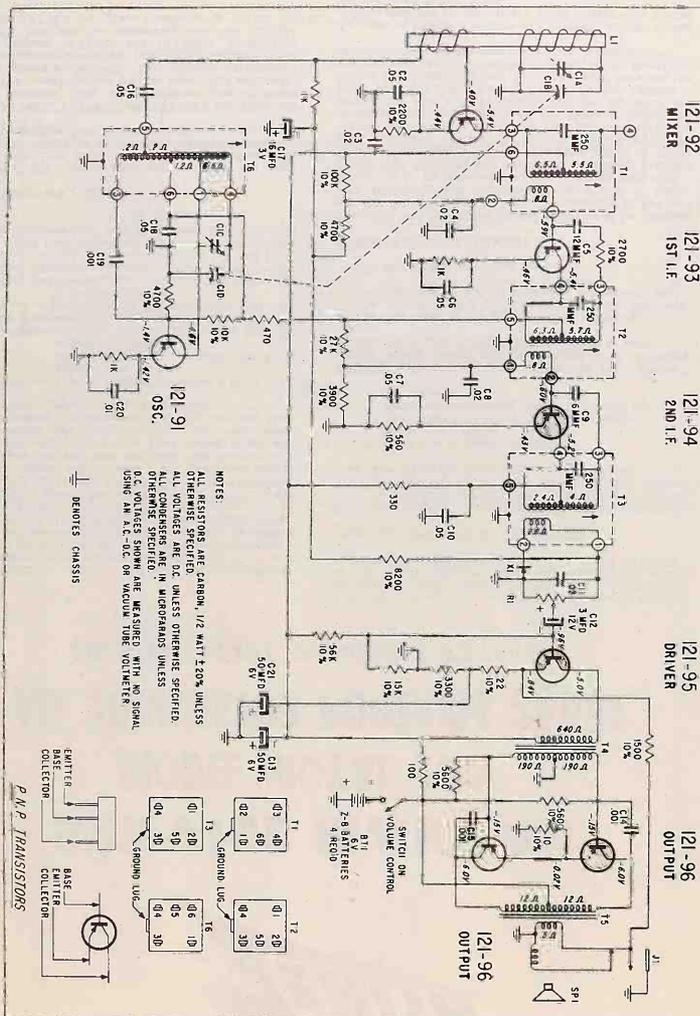
ALIGNMENT PROCEDURE

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dia. of	Trimmers	Purpose
1	455 KC	ONE TURN	Chassis	600 KC	A5, T1, T2, T3 for maximum output.	For I.F. alignment
2	1620 KC	LOOSELY COUPLED TO WAVEMAGNET	---	GANG wide opens	"C1"	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	"C1A"	Align 1000 cycle

CHASSIS INFORMATION CHART

Chassis	Transistor Layout Label Color	Part No.	Mixer	Osc.	1st I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
7AT48Z	Red 102-4234 or 102-4861	Zenith RETMA Type	121-92 2N485 PNP	121-91 2N483 PNP	121-93 2N483 PNP	121-94 2N482 PNP	103-19 IN87G	121-95 2N362 PNP	121-96 2N632 Matched Pair PNP	Raytheon
7AT48Z2	Black 102-4007 or 102-4862	Zenith RETMA Type	121-62 2N411 PNP	121-65 2N409 PNP	121-73 2N409 PNP	121-74 2N409 PNP	103-19 IN87G	121-64 PNP	121-61 Matched Pair PNP	R.C.A.
7AT48Z4	Green 102-4235	Zenith RETMA Type	121-83 2N414 PNP	121-82 2N413 PNP	121-79 2N413A PNP	121-80 2N413A PNP	103-19 IN87G	121-81 2N383 PNP	121-84 2N383 Matched Pair PNP	Tung Sol

SCHEMATIC DIAGRAM FOR 7AT48Z



NOTES
 ALL RESISTORS ARE CARBON, 1/2 WATT ±20% UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITORS ARE POLYESTER UNLESS OTHERWISE SPECIFIED.
 ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 D.C. VOLTAGES SHOWN ARE MEASURED WITH NO SIGNAL.
 OHMS ARE IN A.C. D.C. OR VACUUM TUBE VOLTMETER.

⊕ REMOTES CHASSIS



CHASSIS PARTS

Chassis 7AT48Z, 7AT48Z2 & 7AT48Z4

PART NO.	DIA. NO.	DESCRIPTION	PRICE
12-2659		Volume control mtg. bracket	.30
22-3		.01 mfd. ceramic disc - 500V	.30
22-217	C14,15	.001 mfd. ceramic disc capacitor - 1000V (2 used)	.25
22-2381	C9	6 mmd. ceramic disc capacitor - 500V	.25
22-2728	C2,6,7,10,16,25	6 mmd. ceramic disc capacitor - 125V (6 used)	.18
22-2729	C19	.001 mfd. ceramic disc capacitor - 25V	.60
22-2871	C17	16 mfd. electrolytic capacitor - 3V1.50	.25
22-2884	C12	3 mfd. electrolytic capacitor - 12V1.50	.25
22-2885	C3,4,8	.02 mfd. ceramic disc - 25V	1.50
22-3035	T1	12 mmd. ceramic disc capacitor	.25
22-3091	C13A,B	Electrolytic capacitor - 2x50 mfd. 6V	.25
22-3092	C1A,B,C,D	Two section variable capacitor	2.00
44-34		Miniature jack	3.75
49-859	SP1	3 1/2" PM speaker	.90
54-139		3/8-32x9/16 palnut	4.75
54-417		1/4-32x3/8 hex. nut - brass (mts. 44-34)	.03
63-1701		10 ohm resistor 1/2W Ins. 10%	.10
63-1715		22 ohm resistor 1/2W Ins. 10%	.17
63-1744		100 ohm resistor 1/2W Ins. 20%	.17
63-1765		330 ohm resistor 1/2W Ins. 20%	.17
63-1772		470 ohm resistor 1/2W Ins. 20%	.17
63-1775		560 ohm resistor 1/2W Ins. 10%	.17
63-1786		1 K ohm resistor 1/2W Ins. 20%	.17
63-1792		1500 ohm resistor 1/2W Ins. 10%	.17
63-1799		2200 ohm resistor 1/2W Ins. 10%	.17
63-1803		2700 ohm resistor 1/2W Ins. 10%	.17
63-1806		3300 ohm resistor 1/2W Ins. 10%	.17
63-1810		3900 ohm resistor 1/2W Ins. 10%	.17
63-1813		4700 ohm resistor 1/2W Ins. 10%	.17
63-1817		5600 ohm resistor 1/2W Ins. 10%	.17
63-1824		8200 ohm resistor 1/2W Ins. 10%	.17
63-1827		10 K ohm resistor 1/2W Ins. 10%	.17
63-1834		15 K ohm resistor 1/2W Ins. 10%	.17
63-1845		27 K ohm resistor 1/2W Ins. 10%	.17
63-1859		56 K ohm resistor 1/2W Ins. 10%	.17
63-1869		100 K ohm resistor 1/2W Ins. 10%	.17
63-4392	R1	Volume control & switch	2.05
78-1067		Three contact socket (1 mts. ea. 121-61 & 96)	.30
93-1257	T6	Oscillator transformer	3.00
95-1589	T1	1st I.F. transformer	
95-1628	T2	2nd I.F. transformer	
95-1629	T3	3rd I.F. transformer	
95-1630	T4	Driver transformer	
95-1632	T5	Audio output transformer	
103-19	X1	Crystal diode	.75
114-48		6-32x1/4x1/4 AF hex. hd. mach. screw (3 used)	.03
114-641		6-32x1/4 hex. hd. mach. screw - flat washer att.	
114-642		4-40x1/8x1/4 hex. hd. mach. screw (mts. S-4417)	
121-61		Transistor (output) 7AT48Z2 (2 used)	4.50

CHASSIS PARTS

Chassis 7AT48Z, 7AT48Z2 & 7AT48Z4

PART NO.	DIA. NO.	DESCRIPTION	PRICE
121-62		Transistor (mixer) 7AT48Z2	2.75
121-64		Transistor (driver) 7AT48Z2	2.25
121-65		Transistor (oscillator) 7AT48Z2	2.65
121-73		Transistor (1st I.F.) 7AT48Z2	2.65
121-74		Transistor (2nd I.F.) 7AT48Z2	2.65
121-79		Transistor (1st I.F.) 7AT48Z4	
121-80		Transistor (2nd I.F.) 7AT48Z4	
121-81		Transistor (driver) 7AT48Z4	
121-82		Transistor (oscillator) 7AT48Z4	
121-83		Transistor (mixer) 7AT48Z4	
121-84		Transistor (output) 7AT48Z4 (2 used)	
121-91		Transistor (oscillator) 7AT48Z	
121-92		Transistor (mixer) 7AT48Z	
121-93		Transistor (1st I.F.) 7AT48Z	
121-94		Transistor (2nd I.F.) 7AT48Z	
121-95		Transistor (driver) 7AT48Z	
121-96		Transistor (output) 7AT48Z (2 used)	
S-44217	L1	Antenna	
S-44218		Housing & spring assembly	

CABINET PARTS

PART NO.	DIA. NO.	DESCRIPTION	PRICE
Z-8		1 1/2 volt battery (use 4)	
12-2662		Screw retaining bracket	
14-2443		Plastic cabinet - front - Royal 200K 3.00	
14-2444		Plastic cabinet - front - Royal 200V 3.00	
14-2445		Plastic cabinet - front - Royal 200F (3 used)	
14-2446		Plastic cabinet - front - Royal 200G	
14-2448		Plastic cabinet - rear - Royal 200K 3.00	
14-2449		Plastic cabinet - rear - Royal 200V 3.00	
14-2450		Plastic cabinet - rear - Royal 200F	
14-2451		Plastic cabinet - rear - Royal 200G	
16-1474		Packing carton	
36-218		Cabinet handle	
46-2008		Volume control knob	.50
46-2009		Tuning control knob	
54-79		6-32x1/4 AF hex. nut (2 used)	
54-460		6-32x3/16 hex. nut (3 used on chassis)	
57-2498		Emblem plate	.35
57-2565		Escutcheon	1.25
83-3031		Battery pull-out strip	
110-320		Grille cloth - Royal 200K	.10
110-321		Grille cloth - Royal 200V	.10
110-322		Grille cloth - Royal 200F	
110-323		Grille cloth - Royal 200G	
112-901		6-20x3/8 phils. rd. hd. screw (used on chassis)	.03
112-911		6-32x3/8 special hd. mach. screw - brass (2 used on 14-2448 & 2451)	.03
114-253		6-20x3/8x1/4 AF hex. hd. self-tapping screw	.01
114-639		6-32x 1 1/2x1/4 AF hex. hd. mach. screw (3 used)	.05
188-120		Knob clamping ring (used on 46-2009)	
188-192		Knob clamping ring (used on 46-2008)	
199-259		Spacer sleeve	.03
199-260		Spacer sleeve (2 used)	.03
202-1383		Instruction book	

**HOME RADIO
SECTION**



Admiral

High-Fidelity FM-AM Radio Phonograph

7N1 FM-AM TUNER and 4S2 HI-FI AMPLIFIER

For complete Record Changer servicing information, see SERVICE MANUAL 5800.



SPECIFICATIONS

FREQUENCY RESPONSE:

AMPLIFIER—Amplifier section flat from 50 to 20,000 cycles within 1 db at 10 watts output.

PRE-AMPLIFIER—At 1 watt level, Bass control gives 31 db change at 100 cycles and Treble control gives 26 db change at 10,000 cycles.

DISTORTION—3% at 12 watts.

POWER OUTPUT—17 watts maximum.

POWER CONSUMPTION—100 watts.

POWER SUPPLY—117 volts AC, 60 cycle only. (Phonograph can be converted to 50 cycle operation. See "RECORD CHANGER PARTS", "Kit, 50 Cycle Conversion".)

SPEAKER SYSTEM—Woofers, 12" PM; Tweeter, 3 1/2" PM.



Figure 1. Operating Controls.

MODEL	COLOR	CHASSIS	RECORD CHANGER
392	Mahogany	7N1 and 4S2	RC 637-8
393	Blond		

HI-FI FM-AM CONSOLE PHONOGRAPH

CHASSIS REMOVAL

To remove amplifier chassis from cabinet:

1. Disconnect line cord from power source.
2. Disconnect record changer power plug (M611), speaker plug (M615), tuner audio output plug (M604), and power input plug (M606) from tuner chassis.
3. Remove screws that hold chassis to cabinet.

To remove FM-AM tuner from cabinet:

1. Remove control knobs from tuner front panel and phono output plug (M608) from tuner chassis.
2. Disconnect FM antenna from terminal board and remove terminal board from cabinet.
3. Support tuner from bottom and remove 4 hex nuts and lock washers that hold tuner chassis to cabinet. Carefully remove tuner chassis from cabinet.

To remove FM RF tuner sub-chassis:

1. Remove four screws that hold sub-chassis and disconnect wires from antenna terminals.
2. Disconnect cable from pin 8 on S601.
3. Lift sub-chassis up for servicing. DO NOT disconnect FM tuner dial cord.

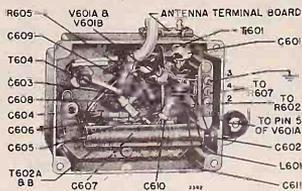


Figure 2. Bottom View of FM Tuner Sub-chassis. Location of components shown.

TROUBLE SHOOTING HINTS

Tube locations for the tuner and amplifier are shown on figures 6 and 7. Alignment points for the tuner are shown on figure 6.

Tubes may be reached from rear of cabinet for servicing purposes.

B+ voltages and filament voltages for tuner are furnished by power supply on amplifier chassis.

By placing a jumper wire between lugs 4 and 8 of M606, the amplifier may be serviced separately. NOTE: When amplifier is serviced separately, voltage readings will be higher due to the reduced load on the power supply.

HUM LEVEL: Excessive hum can often be minimized by reversing line cord plug in wall outlet. Move **Rej-On-Off** pointer to "ON". Touch record changer centerpost and note hum level. Reverse line cord in wall outlet; touch centerpost again and again note hum level. Leave line cord in position giving least hum.

A **Hum Level** control is located on the tuner chassis, see figure 6. Hum may be further reduced, if necessary, by adjusting this control.

RECORD CHANGER SERVICING

For complete record changer service information, see Service Manual 5800.

If it becomes necessary to remove record changer from its mounting board, remove the three large washer-head screws extending through bottom of the mounting board. With these screws removed, the three springs which "float" the record changer may be loose. Lift record changer from the mounting board, being careful to retain mounting screws for installation.

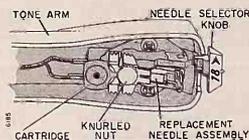


Figure 3. Needle Replacement.

NEEDLE REPLACEMENT

A worn needle causes "scratch" and a harshness of high tones in the output. Damage to records may be caused by worn needles.

To replace needle assembly, refer to figure 3 and loosen the knurled nut that is located under the cartridge. Slip the worn needle assembly out and insert the new needle assembly in the exact same position. Tighten the knurled nut.

See "RECORD CHANGER PARTS" for replacement cartridge and needles.

AMPLIFIER CHECKS

CONTROL SETTINGS FOR AMPLIFIER CHECKS

Loudness Control	Fully Clockwise
Bass Control	Mid Range
Treble Control	Mid Range

AMPLIFICATION CHECK

AUDIO GENERATOR OUTPUT	Frequency 1000 Cycles	Volts in 0.34 Volts
AMPLIFIER OUTPUT	Volts	3 Watts
	S.d. Volts	10 Watts

FREQUENCY RESPONSE CHECK

AUDIO GENERATOR OUTPUT	Frequency in steps between 50 to 20,000 Cycles	Volts in 0.34 Volts
AMPLIFIER OUTPUT	Volts	BS
	S.d. Volts	±25%

AMPLIFICATION AND RESPONSE CHECK

The amplifier may be checked for gain and frequency response by using the tests outlined below.

TEST EQUIPMENT:

Audio Oscillator, preferably with flat output from 50 cycles to 20 kilocycles.

Vacuum Tube Voltmeter, preferably with decibel scale.

PROCEDURE: Disconnect phono power plug (M611). Disconnect phono output plug (M608) from socket (M603) on tuner chassis. The oscillator signal is to be injected into socket (M603) on tuner chassis. This enables the checking of the preamplifier and amplifier for amplification and frequency response. Measurements taken with **FM-AM-Phono** switch in "PHONO" position.

Connect audio oscillator ground to chassis. Connect signal lead to phono input (M603). Allow several minutes warm-up for oscillator and amplifier. Set **Loudness, Bass, and Treble** controls as shown in "AMPLIFIER CHECKS" table.

To check amplification, adjust audio oscillator output to 0.34 volts at 1,000 cycles, measured from M603 to ground with a vacuum tube voltmeter. Connect a 3.2 ohm resistive load across secondary of T609 (audio output transformer). Measure output voltages across the load.

To check frequency response, adjust audio oscillator output to 0.34 volts. Change oscillator frequency in steps between 50 cycles and 20,000 cycles, readjusting oscillator output to 0.34 volts each time a new frequency setting is made.

Compare amplifier output voltage with readings given in "AMPLIFIER CHECKS" table.

PARTS LIST
FM-AM TUNER CHASSIS
(7N1)

RESISTORS

R601	2.2 megohms, 1/2 watt	60B 8-225
R602	10,000 ohms, 2 watts	60B 20-103
R603	1 megohm, 1/2 watt	52C 7-51
R604	2.2 megohms, 1/2 watt	60B 8-225
R605	15,000 ohms, 1/2 watt	60B 8-151
R606	1 megohm, 1/2 watt	60B 8-105
R607	10,000 ohms, 1 watt	60B 14-103
R608	150 ohms, 1/2 watt	60B 8-121
R609	100 ohms, 1/2 watt	60B 8-101
R610	100 ohms, 1/2 watt	60B 8-101
R611	68 ohms, 1/2 watt, 5%	60B 7-680
R612	68,000 ohms, 1/2 watt, 5%	60B 7-653
R613	1,500 ohms, 1/2 watt, 5%	60B 7-152
R614	1,000 ohms, 1/2 watt, 5%	60B 7-103
R615	2.2 megohms, 1/2 watt	60B 8-225
R616	6,800 ohms, 1/2 watt, 5%	60B 7-682
R617	6,800 ohms, 1/2 watt, 5%	60B 7-682
R621	1 megohm, 1/2 watt	60B 8-105
R622	1.5 megohms, 1/2 watt	60B 8-155
R623	10,000 ohms, 1/2 watt, 5%	60B 7-103
R624	6,000 ohms, 1/2 watt, 5%	60B 7-103
R625	LEVEL control	75C 20-107
R626	2,200 ohms, 1/2 watt	60B 8-222
R628	1 megohm, TREBLE control	75D 1-105
R627	1 megohm, BASS control	75D 1-105
R628	100,000 ohms, 1/2 watt	60B 8-104
R629	47,000 ohms, 1/2 watt, 5% (used in prod. runs 10 and 11 only)	60B 7-473
R630	100,000 ohms, 1/2 watt (used in prod. run 12 and later)	60B 8-104
R631	4,700 ohms, 1/2 watt, 5% (used in prod. runs 10 and 11 only)	60B 7-472
R631	10,000 ohms, 1/2 watt (used in prod. run 12 and later)	60B 8-103
R632	100,000 ohms, 1/2 watt	60B 8-104
R632	470,000 ohms, 1/2 watt	60B 8-474
R633	470 ohms, 1/2 watt	60B 8-471
R634	22,000 ohms, 1/2 watt	60B 8-223
R635	390,000 ohms, 1/2 watt	60B 8-394
R636	220,000 ohms, 1/2 watt	60B 8-224
R637	390,000 ohms, 1/2 watt	60B 8-394
R638	51,000 ohms, 1/2 watt, 5%	60B 7-513
R639	500,000 ohms, LOUDNESS control	75D 1-106
R640	51,000 ohms, 1/2 watt, 5%	60B 7-513
R641	220,000 ohms, 1/2 watt	60B 8-224
R642	1 megohm, 1/2 watt	60B 8-105
R643	1,000 ohms, 1/2 watt	60B 8-102

NOTE: Symbol numbers R618, R619 and R620 not used.

CAPACITORS

C601	10 mmf, 500 volts, 10% ceramic, N70 temp. coeff.	53C 2-52
C602	100 mf, 500 volts, 5% ceramic, NPO temp. coeff.	53C 2-53
C603	100 mf, 500 volts, 5% ceramic, N70 temp. coeff.	53C 2-53
C604	Ceramic trimmer	53C 2-53
C605	200 mf, 500 volts, 5% ceramic, NPO temp. coeff.	53C 2-54
C606	20 mmf, 500 volts, 5% ceramic, NPO temp. coeff.	53C 2-56
C607	Ceramic trimmer	53C 2-58
C608	8.2 mmf, 500 volts, 10%, cer. P100	53C 2-59
C609	68 mmf, 500 volts, 5% ceramic, N70 temp. coeff.	53C 2-60
C610	10 mmf, 500 volts, 10% ceramic, N70 temp. coeff.	53C 2-52
C611	15 mmf, 500 volts, 10% ceramic, NPO temp. coeff.	53C 2-61
C612A	Tuning capacitor, AM, 88C	69
C612B	33 mmf, 500 volts, 5%, cer. disc, N1400 temp. coeff.	65D 10-119

C614	100 mf, 500 volts, cer. disc	65D 10-6
C615	01 mf, 500 volts, cer. disc	65D 10-3
C616	10 mmf, 500 volts, 5%, ceramic, NPO temp. coeff.	65D 6-118
C617	02 mf, 500 volts, cer. disc	65D 10-28
C618A	004 mf, 500 volts, dual cer. disc	65A 17-1
C618B	220 mmf, 500 volts, cer. disc	65D 6-80
C619	004 mf, 500 volts, dial cer. disc	65A 17-1
C620	220 mmf, 500 volts, 5%, mica	65B 1-4
C621	220 mmf, 500 volts, 5%, mica	65B 1-4
C622	001 mf, 500 volts, cer. disc	65D 10-53
C623	220 mmf, 500 volts, 5%, mica	65B 1-4
C624	220 mmf, 500 volts, 5%, mica	65B 1-4
C625	5 mf, 50 volts, electrolytic	67B 4-37
C626	02 mf, 500 volts, GMV, ceramic disc	65D 10-28
C627	220 mmf, 500 volts, 1 mf, 400 volts, mylar dielec.	64C 24-32
C628	0015 mf, 500 volts, cer. disc (used in prod. runs 10 and 11 only)	65D 10-53
C629	001 mf, 500 volts, cer. disc (used in prod. runs 10 and 11 only)	65D 10-53
C630	002 mf, 500 volts, cer. disc (used in prod. runs 10 and 11 only)	65D 10-125
C631	02 mf, 400 volts, paper (used in prod. runs 10 and 11 only)	64B 1-23
C632	01 mf, 400 volts, paper (used in prod. run 12 and later)	64B 1-24
C633	015 mf, 200 volts, 10%, paper	64B 1-25
C634	015 mf, 400 volts, ceramic disc	64C 25-10
C635	015 mf, 200 volts, 10%, paper	64B 1-26
C636	005 mf, 500 volts, ceramic disc	65D 10-1
C637	005 mf, 500 volts, ceramic disc	65D 10-1
C638	220 mmf, 500 volts, cer. disc	65D 6-80
C639	100 mmf, 500 volts, cer. disc	65D 6-3
C640	02 mf, 400 volts, paper	64B 1-24
C641	25 mf, 15 volts, electrolytic	67B 4-30
C642	02 mf, 500 volts, ceramic disc	65D 10-28
C643	10 mmf, 500 volts, 10%, ceramic disc	65D 6-44

COILS AND TRANSFORMERS

L601	Choke, Filament	53C 2-54
L602	Antenna, Rod	69B 229-1
L603	AM Oscillator Coil	69A 227-1
L604	Heater Choke	73A 2-8
L605	Heater Choke	73A 2-12
L606	Heater Choke	73A 2-12
T601	Antenna Trans. former, complete	53C 2-63
*T602A	Tuning Coil, with winding	53C 2-66
*T602B	Tuning Core	53C 2-67
T603	AM 1st IF Trans. former, 455 KC.	72D 28-70
T604	FM 1st IF Trans. former, 10.7 MC.	53C 2-64
T605	FM 2nd IF Trans. former, 10.7 MC.	72D 28-68
T606	AM 2nd IF Trans. former, 455 KC.	72D 28-71
T607	FM Ratio Detector Transformer	72D 28-69

*Part numbers 53C2-66 and 53C2-67 together make up T602A and T602B.

MISCELLANEOUS CHASSIS PARTS

M601	Pilot Lamp, #47	81A 1-8
M602	Pilot Lamp, #47	81A 1-8
M603	Socket, Phono Input	88A 1
M604	Plug, Audio Output	88A 2-3
M605	Plug, 14 pin, Power Supply	88A 20-1
S601A	Switch, FM-AM Phono	77B 76-1
S601B	Switch, ON-OFF	77B 77-1
S602	Bracket, Pilot Light Mtg.	15A 1001
S603	Bracket, Tuning Sleeve	15A 1113-1
S604	Bracket, Pointer Slide	15A 1717
S605	Cover, for M605	88A 20-12

1Dial	Scale Window, Plastic	
1Dial	White Lettering (used with BROWN background and extension)	21C 108-1
1Dial	Scale Window, Plastic	
1Dial	Black Lettering (used with ALUMINUM background and extension)	21C 108-5
1Dial	Background, Dark Brown	22C 23-1
1Dial	Background, Aluminum	22C 33-5
1Dial	Background Extension, Dark Brown	15B 1757
1Dial	Background Extension, Aluminum	15B 1757-2
Dial	Pointer and Carriage	17C 1-34
Pulley	Single Groove	17C 1-34
Pulley	Double Groove	17C 1-50
Roller	(guides FM tuner screw)	53C 2-65
Screw	(holds circuit board to FM tuner sub-chassis)	3 required, 53C 2-62
Shield	9 pin tube	87C 7-26
Socket	Octal, Magic Eye	87A 20-3
Socket	Pilot Light	88A 20-2
Socket	9 pin miniature, shielded	87B 23-2
Socket	7 pin miniature, FM tuner volter	10D 1-45
Spring	Control (fits under Spring Dial String)	19D 1-5
Spring	Tuning Core Return	19D 1-5
Spring	FM tuner	53C 2-57

AMPLIFIER CHASSIS (452)

RESISTORS

R661	1 megohm, 1/2 watt	60B 8-105
R662	4,700 ohms, 1/2 watt	60B 8-472
R663	330,000 ohms, 1/2 watt	60B 8-334
R664	47,000 ohms, 1/2 watt	60B 7-472
R665	47,000 ohms, 1/2 watt, 5%	60B 7-473
R666	470,000 ohms, 1/2 watt, 5%	60B 7-474
R667	470,000 ohms, 1/2 watt, 5%	60B 7-474
R668	270 ohms, 4 watts, non-inductive	61B 20-22
R669	3,300 ohms, 1/2 watt	60B 8-392
R670	100 ohms, 2 watts	60B 20-101
R671	100 ohms, 2 watts	60B 20-101
R672	3,300 ohms, 2 watts	61B 24-37
R673	1,000 ohms, 1 watt	60B 14-102
R674	1,000 ohms, 2 watts	60B 20-102

CAPACITORS

C661	022 mf, 400 volts, mylar dielec.	64C 24-36
C662	022 mf, 400 volts, mylar dielec.	64C 24-36
C663	220 mf, 500 volts, cer. disc	65D 6-80
C664	50 mf, 25 volts, electrolytic	67A 4-31
C665A	80 mf, 400 v. electrolytic	67D 7-33
C665B	40 mf, 400 v. electrolytic	67D 7-33
C665C	40 mf, 400 v. electrolytic	67D 7-33
C665D	40 mf, 300 v. electrolytic	(early prod.)
C666A	10 mf, 200 v. winding	67D 7-34
C666B	50 mf, 150 v. winding	67D 7-34
C666C	10 mf, 250 v. electrolytic (later prod.)	67B 4-38
C666D	50 mf, 150 v. electrolytic	67D 7-31
C666E	50 mf, 150 v. electrolytic	67D 7-31
C667	047 mf, 600 volts, mylar dielec.	63B 12-1
C668	4 mf, 10 volts	64B 13-1

TRANSFORMERS

T608	Power Transformer	80B 59-1
T609	Output Transformer	79C 38-6

MISCELLANEOUS CHASSIS PARTS

CR601	Rectifier, Selenium	93B 1-6
M606	Socket, Power Supply (14 lug)	88A 20-2
M607	Socket, Audio from tuner	88A 1
M612	Socket, Phono Motor	88B 8-6
M613	Socket, Speaker	88B 8-3
S606	Line Cord, 8 ft.	89B 1-1
S607	Socket, Octal, Tube	87A 5-1

"PARTS LIST" continued on next page.

FM IF AND RF ALIGNMENT PROCEDURE USING VTVM AND AM SIGNAL GENERATOR

NOTE: For FM alignment, use a signal generator that has crystal calibration. Signal generator settings are critical for FM alignment.

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at minimum, Bass and Treble at mid-rotation.
- Rotate Selector switch to FM position.
- Use DC VTVM as output indicator. Set generator output so that indication on VTVM is 1 volt above noise level for maximum adjustments.
- Use a non-metallic alignment tool with tip 3/32" wide for transformer adjustments.
- Refer to figure 6 for physical location of alignment points.
- Use unmodulated signal for alignment.
- Repeat adjustments to insure good results.
- Adjustments "A", "B", and "E" made from beneath chassis.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
Connect DC VTVM from "S" to ground. Voltage reading will be negative.				
1	To FM antenna terminals on IFM RF sub-chassis.	10.7 MC	Fully open	"A", "B", "C", "D" and "E" for maximum.
Disconnect VTVM and connect between point "R" and ground.				
2	Same as "STEP 1".	10.7 MC	Fully open	"E" for zero reading.
Disconnect VTVM and connect between point "S" and ground. If "Adjustment" for step 2 was in great error, readjust "A", "B", "C", "D" and "E".				
3	Same as "STEP 1". Insert a 150 ohm resistor in series with each lead.	109 MC	*Fully open	"G" for maximum.
4	Same as "STEP 3".	108.4 MC	Fully open	**
5	Same as "STEP 3".	96 MC	Tune in on generator signal	***"Rock" generator setting slightly and adjust "M" for maximum.

Remove signal generator and VTVM. Insert tuner into cabinet and check tracking between dial pointer and scale. It is possible to adjust RF trimmer "H" on a false peak. RF trimmer "H" may have to be readjusted if tuner is not tracked properly.

*Loosen Phillips screw that is located on tuning gang shaft. See figure 5. Loosen FM tuner string until it is slack. Perform instruction listed under "Adjustment". Remove slack in FM tuner string by rotating the washer, to which it is attached, clockwise when viewed from front of chassis. Tighten screw.

**FM tuner should be calibrated to 108.4 mc. If tension adjustment on FM tuner string is incorrect, loosen Phillips screw and change tension slightly until 108.4 MC is being received strongly. Tighten screw.

***When receiver is tuned on 96 MC, the dial pointer will be positioned at approximately mid-band (center point of dial pointer travel). Perform instructions under "Adjustment".

PARTS LIST (cont.)

CABINET PARTS LIST Models 392 and 393

M614 Terminal Board,	
Electrical Speaker	10B 13-2
M615 Plug, Speaker	88B 3-2
M616 Speaker, Washer, 32"	
(3.2 ohm voice coil)	78B 112-1
M617 Speaker, Tweeter, 2 1/2"	
(3.2 ohm voice coil)	78B 91-2
Bolt, "L", Tuner mounting	28A 111-1
Cabinet	
Mahogany (392)	133E 411-12
Blond (393)	232E 411-12
Clip, Escutcheon Mounting	2A 31-1
Cover, Speaker Plug (M615)	88B 3-2
Escutcheon, Dia. Gold finish	23C 299-2
Escutcheon, "H" facility	39D 303
Grille Cloth	
for Mahogany cabinet (392)	36D 86-39
for Blond cabinet (393)	36D 86-40
Hinge, LID	77A 106-2
Knobs and Associated Parts	
Tuning, Beige	33C 254-6
Selector, AM-FM-Phono, Gold	33C 254-7

On-Off-Volume, Loudness, Bass, Treble or Compressor, Beige and Gold

Compression Ring 33C 254-8
Leg, Cabinet Brass 18A 5-12
Lid Support, Brass Plated 37B 132-4
Monogram "A" 28C 68-0
Washers for cabinets and certain matching parts will not be fitted unless full details are given with the order and the damaged part cannot be repaired economically.

RECORD CHANGER PARTS RC637-8

For complete record changer service information, see Service Manual 5509.

M608 Plug, Phono Output 88A 2-3
M609 Cartridge, Pick-up
(Includes needle assembly with twin sapphire-tipped needles)

M610 Motor, Record Changer 407C 30
M611 Plug, Phono Motor A.C. 88A 8-5
M614 Adapter, "REAL-O-RPM" 408A 1
Adapter, 45 RPM Record (reversible) 48A 8-2

Cable, Shielded Pick-up, 20"

(Includes M608)	413A 11-5
Cable, Tone Arm	
Shielded Lead	413A 13-2
Centerpost Assembly	640B 0-1
Control Knob (Coral)	403D 63-3
Escutcheon, Phono, Gold (fits around turntable)	403D 64-5
Kil. 50 Cycle Conversion, for 407C24 motor	98C 15-72
Needle Assembly (.001" microgroove and .002" standard sapphire-tipped needles)	98C 15-43
Needle Assembly (.001" diamond microgroove and .002" standard sapphire-tipped needles)	98C 15-45
Plug, Button, Record Changer	13B 3-15
Replacement Parts for Record Changer Motor 407C24	
Idler Wheel, Molded (Incl. Idler tire)	98C 15-37
Idler Spring	98C 15-38
Drive Belt, 30 and 20 RPM	98C 15-39
Drive Shaft, 16 and 31 RPM	98C 15-40
Drive Shaft, 78 RPM	98C 15-41
Spindle, 45 RPM Adapter	C400H 6415-2
Spring, Float (changer mounting)	405A 139-2
Tone Arm Rest (Coral)	403D 65-3

AM IF AND RF ALIGNMENT PROCEDURE

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at maximum, Bass and Treble controls at mid-rotation.
- Rotate Selector switch to AM position.
- Connect output meter across speaker voice coil.
- Use 400 or 1000 cps modulation for alignment.
- Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool with tip 3/32" wide for IF transformer adjustments.
- Repeat adjustments to insure good results.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
1	To stator plates, antenna section of gang tuning capacitor.	455 KC	Fully open	"S", "K", "L" and "M" for maximum.
2	Same as "STEP 1".	1620 KC	Fully open	"N" for maximum.
3	Radiated signal. Loop of several turns of wire or place generator lead close to receiver for signal pickup.	1620 KC	Tune in on generator signal	"P" for maximum.

*Adjustments "K" and "M" are made from bottom of chassis.

VOLTAGE DATA

- Voltages shown on schematic diagram.
- All measurements, except some filament voltages, are taken with respect to chassis ground.
 - Measured on 117 volts AC, 60 cycle line.

accordance with figure 4 or 5, whichever is proper.

POINTER SETTING

Set tuning gang fully open. With dial background bracket removed, place pointer carriage on top edge of pointer glide frame. Slide dial pointer to tuner until it is positioned at right edge of pointer glide frame. Place dial string in pointer carriage and fasten securely.

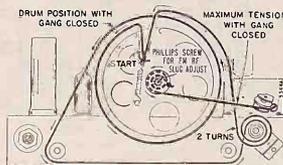


Figure 4. Dial Stringing (Early Production).

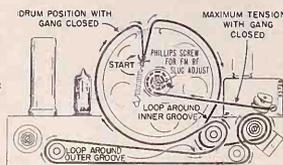


Figure 5. Dial Stringing (Present Production).

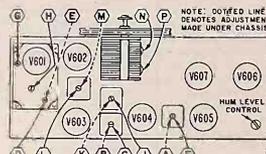


Figure 6. Top View of Tuner Chassis. Tube locations and alignment points shown.

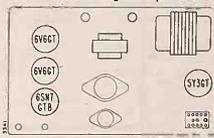


Figure 7. Top View of Amplifier Chassis. Tube locations shown.

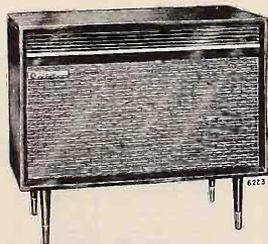


Admiral

High-Fidelity FM-AM Radio Phonograph

8H1 FM-AM TUNER and 4S2 HI-FI AMPLIFIER

For complete Record Changer servicing information, see SERVICE MANUAL 5800.



SPECIFICATIONS

FREQUENCY RESPONSE:

AMPLIFIER—Amplifier section flat from 50 to 20,000 cycles within 1 db at 10 watts output.

PRE-AMPLIFIER—A1 watt level. Bass control gives 31 db change at 100 cycles and Treble control gives 26 db change at 10,000 cycles.

DISTORTION—3% at 12 watts.

POWER OUTPUT—17 watts maximum.

POWER CONSUMPTION—100 watts.

POWER SUPPLY—117 volts AC, 60 cycle only. (Phonograph can be converted to 50 cycle operation. See "RECORD CHANGER PARTS", "Kit, 50 Cycle Conversion".)

SPEAKER SYSTEM—Woofer, 12" PM; Mid-range, 5 1/4" PM; Mid-range, 4" PM; Tweeter, 3 1/2" PM.

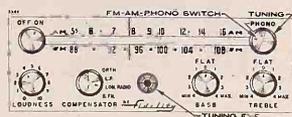


Figure 1. Operating Controls.

HI-FI FM-AM CONSOLE PHONOGRAPH			
MODEL	COLOR	CHASSIS	RECORD CHANGER
402	Mahogany	8H1	RC 637-2
403	Blond	and	
404	Sierra	4S2	

CHASSIS REMOVAL

To remove amplifier chassis from cabinet:

1. Disconnect line cord from power source.
2. Disconnect record changer power plug (M611), speaker plug (M615), tuner audio output plug (M604), and power input plug (M606) from tuner chassis.
3. Remove screws that hold chassis to cabinet.

To remove FM-AM tuner from cabinet:

1. Remove control knobs from tuner front panel and phono output plug (M608) from tuner chassis.
2. Disconnect FM antenna from terminal board and remove terminal board from cabinet.
3. Support tuner from bottom and remove 4 hex nuts and lock washers that hold tuner chassis to cabinet. Carefully remove tuner chassis from cabinet.

To remove FM RF tuner sub-chassis:

1. Remove four screws that hold sub-chassis and disconnect wires from antenna terminals.
2. Disconnect cable from pin 8 on S601.
3. Lift sub-chassis up for servicing. DO NOT disconnect FM tuner dial cord.

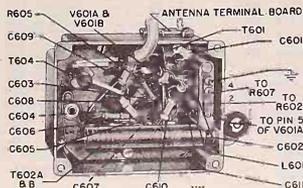


Figure 2. Bottom View of FM Tuner Sub-chassis. Location of components shown.

TROUBLE SHOOTING HINTS

Tube locations for the tuner and amplifier are shown on figures 6 and 7. Alignment points for the tuner are shown on figure 6.

Tubes may be reached from rear of cabinet for servicing purposes.

B+ voltages and filament voltages for tuner are furnished by power supply on amplifier chassis.

By placing a jumper wire between lugs 4 and 8 of M606, the amplifier may be serviced separately. NOTE: When amplifier is serviced separately, voltage readings will be higher due to the reduced load on the power supply.

Tuning Eye tube is mounted vertically on front of chassis. To remove tube, grasp at base and work downward, out of its clip, until it is free.

HUM LEVEL: Excessive hum can often be minimized by reversing line cord plug in wall outlet. Move Rej-On-Off pointer to "ON". Touch record changer centerpost and note hum level. Reverse line cord in wall outlet; touch centerpost again and again note hum level. Leave line cord in position giving least hum.

A Hum Level control is located on the tuner chassis, see figure 6. Hum may be further reduced, if necessary, by adjusting this control.

RECORD CHANGER SERVICING

For complete record changer service information, see Service Manual 5800.

If it becomes necessary to remove record changer from its mounting board, remove the three large washer-head screws extending through bottom of the mounting board. With these screws removed, the three springs which "float" the record changer may be loose. Lift record changer from the mounting board, being careful to retain mounting screws for installation.

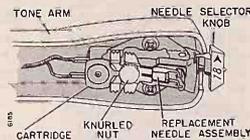


Figure 3. Needle Replacement.

NEEDLE REPLACEMENT

A worn needle causes "scratch" and a harshness of high tones in the output. Damage to records may be caused by worn needles.

To replace needle assembly, refer to figure 3 and loosen the knurled nut that is located under the cartridge. Slip the worn needle assembly out and insert the new needle assembly in the exact same position. Tighten the knurled nut.

See "RECORD CHANGER PARTS" for replacement cartridge and needles.

AMPLIFIER CHECKS		
CONTROL SETTINGS FOR AMPLIFIER CHECKS		
Loudness Control		Fully Clockwise
Bass Control		Mid Rotation
Treble Control		Mid Rotation
AMPLIFICATION CHECK		
AUDIO GENERATOR OUTPUT	Frequency	Volts in
	1000 Cycles	0.34 Volts
AMPLIFIER OUTPUT	Volts	Volts
	5.6 Volts	10 Watts
FREQUENCY RESPONSE CHECK		
AUDIO GENERATOR OUTPUT	Frequency	Volts in
	In steps between 50 to 20,000 Cycles	0.34 Volts
AMPLIFIER OUTPUT	Volts	00
	5.6 Volts	10W

AMPLIFICATION AND RESPONSE CHECK

The amplifier may be checked for gain and frequency response by using the tests outlined below.

TEST EQUIPMENT:

Audio Oscillator, preferably with flat output from 50 cycles to 20 kilocycles.

Vacuum Tube Voltmeter, preferably with decibel scale.

PROCEDURE: Disconnect phono power plug (M611). Disconnect phono output plug (M608) from socket (M603) on tuner chassis. The oscillator signal is to be injected into socket (M603) on tuner chassis. This enables the checking of the preamplifier and amplifier for amplification and frequency response. Measurements taken with FM-AM-Phono switch in "PHONO" position.

Connect audio oscillator ground to chassis. Connect signal lead to phono input (M603). Allow several minutes warm-up for oscillator and amplifier. Set Loudness, Bass, and Treble controls as shown in "AMPLIFIER CHECKS" table.

To check amplification, adjust audio oscillator output to 0.34 volts at 1,000 cycles, measured from M603 to ground with a vacuum tube voltmeter. Connect a 3.2 ohm resistive load across secondary of T609 (audio output transformer). Measure output voltages across the load.

To check frequency response, set "Compensator" control to "LON RADIO" and adjust oscillator output to 0.34 volts. Change oscillator frequency in steps between 50 cycles and 20,000 cycles. Readjust oscillator output to 0.34 volts each time a new setting is made.

Compare amplifier output voltage with readings given in "AMPLIFIER CHECKS" table.

PARTS LIST

FM-AM TUNER CHASSIS (8H1)

RESISTORS

R601	2.2 megohms, 1/2 watt	60B 8-225
R602	10,000 ohms, 1/2 watt	60B 20-103
R603	1 megohm, 1/2 watt	53C 2-51
R604	2.2 megohms, 1/2 watt	60B 8-225
R605	1 megohm, 1/2 watt	60B 8-105
R606	15,000 ohms, 1/2 watt	60B 8-153
R607	10,000 ohms, 1/2 watt	60B 14-103
R608	150 ohms, 1/2 watt	60B 8-101
R609	100 ohms, 1/2 watt	60B 8-101
R610	100 ohms, 1/2 watt	60B 8-101
R611	68 ohms, 1/2 watt 5%	60B 7-680
R612	68,000 ohms, 1/2 watt 5%	60B 8-105
R613	1,500 ohms, 1/2 watt 5%	60B 7-152
R614	1,000 ohms, 1/2 watt 5%	60B 7-102
R615	2.2 megohms, 1/2 watt	60B 8-225
R616	6,800 ohms, 1/2 watt 5%	60B 7-682
R617	6,800 ohms, 1/2 watt 5%	60B 7-682
R618	1 megohm, 1/2 watt	60B 8-105
R619	1 megohm, 1/2 watt	60B 8-105
R620	33,000 ohms, 1/2 watt	60B 8-333
R621	1 megohm, 1/2 watt	60B 8-105
R622	1.8 megohms, 1/2 watt	60B 8-185
R623	10,000 ohms, 1/2 watt 5%	60B 7-103
R624	6,000 ohms, 1/2 watt	75C 20-107
R625	2,200 ohms, 1/2 watt	75D 1-105
R626	1 megohm, TREBLE control	75D 1-105
R627	1 megohm, BASS control	75D 1-105
R628	100,000 ohms, 1/2 watt	60B 8-104
	47,000 ohms, 1/2 watt 5% (used in prod. runs 10 and 11 only)	60B 7-473
R629	100,000 ohms, 1/2 watt (used in prod. run 12 and later)	60B 8-104
	4,700 ohms, 1/2 watt 5% (used in prod. runs 10 and 11 only)	60B 7-472
R630	10,000 ohms, 1/2 watt (used in prod. run 12 and later)	60B 8-103
R631	100,000 ohms, 1/2 watt	60B 8-104
R632	470 ohms, 1/2 watt	60B 8-473
R633	470 ohms, 1/2 watt	60B 8-473
R634	22,000 ohms, 1/2 watt	60B 8-223
R635	390,000 ohms, 1/2 watt	60B 8-394
R636	220,000 ohms, 1/2 watt	60B 8-224
R637	390,000 ohms, 1/2 watt	60B 8-394
R638	51,000 ohms, 1/2 watt 5%	60B 7-513
R639	500,000 ohms, LOUDNESS control	75D 1-106
R640	51,000 ohms, 1/2 watt 5%	60B 7-513
R641	22,000 ohms, 1/2 watt	60B 8-224
R642	1 megohm, 1/2 watt	60B 8-105
R643	1,000 ohms, 1/2 watt	60B 8-102
R644	180,000 ohms, 1/2 watt	60B 8-184
R645	82,000 ohms, 1/2 watt	60B 8-823
R646	120,000 ohms, 1/2 watt	60B 8-124
R647	120,000 ohms, 1/2 watt	60B 8-124

CAPACITORS

C601	10 mf, 500 volts, 10%, ceramic	53C 2-52
C602	.001 mf, 500 volts, +50 -20% cer.	53C 2-53
C603	.001 mf, 500 volts, +50 -20% cer.	53C 2-53
C604	Ceramic trimmer	53C 2-55
C605	NPO temp. coeff. 5%, ceramic	53C 2-56
C606	20 mmf, 500 volts, 5%, ceramic	53C 2-56
C607	NPO temp. coeff. 5%, ceramic	53C 2-56
C608	10 mf, 500 volts, ceramic trimmer	53C 2-58
C609	68 mmf, 500 volts, 10%, cer. P100	53C 2-59
C610	68 mmf, 500 volts, 5%, ceramic	53C 2-60
	N70 temp. coeff. 10%, ceramic	53C 2-62
	N470 temp. coeff. 10%, ceramic	53C 2-63
C611	15 mmf, 500 volts, 10%, ceramic	53C 2-63
	NPO temp. coeff. 5%, cer. disc.	53C 2-63
C612A		
C612B		
C612C		
C612D		
C613	33 mmf, 500 volts, 5%, cer. disc.	53C 2-63
	N1400 temp. coeff. 5%	65D 10-119

C614	.001 mf, 500 volts, cer. disc.	65D 10-6
C615	.01 mf, 500 volts, cer. disc.	65D 10-3
C616	10 mmf, 500 volts, 5%, ceramic	65D 10-3
C617	N70 temp. coeff. 5%, ceramic	65D 10-118
C618	.02 mf, 500 volts, CHEV. cer. disc.	65D 10-28
C618A	.004 mf, 500 volts, dual cer. disc.	65A 17-1
C619	220 mmf, 500 volts, cer.	65D 6-80
C620	.004 mf, 500 volts, dual cer. disc.	65A 17-1
C621	20 mmf, 500 volts, 5%, mica	65B 1-4
C622	270 mmf, 500 volts, 5%, mica	65B 1-4
C623	.001 mf, 500 volts, cer. disc.	65D 10-53
C624	270 mmf, 500 volts, 5%, mica	65B 1-4
C625	5 mf, 50 volts, electrolytic	67B 4-37
C626	.02 mf, 500 volts, GMY. ceramic disc.	65D 10-28
C627	220 mmf, 500 volts, cer.	65D 6-80
C628	.1 mf, 400 volts, mylar dielec.	64C 24-32
C629	.0015 mf, 500 volts, GMY. cer. disc.	65D 10-4
	.001 mf, 500 volts, cer. disc. (used in prod. runs 10 and 11 only)	65D 10-3
C630	.002 mf, 500 volts, cer. disc. (used in prod. run 12 and later)	65D 10-125
	.03 mf, 400 volts, paper (used in prod. runs 10 and 11 only)	64B 1-23
C631	.02 mf, 400 volts, paper (used in prod. runs 12 and later)	64B 1-24
C632	.01 mf, 400 volts, paper	64B 1-25
C633	.015 mf, 200 volts, 10%, paper	64B 2-26
C634	.033 mf, 600 volts, ceramic disc.	64C 25-10
C635	.015 mf, 200 volts, 10%, paper	64B 2-26
C636	.005 mf, 500 volts, ceramic disc.	65D 10-1
C637	.005 mf, 500 volts, ceramic disc.	65D 10-1
C638	220 mmf, 500 volts, cer.	65D 6-80
C639	100 mmf, 500 volts, cer.	65D 6-3
C640	.02 mf, 400 volts, paper	64B 1-24
C641	25 mf, 15 volts, electrolytic	67B 4-30
C642	.02 mf, 500 volts, ceramic disc.	65D 10-28
C643	220 mmf, 500 volts, ceramic disc.	65D 6-80
C644	880 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C645	880 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C646	880 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C647	10 mmf, 500 volts, 10%, ceramic disc.	65D 6-44

COILS AND TRANSFORMERS

L601	Choke, Filament	53C 2-54
L602	Antenna Rod	89B 225-1
L603	AM Oscillator Coil	89A 225-1
L604	Heater Choke	73A 2-8
L605	Heater Choke	73A 2-13
L606	Heater Choke	73A 2-12
T601	Antenna Trans. former, complete	53C 2-63
*T602A	Tuning Coil, with winding	53C 2-66
*T602B	Tuning Core	53C 2-67
T603	AM 1st IF Trans. former, 455 KC.	72D 28-70
T604	FM 1st IF Trans. former, 10.7 MC.	53C 2-64
T605	FM 2nd IF Trans. former, 10.7 MC.	72D 28-69
T606	AM 2nd IF Trans. former, 455 KC.	72D 28-71
T607	FM Ratio Detector Trans. former, 455 KC.	72D 28-69

MISCELLANEOUS CHASSIS PARTS

M601	Pilot Lamp	81A 1-8
M602	Pilot Lamp	81A 1-8
M603	Socket, Phono Input	88A 1
M604	Plug, Audio Output	88A 2-3
M605	Plug, 14 pin, Power Supply	88A 20-1
S601A	Switch, FM-AM Phone	77B 7-1
S601B		
S601C		
S602	Switch, ON-OFF	77B 77-1

S603	Switch, Record Compenator, 4 position	77B 56-4
	Cover, for Magic Eye Socket	25A 17
	Bracket, Tuning Scale	15A 1001
	Bracket, Pilot Light Mtg.	5A 1713-1
	Bracket, Pointer Slide	15A 1717
	Cover, for M605	88A 20-12
D1d1	Scale Window, Plastic, Black Lettering (used with BROWN background and extension)	21C 106-2
D1d2	Scale Window, Plastic, Black Lettering (used with ALUMINUM background and extension)	21C 106-4
D1d3	Background, Dark Brown/22C 33-2	
D1d4	Background, Aluminum finish	22C 33-6
D1d5	Background Extension, Dark Brown	15B 1757
D1d6	Background Extension, Aluminum	15B 1757-2
	Dial Pointer and Carriage	25A 63
	Pulley, Single Groove	17C 1-34
	Pulley, Double Groove	17C 1-50
	Roller (guide, FM tuner dial string)	53C 2-65
	Screw (holds circuit board to FM tuner sub-chassis) 3 required	53C 2-62
	Shield, 9 pin tube	87C 7-20
	Socket, Octal, Magic Eye	87A 20-3
	Socket, Pilot Light	88A 20-2
	Socket, 9 pin miniature	87B 23-2
	Socket, 7 pin miniature	87A 39-2
	Spring, Core (fits under FM tuner roller)	19D 1-45
	Spring, Dial String	19D 1-5
	Spring, Tuning Core Return (FM tuner)	53C 2-57
	1 Indicates matching parts.	
	2 Indicates matching parts.	

AMPLIFIER CHASSIS (452)

RESISTORS

R661	1 megohm, 1/2 watt	60B 8-105
R662	47,000 ohms, 1/2 watt	60B 8-472
R663	330,000 ohms, 1/2 watt	60B 8-334
R664	17,000 ohms, 1/2 watt 5%	60B 7-473
R665	47,000 ohms, 1/2 watt 5%	60B 7-473
R666	470,000 ohms, 1/2 watt	60B 7-474
R667	470,000 ohms, 1/2 watt	60B 7-474
R668	270 ohms, 4 watts	61B 20-22
R669	3,000 ohms, 1/2 watt	60B 8-392
R670	100 ohms, 1/2 watt	60B 8-101
R671	100 ohms, 2 watts	60B 8-201
R672	3,300 ohms, 3 watts	61B 24-327
R673	1,000 ohms, 1 watt	60B 8-102
R674	1,000 ohms, 2 watts	60B 8-202

CAPACITORS

C661	.022 mf, 400 volts, mylar dielec.	64C 24-36
C662	.022 mf, 400 volts, mylar dielec.	64C 24-36
C663	220 mf, 500 volts, cer.	65D 6-80
C664	50 mf, 25 volts, electrolytic	67A 4-31
C665A	80 mf, 400 v. (electrolytic)	67D 7-33
C665B	40 mf, 400 v. (electrolytic)	67D 7-33
C665C	40 mf, 300 v. (electrolytic)	67D 7-33
C666A	10 mf, 300 v. (early prod.)	67D 7-34
C666B	50 mf, 150 v. (prod.)	67D 7-34
C666C	50 mf, 150 v. (later prod.)	67D 7-34
C666D	50 mf, 150 v. (later prod.)	67D 7-34
C667	.047 mf, 600 volts, mylar dielec.	63B 12-1
C668	4 mf, 10 volts, electrolytic	64B 13-1

TRANSFORMERS

T608	Power Transformer	80B 59-1
T609	Output Transformer	79B 56-8

MISCELLANEOUS CHASSIS PARTS

C601	Rectifier, Selenium	83B 1-6
M606	Socket, Power Supply (14 pin)	88A 20-2
M607	Socket, Audio from tuner	88A 1
M612	Socket, Phono	88B 8-6
M613	Motor AC	88B 5-3
M614	Socket, Speaker	89B 1-1
M615	Line Cord, 8 ft.	89B 1-1
M616	Socket, Octal, Tube	87A 5-1

PARTS LIST continued on next page.

FM IF AND RF ALIGNMENT PROCEDURE USING VTVM AND AM SIGNAL GENERATOR

NOTE: For FM alignment, use a signal generator that has crystal calibration. Signal generator settings are critical for FM alignment.

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at minimum, Bass and Treble at mid-rotation.
- Rotate Selector switch to FM position.
- Use DC VTVM as output indicator. Set generator output so that indication on VTVM is 1 volt above noise level for maximum adjustments.
- Use a non-metallic alignment tool with tip 3/32" wide for transformer adjustments.
- Refer to figure 6 for physical location of alignment points.
- Use unmodulated signal for alignment.
- Repeat adjustments to insure good results.
- Adjustments "A", "B", and "E" made from beneath chassis.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
Connect DC VTVM from "S1" to ground. Voltage reading will be negative.				
1	To FM antenna terminals on FM RF sub-chassis.	10.7 MC	Fully open	"A", "B", "C", "D" and "E" for maximum.
Disconnect VTVM and connect between point "R" and ground.				
2	Same as "STEP 1".	10.7 MC	Fully open	"F" for zero reading.
Disconnect VTVM and connect between point "S" and ground. If "Adjustment" for step 2 was in great error, readjust "A", "B", "C", "D" and "E".				
3	Same as "STEP 1". Insert a 150 ohm resistor in series with each lead.	109 MC	*Fully open	"G" for maximum.
4	Same as "STEP 3".	108.4 MC	Fully open	**
5	Same as "STEP 3".	96 MC	Tune in on generator signal	***"Rock" generator spring slightly and adjust "H" for maximum.

Remove signal generator and VTVM. Insert tuner into cabinet and check tracking between dial pointer and scale. It is possible to adjust RF trimmer "H" on a false peak. RF trimmer "H" may have to be readjusted if tuner is not tracked properly.

*Loosen Phillips screw that is located on tuning gang shaft. See figure 5. Loosen FM tuner string until it is slack. Perform instruction listed under "Adjustment". Remove slack in FM tuner string by rotating the washer, to which it is attached, clockwise when viewed from front of chassis. Tighten screw.

**FM tuner should be calibrated to 108.4 mc. If tension adjustment on FM tuner string is incorrect, loosen Phillips screw and change tension slightly until 108.4 MC is being received strongest. Tighten screw.

***When receiver is tuned on 96 MC, the dial pointer will be positioned at approximately mid-band (center point of dial pointer travel). Perform instructions under "Adjustment".

PARTS LIST (cont.)

CABINET PARTS LIST

Models 402, 403 and 404		
M614 Terminal Board.		
External Speaker	10M 13-2	
M615 Plug Speaker	98B 5-2	
M616 Speaker, Woofer, 15" (1.2 ohm voice coil)	78B 112-1	
M617 Speaker, Tweeter, 3 1/2" (2.2 ohm voice coil)	78B 91-2	
M618 Speaker, Mid-Range, 5 1/2" (8 ohm voice coil)	78B 110-4	
M619 Speaker, Mid-Range, 4" (8 ohm voice coil)	78B 84-6	
Bot. "U" tuner mounting	28A 111	
Cabinet		
Mahogany (402)	835E 412-12	
Citron (403)	835E 412-13	
Sierra (404)	835E 412-14	
Clip, Escutcheon Mounting	25A 31-	
Cover, Speaker Plug (M615)	88B 5-12	
Escutcheon, Dial, Control Panel	23C 290-2	
Escutcheon, "hi fidelity"	23D 303	
Ferrule, Leg	37B 123	
Grille Cloth		
for Mahogany Cabinet (402)	36D 86-36	
for Blond Cabinet (403)	36D 86-37	
for Sierra Cabinet (404)	36D 86-38	
Hinge, Lid	37A 106-2	

Knobs and Associated Parts

Tuning, Beige	33C 254-6
Selector, AM-FM-Phono.	33C 254-7
Gold	33C 254-7
On-Off-Volume, Loudness, Bass, Treble or Compression Ring	33C 254-8
and Gold	18A 5-12
Legs, Cabinet	35E 412-52
Black (Models 403 and 404)	35E 412-53
Lid Supports Brass Plated	35E 401-62
Monogram "A"	28C 68-3

RECORD CHANGER PARTS

RC-37-2

For complete record changer information, see Service Manual 3900.

M608 Plug, Phono Output	88A 2-3
M609 Cartridge, Pick-up	
1-speed	409B 27-2
assembly, with twin	
variable-tapped	
(neutronics)	
M610 Motor, Record Changer	407C 24
4-speed	
M611 Plug, Phono Motor AC	88A 8-5
S604 Switch, "REJ-ON-OFF"	408A 1

Adapter, 45 RPM Record

(envelope of 3)	48A 8-2
Cable, Shielded Pick-up, 20"	413A 11-5
(includes M628)	
Cable, Tone Arm, Shielded Lead	413A 13-2
Centerpost Assembly	G400B 601
Control Knob (Coral)	403D 63-3
Escutcheon, Phono, Gold (fits ground turntable)	403D 64-5
M11 50 Cycle Conversion for 407C24 motor	98C 15-72
Needle Assembly (with microgroove and .003" standard sapphire-tipped needles)	98C 15-82
Needle microgroove and .003" standard sapphire-tipped needles	98C 15-81
Plug, Button, Record Changer Replacement Parts for Record Changer Model 407C24	13B 3-15
Idle Wheel, Molded (includes lites)	98C 15-57
Idle Wheel, Molded	98C 15-58
Drive Shaft, 18 and 33 RPM	98C 15-59
Drive Shaft, 16 and 33 RPM	98C 15-60
Drive Shaft, 7.5 RPM	98C 15-61
Spring, 45 RPM Adapter	G400D 645-2
Spring, Pivot (chancer)	405A 139-2
mounting	
Tone Arm Rest (Coral)	403D 65-3

AM IF AND RF ALIGNMENT PROCEDURE

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at maximum, Bass and Treble controls at mid-rotation.
- Rotate Selector switch to AM position.
- Connect output meter across speaker voice coil.
- Use 400 or 1000 cps modulation for alignment, minutes warm-up.
- Use lowest setting of signal generator capable of producing adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool with tip 3/32" wide for IF transformer adjustments.
- Repeat adjustments to insure good results.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
1	To stator plates, antenna section of gang tuning capacitor.	455 KC	Fully open	"K", "L", "M" and "N" for maximum.
2	Same as "STEP 1".	1620 KC	Fully open	"N" for maximum.
3	Radiated signal. Loop of several turns of wire or place generator lead close to receiver for signal pickup.	1400 KC	Tune in on generator signal	"P" for maximum.

*Adjustments "K" and "M" are made from bottom of chassis.

VOLTAGE DATA

Voltages shown on schematic diagram.

- All measurements, except some filament voltages, are taken with respect to chassis ground.
- Measured on 117 volts AC, 60 cycle line.

DIAL STRINGING

To accomplish dial stringing, remove the dial background bracket and string the dial in

accordance with figure 4 or 5, whichever is proper.

POINTER SETTING

Set tuning gang fully open. With dial background bracket removed, place pointer carriage on top edge of pointer glide frame. Slide dial pointer to right until it is positioned at right edge of pointer glide frame. Place dial string in pointer carriage and fasten securely.

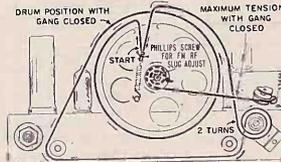


Figure 4. Dial Stringing (Early Production).

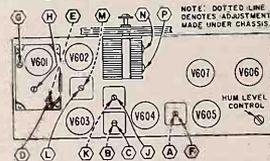


Figure 6. Top View of Tuner Chassis. Tube locations and alignment points shown.

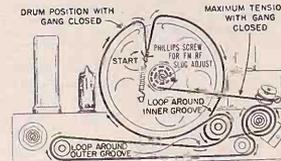


Figure 5. Dial Stringing (Present Production).

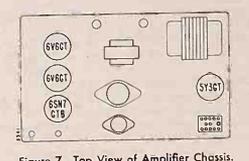


Figure 7. Top View of Amplifier Chassis. Tube locations shown.



Admiral

High-Fidelity FM-AM Radio Phonograph

8H1 FM-AM TUNER and 6D3 HI-FI AMPLIFIER

HI-FI FM-AM CONSOLE PHONOGRAPH

MODEL	COLOR	CHASSIS	RECORD CHANGER
412	MAHOGANY	8H1	RC637
413	BLOND	and 6D3	-3F
414	SIERRA		

- Disconnect FM antenna from terminal board and remove terminal board from cabinet.
- Remove four hex nuts that hold tuner in cabinet. Slide chassis out of cabinet and remove metal cover from chassis bottom to expose circuitry.

To remove FM RF tuner sub-chassis:

- Remove four screws that hold sub-chassis and disconnect wires from antenna terminals.
- Disconnect cable from pin 8 on S601.
- Lift sub-chassis up for servicing. DO NOT disconnect FM tuner dial cord.

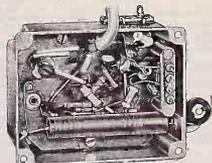


Figure 2. Bottom View of FM Tuner Sub-chassis. Location of components shown.

TROUBLE SHOOTING HINTS

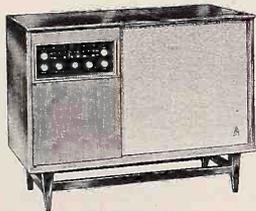
Tube locations for the tuner and amplifier are shown on figures 6 and 7. Alignment points for the tuner are shown in figure 6.

Tubes may be reached from rear of cabinet for servicing purposes.

B+ voltages and filament voltages for tuner are furnished by power supply on amplifier chassis.

By placing a jumper wire between lugs 4 and 8 of M606, the amplifier may be serviced separately. NOTE: When amplifier is serviced separately, voltage readings will be higher due to the reduced load on the power supply.

Tuning Eye tube is mounted horizontally under chassis. To remove tube, grasp at base and work backward, out of its clip, until it is free.



SPECIFICATIONS

FREQUENCY RESPONSE:

AMPLIFIER—Amplifier section flat from 30 to 20,000 cycles within 2 db at 10 watts output. PRE-AMPLIFIER—At 1 watt level, Bass control gives 26.5 db change at 100 cycles and Treble gives 32 db change at 10,000 cycles.

DISTORTION—Less than 1% at 10 watts output. POWER OUTPUT—38 watts maximum.

POWER CONSUMPTION—155 watts.

POWER SUPPLY—117 volts AC, 60 cycle only. (Phonograph can be converted to 50 cycle operation. See "RECORD CHANGER PARTS"; KIT, 50 cycle Conversion.)

SPEAKER SYSTEM—Woofer, 15" PM; Mid-Range, 8" PM; Mid-Range, 5 1/4" PM; Tweeter, 3 1/2" PM.



Figure 1. Operating Controls.

CHASSIS REMOVAL

- To remove amplifier chassis from cabinet: Disconnect line cord from power source.
- Disconnect tuner power socket (M606), amplifier audio output plug (M619), record changer power plug (M614), tuner audio output plug (M604), and aux. input plug (M616).
- Remove screws that hold chassis to cabinet.

To remove FM-AM tuner from cabinet:

- Remove control knobs from tuner front panel and phono output plug (M611).

HUM LEVEL: Excessive hum can often be minimized by reversing line cord plug in wall outlet. Move **REI-ON-OFF** pointer to "ON". Touch record changer centerpost and note hum level. Reverse line cord in wall outlet; touch centerpost again and again note hum level. Leave line cord in position giving least hum.

A **Hum Level** control is located on the tuner chassis, see figure 6. Hum may be further reduced, if necessary, by adjusting this control.

RECORD CHANGER SERVICING

For complete record changer service information, see Service Manual S800.

To remove record changer from its mounting board, remove the three large washer-head screws extending through bottom of the mounting board. With these screws removed, the three springs which "float" the record changer may be loose. Lift record changer from the mounting board, being careful to retain mounting screws for installation.

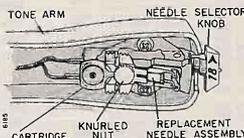


Figure 3. Needle Replacement.

NEEDLE REPLACEMENT

A worn needle causes "scratch" and a harshness of high tones in the output. Damage to records may be caused by worn needles.

To replace needle assembly, refer to figure 3 and loosen the knurled nut that is located under the cartridge. Slip the worn needle assembly out and insert the new needle assembly in the exact same position. Tighten the knurled nut.

See "RECORD CHANGER PARTS" for replacement cartridge and needles.

AMPLIFICATION AND RESPONSE CHECK

The pre-amplifier and amplifier may be checked for gain and frequency response by performing the tests outlined below and referring to the "AMPLIFIER CHECKS" table.

TEST EQUIPMENT:

Audio Oscillator, with flat frequency response across the audio range.

Vacuum Tube Voltmeter, preferably with decibel (db) scale.

PROCEDURE: Connect tuner and amplifier and allow time for warm-up. It is not necessary to connect the record changer at this time. Disconnect audio output plug (M619) and connect a 3.2 ohm, 30 watt resistive load across the secondary of audio output transformer (T609).

AMPLIFIER CHECKS

AMPLIFICATION CHECK	Set Loudness, Bass and Treble to maximum (flat) position. Set Companion to "LON. RADIO". Set AM-FM-Phono switch to "PHONO".	
AUDIO RESPONSE GAIN	FREQUENCY	VOLTS
	1000 Cycles	0.2 Volts
AMPLIFIER GAIN	VOLTS OUT	WATTS OUT
	13.3 Volts	22 Watts

FREQUENCY RESPONSE CHECK	Set Loudness of maximum. Bass and Treble to "FLAT", and Companion to "LON. RADIO". Set AM-FM-Phono switch to "PHONO".		
AUDIO GENERATOR OUTPUT	AMPLIFIER OUTPUT VOLTAGE	DB CHANGE	
Freq.	Voltage	Boost	Cut
100 cycles	+0.35 5.15 volts	-22	-4
1,000 cycles	+0.35 3.9 volts	0	0
10,000 cycles	+0.35 12.2 volts	+12.3	-19.5

*For 325 volts input to M602, refer to "FREQUENCY RESPONSE CHECK" portion of following text.

Connect audio oscillator output from phono input socket (M603) to ground. Before proceeding, adjust **HUM LEVEL** control for minimum hum.

TO CHECK AMPLIFICATION, set controls as shown in the table under "AMPLIFICATION CHECK". Adjust audio oscillator output to 0.2 volts at 1,000 cycles, as measured from phono input socket (M603) to ground. Measure output voltage across 3.2 ohm load and compare with the reading in the table.

FREQUENCY RESPONSE CHECK: Set controls to positions shown in "FREQUENCY RESPONSE CHECK" table. Leave the oscillator connected as shown previously.

If a vacuum-tube voltmeter, that can measure 0.045 volts, is not available, construct a series network consisting of a 100,000 ohm, 5% resistor and a 3,900 ohm, 5% resistor. Connect this network across the generator output and then connect the 3,900 ohm resistor to phono input socket (M603) and ground. Apply 1 volt across this network and the proper input voltage for frequency response measurements will be applied to M603.

Apply 1 volt at 1,000 cycles to amplifier at M603 and vary the Bass and Treble controls. The output voltage, measured across the 3.2 ohm load, should not appreciably change.

Apply 1 volt at 100 cycles. Vary Bass control and measure output. At MAX (Boost), output voltage should be 5.15 volts and, at MIN (Cut), the output voltage should be 0.22 volts. The change of voltage in the output will give a 26.5 db change in bass response.

Apply 1 volt at 10,000 cycles. Vary Treble control to both extremes and measure the output. At MAX (Boost), output voltage should be 12.2 volts and at MIN (Cut), output voltage should be 0.31 volts. This change of output voltage gives a 32 db change in treble response.

NOTE: Voltage readings for the frequency response checks should compare favorably with those listed in the "FREQUENCY RESPONSE CHECK" table.

**PARTS LIST
FM-AM TUNER CHASSIS
(8HI)**

RESISTORS

R601	2.2 megohms, 1/2 watt	60B 8-225
R602	10,000 ohms, 1/2 watt	60B 20-103
R603	1 megohm, 1/2 watt	53C 2-51
R604	2.2 megohms, 1/2 watt	60B 8-225
R605	1 megohm, 1/2 watt	60B 8-103
R606	15,000 ohms, 1/2 watt	60B 8-103
R607	10,000 ohms, 1/2 watt	60B 14-103
R608	150 ohms, 1/2 watt	60B 8-151
R609	100 ohms, 1/2 watt	60B 8-101
R610	10 ohms, 1/2 watt	60B 8-101
R611	18 ohms, 1/2 watt	60B 7-801
R612	68,000 ohms, 1/2 watt	60B 7-683
R613	1,500 ohms, 1/2 watt	60B 7-152
R614	1,000 ohms, 1/2 watt	60B 7-102
R615	2.2 megohms, 1/2 watt	60B 8-225
R616	6,800 ohms, 1/2 watt	60B 7-682
R617	6,800 ohms, 1/2 watt	60B 7-682
R618	1 megohm, 1/2 watt	60B 8-103
R619	1 megohm, 1/2 watt	60B 8-103
R620	22,000 ohms, 1/2 watt	60B 8-103
R621	1 megohm, 1/2 watt	60B 8-103
R622	1.8 megohms, 1/2 watt	60B 8-185
R623	10,500 ohms, 1/2 watt	60B 7-103
R624	6,000 ohms, HUM	
R625	LEXEL control	75C 20-107
R626	2,200 ohms, 1/2 watt	60B 8-222
R627	1 megohm, TREBLE control	75D 1-105
R628	100,000 ohms, 1/2 watt	75D 1-105
R629	1 megohm, BASS control	75D 1-105
R630	100,000 ohms, 1/2 watt	60B 8-104
R631	100,000 ohms, 1/2 watt	60B 8-104
R632	100,000 ohms, 1/2 watt	60B 8-104
R633	100,000 ohms, 1/2 watt	60B 8-104
R634	100,000 ohms, 1/2 watt	60B 8-104
R635	100,000 ohms, 1/2 watt	60B 8-104
R636	100,000 ohms, 1/2 watt	60B 8-104
R637	100,000 ohms, 1/2 watt	60B 8-104
R638	100,000 ohms, 1/2 watt	60B 8-104
R639	100,000 ohms, 1/2 watt	60B 8-104
R640	100,000 ohms, 1/2 watt	60B 8-104
R641	100,000 ohms, 1/2 watt	60B 8-104
R642	100,000 ohms, 1/2 watt	60B 8-104
R643	100,000 ohms, 1/2 watt	60B 8-104
R644	100,000 ohms, 1/2 watt	60B 8-104
R645	100,000 ohms, 1/2 watt	60B 8-104
R646	100,000 ohms, 1/2 watt	60B 8-104
R647	100,000 ohms, 1/2 watt	60B 8-104

CAPACITORS

C601	10 mmf, 500 volts, 10%, ceramic, NPO temp. coeff.	53C 2-52
C602	.001 mf, 500 volts, +5 -20% cer.	53C 2-53
C603	.001 mf, 500 volts, +5 -20% cer.	53C 2-53
C604	.001 mf, 500 volts, +5 -20% cer.	53C 2-53
C605	20 mmf, 500 volts, 5%, ceramic, NPO temp. coeff.	53C 2-56
C606	20 mmf, 500 volts, 5%, ceramic, NPO temp. coeff.	53C 2-56
C607	82 mmf, 500 volts, 10%, cer. P100.	53C 2-58
C608	82 mmf, 500 volts, 10%, cer. P100.	53C 2-58
C609	68 mmf, 500 volts, 5%, ceramic, N150 temp. coeff.	53C 2-60
C610	10 mmf, 500 volts, 10%, ceramic, N170 temp. coeff.	53C 2-52
C611	15 mmf, 500 volts, 10%, ceramic, NPO temp. coeff.	53C 2-61
C612A	Tuning capacitor, AM.	68C 6-9
C612B		
C612C		
C613	33 mmf, 500 volts, 5%, cer. disc, N1400 temp. coeff.	65D 10-119
C614	.001 mf, 500 volts, cer. disc.	65D 10-116
C615	.01 mf, 500 volts, cer. disc.	65D 10-13

C616	10 mmf, 500 volts, 5%, ceramic, NPO temp. coeff.	65D 6-118
C617	.02 mf, 500 volts, GMV, cer. disc.	65D 10-28
C618A	.004 mf, 500 volts, dual cer. disc.	65A 17-1
C618B	.004 mf, 500 volts, cer. disc.	65D 6-80
C619	220 mmf, 500 volts, cer. disc.	65A 17-1
C620	270 mmf, 500 volts, 5%, mica.	65B 1-4
C621	270 mmf, 500 volts, cer. disc.	65B 1-4
C622	270 mmf, 500 volts, 5%, mica.	65B 1-4
C623	270 mmf, 500 volts, 5%, mica.	65B 1-4
C624	270 mmf, 500 volts, 5%, mica.	65B 1-4
C625	5 mf, 50 volts, electrolytic.	67B 4-37
C626	.02 mf, 500 volts, GMV, ceramic disc.	65D 10-28
C627	220 mmf, 500 volts, cer. disc.	65D 6-80
C628	1 mf, 400 volts, mylar disc.	64C 24-32
C629	.0015 mf, 500 volts, GMV, cer. disc.	65D 10-4
C630	.001 mf, 500 volts, cer. disc. (used in prod. runs 10 and 11 only).	65D 10-53
C631	.002 mf, 500 volts, cer. disc. (used in prod. runs 12 and later).	65D 10-53
C632	.02 mf, 400 volts, paper (used in prod. runs 10 and 11 only).	64B 1-23
C633	.02 mf, 400 volts, paper (used in prod. runs 12 and later).	64B 1-24
C634	.015 mf, 200 volts, 10%, paper.	64B 1-25
C635	.02 mf, 400 volts, ceramic disc.	64B 2-26
C636	.005 mf, 500 volts, ceramic disc.	64C 25-10
C637	.005 mf, 500 volts, ceramic disc.	64B 2-26
C638	220 mmf, 500 volts, cer. disc.	65D 10-1
C639	100 mmf, 500 volts, cer. disc.	65D 6-80
C640	.02 mf, 400 volts, paper.	64B 1-24
C641	.02 mf, 15 volts, electrolytic.	67B 3-30
C642	.02 mf, 500 volts, ceramic disc.	65D 10-28
C643	220 mmf, 500 volts, ceramic disc.	65D 6-80
C644	680 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C645	680 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C646	680 mmf, 1,000 volts, 10%, ceramic disc.	65D 10-43
C647	10 mmf, 500 volts, 10%, ceramic disc.	65D 10-43

COILS AND TRANSFORMERS

L601	Choke, Filament	53C 2-54
L602	Antenna, Rod	69B 220-1
L603	Ant Oscillator Coil	69A 227-1
L604	Heater Choke	73A 2-8
L605	Heater Choke	73A 2-13
L606	Heater Choke	73A 2-12
T601	Antenna Trans-	53C 2-63
T602A	Tuning Coil, with winding	53C 2-66
T602B	Tuning Core	53C 2-67
T603	AM 1st IF Trans- former, 455 KC	72D 28-70
T604	FM 1st IF Trans- former, 10.7 MC	53C 2-64
T605	FM 2nd IF Trans- former, 10.7 MC	72D 28-68
T606	AM 2nd IF Trans- former, 455 KC	72D 28-71
T607	FM Ratio Detector	72D 28-69

*Part numbers 53C2-66 and 53C3-67 together make up T602A and T602B

MISCELLANEOUS CHASSIS PARTS

M601	Pilot Lamp, #47	81A 1-8
M602	Pilot Lamp, #47	81A 1-8
M603	Socket, Photo Input	88A 1
M604	Plug, Audio Output	88A 2-3
M605	Plug, 14 pin, Power Supply	88A 20-1
S601A	Switch, FM-AM Phono	77B 76-1
S601C		
S602	Switch, ON-OFF	77B 77-1
S603	Switch, Record Com- pensator, 4 position	77B 56-4
Cover, for Magic Eye Socket		15A 1001
Bracket, Tuning Sleeve		15A 1001
Bracket, Pilot Light Mgr.		15A 1713-1
Bracket, Pointer Slide		15A 1717
Cover, for M605		88A 20-12

Dial Scale Window, Plastic, White Lettering (used with 1Dial Background and extension)	
1Dial Scale Window, Plastic, Black Lettering (used with ALUMINUM background and extension)	21C 108-2
1Dial Background, Dark Brown	22C 33-2
1Dial Background, Aluminum, Finish	22C 33-6
1Dial Background Extension, Dark Brown	15B 157-7
1Dial Background Extension, Aluminum	15B 157-2
Dial Pointer and Carriage	25A 63
Pulley, Single Groove	17C 1-34
Pulley, Double Groove	17C 1-50
Roller (guide for FM tuner dial string)	53C 2-65
Screw, (holds circuit board to FM tuner sub-chassis)	53C 2-62
Shield, 9 pin tube	87C 720
Socket, Magic Eye	87A 20-3
Socket, Pilot Light	87A 20-3
Socket, 9 pin miniature, shielded	87B 23-2
Socket, 7 pin miniature, Spring Contact (fits under FM tuner roller)	87A 29-2
Spring, Dial String	19D 1-45
Spring, Tuning Core Return (FM tuner)	19D 1-5

AMPLIFIER CHASSIS (6D3)

RESISTORS

R651	150,000 ohms, 1/2 watt	60B 8-154
R652	10,000 ohms, 1/2 watt	60B 8-103
R653	270,000 ohms, 1/2 watt	60B 8-274
R654	120,000 ohms, 1/2 watt	60B 8-122
R655	200,000 ohms, 1/2 watt	60B 8-202
R656	150,000 ohms, 1/2 watt	60B 8-154
R657	150,000 ohms, 1/2 watt	60B 8-154
R658	1 megohm, 1/2 watt	60B 8-103
R659	3,300 ohms, 1/2 watt	60B 8-332
R670	100,000 ohms, 1/2 watt	60B 8-104
R671	2,200 ohms, 1/2 watt	60B 8-222
R672	220,000 ohms, 1/2 watt, 5%	60B 7-224
R673	220,000 ohms, 1/2 watt, 5%	60B 7-224
R674	2,200 ohms, 1/2 watt	60B 8-222
R675	68 ohms, 3 watts, 5%	61B 20-18
R676	2,200 ohms, 1/2 watt	60B 8-222
R677	2,200 ohms, 1/2 watt	60B 8-222
R678	10,000 ohms, 1/2 watt	60B 8-103
R679	1,000 ohms, 1 watt	60B 14-102
R680	3,300 ohms, 3 watts, non-inductive	61B 24-37
R681	1,000 ohms, 1 watt	60B 14-102
R682	1,000 ohms, 2 watts	60B 20-102
R683	10 ohms, 1/2 watt	60B 8-100
R684	10 ohms, 1/2 watt	60B 8-100

CAPACITORS

C661	1 mf, 200 volts, molded, mylar	64C 25-57
C662	1 mf, 400 volts, molded, mylar	64C 24-32
C663	1 mf, 400 volts, molded, mylar	64C 24-32
C664	1 mf, 400 volts, molded, mylar	64C 24-32
C665	50 mf, 25 volts, elect.	67B 4-31
C666	56 mmf, 500 volts, cer. disc	65D 6-34
C667	2 mmf, 500 volts, ceramic disc, K1200 temp. coeff.	65D 10-155
C668A	40 mf, 450 volts	
C668B	40 mf, 450 volts	
C668C	40 mf, 450 volts, elect.	67D 7-32
C668D	20 mf, 350 volts	
C669A	50 mf, 150 volts, elect.	67B 4-31
C669B	50 mf, 150 volts, (early 67D 7-34 prod.)	
C669C	50 mf, 150 volts, elect.	67B 4-31
C669D	50 mf, 150 volts, (later 67D 7-31 prod.)	
C669E	See C674; on later prod. C669E is separate.	
C670	.047 mf, 600 volts, paper	64B 8-15
C671	4 mf, 10 volts, (cross-over)	64B 13-1
C672	16 mf, 15 volts AC, non-polarized, elect.	67A 40-1
C673	.047 mf, 600 volts, molded	63B 12-1
C674	10 mf, 250 volts, elect.	67B 4-38

"PARTS LIST" continued on next page.

FM IF AND IF ALIGNMENT PROCEDURE USING VTVM AND AM SIGNAL GENERATOR

NOTE: For FM alignment, use a signal generator that has correct calibration. Signal generator settings are critical for FM alignment.

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at maximum. Tune and Test at mid-frequency.
- Tune Volume control at FM position.
- Use DC VTVM as output indicator. Use generator output as that indicated on VTVM in mid-frequency band for separate adjustments.
- Use a non-reactive alignment coil with 0.25" wide for transformer adjustments.
- Refer to Figure 4 for physical location of alignment points.
- Use unmodulated signal for alignment.
- Repeat adjustments to insure good results.
- Adjustments "A", "B", and "C" made from bottom chassis.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GAIN SETTINGS	ADJUSTMENT
Connect DC VTVM from "I" to ground. Voltage reading will be negative.				
1	To 100 ohm antenna terminals on FM IF sub-chassis.	15.7 MC	fully open	"A", "B", "C", "D" and "E" for maximum.
Disconnect VTVM and connect between (200) "E" and ground.				
2	Same as "STEP 1".	15.7 MC	fully open	"F" for zero reading.
Disconnect VTVM and connect between point "F" and ground. If "Adjustment" for step 1 was in good position, readjust "B", "C", "E", "F" and "G".				
3	Same as "STEP 1". Insert a 100 ohm resistor in series with coil.	155 MC	fully open	"H" for maximum.
4	Same as "STEP 1".	105.5 MC	fully open	"I" for maximum.
5	Same as "STEP 1".	1 1/2 MC	fully open	"J" for maximum setting slightly and adjust "K" for maximum.

Remove signal generator and VTVM. Leave volume trim adjuster and check tracking between dial pointer and scale. It is possible to adjust IF trimmer "H" on a false peak. IF trimmer "H" may have to be retuned if tuner is not tracked properly.

*Loosen Phillips screw that is located on tuning gang shaft. See figure 5. Loosen FM trimmer using small 1/16" dial. Perform maintenance listed under "Adjustments". Remove check in FM trimmer using test lead the wipers to which it is attached; checkwiper when viewed from front of chassis. Tighten screw.

**FM trimmer should be checked to 100.5 MC. If trimmer adjustment on FM trimmer using 100 ohm resistor, loosen Phillips screw and change trimmer slightly until 100.5 MC is being received strongest. Tighten screw.

***This resistor is based on 50 MC. For that position will be positioned at approximately mid-band former point of dial pointer towards "Radio Instructions under "Adjustments".

PARTS LIST (cont.)

GOLD AND TRANSFORMERS	
1540	Power Transformer
1541	Screen Transformer
1542	Detector Transformer
1543	IF Transformer
1544	AF Transformer
1545	Speaker
1546	Speaker
1547	Speaker
1548	Speaker
1549	Speaker
1550	Speaker
1551	Speaker
1552	Speaker
1553	Speaker
1554	Speaker
1555	Speaker
1556	Speaker
1557	Speaker
1558	Speaker
1559	Speaker
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1585	Speaker
1586	Speaker
1587	Speaker
1588	Speaker
1589	Speaker
1590	Speaker
1591	Speaker
1592	Speaker
1593	Speaker
1594	Speaker
1595	Speaker
1596	Speaker
1597	Speaker
1598	Speaker
1599	Speaker
1600	Speaker

RECORD CHANGER RC637-3P

1601	Motor
1602	Motor
1603	Motor
1604	Motor
1605	Motor
1606	Motor
1607	Motor
1608	Motor
1609	Motor
1610	Motor
1611	Motor
1612	Motor
1613	Motor
1614	Motor
1615	Motor
1616	Motor
1617	Motor
1618	Motor
1619	Motor
1620	Motor
1621	Motor
1622	Motor
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1679	Motor
1680	Motor
1681	Motor
1682	Motor
1683	Motor
1684	Motor
1685	Motor
1686	Motor
1687	Motor
1688	Motor
1689	Motor
1690	Motor
1691	Motor
1692	Motor
1693	Motor
1694	Motor
1695	Motor
1696	Motor
1697	Motor
1698	Motor
1699	Motor
1700	Motor

FM IF AND IF ALIGNMENT PROCEDURE

- Turn receiver and amplifier on and allow 15 minutes warm-up.
- Set Volume control at maximum. Tune and Test at mid-frequency.
- Tune Volume control at AM position.
- Connect output across speaker coils and...
- Use 60 to 1000 cps modulation for alignment.
- Use lowest setting of equalizer potentiometer capable of producing adequate modulation 90 degrees with of output meter.
- Use a non-reactive alignment coil with 0.25" wide for IF transformer adjustments.
- Repeat adjustments to insure good results.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	RECEIVER GAIN SETTINGS	ADJUSTMENT
1	To same points, across section of gang tuning capacitor.	655 KC	fully open	"A", "B", "C", "D" and "E" for maximum.
2	Same as "STEP 1".	745 KC	fully open	"F" for maximum.
3	Across signal, loop of several turns of wire or glass thread loop to receiver for signal pickup.	105 KC	Same as in generator signal	"G" for maximum.

*Adjustments "G" and "H" are made from bottom of chassis.

VOLTAGE DATA

- Voltage shown on schematic diagram.
- All measurements, except some filament voltages, are taken with respect to chassis ground.
- Measured on 117 volts AC, 60 cycle line.

accordance with figure 4 or 5, whichever is proper.

POINTER SETTING

Set tuning gang fully open. With dial back ground bracket removed, place pointer carriage on top edge of pointer slide frame. Slide dial pointer to right until it is positioned at right edge of pointer slide frame. Place dial string in pointer carriage and test as necessary.

DIAL STRIPPING

To accomplish dial stripping, remove the dial background bracket and string the dial in

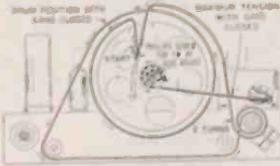


Figure 4. Dial Stripping (Early Production).

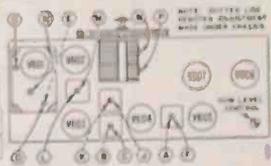


Figure 6. Top View of Tuner Chassis. Tube locations and alignment points shown.

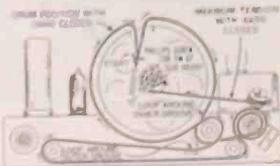


Figure 5. Dial Stripping (Present Production).

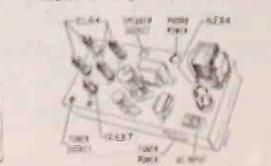


Figure 7. Top View of Amplifier Chassis. Tube locations shown.



High-Fidelity FM-AM Radio Phonograph

8H1B FM-AM TUNER and 4S2C HI-FI AMPLIFIER

For complete Record Changer servicing information, see SERVICE MANUALS S800 and S800A.

This Service Manual Supplement is used with Service Manual S812 to service Models 472, 473, 474, 484 and 489.



Figure 1. Front View of Model 472.



Figure 2. Front View of Model 484.
Bulion Provincial style.

AMPLIFIER CHASSIS REMOVAL

On Models 472, 473, 474 and 489, the cabinet back panel must be removed to service the amplifier. This panel is located on the rear of the cabinet behind the record changer. Remove the screws that hold the panel in place and lift the panel from the cabinet back.

Refer to AMPLIFIER CHASSIS REMOVAL in S812 to complete removal of the amplifier chassis.

For Model 484, the amplifier chassis removal procedure to S812 is used.

HI-FI FM-AM CONSOLE PHONOGRAPH

MODEL	COLOR	CHASSIS	RECORD CHANGER
472	Mahogany	8H1B	RC 638-2
473	Blend	and	
474	Sierra	4S2	
484	Gray Pumice	8H1B and	
489	Fruitwood	4S2C	

TROUBLE SHOOTING HINTS

On some models, the Tuning Eye is mounted horizontally under the FM-AM Tuner chassis. To remove this tube, grasp it by the cover on the base and work it backwards out of its clamp.



Figure 3. Front View of Model 489.
French Provincial style.



Figure 4. Operating Controls. All models.

CHASSIS 8H1B - 4S2C
MODELS 472 - 473 - 474 - 484 - 489

CHASSIS DIFFERENCES 8H1 and 8H1B

All 8H1 chassis use 6AU6 (V602) for AM Mixer-Oscillator. All 8H1B chassis use 6BE6 (V602) AM Mixer-Oscillator. Refer to FM-AM Tuner schematic diagram, in this supplement for chassis differences.

CHASSIS DIFFERENCES 4S2 and 4S2C

The only difference between the 4S2 chassis and the 4S2C chassis is that the 4S2C uses a pilot lamp. See figure 5 (below) for connection of pilot lamp into circuit. Use the 4S2 schematic diagram in S812 for servicing the 4S2C amplifier.

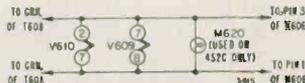


Figure 5. Partial schematic of 4S2C showing connection of pilot lamp.

SPEAKER SYSTEMS

Refer to figure 6 for speaker system complement and connection for all models covered by this supplement.

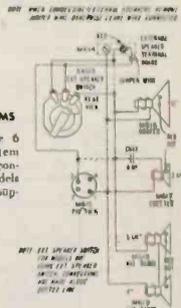


Figure 6.
Speaker System,
All Models.

PARTS LIST (8H1B)

MISCELLANEOUS CHASSIS PARTS

Delete:	
Dial Background	23C 33-4
Dial Background	23C 33-3
Dial Background Extension, Dark Brown	17R 17-37
Dial Scale Window	31C 108-2
Dial Scale Window	21C 108-4
Add:	
Bracket, Chassis Mtg. (left)	13B 1731-8
Bracket, Chassis Mtg. (right)	13B 1731-6
Dial Background (aluminum)	23C 33-4
Dial Scale Window	31C 108-2
Speaker, 8" (for mfg. chassis assembly)	12A 2-10
Speaker Sleeve (for mfg. chassis assembly to Dial Background)	39A 2-12-71

HI-FI AMPLIFIER 4S2C

NOTE: Use the "PARTS LIST" in S812 with the following additions, for the 4S2C chassis.

M620 Pilot Lamp, # 47	81A 1-8
Socket and Leads (for M620)	81A 17-3

RECORD CHANGER RC638-2

NOTE: Use "RECORD CHANGER" section of "PARTS LIST" in S812, with the following changes, for RC638-2.

Delete:	
Centerpost assembly	3A008 601
Add:	
Centerpost assembly	3A008 481

NOTE: Some early production of the models covered by this supplement used the 8H1 FM-AM Tuner. To service these tuners, the 8H1-4H1B schematic diagram in this supplement and the "PARTS LIST" in S812 are used.

To service the 8H1B FM-AM Tuner, use the "PARTS LIST" in S812 with the following changes:

RESISTORS

Delete:		
R601	2.2 megohms, 1/2 watt	608 8-223
R606	15,000 ohms, 1/2 watt	608 8-131
Add:		
R601	22,000 ohms, 1/2 watt	608 8-223
R606	1,000 ohms, 1/2 watt	608 8-107
R648	22,000 ohms, 1/2 watt	608 8-223
R649	120,000 ohms, 1/2 watt	608 8-174

CAPACITORS

Delete:		
C613	33 mfd, 300 volts, 5%, cer. disc.	
	M1400 temp. coeff.	45D 10-139
C614	501 mfd, 400 volts, GMV, cer. disc.	45D 10-146
C647	10 mfd, 300 volts, 10%, cer. disc.	45D 6-64
Add:		
C613	47 mfd, 300 volts, 10%, cer. disc.	45D 10-177
	M150 temp. coeff.	45D 10-177
C614	51 mfd, 300 volts, GMV, cer. disc.	45D 10-12
C647	10 mfd, 300 volts, GMV, cer. disc.	45D 10-2

COILS AND TRANSFORMERS

Delete:		
L603	AM Oscillator Coil	69A 277-1
Add:		
L603	AM Oscillator Coil	69A 32-12

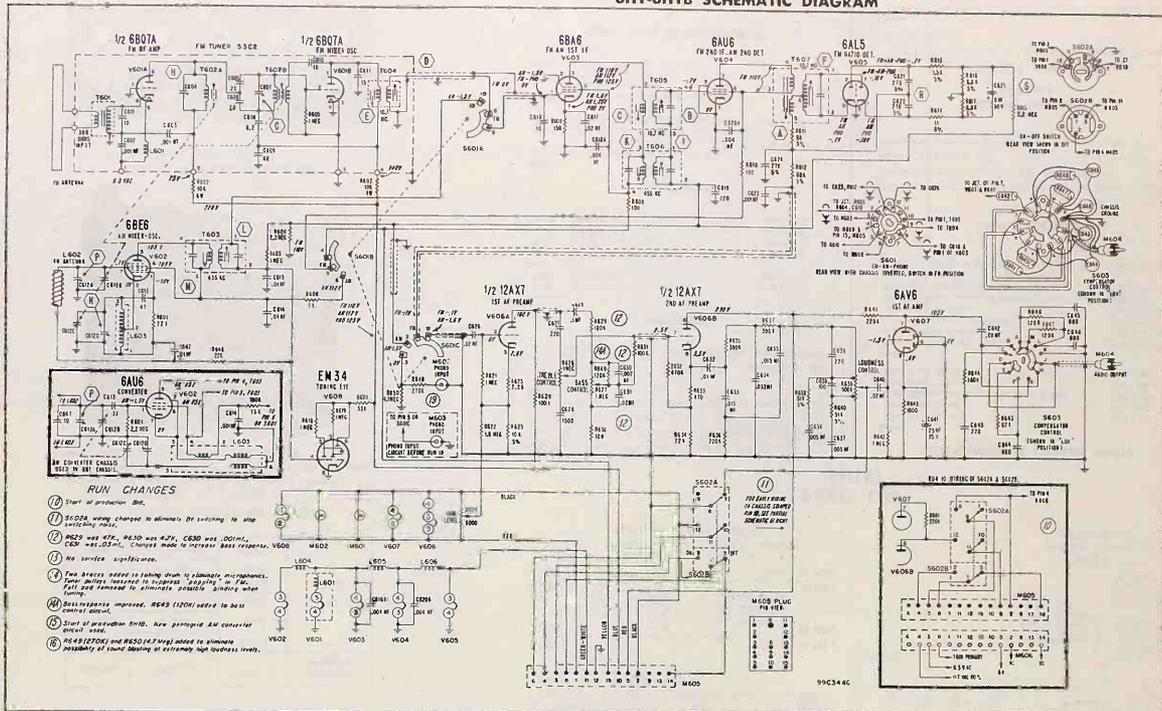
CHASSIS 8H1B • 452C
MODELS 472 • 473 • 474 • 484 • 489

8H1-8H1B SCHEMATIC DIAGRAM

SERVICE MANUAL SUPPLEMENT 5812A

CABINET PARTS
MODELS 484 and 489

Symbol	Description	Part No.
M614	Terminal Board, External Speaker	10B 13-2
M615	Plug, Speaker, 4 Pin	88B 5-2
M616	Speaker, Woofer, 12" FM (3.2 ohms voice coil impedance)	78B 112-3
M617	Speaker, Tweeter, 3 1/4" PM (3.2 ohms voice coil impedance)	78B 91-2
M618	Speaker, Mid-Range, 5 1/4" PM (8 ohms voice coil impedance)	78B 110-4
M619	Speaker, Mid-Range, 4" PM (8 ohms voice coil impedance)	78B 84-6
Antenna	Terminal Board	10B 13-5
Bezel, Chrome, with Threaded Studs (Model 484)		23C 299-3
Bezel, Gold, with Threaded Studs (Model 489)		23C 299-4
Bolt, "U" Type, Tuner Mounting		28A 111
Bullet Catch, Record Compartment Door, Brass (Model 484)		35E 432-55
*Cabinet		
Model 484, Italian Provincial, Gray Pumice		33E 430-4
Model 489, French Provincial, Fruitwood		33E 428-9
Clip, 45 RPM Spindle		11A 20
Cord, Extension, Phono Motor Power, 12" (Model 489 only)		89A 46-1
Cover, Speaker Plug (M615)		88B 5-12
Dial Scale Window, Plastic, White Lettering		21C 108-7
Door Pull, Brass (Model 489)		37A 171-1
Key Escutcheon Section		37A 171-2
Key Section		37A 171-2
Escutcheon, External Speaker Switch		23A 311
Grille Cloth		
for Model 484		36D 86-46
for Model 489		36D 86-28
Hinge, Lid, 1 1/2" Long, Stalvay Bronze (Model 484)		37D 173-3
Hinge, Lid, 1 1/2" Long (Model 489)		37D 173-2
Hinge, Record Compartment Door		37A 106-2
Jewel, Pilot Light, Green		82A 108-8
Keypad, #6-32 (speaker and tuner dial mounting)		2A 19-271
Knobs		
for Model 484		
Tuning (Gray)		33C 254-2
FM-AM-Phono Selector (Aluminum)		33C 254-4
Loudness, Bass, Treble, On-Off and Compensator (Aluminum and Gray)		33C 254-5
External Speaker Switch (Gold and Beige)		33C 254-8
for Model 489		
Tuning (Beige)		33C 254-6
FM-AM-Phono Selector and External Speaker Switch (Gold)		33C 254-7
Loudness, Bass, Treble, On-Off, and Compensator (Gold and Beige)		33C 254-8
Lid, Gray Pumice (Model 484 only)		33E 430-54
Lid Support (Stalvay Bronze) for Model 484		37C 170-6
Lid Supports (Brass Plate) for Model 489		
Right Hand		37C 170-5
Left Hand		37C 170-6
Palnut, 3/4" (speaker switch mounting)		2B 6-4371
Palnut, #6-32 (bezel mounting)		2B 6-3871
Panel, Cabinet Back (one side covered with acoustical material)		
for Model 484		35E 30B-3
for Model 489		35E 30B-4
1 in. Light #47		81A 1-8
Screw, #10-32 x 1 1/4 Washer Head Phillips (record changer mounting)		1A 153-30-71
Spacer, Felt (for 1/4" tuner control shafts)		5A 12-1
Spacer, Tuner Sleeve		32B 396-1
Strike Plate, Record Compartment Door (Model 484)		35E 432-57
Switch, External Speaker, 3 Position		77A 81-1



CABINET PARTS
MODELS 472, 473 and 474

Symbol	Description	Part No.
M614	Terminal Board, External Speaker	10B 13-2
M615	Plug, Speaker, 4 Pin	88B 5-2
M616	Speaker, Woofer, 12" FM (3.2 ohms voice coil impedance)	78B 112-3
M617	Speaker, Tweeter, 3 1/4" PM (3.2 ohms voice coil impedance)	78B 91-2
M618	Speaker, Mid-Range, 5 1/4" PM (8 ohms voice coil impedance)	78B 110-4
M619	Speaker, Mid-Range, 4" PM (8 ohms voice coil impedance)	78B 84-6
Antenna	Terminal Board	10B 13-5
Bezel, Chrome, with Threaded Studs		23C 299-3
Bolt, "U" Type, Tuner Mounting		28A 111
Bullet Catch, Record Compartment Door, Brass		35E 432-55
*Cabinet		
Mahogany (Model 472)		35E 432-12
Blond (Model 473)		35E 432-33

Symbol	Description	Part No.
Sierra (Model 474)		33E 432-14
Clip, 45 RPM Spindle		11A 20
Cover, Speaker Plug		88B 5-12
Dial Scale Window, Plastic, White Lettering		21C 108-7
Door Pull, Brass		37A 172
Escutcheon, External Speaker Switch		23A 311
Grille Cloth		
for Model 472		36D 86-29
for Model 473		36D 86-30
for Model 474		36D 86-31
Hinge, Lid		37A 106-2
Hinge, Record Compartment Door, Brass		35E 432-54
Keypad, #6-32 (speaker and tuner dial mounting)		2A 19-271
Knob, Tuning (Gray)		33C 254-2
Knob, FM-AM-Phono Selector (Aluminum)		33C 254-4
Knob, Loudness, Bass, Treble, On-Off, and Compensator (Aluminum and Gray)		33C 254-5

Symbol	Description	Part No.
Knob, External Speaker Switch (Gold and Beige)		33C 254-8
Leg, Molded, with Ferrule and Anchor Bolt for Model 472 (Mahogany)		37D 168-2
for Model 473 and 474 (Ebony)		37D 168-4
Leg Mounting Plate (straight mounting type)		15B 1813-3
Lid Support, Brass		37C 170-6
Monogram, Admiral "A"		26C 68-1
Palnut, 3/4" (speaker switch mounting)		2B 6-4371
Palnut, #6-32 (bezel mounting)		2B 6-3871
Panel, Cabinet Back (one side covered with acoustical material)		
for Model 472		35E 30B-2
Screw, #10-32 x 1 1/4" WH Phillips (record changer mounting)		1A 153-30-71
Spacer, Felt (for 1/4" tuner control shafts)		5A 12-1
Spacer, Tuner Sleeve		32A 396-1
Strike Plate, Record Compartment Door, Brass		35E 432-57
Switch, External Speaker, 3 Position		77A 81-1

*Orders for cabinets and certain matching parts will not be filled unless full details are given with the order and the damaged parts cannot be repaired economically.

BASIC STEREPHONIC DISC PRINCIPLES

For Stereophonic Disc Record Changer Servicing, Read The Entire Section. For General Understanding, Read First And Last Two Paragraphs.

Stereophonic sound differs from today's popular hi-fi sound in that it adds a new 3D presence dimension to listening. 3D Presence, in the ordinary sense, is the illusion of being at the place of the original sound. Until the introduction of stereo, hi-fi systems have attempted to sustain this illusion merely by keeping the recorded sounds as distortion-free as possible. However, this alone cannot introduce presence since the reproduced sound emanates only from one source, a single hi-fi speaker or speaker system. What is 3D presence? A simple explanation is demonstrated if one visualizes a person sitting in front of an orchestra, as shown in figure 3. Because of the physical locations of the members of the orchestra relative to the listener, sounds from the right side are heard primarily in the right ear and sounds from the left side are heard primarily in the left ear. Thus, to recreate 3D presence in the home, it is necessary to have this same relative division of sound on both sides of the listener.

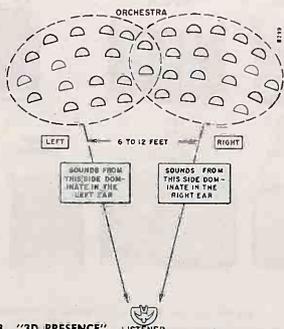


Figure 3. "3D PRESENCE"

Stereophonic disc recordings are made using two separate microphones, each corresponding to a listener's ear, placed in front of the sound-producing body, as at L and R in figure 3. The information from each microphone is recorded independently in a single groove on the disc. Basically, one side wall of the groove records the information from one microphone while the other side records the information from the other. For stereophonic reproduction, the sounds in each separate channel are separately and simultaneously amplified and applied to two independent, and properly-placed speaker systems, as shown in figure 4.

Until the advent of stereophonic discs, hi-fi sound was exclusively recorded on discs with a cutting stylus that moved laterally with the sound variations as shown in figure 5A. The depth of the groove is constant. Therefore, sound variations are lateral and the recorded groove looks like the one shown in figure 5B. Many stereophonic disc ideas have been tried; such as the two parallel lateral-variation tracks method, the 90-degree vertical-horizontal

method, etc. These were discarded as unacceptable for a variety of reasons; incompatibility with present hi-fi systems, mechanical instability and critical alignment; high distortion levels, etc.

In the Westrex 45-45 stereophonic disc recording system, which is the accepted standard system of the industry, the two separate audio channels are recorded in a single groove. One channel is recorded by varying the cutting stylus position laterally as shown in figure 6A. The other channel is recorded by simultaneously moving the same stylus vertically as in figure 6B; this produces "hills and dales" in the track rather than constant depth of monaural recordings. The resultant groove is a simultaneous combination of lateral and horizontal variations in one track. Basically, one wall varies correspondingly to one microphone while the other wall varies accordingly to the second microphone. Each wall variation is independent of the other. This independence is the basis of separation of sound which we call 3D presence in stereo. The resultant sound track of a single-

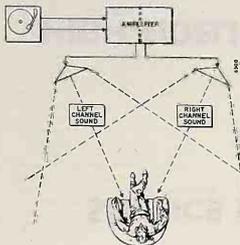


Figure 4. STEREPHONIC HI-FI SOUND REPRODUCTION.

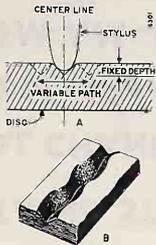


Figure 5. TYPICAL MONAURAL RECORDING TRACK.

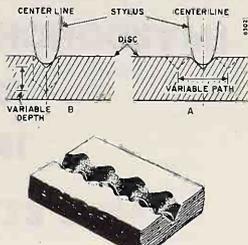


Figure 6. TYPICAL STEREPHONIC DISC TRACK.

stylus stereophonic recording is illustrated in figure 6C.

Figure 7 shows how a single tone in one channel only is stereophonically recorded on a disc. The stylus is mechanically coupled to two recording elements. The elements are positioned 90° apart with respect to each other; each forms an angle of 45° with the horizontal. No signal is applied to element A; the sine-wave signal coupled to element B alternately pushes and pulls on the stylus causing it to vibrate back and forth along the line with arrowheads on each end. The cutting stylus cuts the signal one side of the track only since there is no signal to cause variations in the direction of element A. The variations, therefore, on each side of the track correspond to the signals in each channel. Figure 8 shows how two different signals in each channel cause the cutting stylus to move at an angle other than 45° to the horizontal.

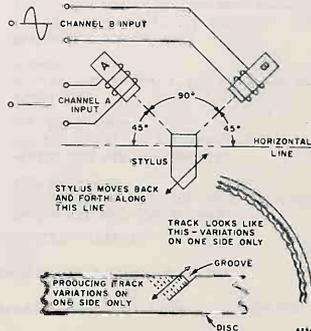


Figure 7. RECORDING A SINGLE CHANNEL SIGNAL.

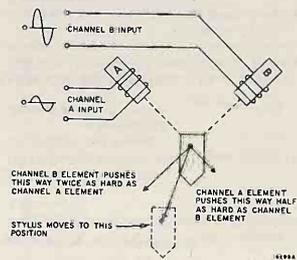


Figure 8. RESULTS OF DIFFERENT INPUTS TO BOTH ELEMENTS.

The stereophonic reproducing head is similar in construction to the recording head, except that two styli are used and the elements may be ceramic, crystal or magnetic. One is .003" (3 mils) in diameter for use with 78 RPM discs; the other is .0007" (.7 mil) in diameter for LPS (Long Play Stereophonic) and regular LP disc reproduction. A 0.7-mil LPS stylus is used in place of the "standard" 1-mil LP stylus because, as a stereo sound track becomes shallower than a standard LP track, the 1-mil stylus would be forced out of the groove. In the reproducing head, the elements develop a voltage corresponding to stylus motions caused by track variations. See figure 9.

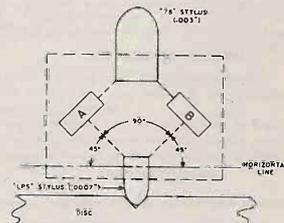


Figure 9. STEREPHONIC REPRODUCING HEAD.

Figure 10 shows how a reproducing head translates a one-channel signal into an audio-frequency voltage. Note that only LATERAL FORCE on each element causes a signal to be produced; although the track variations cause stresses in both elements, a signal is developed only across element "A". This demonstrates the ability for one groove to selectively reproduce a signal into one amplifier channel.

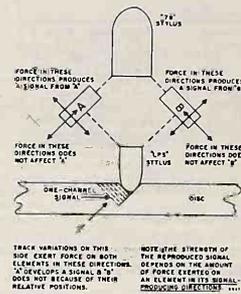


Figure 10. STEREPHONIC REPRODUCTION OF A SINGLE CHANNEL SIGNAL.

In figure 8, two signals caused the cutting stylus to shift to an angle greater than 45° from the horizontal. Separation of this track variation into two signals by the reproducing head is shown in figure 11. Both elements are moved the same distance in the direction of the stylus, resulting in a small movement of element "A" in its signal-producing direction and a large movement of element "B" in its signal-producing direction. Thus, a small signal is developed across element "A" and a large signal is developed across element "B". Note that these signals correspond to the channel "A" and "B" input signals in figure 8.

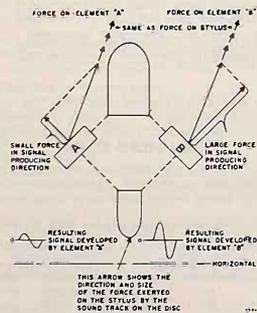


Figure 11. SEPARATION OF TRACK VARIATIONS INTO TWO SIGNALS.

OPERATING CONTROLS

MASTER CHANNEL CONTROLS

The operating controls for this set, excluding Auxiliary channel Balance, Bass and Treble controls, are located on radio tuning dial (figure 13) and operate as follows:



Figure 13. Operating Controls, 12B1.

ON-OFF-TREBLE: The ON-OFF function of this control acts as a master switch to turn both Master channel and Auxiliary channel on and off. To turn set on, rotate knob to right until switch clicks.

Further rotation of the knob controls treble (high note) response of master channel output. Rotation to the left of zero position decreases treble response. Rotation to the right of zero position increases treble response. The zero position will normally give truest reproduction:

Since channel separation depends on the angle of the track variations relative to the pick-up stylus, it is important that the record changer turntable be level and the pick-up stylus be perpendicular to the turntable, as illustrated in figure 12. If these relationships are not observed, both channel separation and stereophonic fidelity will be impaired.

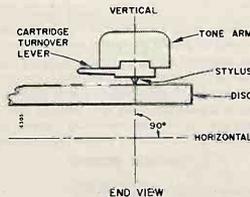


Figure 12. VERTICAL POSITIONING OF THE STEREOGRAPHIC STYLUS.

For operation with monaural 78 and LP discs, the outputs of the two reproducing elements are connected in parallel. This produces a high fidelity monaural signal comparable to the signals available from single-element hi-fi cartridges. The .0007" LPS stylus is used for standard microgroove records and the .003" 78 stylus is used for 78 RPM records.

BASS: Controls bass (low note) response of Master channel. Rotation to left of zero position decreases bass response. Rotation to the right of zero position increases bass response. The zero position will normally give truest reproduction.

SELECTOR: Used to select type of operation desired. Place control to position giving desired type of operation.

STEREO—for playing Stereo Disks on the phonograph or for using an external Stereo tape recorder with the Master and Auxiliary channels.

PHONO—for playing regular single-channel records on the phonograph. For transferring regular records to tape or playing back single-channel tapes from external Monaural tape recorder.

AM—for AM radio reception or for recording AM broadcasts on external tape recorder.

FM-AFC—for drift-free reception of FM radio broadcasts. Gives optimum performance in good signal areas. Placing selector in this position after station has been tuned in will keep station sharply tuned. Also for recording FM broadcasts on external tape recorder.

FM—for FM radio tuning and reception. Provides increased sensitivity for FM reception in poor signal areas.

OPERATING CONTROLS (Cont.)

are located on right side of set and affect the Auxiliary channel only. They function as follows:



Figure 14. Operating Controls, 5T4A.

BALANCE: Used to "balance" the Auxiliary channel output to match the Master channel output. Adjust for desired level of loudness between channels.

BASS and TREBLE: These controls function the same as Treble and Bass controls for the Master channel.

LOUDNESS: Used to adjust to desired sound level. Acts as master control for both Master and Auxiliary channels.

TUNING: Large knob located behind Selector knob. Selects desired FM or AM stations.

RECORD COMPENSATOR: This control compensates for the different recording characteristics used by various record manufacturers. The left setting, "78", is a filter for standard 78 RPM records to minimize needle scratch. The RIAA, LP and EUR positions provide built-in equalization networks which assure truer reproduction of commercial recordings. (During FM or AM radio operation, the compensator circuits will not affect sound output.)

AUXILIARY CHANNEL CONTROLS

Auxiliary channel controls (Balance, Bass and Treble)

SERVICE HINTS

CHASSIS REMOVAL

Master Chassis 12B1

Chassis 12B1 is located in the Master cabinet. To remove 12B1 chassis, proceed as follows:

1. Disconnect line cord from power source.
2. Disconnect FM Antenna terminal board from back of cabinet. Unplug Record Changer Power plug (M3). Disconnect two Phono Output plugs (M5 and M6). Disconnect Master Channel Speaker plug (M20).
3. Disconnect Cabinet Pilot Light plug (M14).
4. Remove control knobs on front of chassis and chassis mounting screws.
5. Remove chassis from cabinet for servicing. To replace chassis in cabinet, perform the above procedure in reverse order.

Auxiliary Chassis 5T4A

The Auxiliary chassis is located in the Auxiliary cabinet except for models 662, 663 and 664. In these models, the Auxiliary chassis (5T4A) is located in the Master cabinet.

To remove Auxiliary chassis, proceed as follows:

1. Disconnect line cord from power source.
2. Remove cabinet back panel on Auxiliary cabinet. For models 662, 663 and 664, remove cabinet back panel behind 5T4A chassis (right side of Master cabinet).
3. Remove three Auxiliary chassis control knobs (outside of cabinet).
4. Disconnect Auxiliary Channel Audio Input plug (M101) from Stereo Input socket (M13). Remove Speaker plug (M109) from Audio Output socket (M108). Disconnect Tape Output plug (M102) from Stereo Tape Input socket (M103).
5. Remove chassis mounting screws. Remove chassis from cabinet for servicing. To replace chassis in cabinet, perform the above procedure in reverse order.

Record Changer

To remove the record changer, perform the following procedure:

1. On all models except 662, 663 and 664, remove cabinet back panel behind changer. Also, remove panel under record changer. Remove three large washer head screws

POWER CONNECTION

AC line power, 60 cps, is supplied to the Master unit through the Master cabinet line cord and controlled by Off-On-Treble control R57.

The Auxiliary chassis has its separate line cord. The Off-On-Power relay (M106), located on the Auxiliary chassis, is energized by a direct current supplied by the Master chassis 12B1 through the Stereo Output socket (M13).

On Models 662, 663 and 664, the line cord to the Master cabinet is terminated in a duplex socket. Then, line cords from the radio chassis and auxiliary chassis are plugged into the duplex outlet to complete the power connection.

CONNECTING THE STEREO UNIT

Figure 15 shows the method of making power connections in all models except 662, 663 and 664. Refer to the illustration and perform the following procedure to make power connections:

1. Make sure that both line cords are disconnected from wall outlet.
2. Connect plug on black cable from the Auxiliary unit to "STEREO OUTPUT" socket on Master cabinet. On Model 649, connect plug to socket on Master chassis. Connect socket, on black cable, to plug on rear of Auxiliary cabinet.
3. Connect both line cords in wall outlets and test the set. Turn the Master unit on and off. The Auxiliary unit should turn on and off at the same time.



Figure 15. Stereo Unit Connections.

RIGHT AND LEFT CHANNEL CONNECTION

The Master unit and the Auxiliary unit have been constructed in production so that the "right" channel is heard through the Auxiliary unit and the "left" channel through the Master unit. In other words, the auxiliary cabinet should be placed to the right of Master unit. If it is desired to place the auxiliary cabinet to the left of the Master unit, the connections from the record changer pick-up arm must be changed to retain the original direction of the recorded sound.

When the auxiliary cabinet is placed to the right of the Master unit, the red plug from the record changer tone arm should be in the chassis socket labeled "AUX" and the other plug in the socket labeled "MASTER". If the auxiliary unit

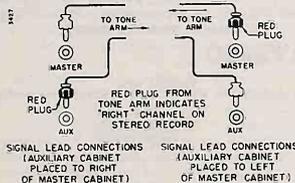


Figure 16. Right and Left Hand Channel Connections.

is moved to the left of the master cabinet, the red plug should be moved to the "MASTER" socket and the other plug moved to the "AUX" socket. See figure 16.

HEATER CIRCUIT FUSE

On chassis 12B1, the heater circuit is fused. Location of fuse is shown on figure 17. To replace fuse, connect a 2" piece of #27 gauge bare annealed copper wire between proper terminals on terminal board.



Figure 17. Heater Circuit Fuse, Chassis 12B1.

RECORD CHANGER SERVICING

For complete Record Changer servicing, refer to Service Manual No. S800B.

NEEDLE AND CARTRIDGE REPLACEMENT

"For replacement part numbers, see page 16."

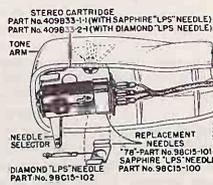
RC688-16S, -17S

To replace either needle, turn NEEDLE SELECTOR so

that needle to be replaced is facing down. Grasp retaining clip and slip old needle from cartridge. See figure 18. To replace needle, reverse above procedure.

To replace cartridge, remove screws (one at each side) and three leads from cartridge. Fasten new cartridge in place. Red lead goes to terminal "R", white lead to terminal "L", shield to center terminal.

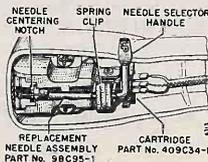
Figure 18. Needle Replacement.

**RC688-18S**

To replace needle assembly, move NEEDLE SELECTOR handle down till it is perpendicular with TONE ARM. See figure 18A. Open spring clip slightly and lift needle assembly. Make sure needle shaft clears centering notch. To replace needle assembly, open spring clip slightly and slip new assembly into position. Make sure that needle shaft is centered in notch.

Signal lead connections to cartridge are the same as above.

Figure 18A. Needle Replacement.

**SPEAKER SYSTEMS**

Speakers may be reached for servicing by removing cabinet back panels. Cross-over capacitor(s) are located on baffle boards adjacent their respective speaker systems.

Each speaker system is connected to its amplifier by a wiring harness. Plugs, sockets and capacitor(s) are replaceable. See "CABINET PARTS" for the particular model.

On model 654, baffle boards are located on front and rear of Master cabinet. To gain access to either speaker system, remove rear baffle board.

CONNECTING AN EXTERNAL SPEAKER SYSTEM

A 5-lead terminal board on the rear of the Master cabinet provides connections for using an external speaker system in addition to the speakers in the set. (Any external speaker system used with this set should have a 16 ohm voice coil impedance for proper operation.)

When using the internal speaker system, the shorting bar, on the terminal board, is to be connected between terminals 3 and 4. See figure 19.

When an external speaker system is to be used, connect external system leads to terminals 1 and 5. Adjust the position of the shorting bar so that terminals 2 and 3 are shorted together. When a 16 ohm external speaker system is connected properly and the shorting bar is placed between terminals 2 and 3, the external speaker systems' impedance will be matched to output transformer and internal speakers.

PHASING AN EXTERNAL SPEAKER SYSTEM

To insure best sound reproduction when making an external speaker installation, the external speaker voice coils must be phased with speaker voice coils in the Master cabinet so that the cones of all the speakers move in the same direction at the same time.

The action of each external speaker voice coil should be tested with a common 1.5 volt flashlight battery. Testing is necessary to determine which terminal on each speaker, when connected to the positive pole of the battery, causes the speaker cone to move forward.

To locate proper terminal, perform following procedure:

1. Connect battery, MOMENTARILY, across voice coil terminals. Observe whether speaker cone moves in or out. If necessary, reverse the momentary connection across the voice coil terminals. On each external speaker to be used, determine which terminal, when connected to the positive pole of a battery, causes the speaker cone to move outward.
2. Refer to instruction under "CONNECTING AN EXTERNAL SPEAKER SYSTEM" and be sure to connect external speaker terminal(s), which causes speaker cone to move forward when connected to positive pole of a battery, to terminal 5. The other external speaker lead to terminal 1.

PROVISION FOR EXTERNAL TAPE RECORDER

A metal bracket labeled "TAPE RECORDER" is used with each model. On models that are operated with an Auxiliary unit, one "TAPE BRACKET" is located on the Master cabinet back panel and the other on the Auxiliary cabinet back panel. On models 662, 663 and 664, two brackets are located on the cabinet back.

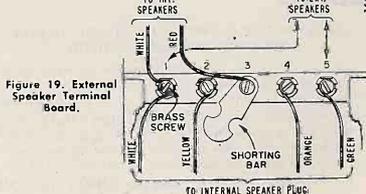


Figure 19. External Speaker Terminal Board.

Each bracket supplies input and output sockets for an external tape recorder. Brackets on Auxiliary units provide input and output sockets for stereo tape recorder recording or play-back. Each bracket looks like one in figure 20.

Connect input plug of tape recorder into left (RECORD) socket on the Master channel bracket—on Master cabinet—and the tape recorder output plug into the right (PLAY) socket on the bracket. When using a stereo tape recorder, make identical connections of the recorders second channel to the sockets on the Auxiliary channel tape recorder bracket.

TO RECORD: Move switch on Master channel bracket to left (RECORD) position. (See "Operating Controls" on page 6.) For stereo recording, move switch on Auxiliary channel bracket to the left (RECORD) position also.

TO PLAY: Move switch to right (PLAY) position. Place Selector switch to "PHONO" position when playing single channel tapes. Move switch on Auxiliary channel tape bracket to right (PLAY) position and Selector switch to "STEREO" when playing stereo tapes.

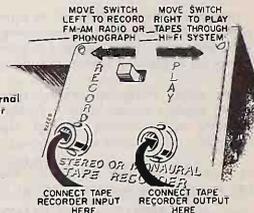


Figure 20. External Tape Recorder Bracket.

AMPLIFICATION AND RESPONSE CHECK

The pre-amplifiers and amplifiers may be checked for gain and frequency response by performing the tests outlined below and referring to the "AMPLIFIER CHECKS" table.

TEST EQUIPMENT:

Audio Oscillator, with flat frequency response across the audio range.

Vacuum Tube Voltmeter, preferably with decibel (db) scale.

Oscilloscope.

AMPLIFIER CHECKS

AMPLIFICATION CHECK	On 12B1 chassis, set Loudness, Bass and Treble controls to maximum (fully clockwise). Set Record Compensation to "EUR" and Function Switch to "STEREO". On 5T4A chassis, set all controls to maximum (fully clockwise).			
	FREQUENCY	VOLTS	FREQUENCY	VOLTS
AUDIO GENERATOR OUTPUT	to 12B1 1000 Cycles	to 5T4A 06 volts \pm 10%	to 12B1 06 volts \pm 10%	to 5T4A 02 volts \pm 10%
	VOLTS OUT		WATTS OUT	
AMPLIFIER OUTPUT	12B1 5 volts	5T4A 5 volts	62B1 7.8 watts	5T4A 7.8 watts

Note: At 7.8 watts out, harmonic distortion is 2%.

AMPLIFIER CHECKS (CONT.)

FREQUENCY RESPONSE CHECK	On 12B1 and 5T4A chassis, set controls as shown above. See instructions in text for settings for individual controls.		OUTPUT VOLTAGE		DB CHANGE		
	SIGNAL GENERATOR OUTPUT		12B1	5T4A	From MAX to MIN position of Bass or Treble control*		
Freq. cycles	Voltage	MAX.	MIN.	MAX.	MIN.	12B1	5T4A
100 cycles	5	0.5V	5	0.7	0.7	-20	-17
1,000 cycles	5	5	5	5	5	0	0
10,000 cycles	5	0.225V or less	5	0.32	0.32	-27	-27

*Set audio generator output at that 5 volts is indicated across 12B1 and 5T4A output. CAUTION: Do not overload amplifiers by overdriving with input signal. Use an oscilloscope to check 12B1 and 5T4A amplifier outputs for undistorted waveform at 5 volt output readings.

PROCEDURE:

Master chassis and Auxiliary chassis may be checked for frequency response and amplification at the same time. If Auxiliary chassis is not available, Master chassis may be checked alone.

Remove bottom covers from 12B1 and 5T4A chassis. Connect a 3.2 ohms, 15 watt resistive load across secondary windings of each Audio Output transformer (T9 and T10).

Connect audio oscillator output to the junction of C54 and R40B on 12B1 chassis.

NOTE: Use an oscilloscope to check output voltage waveforms. At 5 volts output on each chassis, waveforms should be symmetrical.

TO CHECK AMPLIFICATION, set controls as shown in "AMPLIFICATION CHECK" table. Set generator output to 1,000 cycles and increase output amplitude until 5 volts appears across each chassis output load, as measured with a VTVM. Measure generator output voltage. See table for proper input voltage amplitude.

Change generator connection to the junction of R40A and C42 on 12B1 chassis. Set generator output voltage so that 5 volts is indicated across 5T4A output load. See table for proper 5T4A input voltage amplitude.

FREQUENCY RESPONSE CHECK:

For control settings, refer to "FREQUENCY RESPONSE CHECK" table. Connect generator "hot" lead to junction of R40B and C54 on 12B1 chassis. Set audio generator output at 100 cycles and adjust the amplitude so that 5 volts is indicated on VTVM connected across 12B1 output. Rotate Bass control to minimum. 12B1 output voltage should read 0.5 volts or less (20 db change). Return Bass control setting to maximum.

Set generator output frequency to 10,000 cycles and adjust generator output until 5 volts is indicated on VTVM. Rotate Treble control to minimum (maximum counterclockwise—DO NOT turn set off). 12B1 output voltage should read 0.225 volts or less (27 db change). Return Treble to maximum position.

Connect generator output to AUX. CHANNEL input socket (on 12B1 chassis). Connect VTVM across 5T4A load. Set generator frequency at 100 cycles. Set generator output so that 5 volts is indicated on VTVM. Rotate Bass control (on 5T4A chassis) maximum counterclockwise. The 5T4A output voltage should be 0.7 volts (17 db change). Return Bass control to maximum (fully clockwise) setting.

Change generator output frequency to 10,000 cycles. Rotate Treble control to minimum (fully counterclockwise) position. Voltage reading at output of 5T4A should be 0.22

volts (27 db change).

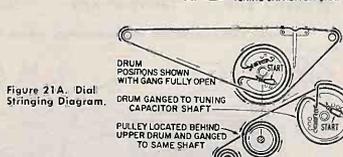
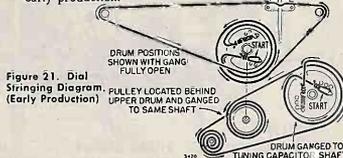
DIAL STRINGING AND POINTER SETTING

Two stringing systems are used on the radio chassis. Two drums (2 3/4" and 1 3/4") and the tuning shaft are used to drive the FM-AM tuning yoke. Two pulleys (3/8" dia., brass) and drum (2") are employed to move dial pointer along dial pointer guide bracket.

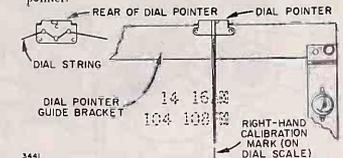
The 1 3/4" drum and 2" drum are mounted on the same shaft and coordinate the movement of the dial pointer and the tuning yoke.

If necessary, either system may be restrung separately. To accomplish dial stringing, perform the following procedure:

1. Remove dial scale.
2. Rotate drums until they are positioned as shown in figure 21. The AM tuning gang should be set fully open.
3. String front or rear pulley system or both according to figure 21 or 21A. Figure 21 shows dial stringing for early production.



4. Replace dial scale.
5. With AM tuning gang fully open, place dial pointer on dial pointer guide bracket. Move dial pointer to line-up with the right hand calibration mark (below "AM" and "FM" on right hand side of dial scale—see figure 22). See figure 22 for method of inserting dial string on dial pointer.



3440 Figure 22. Dial Pointer Setting.

6. Check dial pointer calibration at several points on dial by tuning on known stations. Dial pointer should coincide with calibration marks on each end of the dial when tuning yoke is fully open and fully closed.

AM IF AND RF ALIGNMENT

- Turn radio on and allow 15 minutes warm up.
- Set Loudness control fully clockwise, Bass and Treble controls at mid-rotation. Set Selector Switch to AM position.
- Connect output meter across voice coil (3.2Ω). If speakers are not to be used during alignment, connect a 3.2 ohm, 15 watt resistive load across the 3.2 ohm taps on Audio Output Transformer secondary winding (see schematic diagram).
- Use 400 of 1000 cps modulation for alignment.
- Use lowest setting of signal generator output that produces adequate indication on lowest scale of output meter.
- Use a non-metallic alignment tool with 1/8" wide for IF transformer adjustments (Admiral part no. 98A30-10).
- Repair adjustments to insure best results.

Step	Generator Connection	Gen. Freq.	Receiver Gang Setting	Adjustment
1	To stator plates, antenna section of gang tuning capacitor.	455KC	Fully open	"L", "M", "N" and "P" for maximum.
2	Radiated signal. Feed "hot" generator lead to antenna through several loops of wire or place generator "hot" lead close to receiver for signal pickup.	1620KC	Fully open	"R" for maximum.
3		1400K	Tune in generator signal.	"S" for maximum.

*Adjustment "M" and "P" made from beneath chassis.

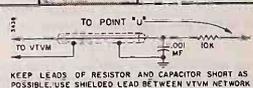
FM IF AND RF ALIGNMENT (using VTVM and Signal Generator)

NOTE: For FM alignment, a signal generator with facilities for crystal calibration should be used. Signal generator frequency settings are critical for FM alignment.

- Turn radio and alignment equipment on and allow 15 minutes for warm up.
- Set Loudness control to minimum, Bass and Treble controls at mid-rotation and Selector switch to "FM" position (completely counterclockwise rotation).
- Use DC VTVM as output indicator. Set generator output so that indication, on VTVM, is approximately 1 1/2 volts above noise level during alignment (except "Step 2").
- Use a non-metallic alignment tool with 1/8" wide for transformer slug adjustments (Admiral part no. 98A30-10).
- Refer to figures 24 and 25 for physical location of alignment points.
- Use an unmodulated signal during alignment.
- Adjustment "A", "B", "D", and "G" made from under side of chassis. Remove chassis bottom cover to reach adjustments and to make VTVM connections.

Step	Signal Generator and VTVM Connections	Gen. Freq.	Receiver Gang Setting	Adjustment
1	Connect generator to antenna terminals with a 150 ohm resistor in series with each lead. Connect VTVM and decoupling network between "U" and ground (see schematic). Voltage reading will be negative. Adjust generator so that indication on VTVM is 1 1/2 volts above noise level.	10.7 MC	Set Tuning gang fully open	"A", "B", "C", "D", "E", "F", and "G" for maximum.
Increase signal generator output until VTVM reads -5 volts.				
2	No change in generator connection. Connect VTVM between alignment point "V" and ground (see schematic diagram). A center zero reading scale is recommended for "ADJUSTMENT" in this step.	10.7 MC	Scan to "Step 1".	"H" for zero reading.
4	Same as "STEP 1".	98 MC	98 MC	Alternately adjust "J" and "K", several times, for maximum.

*Each slug adjustment ("J" and "K") is secured with a drop of wax on the FM tuning yoke. After making slug adjustments, use a soldering iron to remelt wax and secure adjustments "J" and "K" to yoke.



KEEP LEADS OF RESISTOR AND CAPACITOR SHORT AS POSSIBLE. USE SHIELDED LEAD BETWEEN VTVM NETWORK.

Figure 23. Decoupling Network.

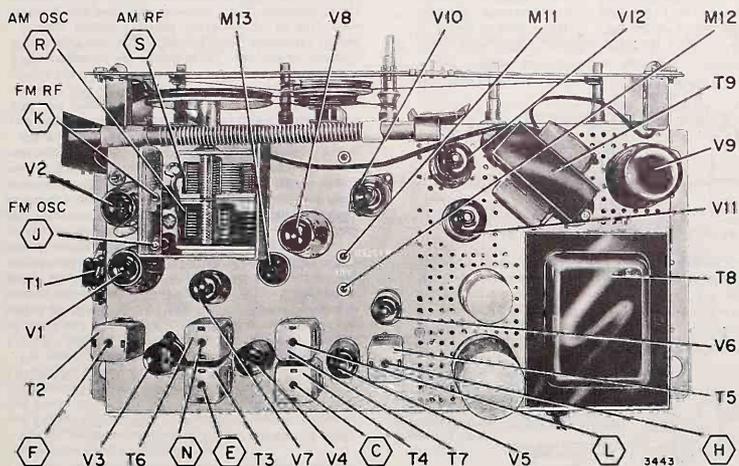


Figure 24. Top View of 12B1 Chassis. Input Connections, Output Connections and Alignment Points Shown.

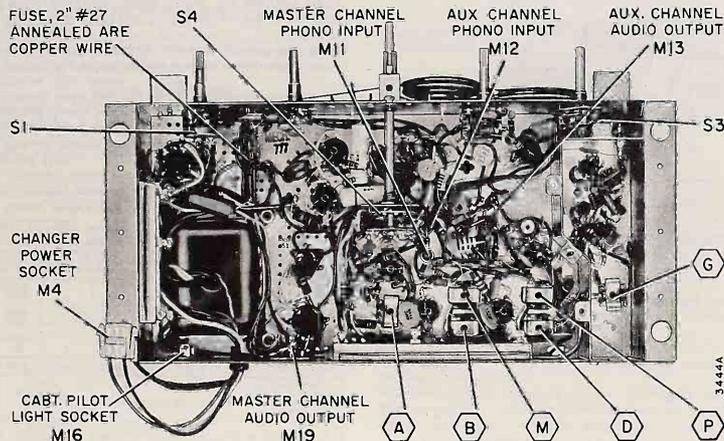


Figure 25. Bottom View of 12B1 Chassis. Input Connections, Output Connections and Alignment Points Shown.

PRODUCTION CHANGES

Production changes are coded RUN 10, RUN 11, etc., as given in the headings below. Run number (stamped on chassis indicates that this chassis has the change(s) incorporated which are explained under that particular run number heading below, as well as changes (lower run numbers) made prior to that time. At the start of production, all chassis were stamped RUN 10.

RUN 11: R25 (15K, 1W) changed to (22K, 1W) to permit full interchangeability of 6BE6 tubes. R33 changed to (390K, 1/2 W), R34 changed to (100K, 1/2 W) and C39 changed to (.002MF) to improve operation on AM. R70 (470K,

1/2 W) added between M11 and M12 to minimize rumble.

RUN 12: R70 (470K, 1/2 W) removed to increase channel separation for "STEREO" operation.

12B1, 12B1A CHASSIS PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	68 ohms, 1/2 watt.....	60B 8-680
R2	68,000 ohms, 1/2 watt.....	60B 8-683
R3	1,500 ohms, 1/2 watt.....	60B 8-152
R4	10,000 ohms, 1/2 watt.....	60B 8-103
R5	560 ohms, 1/2 watt.....	60B 8-561
R6	100 ohms, 1/2 watt.....	60B 8-101
R7	470,000 ohms, 1/2 watt.....	60B 8-474
R8	100 ohms, 1/2 watt.....	60B 8-101
R9	150 ohms, 1/2 watt.....	60B 8-151
R10	39,000 ohms, 1/2 watt.....	60B 14-393
R11	75,000 ohms, 1/2 watt, 5%.....	60B 7-753
R12	100 ohms, 1/2 watt.....	60B 8-101
R13	68 ohms, 1/2 watt.....	60B 8-680
R14	33,000 ohms, 1 watt.....	60B 14-333
R15	75,000 ohms, 1/2 watt, 5%.....	60B 7-753
R16	100 ohms, 1/2 watt.....	60B 8-101
R17	22,000 ohms, 1/2 watt.....	60B 8-223
R18	27,000 ohms, 1/2 watt.....	60B 14-273
R19	100,000 ohms, 1/2 watt, 5%.....	60B 7-104
R20	100,000 ohms, 1/2 watt, 5%.....	60B 7-104
R21	47,000 ohms, 1/2 watt.....	60B 8-473
R22	330,000 ohms, 1/2 watt.....	60B 8-334
R23	1 megohm, 1/2 watt.....	60B 8-105
R24	22,000 ohms, 1/2 watt.....	60B 8-223
R25	15,000 ohms, 1 watt (Run 10).....	60B 14-153
R25	22,000 ohms, 1 watt (Run 11 and higher).....	60B 14-223
R26	22,000 ohms, 1/2 watt.....	60B 8-223
R27	1,000 ohms, 1/2 watt.....	60B 8-102
R28	68,000 ohms, 1/2 watt.....	60B 8-683
R29	180,000 ohms, 1/2 watt.....	60B 8-184
R30	68,000 ohms, 1/2 watt.....	60B 8-683
R31	180,000 ohms, 1/2 watt.....	60B 8-184
R32A	7,000 ohms, 8 watts } tapped, candohm.....	61A 5-17
R32B	5,000 ohms, 12 watts }.....	
R33	390,000 ohms, 1/2 watt.....	60B 8-394
R34	100,000 ohms, 1/2 watt.....	60B 8-104
R35	1 megohm, 1/2 watt.....	60B 8-105
R36	390,000 ohms, 1/2 watt.....	60B 8-394
R37	390,000 ohms, 1/2 watt.....	60B 8-394
R38	47,000 ohms, 1/2 watt.....	60B 8-473
R39	47,000 ohms, 1/2 watt.....	60B 8-473
R40A	500,000 ohms, Loudness control.....	75B 46-1
R40B	500,000 ohms, Loudness control.....	75B 46-1
R41	470,000 ohms, 1/2 watt.....	60B 8-474
R42	1,000 ohms, 1/2 watt.....	60B 8-102
R43	100,000 ohms, 1/2 watt.....	60B 8-104
R44	6,800 ohms, 1/2 watt.....	60B 8-682
R45	39,000 ohms, 2 watts.....	60B 20-393
R46A	125 ohms, 5 watts } tapped, candohm.....	61A 5-18
R46B	1,100 ohms, 1 watt }.....	
R47	47,000 ohms, 1/2 watt.....	60B 8-473
R48	47,000 ohms, 1/2 watt.....	60B 8-473
R49	470,000 ohms, 1/2 watt.....	60B 8-474
R50	2,200 ohms, 1/2 watt.....	60B 8-222
R51	10,000 ohms, 1 watt.....	60B 14-153
R52	220,000 ohms, 1/2 watt.....	60B 8-224
R53	100,000 ohms, 1/2 watt.....	60B 8-104
R54	1 megohm, Base control.....	75D 1-114
R55	10,000 ohms, 1/2 watt.....	60B 8-103

Sym.	Description	Part No.
R56	100,000 ohms, 1/2 watt.....	60B 8-104
R57	1 megohm, Treble control (includes Off-On switch S1).....	75D 1-115
R58	470,000 ohms, 1/2 watt.....	60B 8-474
R59	1 megohm, 1/2 watt.....	60B 8-105
R60	1,200 ohms, 1/2 watt.....	60B 8-122
R61	150,000 ohms, 1/2 watt, 5%.....	60B 7-154
R62	150,000 ohms, 1/2 watt, 5%.....	60B 8-154
R63	1 megohm, 1/2 watt.....	60B 8-105
R64	3,300 ohms, 1/2 watt.....	60B 8-332
R65	150,000 ohms, 1/2 watt, 5%.....	60B 7-164
R66	470,000 ohms, 1/2 watt.....	60B 8-474
R67	470,000 ohms, 1/2 watt.....	60B 8-474
R68	130 ohms, 2 watts, 5%.....	60B 19-131
R69	470,000 ohms, 1/2 watt.....	60B 8-474
R70	470,000 ohms (Run 11 only).....	60B 8-474

CAPACITORS

C1	Description	Part No.
C1	.001 mf, 500 volts, cer. disc.....	65D 10-6
C2	.47 mf, 500 volts, ceramic.....	65D 6-79
C3	220 mf, 500 volts, ceramic.....	65D 6-80
C4	17 mmf, 1.5% NPO temp. coeff. Part of L2.....	
C5	.001 mf, 500 volts, cer. disc.....	65D 10-6
C6	.01 mf, 500 volts, cer. disc.....	65D 10-3
C7	22 mf, 500 volts, 12% ceramic, N750 temp. coeff.....	65D 6-53
C8	20 mmf, 12% NPO temp. coeff.....	Part of L3
C9	100 mf, 500 volts, 10% ceramic, N750 temp. coeff.....	65D 6-19
C10A	.001 mf, 450 volts } dual ceramic disc.....	65A 17-3
C10B	.001 mf, 450 volts }.....	
C11	10 mf, 500 volts, 5% cer. disc, N750 temp. coeff.....	65D 10-50
C12	10 mmf, 500 volts, 5% cer. disc, N750 temp. coeff.....	65D 10-50
C13	.001 mf, 500 volts, cer. disc.....	65D 10-6
C14	.001 mf, 500 volts, feed-through.....	65B 26-5
C15	.01 mf, 500 volts, cer. disc.....	65D 10-3
C16	.001 mf, 500 volts, feed-through.....	65B 26-5
C17	.001 mf, 500 volts, feed-through.....	65B 26-5
C18	.02 mf, 500 volts, cer. disc.....	65D 10-28
C19A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-3
C19B	.004 mf, 450 volts }.....	
C20	.01 mf, 500 volts, cer. disc.....	65D 10-3
C21	.02 mf, 500 volts, cer. disc.....	65D 10-28
C22A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-3
C22B	.004 mf, 450 volts }.....	
C23	.01 mf, 500 volts, cer. disc.....	65D 10-3
C24A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-3
C24B	.004 mf, 450 volts }.....	
C25	47 mmf, 500 volts, ceramic.....	65D 6-79
C26	220 mmf, 500 volts, ceramic.....	65D 6-80
C27	.005 mf, 500 volts, cer. disc.....	65D 10-1
C28A	.556 mmf, max. ant. } gang.....	68B 7-1
C28B	.1047 mmf, max. osc. }.....	
C29	.47 mf, 500 volts, 10% cer. disc.....	65D 10-28
C30	.001 mf, 500 volts, feed-through, N750 temp. coeff.....	65D 10-177

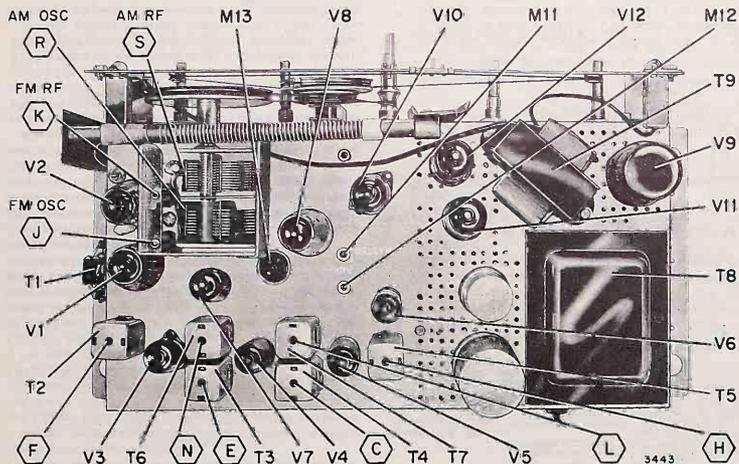


Figure 24. Top View of 12B1 Chassis. Input Connections, Output Connections and Alignment Points Shown.

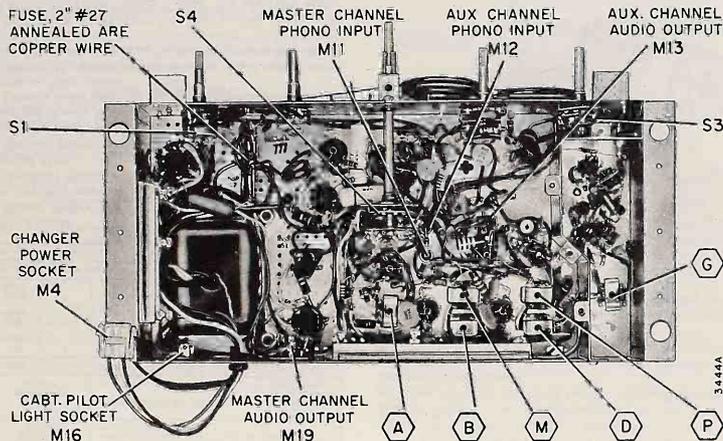


Figure 25. Bottom View of 12B1 Chassis. Input Connections, Output Connections and Alignment Points Shown.

PRODUCTION CHANGES

Production changes are coded RUN 10, RUN 11, etc., as given in the headings below: Run number (stamped on chassis indicates that this chassis has the change(s) incorporated which are explained under that particular run number heading below, as well as changes (lower run numbers) made prior to that time. At the start of production, all chassis were stamped RUN 10.

RUN 11: R25 (15K, 1W) changed to (22K, 1W) to permit full interchangeability of 6BE6 tubes. R33 changed to (390K, 1/2 W), R34 changed to (100K, 1/2 W) and C39 changed to (.002MF) to improve operation on AM. R70 (470K,

1/2 W) added between M11 and M12 to minimize rumble.

RUN 12: R70 (470K, 1/2 W) removed to increase channel separation for "STEREO" operation.

12B1, 12B1A CHASSIS PARTS LIST

RESISTORS

Sym.	Description	Part No.
R1	68 ohms, 1/2 watt.....	60B 8-680
R2	68,000 ohms, 1/2 watt.....	60B 8-683
R3	1,500 ohms, 1/2 watt.....	60B 8-152
R4	10,000 ohms, 1/2 watt.....	60B 8-103
R5	560 ohms, 1/2 watt.....	60B 8-561
R6	100 ohms, 1/2 watt.....	60B 8-101
R7	470,000 ohms, 1/2 watt.....	60B 8-474
R8	100 ohms, 1/2 watt.....	60B 8-101
R9	150 ohms, 1/2 watt.....	60B 8-151
R10	39,000 ohms, 1 watt.....	60B 14-393
R11	75,000 ohms, 1/2 watt, 5%.....	60B 7-753
R12	100 ohms, 1/2 watt.....	60B 8-101
R13	68 ohms, 1/2 watt.....	60B 8-680
R14	33,000 ohms, 1 watt.....	60B 14-333
R15	75,000 ohms, 1/2 watt, 5%.....	60B 7-753
R16	100 ohms, 1/2 watt.....	60B 8-101
R17	22,000 ohms, 1/2 watt.....	60B 8-223
R18	27,000 ohms, 1 watt.....	60B 14-273
R19	100,000 ohms, 1/2 watt, 5%.....	60B 7-104
R20	100,000 ohms, 1/2 watt, 5%.....	60B 7-104
R21	47,000 ohms, 1/2 watt.....	60B 8-473
R22	330,000 ohms, 1/2 watt.....	60B 8-334
R23	1 megohm, 1/2 watt.....	60B 8-105
R24	22,000 ohms, 1/2 watt.....	60B 8-223
R25	15,000 ohms, 1 watt (Run 10).....	60B 14-153
R26	22,000 ohms, 1 watt (Run 11 and higher).....	60B 14-223
R27	1,000 ohms, 1/2 watt.....	60B 8-102
R28	68,000 ohms, 1/2 watt.....	60B 8-683
R29	180,000 ohms, 1/2 watt.....	60B 8-184
R30	68,000 ohms, 1/2 watt.....	60B 8-683
R31	180,000 ohms, 1/2 watt.....	60B 8-184
R32A	7,000 ohms, 8 watts } tapped, candohm.....	61A 5-17
R32B	5,000 ohms, 12 watts }.....	61A 5-18
R33	390,000 ohms, 1/2 watt.....	60B 8-394
R34	100,000 ohms, 1/2 watt.....	60B 8-104
R35	1 megohm, 1/2 watt.....	60B 8-105
R36	390,000 ohms, 1/2 watt.....	60B 8-394
R37	390,000 ohms, 1/2 watt.....	60B 8-394
R38	47,000 ohms, 1/2 watt.....	60B 8-473
R39	47,000 ohms, 1/2 watt.....	60B 8-473
R40A	500,000 ohms, Loudness control } dual.....	75B 46-1
R40B	500,000 ohms, Loudness control }.....	75B 46-1
R41	470,000 ohms, 1/2 watt.....	60B 8-474
R42	1,000 ohms, 1/2 watt.....	60B 8-102
R43	100,000 ohms, 1/2 watt.....	60B 8-104
R44	6,800 ohms, 1/2 watt.....	60B 8-682
R45	39,000 ohms, 2 watts.....	60B 20-393
R46A	125 ohms, 5 watts } tapped, candohm.....	61A 5-18
R46B	1,000 ohms, 5 watts }.....	61A 5-18
R47	47,000 ohms, 1/2 watt.....	60B 8-473
R48	47,000 ohms, 1/2 watt.....	60B 8-473
R49	470,000 ohms, 1/2 watt.....	60B 8-474
R50	2,200 ohms, 1/2 watt.....	60B 8-222
R51	10,000 ohms, 1 watt.....	60B 14-153
R52	220,000 ohms, 1/2 watt.....	60B 8-224
R53	100,000 ohms, 1/2 watt.....	60B 8-104
R54	1 megohm, Base control.....	75D 1-114
R55	10,000 ohms, 1/2 watt.....	60B 8-103

Sym.	Description	Part No.
R56	100,000 ohms, 1/2 watt.....	60B 8-104
R57	1 megohm, Treble control (includes OFF-On switch S1).....	75D 1-115
R58	470,000 ohms, 1/2 watt.....	60B 8-474
R59	1 megohm, 1/2 watt.....	60B 8-105
R60	1,200 ohms, 1/2 watt.....	60B 8-122
R61	150,000 ohms, 1/2 watt, 5%.....	60B 7-154
R62	150,000 ohms, 1/2 watt, 5%.....	60B 8-154
R63	1 megohm, 1/2 watt.....	60B 8-105
R64	3,300 ohms, 1/2 watt.....	60B 8-332
R65	150,000 ohms, 1/2 watt, 5%.....	60B 7-154
R66	470,000 ohms, 1/2 watt.....	60B 8-474
R67	470,000 ohms, 1/2 watt.....	60B 8-474
R68	130 ohms, 2 watts, 5%.....	60B 19-137
R69	47,000 ohms, 1/2 watt.....	60B 8-474
R70	470,000 ohms (Run 11 only).....	60B 8-474

CAPACITORS

C1	Description	Part No.
C1	.001 mf, 500 volts, cer. disc.....	65D 10-6
C2	47 mmf, 500 volts, ceramic.....	65D 6-79
C3	220 mmf, 500 volts, ceramic.....	65D 6-80
C4	17 mmf, 1.5% NPO temp. coeff.....	Part of L2
C5	.001 mf, 500 volts, cer. disc.....	65D 10-6
C6	.01 mf, 500 volts, cer. disc.....	65D 10-3
C7	2 mmf, 500 volts, 12% ceramic, N750 temp. coeff.....	65D 6-53
C8	20 mmf, 1.2% NPO temp. coeff.....	Part of L3
C9	100 mmf, 500 volts, 10% ceramic, N750 temp. coeff.....	65D 6-19
C10A	.001 mf, 450 volts } dual ceramic disc.....	65A 17-3
C10B	.001 mf, 450 volts }.....	65A 17-3
C11	.01 mmf, 500 volts, 5% cer. disc, N750 temp. coeff.....	65D 10-50
C12	10 mmf, 500 volts, 5% cer. disc, N750 temp. coeff.....	65D 10-50
C13	.001 mf, 500 volts, cer. disc.....	65D 10-6
C14	.001 mf, 500 volts, feed-through.....	65B 26-5
C15	.01 mf, 500 volts, cer. disc.....	65D 10-3
C16	.001 mf, 500 volts, feed-through.....	65B 26-6
C17	.001 mf, 500 volts, feed-through.....	65B 26-5
C18	.02 mf, 500 volts, cer. disc.....	65D 10-28
C19A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-1
C19B	.004 mf, 450 volts }.....	65A 17-1
C20	.01 mf, 500 volts, cer. disc.....	65D 10-3
C21	.02 mf, 500 volts, cer. disc.....	65D 10-28
C22A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-1
C22B	.004 mf, 450 volts }.....	65A 17-1
C23	.01 mf, 500 volts, cer. disc.....	65D 10-3
C24A	.004 mf, 450 volts } dual ceramic disc.....	65A 17-1
C24B	.004 mf, 450 volts }.....	65A 17-1
C25	47 mmf, 500 volts, ceramic.....	65D 6-79
C26	220 mmf, 500 volts, ceramic.....	65D 6-80
C27	.005 mf, 500 volts, cer. disc.....	65D 10-1
C28A	.556 mmf, max. ant. } gang.....	68B 71-1
C28B	.1047 mmf, max. osc. }.....	68B 71-1
C29	47 mmf, 500 volts, 10% cer. disc.....	65D 6-79
C30	.001 mf, 500 volts, feed-through, N750 temp. coeff.....	65D 10-177

Sym.	Description	Part No.
C31	.02 mf, 500 volts, cer. disc.	65D 10-28
C32	.01 mf, 500 volts, cer. disc.	65D 10-3
C33	.01 mf, 500 volts, cer. disc.	65D 10-3
C34	.01 mf, 500 volts, cer. disc.	65D 10-3
C35	.001 mf, 500 volts, cer. disc.	65D 10-53
C36	.001 mf, 500 volts, cer. disc.	65D 10-53
C37	.001 mf, 500 volts, cer. disc.	65D 10-53
C38	.001 mf, 500 volts, cer. disc.	65D 10-53
C39	.002 mf, 500 volts, 10% var. disc.	65D 10-125
C40	.200 mf, 500 volts, ceramic	65D 6-80
C41	.0047 mf, 500 volts, cer. disc.	65D 10-112
C42	.220 mf, 500 volts, ceramic	65D 6-80
C43	.100 mf, 500 volts, ceramic	65D 6-83
C44	.0047 mf, 500 volts, cer. disc.	65D 10-112
C45	.02 mf, 500 volts, cer. disc.	65D 10-53
C46	.02 mf, 500 volts, cer. disc.	65D 10-28
C47	.017 mf, 500 volts, tubular	63B 12-1
C48	.40 mf, 350 volts, electrolytic	67D 7-37
C49	.001 mf, 500 volts, lead-through	65B 26-5
C50	.001 mf, 500 volts, cer. disc.	65D 10-5
C51	.0047 mf, 500 volts, cer. disc.	65D 10-112
C52	.0047 mf, 500 volts, cer. disc.	65D 10-112
C53	.100 mf, 500 volts, ceramic	65D 6-83
C54	.220 mf, 500 volts, ceramic	65D 6-80
C55	.005 mf, 500 volts, cer. disc.	65D 10-1
C56	.100 mf, 500 volts, ceramic	65D 6-83
C57	10 mf, 6 volts, electrolytic	67B 35-7
C58	.02 mf, 500 volts, cer. disc.	65D 10-28
C59A	.40 mf, 300 volts, electrolytic	67D 7-36
C59B	.50 mf, 50 volts	67D 7-36
C60	.002 mf, 500 volts, 10% var. disc.	65D 10-125
C61	.02 mf, 500 volts, cer. disc.	65D 10-37
C62	.220 mf, 500 volts, ceramic	65D 6-80
C63	1.500 mf, 500 volts, cer. disc.	65D 10-103
C64	.005 mf, 500 volts, cer. disc.	65D 10-1
C65	.02 mf, 500 volts, cer. disc.	65D 10-28
C66	1 mf, 400 volts, molded, nylon dielec.	64C 25-32
C67	1 mf, 400 volts, molded, nylon dielec.	64C 25-32
C68	50 mf, 500 volts, paper	See C59B
C69	20 mf, 500 volts, paper	65D 6-26
C70	4 mf, 10 volts, paper (cross-over)	64B 13-5
C71	16 mf, 16 volts AC, non-polarized electrolytic	67A 40-1

COILS AND TRANSFORMERS

L3	RF Choke Coil (3.3 ohm—blue color dot; wound on 1 meg resistor)	73B 31-6
L4	FM Mixer Coil (incl. C4)	69B 233-2
L5	FM Osc. Coil (incl. C8)	69B 233-1
L6	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L7	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L8	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L9	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L10	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L11	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L12	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L13	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L14	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L15	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L16	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L17	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L18	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L19	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L20	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L21	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L22	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L23	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L24	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L25	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L26	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L27	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L28	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L29	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L30	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L31	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L32	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L33	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L34	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L35	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L36	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L37	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L38	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L39	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L40	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L41	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L42	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L43	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L44	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L45	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L46	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L47	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L48	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L49	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L50	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L51	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L52	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L53	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L54	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L55	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L56	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L57	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L58	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L59	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L60	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L61	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L62	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L63	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L64	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L65	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L66	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L67	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L68	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L69	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L70	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L71	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L72	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L73	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L74	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L75	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L76	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L77	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L78	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L79	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L80	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L81	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L82	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L83	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L84	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L85	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L86	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L87	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L88	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L89	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L90	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L91	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L92	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L93	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L94	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L95	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L96	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L97	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L98	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L99	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5
L100	RF Choke Coil (1 ohm—green color dot; wound on 1 meg resistor)	73B 31-5

5T4A CHASSIS PARTS LIST

RESISTORS

R101	500,000 ohms, Balance control	75D 1-119
R102	56,000 ohms, 1/2 watt	60B 8-563
R103	470,000 ohms, 1/2 watt	60B 8-474
R104	2,200 ohms, 1/2 watt	60B 8-222
R105	220,000 ohms, 1/2 watt	60B 8-224
R106	100,000 ohms, 1/2 watt	60B 8-222
R107	1 megohm, Base control	60B 8-224
R108	10,000 ohms, 1/2 watt	60B 8-103
R109	100,000 ohms, 1/2 watt	60B 8-103
R110	470,000 ohms, 1/2 watt	60B 8-474
R111	1 megohm, Treble control	60B 8-116
R112	1 megohm, 1/2 watt	60B 8-105
R113	1,200 ohms, 1/2 watt	60B 8-122
R114	150,000 ohms, 1/2 watt	60B 8-154

CAPACITORS

C101	.005 mf, 500 volts, cer. disc.	65D 10-388
C102	.10 mf, 6 volts, electrolytic	67B 35-7
R115	150,000 ohms, 1/2 watt	60B 8-154
R116	1 megohm, 1/2 watt	60B 8-105
R117	3,300 ohms, 1/2 watt	60B 8-332
R118	160,000 ohms, 1/2 watt, 5%	60B 7-164
R119	470,000 ohms, 1/2 watt	60B 8-474
R120	470,000 ohms, 1/2 watt	60B 8-474
R121	130 ohms, 1 watt, 5%	60B 13-131
R122	330 ohms, 1 watt	60B 8-332
R123	130 ohms, 1 watt, 5%	60B 13-131
R124	100,000 ohms, 1/2 watt	60B 8-103
R125	100,000 ohms, 1/2 watt	60B 8-104

Sym.	Description	Part No.
T5	Discriminator Transformer	72D 28-73
T6	1st AM IF Transformer	72D 28-70
T7	2nd AM IF Transformer	72D 28-71
T8	Power Transformer	80D 35-16
T9	Audio Output Transformer (taps at 1.6 ohms, 3.2 ohms and 16 ohms)	79D 56-11

MISCELLANEOUS 12B1 CHASSIS PARTS

Sym.	Description	Part No.
M4	Socket, Record Changer Power (with leads)	700B 137-2
M10	Socket, Type Input	88B 31-3
M11	Socket, Master Channel Phono Input	88B 31-3
M12	Socket, Aux. Channel Phono Input	88B 31-3
M13	Socket, Aux. Channel Audio Output	88B 5-3
M16	Socket, Cabinet Pilot Light (on 12B1 chassis)	88B 5-6
M17	Socket, Dial Pilot Light (with 6" lead)	82A 8-2
M18	Socket, Dial Pilot Light (with 16" lead)	22A 8-6
M19	Socket, Master Channel Audio Output (5 pin)	87B 4-6
SI	Switch, Off-On	Part of R57
SC	Switch, Record Compensator	77B 86-1
SAB	Switch, Selector (12 position, w/af type)	77B 84-1

Sym.	Description	Part No.
Bracket, Cam Follower	15B 1870-1	
Bracket, Dial Scale Mtg.	15B 1865-1	
Bracket, Idler Pulley Mtg.	15A 1867-1	
Bracket, Selector Switch Mtg.	15A 1873-1	
Bracket, Support, Cam Follower	15A 1872-1	
Bracket, Tuning Sleeve	15A 1869-1	
Bushing, Cam and Pulley Mtg.	27A 292-1	
Bushing, Selector Switch	296-1	
Cam	15B 1871-1	
Cam and Drum Assembly (includes cam, 2 1/4" drum and bushing)	700B 136	
Clip, IF Transformer Mtg.	72D 28-10	
Clip, IF Transformer Mtg.	15B 1864-1	
Dial Pointer	22A 65	
Dial Scale (Chassis 12B1)	21C 114-1	
Dial Scale (Chassis 12B1A)	17A 54-1	
Drum, Dial Stringing, 1 1/2" dia.	21C 114-2	
Drum, Dial Stringing, 2" dia.	17A 49	
Drum, Dial Stringing, 2 1/2" dia.	17A 56-1	
Drum and Shaft Assembly (includes 1 1/2" drum, 2" drum and shaft)	700A 140	
Guide-Rail, Dial Pointer	15B 1866-1	
Line Cord and Plug	89B 1-1	
Pilot Lamp, #47	81A-8	
Pulley, Brass, 3/4" dia.	17C 132	
Reflector, Pilot Lamp	82A 6-1	
Shaft, Pulley Mtg. (part of 700A140 assembly)	27A 293-1	
Shield, Tube (for V1, V6 and V8)	87C 7-20	
Sleeve, Drum Shaft (fits lead with 3/8" thread)	27A 299-1	
Sleeve, Tuning, Brass, 1/2" dia.	27A 294-1	
Socket, Octal (for V7)	87A 5-1	
Socket, 7 pin miniature, Black Bakelite (for V3, V4, V5 and V9)	87A 39-2	
Socket, 7 pin miniature, Black Bakelite (for V2)	87A 39-1	
Socket, 9 pin miniature, Black Bakelite (for V1, V6 and V8)	87B 25-1	
Socket, 9 pin miniature, mica filled (for V10, V11 and V12)	87C 23-3	
Spring, Dial Stringing	19D 1-5	
Spring, Return, Cam Follower	19D 1-51	
Strip, Antenna Mtg. (for mtg. L6)	32B 90-3	
Stud, Cam Follower	27A 295-1	
Stud, Slug Adjustment	27A 4	

Sym.	Description	Part No.
C103	100 mmf, 500 volts, ceramic	65D 6-3
C104	.002 mf, 400 volts, tubular	64B 8-30
C105	.0022 mf, 500 volts, cer. disc.	65D 10-89
C106	.02 mf, 500 volts, cer. disc.	65D 10-137
C107	1.500 mf, 500 volts, cer. disc.	65D 10-103
C108	.220 mf, 500 volts, ceramic	65D 6-80
C109	.005 mf, 500 volts, cer. disc.	65D 10-188
C110	.022 mf, 400 volts, tubular	64B 8-30
C111	1 mf, 400 volts, tubular	64B 8-26
C112	1 mf, 400 volts, tubular	64B 8-26
C113A	50 mf, 25 volts, electrolytic	67D 7-36
C113B	40 mf, 300 volts, electrolytic	65D 10-188
C114	35 mmf, 500 volts, cer. disc.	65D 10-78
C115	.047 mf, 600 volts, tubular	63B 12-1
C116	40 mf, 350 volts, electrolytic	67D 7-37
C116B	80 mf, 350 volts, electrolytic	67D 7-37
C116C	40 mf, 350 volts, electrolytic	67D 7-37
C117	40 mf, 350 volts, electrolytic	67D 7-37
C118	4 mf, 10 volts, paper (cross-over)	See C118B
C119	16 mf, 16 volts AC, non-polarized electrolytic (cross-over)	64B 13-5 67A 40-3

CABINET PARTS FOR MASTER UNITS

Models 632, 633, 634, 642, 643 and 644

Sym.	Description	Part No.
M7	Socket, Ext. Tape Input	88A 1
M8	Socket, Ext. Tape Input	88A 1
M9	Plug, Type Output	88A 2-3
M20	Plug, Master Channel Speaker	

CABINET PARTS FOR AUXILIARY UNITS

For Models *SS622, *SS623, *SS624, SS642, SS643, SS644, SS649, SS654 and SS671

*Models SS622, SS623 and SS624 are auxiliary units used with Models 632, 633 and 634 respectively.)

Sym.	Description	Part No.	Sym.	Description	Part No.
	4" PM, Mid-Range, 8 ohms voice coil impedance, Model 649	78C 149-1		Grommet, Rubber (for mtg. radio chassis)	12A 2-3
M23	Speaker			Models 654 and 671	12A 2-15
	4" PM, Mid-Range, 16 ohms voice coil impedance, Model 654	78C 149-2		Model 649	
	5 1/4" PM, Mid-Range, 3.2 ohms voice coil impedance, Model 671	78C 150-1		Hinge, Door, Bronze (center section of door; Model 671)	37A 106-1
	3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance, Model 649	78C 148-1		Hinge, Knife Type, Brass (Model 671)	35E 454-52
M24	Speaker			Hinge, Lid, 15 3/8" long (bronze; Model 671)	37D 173-1
	3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance, Model 654	78C 148-1		Kepanul, #6-32 (bezel mtg.)	2A 19-17-1
	3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance, Model 671	78C 148-2		Kepanul, #8-32 (speaker mtg.)	2A 19-27-1
M25	Terminal Board, External Speaker (includes shorting bar)	10B 13-7		Knobs (all models)	
S2	Switch, Record-Play	77A 20-3		On-Off-Treble, Bass, Loudness or Record Selector	33C 254-5
S101	Bezel and Inlay (for radio)	23D 326-1		Tuning	33B 291-1
				Leg, Walnut (Model 671)	35E 454-51
				Lid Support (bronze, Model 649)	
				Right	37C 170-5
				Left	37C 170-6
				Lid Support (left side; Model 654)	37C 170-6
				Lid Support (Model 671)	37C 170-10
				Nut, Hex, 8-32 (for mtg. baffle board)	2A 1-13-71
				Panel, #6-32 (bezel mtg.)	2B 6-38-71
				Panel, Cabinet Back (lined with acoustical material)	
				Model 649 (speaker compartment)	43D 308-12
				Model 649 (behind radio)	43D 308-13
				Leg, #9-1/2", Brass, PH (rear baffle board mtg.; Model 654)	1A 15-35-72
				Screw, #10-32x1 1/4" WHMS PH (record changer mtg.)	1A 100-10-71
				Screw, #10-32, 3/4" HH SEMS (radio chassis mtg.)	1A 152-47-71
				Screw, #10-32x1 1/4" WH PH (radio chassis mtg.; Model 649 only)	1A 153-28-71
				Speaker, Speaker (2 pin; center of holes 3/4" apart)	87A 86-1
				Socket, Speaker (2 pin; center of holes 3/4" apart)	87A 86-2
				Spacer, Rubber (for mtg. baffle board)	12A 90
				Spring, Record Changer Flat	405A 139-2

CABINET PARTS FOR COMBINED UNITS

Models 662, 663 and 664

Sym.	Description	Part No.	Sym.	Description	Part No.
M17	Socket, External Tape Input	88A 1		Capacitor, 4 mf, Cross-over	64B 13-5
M18	Socket, External Tape Input	88A 2		Clip, 45 RPM Spindle	11A 20
M19	Plug, Tape Output	88A 2-3		Cover, Speaker Plug (for M20 or M109)	88B 3-4
M14	Plug, Cabinet Pilot Light	82A 5-4		Dial Scale Window	23C 331-1
M15	Socket, Cabinet Pilot Light (with leads)	82A 11-11		Duplex Outlet and Line Cord Assembly	700B 157
M20	Plug, Master Channel Speaker	88B 3-5		Eutechtron, "Head of David"	23A 328
M21	Speaker, 12" PM, Woofer, 3.2 ohms voice coil impedance	78C 153-1		Grille Cloth	
M22	Speaker, 5 1/4" PM, Mid-Range, 16 ohms voice coil impedance	78C 150-3		Model 662	36D 86-91
M23	Speaker, 3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1		Model 663	36D 86-92
M25	Terminal Board, External Speaker (includes shorting bar)	10B 13-7		Model 664	36D 86-93
M102	Plug, Stereo Tape Output	88A 2-3		Grommet, Rubber (for mtg. radio chassis)	12A 2-3
M104	Socket, Stereo Tape Input	88A 1		Jewel, Pilot Light (green)	82A 10-8
M105	Socket, Stereo Tape Input	88B 3-5		Kepanul, #6-32 (bezel mtg.)	2A 19-17-1
M109	Plug, Speaker (5 pin)	88B 3-5		Kepanul, #8-32 (Aux. chassis mtg.)	2A 19-27-1
M110	Speaker, 12" PM, Woofer, 3.2 ohms voice coil impedance	78C 153-1		Knobs (for radio; front of cabt.)	2A 19-27-1
M111	Speaker, 5 1/4" PM, Mid-Range, 16 ohms voice coil impedance	78C 150-3		Control (On-Off-Treble, Bass, Loudness or Record Compensator)	33C 254-5
M112	Speaker, 3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance	78C 148-1		Balance	33C 254-17
S2	Switch, Record-Play	77A 20-3		Tuning	33B 291-1
S101	Bezel and Inlay (for radio)	23D 326-1		Knobs (for Aux. chassis; side of cabt.)	
	Bracket Radio Chassis Mtg.	15B 187-7		Bass	33C 254-13
				Treble	33C 254-15
				Leg, Mahogany, Model 662	35E 464-52
				Leg, Blond, Model 663	35E 464-53
				Leg, Sierra, Model 664	35E 464-54
				Line Cord	See Duplex Outlet and Line Cord
				Nut, Hex, #8-32 (speaker mtg.)	2A 1-13-71
				Panel, Cabinet Back (one side covered with acoustical material)	43D 308-8
				Screw, #8-32x1 1/4" (speaker mtg.)	1A 48-4-24
				Screw, #10-32x1 1/4" WHMS PH (changer mtg.)	1A 100-10-71
				Screw, #10-32, 3/4" HHMS (radio chassis mtg.)	1A 152-47-71
				Socket, Pilot Light (with leads)	84B 82-1
				Socket, Speaker (2 hole; center of holes 3/4" apart)	87A 86-1
				Socket, Speaker (2 hole; center of holes 3/4" apart)	87A 86-2

Sym.	Description	Part No.
M102	Plug, Stereo Tape Output	88A 2-3
M104	Socket, Stereo Tape Input	88A 1
M105	Socket, Stereo Tape Output	88A 1
M109	Plug, Speaker (5 pin)	88B 3-5

Sym.	Description	Part No.
M110	Speaker	
	12" PM, Woofer, 3.2 ohms voice coil impedance, Models SS622, SS623, SS624 and SS649	78C 153-1
	15" PM, Woofer, 3.2 ohms voice coil impedance, Models SS622, SS623, SS644 and SS671	78C 154-1
	10" PM, Woofer, 8 ohms voice coil impedance, Model SS644	78C 152-1
	5 1/4" PM, Mid-Range, 8 ohms voice coil impedance, Models SS622, SS623, SS624 and SS649	78C 152-1

Sym.	Description	Part No.
M111	Speaker	
	8" PM, Mid-Range, 16 ohms voice coil impedance, Models SS642, SS643, SS644 and SS671	78C 151-1
	10" PM, Woofer, 8 ohms voice coil impedance, Model SS654	78C 150-2
	4" PM, Mid-Range, 8 ohms voice coil impedance, Models SS622, SS623, SS624 and SS649	78C 149-1

Sym.	Description	Part No.
M112	Speaker	
	5 1/4" PM, Tweeter, 3.2 ohms voice coil impedance, Models SS642, SS643, SS644 and SS671	78C 150-1
	4" PM, Mid-Range, 16 ohms voice coil impedance, Model SS654	78C 149-2
	3 1/2" PM, Tweeter, 3.2 ohms voice coil impedance, Models SS622, SS623, SS624, SS649 and SS654	78C 148-1

Sym.	Description	Part No.
S101	Switch, Record-Play	77A 20-3
	Cable Assembly (15 feet long, shielded; includes plug and socket)	891B 81-1

Sym.	Description	Part No.
	*Cabinet	
	Model SS622, Mahogany	*35E 461-2
	Model SS623, Blond	*35E 461-3
	Model SS624, Sierra	*35E 461-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS642, Mahogany	*35E 462-2
	Model SS643, Blond	*35E 462-3
	Model SS644, Sierra	*35E 462-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS649, Mahogany	*35E 470-2
	Model SS649, Blond	*35E 465-4
	Model SS649, Sierra	*35E 471

Sym.	Description	Part No.
	*Cabinet	
	Model SS654, Mahogany	*35E 466-2
	Model SS654, Blond	*35E 466-3
	Model SS654, Sierra	*35E 466-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS671, Mahogany	*35E 467-2
	Model SS671, Blond	*35E 467-3
	Model SS671, Sierra	*35E 467-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS662, Mahogany	*35E 461-2
	Model SS662, Blond	*35E 461-3
	Model SS662, Sierra	*35E 461-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS663, Mahogany	*35E 462-2
	Model SS663, Blond	*35E 462-3
	Model SS663, Sierra	*35E 462-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS664, Mahogany	*35E 463-2
	Model SS664, Blond	*35E 463-3
	Model SS664, Sierra	*35E 463-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS669, Mahogany	*35E 470-2
	Model SS669, Blond	*35E 465-4
	Model SS669, Sierra	*35E 471

Sym.	Description	Part No.
	*Cabinet	
	Model SS654, Mahogany	*35E 466-2
	Model SS654, Blond	*35E 466-3
	Model SS654, Sierra	*35E 466-4

Sym.	Description	Part No.
	*Cabinet	
	Model SS671, Mahogany	*35E 467-2
	Model SS671, Blond	*35E 467-3
	Model SS671, Sierra	*35E 467-4

RECORD CHANGERS

RC688-16S, -17S AND -18S

Sym.	Description	Part No.
M1	Cartridge, Stereo Pick-up (includes 0007" (7 mil) sapphire microgroove and 003" (3 mil) sapphire standard needles; used on RC688-16S)	409B33-1-4
M1	Cartridge, Stereo Pick-up (includes 0007" (7 mil) diamond microgroove and 003" (3 mil) sapphire standard needles; used on RC688-17S)	409B33-2-1
M1	Cartridge, Stereo Pick-up (includes 0007" (7 mil) sapphire microgroove and 003" (3 mil) sapphire standard needles; used on RC688-18S)	409C 34-1
M2	Motor, Record Changer (4-speed, 4-pole)	407D29
M3	Plug, Record Changer Power (includes contacts and leads)	700B138-1
M5	Plug, Master Channel Photo Output (incl 35" shielded cable)	413C11-9
M6	Plug, Aux. Channel Photo Output (incl 35" shielded cable)	413C11-9-1
SS	Switch, Rej-On-Off (incl. cover)	408A1

Sym.	Description	Part No.
	Adapter, 45 RPM Record (Envelope of 3)	40A8-2
	Cable, Tone Arm, Shielded (12 wires and shield; for RC688-16S and -17S)	413A 17-2
	Cable, Tone Arm, Shielded (12 wires and shield; for RC688-18S)	413A 17-3
	Centerpost Assembly	400B651
	Control Knob (Black)	403A63-4
	Eutechtron, Phono, Silver (fits around turntable)	403D64-6
	Mat, Turntable, Rubber (Black)	466C24
	Needle, 0007" (7 mil) sapphire, microgroove (for 409B33-1 cartridge)	98C15-100
	Needle, 003" (3 mil) sapphire, standard (for 409B33-1 or 409B33-2 cartridge)	98C15-101
	Needle, 0007" (7 mil) diamond, microgroove (for 409B33-1 cartridge)	98C15-102
	Needle, 003" (3 mil) sapphire, standard (for 409B33-1 or 409B33-2 cartridge)	98C15-101
	Needle, 0007" (7 mil) diamond, microgroove (3 mil sapphire neck) (for 409C34-1 cartridge)	98C 95-2
	Needle, 0007" (7 mil) diamond, microgroove (3 mil sapphire neck) (for 409C34-1 cartridge)	98C 95-2
	Spindle, 45 RPM Adapter	400C686-1
	Spring, Float (changer mtg.)	405A139-2
	Tone Arm Rest (Black)	403A65-6

SCHEMATIC NOTES

② ③ etc. indicate production changes covered by a Run Number. Run numbers are stamped at rear of chassis. Brief description of Run changes given on schematic.
 (Y) (Z) etc. indicate alignment points and connections.

Important: Before making voltage measurements, see instructions below.

Fixed resistor values in ohms $\pm 10\%$ tolerance, $\frac{1}{2}$ watt; capacitor values shown in microfarads $\pm 20\%$ tolerance unless otherwise specified.

Note: K = x 1,000; MEG = x 1,000,000;
 MMF = microfarad.

VOLTAGE DATA

- All voltages measured on 117 volts AC, 60 cycle line with a vacuum-tube voltmeter.
- All voltages measured with respect to chassis ground except V9 filament voltage, primary winding voltages on T8 and T102 and heater voltages for tubes on 5T4A chassis.
- Set controls as shown on schematic diagrams.
- All voltages measured with FM antenna terminals shorted together and tuning dial set at low frequency end.
- For further notes regarding voltage readings, refer to schematic diagrams.

Figure 27. Schematic of 5T4A Amplifier Chassis Stamped Run 10.

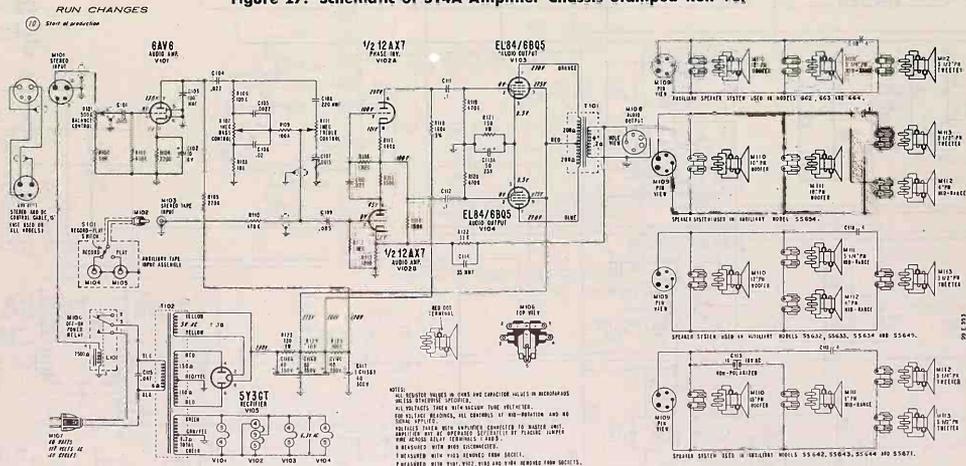
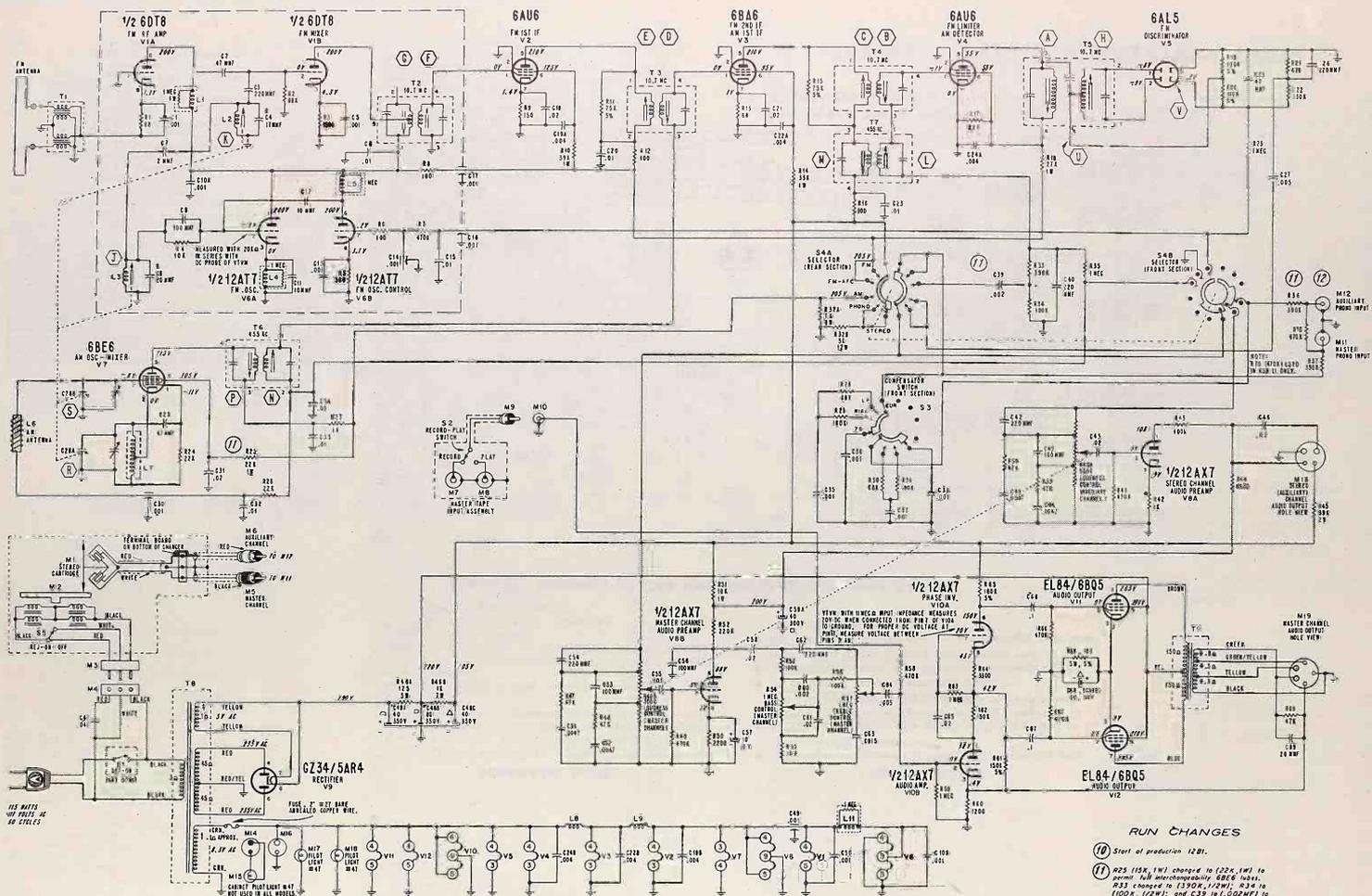
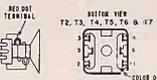
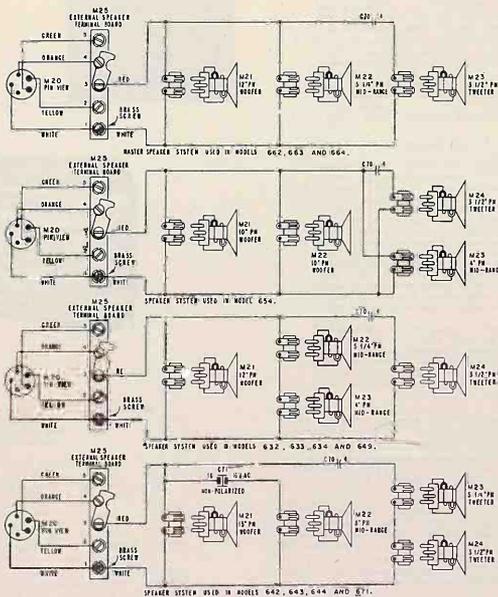


Figure 26. Schematic of 12B1 Radio Chassis Stamped Run 10 through 12.



- RUN CHANGES**
- ⑩ Start of production 12B1.
 - ⑪ R25 (5K, 1W) changed to (22K, 1W) to permit full interchangelability 6BE6 tubes. R33 changed to (1.5K, 1/2W), C34 to (100K, 12P), and C35 to (1,000µF) to improve 14M operation. R70 (470K, 1/2W) added between M11 and M12 to minimize hum.
 - ⑫ R70 (170K, 1/2W) removed to increase channel separation for stereo operation.



NOTES:

ALL RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

ALL WIRINGS TAKEN WITH INSULATION UNLESS OTHERWISE SPECIFIED.

FOR ALL WIRING HEADINGS, ALL CONTROLS AT MID-POSITION AND NO SIGNAL APPLIED.

SWITCH INDICATED AS "SELECT" FROM "ON" TO "OFF" AND "ON" SHOULD BE TAKEN WITH "SELECT" SWITCH IN "ON" OR "OFF" POSITION.

* MEASURED WITH RESPECT TO GROUND, AND UNCALIBRATED.

† MEASURED WITH ALL TUBES, EXCEPT V9, REMOVED FROM SOCKETS.

‡ MEASURED WITH V9 REMOVED FROM SOCKET.

§ -CHASSIS GROUND.

R-4 IS PART OF L2 ASSEMBLY, CH IS PART OF L3 ASSEMBLY.

23 & 24 WIREWOUND FROM HARD COPY, IN EXTREME COUNTER CLOCKWISE POSITION.

PM IF 40.7 MC; AM IF 435 KC.

Emerson Radio

SERVICE NOTE

SEPTEMBER, 1958

MODEL 896B

CHASSIS 120455B

MODELS 971, 971A, 970



MODEL 970

*MODEL 971A (NOT SHOWN)
DIFFERS FROM 971 ONLY
IN CABINET DIMENSIONS.



MODEL 971*



MODEL 896B

SPECIFICATIONS

TYPE: Stereophonic High-Fidelity Radio Phonograph Combination (Model 896B).

External Speaker System Enclosures (Models 971, 971A, 970)

FREQUENCY RANGE: 540-1620KC

TUBE TYPES:

V1 - 12AX7 - Dual-Channel Audio Amplifier
V2 - 25EH5 - Beam-Power Output (Right Channel)

A BRIEF DESCRIPTION OF STEREO

Stereophonic sound is to hearing what three-dimensional vision is to seeing. It adds the sensations of "depth" and "presence" to sound by recreating for the listener the spaciousness of the original sound in his own listening area.

Stereophonic sound is recorded simultaneously from two (or more) separate sources and then played back through two (or more) separate but integrated channels and speaker systems with the original sound-source distance approximated by the speakers. Thus, the conditions under which

the original recording was made are recreated and the stereophonic effect is produced.

The new "compatible" stereophonic records have two separate sound tracks in each groove. A stereo cartridge picks up individual impulses from both tracks in the record groove and feeds them separately through two single-channel amplifiers (or one stereophonic dual-channel amplifier) each channel of which feeds its own speaker system. Recommended speaker placement distance is from 8 to 15 feet apart, depending upon listening preferences of the user.

GENERAL DESCRIPTION

MODEL 896B is a stereophonic high-fidelity radio-phonograph combination incorporating a superheterodyne AM radio, dual-channel stereophonic/monaural amplifier, improved automatic 4-speed intermix record changer for stereophonic and monaural recordings, and a speaker system consisting of one 12" woofer, three tweeters, and an electrical crossover network.

Since the Model 896B has a completely self-contained stereo dual-channel amplifier it is only necessary to obtain an external speaker or speaker system for complete stereo reproduction. The external speaker or speaker system should have a voice coil impedance of 6 to 8 ohms. The following external speaker system enclosures were specifically designed to match Model 896B.

Model 971 is a matching console speaker enclosure incorporating a 3-speaker system consisting of one 12" woofer, two tweeters, and an electrical crossover network.

Model 970 is a table model speaker enclosure incorporating

a 3-speaker system consisting of one woofer, two tweeters, and an electrical crossover network.

Either model 971 or 970 can also be used as an external (remote) speaker system for existing monaural amplifiers having provisions for an external speaker system which has a voice coil impedance of 6 to 8 ohms.

These external speaker enclosures have incorporated an on-off switch (located on back cover of cabinet) for convenient cut-off of speaker at remote locations.

CAUTION: Be certain that the external speaker is in "on" position at all times except when used under conditions explained above.

CONTROLS:

The following controls are necessary to secure and maintain optimum stereo performance of this instrument. These are in addition to conventional (AM) selector and on-off/one controls.

- The Selector (function) switch has three settings: Stereo - Monaural (standard records) and (AM) radio.
- Stereo (fully counter-clockwise) - divides amplifier (dual-channel) into "right" and "left" channels to feed signals to "right" (internal) and "left" (external) speaker systems for stereophonic application (see schematic, page 2 of this note).
- Monaural - (center position) connects "right" and "left" channels of amplifier in parallel and permits conventional records of all four speeds to be played in standard fashion. (note: internal/external speaker system connections are independently controlled by speaker switch described below).
- Radio - allows reception of all standard AM broadcasts.

2. Speaker Switch - (located rear of cabinet) has three positions:

- Internal (up) - (using only self-contained speaker system for monaural use).
- External (down) - When two leads from external speaker system (model 971), for example, are connected to the screw terminals on strip provided, and the lever switch is swung to External, only the external (remote) speaker will function.
- Both - (Level) - Internal, external speaker systems both used (stereo) Connect external speaker leads matching color-code notation on strip to lead. If no color code is found, connect speaker leads and check for correct phasing. Speaker phasing for stereo is more critical and speaker polarity may be checked in the following manner: if color coding has not been used: Connect external leads. 2. Place familiar record on turntable. 3. Swing lever to "Both" position (activating both speaker systems). 4. While record plays on turntable, trace spoke external speaker lead connections several times. A crisp, fuller sound indicates correct phasing of speakers.

*NOTE:

Both speaker systems may also be used together or separately for monaural record application.

3. The Dual Loudness Control is used to balance the output of the two separate speaker systems so that neither predominates. When the speaker lever switch is in the "Both" (central) position, the inner knob controls volume of "right-hand" (internal) speakers and outer concentric-mounted knob controls "left-hand" (external) speakers. The knobs are designed to turn simultaneously as a linked control. If speaker output balancing is required, the individual knob sections may be independently rotated as indicated below.

To balance the output, set the "selector" at "STEREO" and the rear lever-switch at "BOTH", and put a monaural record on the turntable. Turn the outer loudness knob fully

counter-clockwise and hold it firmly with one hand to prevent rotation. Turn up the inner loudness knob clockwise, until the sound from the right-hand (internal) speaker is set for the desired volume level. Observe the dial scale number at which the knob indicator is set. Listen for a while to fix in mind the sound level and then turn the inner knob fully counter-clockwise, so the clockwise rotation of the right-hand speaker. While preventing inner knob movement with one hand, turn the outer knob clockwise until the sound level from the left-hand (external) speaker seems to be at the same volume level previously set for the right-hand speaker. Restrain the outer knob at this point and turn the inner knob to the previously noted scale number. The output from both speaker systems is now approximately the same. Overall loudness level can be adjusted by turning either knob without restraining the other, since both turn simultaneously normally. Any desired readjustments to compensate for individual listening preferences can be made by restraining one knob and turning the other.

Record Changer 819126 (or 819129), used in Model 896B, is a stereophonic/monaural four-speed intermix record changer. It will play stereo and monaural 33-1/3 RPM, 16, 45, and 78 RPM records automatically or manually. With the turntable speed control knob in the Speedminder (Changer 819126) or "Auto-Brain" (Changer 819129) position and the microgroove stylus set for use, the changer will automatically intermix and play 33-1/3 and 45 RPM records without regard to size or sequence. A total of ten records may be placed on the turntable.

The turntable automatically pauses during the changing cycle in order to eliminate record abrasion. When the changer is shut "off", or turns "off" automatically after the last record has been played, the idler wheel is automatically disengaged to prevent "flats" from developing.

*NOTE: The Auto-Brain (Changer 819129) has the following additional features: When Auto-Brain setting is used and the stylus selector lever is turned to the "78" (RPM) side, turntable speed will automatically be switched to 78 RPM and will remain at this speed so long as stylus selector lever is not changed to the L.P. position, even though a record of a different speed (33-1/3 for example) is dropped to the turntable. The resulting speed-distorted sound will indicate to the listener that the wrong stylus is being used and is a method of preventing record wear.

A stereophonic high-fidelity dual-head turnover ceramic cartridge with integrated sapphire-tipped styli has been incorporated into a damped, acoustically isolated tone arm. This cartridge may also be used for monaural records without adaptation.

In order to play 45 RPM records (with large hole in center), 45 RPM spindle attachment, (part #92330), should be used and can be obtained from Emerson distributor. The attachment fits over the existing spindle, enlarging its diameter to accommodate this type of record and eliminate the need for separate center-hole adaptors.

DISASSEMBLY PROCEDURE

AM Tuner and Amplifier Chassis

NOTE: To replace tubes, only masonite back cover need be removed.

- Remove all knobs and remove masonite back. Remove fiber support bracket.
- Remove four Phillips head screws securing AM tuner and amplifier chassis to cabinet. (On top)
- Slide off pilot lift assembly and remove leads for speaker system and loop antenna.
- Remove two screws securing A.C. interlock and its bracket to base of cabinet. (Unstaple fish paper wire holder).
- Remove screw holding AC interlock plug to chassis (chassis to record changer AC cord) and remove screws holding three position speaker-switching panel to back of cabinet.
- Remove live-zero plug from chassis and remove chassis from cabinet. (Top of Cabinet).
- Remove 4 screws holding masonite mounting board and control panel to chassis. In some isolated cases a metal

bracket will protrude thru the bottom of the chassis mounted masonite board. This bracket should be removed by untwisting the protruding portion until it lines up with the hole on the masonite board.

8. Remove masonite board/control panel from chassis. NOTE: The metal bracket should be removed from chassis and discarded. Exercise care in removal of this chassis mfg. bracket piece so that at no time will pressure be applied to etched printed circuit board chassis.

To reassemble, reverse procedure.

To Remove Changer:

- Snop two toggle bolt spring clips into a vertical position. These spring clips secure changer hold-down toggle bolts to mounting board (which is part of cabinet).
- Remove plug (interlocking) from changer.
- Remove AC interlock plug from chassis.
- Remove changer from cabinet.

NOTE: To reassemble, reverse procedure.

ADDITIONAL SERVICE HINTS

- No sound or intermittent sound:
Make certain electrical contacts to cartridge are clean. If any rosin is present on contact strips within cartridge holder, remove with alcohol.
- This changer automatically disengages the rubber idler wheels when allowed to operate through its normal cycle. To avoid defeating this feature, do not operate the off-lever when amplifier switch is in "off" position or line cord is disconnected from wall outlet.
- Do not turn amplifier switch "OFF" or disconnect line cord from wall outlet while changer is operating. Turn changer switch to "off" position first.

Failure to comply with above might result in damage to idler wheels or cause changer to fail to start when power is again applied.

IF ABOVE IS OVERLOOKED AND CHANGER FAILS TO START WHEN TURNED ON, SEVERAL SLIGHT TAPS ON TURNTABLE SHOULD CAUSE CHANGER TO COMMENCE OPERATION.

STYLUS REMOVAL

To Remove Stylus Cartridge:

- Lift tone arm and grasp cartridge with fingers.
- Pull cartridge out (cartridge and stylus are an integrated unit and cannot be removed or replaced separately).
- Reinsert new cartridge. Keying of cartridge is accomplished by lining up ridge on cartridge shafts to slot on holder (see Fig. 3, Stylus removal).

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.

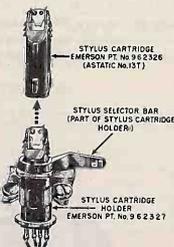


FIGURE 3 - STYLUS REMOVAL

ADJUSTMENTS

Tone Arm Height Adjustment (See Figure 4)

Tone arm height should be set so that the top of tone arm clears the lowest record on the spindle shelf (When changer is in cycle), and the lower edge of tone arm clears the rest post. To lower tone arm, turn height adjustment screw (a) clockwise. To raise tone arm, turn height adjustment screw (a) counter clockwise.

Stylus Pressure Adjustment (See Figure 4)

With tone arm in horizontal position, adjust knurled nut (b) clockwise to increase pressure and counter-clockwise to reduce pressure. Stylus pressure should be adjusted for 6 grams.

Needle Set-Down Adjustment (See Figure 4)

Adjust set-down screw (c) so that the stylus comes to rest on the lead in groove of record. Adjust clockwise to move stylus away from center or counter clockwise to move stylus towards center of record.

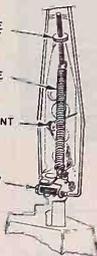


FIGURE 4 - UNDERSIDE VIEW, 819126 (819129) CHANGER TONE ARM, WITH ADJUSTMENT SETTINGS SHOWN

CHASSIS 120455B PARTS LIST

SYMB.	PART NO.	DESCRIPTION	SYMB.	PART NO.	DESCRIPTION
R-1	341534	82 MEGOHM-CARB. -10%	C-171	923554	047 MF-PAPER -120%
R-2	340892	800,000 OHM-TONE CONTROL-RIGHT CH.	C-18		VARIABLE CAPACITOR-R.F. SECTION
R-3	340892	800,000 OHM-TONE CONTROL-LEFT CH.	C-19A	900188	VARIABLE CAPACITOR-O.S.C. SECTION
R-4	340892	47,000 OHM-CARB. -10%	C-19B	923554	047 MF-PAPER -120%
R-5	340892	47,000 OHM-CARB. -10%	C-21	923514	.01 MF-DUREZ -20%
R-6	340892	2 MEGOHM-LOUDNESS CONTROL-RIGHT CH.	C-22	923514	.01 MF-DUREZ -20%
R-7	341512	2 MEGOHM-LOUDNESS CONTROL-LEFT CH.	C-23	923554	047 MF-PAPER -120%
R-8	351412	6.8 MEGOHM-CARB. -20%	C-24	923554	047 MF-MOLDED -120%
R-9	341132	470,000 OHM-CARB. -10%	C-25	923554	047 MF-PAPER -120%
R-10	341132	470,000 OHM-CARB. -10%	C-26	923554	047 MF-PAPER -120%
R-11	341132	470,000 OHM-CARB. -10%	V-1	800218	VACUUM TUBE - 12AX7
R-12	351032	33 OHM-CARB. -10%	V-2	800219	VACUUM TUBE - 25E8H
R-13	351032	470,000 OHM-CARB. -20%	V-3	800219	VACUUM TUBE - 25E8H
R-14	370132	33 OHM-CARB. -10%	V-4	800392	VACUUM TUBE - 6BE6
R-15	370372	330 OHM-CARB. -10%	V-5	800231	VACUUM TUBE - 6BA6
R-16	370132	33 OHM-CARB. -10%	V-6	807020	PILOE LIGHT - NO. 44
R-17	350972	100,000 OHM-CARB. -20%	P-1	950214	INTERLOCK PLUG
R-18	370132	160 OHM-TAPPED, WIRE WOUND 5%	P-2		CHANGER
R-19	370132	22 OHM FUSE-OHM (400 MA.)	S-1	500119	INTERLOCK TERMINAL LUG (2 ROD)
R-20	351532	22 MEGOHM-CARB. -20%	S-2	508024	S-PRONG PHONO SOCKET
R-21	350812	22,000 OHM-CARB. -20%	S-1	Pr. of R-2	ON/OFF SWITCH ON TONE CONTROL
R-22	351032	15 OHM-CARB. -10%	S-2	510145	3 POS. FUNCTION SWITCH
R-23	340252	15 OHM-CARB. -10%	S-3	510146	3 POS. SPEAKER SWITCH
R-24	341332	3.3 MEGOHM-CARB. -20%	T-1	734181	AUDIO OUTPUT TRANSFORMER
R-25	351212	1 MEGOHM-CARB. -20%	T-2		I.F. TRANSFORMER
R-26	350892	47,000 OHM-CARBON -20%	T-3	720259	LOOP ANTENNA
R-27	350252	100 OHM-CARBON -20%	T-4		OSCILLATOR COIL
CTA	Pr. of C19	TRIMMER R.F. SECTION	L-1	720146	SILICON RECTIFIER
CTB	Pr. of C19	TRIMMER, O.S.C. SECTION	L-2	716119	CRYSTAL DIODE IN294
C-1	928894	33 MF CERAMIC N 750	S-1	817079	SPEAKER, PM, 1/2 IN. (TWEETER)
C-2	928894	33 MF CERAMIC N 750	S-2	817061	SPEAKER, PM, 1 1/2 IN. (WOOFER)
C-3	928922	4.700 MF CERAMIC -120%	C-17	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-4	928922	4.700 MF CERAMIC -120%	C-18	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-5	928922	4.700 MF CERAMIC -120%	C-19	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-6	928922	4.700 MF CERAMIC -120%	C-20	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-7	928922	4.700 MF CERAMIC -120%	C-21	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-8	928922	4.700 MF CERAMIC -120%	C-22	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-9	928922	4.700 MF CERAMIC -120%	C-23	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-10	923514	.01 MF PAPER -20%	C-24	925391	4 MF-ELECTROLYTIC, NON POLARIZED
C-11	925461	250 MF-ELECTROLYTIC	SW-3	507006	PT. OF CHANGER (PHONO MOTOR SW)
C-12	925462	.022 MF-MYLAR -20%	401130		BRACKET, INTERLOCK
C-13	924524P	.022 MF-MYLAR -20%	413359		BRACKET, REAR SUPPORT
C-14	924524P	.022 MF-MYLAR -20%	413361		BRACKET, SIDE SUPPORT
C-15	925462	40 MF-ELECTROLYTIC	555037		TERMINAL STRIP, EXTERNAL SPEAKER
C-16	Pr. of C14	80 MF-ELECTROLYTIC	550646		MASONITE CHASSIS REST

CABINET PARTS LIST, MODEL 896B

Part No.	Description	Part No.	Description
Specify Color	Cabinet	700146	Loop Antenna
592070	Legs, Plastic	413246	Bracket, Pilot Light
607139	Grille Cloth	560632	Masonite Back
604042	Decal, Bandmaster	583015	Line Cord
461055	Medallion	413375	Control Panel
461088	Emerson Script	461074	Knob, Volume (outer)
604062	Stereo Hi-Fi (Script)	461075	Knob, Volume (inner)
413348	Name Plate	461082	Knob, Tuning
180191	45 RPM Adaptor Holder	461076	Knob, Tone, On-Off (phono - radio)
18192	Spee. or 12"	460935	Knob, Speaker Selector Switch
		542009	Tinnerman Slednut

CABINET PARTS LIST, MODELS 970, 971, 971A

Part No.	Description	970	971, 971A	Description
Specify Color	Cabinet	510141	510141	Switch, Slide
592070	Legs	412607A	412607A	Bracket, Switch
607139	Grille Cloth	180164A	180191	Speaker, 3 1/2" (2)
604042	Decal	925391	925391	Capacitor, Electrolytic, 4 Mfd, Non-Polarized
461055	Emerson Script	180165A		Speaker, 8 1/2"
461088	Emerson Script	592070	180192	Capacitor, Electrolytic, 4 Mfd, Non-Polarized
607096	Hi-Fi Script, Decal	560782	592070	Grille Cloth
607126	Back, Masonite	560784*	461088*	Script, Stereo Hi-Fi
560782	Back, Masonite		461091*	Script, Stereo Hi-Fi

*1 Used, Model 971 only
*2 Used, Model 971A only

STEREO RECORD CHANGER 819126 (819129) PARTS LIST*

Part No.	Description	Part No.	Description
862326	Cartridge with Stylus (Astatic 137)	862377	Nut, Adjustment, Stylus Pressure
862337	Cartridge Holder	862378	Screw, Adjustment, Stylus Pressure
862340	Tone Arm	962350	Spindle Assembly
862376	Spring, Stylus Pressure	962330	45 RPM Spindle Attachment (Optional Accessory)

*Refer to Record Changer 819126, 819129 Service Note for additional technical information.

Emerson Radio

SERVICE NOTE

JANUARY, 1958
MODEL 895B
CHASSIS 120431-B



MODEL 895

SPECIFICATIONS

Type: AM-FM Radio
Frequency Range: AM: 540 - 1620KC
FM: 88 - 108MC

Power Supply: 105-125 V. AC OR DC.
Voltage Rating: 105 - 125 volts
Power Consumption: AM-FM - 35 watts

GENERAL INFORMATION

Model 895B is an AM-FM table model radio incorporating one woofer, one tweeter and a continuously variable tone control. Built-in antennas for both AM and FM are provided plus external FM antenna input terminals. A phono input jack that can be actuated by a front panel-mounted function switch is also provided.

In the "AM" position, function switch SW-2 connects B+ to the AM converter tube (V-3) and places the AM detector load network in the detector circuit (Pins 1 and 7 of V-5).

In the "FM" position, B+ is applied to the FM tuner and V-5,

(2nd FM I.F. amplifier). In addition, the ratio detector output is coupled to the high side of the volume control.

In "Phono" position B+ is removed from both AM and FM I.F. sections and V-5, (2nd FM I.F. amplifier). The screen grid of V-7 (audio output tube) is connected to a different B+ source in this position and the audio input is connected to the phono jack output.

If replacements are made or the wiring disturbed in the R.F. section of the circuit, the receiver should be carefully realigned.

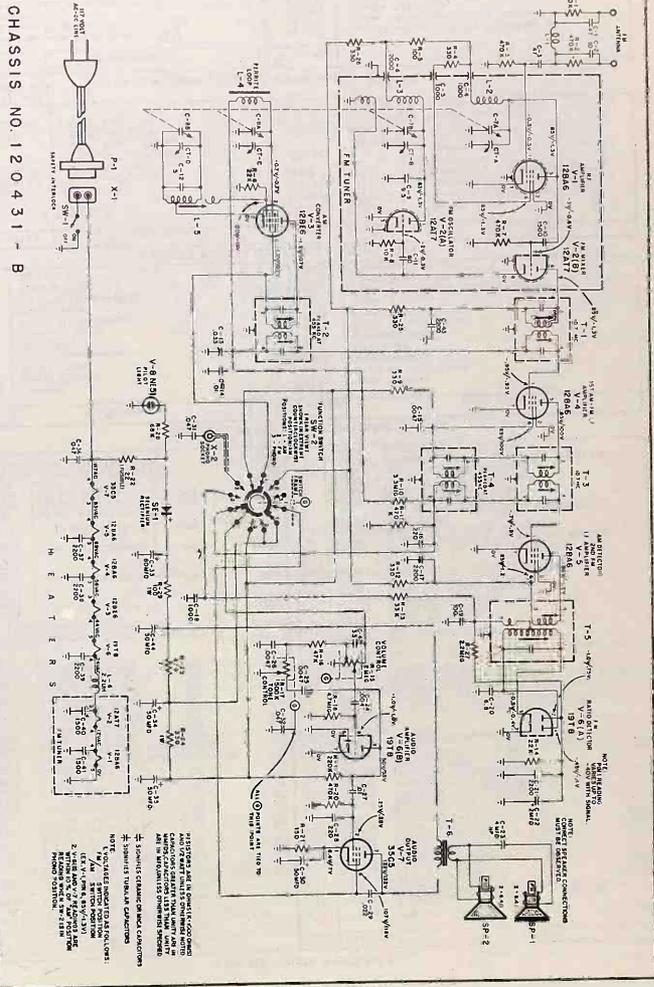
DISASSEMBLY INSTRUCTIONS

To Replace Tubes:

1. Remove line plug from wall outlet.
2. Remove screws from cabinet back.
3. Grasp line cord at point where it is connected to back and pull free of interlock. Remove back.

To Remove AM-FM Chassis

4. Steps 1-3 above.
5. Remove 3 control knobs and 1 tuning knob; disconnect built-in FM antenna and remove antenna terminal. Unsolder 2 speaker leads at chassis solder lug strip and unscrew chassis bolts from underside of cabinet. Unclip pilot light.



CONDITIONS FOR VOLTAGE AND RESISTANCE READINGS

- Voltages indicated are positive d.c., resistances in ohms, unless otherwise indicated.
- Measurements made with voltohmmeter or equivalent.
- All measurements taken from pin to chassis unless otherwise indicated.
- Voltage measurements taken under the following conditions:
 - Line voltage maintained at 117 volts a.c. only.
 - Tuning capacitor fully closed with no signal.
- Resistance measurements taken with:
 - Power Line and cord disconnected from outlet.
 - Loudness control set for maximum volume.
 - Nominal tolerance on component values makes possible a variation of $\pm 5\%$ in voltage and resistance readings.
 - M.C. denotes no connection, K is kilohms, M is megohms.
 - Readings given in FM/AM positions.

RESISTANCE CHART CHASSIS 120431B

TUBE	SW-2 POSITION	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1-12BA6	FM /AM	450K /450K	0 /0	0 /0	12 /12	*450 /*1NF	*800 /*1NF	0 /0	∞	-
V2-12AT7	FM /AM	*350 /1NF	10K /10K	0 /0	12 /12	24 /24	*330 /*1NF	450K /450K	0 /0	-
V3-12BE6	FM /AM	22K /22K	0.3 /0.3	58 /58	44 /44	*1NF /*115	*1NF /*10*	4M /4M	-	-
V4-12BA6	FM /AM	4M /4M	0 /0	58 /58	70 /70	*330 /*330	*330 /*330	0 /0	-	-
V5-12BA6	FM /AM	470K /470K	0 /0	70 /70	82 /82	*330 /*1NF	*330 /*1NF	0 /0	-	-
V6-19T8	FM /AM	2M /1NF	20K /20K	2M /1NF	24 /24	44 /44	0 /0	0 /0	4.7M /4.7M	*250K /*250K
V7-35C5	FM /AM	150 /150	470K /470K	82 /82	118 /118	-	*300 /*300	11M /11M	-	-

*Measured with low side of VTVM connected to Junction R24, C35 (B+ point)
 †Measured to chassis - wait until meter settles (about 30 seconds)

GENERAL ALIGNMENT INSTRUCTIONS

Set Function Switch (SW-2) as indicated. Output of signal generator should be no higher than necessary to obtain an output reading with a 40% modulated R.F. signal. Use an insulated alignment screwdriver and plastic hex tool (for T-1, T-3). Volume control at maximum CW position.

AM ALIGNMENT INSTRUCTIONS - SW-2 IN "AM" POSITION

Step	Sig. Gen. Coupling	Sig. Gen. Frequency	Radio Dial Setting	Output Meter VTVM or Scope	Adjust	Remarks
1	High side to grid end of L-4 low side to chassis thru 0.25 mfd. cap.	455KC	Tuning Cap fully open (no signal)	Across speaker voice coil	T-2 T-4 top and bottom	Adjust for maximum output
2	Form loop of several turns and radiate signal into receiver	600KC	600KC	Across speaker voice coil	T-3	Adjust for maximum output
3	"	1638KC	Tuning Cap fully open	Across speaker voice coil	CT-D osc. trimmer	Adjust for maximum output
4	"	1420KC	1420KC	Across speaker voice coil	CT-C R.F. trimmer	Adjust for maximum output

FM ALIGNMENT INSTRUCTIONS - (Using AM GEN. & VTVM) - SW-2 IN "FM" POSITION

Step	Marker Gen. Coupling	Marker Gen. Frequency	Radio Dial Setting	VTVM Placement	Adjust	Remarks
1	Raise 12AT7 (V-2) shield slightly off ground and clip marker gen. high side to shield and low side to chassis thru 0.25 mfd. cap.	10.7 MC (no mod.)	Extreme CCW Position (no signal)	Across C-22 2 mfd. stabilizer capacitor (neg. scale)	T-1, T-3 top and bottom T-5 bottom	Adjust for maximum neg. voltage, keeping gen. output for readings below 2.5V.
2	Raise 12AT7 (V-2) shield slightly off ground and clip marker gen. high side to shield and low side to chassis thru 0.25 mfd. cap.	10.7 MC (no mod.)	Extreme CCW Position (no signal)	Connect two matched 100K ohm, 1/2 watt resistors in series across C-22. Then place VTVM high side to junction R-13, C-18 and low side to junction of two 100K ohm resistors.	T-5 top	Adjust for 0 volts with \pm readings on either side.

FM ALIGNMENT INSTRUCTIONS (USING SWEEP AND MARKER GEN. AND SCOPE)

SW-2 in "FM" position. Sweep generator set for ± 300 KC frequency deviation and Marker injection level kept below point where distortion of response curve occurs.

Step	Gen. Coupling	Gen. Freq.	Radio Dial Setting	Scope	Adjust	Remarks
1	Raise 12AT7 (V-2) shield off ground and clip high side of sweep and marker gen. to shield low side to chassis thru 0.25 mfd. cap.	Sweep Center freq. 10.7 MC Marker set at 10.7 MC (no mod.)	Extreme CCW (no signal)	Highside to Pin 2 of V6, low side to chassis (disconnect negative end of C22)	T-1 T-3 top & bot. T-5 bot.	Adjust for max. gain and symmetry
2	Sweep & Marker high sides connected to pin 1 of V-5 - low side to chassis thru 0.25 mfd. cap.	Sweep center freq. 10.7 MC Marker set at 10.7 MC (no mod.)	Extreme CCW (no signal)	Connect C22 back in circuit. Highside to junct. of R13 and C18, low side to chassis	T-5 Top	Adjust for response as per Fig. #2

AM-FM TUNING-TRACKING

With tuning shaft (drive shaft) completely CCW, AM tuning capacitor should be in maximum capacity position and FM tuning slugs should be in maximum "in" position. In this position, set screw in nylon worm gear is accessible for tightening through hole in plate and spring.

FM TRACKING (ELECTRICAL)

Ordinarily the only FM front end adjustment that might become necessary due to oscillator tube change would be CT-B, FM oscillator trimmer which is accessible through a hole provided in the tuner shield. This trimmer should be adjusted at 108MC with the tuning dial set at that frequency. This should be done only if the oscillator is off proper frequency.

Should components or wiring be changed, a complete FM front-end alignment might be necessary as follows:

Function Switch (SW-2) in "FM" position; tuner shield bent up for tuning purposes, but not removed (use a non-metallic screw driver).

Step	Marker Generator Coupling	Marker Generator Freq.	Radio Dial Setting	VTVM	Adjust	Remarks
1	FM Ant.	108 MC	108 MC (slugs out)	Across C-22	CT-B CT-A	Adjust for max. neg. reading, keeping gen. input level for voltage reading below 2.5V.
2	FM Ant.	88 MC	88 MC (slugs in)	Across C-22	L-3 L-2	Adjust for max. neg. reading by spreading or compressing slugs. Caution: Do not alter spacing between L-3 and mixer coupling loop.
3	Repeat Steps 1 and 2.					

PHYSICAL FM TRACKING

This is only possible to perform if and when a new slug assembly is installed. FM osc. slug (C-78) is fixed to a plastic bar, but FM-R.F. slug (C-7A) is on a threaded flexible shaft. For correct physical tracking, both slugs should just cover glass dielectric window section simultaneously. Then, crimp R.F. slug shaft as close to plastic bar as possible on front side (see Fig. 5), and cut all but 1/8" of excess shaft length.

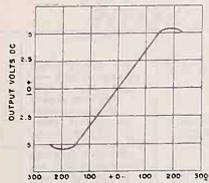


Fig. 2 - FM RATIO DETECTOR CHARACTERISTICS

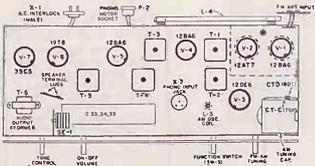
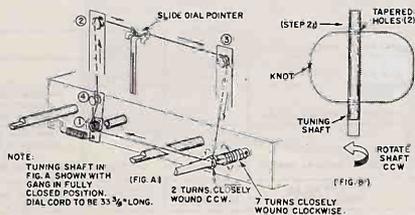


Fig. 3 - TUBE AND TRIMMER LOCATIONS



NOTE: TUNING SHAFT IN FIG. 4 SHOWN WITH GANGS IN FULLY CLOSED POSITION. DIAL CORD TO BE 33 3/4" LONG. 2 TURNS CLOSELY WOUND CCW. 7 TURNS CLOSELY WOUND CLOCKWISE.

- TO STRING DIAL:
1. STRING THROUGH SMALLER DIAMETER OF TAPERED HOLES (FIG. 3) AND KNOT.
 2. PULL KNOT THROUGH HOLE (FIG. 3) AND ROTATE SHAFT COUNTERCLOCKWISE UNTIL GANGS IS FULLY CLOSED.
 3. WIND 7 REAR TURNS COUNTERCLOCKWISE.
 4. LOOP STRING OVER PULLEY (O) AND STUDS (O) AND (O) (FIG. 4).
 5. WIND 2 FRONT TURNS COUNTERCLOCKWISE WORKING TOWARDS FRONT OF SHAFT.
 6. STRING LOOPED CORD UNDER PULLEY (O) (FIG. 4).

Fig. 4 - DIAL CORD STRINGING

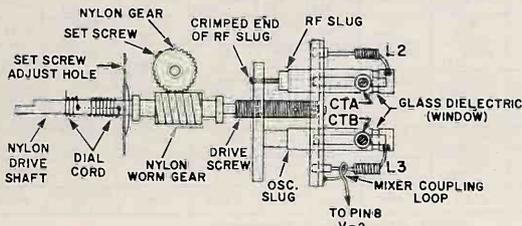


Fig. 5 - BOTTOM VIEW OF TUNER (IN MAX. CW POSITION WITH SHIELD REMOVED)

MECHANICAL TUNER PARTS (ELECTRICAL PARTS LISTED IN CHASSIS PARTS LIST)

- | | |
|------------------------------|--------------------------------------|
| 471066 - Slug Assembly | 413064 - Flat Spring |
| 460961 - Drive Shaft (Nylon) | 460962 - Gear (Nylon) with set screw |
| 265112 - Drive Screw | 275095 - Thrust Washer, Rear |
| 413065 - Shaft Plate | 275096 - Thrust Washer, Front |

CHASSIS PARTS LIST, CHASSIS 120431B

SYMB.	PT. NO.	DESCRIPTION	LIST PRICE	SYMB.	PT. NO.	DESCRIPTION	LIST PRICE
R-1	351132	470,000 OHM-CARBON	±20% 1/2W.	C-26	928922	.0047 MFD-CERAMIC DISK	120% 500V.
R-2	351132	470,000 OHM-CARBON	±20% 1/2W.	C-27	928924	.01 MFD-CERAMIC DISK Z5U	500V.
R-3	PART	470,000 OHM-CARBON	±20% 1/2W.	C-28	928914	220 MMF-CERAMIC DISK	±20% 500V.
R-4	OF	330 OHM-CARBON	±10% 1/2W.	C-29	923524	.022 MFD-PAPER	120% 400V.
R-5	TUNER	100 OHM-CARBON	±10% 1/2W.	C-30	925433	50 MFD-ELECTROLYTIC	25V.
R-6	340812	22,000 OHM-CARBON	±10% 1/2W.	C-31	923754	.047 MFD-PAPER	±20% 600V.
R-7	PART OF	470,000 OHM-CARBON	±20% 1/2W.	C-32	923754	.047 MFD-PAPER	±20% 600V.
R-8	TUNER	10,000 OHM-CARBON	± 5% 1/2W.	C-33	925432	80 MFD-ELECTROLYTIC	150V.
R-9	350372	330 OHM-CARBON	±20% 1/2W.	C-34	PT. OF C-33	50 MFD-ELECTROLYTIC	150V.
R-10	351332	3.3 MEGOHM-CARBON	±20% 1/2W.	C-36	922208	.047 MFD-MOLDED (D.L. BYPASS)	1600V.
R-11	351132	470,000 OHM-CARBON	±20% 1/2W.	C-37	928921	.0222 MFD-CERAMIC DISK	±20% 500V.
R-12	350372	330 OHM-CARBON	±20% 1/2W.	C-38	928921	.0022 MFD-CERAMIC DISK	±20% 500V.
R-13	340852	33,000 OHM-CARBON	±10% 1/2W.	C-39	928921	.022 MFD-CERAMIC DISK	±20% 500V.
R-14	340812	22,000 OHM-CARBON	±10% 1/2W.	C-40	PART OF	1,500 MFD-CERAMIC DISK	500V.
R-16	350372	330 OHM-CARBON	±20% 1/2W.	C-41	TUNER	1,500 MFD-CERAMIC DISK	500V.
R-17	350892	47,000 OHM-CARBON	±20% 1/2W.	C-42	928921	33 MMF-CERAMIC DISK	±10% 500V.
R-18	350372	500,000 OHM-TONE CONTROL		C-43	928921	.0222 MFD-CERAMIC DISK	±10% 500V.
R-19	351052	4.7 MEGOHM-CARBON	±20% 1/2W.	C-44	925447*	30 MFD-ELECTROLYTIC	150V.
R-20	351132	220,000 OHM-CARBON	±20% 1/2W.			*MAY BE PART OF C-33 ON SOME SETS.	
R-21	394207	150 OHM-FUSE OHM	±10% 1/2W.				
R-22	397121	22 OHM-FUSE OHM	±10%				
R-23	394208	470 OHM-WIRE WOUND	±10% 7W.				
R-24	380372	330 OHM-CARBON	±20% 1W.	V-1	800524	VACUUM TUBE 12BA6 (FM TUNER)	
R-25	350372	330 OHM-CARBON	±20% 1/2W.	V-2	800047	VACUUM TUBE 12A7	
R-26	PT. OF TUNER	330 OHM-CARBON	±20% 1/2W.	V-3	800525	VACUUM TUBE 12BE6	
R-27	351292	2.2 MEGOHM CARBON	±20% 1/2W.	V-4	800524	VACUUM TUBE 12BA6	
R-28	340932	68,000 OHM-CARBON	±10% 1/2W.	V-5	800524	VACUUM TUBE 12BA6	
R-29	370552	100 OHM-CARBON	±10% 1W.	V-6	800529	VACUUM TUBE 19T8	
				V-7	800021	VACUUM TUBE 35C5	
C-1	928959	47 MMF-CERAMIC U.L.	±20%	SE-1	817072	SELENIUM RECTIFIER	1.80
C-2	928968	10 MMF-CERAMIC U.L.	±10%		471064	FM TUNER ASSEMBLY	21.00
C-3	928960	47 MMF-CERAMIC U.L.	±10% 500V.				
C-4	962227	1,000 MMF-FEED-THRU					
C-5	962227	1,000 MMF-FEED-THRU		L-1	710034	FM ANTENNA COIL	.15
C-6	962228	2,000 MMF-FEED-THRU		C-2	PART OF	RF COIL (FM)	
C-7	PART OF			L-3	TUNER	OSC. COIL (FM)	
C-7B	TUNER			L-4	700134	BARLOOP ANTENNA	4.70
C-8A	900175	VARIABLE CAPACITOR-R.F. SECTION	3.05	W-5	716122	OSCILLATOR COIL	4.70
C-8B	PT. OF C-8A	VARIABLE CAPACITOR-OSC. SECTION		S-6	705029	FILAMENT CHOKER	.15
C-8C	PT. OF C-8A						
C-8D	PT. OF C-8A			T-1	720307	1ST AM I.F. TRANSFORMER	1.60
C-9	962229	9.5 MMF-DISC N-80		T-2	720075	1ST AM I.F. TRANSFORMER	1.75
C-10	PART OF	1,500 MMF-DISC		T-3	720307	2ND AM I.F. TRANSFORMER	1.60
C-11	TUNER	80 MMF-DISC		T-4	720075	2ND AM I.F. TRANSFORMER	1.75
C-12	928967	5 MMF-CERAMIC DISK-N-1400 ±10% 500V.	.20	T-5	709341	RATIO DETECTOR TRANSFORMER	2.30
C-13	923934	.033 MFD-PAPER	±20% 500V.	T-6	734164	AUDIO OUTPUT TRANSFORMER	1.60
C-14	928924	.01 MFD-CERAMIC DISK Z5U	500V.				
C-15	928922	.0047 MFD-CERAMIC DISK	±20% 500V.	SP-2	180184	SPEAKER-PM-10 X 2-1/2"	
C-16	928914	.020 MFD-CERAMIC DISK	±20% 500V.				
C-17	928921	.0022 MFD-CERAMIC DISK	±20% 500V.				
C-18	928919	.001 MFD-CERAMIC DISK	±20% 500V.	P-1	583075	INTERLOCK SOCKET A LINE CORD	
C-19	928912	100 MMF-CERAMIC DISK	±20% 500V.	X-2	505014	INTERLOCK PLUG	
C-20	928902	6.8 MMF-CERAMIC DISK	± 5% 500V.	X-2	500100	PHONO SOCKET	
C-21	928921	.0022 MFD-CERAMIC DISK	±20% 500V.				
C-22	925434	4 MFD-ELECTROLYTIC	50V.		413067	TUBE SHIELD FOR 12BA6	.10
C-23	925391	4 MFD-ELECTROLYTIC NP	50V.		413066	TUBE SHIELD FOR 12A77	.10
C-24	928922	.0047 MFD-CERAMIC DISK	±20% 500V.		819107	4-SPEED CHANGER	
C-25	928922	.0047 MFD-CERAMIC DISK	±20% 500V.				

CABINET PARTS LIST, MODEL 8928

PART NO.	DESCRIPTION
592064A	Cabinet - Specify color
413223	Grille Cloth
684054	Control Panel
562519	Medallion
180184	Felt Feet
180184	Speaker - 2 1/2" x 10"
180185	Speaker - 3 1/2" x 10"
925391	Electrolytic Capacitor, 4 MFD, NP
413162	Pilot light bracket
506012	Masonite back
583075	Line cord
460997A	Knob - Vol. Tone
460999A	Knob - Tuning
460998A	Knob - Switch-Phono-Am-Fm

Firestone

PORTABLE RADIO PHONOGRAPH

STOCK NO. 4-V-17
CODE NO. 1-8-3RP8

OPERATING INSTRUCTIONS, SERVICE MANUAL AND PARTS CATALOG

IMPORTANT: Do not lose or destroy these instructions. Read them carefully and keep for future reference and correct needle replacement.

IMPORTANT: This instrument is designed to operate from a 105-125 volt 60 cycles AC power source only. In any doubt check with your local power company before connecting the instrument.

TO OPERATE RADIO

1. Turn ON-OFF VOLUME knob clockwise and wait until set warms up. Then push RADIO-PHONO SLIDE SWITCH to radio position. The turntable will not revolve with switch in this position. It will revolve with switch in phono position only.

2. Tune STATION SELECTOR DIAL knob so that arrow points to desired station, and adjust volume to your preference.

NOTE: This model has an external antenna connection for remote pickup.

TO OPERATE PHONOGRAPH

1. Place record on turntable. Move speed indicator to proper speed (33 1/3, 45, or 78).

NOTE: The wrong speed may cause damage to the record, so be SURE to use correct speed.

2. Then place pick up arm on start of record. Push RADIO-PHONO SLIDE SWITCH to PHONO. This will start the motor.

3. Adjust the volume control to your preference.

NOTE: If a 45 RPM record is used, twist adapter counterclockwise to raise it and fit record onto adapter.

4. To shut unit off turn ON-OFF VOLUME Knob counter-clockwise until switch clicks off.

DO NOT DROP PICK UP ARM ON RECORD. This can cause damage to cartridge, needle or record.

Put pick up arm into arm rest before closing the cabinet.

STOCK NO. 4-V-17

CODE NO. 1-8-3RP8

SPECIFICATIONS

Cabinet Dimensions	Width 12 in., Height 5 in., Length 10 in.
Shipping Weight	8 lbs.
Power Supply	105-125 volts AC 50/60 cycles
Tuning Range	Standard Broadcast Band
Intermediate Frequency	455 KC
Loud Speaker	4 in. P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles
Power Output	Maximum 1.8 watts
Tube Complement	1 — 12AU6—Converter 1 — 12AV6—Detector—1st Audio 1 — 50C5—Power Amplifier 1 — 35W4—Rectifier

For alignment or repairs, remove motor board by unscrewing 4 Phillipshead motorboard bolts.

ALIGNMENT

A. Equipment

The following equipment is necessary for proper alignment:

1. Signal Generator that will provide the test frequencies as listed, modulated 400 cycles 30%.
2. Non-metallic screwdriver.
3. Output Meter.

B. Test Set Up

Volume control—maximum, all adjustments
No signal applied to antenna.

Connect .01 condenser in series with output lead of signal generator.
Connect ground lead of signal generator to common ground above chassis.
Connect Output Meter across Voice Coil.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER TO BE ADJUSTED	TRIMMER ADJUSTMENT
Fully open	455 KC	.1 MFD	12AU6 Grid	IF Top and Bottom	Maximum
Fully open	1620 KC		Loosely couple generator to "Loop Antenna"	Osc. section of tuning condenser	Maximum
Tune in signal 1400 KC from generator.			Loosely couple generator to "Loop Antenna"	Ant. section of tuning condenser	Maximum

TO CHANGE NEEDLE:

Raise tone arm to vertical position. Needle is held by small screw on cartridge. Loosen screw, remove defective needle and replace.

NOTE: For best results use exact replacement needle and cartridge.

IMPORTANT — Set Speed Selector lever to "OFF" position when unit is not in use. This will help to prevent flat spots from developing on idler wheel.

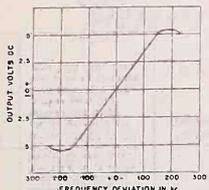


Fig. 2 - FM RATIO DETECTOR CHARACTERISTICS

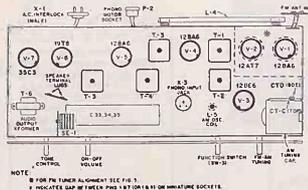
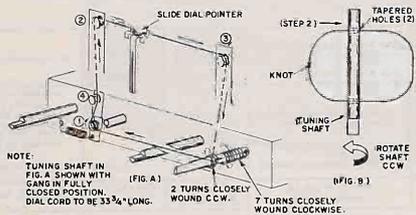


Fig. 3 - TUBE AND TRIMMER LOCATIONS



- NOTE: TUNING SHAFT IN FIG. 4 SHOWN WITH DIAL CORD TO BE 33% LONG. 2 TURNS CLOSELY WOUND CCW. 7 TURNS CLOSELY WOUND CLOCKWISE.
- TO STRING DIAL:
1. STRING THROUGH SMALLER DIAMETER OF TAPERED HOLES (FIG. B) AND KNOT.
 2. PULL KNOT THROUGH HOLE (FIG. B) AND ROTATE SHAFT COUNTERCLOCKWISE UNTIL GANG IS FULLY CLOSED.
 3. WIND 7 REAR TURNS CLOCKWISE.
 4. LOOP STRING OVER PULLEY (O) AND STUDS (X) AND (FIG. 4A).
 5. WIND 2 FRONT TURNS COUNTERCLOCKWISE WORKING TOWARDS FRONT OF SHAFT.
 6. STRING LOOPED CORD UNDER PULLEY (O) (FIG. 4).

Fig. 4 - DIAL CORD STRINGING

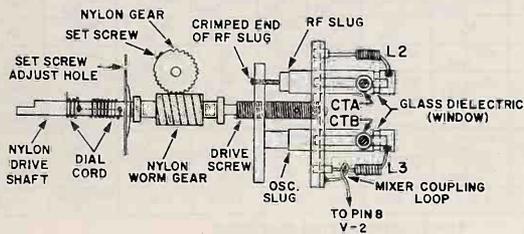


Fig. 5 - BOTTOM VIEW OF TUNER (IN MAX. CW POSITION WITH SHIELD REMOVED)

MECHANICAL TUNER PARTS (ELECTRICAL PARTS LISTED IN CHASSIS PARTS LIST)

- | | |
|------------------------------|--------------------------------------|
| 471066 - Slug Assembly | 413064 - Flat Spring |
| 460961 - Drive Shaft (Nylon) | 460962 - Gear (Nylon) with set screw |
| 265112 - Drive Screw | 275095 - Thrust Washer, Rear |
| 413065 - Shaft Plate | 275096 - Thrust Washer, Front |

CHASSIS PARTS LIST, CHASSIS 120431B

SYMB.	PT. NO.	DESCRIPTION	LIST PRICE	SYMB.	PT. NO.	DESCRIPTION	LIST PRICE
R-1	351132	470,000 OHM-CARBON	±20% 1/2W.	C-26	928922	.0047 MFD-CERAMIC DISK	±20% 500V.
R-2	351132	470,000 OHM-CARBON	±20% 1/2W.	C-27	928924	.01 MFD-CERAMIC DISK	±20% 500V.
R-3	PART	470,000 OHM-CARBON	±20% 1/2W.	C-28	928916	.220 MFD-CERAMIC DISK	±20% 500V.
R-4	OF	330 OHM-CARBON	±10% 1/2W.	C-29	923524	.022 MFD-PAPER	±20% 400V.
R-5	TUNER	100 OHM-CARBON	±10% 1/2W.	C-30	925433	50 MFD-ELECTROLYTIC	25V.
R-6	340812	22,000 OHM-CARBON	±10% 1/2W.	C-31	923754	.047 MFD-PAPER	±20% 600V.
R-7	PART OF	470,000 OHM-CARBON	±20% 1/2W.	C-32	925432	80 MFD-ELECTROLYTIC	150V.
R-8	TUNER	10,000 OHM-CARBON	±5% 1/2W.	C-34	PT. OF C-33	50 MFD-ELECTROLYTIC	150V.
R-9	350772	330 OHM-CARBON	±20% 1/2W.	C-35	923754	.047 MFD-PAPER	±20% 600V.
R-10	351332	3.3 MEGOHM-CARBON	±20% 1/2W.	C-36	922208	.047 MFD-MOLDED (U.L. BYPASS) 600V.	35
R-11	351132	470,000 OHM-CARBON	±20% 1/2W.	C-37	928921	.0022 MFD-CERAMIC DISK	±20% 500V.
R-12	350772	330 OHM-CARBON	±20% 1/2W.	C-38	928921	.0022 MFD-CERAMIC DISK	±20% 500V.
R-13	340812	33,000 OHM-CARBON	±10% 1/2W.	C-39	928921	.0022 MFD-CERAMIC DISK	±20% 500V.
R-14	340812	22,000 OHM-CARBON	±10% 1/2W.	C-40	PART OF	1,500 MFD-CERAMIC DISK	800V.
R-15	390537	2 MEGOHM-VOLUME CONTROL	±20% 1/2W.	C-41	TUNER	1,500 MFD-CERAMIC DISK	800V.
R-16	350892	47,000 OHM-TONE CONTROL	±20% 1/2W.	C-42	928894	33 MFD-CERAMIC DISK	±10% 500V.
R-17	390538	500,000 OHM-TONE CONTROL	±20% 1/2W.	C-43	928921	.0022 MFD-CERAMIC DISK	±10% 500V.
R-18	351372	4.7 MEGOHM-CARBON	±20% 1/2W.	C-44	925447*	30 MFD-ELECTROLYTIC	150V.
R-19	351082	220,000 OHM-CARBON	±20% 1/2W.			*MAY BE PART OF C-33 ON SOME SETS.	
R-20	351132	470,000 OHM-CARBON	±20% 1/2W.				
R-21	394207	150 OHM-FUSE OHM	±10% 1/2W.				
R-22	397121	22 OHM-FUSE OHM	±10% 1/2W.				
R-23	394208	470 OHM-WIRE WOUND	±10% 1/2W.	V-1	800524	VACUUM TUBE 12BA6 (FM TUNER)	
R-24	380372	330 OHM-CARBON	±20% 1W.	V-2	800047	VACUUM TUBE 12AT7	
R-25	350372	330 OHM-CARBON	±20% 1/2W.	V-3	800525	VACUUM TUBE 12BE6	
R-26	PT. OF TUNER	330 OHM-CARBON	±20% 1/2W.	V-4	800524	VACUUM TUBE 12BA6	
R-27	351292	2.2 MEGOHM CARBON	±20% 1/2W.	V-5	800524	VACUUM TUBE 12B6A	
R-28	340932	68,000 OHM-CARBON	±10% 1/2W.	V-6	800029	VACUUM TUBE 19B	
R-29	370253	100 OHM-CARBON	±10% 1W.	V-7	800021	VACUUM TUBE 35C5	
C-1	928969	47 MFM-CERAMIC U.L.	±20%	SE-1	817072	SELENIUM RECTIFIER	1.80
C-2	928968	10 MFM-CERAMIC U.L.	±10%		471064	FM TUNER ASSEMBLY	21.00
C-3	928960	47 MFM-CERAMIC	±10% 500V.				
C-4	962227	1,000 MFM-FEED-THRU		L-1	710034	FM ANTENNA COIL	.15
C-5	962227	1,000 MFM-FEED-THRU		L-2	PART OF	RF COIL (FM)	
C-6	962228	2,000 MFM-FEED-THRU		L-3	TUNER	OSC. COIL (FM)	
C-7A	PART OF	VARIABLE CAPACITOR-R.F. SECTION	3.05	L-4	700134	BARLOOP ANTENNA	1.70
C-7B	TUNER	VARIABLE CAPACITOR-OSC. SECTION		L-5	716122	OSCILLATOR COIL	.70
C-8A	900175	VARIABLE CAPACITOR-R.F. SECTION		L-6	705029	FILAMENT CHOKER	.15
C-8B	PT. OF C-8A	VARIABLE CAPACITOR-OSC. SECTION		T-1	720307	1ST FM I.F. TRANSFORMER	1.60
C-9	962229	9.5 MFM-DISK N-80		T-2	720075	1ST AM I.F. TRANSFORMER	1.75
C-10	PART OF	1,500 MFM-DISK		T-3	720307	2ND FM I.F. TRANSFORMER	1.60
C-11	TUNER	80 MFM-DISK		T-4	720075	2ND AM I.F. TRANSFORMER	1.75
C-12	928957	5 MFM-CERAMIC DISK N-1400 ±10% 500V.	.20	T-5	703341	RATIO DETECTOR TRANSFORMER	2.38
C-13	923534	.033 MFD-PAPER	±20% 500V.	T-6	734164	AUDIO OUTPUT TRANSFORMER	1.60
C-14	928924	.01 MFD-CERAMIC DISK ±20% 500V.	.20	SP-1	180185	SPEAKER-PM-3 1/2"	
C-15	928922	.0047 MFD-CERAMIC DISK ±20% 500V.	.20	SP-2	180184	SPEAKER-PM-10 X 2-1/2"	
C-16	928914	.220 MFD-CERAMIC DISK ±20% 500V.	.20	SW-1	PT. OF R-15	ON-OFF SWITCH	
C-17	928921	.0022 MFD-CERAMIC DISK ±20% 500V.	.20	SW-2	510133	FUNCTION SWITCH	
C-18	928919	.001 MFD-CERAMIC DISK ±20% 500V.	.20	P-1	583075	INTERLOCK SOCKET & LINE CORD	
C-19	928912	100 MFM-CERAMIC DISK ±20% 500V.	.20	P-2	585233	SOCKET & CABLE ASSEMBLY	
C-20	928902	6.8 MFM-CERAMIC DISK ±5% 500V.	.20	X-1	505014	INTERLOCK PLUG	
C-21	928921	.0022 MFD-CERAMIC DISK ±20% 500V.	.20	X-2	508100	PHONE SOCKET	
C-22	924934	5 MFD-ELECTROLYTIC	50V.		413067	TUBE SHIELD FOR 12BA6	.10
C-23	925391	4 MFD-ELECTROLYTIC NP	50V.		413066	TUBE SHIELD FOR 12AT7	.10
C-24	928922	.0047 MFD-CERAMIC DISK ±20% 500V.	.20		819107	4-SP-EEB CHANGER	
C-25	928922	.0047 MFD-CERAMIC DISK ±20% 500V.	.20				

CABINET PARTS LIST, MODEL 8958

PART NO.	DESCRIPTION
592064A	Cabinet - Specify color
413223	Grille Cloth
604054	Control Panel
562519	Medallion
180184	Felt Feet
180185	Speaker - 2 1/2" x 10"
925391	Speaker - 3 1/2"
413162	Electrolytic Capacitor, 4 MFD, NP
560612	Pilot light bracket
583075	Masonite back
460997A	Line cord
460999A	Knob - Vol. Tone
460998A	Knob - Tuning
460998A	Knob - Switch-Phono-Am-Fm

Firestone

PORTABLE RADIO PHONOGRAPH

STOCK NO. 4-V-17
CODE NO. 1-8-3RP8

OPERATING INSTRUCTIONS, SERVICE MANUAL AND PARTS CATALOG

IMPORTANT: Do not lose or destroy these instructions. Read them carefully and keep for future reference and correct needle replacement.

IMPORTANT: This instrument is designed to operate from a 105-125 volt 60 cycles AC power source only. If in doubt check with your local power company before connecting the instrument.

TO OPERATE RADIO

1. Turn ON-OFF VOLUME knob clockwise and wait until set warms up. Then push RADIO-PHONO SLIDE SWITCH to radio position. The turntable will not revolve with switch in this position. It will revolve with switch in phono position only.

2. Tune STATION SELECTOR DIAL knob so that arrow points to desired station, and adjust volume to your preference.

NOTE: This model has an external antenna connection for remote pickup.

TO OPERATE PHONOGRAPH

1. Place record on turntable. Move speed indicator to proper speed (33 1/3, 45, or 78).

NOTE: The wrong speed may cause damage to the record, so be SURE to use correct speed.

2. Then place pick up arm on start of record. Push RADIO-PHONO SLIDE SWITCH to PHONO. This will start the motor.

3. Adjust the volume control to your preference.

NOTE: If a 45 RPM record is used, twist adapter counterclockwise to raise it and fit record onto adapter.

4. To shut unit off turn ON-OFF VOLUME Knob counter-clockwise until switch clicks off.

DO NOT DROP PICK UP ARM ON RECORD. This can cause damage to cartridge, needle or record.

Put pick up arm into arm rest before closing the cabinet.

STOCK NO. 4-V-17

CODE NO. 1-8-3RP8

SPECIFICATIONS

Cabinet Dimensions	Width 12 in., Height 5 in., Length 10 in.
Shipping Weight	8 lbs.
Power Supply	105-125 volts AC 50/60 cycles
Tuning Range	Standard Broadcast Band
Intermediate Frequency	455 KC
Loud Speaker	4 in. P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles
Power Output	Maximum 1.8 watts
Tube Complement	1 — 12AU6—Converter 1 — 12AV6—Detector—1st Audio 1 — 50C5—Power Amplifier 1 — 35W4—Rectifier

For alignment or repairs, remove motor board by unscrewing 4 Philipshead motorboard bolts

ALIGNMENT

A. Equipment

The following equipment is necessary for proper alignment:

1. Signal Generator that will provide the test frequencies as listed, modulated 400 cycles 30%.
2. Non-metallic screwdriver.
3. Output Meter.

B. Test Set Up

Volume control—maximum, all adjustments

No signal applied to antenna.

Connect .01 condenser in series with output lead of signal generator.

Connect ground lead of signal generator to common ground above chassis.

Connect Output Meter across Voice Coil.

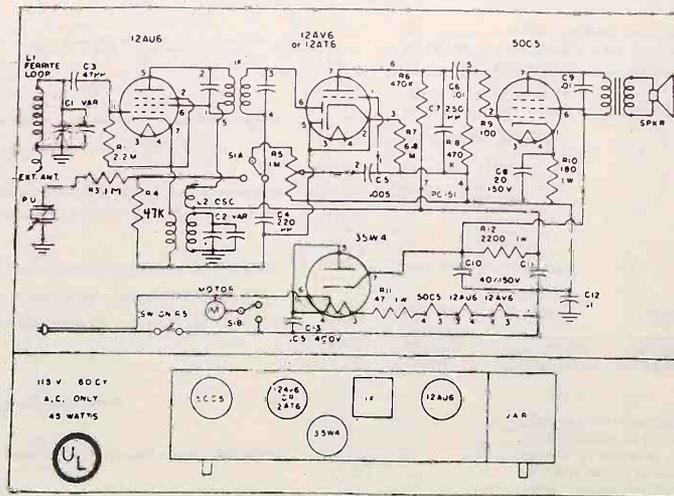
DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER TO BE ADJUSTED	TRIMMER ADJUSTMENT
Fully open	455 KC	.1 MFD	12AU6 Grid	IF Top and Bottom	Maximum
Fully open	1620 KC		Loosely couple generator to "Loop Antenna"	Osc. section of tuning condenser	Maximum
Tune in signal 1400 KC from generator.			Loosely couple generator to "Loop Antenna"	Aft. section of tuning condenser	Maximum

TO CHANGE NEEDLE:

Raise tone arm to vertical position. Needle is held by small screw on cartridge. Loosen screw, remove defective needle and replace.

NOTE: For best results use exact replacement needle and cartridge.

IMPORTANT — Set Speed Selector lever to "OFF" position when unit is not in use. This will help to prevent flat spots from developing on idler wheel.



PARTS LIST - STOCK NO. 4-V-17

Part No.	Description	List Price
231120	*Cabinet	6.00
229017	*Motorboard	1.20
270138	*Knob, with Arrow	.23
270112	*Knob, Plain	.08
310121	*8" 3 Speed 117V. Alliance Motor	10.88
315013	*8" Turntable, Rust, with White "45" Adapter	1.50
321017	Astatic Tone Arm	1.00
321510	Astatic Cartridge 16L3	6.20
329201	Astatic 2 Mil Straight Shank Needle #N4-2	1.00
414001	*4" Speaker	3.80
583020	40 x 40 x 20-MFD-150V. Elect. Cond. CE-1028	1.20
590020	*CV67 Variable Condenser	2.33
420006	*PC 151 Printed Circuit	.66
360081	*VC 42 1.0 Megohm Val. Control-with Switch	.85
450010	*LF 57 IF Transformer	1.16
455055	*LC 54-3 Osc. Coil	.72
464018	*LPFE-24 Ferrite Loop Antenna	1.24
370024	*Slide Switch DPDT Sw 44	.26
350002	12AU6 Tube	2.12
350005	12AV6 or 12AT6 Tube	1.64
350004	50C5 Tube	2.08
350003	35W4 Tube	1.32

NOTE - All parts not appearing on parts list may be replaced with any standard replacement part of similar type and value.

* Use genuine factory replacements for items marked with an asterisk. These parts may be ordered from your Firestone Parts Warehouse.

Firestone

CLOCK RADIO

SERVICE MANUAL AND PARTS CATALOG

STOCK NO. 4-A-158
CODE NO. 1-8-51/284

SPECIFICATIONS

Cabinet Dimensions	Width 11 in., Height 8 in., Depth 7 in.
Shipping weight	7½ lbs.
Power supply	105-125 volts AC 50/60 cycle
Tuning Range	Standard Broadcast Band
Intermediate Frequency	455 KC
Loud Speaker	4 in. P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles
Power Output	Maximum 1.8 watts
Tube Complement	1 - 12BE6-Converter 1 - 12BA6-I.F. Amplifier 1 - 12AV6-Detector-AVC-1st Audio 1 - 50C5-Power Amplifier 1 - 35W4-Rectifier

To Remove Chassis:

1. Pull both knobs off front of cabinet.
2. Remove 4 Phillips head screws tying back to front of cabinet.
3. Remove 4 hex-head chassis bolts on bottom of cabinet.
4. Pull chassis out.

To Remove Clock

1. Remove 2 clock knobs on face of clock by pulling away from cabinet.
2. Remove 4 hex-head nuts inside cabinet from clock mounting plate.
3. Remove clock by pulling towards rear of cabinet.

RESISTANCE-CHART

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
12BE6	22K	1.2	36	24	2.2*K	2.2*K	3.2Meg
12BA6	3.2Meg	0	24	12	2.2*K	2.2*K	180
12AV6	6.8Meg	0	0	12	1Meg	1Meg	472*K
50C5	150	470K	36	85	150	2.2*K	180*
35W4	NC	NC	85	120	115	115	∞~

Measurements taken with VT VM between B- and socket pins except for readings marked with *asterisk, which were taken between pin 7 of 35W4 and socket pin. All readings with set disconnected, volume control fully (CW) open, clock set to "OFF".
Readings may vary plus or minus 20%.

*This reading taken with filter cond. fully discharged.

NC=No Connection

∞= Infinite

ALIGNMENT

A. Equipment

The following equipment is necessary for proper alignment:

1. Signal Generator that will provide modulated test frequencies as listed.
2. Non-metallic screwdriver.
3. Output Meter.

B. Test Set Up

Volume control—maximum, all adjustments.

No signal applied to antenna.

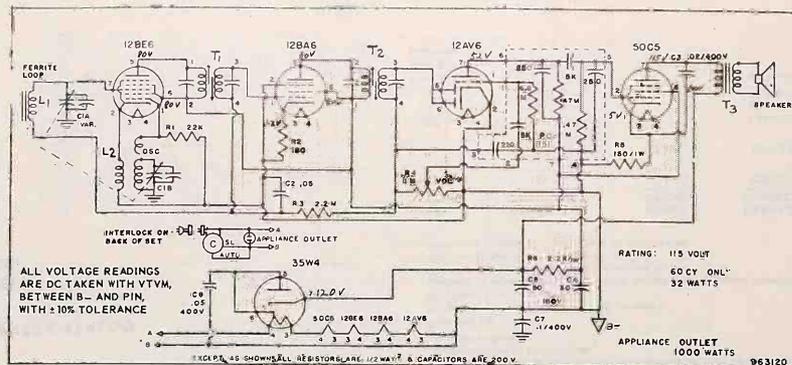
Connect .1 condenser in series with output lead of signal generator.

Connect ground lead of signal generator to B...

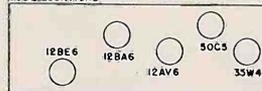
Connect Output Meter across Voice Coil.

Generator—output just sufficient to get reading.

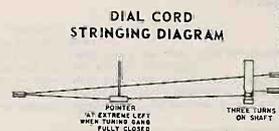
DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER TO BE ADJUSTED	TRIMMER ADJUSTMENT
Fully open	455 KC	.1MFD	12BE6 Grid	1st IF Top and Bottom	Maximum
Fully open	455 KC	.1 MFD	12BE6 Grid	2nd IF Top and Bottom	Maximum
Fully open	1620 KC		Loosely couple generator to "Loop Antenna"	Osc. section of tuning condenser	Maximum
Tune in signal 1400 KC from generator.	1400 KC		As above	Ant. section of tuning condenser	Maximum



TUBE LOCATIONS



DIAL CORD STRINGING DIAGRAM



PARTS LIST

PART NO.	DESCRIPTION	LIST PRICE
250370	*Plastic Cabinet, Front, White	\$2.20
250313	*Plastic Cabinet, Rear, Gold	1.84
272261	*Knob, Gold	.16
250312	*Plastic Cabinet, Rear, Blue	1.84
272240	*Knob, Blue	.16
404506	Speaker, 4" P.M.	2.48
451023	*I.F. Transformer T1 & T2	1.02
415	Electrolytic 50 x 30/150V	.92
430330	*Output Transformer	1.00
455075	*Oscillator Coil	.64
368030	*Volume Control, 1 Meg.	.60
464028	*Ferrite Loop	1.12
590054	*Variable Condenser w. drum	2.45
420006	PC 151 Couplate	.62
260068	Dial Crystal	.10
384020	Clock	11.00
272252	Clock Knobs	.02

NOTE: - All parts not appearing on parts list may be replaced with any standard replacement part of similar type and value.

*Use Genuine factory replacements for items marked with an asterisk. These parts may be ordered from your Firestone Parts Warehouse.

STOCK NO. 4-A-157

CODE NO. 1-8-51/283

Firestone

CLOCK RADIO

SERVICE MANUAL AND PARTS CATALOG

STOCK NO. 4-A-157
CODE NO. 1-8-51/283

SPECIFICATIONS

Cabinet Dimensions	Width 11 in., Height 8 in., Depth 7 in.
Shipping weight	7½ lbs.
Power supply	105-125 volts AC 50/60 cycle
Tuning Range	Standard Broadcast Band
Intermediate Frequency	455 KC
Loud Speaker	4 in. P.M.
Voice Coil Impedance	3.2 ohms at 400 cycles
Power Output	Maximum 1.8 watts
Tube Complement	1 - 12BE6-Converter 1 - 12BA6-I.F. Amplifier 1 - 12AV6-Detector-AVC-1st Audio 1 - 50C5-Power Amplifier 1 - 35W4-Rectifier

To Remove Chassis:

1. Pull both knobs off front of cabinet
2. Remove 4 Phillips head screws tying back to front of cabinet.
3. Remove 4 hex-head chassis bolts on bottom of cabinet.
4. Pull chassis out.

To Remove Clock

1. Remove 2 clock knobs on face of clock by pulling away from cabinet.
2. Remove 4 hex-head nuts inside cabinet from clock mounting plate.
3. Remove clock by pulling towards rear of cabinet.

RESISTANCE-CHART

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
12BE6	22K*	1.2	36	24	2.2*K	2.2*K	3.2Meg
12BA6	3.2Meg	0	24	12	2.2*K	2.2*K	180
12AV6	6.8Meg	0	0	12	1Meg	1Meg	472*K
50C5	150	470K	36	85	150	2.2*K	180*
35W4	NC	NC	85	120	150	115	~+

Measurements taken with VTVM between B- and socket pins except for readings marked with *asterisk, which were taken between pin 7 of 35W4 and socket pin. All readings with set disconnected, volume control fully (CW) open, clock set to "OFF".

Readings may vary plus or minus 20%

+ This reading taken with filter cond. fully discharged.

NC = No Connection

~ = Infinite

ALIGNMENT

A. Equipment

The following equipment is necessary for proper alignment:

1. Signal Generator that will provide modulated test frequencies as listed.
2. Non-metallic screwdriver.
3. Output Meter.

B. Test Set Up

Volume control—maximum, all adjustments.

No signal applied to antenna.

Connect .1 condenser in series with output lead of signal generator.

Connect ground lead of signal generator to B-.

Connect Output Meter across Voice Coil.

Generator—output just sufficient to get reading.

DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER TO BE ADJUSTED	TRIMMER ADJUSTMENT
Fully open	455 KC	.1 MFD	12BE6 Grid	1st IF Top and Bottom	Maximum
Fully open	455 KC	.1 MFD	12BE6 Grid	2nd IF Top and Bottom	Maximum
Fully open	1620 KC		Loosely couple generator to "Loop Antenna"	Osc. section of tuning condenser	Maximum
Tune in signal 1400 KC from generator.	1400 KC		As above	Ant. section of tuning condenser	Maximum

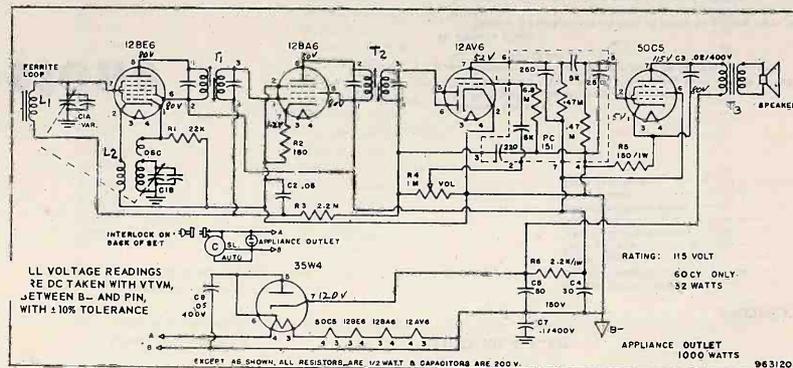
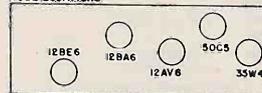
PARTS LIST

PART NO.	DESCRIPTION	LIST PRICE
250360	*Plastic Cabinet, Front, White	\$2.20
250301	*Plastic Cabinet, Rear, Red	1.84
272262	*Knob, Tuning, Red	.24
272259	*Knob, Volume, Red	.16
250304	*Plastic Cabinet, Rear, Pink	1.84
272251	*Knob, Tuning, Pink	.24
272250	*Knob, Volume, Pink	.16
404006	Speaker, 4" P.M.	2.48
450023	*I.F. Transformer T1 & T2	1.02
582005	Electrolytic 50 x30/150V	.92
430330	*Output Transformer	1.00
455075	*Oscillator Coil	.64
368030	*Volume Control, 1 Meg.	.60
464028	*Ferrite Loop	1.12
590052	*Variable Condenser	2.12
420006	PC 151 Couplate	.62
260015	*Clock Crystal	.30
384019	*Clock	10.60
272224	*Clock Knobs	.02

NOTE - All parts not appearing on parts list may be replaced with any standard replacement part of similar type and value.

*Use Genuine factory replacements for items marked with an asterisk. These parts may be ordered from your Firestone Parts Warehouse.

TUBE LOCATIONS



Firestone

5 TUBE AC-DC RADIO RECEIVER

SERVICE MANUAL AND PARTS CATALOG

STOCK NO. 4-A-156
CODE NO. 1-8-51/184

STOCK NO. 4-A-156

CODE NO. 1-8-51/184

SPECIFICATIONS

Cabinet Dimensions Width 11 in., Height 8 in., Depth 7 in.
Shipping weight 7 lbs.
Power supply 105-125 volts AC 50/60 cycle, or DC
Tuning Range Standard Broadcast Band
Intermediate Frequency 455 KC.
Load Speaker 4 in. P.M.
Voice Coil Impedance 3.2 ohms at 400 cycles
Power Output Maximum 1.8 watts
Tube Complement 1-12BE6-Converter
1-12BA6-I.F. Amplifier
1-12AV6-Detector-AVC-1st Audio
1-50C5-Power Amplifier
1-35W4-Rectifier

To Remove Chassis:

1. Pull both knobs off front of cabinet.
2. Remove 4 Phillips head screws tying back to front of cabinet.
3. Remove 4 hex-head chassis bolts on bottom of cabinet.
4. Pull chassis out.

RESISTANCE-CHART

	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
12BE6	22K	1 μ 2	36	24	25 Ω K	2.2*K	3.2Meg
12BA6	3.2Meg	0	24	12	2.2*K	2.2*K	180
12AV6	6.8Meg	0	0	12	1Meg	1Meg	472*K
50C5	150	470K	36	85	150	2.2*K	180*
35W4	NC	NC	85	120	115	115	∞ †

Measurements taken with VTVM between B- and socket pins except for readings marked with * asterisk, which were taken between pin 7 of 35W4 and socket pin. All readings with set disconnected, volume control fully (CW) open.
Readings may vary plus or minus 20%.
†This reading taken with filter cond. fully discharged.
NC = No Connection
 ∞ = Infinite

ALIGNMENT

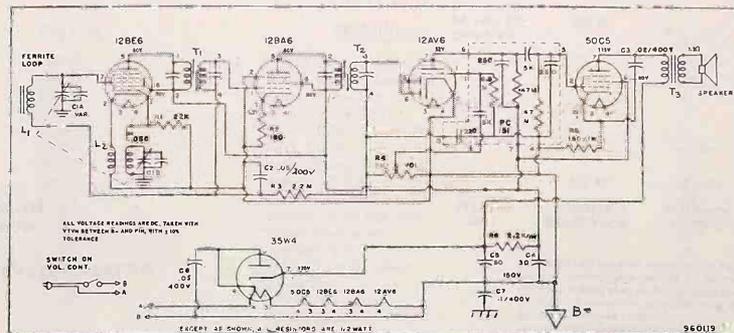
A. Equipment

- The following equipment is necessary for proper alignment:
1. Signal Generator that will provide modulated test frequencies as listed.
 2. Non-metallic screwdriver.
 3. Output Meter.

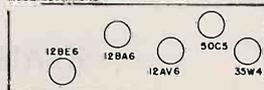
B. Test Set Up

Volume control-maximum, all adjustments
No signal applied to antenna.
Connect .1 condenser in series with output lead of signal generator.
Connect ground lead of signal generator to B-.
Connect Output Meter across Voice Coil.
Generator-output just sufficient to get reading.

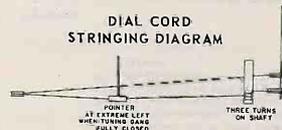
DIAL SETTING	GENERATOR FREQUENCY	DUMMY ANTENNA	GENERATOR CONNECTION	TRIMMER TO BE ADJUSTED	TRIMMER ADJUSTMENT
Fully open	455 KC	.1 MFD	12BE6 Grid	1st IF Top and Bottom	Maximum
Fully open	455 KC	.1 MFD	12BE6 Grid	2nd IF Top and Bottom	Maximum
Fully open	1620 KC		Loosely couple generator to "Loop Antenna".	Osc. section of tuning condenser	Maximum
Tune in signal 1400 KC from generator.	1400 KC		As above	Ant. section of tuning condenser	Maximum



TUBE LOCATIONS



DIAL CORD STRINGING DIAGRAM



PARTS LIST

PART NO.	DESCRIPTION	LIST PRICE
250340	*Plastic Cabinet, Front, White	\$2.20
250213	*Plastic Cabinet, Rear, Gold	1.84
272261	*Knob, Gold	.16
250214	*Plastic Cabinet, Rear, Pink	1.84
272250	*Knob, Pink	.16
404006	Speaker, 4" P.M.	2.48
450023	*I.F. Transformer T1 & T2	1.02
582005	Electrolytic 50 x 30/150V	.92
430330	*Output Transformer	1.00
455075	*Oscillator Coil	.64
368029	*Volume Control, 1 Meg., w/switch	.83
464028	*Ferrite Loop	1.12
590054	*Variable Condenser w. drum	2.45
420006	PC 151 Couplate	.62

NOTE - All parts not appearing on parts list may be replaced with any standard replacement part of similar type and value.

*Use Genuine factory replacements for items marked with an asterisk. These parts may be ordered from your Firestone Parts Warehouse



PRELIMINARY SERVICE DATA

S-C420-1
COVERS
MODELS
C420A
C421A,B
C 422B

SPECIFICATIONS	
CABINET:	C420A, Mahogany; C421A, B, Blue; C422B, Rose Beige
ELECTRICAL RATING:	105-120 volts A. C. 60 cycles 30 Watts
POWER OUTPUT:	Undistorted: .75 Watts Maximum: 1.25 Watts
SPEAKER:	5 1/4" 3.2ohms @ 400 cps.
TUBE COMPLEMENT:	V1 R. F. Amplifier 12BA6 V2 Osc.-Converter 12BE6 V3 I. F. Amplifier 12BA6 V4 Det. & Audio Amplifier 12AV6 V5 Power Output 35C5 V6 Rectifier 3594A

PARTS LIST CONT'D.			
CATALOG NO.	SYMBOL	DESCRIPTION	LIST PRICE
	C5,6	05mf., 400V., Paper	
	C10,16	02mf., 400V., Paper	
	C15,20,21	.04mf., 600V., Paper	
POTENTIOMETER			
n-RS-1219	R8	Volume Control, 4mega....	1.90
COILS AND TRANSFORMERS			
RS-1142	T2	Oscillator Coil.....	.60
RS-1143	T3,4	I. F. Transformer.....	1.80
RS-1145	T1	R. F. Transformer.....	2.20
n-RS-1220	L1	Antenna.....	1.15
n-RS-1222	T5	Output Transformer.....	3.65

GENERAL INFORMATION

The models C420A, C421A, C422B, and C422B are 5 tube plus rectifier superheterodyne radio-timer receivers. A R. F. amplifier stage is used to provide increased sensitivity and selectivity.

The volume control is used for both the radio and phono volume. A switch at the center position of the control eliminates any radio signal from being audible when listening to the phono. A slide switch for tone control is provided on the rear of the cabinet.

Service on defective timer units, (Telechron Cat. No. C11408) should be referred to the nearest G. E. Service Center or G. E. Service Station.

- TO REMOVE CHASSIS**
1. Remove volume and tuning knobs.
 2. Unscrew alarm set indicator knob (Rear).
 3. Remove back of cabinet.
 4. Unsolder leads from speaker.
 5. Remove the cabinet top.
 6. Remove the cabinet bottom.
- Timer leads should remain connected as they are long enough to allow removal of radio for repair.
- TO REMOVE SPEAKER**
1. Follow steps 1 through 5 as above.
 2. Remove the 4 hexhead screws from speaker grille. This will remove the speaker and speaker grille.

NOTE: when servicing or aligning, always use an isolation transformer to protect test equipment and personnel.
Always have the volume control set for maximum and reduce the signal input so AVC will not affect output.

PRELIMINARY REPLACEMENT PARTS LIST			
CATALOG NO.	SYMBOL	DESCRIPTION	LIST PRICE
CAPACITORS			
RS-1134	C18A, B	100-50mf., 150V.....	2.40
RS-1191	C3	1.5mf., 500V.....	.15
RS-1202	C19	5000mf., 450V.....	.25
RS-1203	C12, 13	220mf., 450V.....	.15
RS-1204	C11	150mf., 450V.....	.15
n-RS-1218	C1A, B, C	Tuning Capacitor... 6.80	
RCM-3075	D, E, F			47mf., 500V., Paper... .25

MISCELLANEOUS ELECTRICAL

n-RB-1046	Speaker, 5 1/4".....	6.25
RS-1223	Appliance Receptacle.....	.60
RJS-182	Phono Jack.....	.15
RJS-232	Tube Socket with center pin, (V3).....	.25
RJS-237	Tube Socket.....	.15
RVL-039	Power Cord.....	.95
RS-1128	Slide Switch (Tone Control).....	.35
RS-1183	Terminal.....	.03

MISCELLANEOUS MECHANICAL

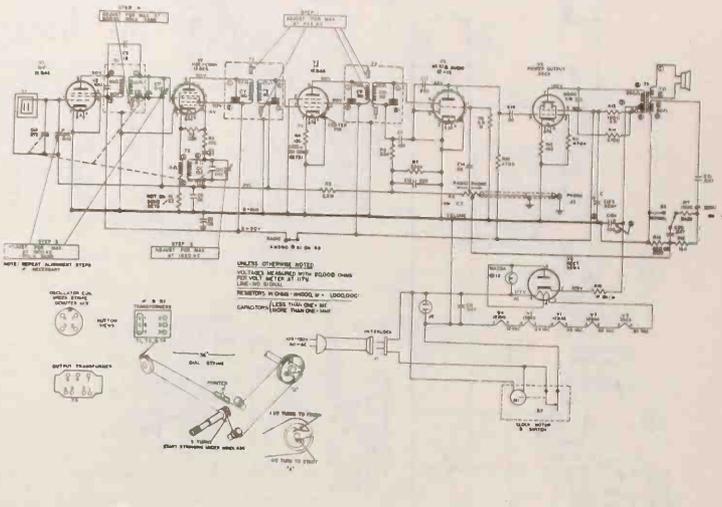
RS-1100	U Type Nut.....	.05
RS-1127	Pulley 1/4".....	.05
RS-1168	Shoulder Rivet (power cord).....	.05
RS-1174	Plate (power cord).....	.03
n-RS-1213	Socket, (pilot light).....	.55
n-RS-1214	Lamp Hood.....	.10
n-RS-1215	Tuning Shaft Assembly.....	.65
n-RS-1216	Antenna Holder.....	.10
n-RS-1323	Pilot Light #12.....	.80
n-RS-1324	Rubber Grommet.....	.02
RJ1-010	Power Cord Receptacle.....	.10
RMS-130	Spring (Tuning gang).....	.15
RMS-374	Tube Shield Pin.....	.02
RMS-038	Pulley, 11/16".....	.10

CABINET AND APPEARANCE ITEMS

n-RB-1037	Cabinet Top, Mahogany, C420A.....	4.70
n-RB-1038	Cabinet Top, Blue, C421A.....	4.70
n-RB-1039	Cabinet Bottom, Mahogany, C420A.....	3.55
n-RB-1040	Cabinet Bottom, Blue, C421A, B.....	3.55
n-RB-1041	Cabinet Back, Mahogany, C420A.....	2.35
n-RB-1042	Cabinet Back, Blue, C421A, B.....	2.35
n-RB-1043	Grille, Mahogany, C420A.....	.80
n-RB-1044	Grille, Blue, C421A, B.....	.80
n-RB-1074	Cabinet Top, Blue, C421B.....	4.70
n-RB-1075	Cabinet Top, Rose Beige, C422B.....	4.70
n-RB-1076	Cabinet Bottom, Rose Beige, C422B.....	3.55
n-RB-1077	Cabinet Back, Rose Beige, C422B.....	2.35
n-RB-1078	Grille, Rose Beige, C422B.....	.80
RS-1096	Clock Control Knob (Lever type).....	.10
n-RS-1205	Window Dial Backing, C420A.....	.55
n-RS-1206	Window Dial Backing, C421A, B.....	.55
n-RS-1207	Snoot-Alarm Bar Knob, Blue, C421A, B.....	.20
n-RS-1208	Snoot-Alarm Bar Knob, Mahogany, C420A.....	.20
n-RS-1209	Clock Crystal, C420A, C421A.....	.95
n-RS-1210	Pointer, C420A, C421A, B.....	.25
n-RS-1217	Medallion.....	.35
n-RS-1474	Window Dial Backing, C422B.....	.55

PARTS LIST CONT'D.		
CATALOG NO.	DESCRIPTION	LIST PRICE
CABINET AND APPEARANCE ITEMS		
n-RS-1475	Snoot-Alarm Bar Knob, C422B.....	.20
n-RS-1476	Clock Crystal, C421B, C422B.....	.95
n-RS-1478	Pointer, C422B.....	.25
RDK-425	Tuning & Volume Knob.....	.35

n- Denotes Parts Not Previously Cataloged.
All Parts Not Listed by Cat. Nos. are Common Items, Obtainable From Radio Parts Jobbers.
Prices are Suggested List Prices and Subject to Change Without Notice.



ALIGNMENT CHART				
Step	Connect Test Oscillator	Test Oscillator Setting	Receiver Tuning	Adjust for Maximum Output
1.	12BA6, V3 grid (pin 1) in series with a .05 mf.	455KC.	Tuning Gang Open (minimum capacity)	Cores of 2nd I. F. Transformer T4
2.	12BE6, V2 grid (pin 7) in series with a .05 mf.			Cores of 1st I. F. Transformer T3
3.		1620 KC	Tuning gang open	Recheck adjustment of T3 and T4
4.	Inductively coupled to Antenna L1			CLD Oscillator trimmer
5.		1500 KC	Tune for max. signal	C1F, R.F. Trimmer
6.				C1B, Antenna trimmer
7.		Approximately 800 KC.	Rock in with core of T1	cores of R. F. Transformer, T1, Rock in with receiver tuning
8.	Repeat Steps 4,5,6,7			



PRELIMINARY SERVICE DATA

S-C435
COVERS
MODEL
C-435A

SPECIFICATIONS	
CABINET:	C435A, Antique White
OUTPUT:	.9 Watts Undistorted 1.8 Watts Maximum
CLOCK:	Telechron Model J2G1
OPERATING FREQUENCIES:	540 - 1600 KC 455 KC I. F.

TO REMOVE CABINET BACK:

Remove time set knob from shaft at back of cabinet. Hold time set shaft with long-nose pliers and turn knob counter clockwise to remove. Set cabinet on the clock and using a soft cloth to protect the finish. Hold the line cord interlock plug with one hand. Place other hand on cabinet bottom with fingers around bottom edge of cabinet front, and thumb on bottom edge of cabinet back in groove provided. Using the thumb, force the cabinet bottom away from the cabinet back to free the locking tabs on the bottom of the cabinet back. Remove back by pulling away, freeing interlock and locking tabs at top of cabinet back.

To replace cabinet back line the time set shaft in the hole and place locking tabs on top of cabinet back in slots on cabinet top. Push on bottom of cabinet back sliding the locking tabs up the beveled inclines and snap in slots. Make certain the interlock terminals and plug engage. Replace time set knob by turning clockwise on shaft.

TO REMOVE CHASSIS FROM CABINET:

After removing cabinet back remove the screw on the cabinet bottom that holds the chassis board support. The tuning knob is a captive knob and remains in the cabinet front. Close the tuning gang to prevent any possible damage to the plates. Slide one hand under the printed chassis board placing the fingers over the front edge. Slide the board back out of the grooves on either end simultaneously removing the tuning gang shaft from the tuning knob.

When replacing the chassis, close the tuning gang and line the flat side of the tuning gang shaft up with the flat in the tuning knob. Place the ends of the board in the grooves and push on the edge of the board, not on the components. The tuning shaft will enter the tuning knob and the front edge of the board will seat itself in the grooved bosses inside the cabinet front. Replace the board support and self-tapping screw.

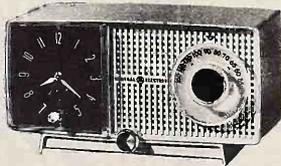
TO REMOVE VOLUME CONTROL:

The volume control is attached to the cabinet and may be removed by pulling the knob straight off and removing the pinnut.

When replacing the volume control place the tab on the control in the groove provided.

TO REMOVE SPEAKER:

After removing the chassis board remove four tubular speaker clips and lift the speaker out of the cabinet.



TO REMOVE CRYSTAL:

1. Remove clock control knob by pulling straight off; 2. Press down on the top of the crystal slightly to release the top locking tab; 3. Move crystal up from bottom releasing the bottom locking tab; 4. Lift crystal off carefully to prevent scratching on the control shaft.

To replace the crystal slide it over the control shaft and place bottom locking tab in position. Push on top face of crystal sliding top locking tab in position.

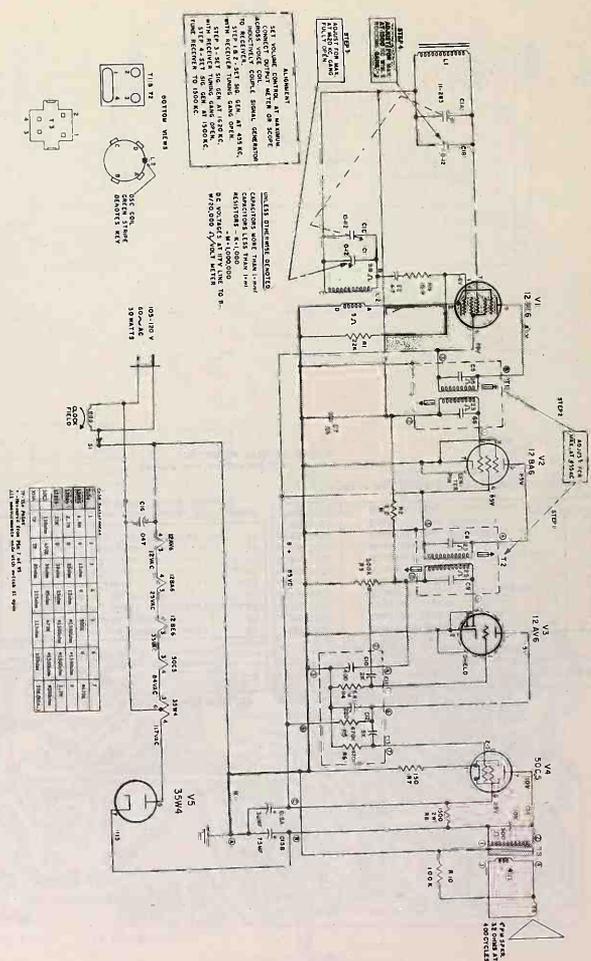
TO REMOVE CLOCK:

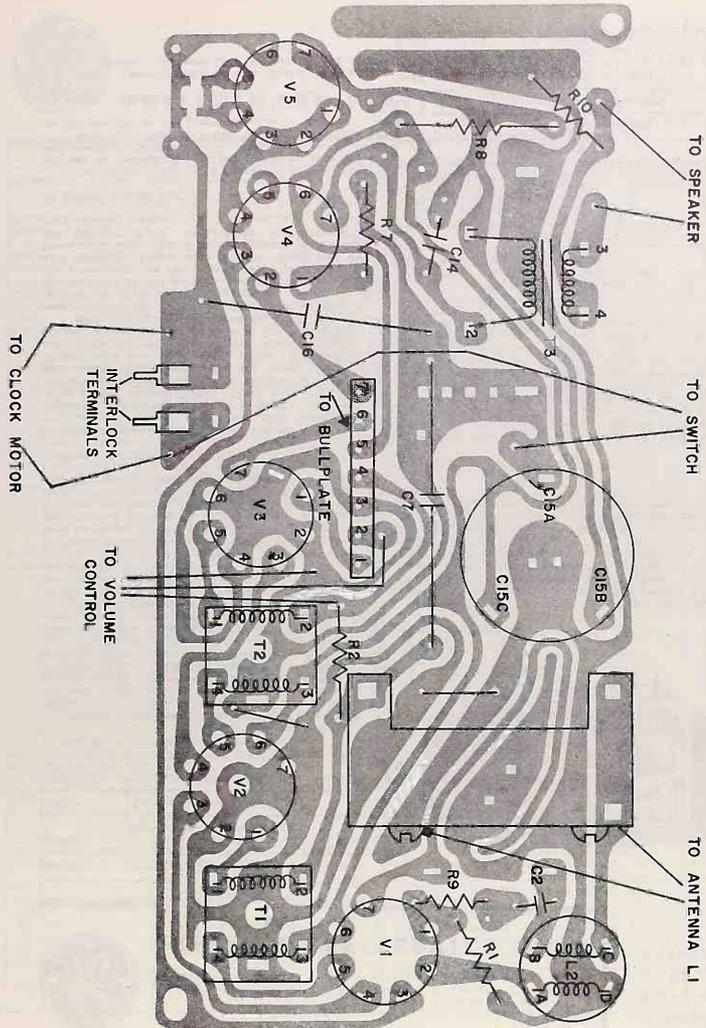
Turn time set knob so that all hands are at twelve o'clock. Remove time set knob by holding shaft with long-nose pliers and turn knob counter clockwise. Remove chassis speaker and crystal as described previously. Remove each hand separately with recommended hand lift tool WCT7070 which is available from General Electric Servicenters. Remove the two tubular clips from inside the cabinet.

When replacing the clock replace the hands in the same position they were in before removal (twelve o'clock).

REPLACEMENT PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
RCE-215	C15A, B	Elect. 75-30 @ 150V.....	2.00
n-RS-1413	C1A, 1B, 1C, 1D	Tuning Gang.....	3.60
REK-011	C10, 11, 12, 13	Bulplane.....	2.00
POTENTIOMETER			
n-RS-1417	8B	Volume Control 500K.....	1.00
COILS & TRANSFORMERS			
n-RS-1409	L1	Antenna (Iron Core).....	1.15
n-RS-1417	L2	Oscillator Coll.....	.65
n-RS-1412	T1, 2	I. F. Transformer.....	1.55
n-RS-1416	T3	Output Transformer.....	2.20





REPLACEMENT PARTS LIST MODEL C435 (CONTINUED)

CAT. NO.	DESCRIPTION	PRICE	CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS			CABINET & APPEARANCE ITEMS		
RMS-356	Clip, Captive (Tuning Knob).....	.05	n-RS-1063	Cabinet, Antique White.....	3.25
RHC-095	Clip, Tubular (Speaker).....	.05	n-RS-1404	Cabinet Back, Masonite.....	.25
RS-1093	Extension, Shaft (Clock).....	.10	n-RS-1401	Crystal, Clock.....	.50
n-RS-1618	Terminals, Interlock.....	.03	n-RS-1402	Clock Face.....	.60
RS-1188	Antenna, Clamp.....	.15	n-RS-1405	Second Hand.....	.10
RB-1057	Speaker 4".....	5.45	n-RS-1406	Alarm Hand.....	.10
RS-1455	Power Cord.....	1.00	n-RS-1407	Minute Hand.....	.10
n-RS-1307	Tube Socket.....	.10	n-RS-1408	Hour Hand.....	.10
n-RS-1309	Tube Socket, 7Pin w/Center Pin.....	.15	n-RS-1464	Knob, Tuning w/Insert.....	.85
			RDK-425	Knob, Volume w/Insert.....	.35
			RS-0005	Knob, Clock.....	.05

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

"n" - Denotes New Items Not Previously Cataloged.

Prices Are Suggested List Prices Subject To Change Without Notice.



PRELIMINARY SERVICE DATA

S-C440A
COVERS
MODELS
C440A
C441A

SPECIFICATIONS	
CABINET:	C440A - White, Blue, & Silver C441A - White, Black & Gold
OPERATING FREQUENCIES:	540 - 1600 KC 455 - KC I. F.
POWER OUTPUT:	Undistorted: 1 Watt Maximum: 1.5 Watts
TUBE COMPLEMENT:	V1 Osc. Conv. 12BE6 V2 I.F. Amplifier 12BA6 V3 Det. & Audio Amplifier 12AV6 V4 Power Output 50C5 V5 Rectifier 35W4

TO REMOVE CABINET BACK

1. Remove timer time-set knob from shaft on cabinet back.
2. Remove two screws at top of cabinet back and one over appliance outlet.
3. Remove two screws from line cord interlock plate.
4. Pull line cord interlock out slightly to disengage.
5. Open cabinet back.

To replace pilot light, set dial at 55, then remove light.

TO REMOVE CHASSIS

1. Follow steps one through six as above.
 2. Remove tuning and volume knobs.
 3. Unsolder green wire from top right side of timer. (Other end of wire enters circuit board near electrolytic capacitor.)
 4. Unsolder leads from speaker.
 5. Remove four screws from cabinet bottom.
- NOTE: When servicing or aligning this receiver, always use an isolation transformer to protect test equipment and personnel.

Always have volume control set for maximum, and reduce signal input so AVC will not affect output.

Service on defective timer units (Telechron Catalog Number C114C13 for Model C440A and C114G14 for Model C441A) should be referred to the nearest G. E. Servicenter or C. E. Service Station.

When removing and replacing timer, use extreme care not to scratch the cabinet front crystal with the timer shafts.

PRELIMINARY REPLACEMENT PARTS LIST (CONT'D.)

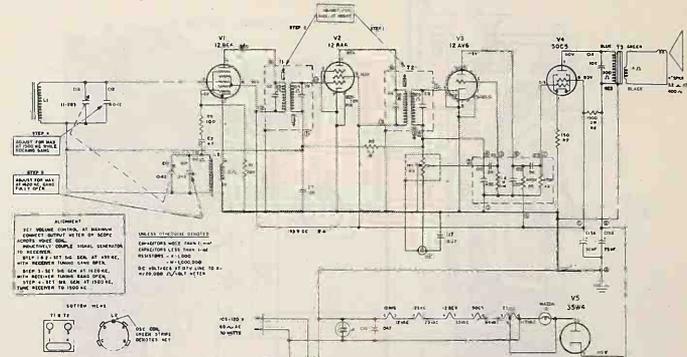
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
POTENTIOMETER			
*RS-1568	R3	Volume Control, 1 meg.....	1.10
COILS & TRANSFORMERS			
RS-1415	T, 2	Transformer, I.F.....	1.55
*RS-1637	L2	Coil, Oscillator.....	.65
*RS-1564	L1	Antenna.....	1.40
*RS-1567	T3	Transformer, Output.....	2.15
MISCELLANEOUS			
RB-1057		Speaker.....	5.45
RS-1323		Light, Pilot #12 (Radio Dial).....	.25
*RS-1522		Tuning Shaft Assembly.....	.70
*RS-1557		Holder, Interlock.....	.10
*RS-1559		Socket, Pilot Light (for #43).....	.60
*RS-1561		Socket, Pilot Light (for #12).....	.60
*RS-1562		Hood, Pilot Light.....	.15
*RS-1563		Light, Pilot #43 (Nite-Light).....	.75
*RS-1569		Receptacle, (Appliance).....	.55
*RS-1570		Power Cord, (Ant. White).....	1.40
*RS-1571		Interlock.....	.10
*RS-1656		Switch, (Nite-Light).....	1.05
*RS-1657		Clip, Spring, (Nite-Light).....	.05
RDC-032		Cord, Dial (25 yds. bulk).....	2.50
RHC-095		Clip, Tubular.....	.10
RJS-182		Connector, Phono.....	.15
RJS-232		Socket, (4th center pin).....	.25
RJS-237		Socket, (V/o center pin).....	.15
RMS-130		Spring, (Tuning gang).....	.15
CABINET & APPEARANCE ITEMS			
*RB-1080	(Assem.)	Cabinet Front, Blue, C440A Cabinet Back, White.....	11.30
		Crystal.....	
		Hinges (2).....	
		Backing & Reflector.....	
*RB-1081	(Assem.)	Cabinet Front, Black & Gold C441A Cabinet Back, White.....	11.30
		Crystal.....	
		Hinges (2).....	
		Backing & Reflector.....	
RS-1096		Knob, Timer, (lever type).....	.10
*RS-1528		Crystal, Blue & Silver, C440A.....	3.05
*RS-1529		Crystal, Black & Gold, C441A.....	3.05
*RS-1556		Knob, Snooze-Alarm Bar.....	.10
*RS-1558		Window, (Dial Backing).....	.50
*RS-1560		Pointer.....	.35
RDK-425		Knob, (Vol. & Tune).....	.35

* - Denotes Parts Not Previously Cataloged.

All Parts Not Listed by Catalog Numbers are Common Items, Obtainable From Radio Parts Jobbers.

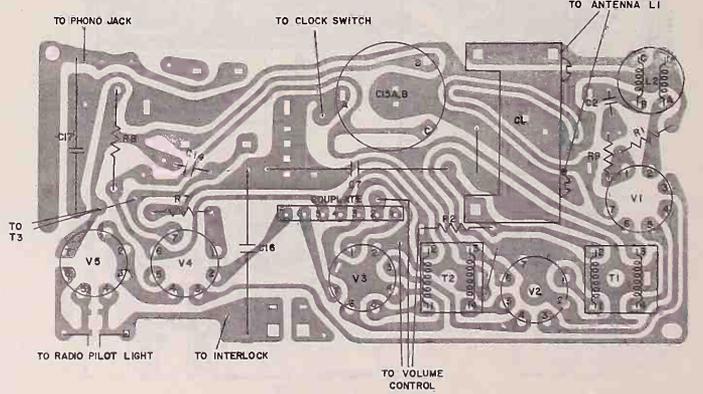
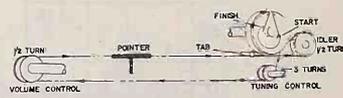
Prices are Suggested List Prices and Subject to Change Without Notice.

PRELIMINARY REPLACEMENT PARTS LIST			
CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
*RS-1565	C1	Capacitor, Tuning.....	3.90
RCE-215	C15A, B	30MF., 75 MF., @150V.....	2.00
REX-011	R4, 5, 6	.....
	C10, 11, 12	Couplate.....	1.00
	C2	47MF., 500V.....	
	C7	.05MF., 400V.....	
	C14	.01MF., 450V.....	
	C16, 17	.047MF., 600V.....	



Tube	1	2	3	4	5	6	7
12AV6	6-0H	0	15	50	300L	0	+70K
12BA6	2-7M	0	35	15	+1500ohm	0	
12BE6	22K	0	35	15	+1500ohm	2.7M	
50C5	150ohm	470K	35	30	+70K	+300ohm	
35W4	TP	80	110	105	1.0	120	100V

TP-15E Pinout
* Required from Pin 7 of V5
Resistance measured with pilot light (model # 12) in socket
All measurements taken with respect to 3, unless otherwise designated.





PRELIMINARY SERVICE DATA

SUPERSEDES S-T105-1

S-T105-2
COVERS
MODELS
T105A
T106A,B
T107B

SPECIFICATIONS	
CABINET:	Plastic, 6 3/4 x 6 x 12 1/8" Model T106B, Antique White Model T107B, Turquoise
ELECTRICAL RATING:	105-120 Volts A-C or D-C 24 Watts @ 117 Volts A-C
OUTPUT:	Undistorted 1.0 Watt Maximum 1.6 Watt
SPEAKER:	(2) 4 inch PM., 3.2 ohms @ 400 cps.
TUBE COMPLEMENT:	V1 Oscillator-Converter..... 12BE6 V2 I-F Amplifier..... 12BA6 V3 Detector, 1st Audio Amp..... 12AV6 V4 Audio Output..... 50C5 V5 Rectifier..... 35W4

CAUTION: It is important to use extreme care replacing parts and/or soldering on this chassis. Too much heat on the chassis will cause the copper plating to become unbonded. Only apply the soldering iron long enough to melt the solder and pull out the part to be replaced.
A 35 watt soldering iron is recommended for all repairs on the circuit board to protect the copper pattern.

TO REPLACE THE VOLUME CONTROL

Remove the shaft nut and the fibre washer, then cut the center and lower terminals. Apply only enough heat to the upper terminal to pull out the control. Apply heat to the center and lower terminals so they may be pushed out. The new control may now be inserted into place and soldered. Make sure the fibre washer is in place before installing the shaft nut.

GENERAL INFORMATION

The Models T106B and T107B are twin speaker and all-electron-tube radios. The circuitry is similar to the previous T105 radios.

TO REMOVE CHASSIS FROM CABINET

To remove chassis from cabinet, remove cabinet back. Unsolder the output transformer leads from the speaker. Remove the four self-tapping screws, (hex-heads) one on each corner of the chassis, and the single hex screw just below the tuning gang capacitor. Pull off the volume control knob. The tuning control knob is held to the cabinet, so the chassis must be pulled out of the cabinet, at the same time pulling it off the tuning knob, which remains on the cabinet. When pulling out the chassis, it is best to grasp the tuning capacitor (C1) by the thumb and forefinger of one hand, the tuning knob by the other hand and pull.

PRELIMINARY PARTS LIST

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
*RS-1607	CLA,B,C,D	Tun. Cap. T106B,T107B....	3.60
RS-1163	CLA,B,C,D	Tun. Cap. T105A,T106A....	4.15
RCW-3207	CSA,B,C,D	Bulplate.....	1.00
RCM-3266	C2, 3	22mfd. ±20%, 500V.....	.20
RCE-207	CL1A, B	30-50MF @150V.....	2.15
POTENTIOMETER			
RS-1162	R3	Vol. Cont. (500K) & Sw... 2.30	
COILS & TRANSFORMERS			
*RS-1606	L1	Loop Ant. T106B,T107B....	1.25
RS-1415	T1, 2	IF Transformer T106B,T107B	1.55
RS-1523	L2	Osc. Coil T106B, T107B....	1.00
RS-1161	T3	Output Transformer.....	2.55
RS-1156	L1	Loop Ant. T105A,T106A....	1.25
RTL-183	T1, 2	IF Trans. T105A, T106A....	1.65
RLC-135	L2	Osc. Coil T105A, T106A....	1.00

*# - Denotes Parts Not Previously Cataloged.

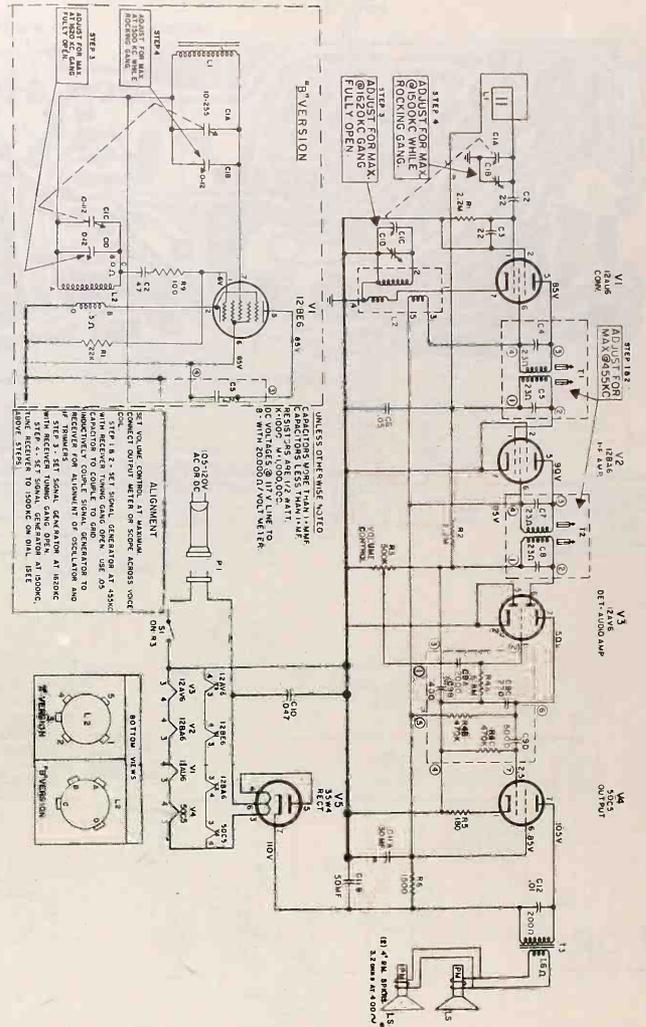
SPEAKERS

When connecting the speaker leads after repair, care must be taken to insure the speakers are in correct phase with one another. To do this, you must connect the two ground lugs together, as well as the two ungrounded lugs. For example, if one grounded lug and one ungrounded lug were connected together, the speakers would be out of phase, which would result in distortion and loss of audio signal.

SERVICE HINT

Always use an isolation transformer when servicing or aligning this receiver to protect the service personnel and his equipment.

CAT. NO.	DESCRIPTION	PRICE
MISCELLANEOUS ITEMS		
RS-1157	Loop Mtg. Bracket.....	.10
RS-1158	Tube Shield.....	.10
RJS-232	Tube Socket W/Center Pin.....	.25
RJS-237	Tube Socket.....	.15
RS-1159	Heat Shield.....	.15
RS-1164	Vol. Cont. Washer.....	.05
RHS-161	Eyelet, Shield.....	.10
RM-061	Clamp, Plastic.....	.20
RMS-356	Clamp, Knob.....	.05
RHC-095	Clamp, Speaker.....	.05
RML-037	Power Cord.....	1.00
RJJ-014	Receptacle, Power Cord.....	.15
RB-1057	Speaker 4".....	5.45
RS-1190	Ground Strap.....	.05
CABINET & APPEARANCE ITEMS		
RB-1018	Cab. (Mah)W/Trim Strip & Dial Plate T105A....	5.70
RB-1019	Cab. (Ant.White)W/Trim Strip & Dial Plate T106A, T106B....	5.70
*RB-1085	Cab. (Turq.)W/Trim Strip & Dial Plate T107B....	5.70
RS-1155	Cab. Back.....	.25
RS-1154	Dial Plate (Triangle).....	.20
RS-1153	Trim Strip T106A,B, Maroon.....	.70
RS-1139	Trim Strip T105A, T107B, Gold.....	.50
RS-1152	Knob, Tuning.....	.85
RS-1186	Dial Plate (Circular W/O Triangle).....	.75
RDK-425	Knob, Volume.....	.35



GENERAL ELECTRIC

SERVICE MANUAL

FOR

PORTABLE RADIO RECEIVERS

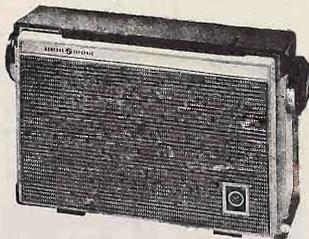
(340-1600 KC., 455 KC., I.-F.)

ER-S-P735A

COVERS
MODELS
P735A
P736A

SPECIFICATIONS

CABINETS: (Plastic)	Model P735A - Turquoise and White Model P736A - White and Tan
ELECTRICAL RATING:	105-120 Volts A-C (50 to 60 Cycles) or DC, 10 Watts at 117 volts A-C 1 "A" Battery - 7 1/2 volt Eveready No. 717 or equivalent 1 "B" Battery - 90 Volt Eveready No. 479 or equivalent
OPERATING FREQUENCIES:	Tuning range 540-1600 KC I.-F Amplifier 455 KC
AUDIO POWER OUTPUT:	150 Milliwatts 10% distortion Maximum 250-300 Milliwatts
TUBE COMPLEMENT:	V1 Oscillator-Converter 1R5 V2 I.-F Amplifier 1U4 V3 Detector - Audio Amplifier 1U5 V4 Power Amplifier 3V4



GENERAL INFORMATION

The models P735A and P736A are four-tube super-heterodyne portable radio receivers. They operate on self-contained batteries or from a power line source of 105 to 120 volts A. C. or D. C.

These models are very compactly made and incorporate two plated circuit chassis, the smaller of which contains the power supply components. The front of the cabinet swings down and open, providing easy accessibility to tubes and batteries.

CHASSIS REMOVAL:

The chassis is easily removed by means of the following procedure:

1. Swing down cabinet front by grasping front at top edge under handle.
2. Remove tuning volume control knobs by pulling straight off their shafts.
3. Remove the two small Phillips-head screws from the top rear edge of the metal chassis mounting bracket.
4. Slide chassis and bracket out of cabinet.
5. Remove bracket from the chassis by removing the 1/4" mounting screw from center of bracket.

The power supply chassis is removed from the cabinet by removing the four small hex-head mounting screws.

The speaker is mounted on the cabinet front and may be removed by removing the four speaker mounting clips which secure the speaker to the four bosses on the inside of the cabinet front.

IMPORTANT: Use care when replacing defective parts. Apply as little heat to terminals and connections as

possible to remove the parts, as excessive heat will damage the plated wiring on the chassis boards.

When replacing knobs, do not force them on, as too much pressure may cause circuit board to bend and crack.

VOLUME CONTROL REPLACEMENT:

The chassis must first be removed from the cabinet as described under CHASSIS REMOVAL and the control removed as follows:

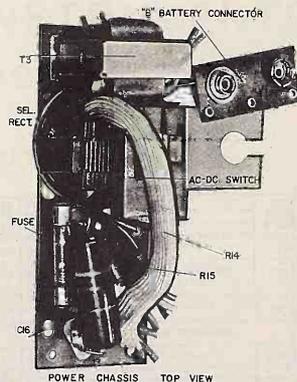
1. Cut off the three volume control lugs and the four switch lugs.
2. Individually remove the remaining parts of the lugs with a long-nose pliers while applying a soldering iron.
3. Clean all holes of excess solder.
4. Insert new control, then solder all lugs securely in place.

TO REPLACE A TUBE SOCKET:

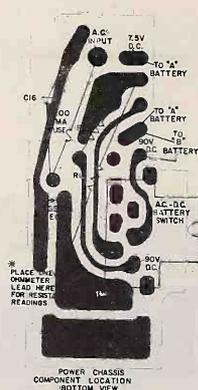
Cut the socket free by cutting all of the socket terminals at the chassis. One socket (V2) has a center terminal which must be unsoldered. Now, heat the pieces of terminals remaining in the board only enough so they may be pushed out. The new socket can now be inserted into the holes left by the old one and soldered into place.

BATTERY INSTALLATION:

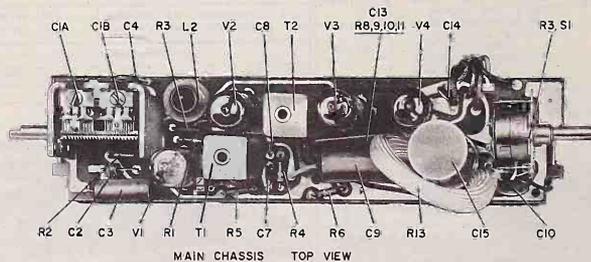
When placing the batteries into position, make sure the battery connections are well seated to make good contact between batteries and battery connections.



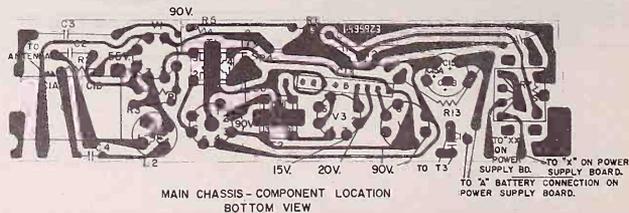
POWER CHASSIS TOP VIEW



POWER CHASSIS COMPONENT LOCATION BOTTOM VIEW



MAIN CHASSIS TOP VIEW



MAIN CHASSIS - COMPONENT LOCATION BOTTOM VIEW

HOFFMAN HI-FI INSTRUMENTS

MODEL SERIES 8003, 8005

GENERAL INFORMATION

MODEL SERIES 8003

The Model Series 8003 are high quality High Fidelity instruments which incorporate a Garrard Mark II Record Changer with Reluctance Pickup Cartridge (DIAMOND NEEDLE), preamp and Record Equalizer Control. The preamp is a transistor stage for low noise and hum factors.

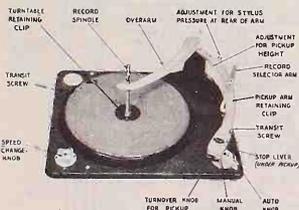
Each component of these instruments is a high quality precision unit, and exact replacement components should be used for replacement purposes to insure original performance.

FLOATING SOUND SPEAKER CHAMBER

This unit should be free to float on its mounting springs with no adjacent units touching the enclosure if rumble-free operation is to be maintained.

RECORD CHANGER

The Garrard Mark II Changer Unit may be operated manually for special records, as well as automatically for 7, 10 or 12 inch records at speeds of 16 2/3, 33 1/3, 45 or 78 RPM. The changer must be floating free on its springs to prevent rumble.



GARRARD MARK II RECORD CHANGER

HUM CONTROL

The HUM control is a variable control used to balance the filament circuits to ground. This control is factory adjusted with the amplifier installed in the cabinet with all components connected. Balance may be checked with LOUDNESS control full clockwise and no audio being fed into the amplifier. Adjust to minimum hum, preferably with an AC meter across the speaker Voice Coil terminals.

AM-FM TUNER

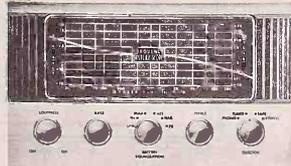
Extremely sensitive with a cascade RF stage the FM band. Built in FM antenna should be replaced with a lead from the customer's outside TV antenna if possible. This arrangement results in the ultimate in FM reception. FM-AFC permits the FM oscillator to pull the FM station into perfect tune even when the dial setting is considerably off the exact station frequency, which allows for human error in tuning at the high FM frequencies.



FREQUENCY DISPLAY SCOPE

The Frequency Display Scope is actuated by the settings of the tone controls. This results in a visual display of tone control settings which may be logged for future playings of individual records.

To avoid accidental damage to the Frequency Display Scope indicators, keep the Bass and Treble controls adjusted either in their extreme right or left rotation while removing the amplifier chassis from the cabinet, and while it is outside of the cabinet. This will place the tips of the indicators inside the protective edge of the dial plate and prevent breakage.



MODEL SERIES 8005

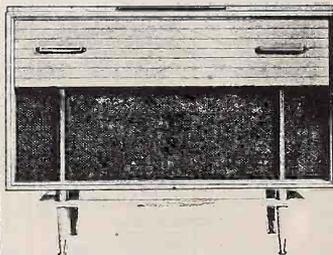
The Model Series 8005 are high quality High Fidelity instruments which incorporate a 4 speed VM Deluxe Record Changer with a ceramic cartridge.

FLOATING SOUND SPEAKER CHAMBER

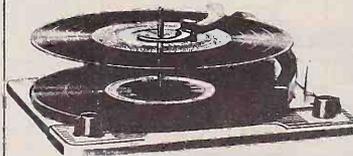
This complete speaker enclosure chamber, with its 3 matched speakers should be free to float on its 4 mounting springs if rumble-free operation is to be achieved.

RECORD CHANGER

The detailed Service Data on the VM 1200A Record Changer is available in VM Booklets #6004 and 1017, both of which may be ordered through your Hoffman Distributor. Two machine screws mount the changer to its base board. These screws allow the changer to float on its mounting springs when they are turned IN until flush with the surface of the changer. When the entire instrument is to be moved any distance, these screws should be turned OUT until the changer is drawn down tight against the mounting board.



MODELS M8003
B8003
SP8003



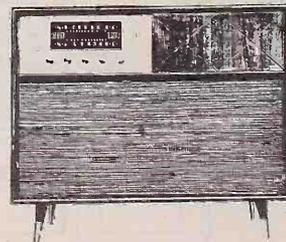
VM 120-A RECORD CHANGER

ELECTRICAL POWER

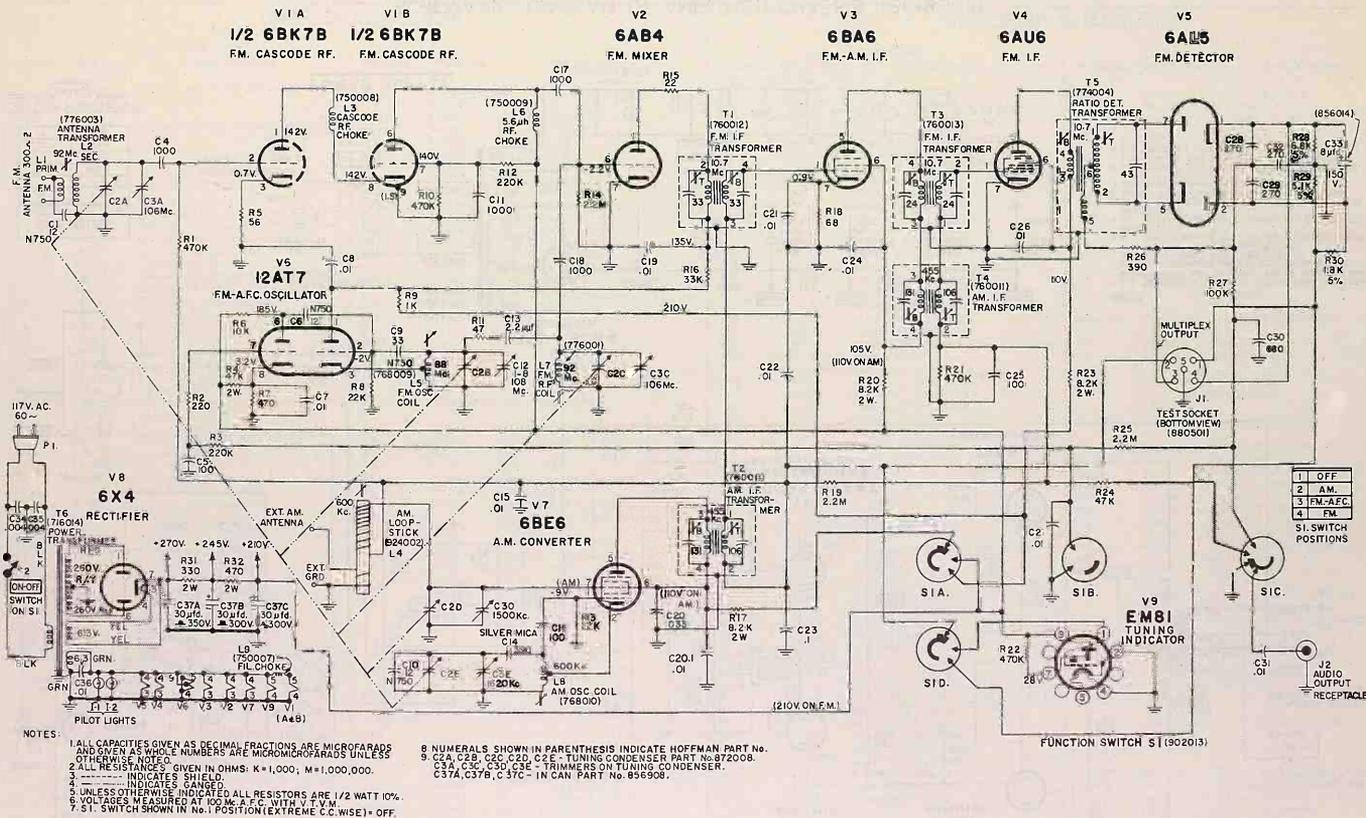
110 to 120 volts 60 cycle AC power. Do not connect to DC or AC of any other frequency.

AC LINE PLUG POLARIZING

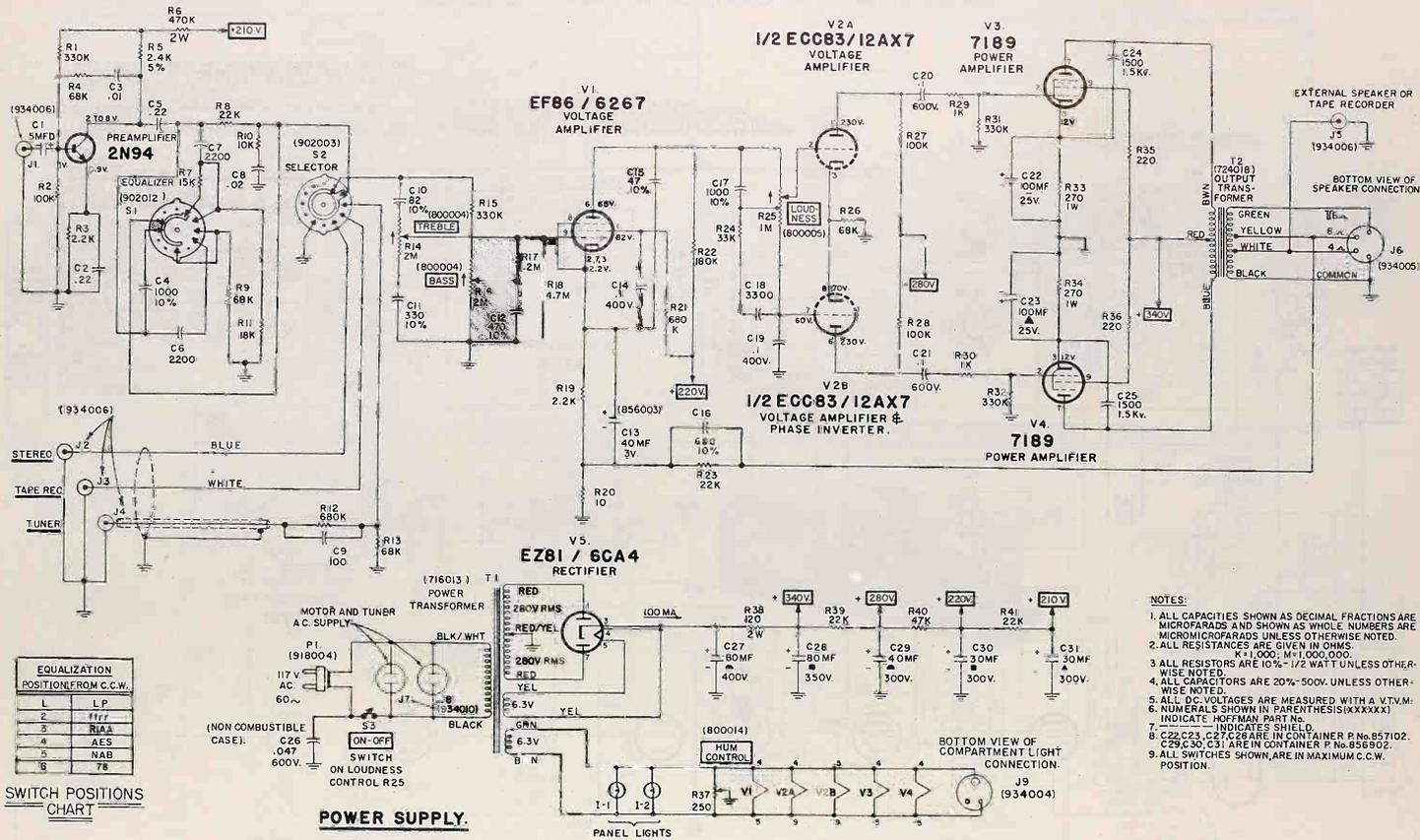
Plug in the power cord, after amplifier warms up advance the loudness control full clockwise with no audio being fed to the amplifier. Reverse the power plug and choose the polarity which gives the least hum.



MODELS M8005
B8005
SP8005
W8005



SCHMATIC DIAGRAM OF TUNER CHASSIS 1124 (8003)



SCHEMATIC DIAGRAM OF AMPLIFIER CHASSIS 1121 (8003)

EASY SERVICE GUIDE

ALIGNMENT CHART

AM-FM TUNER I124 & I126

ALIGNMENT PROCEDURE FOR HOFFMAN AM-FM TUNER

The signal generator output should be no higher than necessary to produce 0.3 VAC during AM alignment and 2VDC during FM alignment. To set the dial pointer, turn the tuning condenser fully closed. Then set the pointer about 1/16 inch beyond the left end of the center horizontal line on the dial plate. Use an insulated alignment screwdriver and hex head alignment tool for adjusting trimmers and coils in the tuner.

AM ALIGNMENT

TUNER SELECTOR SWITCH	SIGNAL GENERATOR FREQUENCY INPUT POINT	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS	
1. AM	455 KC AM at 400 CPS	High side to pin #7 of V7. Low side to chassis. .01 MF isolation	High end of dial	Across tuner output cable	Four (4) cores in 455 KC IF transformers	Adjust for maximum. Keep the generator output low. Maximum of 0.3 VAC at tuner output.
2. "	600 KC AM	High side to AM antenna terminal through 150MMF. Low side to chassis	600 KC	"	600 KC L8 oscillator coil	"
3. "	620 KC	"	"	"	1620 KC C3 B osc. trimmer	"
4. "	1400 KC	"	1400 KC	"	1400 KC antenna trimmer	"
5. Repeat step #2. If adjustment of 600 KC (L8) is required, repeat step #3 and 4 also.						

FM ALIGNMENT

TUNER SELECTOR SWITCH	SIGNAL GENERATOR FREQUENCY INPUT POINT	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS	
1. FM	10.7 MC	High side to FM RF stator lug on tuning condenser. Low side to chassis. Use .01 MF for isolation.	High end of the dial	Between pin #2 of the 6AL5 and chassis. Use 5 VDC scale.	Six (6) cores in 10.7 MC IF transformers	Adjust for maximum. Keep the generator output low. Do not exceed 2 VDC on the VTVM.
2. "	"	"	"	"	"	Attenuate the generator to get a 1 VDC reading on the VTVM.
3. "	"	"	"	"	Top core of ratio detector. Last 10.7 MC IF transformer	Adjust for zero VDC
4. "	80 MC CW	High side to the #1 Fm antenna terminal through 100 ohm. Low side to #2 FM antenna terminal through 150 ohm.	"	Same as step #1	88 MC 92 MC 92 MC	Same as step #1
5. "	107 MC	"	"	"	106 MC 106 MC 108 MC	"
6. Repeat step #4. If any adjustments are required, repeat step #5 also.						

EQUIPMENT REQUIRED:

- A) VTVM
- B) AM signal generator with 30% modulation at 400 CPS. The generator should have outputs at frequencies of 455 KC, 600 KC, 1400 KC, and 1620 KC.
- C) CW signal generator with output at frequencies of 10.7 MC, 90 MC, 98 MC and 107 MC.

PROCEDURE:

Remove the tuner from the cabinet. Remove the bottom chassis plate and connect the power cord to a 117 volt 60 CPS AC power outlet.

Alignment adjustment points are identified by frequency on the tuner chassis illustrations and in this alignment procedure to simplify their location.

IF ALIGNMENT FOR AM

- Set the tuner selector switch to AM.
- Apply a 455 KC, 30% AM at 400 CPS signal to pin #7 of the 6BE6 AM converter. Use a .01 MF capacitor in series with the high side lead from the generator. Connect the low side lead from the generator to the tuner chassis.
- Set the tuning condenser to minimum capacity (wide open or with the pointer to the high end of the dial).
- Set the VTVM to read AC and connect to the output cable of the tuner. Use the high side of the Loudness control on chassis #1126. Use a low reading scale, one volt would be ideal.
- Adjust the four (4) 455 KC IF cores for maximum output. Reduce the inputs necessary to keep the output below 0.3 VAC. The four IF cores, or slugs, are in the two 455 KC transformers (one at the top and bottom of each can) on the back edge of the chassis pan.

ANTENNA AND OSCILLATOR ADJUSTMENTS—AM

- Tighten the two AM trimmers on the tuning capacitor. 1500 KC is the antenna trimmer. 1620 KC is the oscillator trimmer. Then back off each of the two trimmers 1/4 turn to the left.
- Turn the tuning condenser to maximum capacity (fully meshed). The dial pointer should now be one pointer thickness to the left of the last dial marker. Adjust the pointer as required if it is not correctly positioned.
- Apply a 600 KC 30% AM signal through a 150 MMF condenser to the AM antenna terminal. Connect the low side to the tuner chassis. Connect the VTVM across the tuner output cable and set the meter to read AC. Tune the dial pointer to 60 on the AM position of the dial.
- Adjust 600 KC (the oscillator coil L8) for maximum. Keep the generator output reduced to the point giving an output voltage of less than 0.3 VAC.
- Change the generator output to 1620 KC and tune to 162 on the tuner dial. Adjust 1620 KC (the oscilla-

tor trimmer) for maximum output. Attenuate the generator output if necessary to keep the output below 0.3 VAC.

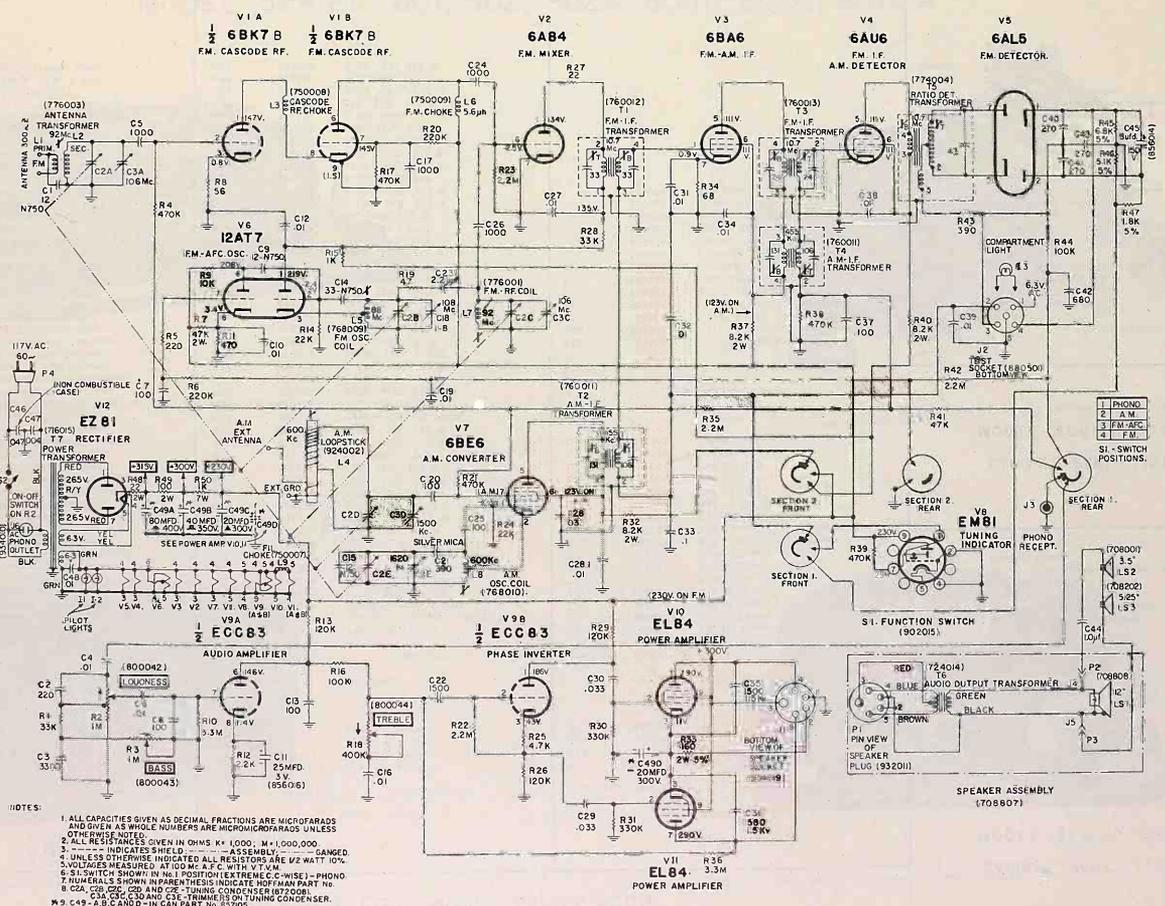
- Change the generator output to 1400 KC and tune to 140 on the tuner dial. Adjust 1500 KC (AM loop trimmer) for maximum. Keep the generator output at a level that will produce 0.3 VAC or less on the meter.

IF ALIGNMENT FOR FM

- Set the tuner selector switch to FM.
- Apply a 10.7 MC CW signal through a .01 MF capacitor to the stator lug on the FM section of the center gang of the tuning condenser. NOTE: The FM section of each gang is the smaller section and has two (2) plates on the rotor and two on the stator.
- Turn the tuning condenser for minimum capacity (pointer to the high end of the dial).
- Set the VTVM to the 5 VDC scale and connect the meter between pin #2 of the 6AL5 tube and chassis.
- Adjust the six (6) 10.7 MC IF cores for maximum DC voltage reading. Keep the DC voltage under 2 volts by reducing the generator output. The IF cores are in the top and bottom of the three (3) 10.7 MC IF transformers.
- Reduce the 10.7 MC input signal until one (1) volt output is obtained. Move the meter lead from pin #2 of the 6AL5 to terminal 3 of the test socket.
- Adjust the top core of the ratio detector (last 10.7 MC IF) transformer for zero VDC.

ANTENNA, RF, AND OSCILLATOR ADJUSTMENT FOR FM

- Connect the hot lead of the CW generator through a 100 ohm resistor to the #1 FM antenna terminal. Connect the low side of the generator to the #2 FM antenna terminal through a 150 ohm resistor. Use 1/2 watt composition resistors.
- Set the VTVM to read 5 VDC scale and connect the meter between pin #2 of the 6AL5 tube and chassis.
- Turn the tuning condenser to a reading of 90 MC on the FM section of the dial. Turn the tuner selector switch to FM.
- Set the 108 MC adjustment (FM oscillator trimmer, adjacent to the tuning condenser) with the bottom of the screw head about 1/2 inch above the chassis. Loosen 106 MC (FM RF trimmer on the center section of tuning condenser) 1/8 turn from maximum clockwise. Loosen 106 MC (FM antenna trimmer on the first section of tuning condenser) 5/8 turn from the maximum clockwise position.
- With an input signal of 90 MC, adjust 88 MC (FM oscillator coil) and the two 92 MC coils (antenna coil and mixer coil located beneath the chassis) for maximum. Reduce the generator output as required to keep the meter at 2 volts or less.
- Turn the tuning condenser to a reading of 107 MC on the FM section of the dial. Change the generator signal to 107 MC. Then adjust 106 MC, 107 MC, and 108 MC for maximum output.



- NOTES:
1. ALL CAPACITIES GIVEN AS DECIMAL FRACTIONS ARE MICROFARADS AND GIVEN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
 2. ALL RESISTANCES GIVEN IN OHMS K = 1000, M = 1,000,000.
 3. --- INDICATES SHIELDED ASSEMBLY GANGED.
 4. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE 1/2 WATT 10% 5000V MEASURED AT 100 MC A.C. WITH V.T. V.M.
 5. S1 SWITCH SHOWN IN NO. 1 POSITION (EXTREME C-C WISE) - PHONO.
 6. NUMERALS SHOWN BETWEEN TUBES INDICATE HOFFMAN PART NO.
 7. CEA, C20, C22, C23 AND C24 TUNING CONDENSER (R772001).
 8. C25, C26, C27, C28 AND C29 TUNING CONDENSER (R772002).
 9. C30, C31, C32, C33, C34, C35, C36, C37, C38, C39, C40, C41, C42 AND C43 TUNING CONDENSER (R772003).

SCHEMATIC DIAGRAM OF TUNER/AMP CHASSIS 1126 (8005)

REPLACEMENT PARTS LIST - MODEL SERIES 8005

CAPACITORS		
SYMBOL	PART NO.	DESCRIPTION
C1	850003	32mmf, 5% (N750) Ceramic
C2A	872008	3 Gang AM-FM Tuning(with pulley)
C2B		
C2C		
C2D		
C2E		
C3A	Pair of C2	Alignment Trimmers
C3C		
C3D		
C3E		
C3F		
C2	851144	220mmf, 20% Ceramic
C3	851123	3300mmf, 20% Ceramic
C4	851002	.01mfd Ceramic Disc
C5	851123	1000mmf, 20% Ceramic
C6	851002	.01mfd Ceramic Disc
C7	851128	100mmf, 20% Ceramic
C8	851128	.000mfd, 20% Ceramic
C9	850003	12mmf, 5% (N750) Ceramic
C10	851002	.01mfd Ceramic Disc
C10	856016	25mfd @ 3V, Tubular
C12	851002	.01mfd Ceramic Disc
C13	851128	100mmf, 20% Ceramic
C14	850012	33mmf, 20% (NPO) Ceramic
C15	850003	12mmf, 5% (NPO) Ceramic
C16	831002	.01mfd Ceramic Disc
C17	851126	1000mmf, 20% Ceramic
C18	872006	1-8mmf Tubular Trimmer
C19	851002	.01mfd Ceramic Disc
C20	851128	100mmf, 20% Ceramic
C21	862401	390mmf, 5% Silver Mica
C22	851129	1500mmf, 20% Ceramic
C23	854035	2.2mmf, 10% Composition
C24	851126	1000mmf, 20% Ceramic
C25	851128	100mmf, 20% Ceramic
C26	851126	1000mmf, 20% Ceramic
C27	851002	.01mfd Ceramic Disc
C28	866219	.033mfd, 20%, 400V
C29	866219	.033mfd, 20%, 400V
C30	866219	.033mfd, 20%, 400V
C31	851002	.01mfd Ceramic Disc
C32	851002	.01mfd Ceramic Disc
C33	866126	.1mfd, 20%, 200V
C34	851002	.01mfd Ceramic Disc
C35	851115	1500mmf, 20%, 1.5KV
C36	854115	1500mmf, 20%, 1.5KV
C37	851128	100mmf, 20% Ceramic
C38	851002	.01mfd Ceramic Disc
C39	851002	.01mfd Ceramic Disc
C40	851116	270mmf, 10%, 500V
C41	851116	270mmf, 10%, 500V
C42	851108	680mmf, 20% Ceramic
C43	851116	270mmf, 10%, 500V
C44	866035	1mfd, 100V Tubular
C45	856014	8mfd @ 150V Tubular
C46	870221	.047, 20%, 600V
C47	851134	.004mfd, 20%, 1.5KV
C48	851002	.01mfd Ceramic Disc

CAPACITORS		
SYMBOL	PART NO.	DESCRIPTION
C49A	857105	80mfd @ 400V
C49B		40mfd @ 350V
C49C		20mfd @ 300V
C49D		20mfd @ 300V

RESISTORS		
SYMBOL	PART NO.	DESCRIPTION
R1	814210	33K, 10%, 1/2 W
R2	800042	Loudness Control & ON/OFF
R3	800044	BASS Control, 1 meg
R4	814224	470K, 10%, 1/2 W
R5	814184	220, 10%, 1/2 W
R6	814220	220K, 10%, 1/2 W
R7	818212	47K, 10%, 2 W
R8	814177	56, 10%, 1/2 W
R9	814204	10K, 10%, 1/2 W
R10	814234	3.3M, 10%, 1/2 W
R11	814188	470, 10%, 1/2 W
R12	814196	2.2K, 10%, 1/2 W
R13	814217	120K, 10%, 1/2 W
R14	814208	22K, 10%, 1/2 W
R15	814192	1K, 10%, 1/2 W
R16	814216	100K, 10%, 1/2 W
R17	814224	470K, 10%, 1/2 W
R18	800044	Treble Control, 400K
R19	814176	47, 10%, 1/2 W
R20	814220	220K, 10%, 1/2 W
R21	814224	470K, 10%, 1/2 W
R22	814232	2.2M, 10%, 1/2 W
R23	814232	2.2M, 10%, 1/2 W
R24	814208	22K, 10%, 1/2 W
R25	814200	4.7K, 10%, 1/2 W
R26	814217	120K, 10%, 1/2 W
R27	814172	22, 10%, 1/2 W
R28	814210	33K, 10%, 1/2 W
R29	814217	120K, 10%, 1/2 W
R30	814222	330K, 10%, 1/2 W
R31	814222	330K, 10%, 1/2 W
R32	818203	8.2K, 10%, 2 W
R33	818044	160, 5%, 2 W
R34	814178	68, 10%, 1/2 W
R35	814232	2.2M, 10%, 1/2 W
R36	814234	3.3M, 10%, 1/2 W
R37	818203	8.2K, 10%, 2 W
R38	814224	470K, 10%, 1/2 W
R39	814224	470K, 10%, 1/2 W
R40	818203	8.2K, 10%, 2 W
R41	814212	47K, 10%, 1/2 W
R42	814232	2.2M, 10%, 1/2 W
R43	814187	390, 10%, 1/2 W
R44	814216	100K, 10%, 1/2 W
R45	814083	6.8K, 5%, 1/2 W
R46	814080	5.1K, 5%, 1/2 W

RESISTORS		
SYMBOL	PART NO.	DESCRIPTION
R47	814069	1.8K, 5%, 1/2 W
R48	818172	22, 10%, 2 W
R49	818180	100, 10%, 2 W
R50	824425	1K, 10%, 7W-WW

TRANSFORMERS AND COILS		
SYMBOL	PART NO.	DESCRIPTION
T1	760012	FM IF Trans
T2	760011	AM IF Trans
T3	760013	FM IF Trans
T4	760011	AM IF Trans
T5	774004	Ratio Detector Trans
T6	724014	Audio Output Trans
T7	716015	Power Trans
L1	776003	FM Antenna Coil (Primary)
L2	776003	FM Antenna Coil (Secondary)
L3	750008	Gascode RF Choke
L4	924002	AM Loopstick Antenna
L5	768009	FM Oscillator Coil
L6	750009	FM RF Choke
L7	776001	FM RF Coil
L8	768010	AM Oscillator Coil
L9	750007	Filament RF Choke

MISCELLANEOUS		
SYMBOL	PART NO.	DESCRIPTION
LS1	708808	12" Round Speaker
LS2	708201	3 1/2" Round - 8 ohm Speaker
BS3	708202	5 1/4" Round - 8 ohm Speaker
S1	902015	Function Switch - 4 Position
83	940047	Dial Light #47, 6.3V
12	940047	Dial Light #47, 6.3V
13	940044	Compartment Light #44
	565004	Flywheel, Tuning
	577034	Tuning Eye Bracket
	594002	Pulley, Idler
	603004	Spring, Dial Cord
	619018	Tuner Dial
	623005	Dial Pointer

CABINET PARTS LIST
MODEL SERIES 8005

PART NO.	DESCRIPTION
381029	Cabinet - Walnut
381030	Cabinet - Mahogany
381031	Cabinet - Oak
381032	Cabinet - Salem Maple
311012	Floating Sound Chamber
990004	Record Changer - VM 4 Speed
990502	45 RPM Adapter
500039	Knob-Control with Indicator
500038	Knob-Control without Indicator
529003	Bezel-Dial
286004	Compartment Light Cover
223333	Screw for Compartment Light Cover
452037	Control Panel

CABINET PARTS LIST
MODEL SERIES 8003

PART NO.	DESCRIPTION
381026	Cabinet - Mahogany
381027	Cabinet - Oak
381028	Cabinet - Salem Maple
990006	4 Speed Garrard RCJ21 - Mark 2 Record Changer
990516	45 RPM Spindle Adapter Post #LR54
981004	G.E. Reluctance Cartridge, Diamond LP.
286005	Jewel-Indicator Light
286004	Compartment Light Cover
223333	Compartment Light Cover Screw
452031	Amplifier Control Panel
452032	Tuner Control Panel
500035	Knob - Control with Indicator
500036	Knob - Control without Indicator
599034	Pad - Spindle Cup
603017	Floating Sound Chamber Spring
529002	Bezel-Tuner Dial & Tone Display
640015	Catalogue - Record Index
940044	Pilot Light
926004	FM Antenna

HOFFMAN HI-FI INSTRUMENTS

MODEL SERIES 801, 802, 802A, 8001, 8002, 8002A



FIGURE 4. V.M. 1206A RECORD CHANGER. REFER TO V.M. BOOKLETS NO. 6004 AND 1017 FOR SERVICE AND PARTS DATA.



FIGURE 2. GARRARD R.C. 121/4D RECORD CHANGER. FOR SERVICE AND PARTS DATA REFER TO HOFFMAN SERVICE DATA NOTE NO. 801.

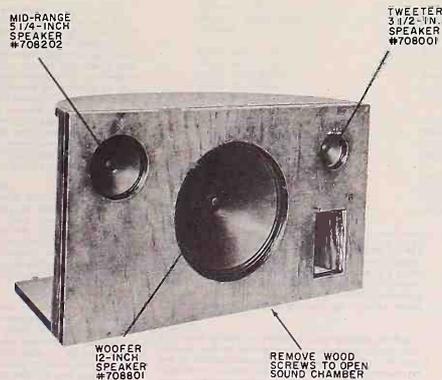


FIGURE 4. HOFFMAN FLOATING SOUND CHAMBER



FIGURE 3. GARRARD R.C. 12 1/4 MARK II RECORD CHANGER

INSTALLATION INSTRUCTIONS

GENERAL INFORMATION

MODEL SERIES 801 - Instruments in this group are Hoffman High Fidelity Record Players. VM four-speed record changers and Hoffman High Fidelity Amplifier #1112 are incorporated in these models. Replacement Parts and Service Data for all parts of the instrument, except record changer, are included in this Service Data Note. Refer to V-M booklets No. 6004 and 1017 for the record changer service and parts information other than cartridge, needles, and 45 RPM adapter.

MODEL SERIES 8001 - Instruments in this group are Hoffman High Fidelity AM-FM Radio/Record players. The AM-FM radio tuner is shock mounted on the amplifier, chassis #119. Replacement Parts Data for all parts of the instrument, except record changer, are included in this Service Data Note. Refer to V-M booklets No. 6004 and 1017 for record changer service and parts information other than cartridge, needles and 45 RPM adapter.

MODEL SERIES 802, 802A, 8002, 8002A - Instruments in this group are Hoffman High Fidelity models using the same basic amplifier, sound chamber, and cabinets. The major differences are in the use of AM-FM tuners and record changers. Refer to the Replacement Cabinet Parts list in this Service Data Note for the components used in specific models. All service and parts data for these instruments is included in this Service Data Note except that pertaining to the record changers. Cartridge, needle, and 45 RPM parts data will be found in the Replacement Cabinet Parts List. For complete data on Garrard Changer Model R.C. 121/4D refer to Hoffman Service Data Note No. 801. The complete data for Garrard Changer Model R.C. 121/4 Mk. II will be released later.

SIGNIFICANT CODE LETTER DESIGNATIONS

Code letters are used to designate component variations in Hoffman instruments. The code letter is stamped in the space provided for this purpose in the vicinity of the model designation. Following are code letter variations which are important regarding service and parts for the instruments covered by this Service Data Note:

MODEL SERIES 802, with no code designation have a two-conductor shielded cable between the record player and amplifier. The PHONO receptacle on the amplifier is a three-terminal receptacle (#934006), and a three-pin plug (#932003) is used on the connecting cable.

MODEL SERIES 802, CODE "H" instruments use the conventional type phono receptacle (#934006) and cable plug (#932008) with shielded connecting cable between the amplifier and record changer.

MODEL SERIES 802, CODE "B" and **CODE "C"** instruments have minor revisions to facilitate Factory assembly of the complete instrument.

MODEL SERIES 802, CODE "D" and **CODE "E"** instruments use the Garrard Model R.C. 121/4 Mk. II record changer. The pilot lamp connection for these instruments has been removed from the speaker socket at the rear of the amplifier. A pilot lamp connecting socket has been added to the top surface of the amplifier on these instruments.

MODEL SERIES 8002, CODE "A", CODE "B", AND CODE "C" instruments have the same variations as Model Series 802 instruments for each respective code designation.

MODEL SERIES 8002, CODE "D" AND CODE "E" instruments use the Garrard Model R.C. 121/4 Mk. II record changer and AM-FM radio tuner #1120 in place of tuner #1116.

ACCESSORIES

Hoffman Model Series 802, 802A, 8001, 8002, and 8002A High Fidelity instruments have extra audio receptacles, switch controlled AC power receptacles and an entertainment selector switch to allow for permanent plug-in installation of accessory items. Accessories should be equipped with Hoffman plug No. 932015.

RECORDING ON A TAPE RECORDER - Model Series 802 and 8002 have an extra audio output receptacle connected directly across the audio output transformer. The impedance at the receptacle is 8 ohms and allows for recording on tape while you are listening to the record player or radio. It is not necessary

to unpack the instrument and then refer to the special installation instructions attached to the turntable of the record changer. Follow these instructions in the order specified for best results. Models 802, 802A, and 8002A are equipped with the exclusive Hoffman "Floating Sound" Chamber.

1. CABINET LEGS - Models which include cabinet legs have the legs removed for shipment. The legs are packed in a small cardboard box attached to the back compartment of the instrument. Lay the instrument over on its side, on a protective pad, and then install the legs by threading the bolts into the Tee Nuts or mounting plates on the bottom of the cabinet.

2. FLOATING SOUND CHAMBER - The sound chamber is secured to the cabinet for shipment. The shipping bolts must be removed during installation. If the complete instrument is to be moved at any time, replace the shipping bolts to avoid accidental damage to the sound chamber or other components of the instrument during shipment.

3. 45 RPM SPINDLE ADAPTER - The 45 RPM spindle adapter will be found packed in a carton attached to the back of the instrument. On models which include legs, the adapter is packed with the legs.

4. RECORD CHANGER - On Model Series 801 and 8001 the record changer is secured to the cabinet by two machine screws which extend above the baseplate of the changer. Turn these screws down flush with the top of the baseplate to float the changer. On Model Series 802, 802A, 8002, and 8002A the changer is secured to the cabinet with two machine screws marked with red paint for easy identification. Remove these two screws when putting the instrument into operation. Remove all packing material from the changer.

For best results the record changer should be absolutely level and floating freely on its spring mounting. Check by placing a small level on the turntable. On models using the Garrard R.C. 121/4D or R.C. 121/4 Mk. II, slight corrections may be made by adjusting the changer mounting screws. On other models leveling may be accomplished by use of small shims under the legs of the instrument.

5. TONE ARM - Remove all padding material and packing from the tone arm and place the tone arm on its pedestal. Be sure to remove the stylus guard from the bottom side of the cartridge.

6. POWER - Plug the power cord into a 110 to 120 volt 60 cycle AC power outlet. Set the selector switch to PHONO and turn the LOUDNESS fully to the right (clockwise). Reverse the AC cord plug if necessary to eliminate hum.

7. AMPLIFIER OPERATION - Rotate the LOUDNESS knob to the left to the point of minimum volume. Then proceed to check out the record changer.

to change the setting of the SELECTOR while recording. For recording purposes it is suggested that the BASS be set to the flat position and the TREBLE set to the maximum position.

Models 801 and 8001 have no recording receptacle but can be used for recording by connecting the recorder across the secondary of the audio output transformer at the back of the instrument. The output transformer for Model Series 8001 instruments is located on the frame of the 12-inch speaker.

EXTERNAL SPEAKERS - The audio output receptacle on Model Series 802 and 8002 may also be used to connect remote speakers to the instrument. Impedance at the receptacle is 8 ohms. On Model Series 801 and 8001, make appropriate connections for remote speakers directly to the output transformer.

PLAYING TAPE RECORDINGS - The input signal to the amplifier should be about 1.5 volts for best results. Plug the output from the tape into the TAPE REC. receptacle on the amplifier on Model Series 802, 802A, 8002, 8002A. On Model Series 801 use the PHONO receptacle. Then set the SELECTOR to the appropriate position. **AUXILIARY INPUTS** - Input signals from accessories which are connected to Hoffman High Fidelity instruments in the Model Series covered by this Service Data Note should be an input of about 1.5 volts. Use a preamplifier if the signal does not meet these requirements.

8. RADIO - If the instrument is equipped with a radio tuner, the radio should be checked out next for proper operation. Built-in antennas are provided for both AM and FM reception. No external antenna should be required for reception in normal signal areas. AM and FM antenna input terminals are provided on the back of the tuner chassis. Connect the ground terminal to a cold water pipe if an external AM antenna is added or if stray AC hum pick up is a problem on any portion of the AM band while operating on the built-in antenna. If an external FM antenna is desired, reception conditions will determine the type of antenna to be used. An external antenna will not be required for FM reception except in cases of extreme fringe signal or problem reception areas with multi-path conditions. The FM antenna input is 300 ohm balanced.

9. CONTROLS - Instruct the owner in the use of all operating controls. The TREBLE and BASS controls should be set at the mid-position for initial set up. The LOUDNESS control should be set in the minimum position when the instrument is first turned on. Be sure to instruct the owner in the use of the stylus lever; RED dot or LP for long play micro-groove records and WHITE dot or 78 for standard 78 RPM records.

Models with radio tuner have two FM tuning positions on the SELECTOR switch, FM and FM-AFC. When switched to the FM position the AFC (automatic frequency control) circuit is disabled. This feature provides for accurate tuning of FM stations which are closely spaced on the dial or in tuning stations in fringe areas. Tune the station on the FM position and then switch to FM-AFC to lock the tuner to the station.

NOTE: The LOUDNESS control is designed around a linear variable resistor rather than the tapered volume control usually found on television and radio receivers. This feature allows for uniform increase or attenuation of all frequencies as the LOUDNESS control is adjusted.

A special HUM control is provided on the amplifier of each instrument covered by this Service Data Note. This control is factory adjusted and will usually require no further adjustment unless repair of the amplifier becomes necessary. Adjustment is made with the amplifier in the cabinet and all components of the instrument connected together in normal fashion.

SPECIAL SERVICE NOTES

MODELS WITH CHASSIS 1119 and 1120

A 330 ohm resistor is installed across the FM antenna terminals of these tuners at the Factory. The resistor may be removed for increased sensitivity in areas where there is no local FM station. In areas with strong local stations, the 330 ohm resistor should not be removed or image frequency problems may result.

ALL MODELS WITH FREQUENCY DISPLAY SCOPE

To avoid accidental damage to the Frequency Display Scope Indicator, keep the Bass and Treble controls adjusted to either extreme right or extreme left while removing the amplifier chassis from the cabinet and while it remains outside of the cabinet. This will keep the tips of the indicator inside the protective edge of the dial plate and prevent breakage due to an accidental bump while handling the amplifier.

ELECTRICAL POWER - 110 to 120 volts 60 cycle AC power. Do not connect to DC or AC of any other frequency.

INTERMEDIATE FREQUENCIES - AM radio 455 kilocycles. FM radio 10.7 megacycles.

TUNING RANGE - AM radio, 530 to 1620 kilocycles. FM radio, 88 to 108 megacycles.

FM ANTENNA INPUT IMPEDANCE - 300 ohms balanced.

FM TUNER SENSITIVITY - 2 to 3 microvolts.

AMPLIFIER OUTPUT IMPEDANCE - 8 ohms.

SPEAKERS - 12-inch woofer, 5-1/4 inch midrange, 3-1/2 inch tweeter.

SOUND CHAMBERS - Models in the 802, 802A, 8002, and 8002A groups are equipped with the exclusive Hoffman "Floating Sound" Chamber. Models in the 801 and 8001 series have three-speaker systems built into the cabinet.

FINISH MODEL CODE CABINET PARTS

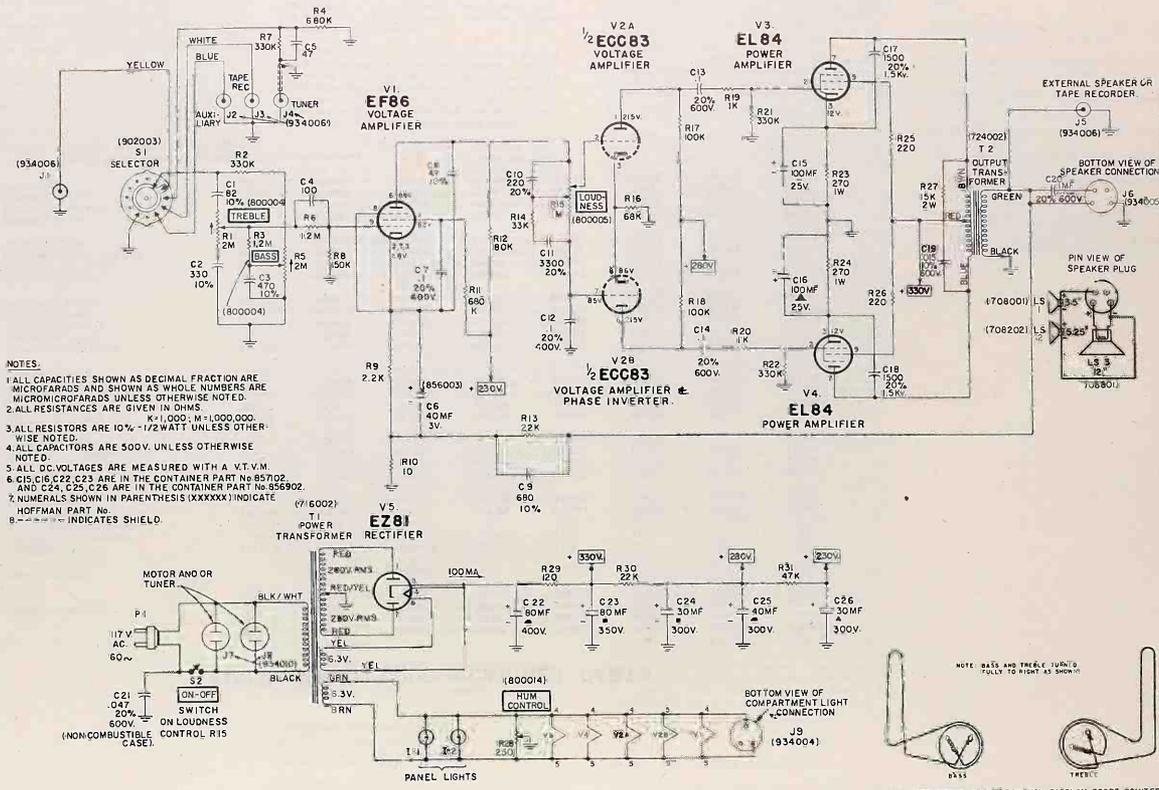
MODEL NUMBER	W801	W8001	W802	W801	W8002	W8002	C802A	C8002A
	M801	M8001	M802	M802	M8002	M8002	LW802A	LW8002A
CODE LETTER	B801	B8001	B802	B802	B8002	B8002	B802A	B8002A
	SP801	SP8001	SP802	SP802	SP8002	SP8002	SP802A	SP8002A
	A, B, C			D, E		A, B, C		D, E
Amplifier Chassis	1112	-----	1108	1108	1108	1108	1108	1108
AM-FM Tuner Chassis	-----	-----	-----	-----	1116	1120	-----	1120
Tuner-Amplifier Chassis	-----	1119	-----	-----	-----	-----	-----	-----
Record Changer	990004	990004	990002	990006	990002	990006	990006	990006
Sound Chamber	-----	-----	390003	390003	390003	390003	390003	390003
Bezel Display Scope	-----	-----	529002	529002	529002	529002	529002	529002
Bezel Tuner	-----	-----	-----	-----	529001	529001	-----	529001
Dial Glass, Amplifier	-----	-----	619001	619001	619001	619001	619001	619001
Dial Glass, Tuner	-----	619000	-----	-----	619008	619008	-----	619008
Cabinet, Mahogany	385006	381010	381006	381018	381006	381018	381023	381023
Cabinet, Oak	385007	381011	381007	381019	381007	381019	381024	381024
Cabinet, Walnut	385005	381009	381005	381017	381005	381017	381022	381022
Cabinet, Siam Maple	385008	381012	381008	381020	381008	381020	381025	381025
Cabinet, Cherry	-----	-----	-----	-----	-----	-----	381021	381021
Escutcheon, Amplifier	452014	-----	452024	452024	452024	452024	452035	452035
Escutcheon, Tuner	-----	452026	-----	-----	452025	452025	-----	452034
Knob, With Pointer	500027	500030	500028	500028	500028	500028	500035	500035
Knob, No Pointer	-----	500019	500029	500029	500029	500029	500036	#500036
Instruction Booklet	640009	640016	640013	640013	640013	640013	640025	640025
Changer Cartridge	981003	981003	981003	981003	981003	981003	981003	981003
Dual Sapphire Needles	990507	990507	990507	990507	990507	990507	990507	990507
Diamond Sapphire Needles	990506	990506	990506	990506	990506	990506	990506	990506
45 RPM Spindle	990502	990502	990501	990516	990501	990516	990516	990516
Speaker, 3.5 inch	708001	708001	708001	708001	708001	708001	708001	708001
Speaker, 5.25 inch	708202	708202	708202	708202	708202	708202	708202	708202
Speaker, 12 inch	708806	*708807	708801	708801	708801	708801	708801	708801
Pilot Lamp	940044	940044	940044	940044	940044	940044	940044	940044

* NOTE: Includes 724014 Output Transformer, Plus Cable and Plug.
NOTE: For Tuner Selector Knob use 500037.

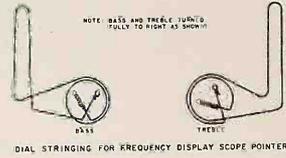
SPECIAL REPLACEMENT PARTS NOTE

Refer to the Schematic NOTES for interpretation of parts symbols, description, and part numbers. Special type components are listed below for your convenience and should be replaced only with the types specified. Part numbers for replacement components which apply to complete instruments are included in the Replacement Cabinet Parts List.

SYMBOL	PART NO.	DESCRIPTION
CAPACITORS		
C6	856003	40 MF, 3 DCWV, Electrolytic
C45	857102	100 MF, 25 DCWV, Electrolytic
C160		100 MF, 25 DCWV, Electrolytic
C220		80 MF, 400 DCWV, Electrolytic
C230		80 MF, 400 DCWV, Electrolytic
C240	856902	30 MF, 300 DCWV, Electrolytic
C250		40 MF, 300 DCWV, Electrolytic
C260		30 MF, 300 DCWV, Electrolytic
C17	851115	1500 MMF, 20%, 1.5 KV
C18	851115	1500 MMF, 20%, 1.5 KV
C21	870225	.1 MF, 20%, 600V, with non-combustible case
R1	800004	Treble Control, 2M
R6	800004	Bass Control, 2M
R15	800005	Loudness Control, 1M
R28	800014	Hum Control, 250 ohm
S1	902003	Selector Switch
MISCELLANEOUS		
T1	716002	Power Transformer
T2	724002	Output Transformer
J11	934004	Phono Receptacle for Instruments with no code.
J2	934006	Phono Receptacle for Coded Instruments
J3	934006	Auxiliary or Stereo Receptacle
J4	934006	Tape Receptacle
J5	934006	Tuner Receptacle
J6	934006	Extra Speaker Recept.
J7	934005	Speaker Receptacle
J8		Speaker Plug



NOTES:
 1. ALL CAPACITIES SHOWN AS DECIMAL FRACTION ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
 2. ALL RESISTANCES ARE GIVEN IN OHMS
 K = 1,000; M = 1,000,000.
 3. ALL RESISTORS ARE 10% - 1/2 WATT UNLESS OTHERWISE NOTED.
 4. ALL CAPACITORS ARE 500V UNLESS OTHERWISE NOTED.
 5. ALL DC VOLTAGES ARE MEASURED WITH A VT-V.M. C15, C16, C22, C23 ARE IN THE CONTAINER PART No 857102 AND C24, C25, C26 ARE IN THE CONTAINER PART No 856902.
 7. NUMERALS SHOWN IN PARENTHESIS (XXXXXX) INDICATE HOFFMAN PART No.
 8. ----- INDICATES SHIELD.



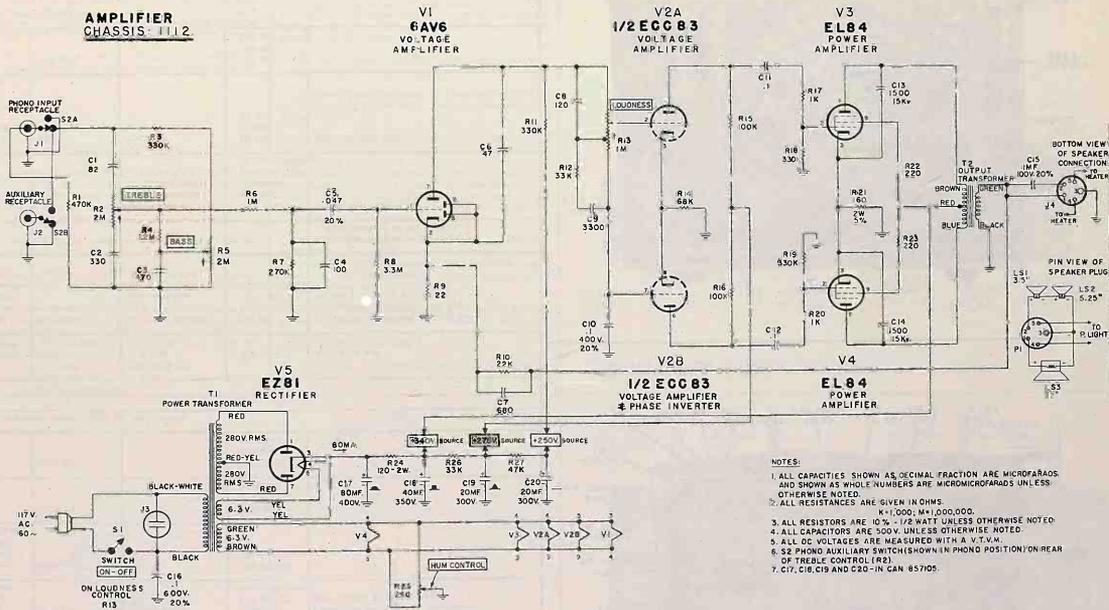
REPLACEMENT PARTS DATA & SCHEMATIC DIAGRAM FOR HOFFMAN CHASSIS 1108

SPECIAL REPLACEMENT PARTS NOTE

Refer to the Schematic NOTES for interpretation of parts symbols, description, and part numbers. Special type components are listed below for your convenience and should be replaced only with the types specified. Part numbers for replacement components which apply to complete instruments are included in the Replacement Cabinet Parts List.

SYMBOL	PART NO.	DESCRIPTION
CAPACITORS		
C17)	857105	80 MF., 400 DCWV, Electrolytic
C18)		40 MF., 350 DCWV, Electrolytic
C19)		20 MF., 300 DCWV, Electrolytic
C20)		20 MF., 300 DCWV, Electrolytic
C13	851115	1500 MMF., 20%, 1.5 KV
C14	851115	1500 MMF., 20%, 1.5 KV
CONTROLS		
R3)	800033	Treble Control, .2M
S2)		Phono-Auxiliary Switch
R5	800004	Bass Control, 2M
R13)	800005	Loudness Control
S1)		On-Off Switch
MISCELLANEOUS		
T1	716007	Power Transformer
T2	706009	Output Transformer
J1, J2	934006	Input Receptacles
J4	934019	Speaker Receptacle

AMPLIFIER CHASSIS 1112



- NOTES:**
1. ALL CAPACITIES SHOWN AS DECIMAL FRACTION ARE MICROFARADS AND SHOWN AS WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
 2. ALL RESISTANCES ARE GIVEN IN OHMS.
 3. ALL RESISTORS ARE 10% - 1/2 WATT UNLESS OTHERWISE NOTED.
 4. ALL CAPACITORS ARE 500V UNLESS OTHERWISE NOTED.
 5. ALL DC VOLTAGES ARE MEASURED WITH A V.T.V.M.
 6. S2 PHONO-AUXILIARY SWITCH (SHOWN IN PHONO POSITION) ON REAR OF TREBLE CONTROL (R3).
 7. C17, C18, C19 AND C20 - IN CAB 857105.

REPLACEMENT PARTS DATA & SCHEMATIC DIAGRAM FOR HOFFMAN CHASSIS 1112

EASY-SERVICE AM-FM TUNER ALIGNMENT GUIDE

The signal generator output should be no higher than necessary to produce 0.3 VAC during AM alignment and 2VDC during FM alignment. To set the dial pointer, turn the tuning condenser fully closed. Then set the pointer about 1/16 inch beyond the left end of the center horizontal line on the dial plate. Use an insulated alignment screwdriver and hex head alignment tool for adjusting trimmers and coils in the tuner.

AM ALIGNMENT

TUNER SELECTOR SWITCH	SIGNAL GENERATOR FREQUENCY	SIGNAL GENERATOR INPUT POINT	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1. AM	455 KC AM at 400 CPS	High side to pin #7 of V7, Low side to chassis. .05 MF isolation	High end of dial	Across tuner output cable	Four (4) cores in 455 KC IF transformers	Adjust for maximum. Keep the generator output low. Maximum of 0.3 VAC at tuner output.
2. "	600 KC AM	High side to AM antenna terminal through 150MME. Low side to chassis	600 KC	"	600 KC L8 oscillator coil	"
3. "	1620 KC	"	1620 KC	"	1620 KC C10B osc. trimmer	"
4. "	1400 KC	"	1400 KC	"	1500 KC antenna trimmer	"

5. Repeat step #2. If adjustment of 600 KC (L8) is required, repeat step #3 and 4 also.

FM ALIGNMENT

TUNER SELECTOR SWITCH	SIGNAL GENERATOR FREQUENCY	SIGNAL GENERATOR INPUT POINT	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1. FM	10.7 MC	High side to FM RF mixer lug on tuning condenser. Low side to chassis. Use .01 MF for isolation.	High end of the dial	Between pin #2 of the 6AL5 and chassis. Use 5 VDC scale.	Six (6) cores in 10.7 MC IF transformers	Adjust for maximum. Keep the generator output low. Do not exceed 2 VDC on the VTVM.
2. "	"	"	"	"	"	Attenuate the generator to get a 1 VDC reading on the VTVM.
3. "	"	"	"	Move high side lead to terminal #3 of test socket.	Top core of ratio detector. Low 10.7 MC IF transformer	Adjust for zero VDC
4. "	"	High side to the #1 antenna terminal through 100 ohm. Low side to #2 FM antenna terminal through 150 ohm.	90 MC	Same as step #1	88 MC 92 MC 92 MC	Same as step #1
5. "	107 MC	"	107 MC	"	106 MC 106 MC 108 MC	"

6. Repeat step #4. If any adjustments are required, repeat step #5 also.

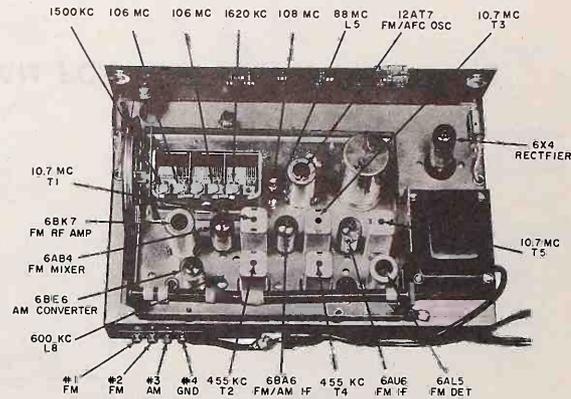


FIGURE 6. TOP VIEW OF HOFFMAN AM-FM RADIO TUNERS—CHASSIS 1116 & 1120

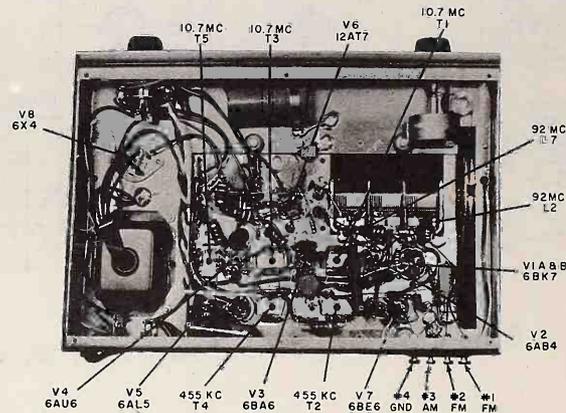


FIGURE 7. BOTTOM VIEW OF HOFFMAN AM-FM RADIO TUNERS

ALIGNMENT PROCEDURE FOR HOFFMAN AM-FM TUNER

EQUIPMENT REQUIRED:

- A) VTVM
- B) AM signal generator with 30% modulation at 400 CPS. The generator should have outputs at frequencies of 455 KC, 600 KC, 1400 KC, and 1620 KC.
- C) CW signal generator with output at frequencies of 107 MC, 90 MC, 98 MC and 107 MC.

PROCEDURE:

Remove the tuner from the cabinet. Remove the bottom chassis plate and connect the power cord to a 117 volt 60 CPS AC power outlet.

Alignment adjustment points are identified by frequency on the tuner chassis illustrations and in this alignment procedure to simplify their location. For example: The AM oscillator (L8) is identified as 600 KC which is also its alignment adjustment frequency. Alignment reference marks have also been included on the backside of the dial pointer slide rail to assist the technician in locating correct setting of the tuning condenser for Antenna, RF, and Oscillator alignment. For Example: 1620 KC is an AM alignment frequency. The tuning condenser can be accurately set to 1620 KC by use of the 1620 KC mark on the back of the pointer slide rail, in conjunction with the regular dial pointer and scale. Turn the tuning knob until the left side of the carriage just covers the 1620 mark on the slide rail.

NOTE: The alignment illustrations show tuners No. 1116 and No. 1120 but may also be used for chassis 1119 which includes the same tuner sub-chassis.

IF ALIGNMENT FOR AM

1. Set the tuner selector switch to AM.
2. Apply a 455 KC, 30% AM at 400 CPS signal to pin #2 of the 6BE6 AM converter. Use a .01 MF capacitor in series with the high side lead from the generator. Connect the low side lead from the generator to the tuner chassis.
3. Set the tuning condenser to minimum capacity (wide open or with the pointer to the high end of the dial).
4. Set the VTVM to read AC and connect to the output cable of the tuner. Use the high side of the Loudness control on chassis #1119. Use a low reading scale, one volt would be ideal.
5. Adjust the four (4) 455 KC IF cores for maximum output. Reduce the inputs as necessary to keep the output below 0.3 VAC. The four IF cores, or slugs, are in the two 455 KC transformers (one at the top and bottom of each can) on the back edge of the chassis pan.

ANTENNA AND OSCILLATOR ADJUSTMENTS FOR AM

1. Tighten the two AM trimmers on the tuning capacitor. 1500 KC is the antenna trimmer. 1620 KC is the oscillator trimmer. Then back off each of the two trimmers 1/4 turn to the left.
2. Turn the tuning condenser to maximum capacity (fully meshed). The dial pointer should now be one pointer thickness to the left of the last dial marker. Adjust the pointer as required if it is not correctly positioned.
3. Apply a 600 KC 30% AM signal through a 150 MMF condenser to the AM antenna terminal. Connect the low side to the tuner chassis. Connect the VTVM across the tuner output cable and set the meter to read AC. Turn the dial pointer to 60 on the AM position of the dial.

4. Adjust 600 KC (the oscillator coil L8) for maximum. Keep the generator output reduced to the point giving an output voltage of less than 0.3 VAC.

5. Change the generator output to 1620 KC and tune to 162 on the tuner dial. Adjust 1620 KC (the oscillator trimmer) for maximum output. Attenuate the generator output if necessary to keep the output below 0.3 VAC.

6. Change the generator output to 1400 KC and tune to 140 on the tuner dial. Adjust 1500 KC (AM loop trimmer) for maximum. Keep the generator output at a level that will produce 0.3 VAC or less on the meter.

7. Recheck steps 3 and 4. If any adjustment of 600 KC (the oscillator coil) is required, repeat steps 5 and 6 also.

IF ALIGNMENT FOR FM

1. Set the tuner selector switch to FM.
2. Apply a 10.7 MC CW signal through a .01 MF capacitor to the stator lug on the FM section of the center gang of the tuning condenser. NOTE: The FM section of each gang is the smaller section and has two (2) plates on the rotor and one the stator.
3. Turn the tuning condenser for minimum capacity (pointer to the high end of the dial).
4. Set the VTVM to the 5 VDC scale and connect the meter between pin #2 of the 6AL5 tube and chassis.
5. Adjust the six (6) 10.7 MC IF cores for maximum DC voltage reading. Keep the DC voltage under 2 volts by reducing the generator output. The IF cores are in the top and bottom of the three (3) 10.7 MC IF transformers.
6. Reduce the 10.7 MC input signal until one (1) volt

output is obtained. Move the meter lead from pin #2 of the 6AL5 to terminal 3 of the test socket.

7. Adjust the top core of the ratio detector (last 10.7 MC IF) transformer for zero VDC.

ANTENNA, RF, AND OSCILLATOR ADJUSTMENT FOR FM

1. Connect the hot lead of the CW generator through a 100 ohm resistor to the #1 FM antenna terminal. Connect the low side of the generator to the #2 FM antenna terminal through a 150 ohm resistor. Use 1/2 watt composition resistors.
2. Set the VTVM to read 5 VDC scale and connect the meter between pin #2 of the 6AL5 tube and chassis.
3. Turn the tuning condenser to a reading of 90MC on the FM section of the dial. Turn the tuner selector switch to FM.
4. Set the 108 MC adjustment (FM oscillator trimmer, adjacent to the tuning condenser) with the bottom of the screw head about 1/2 inch above the chassis. Loosen 106 MC (FM RF trimmer) on the center section of tuning condenser 1/8 turn from maximum clockwise. Loosen 106 MC (FM antenna trimmer) on the first section of tuning condenser 5/8 turn from the maximum clockwise position.
5. With an input signal of 90 MC, adjust 88 MC (FM oscillator coil) and the two 92 MC coils (antenna coil and mixer coil located beneath the chassis) for maximum. Reduce the generator output as required to keep the meter at 2 volts or less.
6. Turn the tuning condenser to a reading of 107 MC on the FM section of the dial. Change the generator signal to 107 MC. Then adjust 106 MC, 107 MC, and 108 MC for maximum output.
7. Repeat step 5. If any adjustments are required in step 5, step 6 should also be repeated.

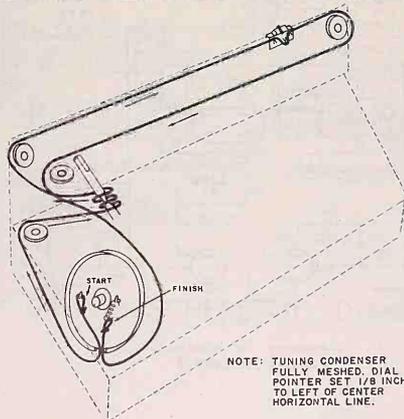


FIGURE 7. AM-FM TUNER DIAL STRINGING PROCEDURE

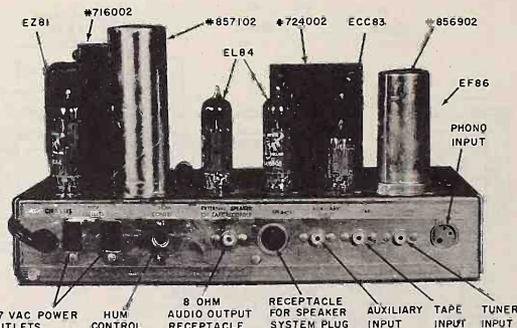


FIGURE 8. TOP VIEW OF AMPLIFIER CHASSIS 1108

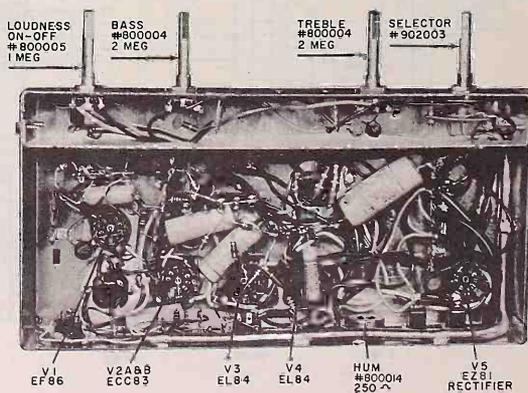


FIGURE 9. BOTTOM VIEW OF AMPLIFIER CHASSIS 1108

SPECIAL REPLACEMENT PARTS NOTE

Refer to the Schematic Notes for interpretation of parts symbols, description, and part numbers. Special type components are listed below for your convenience and should be replaced only with the types specified. Part numbers for replacement components which apply to complete instruments are included in the Replacement Cabinet Parts List.

SYMBOL PART NO. DESCRIPTION

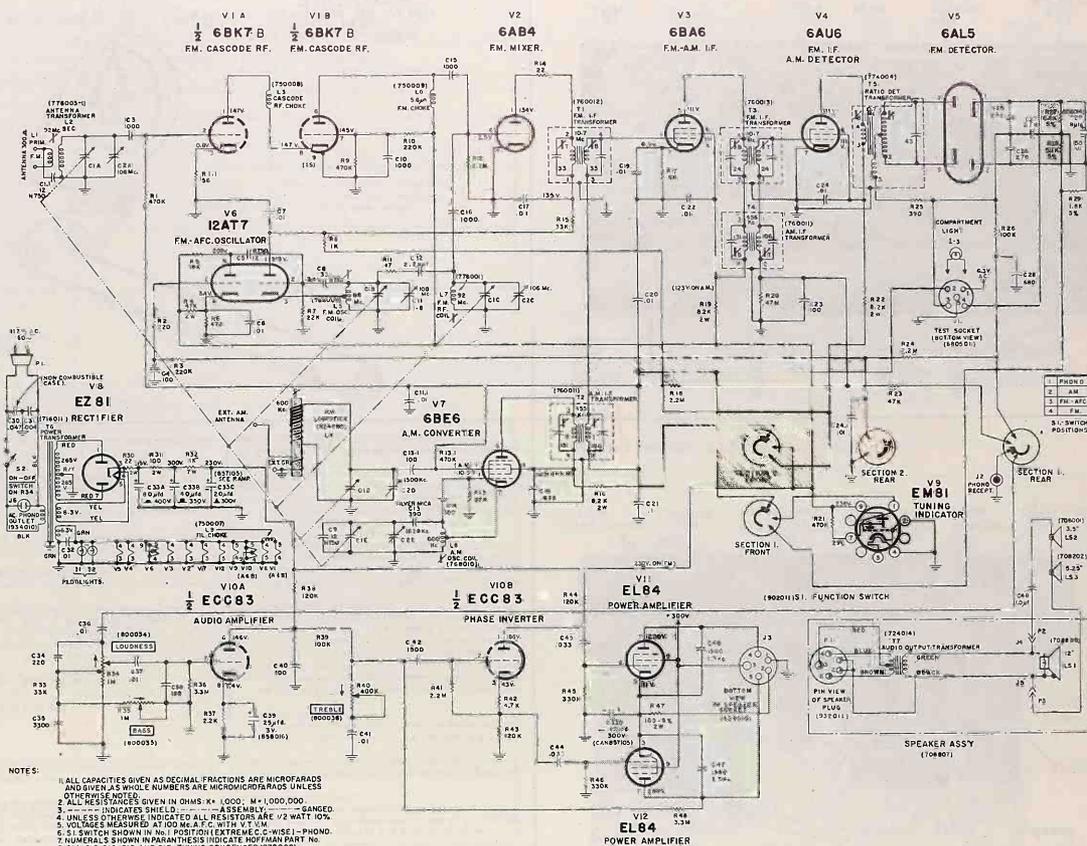
872008	Tuning Condenser
Consists of C1A, C1B, C1C, C1D, C1E plus; Trimmers C2A, C2C, C2D, C2E:	
C5	850003 12 MMF, 5%, N750
C8	850012 33 MMF, 20%, N750
C9	850003 12 MMF, 5%, N750
C11	872006 1 - 8 Tubular Trimmer
C13	862401 390 MMF, 5%, Silver Mica
C29	856014 8 MF, 150 DCWV, Electrolytic
C30	870223 .047 MF, 20%, 600V, Non-combustible
C31	85N34 .004 MF, 20%, 1.5 KV
C33A)	857105 80 MF, 400 DCWV, Electrolytic
C33B)	Electrolytic
C33C)	40 MF, 350 DCWV, Electrolytic
C33D)	20 MF, 300 DCWV, Electrolytic
C33E)	20 MF, 500 DCWV, Electrolytic
C39	856016 25 MF, 3 DCWV, Electrolytic
C46	851115 4500 MMF, 20%, 1.5 KV
C47	851115 8500 MMF, 20%, 1.5 KV

CONTROLS

R34)	800034	Loudness, IM
S2)		On-Off Switch
R35	800035	Bass Control, IM
R40	800036	Treble Control, 400K
S1	902011	Selector Switch

MISCELLANEOUS

L4	924002	AM Antenna
L5	768009	FM Oscillator Coil
L8	750009	AM Oscillator Coil
T1	760012	FM IF Transformer
T2	760011	AM IF Transformer
T3	760013	FM IF Transformer
T4	760011	AM IF Transformer
T5	774004	FM Ratio Detector
T6	716013	Power Transformer
T7	724014	Output Transformer (Part of speaker assembly #708807)



NOTE: 1. ALL CAPACITIES GIVEN AS DECIMAL FRACTIONS ARE MICROFARADS AND GIVEN AS WHOLE NUMBERS ARE MEGAWH/1000 FARADS UNLESS OTHERWISE INDICATED.
 2. ALL RESISTANCES GIVEN IN OHMS: X = 1000; M = 1,000,000.
 3. ALL RESISTANCES GIVEN IN OHMS: K = 1000.
 4. UNLESS OTHERWISE INDICATED ALL RESISTORS ARE 1/2 WATT 10% 5. VOLAGES MEASURED AT 100 MA. A.C. WITH V.T. ON.
 6. S1 SWITCH SHOWN IN No. 1 POSITION (EXTREME C-C WISE) - PHONO.
 7. NUMBERS SHOWN IN PARENTHESES INDICATE HOFFMAN PART NO.
 8. C1A, C1B, C1C, C1D AND C1E - TUNING CONDENSER (872008).
 9. C33, A, B, C AND D - IN CAB. PART No. 857005.

REPLACEMENT PARTS DATA & SCHEMATIC DIAGRAM FOR HOFFMAN CHASSIS III9

SPECIAL REPLACEMENT PARTS NOTE

Refer to the Schematic NOTES for interpretation of parts symbols, description, and part numbers. Special type components are listed below for your convenience and should be replaced only with the types specified. Part numbers for replacement components which apply to complete instruments are included in the Replacement Cabinet Parts List.

SYMBOL PART NO. DESCRIPTION

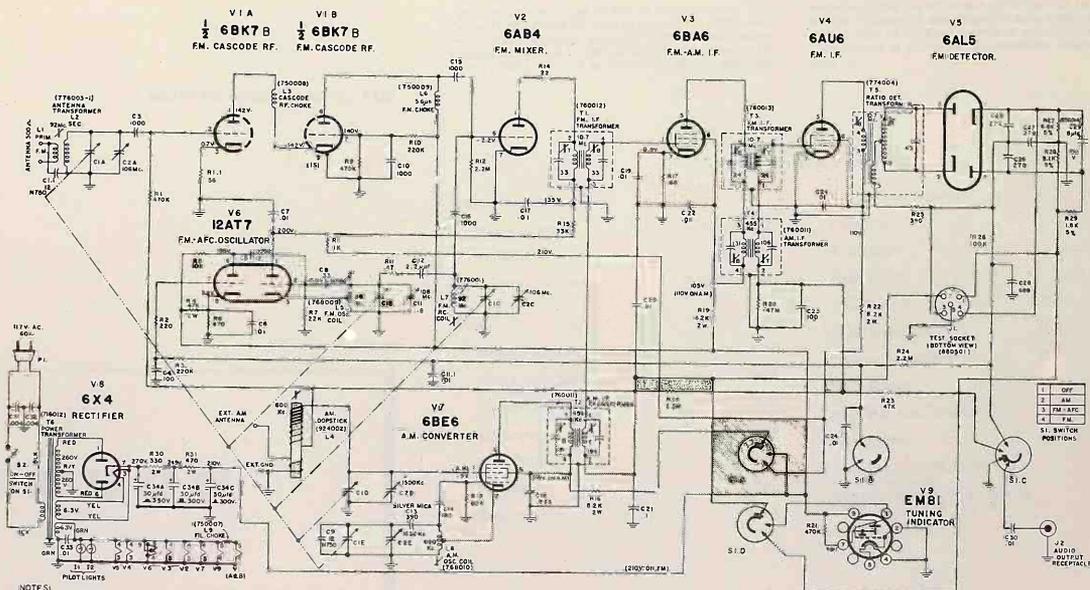
	872008	Tuning Condenser
Consists of C1A, C1B, C1C, C1D, C1E plus:		
	TH1mmers C2A, C2C, C2D, C2E.	
C5	850003	12 MMF, 5%, N750
C8	850012	33 MMF, 20%, N750
C9	850003	12 MMF, 5%, N750
C11	872006	1 - 8 MMF, Tubular Trimmer
C13	862401	390 MMF, 5%, Silver Mica
C29	856014	8 MF, 150 DCWV, Electrolytic
C31	851134	.004 MF, 20%, 1.5 KV
C32	851134	.004 MF, 20%, 1.5 KV
C34A)	856908	30 MF, 150 DCWV, Electrolytic
C34B)		30 MF, 300 DCWV, Electrolytic
C34C)		30 MF, 300 DCWV, Electrolytic

CONTROLS

S1)	902008	Selector Switch, Chassis 1116
S2)		
S1)	902019	Selector Switch, Chassis 1120
S2)		

MISCELLANEOUS

L4	724002	AM Antenna
L5	768009	FM Oscillator Coil
L8	768010	AM Oscillator Coil
T1	760012	FM IF Transformer
T2	760011	AM IF Transformer
T3	760013	FM IF Transformer
T4	760014	AM IF Transformer
T5	774004	FM Ratio Detector
T6	716012	Power Transformer



NOTES:

1. ALL CAPACITIES GIVEN AS DECIMAL FRACTIONS ARE MICROFARADS UNLESS OTHERWISE NOTED.
 2. ALL RESISTANCES GIVEN IN OHMS. K=1,000. M=1,000,000.
 3. --- INDICATES SHIELD.
 4. UNLESS OTHERWISE SPECIFIED.
 5. VOLTAGE MEASURED AT 100V AT C WITH 50% RFLY PART 10%.
 6. SWITCH POSITION IN HUI POSITION (EXT. ANTENNA) WITH 100V.
 7. NUMERALS SHOWN IN PARENTHESES INDICATE HOFFMAN PART NO.

1. C1A, C1B, C1C, C1D, C1E - TUNING CONDENSER PART NO. 872008.
 C1A, C2C, C2D, C2E - TRIMMERS ON TUNING CONDENSER.
 C1A, C2C, C2D, C2E - CAN PART NO. 850008.

(100003)S1: FUNCTION SWITCH

1	OFF
2	AM
3	FM-AM
4	FM
S1	SWITCH POSITION

REPLACEMENT PARTS DATA & SCHEMATIC DIAGRAM FOR HOFFMAN CHASSIS 1116 & 1120

MAINTENANCE MANUAL 1326

Magnavox

RADIO CHASSIS — 51 SERIES

GENERAL

This manual covers the 51 series radio chassis, versions 51-01AA thru 51-11AA and also the 51-03BA version. Three complete electrical parts lists and 3 schematics are shown to provide complete coverage. On the 51-03BA version an electrical change has been

made regarding the AC switch on the rear of the band switch. This switch was eliminated and a double-throw switch used on the Bass control as an Off-On switch. This change is shown on the schematic diagram on page 10.

SPECIFICATIONS

Tuning Frequency Range:	540-1620 KC	AM Detector (crystal)	1N34A
Broadcast Band	88-108 MC	Tuning Eye†	6E5
FM Band	455KC/10.7 MC	Audio Amp*	6AV6
Intermediate Frequency		Audio Amp**	(1/2) 6U8
Tubes:		Audio Amp***	(1/2) 12AX7
FM RF Amplifier	6C45	Phase Inverter**	(1/2) 6U8
AM RF Amplifier	6BZ5	Cathode Follower***	(1/2) 12AX7
FM Mixer & Osc.	6U8	Audio Output*	6AQ5
AM Converter	6BE6	Push-Pull Audio Output**	(2) 6AQ5
IF Amplifier	6BA6	Rectifier***	5Y3
FM Driver	6BA6		
Ratio Detector	6AL5		

†Not used on 51-01, 02, 07, 09 & 11

**Used only on 51-02

***Used only on 51-01, 04, 07, 09 & 11

***Used only on 51-03, 05 & 08

CHASSIS DIFFERENCES

Chassis No.	Tuning Eye	Output	Chassis No.	Tuning Eye	Output
51-01	No	Push-Pull	51-07	No	Push-Pull
51-02	No	Single Ended	51-08	Yes	None
51-03	Yes	None	51-09	No	Push-Pull
51-04	Yes	Push-Pull	51-10	Not Released	Push-Pull
51-05	Yes	None	51-11	No	
51-06	Not Released				

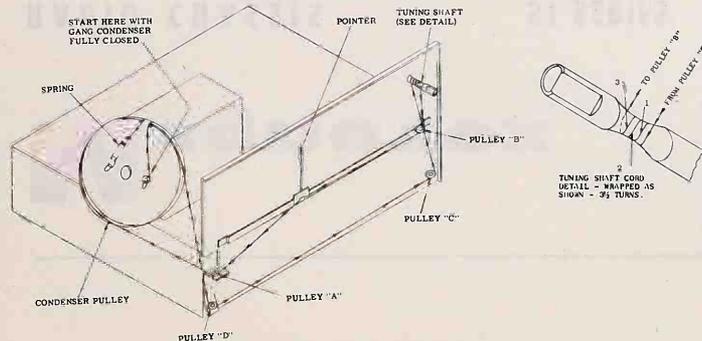
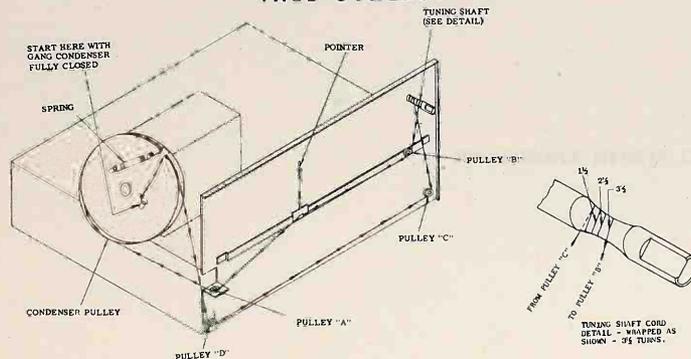
DIAL STRINGING INSTRUCTIONS

DIAL CORD PLACEMENT

Select a 50-inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.

DIAL POINTER PLACEMENT

Place the dial pointer onto the pointer slide and turn the tuning gang completely in mesh. Lace the dial cord around the three hooks on the front of the pointer and with the tuning condenser still fully in mesh, slide the pointer over until it lines up with the last dial calibration mark at the low frequency end of the broadcast band. This completes the assembly.

DIAL STRINGING GUIDE
(51-03, 51-05 & 51-08)DIAL STRINGING GUIDE
(ALL OTHERS)

ALIGNMENT

AM ALIGNMENT
Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated)	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	T105, T104	"	Adjust for max. output.
"	----	----	----	"	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)
Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From (pin 5) to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with: 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coll.)	"	"
"	----	----	----	----	Repeat two preceding steps.

ALIGNMENT

FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
 Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO	
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5 pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1 below.
"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	---	---	---	Repeat steps 1, 2 and 3.

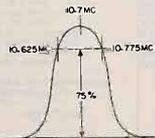


FIG 1
F.M.I.F SELECTIVITY CURVE

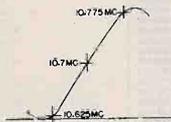
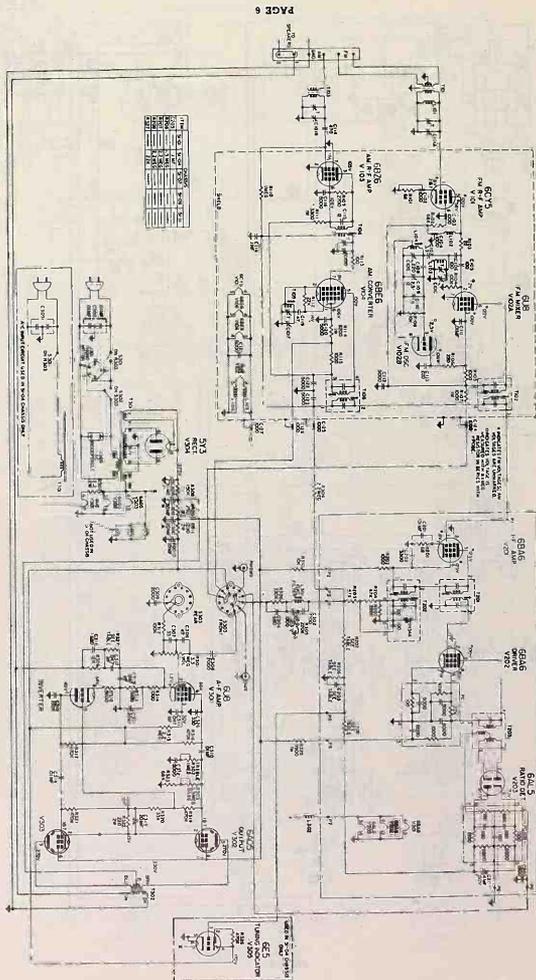
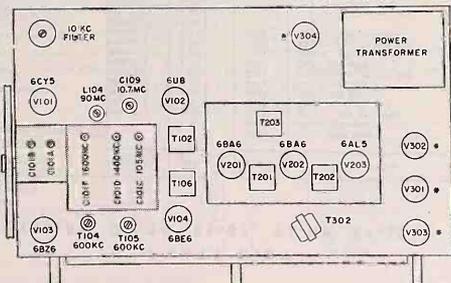


FIG 2
RATIO DETECTOR RESPONSE CURVE

CHASSIS LAYOUT



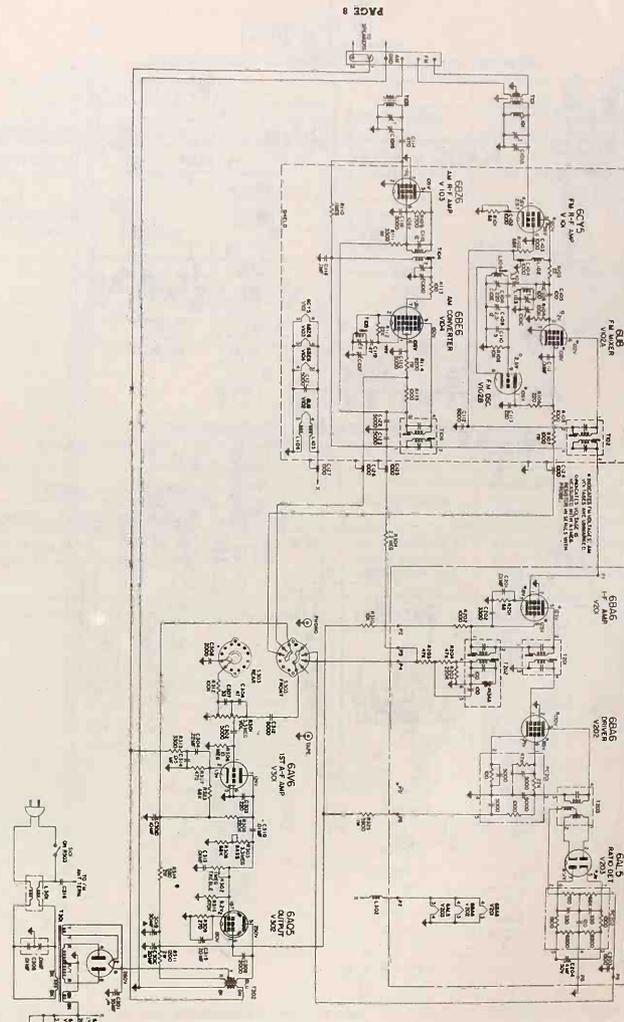
SCHEMATIC DIAGRAM
(51-01, 51-04, 51-07, 51-09, 51-11)

PARTS LIST
(51-01, 51-04, 51-07, 51-09, 51-11)

SYMBOL	DESCRIPTION	PART NO.	LIST
TRANSFORMERS-COILS-CHOICES			
T101	FM Input	360491-4	1.00
T102	1st FM I-F	360626-1	1.60
T103	Rod Antenna Assembly	360746-1	3.50
T104	AM R-F	360753-1	1.35
T105	AM Oscillator	360752-1	.65
T106	1st AM I-F	360611-1	1.40
T201	2nd FM I-F	360747-1	1.60
T202	2nd AM I-F	360746-1	2.65
T203	Ratio	360748-1	2.65
T301	Power	300165-1	12.00
T301	Power (51-04)	300165-2	13.50
T302	Audio Output	320077-1	3.35
L101	FM Antenna	360750-1	.15
L102	RF Choke	360522-9	.30
L103	FM R-F	360751-1	.15
L104	FM Oscillator	360628-1	.90
L105	RF Choke	360522-9	.30
L106	RF Choke	360522-9	.30
L301	10K Filter	360621-1	.25
L302	RF Choke	360522-9	.30
CAPACITORS			
All capacitors are 500V unless specified otherwise			
C101	Tuning Capacitor	260147-1	6.75
C102	Feed Thru, 1000 mmf	250276-2	.20
C103	Feed Thru, 1000 mmf	250276-2	.20
C104	Feed Thru, 1000 mmf	250276-1	.25
C105	Mica, 100 mmf	250187-53	.25
C106	Mica, 100 mmf	250187-53	.25
C107	Mica, 2.3 mmf	260221-118	.15
C108	Mica, 220 mmf	250187-57	.35
C109	Cer. 2.5-12.0 mmf (trimmer)	250188-9	.30
C110	Cer. 8 mmf-4%	250088-138	.20
C112	Cer. 5000 mmf	250175-30	.20
C113	Mica, 200 mmf	250187-57	.35
C114	Mica, 470 mmf	250159-102	.25
C115	Cer., 12 mmf-5%	250088-179	.20
C116	Cer., 5000 mmf	250175-30	.20
C118	Mylar, .1 mfd-100V	250291-128	.40
C119	Cer., 47 mmf	250218-17	.15
C120	Cer., 5000 mmf	250175-30	.20
C121	Cer., 5000 mmf	250175-30	.20
C122	Cer., 5000 mmf	250175-30	.20
C123	Cer., 5000 mmf	250175-30	.20
C124	Cer., Feed Thru, 1000 mmf	250276-1	.25
C125	Cer., Feed Thru, 1000 mmf	250276-1	.25
C126	Cer., Feed Thru, 1000 mmf	250276-1	.25
C127	Cer., Feed Thru, 1000 mmf	250276-1	.25
C201	Cer., .01 mf	260234-66	.30
C202	Cer., .0033 mf	260234-154	.25
C203	Cer., .0015 mf	260234-146	.20
C204	Electrolytic, 4mf-50V	270559-9	1.10
C205*	Paper, .1mf-200V	250140-13	.35
C301	Electrolytic 35 mfd-350V	270021-71	2.75
C301	Electrolytic 35 mfd-350V	270021-71	2.75
C301	Electrolytic 35 mfd-350V	270021-71	2.75
C302	Mica, 1000 mmf 5%	250228-354	.45
C303	Mica, 1000 mmf 5%	250228-354	.45
C304	Ceramic, 80 mmf	250218-4	.20
C305	Ceramic, 2 x 10K mmf-1000V	250218-3	.55
C306	Ceramic, 47 mmf	250218-17	.15
C307	Ceramic, 33 mmf	250218-21	.25
C308	Ceramic, 2000 mmf	250218-20	.25

SYMBOL	DESCRIPTION	PART NO.	LIST
C309	Cer., 2000 mmf	250218-20	.25
C310	Cer., 10K mmf	250218-19	.20
C311	Paper, .047 mfd-200V	250202-11	.25
C312	Ceramic, 5000 mmf	250175-30	.20
C313	Cer., 100 mmf	250218-22	.25
C314	Cer., 10K mmf	250218-19	.20
C315	Electrolytic, 20 mfd-25V	270027-28	1.00
C316	Cer., .880 mmf	250218-4	.20
C317	Paper, .047 mfd-200V	250202-11	.25
C318	Electrolytic, 20 mfd-25V	270027-28	1.00
C319	Paper, .047 mfd-200V	250202-11	.25
RESISTORS			
All resistors are 10% - 1/2W unless specified otherwise			
R101	68	230104-48	2.00
R102	68K	230104-84	2.00
R103	22	230104-42	2.00
R104	100K	230104-86	2.00
R105	1000	230104-62	2.00
R106	220	230104-54	2.00
R107	1000 - 1W	230105-82	2.50
R108	10K	230104-74	2.00
R109	2700	230104-87	2.00
R110	1 meg.	230104-98	2.00
R111	3300 - 1W	230105-88	2.50
R112	22K	230104-78	2.00
R113	100	230104-50	2.00
R114	8200 - 1W	230105-73	2.50
R115	1000	230104-62	2.00
R201	680	230104-48	2.00
R202	1000	230104-62	2.00
R203	220K	230104-90	2.00
R204	47K	230104-82	2.00
R205	47K	230104-82	2.00
R206*	1.5 meg.	230104-100	2.00
R207*	2.2 meg.	230104-102	2.00
R208*	2.2 meg.	230104-102	2.00
R301	Leadless Control (3.3 meg)	220731-15	61.25
R302	Treble Control (1 meg)	220072-36	61.00
R303	Bass Control (3.3 meg)	220073-21	61.25
R304	2.2 meg	230104-102	2.00
R305	220K	230104-90	2.00
R306	330K	230104-92	2.00
R307	2.2 - 2W	230109-2	3.50
R308	150 - 2W	230106-1052	3.50
R309	750 - 3W	230150-315	3.50
R310	10K - 2W	230106-1074	3.50
R311	1200 - 2W	230106-1063	3.50
R312	100K	230104-88	2.00
R313	3300	230104-68	2.00
R314	1000	230104-62	2.00
R315	2.2 meg.	230104-102	2.00
R316	470K	230104-94	2.00
R317	470K	230104-94	2.00
R318	5600	230104-71	2.00
R319	470K	230104-94	2.00
R320	33K	230104-80	2.00
R321	470K	230104-94	2.00
R322	220 - 2W	230106-1054	3.50
R323	68K	230104-84	2.00
R324	12K	230104-75	2.00
R325	3900 - 1W	230105-89	3.50
R326	470K	230104-94	2.00
R327*	22K	230104-78	2.00

*Used only on 51-04 Chassis.



SCHEMATIC DIAGRAM
(51-03, 51-05, 51-08)

SYMBOL	DESCRIPTION	PART NO.	LIST
TRANSFORMERS-COILS-CHOKES			
T101	FM Input	360491-4	1.00
T102	1st FM I-F	360828-1	1.60
T103	Rad Antenna Assembly	360746-1	3.50
T104	AM R-F	360753-1	1.35
T105	AM Oscillator	360752-1	.85
T106	1st AM I-F	360931-1	1.40
T201	2nd FM I-F	360747-1	1.60
T202	2nd AM I-F	360749-1	2.65
T203	Radio Detector	360748-1	2.65
T301	Filament	320277-2	4.50
L101	FM Antenna	360750-3	.15
L102	RF Choke	360522-9	.30
L103	FM R-F	360751-1	.15
L104	FM Oscillator	360629-3	.90
L105	RF Choke	360522-9	.30
L106	RF Choke	360522-9	.30
L301	10KC Filter	360821-1	.35
L302	RF Choke	360522-9	.30
CAPACITORS			
All capacitors are 50V unless specified otherwise			
C101	Tuning Capacitor	260147-1	6.75
C102	Feed Thru, 1000 mmf	250276-2	.20
C103	Feed Thru, 1000 mmf	250276-2	.20
C104	Feed Thru, 1000 mmf	250276-1	.25
C105	Mica, 100 mmf	250187-53	.25
C106	Mica, 100 mmf	250187-53	.25
C107	Mica, 2.5 mmf	250221-118	.15
C108	Mica, 220 mmf	250187-57	.35
C109	Cer. 2.5 - 12.0 mmf (Trimmer)	250188-9	.30
C110	Cer., 5 mmf - 5%	250086-138	.20
C111	Paper, .01 mfd - 400V	250211-7	.25
C112	Cer., 5000 mmf	250175-30	.20
C113	Mica, 220 mmf	250187-57	.35
C114	Mica, 470 mmf	250159-102	.25
C115	Cer., 12 mmf - 5%	250088-179	.20
C116	Cer., 5000 mmf	250175-30	.20
C118	Mylar, 1 mfd - 100V	250261-125	.40
C119	Cer., 47 mmf	250218-17	.15
C120	Cer., 5000 mmf	250175-30	.20
C121	Cer., 5000 mmf	250175-30	.20
C122	Cer., 5000 mmf	250175-30	.20
C123	Cer., 5000 mmf	250175-30	.20
C124	Cer., Feed Thru, 1000 mf	250276-1	.25
C125	Cer., Feed Thru, 1000 mf	250276-1	.25
C126	Cer., Feed Thru, 1000 mf	250276-1	.25
C127	Cer., Feed Thru, 1000 mf	250276-1	.25
C201	Ceramic, .01 mf	250234-66	.30
C202	Ceramic, .0033 mf	250234-154	.05
C203	Ceramic, .0015 mf	250234-156	.50
C204	Electric 1 mf - 50V	270558-9	4.10
C205	Paper, .1 mf - 200V	250240-13	.35
C301	Electric, 30-30 mid-455V	270021-98	2.35
C302	Mica, 1000 mmf	250228-354	.45
C303	Mica, 1000 mmf	250228-354	.45
C304	Ceramic, 470 mmf	250218-4	.30
C305	Ceramic, 2x10K mmf - 1000V	250219-3	.55
C306	Ceramic, 47 mmf	250218-17	.15
C307	Ceramic, 3300 mmf	250375-28	.25
C308	Ceramic, 2000 mmf	250218-20	.25
C309	Ceramic, 2000 mmf	250218-20	.25
C310	Ceramic, 10K mmf	250218-18	.20

SYMBOL	DESCRIPTION	PART NO.	LIST
C311	Ceramic, 470 mmf	250218-6	.20
C312*	Ceramic, 22 mmf	250218-1	.20
C313	Ceramic, 10K mmf	250218-19	.20
C314	Ceramic, 10K mmf	250218-19	.20
C315	Electrolytic, 20 mid - 25V	270027-28	1.00
C316	Mica, 100 mmf	250187-53	.25
C317	Ceramic, 10K mmf - 1000V	250218-2	.20
C318	Ceramic, 1000 mmf	250218-18	.20
C319**	Ceramic, 1000 mmf	250218-18	.20
C320**	Ceramic, 180 mmf	250175-40	.20
RESISTORS			
All resistors are 10% - 1/2W unless specified otherwise			
R101	68	230104-48	2.00
R102	68K	230104-84	2.00
R103	22	230104-42	2.00
R104	100K	230104-86	2.00
R105	1000	230104-62	2.00
R106	220	230104-54	2.00
R107	1000 - 1W	230105-62	2.50
R108	10K	230104-74	2.00
R109	2700	230104-67	2.00
R110	1 meg	230104-98	2.00
R111	3300 - 1W	230105-68	2.50
R112	22K	230104-78	2.00
R113	100	230104-50	2.00
R114	8200 - 1W	230105-73	2.50
R115	1000	230104-62	2.00
R201	860	230104-68	2.00
R202	1000	230104-62	2.00
R203	220K	230104-90	2.00
R204	47K	230104-82	2.00
R205	47K	230104-82	2.00
R206	1.5 meg.	230104-100	2.00
R207	2.2 meg	230104-102	2.00
R208	2.2 meg	230104-102	2.00
R301	Loudness Control (9.3 meg)	220311-13	01.25
R302	Treble Control (1 meg)	220072-38	01.00
R303**	Base Control (1 meg)	220073-24	01.25
R304	2.2 meg	230104-102	2.00
R305	220K	230104-86	2.00
R306	330K	230104-92	2.00
R307	1 meg	230104-98	2.00
R308	68K	230104-84	2.00
R309	330K	230104-92	2.00
R310	10K - 2W	230104-1074	3.50
R311	1200 - 2W	230106-1063	5.00
R312	100K	230104-86	2.00
R313	3300	230104-69	2.00
R314	1000	230104-62	2.00
R315	47K	230104-82	2.00
R316	470K	230104-94	2.00
R317*	1 meg	230104-98	2.00
R318	1 meg	230104-98	2.00
R319	4700	230104-70	2.00
R320	2500 - 10W	240071-39	0.40
R321	100	230104-50	2.00
R322	100	230104-50	2.00
R326	3900 - 1W	23005-89	2.50
R327**	82K	230104-85	2.00
R328**	330K	230104-92	2.50
*Used only in 51-03.			
**Used only in 51-05 & 08			
***Used only in 51-03BA			

Magnavox MAINTENANCE MANUAL 1326

51 SERIES RADIO CHASSIS

GENERAL

Complete maintenance information necessary for the proper servicing of any of the 51 series radio chassis is covered on the following pages. Some of these chassis are AM-FM tuners only which require an additional amplifier for voltages and output. Others contain a built-in amplifier which may have push-pull output or single ended output. The chassis having push-pull output provide approximately 6-watts power output and those chassis having single-ended output provide approximately 3-watts power output.

Electrical changes which were made on the 51-01 and 51-03 are included on the schematic diagram covering those chassis. These electrical changes will appear in those chassis which contain the suffix letters "BA" appearing after the chassis numbers. The chassis which have the suffix letters "BAX" appearing after the chassis numbers are identical to the "BA" versions, however, they use a different transformer as illustrated in the Parts List.

SPECIFICATIONS

Tuning Frequency Range:		Ratio Detector	6AL5
Broadcast Band	540-1620KC	AM Detector (crystal)	1N34A
FM Band	88-108MC	Tuning Eye (51-03, 04, 05, 08)	6E5
Intermediate Frequency	455KC/10.7MC	Audio Amp. (51-02)	6AV6
Tubes:		Audio Amp. (51-01, 04, 07, 09, 11)	(1/2) 6U8
FM RF Amplifier	6CY5	Audio Amp (51-03, 05, 08)	(1/2) 12AX7
AM RF Amplifier	6BZ8	Phase Inverter (51-01, 04, 07, 09, 11)	(1/2) 6U8
FM Mixer & Osc.	6U8	Cathode Follower (51-03, 05, 08)	(1/2) 12AX7
AM Converter	6BE6	Audio Output (51-02)	6AQ5
IF Amplifier	6BA6	Audio Output Push-Pull (51-01, 04, 07, 09, 11)	(2) 6AQ5
FM Driver	6BA6	Rectifier (51-01, 02, 04, 07, 09, 11)	5Y3

CHASSIS DIFFERENCES

Chassis No.	Tuning Eye	Output	Chassis No.	Tuning Eye	Output
51-01	No	Push-Pull	51-07	No	Push-Pull
51-02	No	Single Ended	51-08	Yes	None
51-03	Yes	None	51-09	No	Push-Pull
51-04	Yes	Push-Pull	51-10 Not Released		
51-05	Yes	None	51-11	No	Push-Pull
51-06 Not Released*					

ALIGNMENT

AM ALIGNMENT
Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated)	1400 kc	C101F C101D C101B		"
"	600 kc (modulated)	600 kc	T105, T104		Adjust for max. output
"	"	"	"	"	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)
Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From (pin 5) to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. term. in series with: 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coil)	"	"
"	"	"	"	"	Repeat two preceding steps.

ALIGNMENT

FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
 Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO	
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5 pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1 below.
"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straight slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	----	----	----	Repeat steps 1, 2 and 3.

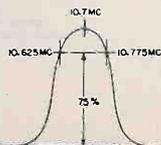


FIG 1
F.M.I.F SELECTIVITY CURVE

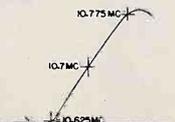
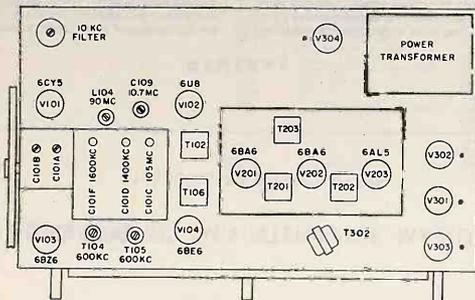


FIG 2
RATIO DETECTOR RESPONSE CURVE

CHASSIS LAYOUT



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DIAL STRINGING INSTRUCTIONS

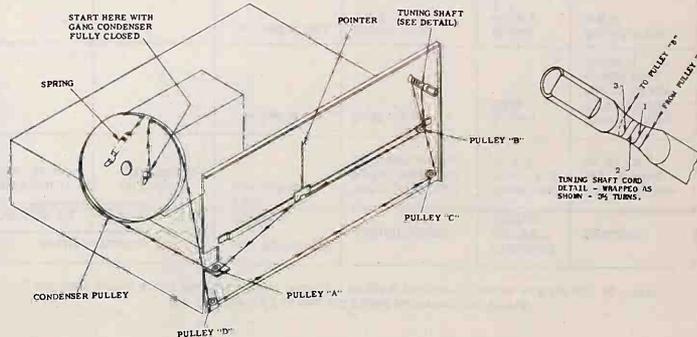
DIAL CORD PLACEMENT

Select a 50-inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.

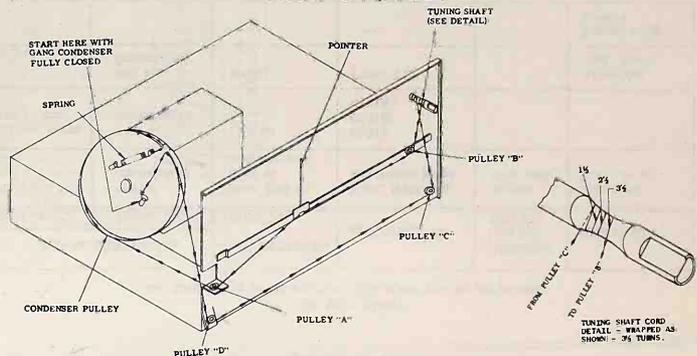
DIAL POINTER PLACEMENT

Place the dial pointer onto the pointer slide and turn the tuning gang completely in mesh. Lace the dial cord around the three hooks on the front of the pointer and with the tuning condenser still fully in mesh, slide the pointer over until it lines up with the last dial calibration mark at the low frequency end of the broadcast band. This completes the assembly.

DIAL STRINGING GUIDE
(51-03, 51-05 & 51-08)

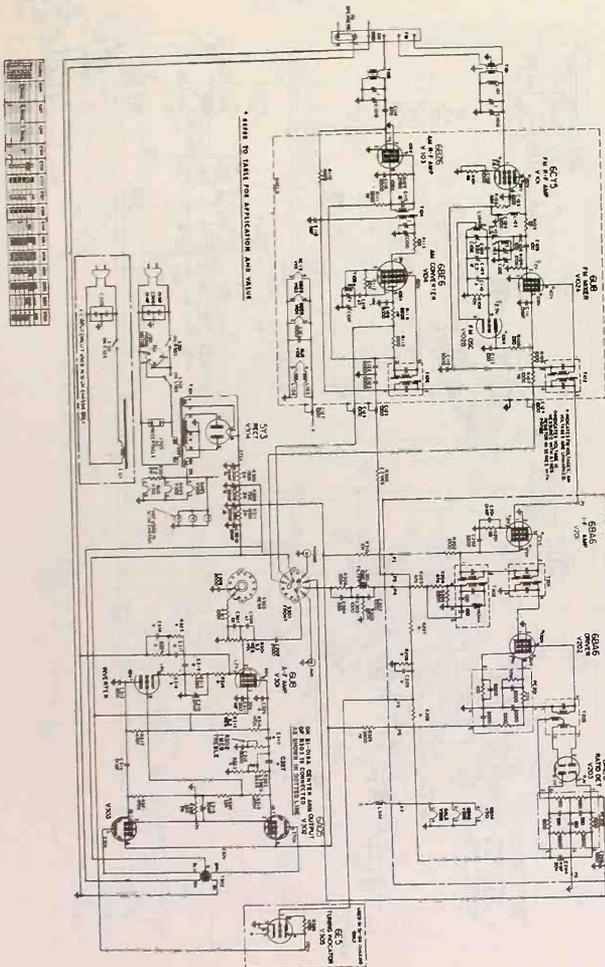


DIAL STRINGING GUIDE
(ALL OTHERS)



REPLACEMENT PARTS LIST

(51-01, 04, 07, 09, 11)



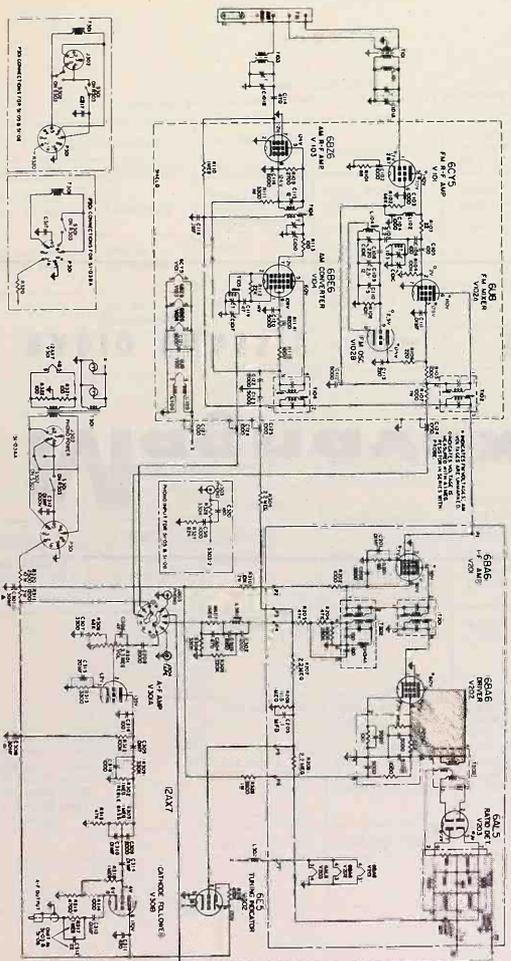
SCHEMATIC DIAGRAM
(51-01, 04, 07, 09, 11)

SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.
TRANSFORMERS-COILS-CHOKES					
T101	FM Input	360491-4	C314	Cer., 10K mmf	250218-19
T102	1st FM I-F	360265-1	C315	Electrolytic, 20 mfd-25V	270227-28
T103	Rod Antenna Assembly	360746-1	C316	Cer., 800 mmf (51-01BA)	250218-4
T104	AM R-F	360735-1	C317	Paper, .047 mfd-200V	260202-11
T105	AM Oscillator	360752-1	C317	Paper, 1 mfd-200V (51-01BA)	250202-13
T106	1st AM I-F	360611-1	C318	Electrolytic, 20mfd-25V	270227-28
T201	2nd FM I-F	360747-1	C319	Paper, .047 mfd-200V	250202-11
T202	2nd AM I-F	360748-1	C319	Paper, 1 mfd-200V (51-01BA)	250202-13
T203	Ratio	360748-1	C326	Cer., 300 mmf	250207-40
T301	Power (51-04) & (51-01BAX)	300185-1	C328	Cer., 100 mmf (51-01BA)	250218-22
T302	Audio Output	300185-2	C327	Cer., 1000 mmf (51-01BA)	250218-8
L101	FM Antenna	320077-1	RESISTORS		
L102	RF Choke	360750-1	All resistors are 10%, 1/2W unless specified otherwise		
L103	FM R-F	360532-9	R101	68	230104-48
L104	FM Oscillator	360751-1	R102	88K	230104-84
L105	RF Choke	360628-1	R103	22	230104-42
L106	RF Choke	360522-9	R104	100K	230104-62
L301	10K Filter	360621-1	R105	1000	230104-62
L302	RF Choke	360522-9	R106	220	230104-54
CAPACITORS					
All capacitors are 500V unless specified otherwise					
C101	Tuning Capacitor	260147-1	R107	1000, 1W	230105-52
C102	Feed Thru, 1000 mmf	250276-2	R108	10K	230104-74
C103	Feed Thru, 1000 mmf	250276-2	R109	2700	230104-07
C104	Feed Thru, 1000 mmf	250276-1	R110	1 meg	230104-98
C105	Mica, 100 mmf	250187-53	R111	3300, 1W	230105-08
C106	Mica, 100 mmf	250187-53	R112	22K	230104-78
C107	Mica, 2.2 mmf	250223-118	R113	100	230104-50
C108	Mica, 220 mmf	250187-57	R114	3200, 1W	230105-73
C109	Cer. 2.5-12.0 mmf (Trimmer)	250188-9	R115	1000	230104-62
C110	Cer. 5 mmf, 5%	250088-138	R201	680	230104-48
C111	Cer. 600 mmf	250175-30	R202	1000	230104-62
C112	Mica, 400 mmf	250187-67	R203	220K	230104-00
C113	Mica, 470 mmf	250187-67	R204	47K	230104-82
C114	Mica, 470 mmf	260159-102	R205	47K	230104-82
C115	Cer., 12 mmf, 5%	250088-178	R206*	1.5 meg.	230104-100
C116	Cer., 5000 mmf	250175-30	R207*	2.2 meg.	230104-102
C117	Mylar, .1 mfd, 100V	250281-125	R208*	2.2 meg.	230104-102
C118	Cer., 47 mmf	250218-17	R301	Loadness Control (3.3 meg)	220027-30
C119	Cer., 5000 mmf	250175-30	R302	Treble Control (1 meg)	220073-21
C120	Cer., 5000 mmf	250175-30	R303	Bass Control (3.3 meg)	220073-21
C121	Cer., 5000 mmf	250175-30	R304	2.2 meg	230104-60
C122	Cer., 5000 mmf	250175-30	R305	220K	230104-60
C123	Cer., Feed Thru, 1000 mmf	250175-30	R306	330K	230104-52
C124	Cer., Feed Thru, 1000 mmf	250175-30	R307	2.2, 2W	230104-22
C125	Cer., Feed Thru, 1000 mmf	250276-1	R308	150, 2W	230108-1052
C126	Cer., Feed Thru, 1000 mmf	R310	750, 3W	230150-315	
C127	Cer., .01 mfd	R311	10K, 2W	230108-1074	
C201	Cer., .0633 mf	R312	1200, 2W	230108-1060	
C202	Cer., .0215 mf	R313	100K	230104-86	
C203	Cer., .0215 mf	R314	3300	230104-68	
C204	Electrolytic, 4 mf-50V	R314	100K	230104-68	
C205*	Paper, .1mf-200V	R314	330 (51-01BA)	230104-56	
C301	Electrolytic 35 mfd - 350V	R315	2.2 meg	230104-102	
	30 mfd - 350V	R316	470K	230104-84	
	20 mfd - 350V	R317	470K	230104-84	
	10 mfd - 350V	R318	5600	230104-71	
		R318	330 (51-01BA)	230104-68	
		R319	470K	230104-84	
		R320	33K	230104-80	
		R321	470K	230104-54	
		R322	220, 2W	230106-1054	
		R323	88K	230104-88	
		R323	150K (51-01BA)	230104-88	
		R324	120K	230104-78	
		R325	4.7K (51-01BA)	230104-78	
		R326	3900	230104-58	
		R328	470K	230104-84	
		R327*	22K	230104-78	
		R330	22 (51-01BA)	230104-42	

*Used only on 51-04 Chassis.

REPLACEMENT PARTS LIST

(51-03, 05, 08)



SCHEMATIC DIAGRAM
(51-03, 05, 08)

SYMBOL	DESCRIPTION	PART NO.
TRANSFORMERS-COILS-CHOKES		
T101	FM Input	360491-4
T102	1st FM I-F	360626-1
T103	Rod Antenna Assembly	360746-1
T104	AM R-F	360753-1
T105	AM Oscillator	360752-1
T106	1st AM I-F	360611-1
T201	2nd FM I-F	360747-1
T202	2nd AM I-F	360749-1
T203	Ratio Detector	360748-1
T301	Filament	320277-2
L101	FM Antenna	360750-1
L102	RF Choke	360522-9
L103	FM R-F	360751-1
L104	FM Oscillator	360628-1
L105	RF Choke	360522-9
L106	RF Choke	360522-9
L301	10KC Filter	360621-1
L302	RF Choke	360522-9
CAPACITORS		
All capacitors are 500V unless specified otherwise		
C101	Tuning Capacitor	260147-1
C102	Feed Thru, 1000 mmf	250278-2
C103	Feed Thru, 1000 mmf	250278-2
C104	Feed Thru, 1000 mmf	250278-1
C105	Mica, 100 mmf	250187-53
C106	Mica, 100 mmf	250187-53
C107	Mica, 2.2 mmf	250221-118
C108	Mica, 220 mmf	250187-57
C109	Cer., 2.5-12.0 mmf(Trimmer)	250188-9
C110	Cer., .5 mmf, 5%	250088-138
C111	Paper, .01 mfd, 400V	250211-7
C112	Cer., 5000 mmf	250175-30
C113	Mica, 220 mmf	250187-57
C114	Mica, 470 mmf	250159-102
C115	Cer., 12 mmf, 5%	250088-179
C116	Cer., 5000 mmf	250175-30
C117	Cer., 5000 mmf	250175-30
C118	Mylar, .1 mfd, 100V	250261-125
C119	Cer., .47 mmf	250218-17
C120	Cer., 5000 mmf	250175-30
C121	Cer., 5000 mmf	250175-30
C122	Cer., 5000 mmf	250175-30
C123	Cer., Feed Thru, 1000 mf	250278-1
C124	Cer., Feed Thru, 1000 mf	250278-1
C125	Cer., Feed Thru, 1000 mf	250278-1
C126	Cer., Feed Thru, 1000 mf	250278-1
C127	Cer., Feed Thru, 1000 mf	250278-1
C201	Ceramic, .01 mf	250234-68
C202	Ceramic, .0033 mf	250234-154
C203	Ceramic, .0015 mf	250234-148
C204	Electrolytic 4 mf, 50V	270529-24
C205	Paper, .1 mf, 200V	250240-13
C301	Electrolytic, 30-30 mfd, 450V	270021-58
C302	Mica, 1000 mmf	250228-354
C303	Mica, 1000 mmf	250228-354
C304	Ceramic, 470 mmf	250218-6
C305	Ceramic, 2x10K mmf, 1000V	250218-4
C306	Ceramic, 47 mmf	250218-17
C307	Ceramic, 3300 mmf	250175-28
C308	Ceramic, 2000 mmf	250218-20
C309	Ceramic, 2000 mmf	250218-30
C310	Ceramic, 10K mmf	250218-18

SYMBOL	DESCRIPTION	PART NO.
C311	Ceramic, 470 mmf	250218-6
C312*	Ceramic, 32 mmf	250218-1
C313	Ceramic, 10K mmf	250218-18
C314	Ceramic, 10K mmf	250218-18
C315	Electrolytic, 20mfd, 25V	270027-28
C316	Mica, 100 mmf	250187-53
C317	Ceramic, 10K mmf, 1000V	250218-2
C318	Ceramic, 1000 mmf	250218-18
C319**	Ceramic, 1000 mmf	250218-18
C320**	Ceramic, 180 mmf	250175-40
RESISTORS		
All resistors are 10%, 1/2W unless specified otherwise		
R101	68	230104-48
R102	68K	230104-84
R103	22	230104-42
R104	100K	230104-86
R105	1000	230104-62
R106	220	230104-54
R107	1000, 1W	230105-62
R108	10K	230104-74
R109	2700	230104-87
R110	1 meg	230104-98
R111	3300, 1W	230105-68
R112	22K	230104-78
R113	100	230104-50
R114	8200, 1W	230105-73
R115	1000	230104-62
R201	680	230104-48
R202	1000	230104-52
R203	220K	230104-90
R204	47K	230104-82
R205	47K	230104-82
R206	1.5 meg.	230104-100
R207	2.2 meg	230104-102
R208	2.2 meg	230104-102
R301	Loudness Control (3.9 meg)	220131-53
R302	Treble Control (1 meg)	220072-36
R303	Bass Control (1 meg)	220073-22
R303***	Bass Control (6 meg)	220073-24
R304	2.2 meg	230104-102
R305	220K	230104-92
R306	330K	230104-92
R307	1 meg	230104-88
R308	68K	230104-84
R309	330K	230104-92
R310	10K, 2W	230104-1074
R311	1200, 3W	230105-1063
R312	100K	230104-86
R313	3300	230104-88
R314	1000	230104-82
R315	47K	230104-82
R316	47K	230104-84
R317*	1 meg	230104-88
R318	1 meg	230104-88
R319	470K	230104-70
R320	2500, 10W	230104-50
R321	100	230105-65
R322	100	230104-50
R323	3900, 1W	230105-65
R324**	82K	230104-85
R328**	330K	230104-92

*Used only in 51-03.
**Used only in 51-05 & 08
***Used only in 51-03BA

MAINTENANCE MANUAL 1327

Magnavox

RADIO CHASSIS

-

52 SERIES

GENERAL

The service information on the following pages covers the three versions of the 52 series chassis. These chassis are AM-FM tuners only and the 52-01 and 52-02 versions obtain their voltages from the Amplifier used in conjunction with them. The 52-03 version contains its own power supply and uses a 5Y3GT as a rectifier.

Provisions are provided for the connection of an external AM or FM antenna. A terminal board having two connections marked FM, a connection marked AM and three other connections marked G, 1, and 2 respectively are located on a fibre board fastened to the rear of the radio chassis. To connect an external FM antenna to this unit merely connect the FM antenna leads to the two connections marked FM and to connect

an external AM antenna connect one lead to the AM connection and ground the antenna to the connection marked G. The connections marked 1 and 2 are not used.

Provisions have also been provided for using a tape recorder in conjunction with instruments using these chassis. On the rear apron of the radio chassis are two sockets labeled "Record" and "Play". To record from either radio or phono set the band selector switch to the desired recording position and connect the input of the tape recorder to the socket identified as "Record". To play the tape recorder back thru instruments using these chassis, set the band selector switch to Tape and plug the output of the recorder into the socket identified as "Play".

SPECIFICATIONS

POWER SUPPLY	117 VOLTS, 50/60 CYCLES AC
POWER CONSUMPTION	75 WATTS
TUNING FREQUENCY RANGE:	
BROADCAST BAND	540-1620 KC
FM BAND	88-108 MC
INTERMEDIATE FREQUENCY	455 KC/10.7 MC
TUBES:	
FM RF AMPLIFIER	6CY5
FM MIXER-OSCILLATOR	6U8
AM RF AMPLIFIER	6BZ6
AM CONVERTER	6BE6

I. F. AMPLIFIER	6BA6
FM DRIVER	6BA6
RATIO DETECTOR	6AL5
AM DETECTOR (CRYSTAL DIODE)	1N34A
1ST AUDIO AMP (52-01)	(1/2) 12AX7
1ST AUDIO AMP	(1/2) 12AX7
CATHODE FOLLOWER (52-01)	(1/2) 12AX7
CATHODE FOLLOWER	(1/2) 12AX7
PHONO PREAMPLIFIER	6AV6
RECTIFIER (52-03)	5Y3
TUNING INDICATOR	6E5

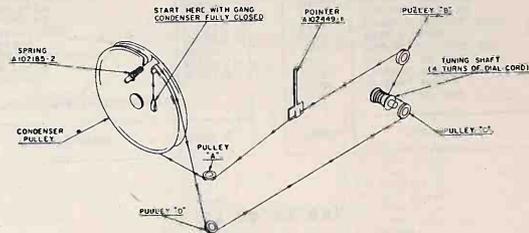
DIAL STRINGING

DIAL CORD PLACEMENT

Select a 64 inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.

DIAL POINTER PLACEMENT

Place the dial pointer onto the pointer slide and turn the tuning gang completely in mesh. Lace the dial cord around the three hooks on the front of the pointer and with the tuning condenser still fully in mesh, slide the pointer over until it lines up with the last dial calibration mark at the low frequency end of the broadcast band. This completes the assembly.



ALIGNMENT

AM ALIGNMENT

Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated)	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	T105, T104	"	Adjust for max. output.
"	-----	-----	-----	-----	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)

Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From (pin 5) to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with: 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coil)	"	"
"	-----	-----	-----	-----	Repeat two preceding steps.

ALIGNMENT

FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).

Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT SCOPE TO	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5 pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1 below.
"	"	Low end of dial	T203 top slug	AcF088 C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	-----	-----	-----	Repeat steps 1, 2 and 3.

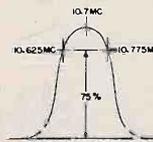


FIG 1
F.M.I.F. SELECTIVITY CURVE

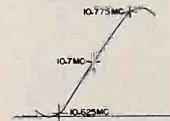
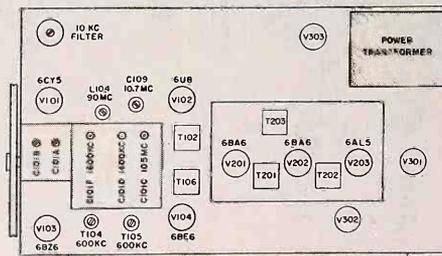
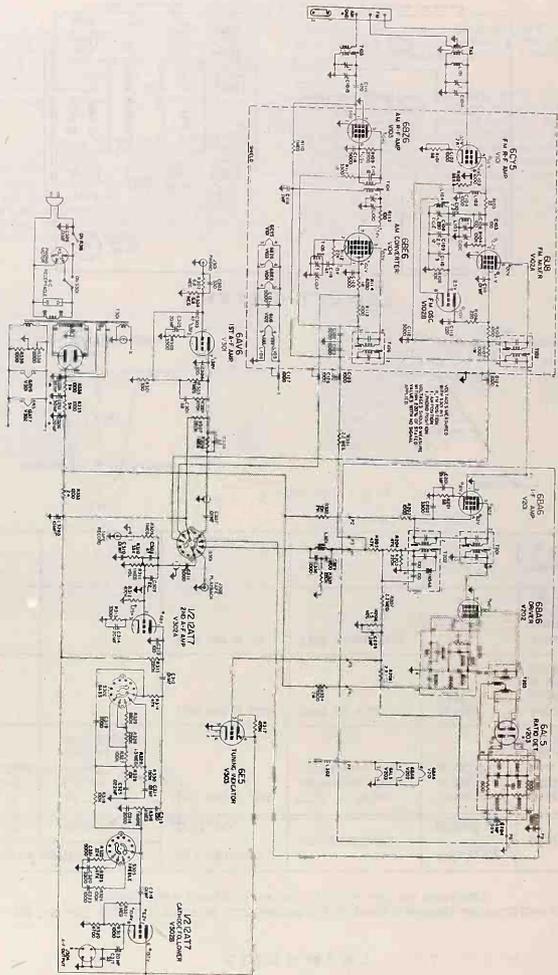


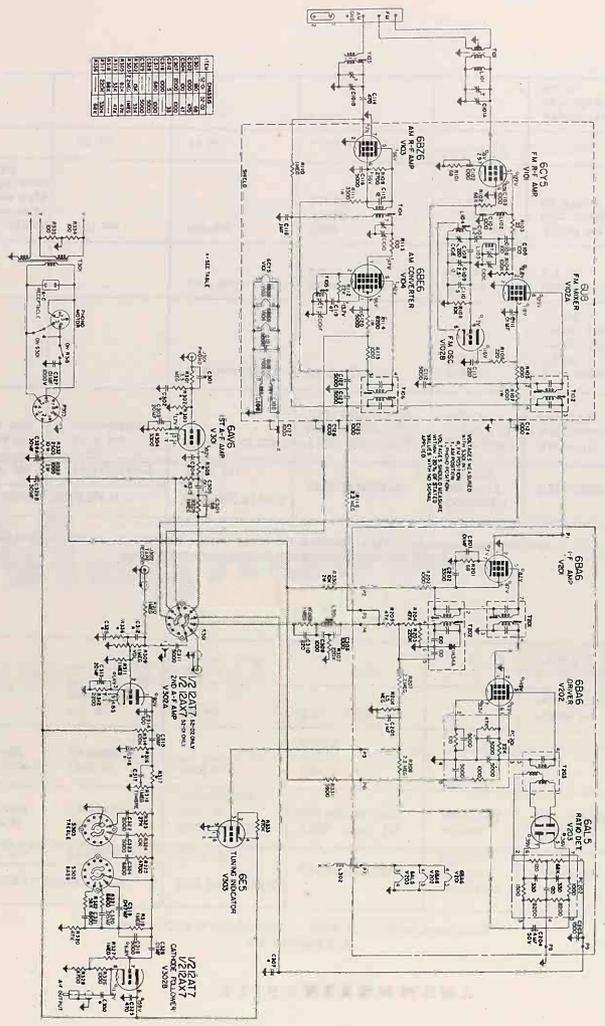
FIG 2
RATIO DETECTOR RESPONSE CURVE

CHASSIS LAYOUT





SCHEMATIC DIAGRAM
(52-03)



SCHEMATIC DIAGRAM
(52-01 and 02)

NO.	DESCRIPTION	QTY.	REMARKS
1	6C7A	1	P.A. DRIVER
2	6E8	1	A.M. CONVERTER
3	6E6	1	A.M. DETECTOR
4	6E5	1	A.M. DETECTOR
5	6E4	1	A.M. DETECTOR
6	6E3	1	A.M. DETECTOR
7	6E2	1	A.M. DETECTOR
8	6E1	1	A.M. DETECTOR
9	6E0	1	A.M. DETECTOR
10	6E-1	1	A.M. DETECTOR
11	6E-2	1	A.M. DETECTOR
12	6E-3	1	A.M. DETECTOR
13	6E-4	1	A.M. DETECTOR
14	6E-5	1	A.M. DETECTOR
15	6E-6	1	A.M. DETECTOR
16	6E-7	1	A.M. DETECTOR
17	6E-8	1	A.M. DETECTOR
18	6E-9	1	A.M. DETECTOR
19	6E-10	1	A.M. DETECTOR
20	6E-11	1	A.M. DETECTOR
21	6E-12	1	A.M. DETECTOR
22	6E-13	1	A.M. DETECTOR
23	6E-14	1	A.M. DETECTOR
24	6E-15	1	A.M. DETECTOR
25	6E-16	1	A.M. DETECTOR
26	6E-17	1	A.M. DETECTOR
27	6E-18	1	A.M. DETECTOR
28	6E-19	1	A.M. DETECTOR
29	6E-20	1	A.M. DETECTOR
30	6E-21	1	A.M. DETECTOR
31	6E-22	1	A.M. DETECTOR
32	6E-23	1	A.M. DETECTOR
33	6E-24	1	A.M. DETECTOR
34	6E-25	1	A.M. DETECTOR
35	6E-26	1	A.M. DETECTOR
36	6E-27	1	A.M. DETECTOR
37	6E-28	1	A.M. DETECTOR
38	6E-29	1	A.M. DETECTOR
39	6E-30	1	A.M. DETECTOR
40	6E-31	1	A.M. DETECTOR
41	6E-32	1	A.M. DETECTOR
42	6E-33	1	A.M. DETECTOR
43	6E-34	1	A.M. DETECTOR
44	6E-35	1	A.M. DETECTOR
45	6E-36	1	A.M. DETECTOR
46	6E-37	1	A.M. DETECTOR
47	6E-38	1	A.M. DETECTOR
48	6E-39	1	A.M. DETECTOR
49	6E-40	1	A.M. DETECTOR
50	6E-41	1	A.M. DETECTOR
51	6E-42	1	A.M. DETECTOR
52	6E-43	1	A.M. DETECTOR
53	6E-44	1	A.M. DETECTOR
54	6E-45	1	A.M. DETECTOR
55	6E-46	1	A.M. DETECTOR
56	6E-47	1	A.M. DETECTOR
57	6E-48	1	A.M. DETECTOR
58	6E-49	1	A.M. DETECTOR
59	6E-50	1	A.M. DETECTOR
60	6E-51	1	A.M. DETECTOR
61	6E-52	1	A.M. DETECTOR
62	6E-53	1	A.M. DETECTOR
63	6E-54	1	A.M. DETECTOR
64	6E-55	1	A.M. DETECTOR
65	6E-56	1	A.M. DETECTOR
66	6E-57	1	A.M. DETECTOR
67	6E-58	1	A.M. DETECTOR
68	6E-59	1	A.M. DETECTOR
69	6E-60	1	A.M. DETECTOR
70	6E-61	1	A.M. DETECTOR
71	6E-62	1	A.M. DETECTOR
72	6E-63	1	A.M. DETECTOR
73	6E-64	1	A.M. DETECTOR
74	6E-65	1	A.M. DETECTOR
75	6E-66	1	A.M. DETECTOR
76	6E-67	1	A.M. DETECTOR
77	6E-68	1	A.M. DETECTOR
78	6E-69	1	A.M. DETECTOR
79	6E-70	1	A.M. DETECTOR
80	6E-71	1	A.M. DETECTOR
81	6E-72	1	A.M. DETECTOR
82	6E-73	1	A.M. DETECTOR
83	6E-74	1	A.M. DETECTOR
84	6E-75	1	A.M. DETECTOR
85	6E-76	1	A.M. DETECTOR
86	6E-77	1	A.M. DETECTOR
87	6E-78	1	A.M. DETECTOR
88	6E-79	1	A.M. DETECTOR
89	6E-80	1	A.M. DETECTOR
90	6E-81	1	A.M. DETECTOR
91	6E-82	1	A.M. DETECTOR
92	6E-83	1	A.M. DETECTOR
93	6E-84	1	A.M. DETECTOR
94	6E-85	1	A.M. DETECTOR
95	6E-86	1	A.M. DETECTOR
96	6E-87	1	A.M. DETECTOR
97	6E-88	1	A.M. DETECTOR
98	6E-89	1	A.M. DETECTOR
99	6E-90	1	A.M. DETECTOR
100	6E-91	1	A.M. DETECTOR
101	6E-92	1	A.M. DETECTOR
102	6E-93	1	A.M. DETECTOR
103	6E-94	1	A.M. DETECTOR
104	6E-95	1	A.M. DETECTOR
105	6E-96	1	A.M. DETECTOR
106	6E-97	1	A.M. DETECTOR
107	6E-98	1	A.M. DETECTOR
108	6E-99	1	A.M. DETECTOR
109	6E-100	1	A.M. DETECTOR

REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NO.	LEST
TRANSFORMERS-COILS-CHOKES			
T101	FM Input	360491-4	1.00
T102	FM 1st I-F	360626-1	1.60
T103	Mod Antenna Assy	360746-1	3.50
T104	AM-IF	360633-1	1.70
T105	AM Oscillator	360752-1	.45
T106	1st AM-I-F	360612-1	1.40
T107	2nd FM-I-F	360747-1	1.40
T108	2nd AM-I-F	360749-1	2.65
T109	Ratio Detector	360748-1	3.45
T110	Flameter	320076-1	4.50
T111	Power (IS-02)	300156-1	11.50
L101	FM Antenna	360750-1	.15
L102	RF Choke	360622-9	.35
L103	FM - RF	360751-1	.15
L104	FM Oscillator	360626-1	.90
L105	RF Choke	360622-9	.35
L106	RF Choke	360622-2	.35
L107	100K Filter	360621-1	.35
L102	RF Choke	360623-9	.35
CAPACITORS			
All capacitors are 500V unless specified otherwise			
C101	Tuning Gang	250107-1	6.75
C102	Feed Thru, 1000 mfd	250276-2	.20
C103	Feed Thru, 1000 mfd	250278-2	.20
C104	Feed Thru, 2000 mfd	250278-1	.25
C105	Mica, 100 mfd	250187-43	.25
C106	Mica, 100 mfd	250187-53	.25
C107	Mica, 2.2 mfd	250211-118	.15
C108	Ceramic, 220 mfd	250188-5	.20
C109	Titanium 2.5, 15 mfd	250189-9	.30
C110	Ceramic, 5 mfd, 95	250068-136	.25
C111	Paper, 01 mfd	250211-7	.25
C112	Ceramic, 5000 mfd	250175-30	.20
C113	Mica, 220 mfd	250187-97	.35
C114	Mica, 470 mfd	250188-102	.25
C115	Ceramic, 15 mfd, 95	250068-179	.20
C116	Ceramic, 5000 mfd	250175-30	.20
C118	Wetlar, 1 mfd mfd	250281-28	.40
C119	Ceramic, 47 mfd	250218-17	.15
C120	Ceramic, 5000 mfd	250175-30	.20
C121	Ceramic, 5000 mfd	250175-30	.20
C122	Ceramic, 5000 mfd	250175-30	.20
C123	Feed Thru, 1000 mfd	250278-1	.25
C124	Feed Thru, 1000 mfd	250278-1	.25
C125	Feed Thru, 1000 mfd	250278-1	.25
C126	Feed Thru, 1000 mfd	250278-1	.25
C127	Feed Thru, 1000 mfd	250278-1	.25
C128	Ceramic, 01 mfd	250234-68	.30
C129	Ceramic, 2021 mfd	250234-154	.25
C130	Ceramic, 0015 mfd	250234-148	.20
C131	Electrolytic, 4 mfd-20V	250202-13	1.00
C132	Paper, 1 mfd, 200V	250202-13	.30
C133	Ceramic, 180 mfd (IS-01)	250175-40	.20
C134	Ceramic, 48 mfd	250218-7	.15
C135	Ceramic, 100 mfd (IS-01)	250218-8	.25
C136	Ceramic, 470 mfd (IS-02)	250218-6	.20
C137	Ceramic, 220 mfd (IS-02)	250207-68	.20
C138	Electrolytic, 20 mfd-25V (IS-01)	250207-28	1.00
C139	Electrolytic, 20 mfd-25V (IS-01)	250218-22	.25
C140	Ceramic, 47 mfd (IS-02)	250218-17	.15
C141	Ceramic, 01 mfd	250218-19	.20
C142	Electrolytic, 20mfd-25V (IS-03)	250207-28	1.00
C143	Ceramic, 48 mfd	250218-7	.20
C144	Ceramic, 2000 mfd	250218-20	.25
C145	Ceramic, 01 mfd (IS-03)	250218-19	.20
C146	Mica, 1000 mfd	250228-354	.45
C147	Mica, 1000 mfd	250228-354	.45
C148	Mica, 1000 mfd	250228-354	.45
C149	Ceramic, 22 mfd (IS-03)	250218-1	.20
C150	Ceramic, 220 mfd	250218-5	.20
C151	Ceramic, 01 mfd (IS-03)	250218-19	.20
C152	Ceramic, 5000 mfd	250175-30	.20
C153	Ceramic, 5 mfd (IS-01)	250207-1	.25
C154	Ceramic, 33 mfd (IS-01)	250218-21	.15
C155	Ceramic, 01 mfd (IS-02)	250218-19	.20
C156	Electrolytic, 20 mfd, 25V	250207-28	1.00
C157	Ceramic, 100 mfd	250218-22	.25
C158	Ceramic, 100 mfd	250218-22	.25
C159	Electrolytic, 20mfd-25V (IS-03)	250207-28	1.00

SYMBOL	DESCRIPTION	PART NO.	LEST
C315	Ceramic, 01 mfd	250218-19	.20
C315	Ceramic, 220 mfd (IS-03)	250218-5	.20
C316	Ceramic, 1000 mfd (IS-01)	250218-8	.25
C316	Ceramic, 3000 mfd (IS-03)	250218-20	.25
C317	Ceramic, 680 mfd (IS-01)	250218-4	.20
C317	Ceramic, 1000 mfd (IS-02)	250218-8	.25
C317	Ceramic, 33 mfd (IS-03)	250218-21	.15
C318	Ceramic, 5000 mfd	250175-30	.20
C319	Ceramic, 01 mfd (IS-03)	250218-19	.20
C319	Paper, .047 mfd-200V	250202-11	.25
C319	Ceramic, 2000 mfd (IS-03)	250218-20	.25
C320	Paper, .015 mfd-200V	250202-8	.25
C320	Electrolytic, 20mfd-25V (IS-03)	250207-13	1.50
C321	Paper, 6800 mfd-200V	250211-6	.25
C321	Ceramic, 5000 mfd (IS-03)	250175-30	.20
C322	Ceramic, 2000 mfd	250188-20	.25
C322	Ceramic, 3300 mfd (IS-03)	250175-28	.25
C323	Ceramic, 5000 mfd	250175-30	.20
C323	Ceramic, 1000 mfd (IS-03)	250218-8	.25
C324	Paper, 6800 mfd-200V	250211-6	.25
C324	Ceramic, 1000 mfd (IS-03)	250175-30	.20
C325	Ceramic, 470 mfd	250218-6	.20
C325	Paper, .022 mfd-200V (IS-03)	250202-9	.20
C326	Ceramic, 01 mfd	250218-19	.20
C326	Ceramic, 01 mfd-1000V	250218-2	.20
C327	Ceramic, 01 mfd-1000V	250218-2	.20
C328	Electrolytic, 20-30mfd-450V	250207-18	2.25
C328	Electrolytic, 35-30-20-10mfd-350V	250207-21	2.75
C329	Ceramic, 5000 mfd (IS-03)	250175-30	.20

RESISTORS

SYMBOL	DESCRIPTION	PART NO.	LEST
All resistors are 1/2W unless specified otherwise			
R101	50	250104-44	2.00
R102	68K	250104-44	2.00
R103	22	250104-82	2.00
R104	100K	250104-86	2.00
R105	1000	250104-82	2.00
R106	220	250104-54	2.00
R107	1000, 1W	250105-62	2.00
R108	10K	250104-74	2.00
R109	700	250104-87	2.00
R110	1 m meg	250104-98	2.00
R111	3300, 1W	250105-68	2.50
R112	22K	250104-76	2.00
R113	100	250104-50	2.00
R114	8200, 1W	250105-73	2.00
R115	1000	250104-82	2.00
R116	2.2 m meg	250104-102	2.00
R117	68	250104-62	2.00
R120	1000	250104-82	2.00
R203	220K	250104-90	2.00
R204	27K	250104-82	2.00
R205	47K	250104-82	2.00
R206	1.5 m meg	250104-102	2.00
R207	2.2 m meg	250104-102	2.00
R208	2.2 m meg	250104-102	2.00
R209	2.3 m meg	250104-102	2.00
R301	330K (IS-03)	250104-102	2.00
R302	15K (IS-01)	250104-76	2.00
R302	33K (IS-03)	250104-80	2.00
R303	6.8 m meg (IS-03)	250104-100	2.00
R304	2.2 m meg (IS-01)	250104-102	2.00
R303	1 m meg	250104-98	2.00
R304	3300 (IS-03)	250104-68	2.00
R305	82K (IS-01)	250104-85	2.00
R305	47K (IS-03)	250104-82	2.00
R306	3300 (IS-03)	250104-80	2.00
R306	1 m meg	250104-98	2.00
R307	220K	250104-90	2.00
R308	1 m meg	250104-98	2.00
R309	220K (IS-03)	250104-80	2.00
R310	1 m meg (IS-03)	250104-98	2.00
R310	1 m meg	250104-98	2.00
R311	33K (IS-03)	250104-80	2.00
R311	1 m meg	250104-98	2.00
R312	1 m meg-Loadness (IS-03)	250207-15	0.11
R312	700K (IS-01)	250104-66	2.00
R312	3300 (IS-03)	250104-80	2.00
R314	100K	250104-86	2.00

REPLACEMENT PARTS LIST (Cont.)

SYMBOL	DESCRIPTION	PART NO.	LEST
R314	47K (IS-03)	250104-82	2.00
R315	33K (IS-01)	250104-80	2.00
R315	47K (IS-03)	250104-82	2.00
R315	220K (IS-03)	250104-90	2.00
R316	68K (IS-01)	250104-84	2.00
R316	1 m meg - Timbre (IS-03)	250124-5	2.00
R317	220K (IS-01)	250104-90	2.00
R317	330K (IS-03)	250104-92	2.00
R317	470K (IS-03)	250104-94	2.00
R318	1 m meg - Timbre	250124-5	0.11
R318	100K (IS-03)	250104-86	2.00
R319	1 m meg	250104-98	2.00
R320	47K (IS-03)	250104-82	2.00
R320	4.7K (IS-03)	250104-70	2.00
R321	6.8K	250104-72	2.00
R321	1 m meg (IS-03)	250104-98	2.00
R322	38K	250104-83	2.00
R322	22K (IS-03)	250104-78	2.00
R323	27K	250104-79	2.00
R323	47K (IS-03)	250104-82	2.00
R324	10K	250104-74	2.00
R324	100K (IS-03)	250104-86	2.00
R325	4.7K	250104-70	2.00
R325	680K (IS-03)	250104-96	2.00
R326	1000	250104-82	2.00
R326	220K (IS-03)	250104-90	2.00
R327	1 m meg	250104-98	2.00
R327	100K (IS-03)	250104-88	2.00
R328	4.7K	250104-70	2.00
R328	10K (IS-03)	250104-74	2.00
R329	1200 - 2W	250106-1053	3.50
R329	1.5 m meg (IS-03)	250104-100	2.00

SYMBOL	DESCRIPTION	PART NO.	LEST
R330	10K - 2W	250106-1074	3.50
R330	100K (IS-03)	250104-86	2.00
R331	3900K - 1W	250106-103	2.00
R331	2.2 m meg (IS-03)	250104-102	2.00
R332	2500 - 3W W.W.	240071-39	3.50
R332	10K - 8W (IS-03)	230150-342	0.30
R333	470K	250104-94	2.00
R333	1200 - 2W (IS-03)	250106-1063	3.50
R334	100	250104-80	2.00
R334	8.2K - 2W (IS-03)	250104-1073	3.50
R335	100	250104-80	2.00
R335	10K, 3W (IS-03)	250106-818	0.35
R336	68K (IS-01)	250104-84	2.00
R336	100K (IS-03)	250104-82	2.00
R337	470K (IS-03)	250104-94	2.00
R338	2000 - Hum Balance (IS-03)	250104-4	0.45
R339	100K (IS-03)	250104-82	2.00
MISCELLANEOUS			
PC-201	Printed Circuit	250255-1	1.15
PC-202	Printed Circuit	250254-1	1.15
SW-301	Band Switch	169284-3	2.25
SW-302	Trase Switch (w/air)	169478-1	1.75
SW-303	Treble Switch (w/air)	169276-1	1.75
J101	Phono Jack	180486-1	10
J102	Recorder Jack	180486-1	10
J103	Part of J102	180486-1	10
	Dial Glass	150551-1	90
	Dial Pointer	435211-1	90
	Pilot Light (#1470E)	180461-17	20
	Crystal Diode (8184K)	830049-1	1.65

MAINTENANCE MANUAL 1319

GENERAL

The CR-740 radio chassis is designed for use on the AM broadcast band and works in conjunction with a separate audio amplifier. All voltages are obtained from the external amplifier.

Original production of the CR-740 will

carry the suffix letters "AA" after the 740. If it is necessary to make an electrical change, the chassis will then be identified as the CR-740AA. If no electrical change is necessary but a mechanical change has been deemed necessary, the chassis will be identified as the CR-740AB.

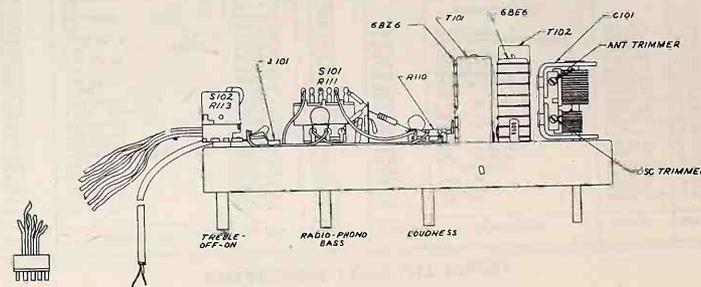
ALIGNMENT

The output indicator may be a VTVM connected in the AVC circuit from test point A to circuit ground --- or an output meter across the speaker voice coil if test signal is modulated.

SIGNAL GENERATOR INPUT	SIGNAL GENERATOR FREQUENCY	TUNING CAPACITOR SETTING	ADJUSTMENTS	NOTES
Converter grid (pin #7 of 6BE6) thru .01 mfd cap.	455 KC	Near mid-range point of no interference	Top and bottom slugs of T102 and T101	Adjust for max. reading of VTVM or output meter
Same	1620 KC	Fully unmeshed (maximum high frequency limit of tuning dial)	Oscillator trimmer, on tuning gang	Same
Radiating loop*	1400 KC	Tuned to 1400KC	Ant. trimmer on tuning gang	Same
Same	600 KC	600 KC	If necessary, move adjustable portion of rod antenna back and forth	Same
Repeat last two steps				

Radiating loop may consist of a loop of wire approximately 2 inches in diameter connected across terminals of signal generator leads and loosely coupled to receiver loop antenna.

CHASSIS LAYOUT



Magnavox

RADIO CHASSIS — CR-740

Magnavox

SERVICE MANUAL

1329

54 SERIES RADIO CHASSIS

GENERAL

The 54 series radio chassis contains two separate audio circuits. These are necessary for operation of the chassis with record changers or tape recorders designed for stereo operation. Dual controls are used throughout which vary the output from each channel equally and simultaneously.

On the 54-02 and 54-03 inputs are provided for connecting a Stereo tape recorder which will enable the tape recorder to play through the audio circuits of these chassis. On the 54-01 only a conventional tape recorder can be played through the audio circuits. On all three chassis, however, only conventional monaural tape recordings can be made.

Due to the design of the chassis it is recommended that a tape recording having a high input and output imped-

ance be used for recording and playback. However, a tape recording having a low output impedance can be used for playback providing sufficient signal output is available from the tape recorder.

Provisions are provided for the connection of an external AM or FM antenna. A terminal board having two connections marked FM, a connection marked AM and three other connections marked G, 1, and 2 respectively are located on a fibre board fastened to the rear of the radio chassis. To connect an external FM antenna to this unit merely connect the FM antenna leads to the two connections marked FM and to connect an external AM antenna connect one lead to the AM connection and ground the antenna to the connection marked G. The connections marked 1 and 2 are not used.

SPECIFICATIONS

Power Supply	117 volts, 50/60 cycles AC
Power Consumption	75 watts
Tuning Frequency Range:	540-1620KC
Broadcast Band	88-108MC
FM Band	455KC/10.7MC
Intermediate Frequency	
Tubes:	6CY5
FM RF Amplifier	6U8
FM Mixer-Oscillator	6B26
AM RF Amplifier	6BE6
AM Converter	

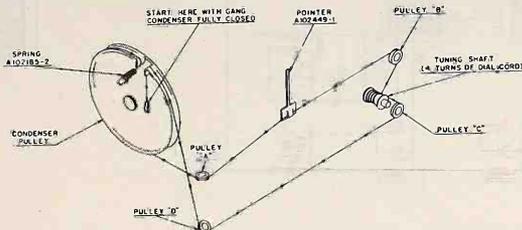
I. F. Amplifier	6BA6
FM Driver	6BA6
Ratio Detector	6AL5
AM Detector (Crystal Diode)	1N34A
Audio Amp (Channel 1&2)	12AX7
Audio Amp & Cathode Follower (Channel 1)	12AX7
Audio Amp & Cathode Follower (Channel 2)	12AX7
Audio Amp & Cathode Follower (Channel 1)*	12AT7
Audio Amp & Cathode Follower (Channel 2)*	12AT7
Rectifier*	5Y3GT
Tuning Eye	6E5

*Used only on 54-02 Chassis.

DIAL STRINGING

Select a 64 inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the con-

denser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.



ALIGNMENT

AM ALIGNMENT

Set band switch to AM position. Check dial pointer positioning.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
SBE6 (pin 7) thru .01 mfd	455 kc (modulated)	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across voice coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated)	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	T106, T104	"	Adjust for max. output.
"	-----	-----	-----	"	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)

Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

SIGNAL GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:			
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From pin 5 on pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM (Point where voltage swings pos. or neg.)
"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. terms in series with: 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	L104 (osc. coil)	"	"
"	-----	-----	-----	-----	Repeat two preceding steps.

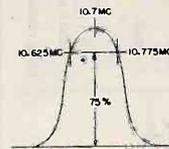


FIG 1
F.M.I.F. SELECTIVITY CURVE

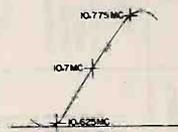


FIG 2

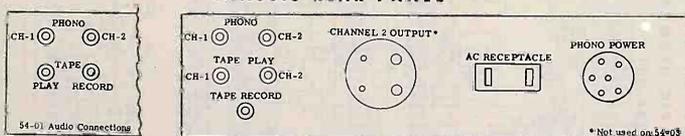
FIG 2
RATIO DETECTOR RESPONSE CURVE

ALIGNMENT

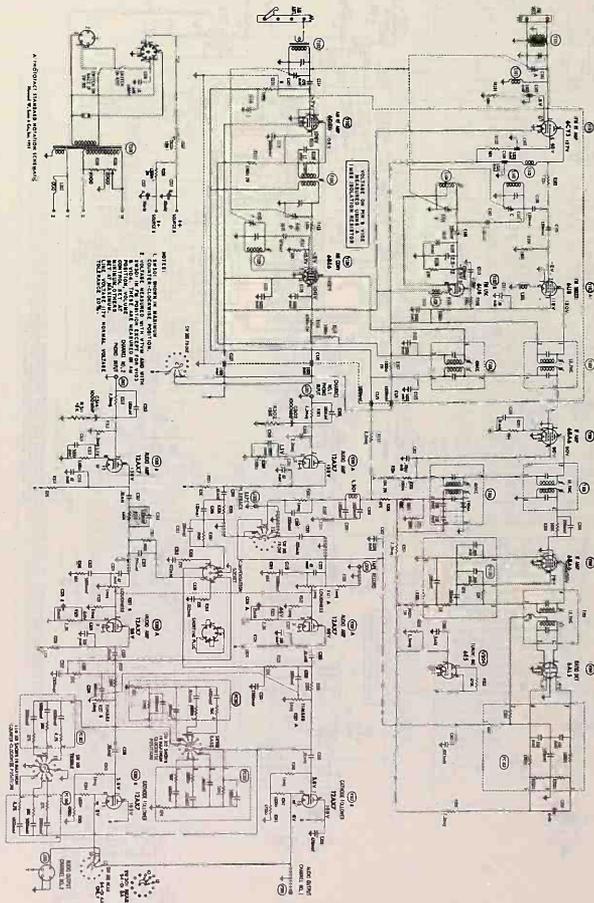
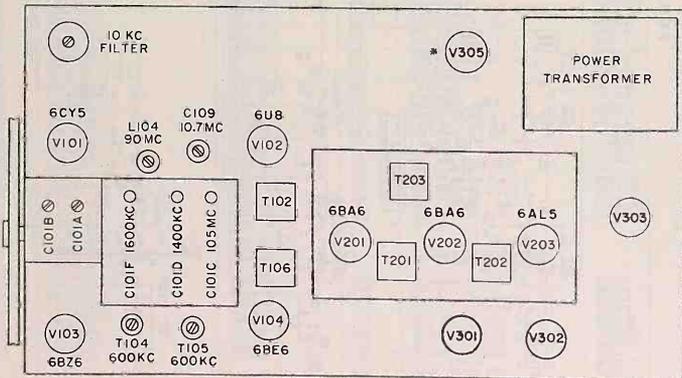
FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
Note: Place 1 megohm resistor in series with hot scope lead.

SWEEP GENERATOR		SET RECEIVER	ADJUSTMENTS	CONNECT	REMARKS
COUPLE TO:	FREQUENCY	DIAL TO:		SCOPE TO	
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (.3 mc sweep) couple a marker sig. to 6CY5 pin 5	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1
"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	-----	---		Repeat steps 1, 2 and 3.

CHASSIS REAR PANEL



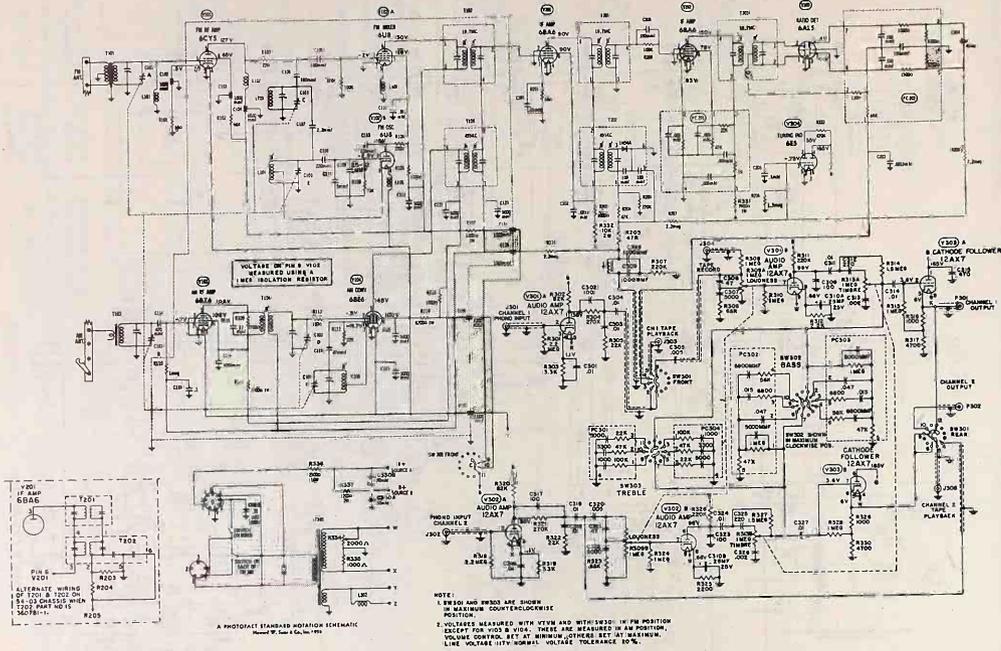
CHASSIS LAYOUT



SCHEMATIC DIAGRAM
(54-01)

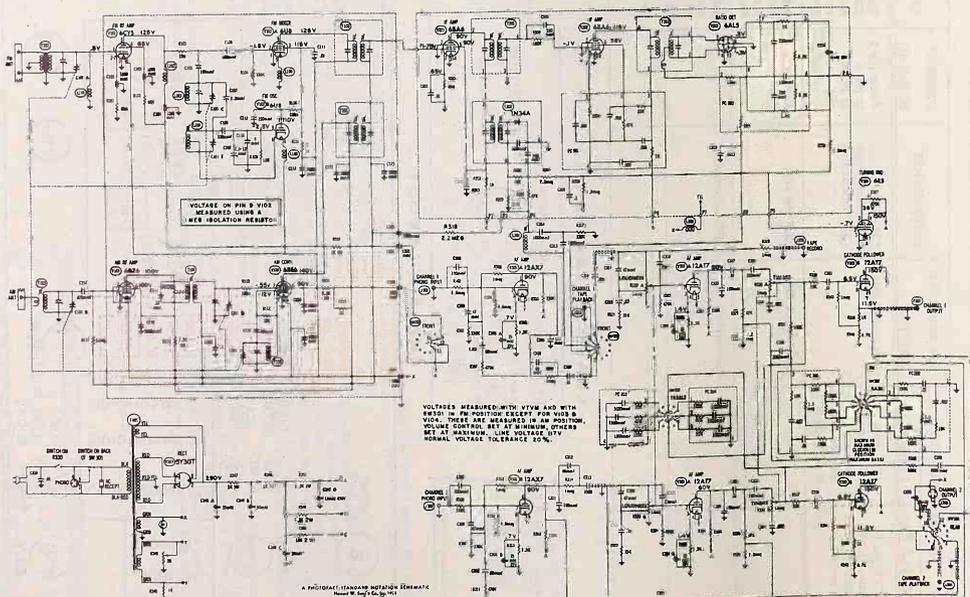
SCHEMATIC DIAGRAM

(54-03)



SCHEMATIC DIAGRAM

(54-02)



REPLACEMENT PARTS LIST

SYMBOL	DESCRIPTION	PART NO.
TRANSFORMERS & COILS		
T101	FM Input Transformer	350491-4
T102	1st FM I-F Trans.	350628-2
T103	RF Amplifier Assembly	350746-1
T104	AM RF Trans.	350753-1
T105	AM Oscillator Coil	350755-1
T106	1st AM I-F Trans.	350811-1
T201	2nd FM I-F Trans.	350717-1
T202	2nd AM I-F Trans.	350749-1
T301	Ratio Detector Trans.	350748-1
T501	Flameless Trans.	350978-1
T601	Power Trans. (54-01)	350186-1
L101	FM Antenna Coil	350750-1
L102	RF Choke	350523-9
L103	FM RF Coil	350751-1
L104	FM Oscillator	350628-1
L105	RF Choke	350523-9
L106	RF Choke	350523-8
L107	100K Filter	350821-1
L202	RF Choke	350523-8

RESISTORS

All resistors are 10%, 1/2W unless specified otherwise.

R101	68	230104-68
R102	68K	230104-54
R103	22K	230104-22
R104	100K	230104-88
R105	100K	230104-82
R106	220	230104-50
R107	100K, 1W	230105-82
R108	10K	230104-14
R109	2700	230104-87
R110	1 meg	230104-98
R111	3300, 1W	230105-88
R112	220	230104-28
R113	100	230104-50
R114	8200, 1W	230105-73
R115	100K	230104-82
R116	2.2 meg (54-01 & 03)	230104-102
R201	68	230104-66
R202	100K	230104-82
R203	220K	230104-80
R204	47K	230104-82
R205	47K	230104-82
R206	1.5 meg	230104-100
R207	2.2 meg	230104-102
R208	2.2 meg	230104-108
R209	100K	230104-88
R301	330K (54-02)	230104-82
R302	3.3 meg (54-01)	230104-104
R303	2.2 meg (54-02)	230104-102
R304	15K (54-01)	230104-78
R305	6.8 meg (54-02)	230104-108
R306	2.2 meg (54-01)	230104-102
R307	1 meg (54-02)	230104-98
R308	3300 (54-03)	230104-88
R309	3300 (54-03)	230104-88
R310	3300 (54-03)	230104-88
R311	6.8 meg (54-02)	230104-108
R312	6.8 meg (54-02)	230104-108
R313	3300 (54-03)	230104-88
R314	6.8 meg (54-02)	230104-108
R315	270K (54-01)	230104-81
R316	820K (54-01)	230104-84
R317	33K (54-02)	230104-80
R318	22K (54-02)	230104-78
R319	390K (54-01)	230104-83
R320	1 meg (54-02)	230104-98
R321	68K (54-01)	230104-84
R322	220K (54-02)	230104-86
R323	470K (54-02)	230104-84
R324	220K (54-01)	230104-80
R325	330K (54-02)	230104-86
R326	1 meg (54-01)	230104-98
R327	220K (54-02)	230104-86
R328	1 meg (54-01)	230104-98
R329	220K (54-02)	230104-86
R330	47K (54-01)	230104-78
R331	100K (54-01)	230104-82
R332	100K (54-01)	230104-82
R333	470K (54-01)	230104-78
R334	330K (54-01)	230104-80
R335	100K (54-02)	230104-88
R336	100K (54-02)	230104-88
R337	220K (54-01)	230104-80
R338	10K, 2W (54-03)	230105-104
R339	220K (54-02)	230104-86
R340	220K (54-02)	230104-86
R341	10K (54-02)	230104-74
R342	10K, 2W (54-03)	230105-104
R343	10K, 2W (54-03)	230105-104
R344	220K (54-02)	230104-86
R345	10K, 2W (54-03)	230105-104
R346	220K (54-02)	230104-86
R347	10K, 2W (54-03)	230105-104
R348	10K, 2W (54-03)	230105-104
R349	8200, 2W (54-03)	230105-104
R350	10K, 2W (54-03)	230105-104
R351	1200, 2W (54-02)	230106-1063

CAPACITORS

All capacitors are 50%, 500V unless specified otherwise.

C101	Tuning capacitor	350171-7
C102	Feed Thru, 1000 mfd	350276-2
C103	Feed Thru, 1000 mfd	350276-1
C104	Feed Thru, 1000 mfd	350276-1
C105	Mica, 100 mfd, 10%	350187-81
C106	Mica, 100 mfd, 10%	350187-83
C107	Molded, 2.2 meg, 10%	350181-118
C108	Mica, 280 mfd, 10%	350187-87
C109	Trimmer, 2.2 meg, 10%	350188-09
C110	Cap., 8 mfd, 5%	350088-138
C111	Paper, .01 mfd, 400V	350211-7

REPLACEMENT PARTS LIST (Cont)

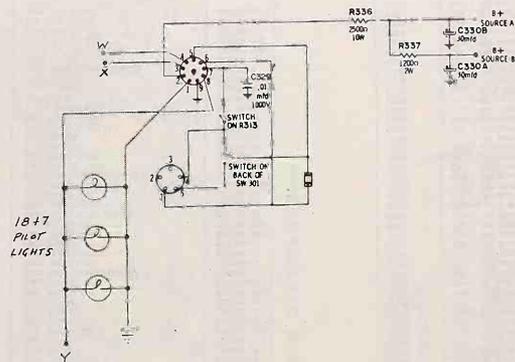
SYMBOL	DESCRIPTION	PART NO.
C112	Cap., 5000 mfd	350171-30
C113	Mica, 220 mfd, 10%	350187-87
C114	Mica, 470 mfd	230106-102
C115	Cap., 12 mfd, 5%	230088-178
C116	Cap., 5000 mfd	350171-30
C118	Mylar, .1 mfd, 100V	230281-125
C119	Cap., 47 mfd	230218-17
C120	Cap., 2000 mfd	230171-30
C121	Cap., 5000 mfd	230171-30
C122	Cap., 5000 mfd	230171-30
C123	Cap., 5000 mfd	230171-30
C124	Feed Thru, 1000 mfd	230278-1
C125	Feed Thru, 1000 mfd	230278-1
C126	Feed Thru, 1000 mfd	230278-1
C127	Cap., .01 mfd	230334-66
C128	Cap., 100 mfd (54-01)	230234-154
C203	Cap., 1500 mfd	230234-158
C204	Elect., 4 mfd, 50V	230259-6
C205	Paper, .1 mfd, 200V	230240-13
C301	Cap., 180 mfd, 10% (54-01)	230171-40
C302	Cap., 48 mfd (54-02)	230218-7
C303	Cap., .01 mfd (54-03)	230218-19
C304	Cap., 1000 mfd (54-01)	230218-8
C305	Cap., 100 mfd (54-02)	230218-22
C306	Cap., 100 mfd (54-01)	230218-22
C307	Cap., 100 mfd (54-02)	230218-22
C308	Cap., 100 mfd (54-01)	230218-22
C309	Cap., 100 mfd (54-01)	230218-22
C310	Cap., 100 mfd (54-01)	230218-22
C311	Cap., 100 mfd (54-01)	230218-22
C312	Cap., 100 mfd (54-01)	230218-22
C313	Cap., 100 mfd (54-01)	230218-22
C314	Cap., 100 mfd (54-01)	230218-22
C315	Cap., 100 mfd (54-01)	230218-22
C316	Cap., 100 mfd (54-01)	230218-22
C317	Cap., 100 mfd (54-01)	230218-22
C318	Cap., 100 mfd (54-01)	230218-22
C319	Cap., 100 mfd (54-01)	230218-22
C320	Cap., 100 mfd (54-01)	230218-22
C321	Cap., 100 mfd (54-01)	230218-22
C322	Cap., 100 mfd (54-01)	230218-22
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C385	Cap., 100 mfd (54-01)	230218-22
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C401	Cap., 100 mfd (54-01)	230218-22
C402	Cap., 100 mfd (54-01)	230218-22
C403	Cap., 100 mfd (54-01)	230218-22
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C405	Cap., 100 mfd (54-01)	230218-22
C406	Cap., 100 mfd (54-01)	230218-22
C407	Cap., 100 mfd (54-01)	230218-22
C408	Cap., 100 mfd (54-01)	230218-22
C409	Cap., 100 mfd (54-01)	230218-22
C410	Cap., 100 mfd (54-01)	230218-22
C411	Cap., 100 mfd (54-01)	230218-22
C412	Cap., 100 mfd (54-01)	230218-22
C413	Cap., 100 mfd (54-01)	230218-22
C414	Cap., 100 mfd (54-01)	230218-22
C415	Cap., 100 mfd (54-01)	230218-22
C416	Cap., 100 mfd (54-01)	230218-22
C417	Cap., 100 mfd (54-01)	230218-22
C418	Cap., 100 mfd (54-01)	230218-22
C419	Cap., 100 mfd (54-01)	230218-22
C420	Cap., 100 mfd (54-01)	230218-22

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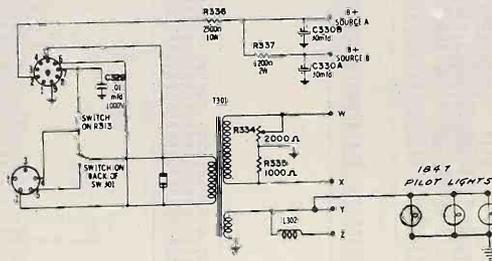
ADDENDA
SERVICE MANUAL 1329

The following information concerns production changes made since the publication release of Service Manual 1329.

The 54-03 Chassis has been revised in the initial production run so that a filament transformer is not used. All power connections are supplied from the Main Amplifier as shown below.

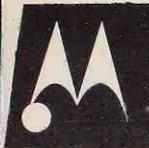


The 54-04 Chassis has recently been released for production. This version is identical to the 54-03 except for the power connections shown below.



The schematic diagram shown in Manual 1329 for the 54-03 Chassis will be correct for the 54-03 and 54-04 with exceptions noted above.

The Parts List for the 54-03 Chassis in Manual 1329 is correct for the 54-03 and 54-04 Chassis except that T301, L302, R334 & R335 are not used on the 54-03.



MOTOROLA

Service Manual

SUPERSEDES SK16, 17, 18 SERIES PRELIMINARY SERVICE MANUAL PART NO. 68P643063.



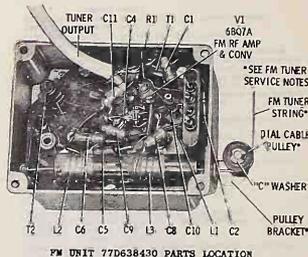
HOME RADIO

MODELS	CHASSIS
SK16W	HS-710,711
SK16W	—
SK17W	HS-710,711
SK17W	—
SK18M	HS-710,711
SK18M	—

Drexel Series

FM TUNER SERVICE NOTES

Do not free the dial cable pulley located on the FM tuner unit, as this may result in audio howl. This is due to core vibration caused by acoustic feed-back from the loudspeaker at certain frequencies. Silicon grease is applied at the junction of string and pulley, to insure smooth tuning action and must not be removed. Therefore, whenever tuning action is erratic, check for proper use of silicon grease (Motorola Part Number 11M490487). Also affecting tuning action is the angle of the pulley bracket with respect to the take-up shaft. Position bracket until tuning action is as smooth as possible.



FM UNIT 77D638430 PARTS LOCATION

SK16 SERIES

SK17 SERIES

SK18 SERIES

SK17 & SK18 SERIES

GENERAL INFORMATION

TYPE - Models SK16, SK17 & SK18 are console stereophonic, high-fidelity, radio-phonograph combinations containing a dual channel amplifier, AM-FM tuner, four-speed record changer and multiple speaker system. Models SK16, SK17 & SK18 are the right channel speaker systems. These models differ from each other only in the type of cabinetry used.

TUBE COMPLEMENT

HS-710 TUNER & PRE-AMP

Ref. No.	Type	Function
V-1	6BQ7A	FM RF amp & converter
V-2	6BA6	1st FM IF
V-3	6BA6	AM IF & 2nd FM IF
V-4	6AU6	FM limiter
V-5	6AL5	FM ratio detector
V-6	6BA6	AM RF amp
V-7	6BE6	AM converter
V-8	5M61/6DA5	Tuning indicator
V-9	12AX7	1st & 2nd AF amp
V-10	12AX7	1st & 2nd AF amp

HS-711 POWER AMP

Ref. No.	Type	Function
V-1	12AX7	Phase inverter
V-2	EL84/6BD5	Power amp
V-3	EL84/6BD5	Power amp
V-4	12AX7	Phase inverter
V-5	EL84/6BD5	Power amp
V-6	EL84/6BD5	Power amp
V-7	5U4GB	Rectifier

RECORD CHANGER

These models use the VM24RC record changer. Refer to the VM17-VM25RC Record Changer Service Manual (Motorola Part Number 68P643068) for service information and changer operation.

ELECTRICAL SPECIFICATIONS

Frequency Response - ± 1 db from 20 to 20,000 cps at normal listening levels
 Power Output - 10 watts at 1% distortion each channel (20 watts peak)
 Tone Controls - Bass $+10$ db, -15 db at 50 cps
 Treble $+7$ db, -12 db at 10,000 cps
 Amplifier Sensitivity - 2 volts max RMS (at 1000 cps) in for 10 watts output.

Conditions:

1. Compensator switch set to AUX position.
2. Loudness and Bass controls at max, Treble at min.
3. 8 ohm, 20 watt resistive load across the output of each channel (speakers disconnected).
4. Output meter across each resistive load.
5. Source (generator) connected to AUX jack.

Procedure:

1. With .1 volts RMS (at 1000 cps) in, adjust Balance control for equal output from each channel.
2. With 8.9 volts (10 watts) across the output loads, the input voltage (from generator) should be .2 volts or less.

Power Supply - 120 volts, 60 cycle AC only
 Power Consumption - 175 watts AM IF - 455 Kc
 FM Tuning Range - 540 to 1600 Kc FM IF - 10.7 Mc
 Speaker System -
 Left channel (SK16, SK17, SK18)
 15" woofer
 2-5-1/4" mid-range
 5" tweeter
 Right channel (SK16, SK17, SK18)
 10" woofer
 2-5-1/4" mid-range
 5" tweeter

AUXILIARY CIRCUITS AND EXTERNAL CONNECTIONS

STEREO TAPE INPUT JACKS

A stereophonic tape recorder may be connected to these jacks (located on cabinet back) to enable stereophonically recorded tapes to be played through this system when the COMPENSATOR is set to TAPE. The output of the tape recorder should be .1 volts RMS or more, pre-equalized (in tape recorder) for NAB/EB playback curve. Connect the right channel output of the recorder to RIGHT STEREO TAPE INPUT and the left channel output of the recorder to LEFT STEREO TAPE INPUT. Use a suitable phono plug (Motorola Part No. 28K731154 or equivalent) and shielded audio cable to minimize hum pick-up.

AUX JACK

An audio signal from any external source (such as the

pre-equalized output from a monaural tape recorder... etc.) whose magnitude is .1 volts RMS or more, may be connected into the AUX (input) jack on back of cabinet; the external source can be operated when the COMPENSATOR is turned to AUX position. Use a suitable phono plug (Motorola Part No. 28K731154 or equivalent) and shielded audio cable to minimize hum pick-up.

IMPORTANT: Care should be exercised when making connection to transformerless type equipment. When in doubt, suitable tests should be employed to prevent damage to equipment and dangerous electrical shock.



FRONT PANEL CONTROLS

SERVICE NOTES

DISASSEMBLY INSTRUCTIONS

To Remove Chassis From Cabinet (HS-710)

1. Remove control knobs.
2. Remove cabinet back cover.
3. Disconnect all chassis connecting leads (from power amp, record changer, etc.). NOTE: The green AM antenna lead is held in place by an armite strip, therefore, slide the lead through the strip so that chassis can be removed easily.
4. Remove pilot light socket from record changer compartment by first pulling up the light shield, then unclipping pilot light mounting socket from the retaining clip.

To Remove Chassis From Cabinet (HS-711)

1. Remove cabinet back cover.
2. Disconnect all chassis connecting cables except connections to left channel speaker system.
3. Remove chassis mounting screws, then rotate chassis until left channel speaker mounting screws are accessible; then disconnect leads to left channel system.
4. Remove chassis from cabinet.

To Remove Record Changer From Cabinet

1. Remove cabinet back cover.
2. Turn the 2 record changer mounting screws clockwise until they are flush with the changer base.
3. Disconnect all cable to record changer.
4. Turn the mounting clips, located at the ends of the mounting screws, so they are parallel with the mounting screws.
5. Lift the changer out of the cabinet.

To Replace Pilot Light (From chassis)

1. Remove chassis from cabinet (see HS-710 Chassis Removal).
2. Replace pilot light.

To Replace Pilot Light (in record changer compartment)

1. Remove light shield in compartment by pulling straight up.

2. Replace pilot light.

To Replace On-Off Indicator Pilot Light (SK17, SK18 only)

1. Remove cabinet back cover (model SK18 only).
2. Remove pilot light bracket mounting screw located inside cabinet (near bottom).
3. Replace pilot light.
4. Replace bracket and cabinet back cover (SK18).

STEREO NOTES

Excellent stereophonic reproduction can be obtained from this unit with correct installation.

Seemingly imperfect stereophonic record reproduction does not necessarily mean the unit itself is at fault. Incorrect location, volume level, balance adjustment, etc., can create the illusion that the unit is not operating properly. Therefore, before suspecting the unit, make certain that the initial setup is correct (see Operating Instruction booklet, if necessary). The room, with its individual acoustic characteristics, and the level at which the unit is operated, are of importance. Some room settings are better than others; experimentation in setting up the units will determine which setting is best (try to have the main unit and right channel speaker placed along the same wall). The level at which the unit is operating and the distance of the listener from the units will affect spacing—use closer spacing (4 to 7 feet) at low volume levels (listener is close to units) and greater spacing (5 to 10 feet) at higher volume levels (listener is further away). Too great a spacing, however, will cause the commonly known "hole in the middle" effect, or if the listener is seated too far from the units, there will

be a loss of the stereophonic effect. Once the room setup is determined, the controls must be adjusted. First, the output level from both speaker systems must be made the same. With the unit operating (use a monaural LP disc; set COMPENSATOR to RIAA) and the loudness control at an intermediate setting to avoid listening, adjust the balance control so that each speaker has approximately the same volume level.

Secondly, adjust the loudness control to desired listening level. (Extremely low loudness levels may require re-adjustment of the balance control.)

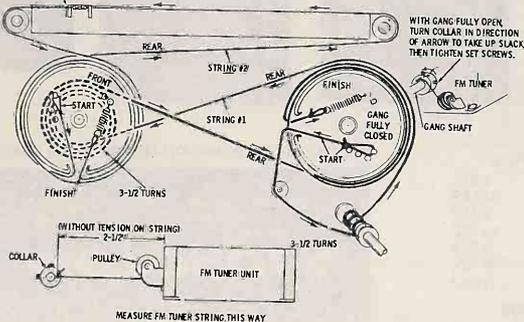
Thirdly, since the directional characteristic of stereophonic reproduction is dependent to a great degree on mid-range and treble notes, the treble control should be advanced to increase treble response; however, the "hardness" of some rooms may require an intermediate setting for best tonal balance.

Finally, re-orientation of main cabinet and right channel speaker system may be necessary.

PRODUCTION CHANGES HS-710

Chassis Coding	Changes	Chassis Coding	Changes
HS-710A	Original chassis	HS-710B (cont'd)	
HS-710B	SHIELDED CABLE ADDED: The signal input cable to the grids of V-10A-12AX7 (pin #2), V-10B-12AX7 (pin #1), and the cable to the input of the two loudness controls (pin #1 on E-4 and E-6) has been changed to a shielded type.		

POINTER CALIBRATION MARK LINE UP WITH GANG FULLY CLOSED.

**DIAL STRINGING DETAIL**

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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 Motorola parts replacement.

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
FM TUNER 770638430 (UT-343) ELECTRICAL PARTS					
C-1	21K640021	Capacitor, cer tub; 10 mf 500V	L-4	11V642422	AM Antenna & Panel; incl C21 (SK18 only)
C-2	21K640022	Capacitor, cer tub; .001 mf 500V	L-5	*11V642112	AM Antenna & Panel; incl C21 (SK18 only)
C-3	21K640023	Capacitor, cer trib; .001 mf 500V	L-5	*11V642406	AM Antenna & Panel; incl C21 (SK18 only)
C-4	21K640024	Capacitor, cer tub; 20 mf 500V		2466383460	AM, AMc
C-5	21K640024	Capacitor, cer tub; 20 mf 500V	R-1		Resistors - Note: All resistors are insulated carbon type use ohmic value specified.
C-6	21K640026	Capacitor, mica trim (on tra)	R-2	6R6054	See FM Tuner Parts List
C-7	21K640026	Capacitor, cer tub; 10 mf 500V	R-3	6R0204	100,000 20% 1/2W
C-8	21K640027	Capacitor, cer tub; 8.2 mf 500V	R-4	6K127516	82 10% 1/2W
C-9	21K640028	Capacitor, cer tub; 15 mf 500V	R-5	6K121277	4.7 meg 10% 1/2W
C-10	21K640029	Capacitor, cer tub; 68 mf 500V	R-6	6K122524	100,000 10% 1/2W
L-1	75K640030	Ferrite Bead (this represents inductance shown as L1 on schematic)	R-7	6K127516	82 10% 1/2W
L-2	24K640031	Coil, FM RF; complete (incl L3)	R-8	6K127516	82 10% 1/2W
L-3		Coil, FM osc (part of L2)	R-9	6K127516	82 10% 1/2W
R-1	17K640032	Resistor, carbon film; 1 meg 10%	R-10	6K119932	10,000 10% 1/2W
T-1	25K640033	Transformer, FM IF; incl core	R-11	6R0209	68 10% 1/2W
T-2	25K640034	Transformer, FM ant input	R-12	6K123219	10,000 10% 1/2W (in some sets)
FM TUNER 770638430 (UT-343) MECHANICAL PARTS					
C-1	770638430	FM Tuner; complete	R-13	6K118405	22,000 20% 1/2W
42K640040	Collar, tuning gang shaft; less nut/washer	R-14	6K123219	10,000 10% 1/2W (in some sets)	
42K640041	Core, IF coil; incl string	R-15	17K641470	Wirewound; 2200 10% 5w	
42K640042	Core, IF trim	R-16	6K121289	3900 10% 1/2W	
42K640043	Core, IF trim	R-17	6K121289	3900 10% 1/2W	
42K640044	Core, IF trim	R-18	6K119407	3.3 meg 20% 1/2W	
42K640045	Core, IF trim	R-19	6K124646	100,000 10% 1/2W	
42K640046	Core, IF trim	R-20	6K127001	2.2 meg 10% 1/2W (not in add. sets)	
42K640047	Core, IF trim	R-21	6K124646	100,000 10% 1/2W	
42K640048	Core, IF trim	R-22	6K124646	100,000 10% 1/2W	
42K640049	Core, IF trim	R-23	6K121287	3900 10% 1/2W	
42K640050	Core, IF trim	R-24	6K121287	3900 10% 1/2W	
42K640051	Core, IF trim	R-25	6K121287	3900 10% 1/2W	
42K640052	Core, IF trim	R-26	6K121287	3900 10% 1/2W	
42K640053	Core, IF trim	R-27	6K119407	3.3 meg 20% 1/2W	
42K640054	Core, IF trim	R-28	18R642126	Dual Control; 2 meg (beam)	
42K640055	Core, IF trim	R-29	6K125523	100,000 10% 1/2W	
42K640056	Core, IF trim	R-30	6K125524	100,000 10% 1/2W	
42K640057	Core, IF trim	R-31	18R642126	Triple Control & Switch; 2 meg (typical); 400K (balance)	
42K640058	Core, IF trim	R-32	6K122445	1800 10% 1/2W	
42K640059	Core, IF trim	R-33	6K123234	100,000 10% 1/2W	
42K640060	Core, IF trim	R-34	6K121302	820 10% 1/2W	
42K640061	Core, IF trim	R-35	6K123234	100,000 10% 1/2W	
42K640062	Core, IF trim	R-36	6K119407	3.3 meg 20% 1/2W	
42K640063	Core, IF trim	R-37	6K125523	100,000 10% 1/2W	
42K640064	Core, IF trim	R-38	6K125524	100,000 10% 1/2W	
42K640065	Core, IF trim	R-39	6K122445	1800 10% 1/2W	
42K640066	Core, IF trim	R-40	6K125524	100,000 10% 1/2W	
42K640067	Core, IF trim	R-41	6K121300	27,000 10% 1/2W (not in A/B Ret)	
42K640068	Core, IF trim	R-42	6K121301	1000 10% 1/2W	
42K640069	Core, IF trim	R-43	17R642626	Wirewound; 47 10% 1/2W (See Prod Change MS7100)	
42K640070	Core, IF trim	R-44	40K642125	Switch, 7-position (compensator)	
42K640071	Core, IF trim	R-45	40K642125	Switch, A5-06-07 (on S1)	
42K640072	Core, IF trim	T-1 & 2		See FM Tuner Parts List	
42K640073	Core, IF trim	T-3	24K642112	Transformer, FM IF; 10% Mc	
42K640074	Core, IF trim	T-4	24K638647	Transformer, FM IF; 10% Mc	
42K640075	Core, IF trim	T-5	24K638488	Transformer, ratio detector	
42K640076	Core, IF trim	T-6	24K631251	Transformer, AM IF	
42K640077	Core, IF trim	T-7	24K641654	Transformer, AM IF; 45% K	
42K640078	Core, IF trim	T-8	24K642707	Transformer, AM IF; 45% K	
HS-710 MECHANICAL PARTS					
64C641390	Background, dial	64C641390	Background, dial	64C641390	Background, dial
64C641391	Blanking, tuning shaft	64C641391	Blanking, tuning shaft	64C641391	Blanking, tuning shaft
15471368	Cap, plug (for 8-pin plug)	15471368	Cap, plug (for 8-pin plug)	15471368	Cap, plug (for 8-pin plug)
17641830	Clip, 7-pin thru 8-pin	17641830	Clip, 7-pin thru 8-pin	17641830	Clip, 7-pin thru 8-pin
17641830	Drive Pulley & Bushing Assembly (on pulley brkt - large)	17641830	Drive Pulley & Bushing Assembly (on pulley brkt - large)	17641830	Drive Pulley & Bushing Assembly (on pulley brkt - large)
56431359	Eyelet (CG 21)	56431359	Eyelet (CG 21)	56431359	Eyelet (CG 21)
49R628225	Flywheel, tuning; less nut/washer	49R628225	Flywheel, tuning; less nut/washer	49R628225	Flywheel, tuning; less nut/washer
37412691	Insulator, rubber (CG 21)	37412691	Insulator, rubber (CG 21)	37412691	Insulator, rubber (CG 21)
644C33663	Insulator (under phono recept)	644C33663	Insulator (under phono recept)	644C33663	Insulator (under phono recept)
18R641685	Lug, FM ant (cond)	18R641685	Lug, FM ant (cond)	18R641685	Lug, FM ant (cond)
291501	Pin, 3/8-22 (control mtg)	291501	Pin, 3/8-22 (control mtg)	291501	Pin, 3/8-22 (control mtg)
28A732701	Plug, 8-pin (str 7)	28A732701	Plug, 8-pin (str 7)	28A732701	Plug, 8-pin (str 7)
30K642877	Plug & Cable Assembly (right & left stereo)	30K642877	Plug & Cable Assembly (right & left stereo)	30K642877	Plug & Cable Assembly (right & left stereo)
18R641685	Pointer, dial	18R641685	Pointer, dial	18R641685	Pointer, dial
69A41358	Recessible, 4-pin & Cable Assembly (to record changer)	69A41358	Recessible, 4-pin & Cable Assembly (to record changer)	69A41358	Recessible, 4-pin & Cable Assembly (to record changer)
8A211282	Recessible, phono & aux input	8A211282	Recessible, phono & aux input	8A211282	Recessible, phono & aux input
58A41583	Rivet, shoulder (dial cord guide - on brkt)	58A41583	Rivet, shoulder (dial cord guide - on brkt)	58A41583	Rivet, shoulder (dial cord guide - on brkt)
98R74012	Rivet, shoulder (on main chassis)	98R74012	Rivet, shoulder (on main chassis)	98R74012	Rivet, shoulder (on main chassis)
38Z224	Screw, Lock; 6-32 x 1/2 (CG 21 mtg)	38Z224	Screw, Lock; 6-32 x 1/2 (CG 21 mtg)	38Z224	Screw, Lock; 6-32 x 1/2 (CG 21 mtg)
39R724	Set screw; 6-32 x 1/4 (flywheel mtg)	39R724	Set screw; 6-32 x 1/4 (flywheel mtg)	39R724	Set screw; 6-32 x 1/4 (flywheel mtg)
35129023	Set screw; 5-40 x 3/8 (pulley brkt bushing)	35129023	Set screw; 5-40 x 3/8 (pulley brkt bushing)	35129023	Set screw; 5-40 x 3/8 (pulley brkt bushing)
17641828	Shaft & Pulley Assembly (on center pulley)	17641828	Shaft & Pulley Assembly (on center pulley)	17641828	Shaft & Pulley Assembly (on center pulley)
17641829	Shaft & Pulley Assembly (tuning)	17641829	Shaft & Pulley Assembly (tuning)	17641829	Shaft & Pulley Assembly (tuning)
26A34276	Slide, tube	26A34276	Slide, tube	26A34276	Slide, tube
98R64387	Socket, pilot light (in record changer compartment)	98R64387	Socket, pilot light (in record changer compartment)	98R64387	Socket, pilot light (in record changer compartment)
L-1, 2 & 3	See FM Tuner Parts List	L-1, 2 & 3	See FM Tuner Parts List	L-1, 2 & 3	See FM Tuner Parts List

ALIGNMENT

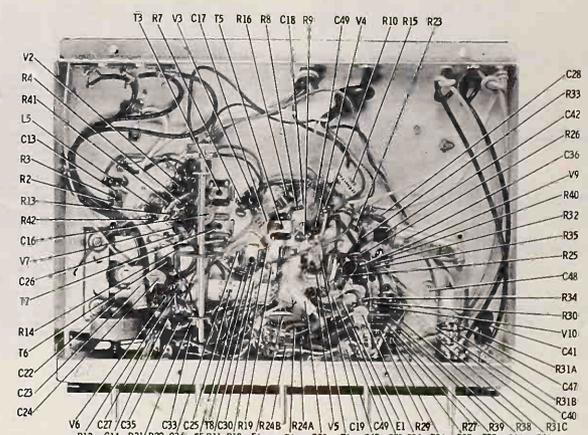
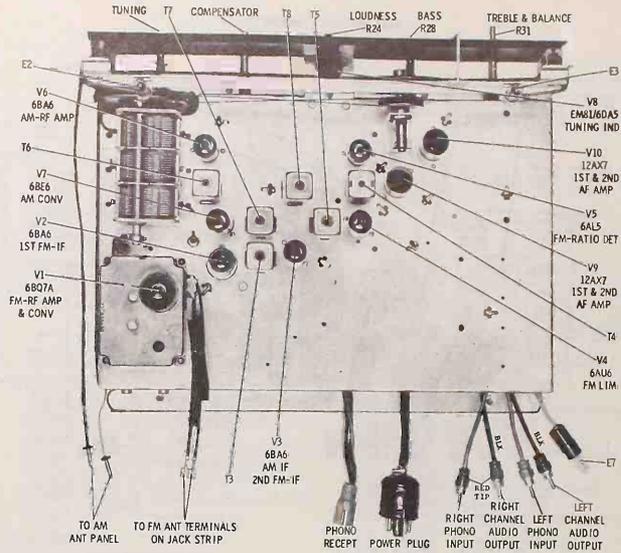
PRELIMINARY PROCEDURE

Either AM or FM alignment may be performed independent of the other. Use an AM signal generator, a VTVM and output meter as indicated. Set loudness and bass controls to maximum, treble control to minimum. The AM antenna loop should be connected; use either the speakers or an 8 ohm load connected to output transformer secondary. Use insulated alignment tools. As stages are brought into alignment, keep reducing signal generator output so meter reads no more than .5V DC when aligning FM, or no more than 2V AC when aligning AM; this prevents overloading and assures greater accuracy. With gang fully closed, right edge of pointer (rear) should line up with mark on right end of pointer rail (see Dial Stringing Detail). In AM alignment, signal generator output should be modulated with 400 cps.

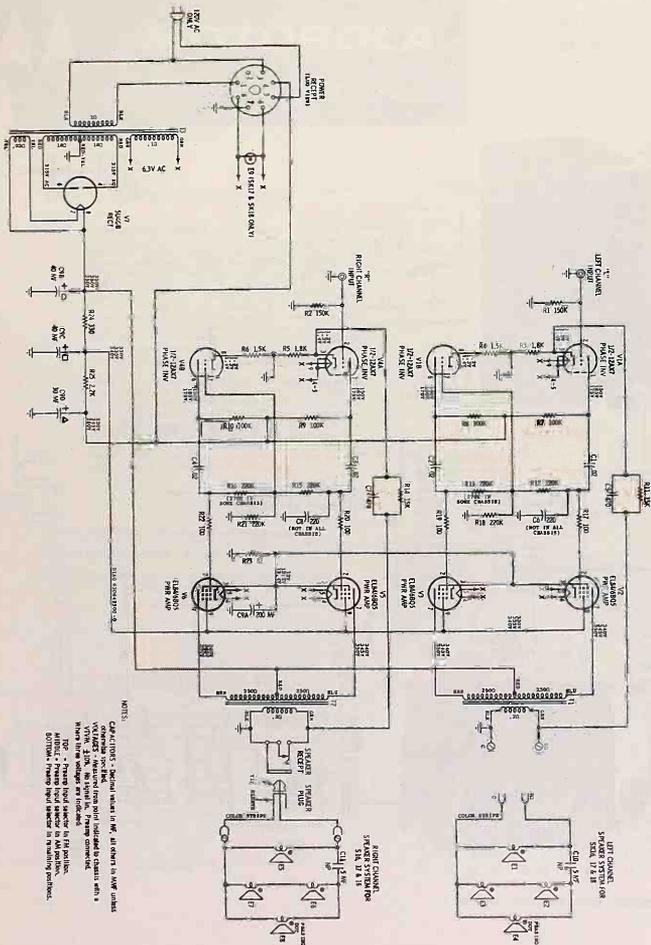
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	BAND SW SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
FM-IF ALIGNMENT							
1.	FM ant terminals	10.7 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	1, 2, 3, 4, 5, 6 & 7	Adjust for max neg reading
2.	FM ant terminals	"	"	FM	VTVM-DC probe to lead 3 of E-1. Com to chassis	8	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of correct setting. (If meter has zero center scale, use this scale.) Repeat steps 1 and 2 until no further increase; step 2 should be last step.
FM-RF ALIGNMENT - See Note *							
3.	FM ant terminals	108.1 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	9	Adjust for max neg reading
4.	FM ant terminals	98 Mc No mod	Tune for max	FM	"	10	"
AM-IF ALIGNMENT							
5.	6BE6 grid (pin 7) or antenna stator of AM tuning cap thru .1mf & chassis	455 Kc	Fully open	AM	Output meter across VC	11, 12, 13 & 14	Adjust for max reading
AM-RF ALIGNMENT							
6.	Radiation loop**	1620 Kc	"	AM	"	15	"
7.	"	1400 Kc	Tune for max	AM	"	16	"
8.	"	"	"	AM	"	17	With chassis installed in cabinet, adjust for max reading
NOTE: Do not perform the following steps unless the RF or oscillator cores have been tampered with or associated components have been replaced.							
9.	6BE6 grid (pin 7) thru .1mf & chassis	1620 Kc	Fully open	AM	Output meter across VC	15	Adjust for max reading
10.	"	535 Kc	Fully closed	AM	"	18	Adjust for max reading. Repeat steps 9 & 10 until oscillator covers required range; step 9 should be last adjustment.
11.	Radiation loop**	1400 Kc	Tune for max	AM	"	16	Adjust for max reading
12.	"	600 Kc	Tune for max	AM	"	19	Adjust for max reading. Repeat steps 11 and 12 until no further increase; step 11 should be last adjustment.
13.	Repeat step 8.						

*If FM tuner string has been replaced or tampered with, check it for correct length and set-up before proceeding with steps 3 & 4. String should measure about 2-1/2" from FM tuner opening to gang shaft collar. Open gang fully, place collar and string on gang shaft, then turn collar clockwise to just remove slack from string; tighten collar setscrews (see Dial Stringing Detail).

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

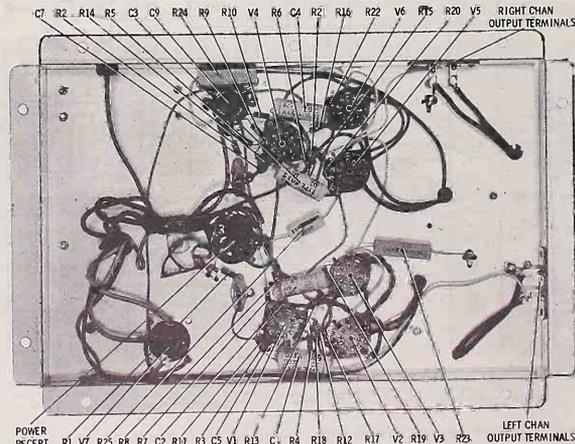
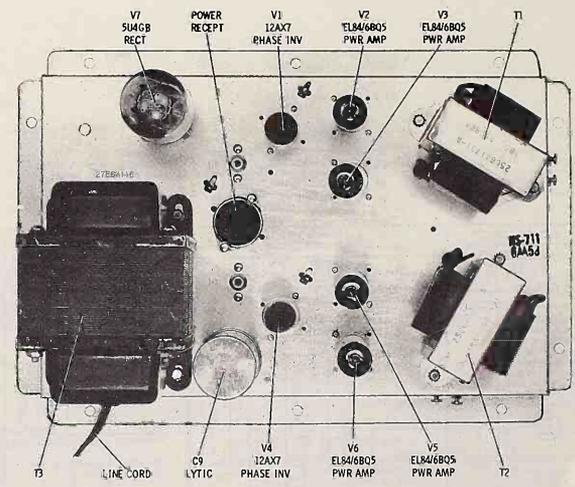
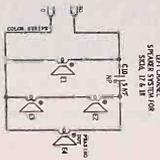
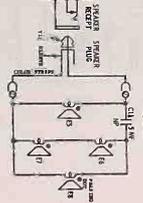


HS-710A PARTS LOCATIONS (SEE PRODUCTION CHANGES)

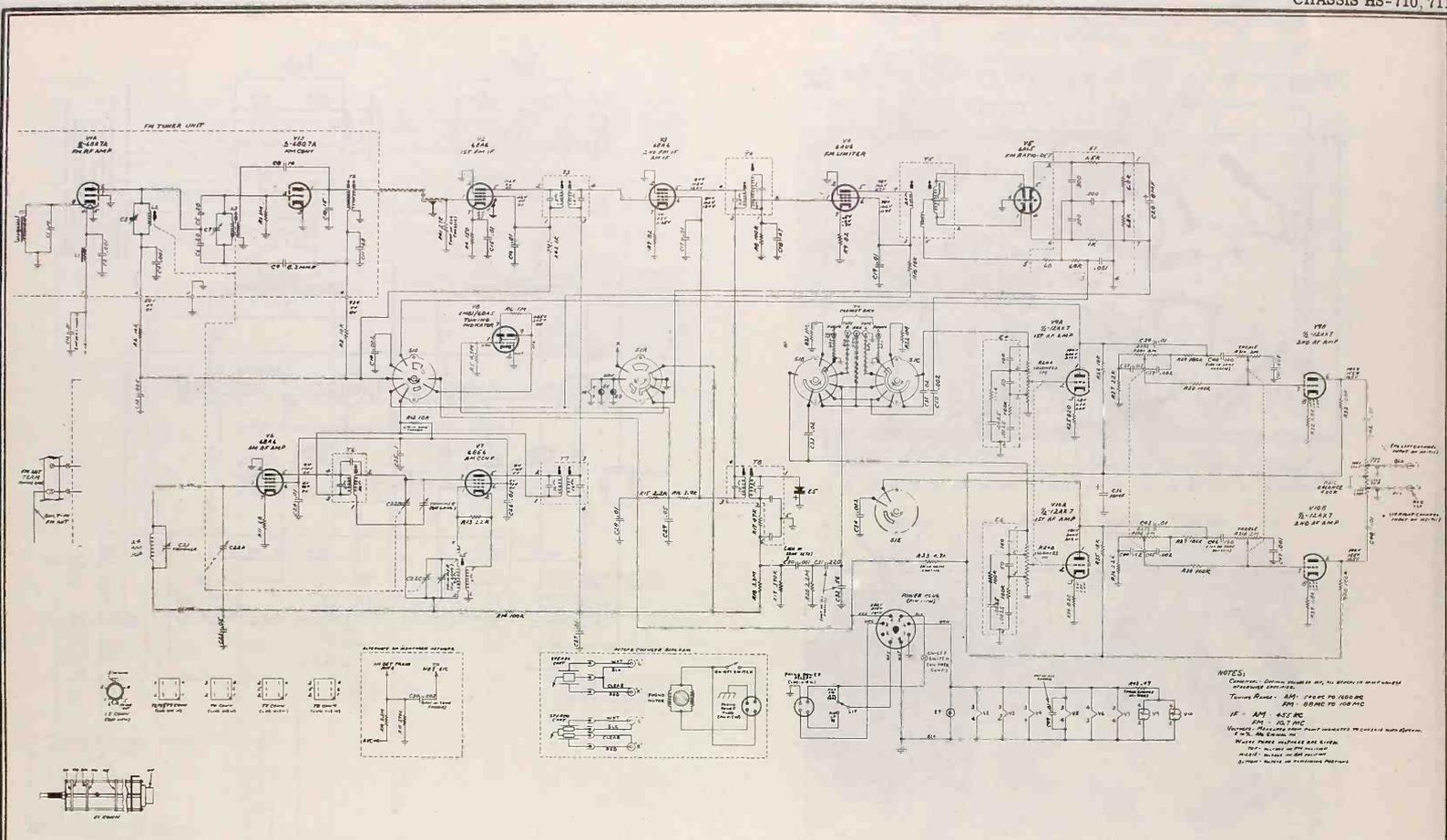


NOTES:

- 1. CAPACITORS - SPECIAL VALUES IN μ F, ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
- 2. RESISTORS - SPECIAL VALUES IN Ω , ALL OTHERS IN OHMS UNLESS OTHERWISE SPECIFIED.
- 3. ∞ - PERMANENT SHORT CIRCUIT TO CHASSIS OR TO LINE.
- 4. ∞ - PERMANENT OPEN CIRCUIT.
- 5. ∞ - PERMANENT SHORT CIRCUIT TO CHASSIS OR TO LINE.
- 6. ∞ - PERMANENT OPEN CIRCUIT.
- 7. ∞ - PERMANENT SHORT CIRCUIT TO CHASSIS OR TO LINE.
- 8. ∞ - PERMANENT OPEN CIRCUIT.



HS-711 PARTS LOCATIONS



HS-710 SCHEMATIC DIAGRAM



MOTOROLA

Service Manual

HOME RADIO

MODEL CHASSIS
HK-27 HS-695

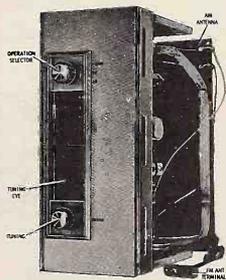
ALIGNMENT

GENERAL INFORMATION

TYPE - High-Fidelity AM-FM tuner custom designed for installation in the record storage compartment of Motorola Models SK13, 6K22, SK11, SK12, SK13, SK14 or into any space that has the following dimensions: 14-3/4" x 6-1/8" x 6-3/4" (HWD).

This model features built-in AM antenna with provision for internal or external FM antenna. Fly-wheel tuning for simplified tuning, tuning eye for precision fine tuning of stations (on both AM and FM) and low impedance cathode follower output to permit longer interconnecting cables between tuner and amplifier with little or no high frequency loss.

When the tuner is installed into the Motorola Models listed above per instructions given in the HK-27 Installation Instruction booklet, all former operating instructions of those models remain the same when the tuner Operation Selector knob is in the PHONO position; in the AM or FM positions, the phonograph motor is automatically shut off and the AM or FM stations are played through the amplifier-speaker system of the phonograph.



HK-27 SERIES

TUBE COMPLEMENT -

Type	Function
6BE6	AM converter
6BQ7A	FM RF amp & converter
6BA6	FM IF amp
6BA6	AM-FM IF amp
6AV6	FM limiter
6AL5	FM ratio detector
12AU7	AM Det-AVC-cathode follower
6X4	Rectifier
EM-81/6DA5	Tuning eye

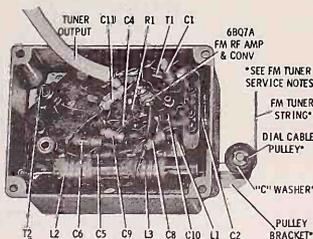
POWER SUPPLY - 120 volts, 60 cycle AC only

POWER CONSUMPTION - 40 watts

TUNING RANGE - AM 540 to 1600 Kc FM 88 to 108 Mc
AM IF - 455 Kc FM IF - 10.7 Mc

FM TUNER SERVICE NOTES

Do not free the dial cable pulley located on the FM tuner unit, as this may result in audio howl. This is due to core vibration caused by acoustic feed-back from the loudspeaker at certain frequencies. Silicon grease is applied at the junction of string and pulley, to insure smooth tuning action and must not be removed. Therefore, whenever tuning action is erratic, check for proper use of silicon grease (Motorola Part Number 11M490487). Also affecting tuning action, is the angle of the pulley bracket with respect to the take-up shaft. Position bracket until tuning action is as smooth as possible.



FM UNIT 77D638430 PARTS LOCATION

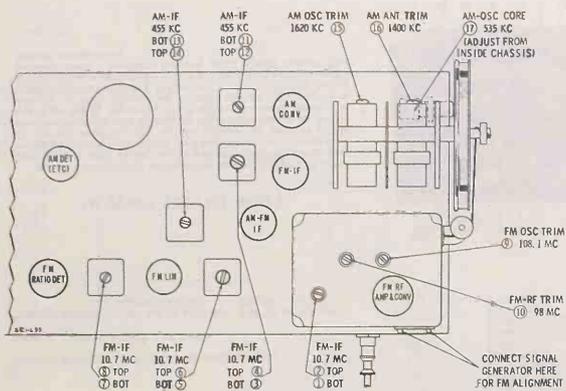
PRELIMINARY PROCEDURE

Either AM or FM alignment may be performed independent of the other. Use an AM signal generator and a VTVM as indicated. The AM antenna loop should be connected. Use insulated alignment tools. As stages are brought into alignment, keep reducing signal generator output so meter reads no more than -8V DC when aligning FM, or no more than -5V DC when aligning AM; this prevents overloading and assures greater accuracy. With gang fully closed, left edge of pointer (front) should line up with mark on left end of pointer rail (see Dial Stringing Detail). In AM alignment, signal generator should be modulated with 400 cps.

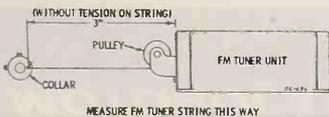
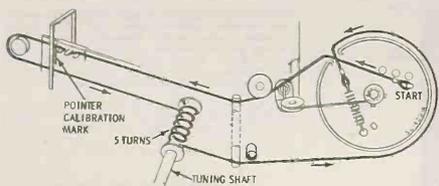
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	INDICATOR	OUTPUT	ADJUST	REMARKS
FM-IF ALIGNMENT							
1.	FM ant terminals	10.7 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1, Com to chassis	1, 2, 3, 4, 5, 6 & 7	Adjust for max neg reading.
2.	FM ant terminals	"	"	FM	VTVM-DC probe to lead 3 of E-1, Com to chassis	8	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of correct setting. (If meter has zero center scale, use this scale.) Repeat steps 1 and 2 until no further increase; step 2 should be last step.
FM-RF ALIGNMENT - See Note *							
3.	FM ant terminals	108.1 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1, Com to chassis	9	Adjust for max neg reading
4.	FM ant terminals	98 Mc No mod	Tune for max	FM	"	10	"
AM-IF ALIGNMENT							
5.	6BE6 grid (pin 7) or antenna stator of AM tuning cap thru 1mf & ch	455 Kc	Fully open	AM	VTVM-DC probe to AVC line (pin 3 of T6), Com to chassis	11, 12, 13 & 14	"
AM-RF ALIGNMENT							
6.	Radiation loop**	1620 Kc	"	AM	"	15	"
7.	"	1400 Kc	Tune for max	AM	"	16	With chassis installed in cabinet, adjust for max close of tuning eye
NOTE: Do not perform the following steps unless the oscillator core has been tampered with or associated components have been replaced.							
8.	6BE6 grid (pin 7) thru 1 mf & chassis	1620 Kc	Fully open	AM	VTVM-DC probe to AVC line (pin 3 of T6), Com to chassis	15	Adjust for max neg reading
9.	"	535 Kc	Fully closed	AM	"	17	Adjust for max neg reading. Repeat steps 8 & 9 until oscillator covers required range; step 8 should be last adjustment
10.	Repeat step 7.						

*If FM tuner string has been replaced or tampered with, check it for correct length and set-up before proceeding with steps 3 & 4. String should measure about 3" from FM tuner opening to gang shaft collar. Open gang fully, place collar and string on gang shaft, then turn collar counterclockwise to just remove slack from string; tighten collar setscrews (see Dial Stringing Detail).

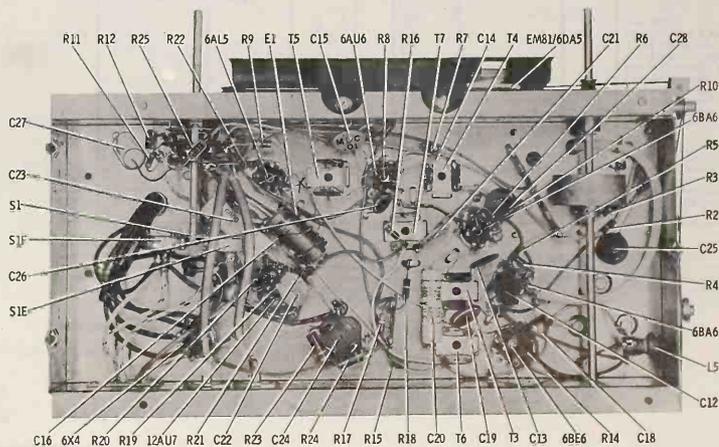
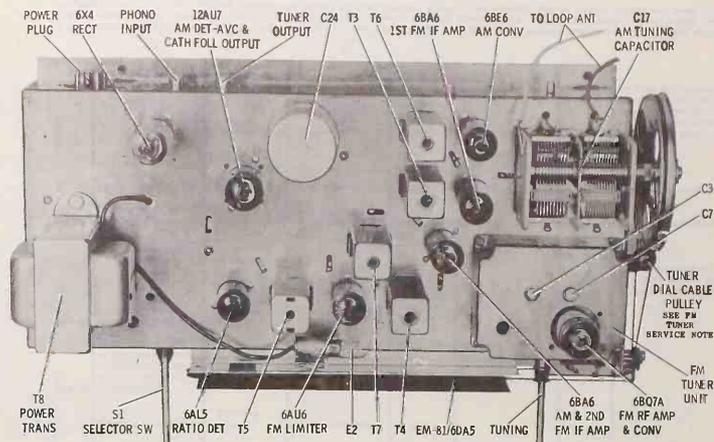
**Connect generator across 5" diameter, 5-turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver loop.



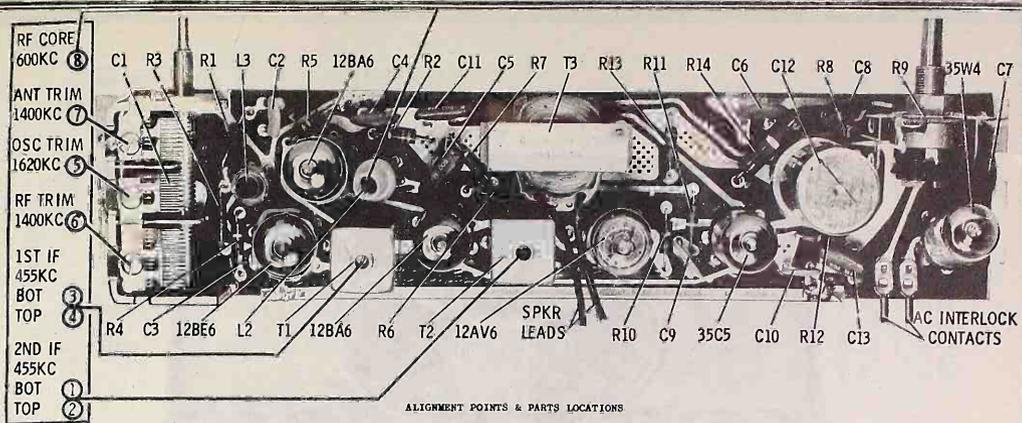
ALIGNMENT POINTS LOCATION DETAIL



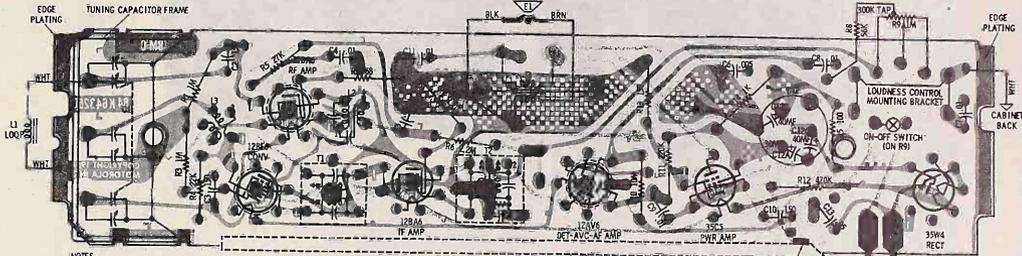
DIAL STRINGING DETAIL



PARTS LOCATION



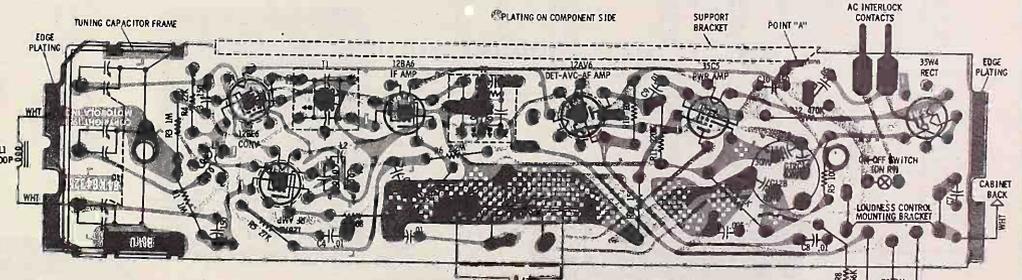
ALIGNMENT POINTS & PARTS LOCATIONS



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)

NOTES:
 CAPACITORS - DECIMAL VALUES IN MF, ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
 ▽ CABINET BACK
 PLATED PANEL WIRING LEGEND
 —□— □+ : AVC ▴ : FILAMENT

PLATED PANEL WIRING SHOWN IS FOR THE 84K6020 PLATED PANEL BOARD ONLY. FOR 84K6130 & 84K6020 PLATED PANEL BOARD WIRING DIFFERENCES, SEE REPLACEMENT PARTS LIST.



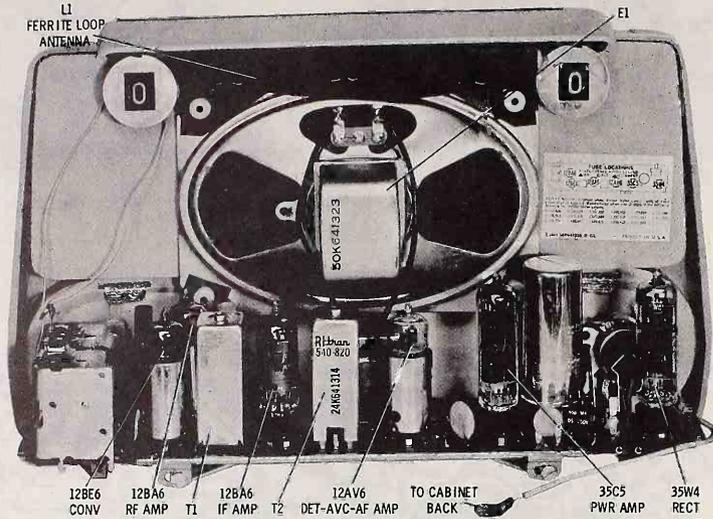
ALIGNMENT

PLATED PANEL WIRING AS VIEWED FROM BOTTOM

Use an isolation transformer between the power line and the receiver. If not available, connect the low side of the generator to B- thru a .1 mf capacitor. Connect a low range output meter across the speaker voice coil, and set loudness control to maximum. Attenuate generator output to maintain .4 volt on output meter to prevent overloading; if noise is too high when using radiation loop, use 1.25 volts output. Use an insulated 3/32" hex alignment tool for RF core (8) and the IF adjustments (in some sets the IF cores are slotted).

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	"	5	"
3.	Radiation loop*	1400 Kc	Tune for max	6 & 7	"
NOTE: Do not perform the following steps unless the speaker has been tampered with or associated components have been replaced.					
4.	Radiation loop*	1620 Kc	Tune for max	5	Adjust for maximum
5.	"	600 Kc	"	8	"
6.	"	1400 Kc	"	6	"
7.	Repeat steps 5 & 6 until no further increase; step 6 should be last adjustment.				

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



PARTS LOCATION

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	18C541067	Capacitor, variable: 3 gmc	used as replacement for 84K641380 & 84K643200. This panel replaces the two other versions. In panel 84K641380, the support bracket and the edge plating were connected to B-. In panel 84K643200, the support bracket and edge plating were removed electrically from B-. In panel 84K642250, the support bracket and edge plating were connected to B- thru a capacitor (C7). The physical placement of the components in the same in all versions. When replacing panel, solder plated panel bracket to point "A" as indicated on Plated Panel Wiring Diagram.		
C-2	21K127652	Capacitor, cer disc: 150 mmf 500V	50K641323	Capacitor, cer disc: 150 mmf 500V	
C-3	21K127652	Capacitor, cer disc: 150 mmf 500V			
C-4	21R128284	Capacitor, cer disc: .01 mf 500V			
C-5	8K121248	Capacitor, paper tub: .05 mf 400V			
C-6	21K83232	Capacitor, cer disc: .005 mf 500V			
C-7	21R128284	Capacitor, cer disc: .01 mf 500V			
C-8	21R128284	Capacitor, cer disc: .01 mf 500V			
C-9	21R128284	Capacitor, cer disc: .01 mf 500V			
C-10	21K127652	Capacitor, cer disc: 150 mmf 500V			
C-11	21R33472	Capacitor, cer disc: .01 mf 500V			
C-12	23R84460	Capacitor, electrolytic: 30-40-60mf/150V			
C-13	8K121248	Capacitor, paper tub: .05 mf 400V			
E-1	50K640785	Speaker, PM: 4 x 8"; 3.2 ohm VC			
L-1	1V641352	Antenna ferrite rod			
L-2	44B41321	Coil: RF			
L-3	44B41320	Coil, oscillator			
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.					
R-1	8K122324	1 meg 20% 1/2W			
R-2	8R2039	68 10% 1/2W			
R-3	8K122324	1 meg 20% 1/2W			
R-4	8K118405	22,000 20% 1/2W			
R-5	8K121300	27,000 10% 1/2W			
R-6	8R3227	2.2 meg 20% 1/2W			
R-7	8K124797	150 10% 1/2W			
R-8	8K127841	85,000 10% 1/2W			
R-9	18R40059	Loudness Control & Switch: 1 meg, tap at 300K			
R-10	8K118408	10 meg 20% 1/2W			
R-11	8R6015	220,000 20% 1/2W			
R-12	8K118406	470,000 20% 1/2W			
R-13	8K124797	150 10% 1/2W			
R-14	8R6227	1000 10% 1/2W			
R-15	8R6228	100 10% 1/2W			
T-1	24K641313	Transformer, 1st IF: 455 Kc			
T-2	24K641314	Transformer, 2nd IF: 455 Kc			
T-3	23K400899	Transformer, output			
MECHANICAL PARTS					
	29A630682	Contact, AC interlock			
	1V641352	Plated Panel Board: less all components; incl AC contacts and 84K643250 plated panel board			
Note: When replacing the plated panel, Part No. 84K643250 is required.					
CABINET PARTS					
1V641361	Cabinet Front: brown (6T15W)				
1V641362	Cabinet Front: tan (6T15Z)				
38K641010	Cabinet Rear: tortoise shell				
28K37286	Clip, speed (latch mtg - not in all sets)				
28K37708	Clip, speed (spr mtg)				
3V642899	Grille, trim: incl nameplate				
38K641065	Knob, dial scale: brown (6T15W)				
38K641064	Knob, dial scale: tan (6T15Z)				
38K641028	Knob, loudness indicator: brown (6T15W)				
38K641027	Knob, loudness indicator: tan (6T15Z)				
38C641020	Knob, tuning: clear				
38C641022	Knob, On-off & loudness: clear				
38K640046	Line Cord: brown				
33A40099	Nameplate				
28V051	Palnut: 3/8-32 x 9/16 (loudness cont mtg)				
3812836	Screw, tapping: #6 x 3/8 (cab back mtg)				
3512235	Screw, tapping: #6 x 1/2 (loudness knob & chassis mtg)				
42B40089	Spring, cover latch				
78A40207	Stand, cabinet: solid				
3812235	Screw, tapping: #6 x 1/2 (cover latch spring mtg - not in all sets)				
44B4364	Washer, cup (cover latch spring mtg - not in all sets)				
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.					
	76K43282	Bracket, plated panel support			
	42A643259	Clip, plastic (trim mtg)			
	22B40098	Gasket, trim grille			

MOTOROLA

Service Manual

SUPERSEDES 13KT15 PRELIMINARY SERVICE MANUAL
PART NO. 68P643064

GENERAL INFORMATION

TYPE - Hi-Fi radio-phonograph containing an AM-FM tuner, four-speed record changer, multiple speaker system. Also built-in provision for simple, future conversion to stereophonic operation through use of appropriate conversion kit.

TUBE COMPLEMENT

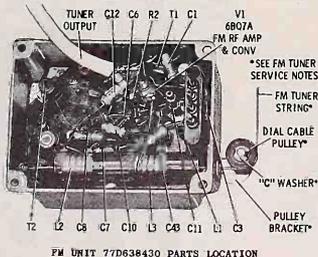
Ref. No.	Type	Function
V-1	6BQ7A	FM RF amp and converter
V-2	6BA6	1st FM IF amp
V-3	6BA6	AM IF amp - 2nd FM IF amp
V-4	6AV6	FM limiter
V-5	6AL5	FM ratio detector
V-6	6BA6	AM RF amp
V-7	6BE6	AM converter
V-8	EM81/6DA5	Tuning indicator
V-9	12AX7	1st & 2nd AF amp
V-10	12AX7	AF amp & inverter
V-11	EL84/6BQ5	Power output
V-12	EL84/6BQ5	Power output
V-13	EZ81/6CA4	Rectifier

ELECTRICAL SPECIFICATIONS

Frequency Response: 20 to 20,000 cps at normal listening level
Power Output - 10 watts @ 1% distortion; 20 watts peak
Amplifier Sensitivity - 2 volts for 10 watts output measured across an 8 ohm resistive load. A reading of 8.9 volts indicates an output of 10 watts.

FM TUNER SERVICE NOTES

Do not free the dial cable pulley located on the FM tuner unit as this may result in audio howl. This is due to core vibration caused by acoustic feed-back from the loudspeaker at certain frequencies. Silicon grease is applied at the junction of string and pulley, to insure smooth tuning action and must not be removed. Therefore, whenever tuning action is erratic, check for proper use of silicon grease (Motorola Part Number 11M499487). Also affecting tuning action, is the angle of the pulley bracket with respect to the take-up shaft. Position bracket until tuning action is as smooth as possible.



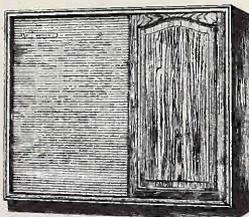
FM UNIT 77D638430 PARTS LOCATION

PRODUCTION CHANGES

Chassis Coding	Changes	Chassis Coding	Changes
HS-677A	Original chassis		
HS-677B	TO REPLACE 12AX7 FUL VOLTAGE: Dropping resistor added, the following were added: 1.0hm	2W ww; 1.2 ohm 1/2W ww; .94 ohm choke (used as resistor); .47 ohm 1/2W ww; Use 17K482626; .47 ohm 10% 1/2W wirewound as replacement (see R50 on schematic diagram).	

HOME RADIO

MODEL	CHASSIS
13KT15B	HS-677
13KT19CW	HS-677
13KT15M	HS-677



13KT15 SERIES

Tone Controls - Bass +10, -15 db at 50 cps
AM Tuning Range - Treble ± 7 , -12 db at 10,000 cps
AM Tuning Range - 540 to 1600 Kc AM IF - 455 Kc
FM Tuning Range - 88 to 108 Mc FM IF - 10.7 Mc
Power Supply - 120 volts, 60 cycle AC only
Power Consumption - 185 watts
Speaker System - one 15" woofer, two 5-1/4" mid-range, one 5" tweeter

RECORD CHANGER

These models use the VM17RC record changer. Refer to the VM17RC - VM25RC Record Changer Service Manual (Motorola Part Number 68P643068) for service information and changer operation.

AUXILIARY CIRCUITS AND EXTERNAL CONNECTIONS

EXT SPEAKER JACK

The Hi-Fi sound of this Radio-Phonograph can be played through an external speaker system in addition to the internal speaker system within the cabinet; the external speaker system is connected to the EXT SPEAKER Φ jack on the cabinet back. The Speaker Switch selects either internal, external, or simultaneous operation of both internal and external speakers.

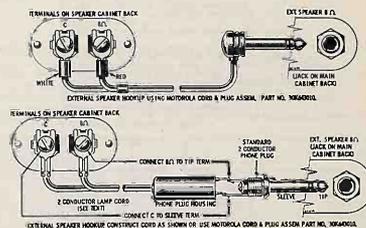
Use an external FM speaker with a voice coil impedance of 4 to 8 ohms; 8 ohms is recommended. The use of more than one external speaker may cause a loss of volume. To connect external speaker, use Cord and Plug Assembly (Motorola Part No. 30K644101), or no more than 25 feet of Number 20 lamp cord (see Details). If the distance is greater than 25 feet, use a heavier gauge wire to reduce power losses. A complete line of suitable speaker enclosures, such as the S12, S14, S16, S17, S18, and S21, is available from Motorola Dealers or Distributors. When using a Motorola external speaker system, the proper phasing of internal and external speakers is achieved if the connections are made as shown in the details shown, however, when using other speaker systems, the phasing should be checked (see Speaker Phasing).

RIGHT STEREO CHANNEL JACK - STEREO CONVERSION

The RIGHT STEREO CHANNEL JACK (located on cabinet back) terminates in a second pair of leads located in the tone arm; these leads are used when this model is to be converted to stereophonic operation. Motorola Stereo Conversion Kit KH33, available at Motorola Dealers or Distributors contains all necessary conversion parts, including stereophonic cartridge.

AUX (INPUT) JACK

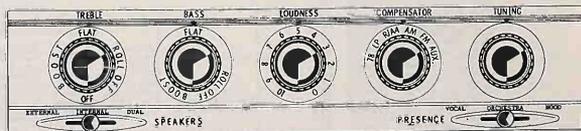
An audio signal from any external source (such as the



EXTERNAL SPEAKER HOODUP

pre-equalized output from a tape recorder, etc) whose magnitude is .1 volts RMS or more is connected into the AUX (input) jack on back of cabinet; the external source can be operated when the COMPENSATOR knob is turned to AUX position. Use a shielded cable to minimize hum pickup.

IMPORTANT: Care should be exercised when making connection to transformerless type equipment. When in doubt, suitable tests should be employed to prevent damage to equipment or dangerous electrical shock.



FRONT PANEL CONTROLS

SERVICE NOTES

with the screws.
5. Group changer at base and lift up.

- TO Replace Pilot Light (in record changer compartment)**
1. Remove light shield (in record changer compartment).
 2. Replace pilot light in socket.
- TO Replace Pilot Lights (on chassis)**
1. Remove cabinet back cover.
 2. From inside cabinet, replace pilot light in socket.

SPEAKER PHASING

THE SPEAKERS MUST BE IN PHASE OR A LOSS OF MID-RANGE FREQUENCIES WILL RESULT

Phasing can be checked by momentarily connecting a 1/2 volt flashlight battery in parallel with the speaker connecting leads (temporarily short across any capacitor in cross-over network) and noting if all speaker cones move in same direction. If they do not, reverse the connections of the speaker whose cone is out of phase.

DISASSEMBLY INSTRUCTIONS

To Remove Chassis From Cabinet

1. Remove control knobs.
2. Remove light shield inside record changer compartment; then remove pilot light socket from its mounting clip.
3. Remove leads from FM antenna terminals on rear of cabinet, then remove cabinet back cover.
4. Disconnect all chassis connecting leads (AM antenna leads, phono power plug, etc).
5. Unsolder blue lead at 15" speaker and disconnect black speaker circuit lead from chassis.
6. Remove the four chassis mounting screws (accessible from record storage compartment) and remove chassis from cabinet.

To Remove Record Changer From Cabinet

1. Remove cabinet back cover.
2. Disconnect all changer leads.
3. Turn the record changer mounting screws fully clockwise (down flush against changer base).
4. From bottom of changer, turn the two mounting clips, located at ends of mounting screws, so they are parallel

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
434721440	434721440	Retainer, line cord (Use with 434721314 bushing)	55638888	55638888	Hinge, door (HS)
55641563	55641563	Rivet, shoulder (dial cord guide - on brackets)	623441566	623441566	Knob, 45RPM spindle
57407112	57407112	Rivet, shoulder (dial cord guide - on main chassis)	852441569	852441569	Jack, statorial spider
352294	352294	Screw, lock: 6-32 x 1/2 (C21 stg)	13230306	13230306	Key, door (13230306)
35127518	35127518	Screw, tapping: #4 x 3/8 (FM tuner stg)	356441815	356441815	Knob, control (base)
38120023	38120023	Spacers, 1-3/4 x 3/16 (pulley base bushing)	356441810	356441810	Knob, control (presence & aprs)
3592724	3592724	Set screws, 6-32 x 1/4 (17RHS1 stg)	356441796	356441796	Knob, control (tuning)
37442528	37442528	Start & Pulley Assembly (on center pulley bracket - small)	356441875	356441875	Knob, control (treble)
37441829	37441829	Start & Pulley Assembly (tuning)	356441838	356441838	Knob, control (tuning)
35641828	35641828	Socket, pilot light (in record changer compartment)	356441793	356441793	Lid, cabinet (13RT150)
96542279	96542279	Socket, tube: 7 pin 6X5	162441790	162441790	Lid, cabinet (13RT150C)
96541398	96541398	Socket, tube: 9 pin 6X5 (16M1/6M45)	356441789	356441789	Lid, cabinet (13RT150)
96542757	96542757	Socket, tube: 9 pin 6X5 (13M37, 5144)	26238607	26238607	Locknut (ext apr jack stg)
41471681	41471681	Spring (pulley)	295720154	295720154	Lug, spindle (7P ant terminals)
29476260	29476260	Torsional pin (as ant panel cover)	332632467	332632467	Washplate
48329298	48329298	Washer, "C" (tuning shaft & pulley)	237007	237007	Nut, lock: 8-32 x 1/4 (spr stg)
46441660	46441660	Washer, fibre (S&B tube ext lid)	39649685	39649685	Pinhead: 10-32 x 3/8 (base stg)
46441703	46441703	Washer, fibre (tuning shaft & pulley)	21218180	21218180	Pin, escutchion (camplate stg)
			305424977	305424977	Plug & Cable Assembly (loop - right stereo output)
			305424978	305424978	Plug & Cable Assembly (short - aux)
			478241977	478241977	Red, pilot light
			48441737	48441737	Scale, dial
			35641798	35641798	Screw, machine: 8-32 x 1-1/4; brass (Door Key stg - 13RT150C & 13RT150)
			35641798	35641798	Screw, machine: 8-32 x 1-1/4; (spr stg)
			35641798	35641798	Screw, tapping: #8 x 1-1/8 (chassis stg)
			35641798	35641798	Screw, washer head (AM aux panel stg)
			35641798	35641798	Screw, washer head (cab back stg)
			35641798	35641798	Screw, wood: #6 x 1/2; brass (Dogg stg)
			35641798	35641798	Shield, light
			35641798	35641798	Strip & Nail
			35641798	35641798	Strip, recept (inc 1/2 AM antenna terminals, aux & right stereo output jack)
			35641798	35641798	Support, lid
			35641798	35641798	Trim, ornamental (aluminum - 13RT150)
			35641798	35641798	Washer, flat (control knob)
			35641798	35641798	Washer, rubber (chassis stg)

13RT15 CABINET PARTS

130641514	130641514	Bezel, dial (lower)
130641512	130641512	Bezel, dial (upper)
434841651	434841651	Bushing, rubber (chassis stg)
552487792	552487792	Bullet Catch
105641752	105641752	Cabinet: blood (13RT150)
168541781	168541781	Cabinet: cherry (13RT150C)
168541780	168541780	Cabinet: mahogany (13RT150)
426441558	426441558	Clip, speed (45RPM spindle holder stg)
426441558	426441558	Clip, speed (oscillator stg)
426441557	426441557	Clip, speed (pilot light rod)
358641784	358641784	Cloth, grille (13RT150)
358641783	358641783	Cloth, grille (13RT150C & 13RT150)
168641788	168641788	Door, cabinet (13RT150)
168641787	168641787	Door, cabinet (13RT150C)
168641786	168641786	Door, cabinet (13RT150)
55641785	55641785	Escutchion, door & key (13RT150)
55641784	55641784	Escutchion, door (13RT150C)
35129018	35129018	Bracket (chassis stg)
324641689	324641689	Gasket, dial scale trim
556428215	556428215	Clide, door (cab lid)
556434714	556434714	Hinge, cab lid
*556442428	*556442428	Hinge, door (lid)

LIMITED REPLACEMENT PARTS

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

130642106 Cover, cab back

*New Item, Appears in any List for First Time

ALIGNMENT

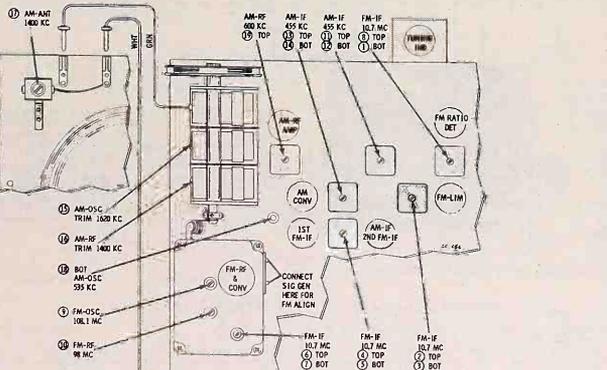
PRELIMINARY PROCEDURE

Either AM or FM alignment may be performed independent of the other. Use an AM signal generator, a VTVM and output meter as indicated. Set loudness and bass controls to maximum, treble control to minimum. The AM antenna loop should be connected; use either the speakers or an 8 ohm load connected to output transformer, secondary. Use installed alignment tools. As stages are brought into alignment, keep reducing signal generator output so meter reads no more than .8V DC when aligning FM, or no more than 2V AC when aligning AM; this prevents overloading and assures greater accuracy. With gang fully closed, right edge of pointer (rear) should line up with mark on right end of pointer rail (see Dial Stringing Detail). In AM alignment, signal generator output should be modulated with 400 cps.

STEP	GENERATOR CONNECTION	FREQUENCY	GANG SETTING	BAND SW SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
FM-IF ALIGNMENT							
1.	FM ant terminals	10.7 Mc	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	1, 2, 3, 4	Adjust for max neg reading
2.	FM ant terminals	"	"	FM	VTVM-DC probe to lead 3 of E-1. Com to chassis	8	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of correct setting. (If meter has zero center scale, use this scale). Repeat steps 1 and 2 until no further increase; step 2 should be last step.
FM-RF ALIGNMENT - See Note *							
3.	FM ant terminals	108.1 Mc	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	9	Adjust for max neg reading
4.	FM ant terminals	98 Mc	Tune for max	FM	"	10	"
AM-IF ALIGNMENT							
5.	6BE6 grid (pin 7) or antenna diode of AM tuning cap thru .1mf & chassis	455 Kc	Fully open	AM	Output meter across VC	11, 12, 13 & 14	Adjust for max reading
AM-RF ALIGNMENT							
6.	Radiation loop**	1620 Kc	"	AM	"	15	"
7.	"	1400 Kc	Tune for max	AM	"	16	"
8.	"	"	"	AM	"	17	With chassis installed in cabinet, adjust for max reading
NOTE: Do not perform the following steps unless the RF or oscillator cores have been tempered with or associated components have been replaced.							
9.	6BE6 grid (pin 7) thru .1 mf & chassis	1620 Kc	Fully open	AM	Output meter across VC	15	Adjust for max reading
10.	"	535 Kc	Fully closed	AM	"	18	Adjust for max reading. Repeat steps 9 & 10 until no further increase; step 11 should be last adjustment.
11.	Radiation loop**	1400 Kc	Tune for max	AM	"	16	Adjust for max reading
12.	"	600 Kc	Tune for max	AM	"	19	Adjust for max reading. Repeat steps 11 and 12 until no further increase; step 11 should be last adjustment.
13.	Repeat step 8.						

**If FM tuner string has been replaced or tampered with, check it for correct length and set-up before proceeding with steps 3 & 4. String should measure about 2-1/2" from FM tuner opening to gang shaft collar. Open gang fully, place collar and string on gang shaft, then turn collar clockwise to just remove slack from string; tighten collar set screws (see Dial Stringing Detail).

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



ALIGNMENT POINTS LOCATION



SUPERSEDES 10TX12 PRELIMINARY SERVICE MANUAL PART NO. 68P643062.

GENERAL INFORMATION

TYPE - Hi-Fi radio-phonograph containing an AM-FM tuner, four-speed record changer, multiple speaker system. Also built-in provision for simple, future conversion to stereophonic operation, through use of appropriate conversion kit.

TUBE COMPLEMENT

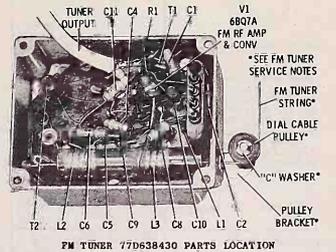
Ref. No.	Type	Function
V-1	6BQ7A	FM RF amp and converter
V-2	6AU6	1st FM IF amp
V-3	6BA6	AM IF amp-2nd FM IF amp
V-4	6AL5	FM ratio detector
V-5	6BE6	AM converter
V-6	12AX7	1st & 2nd AF amp
V-7	12AX7	AF amp & inv
V-8	EL84/6BQ5	Power output
V-9	EL84/6BQ5	Power output
V-10	EZ81/6CA4	Rectifier

ELECTRICAL SPECIFICATIONS

Frequency Response - 20 to 20,000 cps at normal listening level
 Power Output - 10 watts @ 1% distortion; 20 watts peak
 Amplifier Sensitivity - 2 volt in for 10 watts output (measured across an 8 ohm resistive load. A reading of 8.9 volts indicates an output of 10 watts).

FM TUNER SERVICE NOTES

Do not free the dial cable pulley located on the FM tuner unit, as this may result in audio howl. This is due to core vibration caused by acoustic feed-back from the loudspeaker at certain frequencies. Silicon grease is applied at the junction of string and pulley to insure smooth tuning action and must not be removed. Therefore, whenever tuning action is erratic, check for proper use of silicon grease (Motorola Part No. 11M499487). Also affecting tuning action is the angle of the pulley bracket with respect to the take-up shaft. Position bracket until tuning action is as smooth as possible.



FM TUNER 77D638430 PARTS LOCATION

AUXILIARY CIRCUITS AND EXTERNAL CONNECTIONS

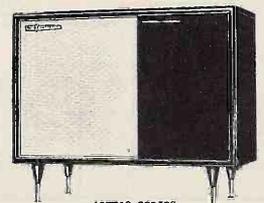
EXT SPEAKER JACK

The Hi-Fi sound of this Radio-Phonograph can be played through an external speaker system in addition to the internal speaker system within the cabinet; the external speaker system is connected to the EXT SPEAKER 8 Ω jack on the cabinet back. The Speaker Switch selects either internal, external, or simultaneous operation of both internal and external speakers.

Use an external FM speaker with a voice coil impedance of 4 to 8 ohms; 8 ohms is recommended. The use of more than one external speaker may cause a loss of volume. To connect external speaker, use Cord and Plug Assembly (Motorola Part No. 30K643010), or no more than 25 feet of Number 20 lamp cord (see details). If the distance is greater than 25 feet, use a heavier gauge wire to reduce power losses. A complete line of suitable speaker enclosures, such as the S12, S14, S16, S17, S18, and S21 is

HOME RADIO

MODELS	CHASSIS
10KT12B	HS-674
10KT12M	HS-674
10KT12W	HS-674



10KT12 SERIES

Tone Controls - Bass +10, -15 db at 50 cps
 Treble +7, -12 db at 10,000 cps
 AM Tuning Range - 540 to 1600 Kc AM IF - 455 Kc
 - 88 to 108 Mc FM IF - 10.7 Mc
 Power Supply - 120 volts, 60 cycle AC only
 Power Consumption - 165 watts
 Speaker System - one 12" woofer, one 6" mid-range, one 4" tweeter

RECORD CHANGER

These models use the VM17RC record changer. Refer to the VM17RC-VM25RC Record Changer Service Manual (Motorola Part Number 68P643068) for service information and changer operation.

available from Motorola Dealers or Distributors. When using a Motorola external speaker system, the proper phasing of internal and external speakers is achieved if the connections are made as shown in the details below, however, when using other speaker systems, the phasing should be checked (see Speaker Phasing).

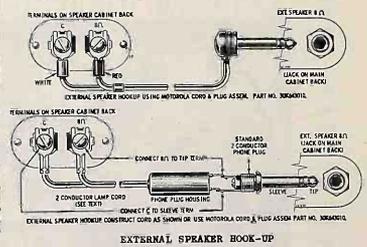
RIGHT STEREO CHANNEL JACK - STEREO CONVERSION

The RIGHT STEREO CHANNEL jack (located on cabinet back) terminates in a second pair of leads located in the tone arm; these leads are used when this model is to be converted to stereophonic operation. Motorola Stereo Conversion Kit HK33, available at Motorola Dealers or Distributors contains all necessary conversion parts, including stereophonic cartridge.

AUX (INPUT) JACK

An audio signal from any external source (such as the pre-equalized output from a tape recorder, etc.) whose magnitude is .1 volts RMS or more may be connected into the AUX (input) jack on back of cabinet; the external source can be operated when the COMPENSATOR knob is turned to AUX position. Use a suitable phone plug (Motorola Part No. 28K731154 or equivalent), and shielded cable to minimize hum pick-up.

IMPORTANT: Care should be exercised when making connection to transformerless type equipment. When in doubt, suitable tests should be employed to prevent damage to equipment of dangerous electrical shock.



EXTERNAL SPEAKER HOOK-UP

SERVICE NOTES

DISASSEMBLY INSTRUCTIONS

To Remove Chassis From Cabinet

1. Remove control knobs.
2. Remove pilot shield inside record changer compartment; then remove pilot light socket from its mounting clip.
3. Remove leads from FM antenna terminals on rear of cabinet, then remove cabinet back cover.
4. Disconnect all chassis connecting leads (AM antenna leads, phone power plug, etc.).
5. Unsolder blue lead at 12" speaker and disconnect black speaker circuit lead from chassis.
6. Remove the four chassis mounting screws (accessible from record compartments) and remove chassis from cabinet.

To Remove Record Changer From Cabinet

1. Remove cabinet back cover.
2. Disconnect all changer leads.
3. Turn the two record changer mounting screws fully clockwise (down flush against changer base).

4. From bottom of changer, turn the two mounting clips, located at ends of mounting screws, so they are parallel with the screws.
5. Grasp changer at base and lift up.

To Replace Pilot Light (in record changer compartment)

1. Remove light shield (in record changer compartment).
2. Replace pilot light in socket.

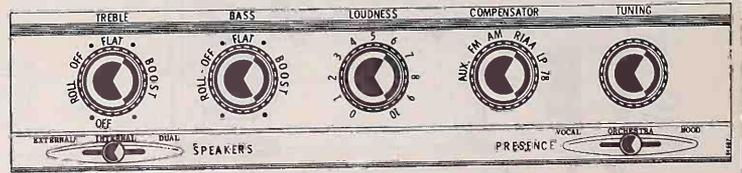
To Replace Pilot Lights (in chassis)

1. Remove cabinet back cover.
2. From inside cabinet, replace pilot light in socket.

SPEAKER PHASING

THE SPEAKERS MUST BE IN PHASE OR A LOSS OF MID-RANGE FREQUENCIES WILL RESULT

Phasing can be checked by momentarily connecting a 150/2 volt flashlight battery in parallel with the speaker connecting leads (temporarily short across any capacitor in cross-over network) and noting if all speaker cones move in the same direction. If they do not, reverse the connections of the speaker whose cone is out of phase.



FRONT PANEL CONTROLS

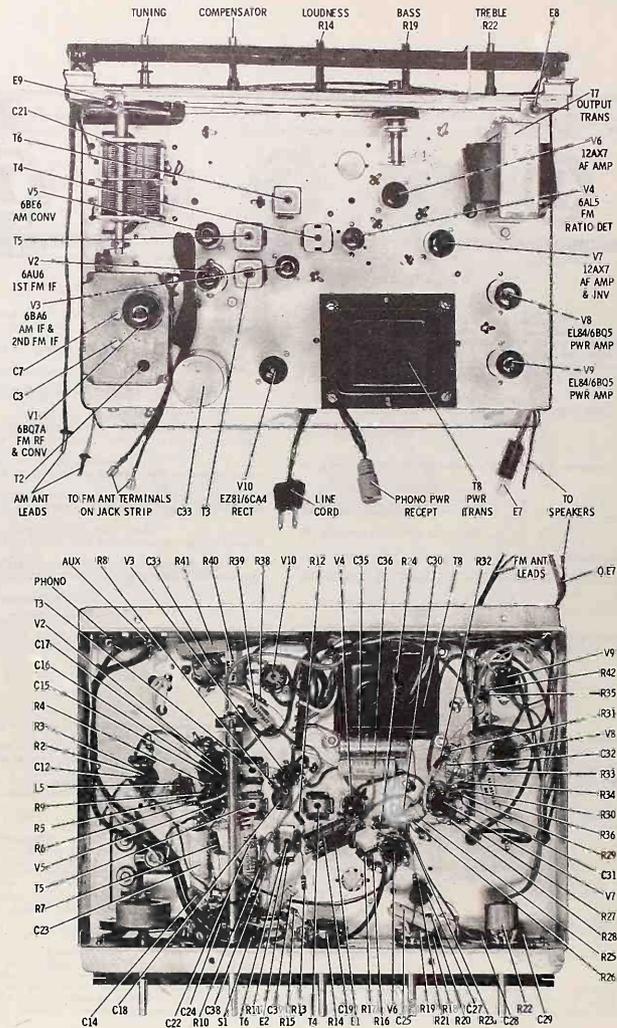
ALIGNMENT

Either AM or FM alignment may be performed independent of the other. Use an AM signal generator, a VTVM, and output meter as indicated. Set loudness and bass controls to maximum, treble control to minimum. The AM antenna loop should be connected, use either the speakers or an 8 ohm load connected to output transformer secondary. Use insulated alignment tools. As stages are brought into alignment, keep reducing signal generator output so meter reads no more than -8V DC when aligning FM, or no more than 2V AC when aligning AM; this prevents overloading, and assures greater accuracy. With gang fully closed, right edge of pointer (rear) should line up with mark on right end of pointer rail (see Dial Stringing Detail). In AM alignment, signal generator output should be modulated with 400 cps.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY	GANG SETTING	BAND SW SETTING	OUTPUT INDICATOR	ADJUST	REMARKS
FM-IF ALIGNMENT							
1.	FM ant terminals	10.7 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	1, 2, 3, 4, & 5	Adjust for max neg reading
2.	FM ant terminals	"	"	FM	VTVM-DC probe to lead 3 of E-1. Com to chassis	6	Adjust for zero reading on VTVM. A positive and negative reading will be obtained on either side of correct setting. (If meter has zero center scale, use this scale.) Repeat steps 1 and 2 until no further increase; step 2 should be last step.
FM-RF ALIGNMENT - See Note *							
3.	FM ant terminals	108.1 Mc No mod	Fully open	FM	VTVM-DC probe to lead 7 on E-1. Com to chassis	7	Adjust for max neg reading
4.	FM ant terminals	98 Mc No mod	Tune for max	FM	"	8	"
AM-IF ALIGNMENT							
5.	Pin 7 of 6BE6 or antenna stator of AM tuning capacitor thru .1 mf and chassis	455 Kc	Fully open	AM	Output meter across VC	9, 10, 11, & 12	Adjust for max reading
AM-RF ALIGNMENT							
6.	Radiation loop**	1620 Kc	"	AM	"	13	"
7.	"	1400 Kc	"	AM	"	14	Adjust for max. Repeat steps 6 and 7 until no further increase; step 7 should be last step.
NOTE: Do not perform steps 8 & 9 unless the oscillator core has been tampered with or associated components have been replaced.							
8.	6BE6 grid (pin 7) thru .1mf & chassis	1620 Kc	Fully open	AM	Output meter across VC	13	Adjust for max reading.
9.	"	535 Kc	Fully closed	AM	"	15	Adjust for max reading. Repeat steps 8 and 9 until oscillator covers required range; step 8 should be last step.
10.	Radiation loop**	1400 Kc	Fully open	AM	"	14	With chassis installed in cabinet, adjust for max reading.

*If FM tuner string has been replaced or tampered with, check it for correct length and set-up before proceeding with steps 3 & 4. String should measure about 2-1/2" from FM tuner opening to gang shaft collar. Open gang fully, place collar and string on gang shaft, then turn collar clockwise to just remove slack from string; tighten collar setscrews (see Dial Stringing Detail).

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



CHASSIS HS-674A PARTS LOCATION (SEE PRODUCTION CHANGES)

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 circuit involved. Maximum customer satisfaction and minimized coil-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
FM TUNER 770638430 (UT-34) ELECTRICAL PARTS					
C-1	21864002	Capacitor, cer tub: 10 mf 500V NTC7509PM	R-8	6K127316	82 10% 1/2W
C-2	21864002	Capacitor, cer tub: .01 mf 500V	R-9	6K119405	50 10% 1/2W
C-3	20864003	Capacitor, mica trim (8P tria)	R-10	6K119928	2.700 10% 1/2W
C-4	21864002	Capacitor, cer tub: .001 mf 500V	R-11	6K121299	47 10% 1/2W
C-5	21864004	Capacitor, cer tub: 20 mf 500V	R-12	6K119407	1.5 meg 20% 1/2W
C-6	21864002	Capacitor, cer tub: 20 mf 500V	R-13	6K056466	390.000 10% 1/2W
C-7	20864005	Capacitor, mica trim (50C tria)	R-14	180841273	1 meg 10% 1/2W
C-8	21864002	Capacitor, cer tub: 20 mf 500V	R-15	6K124493	1 meg 10% 1/2W
C-9	21864002	Capacitor, cer tub: 10 mf 500V NTC4107PM	R-16	6K121002	100 10% 1/2W
C-10	21864002	Capacitor, cer tub: 15 mf 500V	R-17	6K15734	18,000 10% 1W
C-11	21864002	Capacitor, cer tub: 68 mf NTC7509PM	R-18	6K119935	100,000 10% 1/2W
L-1	766440030	Ferrite Bead (this represents inductance shown as L1 on schematic)	R-20	6K125531	180,000 10% 1/2W
L-2	246440031	Coil, FM RF: complete (incl L2)	R-21	188611776	Control, treble & switch: 2 meg
L-3	176440032	Coil, FM core (part of L2)	R-23	6K122445	1,800 10% 1/2W
R-1	176440032	Resistor, carbon film: 1 meg 10%	R-24	6K119933	12,000 10% 1/2W
T-1	256440033	Transformer, FM ant input	R-28	6K122445	1,800 10% 1/2W
T-2	256440034	Transformer, FM IF: incl core	R-29	6K127313	1,500 10% 1/2W
FM TUNER 770638430 (UT-34) MECHANICAL PARTS					
770638430	FM Tuner, complete	R-30	6K125534	100,000 10% 1/2W	
436640041	Coil, tuning gang shaft: less set screws	R-35	6K125534	100,000 10% 1/2W	
766440043	Coil, ant & IF coil: incl string	R-36	176463026	Wirewound: 150 10% 5W	
766440036	Core, IF trans	R-37	176464170	Wirewound: 18 10% 5W	
496440025	Pulley, dial	R-38	6K121391	3900 10% 1/2W	
305127118	Screw, machine (tuner sub-chassis mtg)	R-39	176417400	Wirewound: 2,200 10% 5W	
305400044	Screw, tapping: #4 x 3/8 (FM Tuner mtg)	R-40	176464170	Wirewound: 2,200 10% 5W	
305400044	Screw, tapping: #4 x 3/8 (FM Tuner mtg)	R-41	176464037	Wirewound: 320 10% 5W	
9K640039	Socket, tube: 7-pin min	R-42	6K124668	10 10% 1/2W	
426440037	Washer, RF & antenna coil return	R-43	17K488266	Wirewound: 47 10% 1/2W (See Prod Changes)	
316440040	Strip, ant terminal	R-44	6K119405	50 10% 1/2W (See Prod Changes)	
4K601156	Washer, "C" (pulley anti-vibrating -not in kit)	S-1	408642108	Switch, 6-pos (componator)	
4K640038	Washer, "C" (pulley w/retainer)	S-2	408641905	Switch, Ac-coupler (on pin 3)	
		S-3	408641705	Switch, 3-pos (speaker)	
		S-4	408641705	Switch, 3-pos (speaker)	
		T-1,2	See FM Tuner Replacement Parts List		
		T-3	24K642112	Transformer, FM IF: 10.7 MC	
		T-4	54C626488	Transformer, ratio detector	
		T-5	24K641654	Transformer, AM IF: 455 KC	
		T-6	24K641655	Transformer, AM IF: 455 KC	
		T-7	25C641731	Transformer, output	
		T-8	25C641644	Transformer, power	

CHASSIS BS-674 ELECTRICAL PARTS

C-1 thru	See FM Tuner Parts List
C-12	218482726 Capacitor, cer disc: .01 mf 500V
C-13	218122915 Capacitor, cer disc: .005 mf 500V
C-14	218121838 Capacitor, cer disc: .005 mf 500V
C-15	218482726 Capacitor, cer disc: .01 mf 500V
C-16	218482726 Capacitor, cer disc: .01 mf 500V
C-17	218482726 Capacitor, cer disc: .01 mf 500V
C-18	218482726 Capacitor, cer disc: .01 mf 500V
C-19	23A638536 Capacitor, cer disc: .01 mf 500V
C-20	208641777 Capacitor, mica trim: 1.3 mf to 1 mf
C-21	195641846 Capacitor, var: 2.5mf
C-22	8R121005 Capacitor, paper tub: .05 mf 200V
C-23	8R121069 Capacitor, paper tub: .1 mf 600V
C-24	8K128691 Capacitor, paper tub: .02 mf 400V
C-25	8K128691 Capacitor, paper tub: .02 mf 400V
C-26	21K121836 Capacitor, cer disc: .002 mf 500V
C-27	21K121396 Capacitor, cer disc: .01 mf 500V
C-28	21K400537 Capacitor, cer disc: 100 mf 500V(120VAC)
C-29	21K410237 Capacitor, cer disc: .001 mf 500V
C-30	8R121188 Capacitor, paper tub: .01 mf 600V
C-31	8R122079 Capacitor, paper tub: .02 mf 500V
C-32	8R122079 Capacitor, paper tub: .02 mf 500V
C-33	23M641513 Capacitor, electrolytic: 40-40-20 mf/30V; 40 mf/25V
C-34	23A832250 Capacitor, electrolytic: 5 mf 10V; non-polarized
C-35	23M642249 Capacitor, electrolytic: 10 mf 400V
C-36	8R122185 Capacitor, paper tub: .05 mf 600V
C-37	21K410218 Capacitor, cer disc: 500 (not in base)
C-38	21K121797 Capacitor, cer disc: 470 mf 500V (See Prod Changes)
C-39	8R121158 Capacitor, paper tub: .002 mf 500V
E-1	518061944 Printed Resistor-Capacitor Plate
E-2	48533691 Diode
E-3	50E642556 Speaker, PM: 12"; 80 VC
E-4	50E642557 Speaker, PM: 160 VC
E-5	50E636448 Speaker, PM: 4"; 80 VC
E-6	518061943 Printed Resistor-Capacitor Plate
E-7	65R115589 Bulb, pilot light: #1847; 6V
E-8	65R125590 Bulb, pilot light: #1847; 6V
E-9	65R125590 Bulb, pilot light: #1847; 6V
L-1,2,3	See FM Tuner Replacement Parts List
L-4	19644242 AN antenna & panel (incl C20)
L-5	24M638430 Coil, AM core

Resistors - Note: All resistors are insulated carbon type unless otherwise specified.
 See FM Tuner Replacement Parts List
 R-1 8R6054 10 000 20% 1/2W
 R-2 6R6054 10,000 10% 1/2W
 R-3 6R121787 1,000 10% 1/2W
 R-4 6R121787 1,000 10% 1/2W
 R-5 6K119854 15,000 10% 1/2W
 R-6 6K121501 1,000 10% 1/2W
 R-7 6K125865 3,000 10% 1W

10K121 CABINET PARTS

13K641216	Bracket, dial (lower)
13K641312	Bracket, dial (upper)
55K482792	Bullet Catch
43641691	Bushing, rubber (chassis etc)

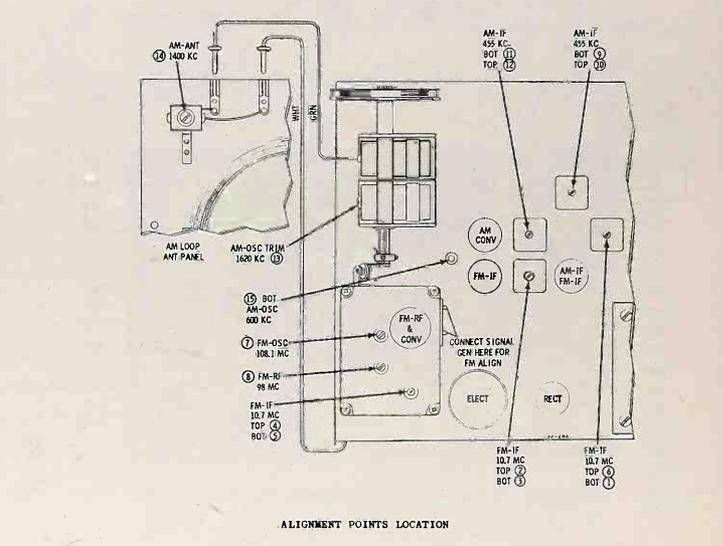
Ref. No.	Part Number	Description	Ref. Number	Description
16K641763	Cabinet, blonde oak (10K12B)	25121841	Nut, hex: 8-32 (light shield clip mtg)	
16K641761	Cabinet, mahogany (10K12B)	257007	Nut, hex: 8-32 (speaker mtg)	
16K641702	Cabinet, walnut (10K12B)	22647865	Pin, neotuchon (ferrolo mtg)	
42641538	Clip, speed (45 RPM spindle holder mtg)	22612820	Pin, neotuchon (nameplate mtg)	
42638454	Clip, speed (recallition mtg)	648E1539	Plate, leg mtg	
426416157	Clip, speed (pilot light rod mtg)	30K639986	Plug & Cable Assembly (record charger to phono input)	
3266412764	Cloth, grille (10K12B, 10K12W, 10K12W)	474641553	Rod, pilot light	
16K641775	Door, cabinet (10K12B)	34C641737	Scale, dial	
16K641773	Door, cabinet (10K12W)	359279	Screw, machine: 6-32 x 3/8 (light shield-clip mtg)	
43K641766	Ferrolo, leg	3K641766	Screw, machine: 8-32 x 1 (handle mtg)	
43K641765	Handle, door	3K126466	Screw, machine: 8-32 x 1-1/4 (speaker mtg)	
55K398885	Hinge, door	3B749168	Screw, wood: #6 x 5/8 (cabinet back mtg)	
55K64667	Hinge, lid	3C7526	Screw, wood: #8 x 1-1/8 (chassis mtg)	
42C61566	Holder, 45 RPM spindle	26K636238	Shield, light	
9K642129	Jack, ext speaker	53K6482793	Strick & Bolt	
36K641577	Knob, control (bass, treble, loudness, companionator)	648E1533	Strip, ornamental (aluminum)	
36K641556	Knob, control (tuning)	31641792	Strip, receptacle (right stereo output, aux input & FM antenna terminals)	
26A61796	Knob (speakers & presence)	50K38838	Support, lid	
16K641772	Lid, cabinet (10K12B)	46E1686	Washer, rubber (chassis mtg)	
16K641770	Lid, cabinet (10K12W)			
16K641771	Lid, cabinet (10K12W)			
16K641769	Lid, cabinet (10K12B)			
16K641767	Lid, cabinet (10K12W)			
16K641768	Lid, cabinet (10K12W)			
29K730154	Lug, spade (conn to FM antenna terminals)			
13K641645	Medallion			
33K638467	Neuseplate			

LIMITED REPLACEMENT PARTS

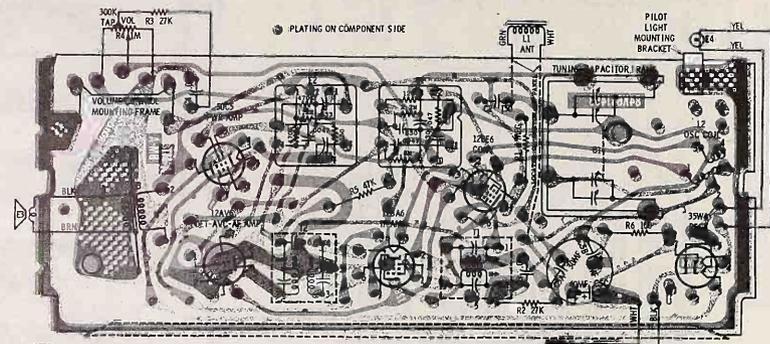
Note: The volume of replacement on the following part is small; consequently, it is suggested that ordering be done only as required.
 1506-2105 Cover, cabinet back

PRODUCTION CHANGES

Chassis Coding	Changes	Chassis Coding	Changes
HS-674A	Original chassis		
HS-674B	TO IMPROVE RESPONSE IN "AM" POSITION; C-8 changed from .002 mf to 470 mfm (see schematic diagram).	HS-674C	TO ELIMINATE SPURIOUS OSCILLATION (which occurred on some sets); A 22,000 ohm resistor added from pin 3 of E-1 to .002 mf (C-9) - see R-44 on schematic diagram.
	TO REDUCE 12AX7 FIL VOLTAGE; D'popping resistor added, the following were used: 1 ohm 2W wwr, 1.2 ohm 1/2W wwr, .94 ohm choke (used as required)		



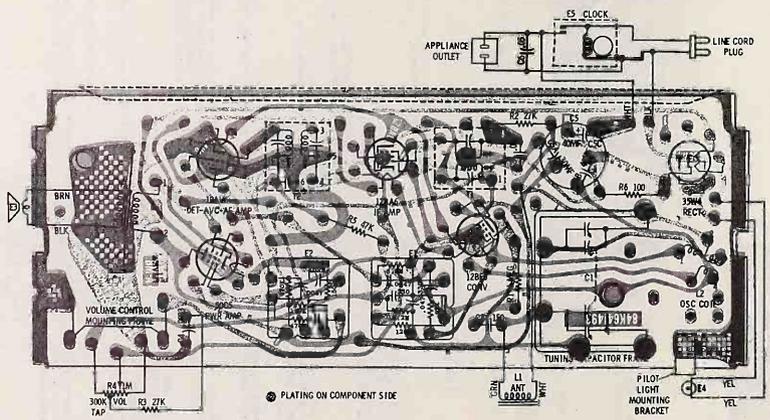
ALIGNMENT POINTS LOCATION



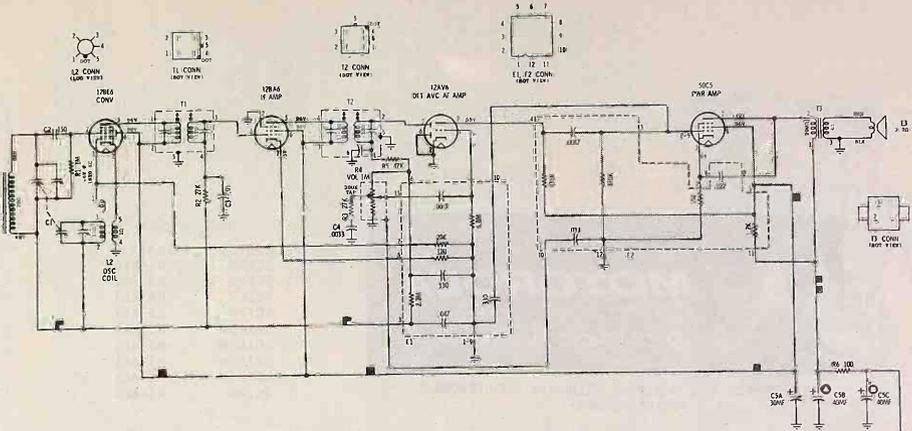
NOTES:
 CAPACITORS - DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
 PLATED PANEL WIRING LEGEND
 ■ - BH ■ - AVC ▲ - FILAMENT



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)

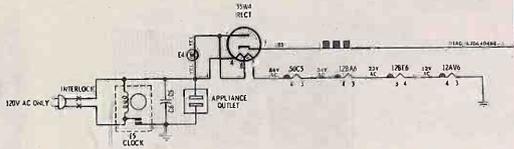


PLATED PANEL WIRING AS VIEWED FROM BOTTOM



NOTES:
 CAPACITORS - Decimal values in μ F, all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated in chassis with a VTVM. $\pm 10\%$ No signal input.
 INPUT VOLTAGE - 120V AC ONLY
 TUNING RANGE - 525KC TO 1625KC
 IF - 65KC

PLATED PANEL WIRING LEGEND
 ■ = 60
 □ = AVC
 ▲ = FILAMENT



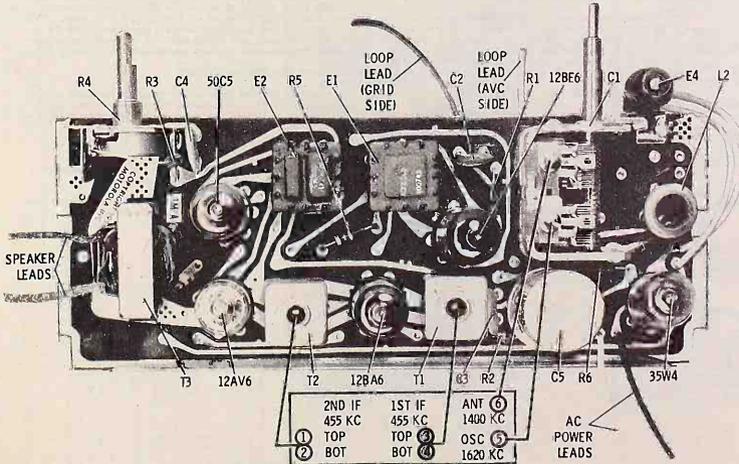
SCHEMATIC DIAGRAM

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. Alternate generator output to maintain .4 volts on output meter to prevent overloading the receiver.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	12BE6 grid (pin 7) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Radiation loop*	1620 Kc	Fully open	5	Adjust for maximum.
3.	"	1400 Kc	Tune for max	6	"
4. Repeat steps 2 & 3 until no further increase; step 3 should be last adjustment.					

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



①	2ND IF	455 KC	1ST IF	455 KC	ANT	1400 KC
②	TOP		TOP		OSC	1620 KC
③	BOT		BOT			

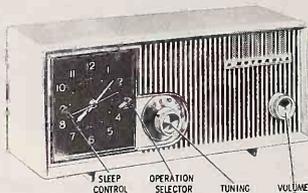
ALIGNMENT POINTS & PARTS LOCATIONS



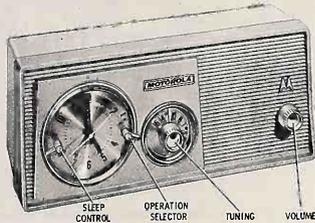
SUPERSEDES 5C13, 5C14, 5C16 SERIES PRELIMINARY SERVICE MANUAL
PART NO. 68P642572.

HOME RADIO

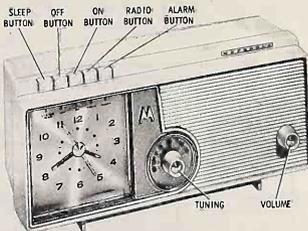
MODELS	CHASSIS
5C13B	HS-660
5C13M	HS-660
5C13P	HS-660
5C13W	HS-660
5C14CW	HS-661
5C14GW	HS-661
5C14PW	HS-661
5C16NW	HS-663
5C16W	HS-663



5C13 SERIES



5C14 SERIES



5C16 SERIES

GENERAL INFORMATION

TYPE - Clock model superheterodyne receivers with a plated circuit chassis and ferric rod antenna. These receivers have an electric clock for automatically controlling radio operation.

TUBE COMPLEMENT - 12BE6 Converter
12BA6 IF amp
12AV6 Det-AVC-AF amp
50C5 Power amp
35W4 Rectifier

TUNING RANGE - 532 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts, 60 cycle AC only; 35 watts

SERVICE NOTES

USE OF ISOLATION TRANSFORMER

The chassis of this receiver is connected directly to the power line, however, the power cord circuit is broken by an interlock when the cabinet rear section is removed. When servicing or aligning this chassis, an isolation transformer should be inserted between the power line and the chassis.

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 connecting wires and making wiring more uniform.
2. The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
3. Reference to the schematic diagram, plated panel wiring diagrams, and to chassis, will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated panel 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.

COMPONENT REPLACEMENT

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P64536) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.

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.

REPLACEMENT PARTS LIST

DISASSEMBLY INSTRUCTIONS

To Remove Chassis From Cabinet (SC13 Series)

1. Remove volume and tuning knobs.
2. From rear, remove the cabinet back mounting screws and remove cabinet back.
3. From inside cabinet, unsolder antenna, speaker and AC power leads.
4. Remove the chassis mounting screws.
5. Remove chassis from cabinet.

To Remove Chassis From Cabinet (SC14 & SC16 Series)

1. Remove the dial scale (SC16 Series), tuning and volume knobs.
2. From rear, remove the 2 rear cabinet mounting screws and pull out rear cabinet.
3. Remove the 4 chassis mounting screws.
4. Unsolder antenna, speaker and AC power leads.
5. Remove chassis from cabinet.

To Remove Clock Crystal (SC13 Series)

1. Pull off clock knobs. Insert a screwdriver between the cabinet and the right-hand edge of the clock crystal (near 1600 on crystal) to release catch.
2. Pry the crystal out with the screwdriver. Caution should be exercised when removing the crystal so as not to scratch or break it.

To Remove Clock Crystal (SC14 Series)

1. Remove clock (see "To Remove Clock" - SC14 Series).
2. Remove clock crystal.

To Remove Clock Crystal & Escutcheon (SC16 Series)

1. Remove dial scale and tuning knobs.
2. From rear, remove the 2 rear cabinet mounting screws and pull out rear cabinet.
3. From rear, remove 2 escutcheon mounting speed clips.
4. Remove escutcheon, then clock crystal.

To Remove Clock From Cabinet (SC13 Series)

1. From rear, remove the 2 cabinet back mounting screws and remove cabinet back.
2. Remove clock crystal (see "To Remove Clock Crystal" - SC13 Series).
3. Unsolder clock leads.
4. From rear of clock, remove the 3 clock mounting speed clips.
5. Remove clock from cabinet.

To Remove Clock From Cabinet (SC14 Series)

1. From rear, remove the 2 rear cabinet mounting screws and pull out rear cabinet.
2. Unsolder clock leads.
3. Remove 3 clock mounting speed clips.
4. Remove clock from cabinet.

To Remove Clock From Cabinet (SC16 Series)

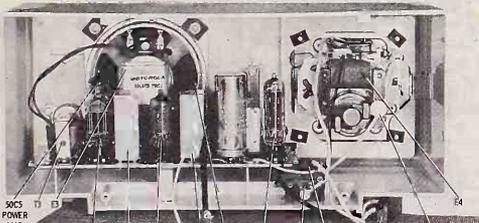
1. From rear, remove the 2 rear cabinet mounting screws and pull out rear cabinet.
2. Unsolder clock leads.
3. Remove clock crystal and escutcheon (see "To Remove Clock Crystal & Escutcheon" - SC16 Series).
4. Remove clock mounting speed clips.
5. Remove clock from cabinet.

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

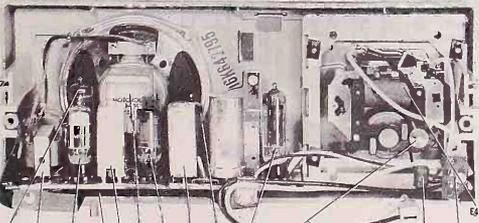
Electronic parts of equivalent rating are not necessarily of equivalent standards. The components listed in this Service Manual have been chosen for reliability and applicability to the specific circuits involved. For maximum customer satisfaction and minimized call-backs, use the exact Motorola parts replacement.

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
ELECTRICAL PARTS					
C-1	19K640821	Capacitor, variable: 2 gang (SC13 Series)	19V41152	Cabinet Rear:	antique white (SC16 Series)
	19M60820	Capacitor, variable: 2 gang (SC14 Series)	2C730627	Clip, speed (clock mtg - SC13 Series)	
C-2	19M60770	Capacitor, variable: 2 gang (SC16 Series)	2C730822	Clip, speed (escutcheon, clock mtg - SC13 Series)	
C-3	21K127522	Capacitor, cer disc: 150 mf 500V	42A37926	Clip (rear cab screw mtg - SC14 Series)	
	21M323471	Capacitor, cer disc: 0.1 mf 500V	26A37708	Clip, speed (sprng mtg - SC13 Series; spr & clock - SC14 Series)	
C-4	21K632322	Capacitor, cer disc: 005 mf 500V	61K640807	Crystal, clock (SC13 Series)	
C-5	23M282426	Capacitor, electrolytic: 30-40mf/150V	61M30785	Crystal, clock (SC14 Series)	
C-6	8K128400	Capacitor, electrolytic: .05 mf 400V	61M40819	Crystal, clock (SC16 Series)	
E-1	51C637000	Modular Component	12M40815	Escutcheon, gold (SC16 Series)	
E-2	51K637001	Modular Component	1K125501	Eyebolt (line cord atk - SC14 Series & SC16 Series)	
E-3	50K638023	Speaker, 8Ω: 4" x 3.2 ohm VC (SC13 Series)	35M612068	Knob, dial scale: clear (SC16 Series)	
	50K637838	Speaker, 8Ω: 4" x 3.2 ohm VC (SC14 Series)	35K632818	Knob, clock (SC13 Series)	
	50K610832	Speaker, 8Ω: 4" x 3.2 ohm VC (SC16 Series)	35K637823	Knob, clock (SC14 Series)	
E-4	72M638025	Clock Assembly (SC13M)	36K408008	Knob, tuning: white (SC13 Series)	
	72K610800	Clock Assembly (SC13M, SC14M, SC15M)	36K408051	Knob, tuning: antique white (SC14 Series)	
	72M640820	Clock Assembly (SC16 Series)	36K408089	Knob, volume: white (SC13 Series)	
	72M640857	Clock Assembly (SC16 Series)	36K408086	Knob, volume: antique white (SC14 Series)	
L-1		Antenna, ferrite rod (for SC13 Series - See Cabinet Back)	36K632788	Knob, volume: antique white (SC16 Series)	
	24K638190	Antenna, ferrite rod (SC14 & SC16 Series)	30M638021	Line Cord: antique white (SC13 Series)	
L-2	24W637228	Cell, cap	30M64028	Line Cord: antique white (SC14 Series & SC16 Series)	
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.					
R-1	6K122324	1 meg 20% 1/2W	23A90809	Insul. gasket (on ends of appliance outlet restraining cord - SC13 Series)	
R-2	6K121300	47,000 10% 1/2W	29K534296	Insul. ferrule (for 30A0809 appliance outlet in some SC14 & SC16 Series sets)	
R-3	18K638017	Volume Control: 1 meg (SC13 Series)	12M637858	Medallion (rear cabinet - SC13 Series)	
	18M637860	Volume Control: 1 meg (SC14 Series)	23A640810	Nameplate (SC13 Series)	
	18K640718	Volume Control: 1 meg; tap at 300K (SC16 Series)	23M640816	Nameplate (front cabinet - SC14 Series)	
R-4	6K121687	47,000 20% 1/2W	23A640888	Nameplate (front cabinet - SC16 Series)	
R-5	6K123526	19,000 10% 1/2W (SC16 Series only)	35A37852	Nameplate (rear cabinet - SC13 Series & SC16 Series)	
R-6	6K119402	100 20% 1/2W	26A638010	Plug, interlock (SC13 Series)	
T-1	24K638016	Transformer, 1st IF: 455 Kc	26A61328	Plug, interlock (SC13 Series & SC16 Series)	
T-2	24K638082	Transformer, 2nd IF: 455 Kc	*38K61367	Pushbutton: antique white (clock of SC16 Series)	
T-3	23M640767	Transformer, output	38K63819	Receptacle, appliance outlet: incl. tag (SC13 Series)	
MECHANICAL PARTS					
	84C64190	Plated Panel Board: less all components	91M40817	Receptacle, appliance outlet (SC14 Series & SC16 Series - Rubber - in some sets)	
Note: When ordering, specify part number (and letter) - if any found on original board, and mention model number of this set. If part number is different from that found in this parts list, order by complete part number found on board and mention model number of this set.					
	5812451	Rivet, #16-18 (tube socket center)	91M40919	Receptacle, appliance outlet (SC14 Series & SC16 Series - plastic - in some sets)	
	9K636609	Screw, tube: 7 pin min	31A20646	Screw, lock: #6 x 3/8 (cabinet rear mtg)	
CABINET PARTS					
64A640814	Background, dial scale (SC13 Series)	31Z7392	Screw, machine: 10-24 x 3/4 (line cord mtg - SC13 Series & SC16 Series)		
34M640819	Background, dial scale (SC14 Series)	31Z12625	Screw, tapping: #6 x 1/2 (chassis mtg - SC14 Series & SC16 Series)		
1V640886	Cabinet: blue (SC13)	31Z12235	Screw, tapping: #6 x 1/2 (cabinet back & interlock mtg - SC13 Series; chassis & interlock mtg - SC14 Series & SC16 Series)		
*1V640888	Cabinet: beige (SC13)	31Z22516	Screw, tapping: #6 x 3/8 (chassis mtg - SC13 Series)		
1V640885	Cabinet: pink (SC13)	*41K641308	Spring (pushbutton return - SC16 Series Clock)		
1V640899	Cabinet: antique white (SC13)	LIMITED REPLACEMENT PARTS			
1V640897	Cabinet: light blue (SC13 Series)	Notes: The volume of replacement on the following parts is small; consequently, it is suggested that ordering be done only as required.			
1V640825	Cabinet Front: blue (SC14)	78K37938	Bracket, plated panel support (SC13 Series)		
1V640926	Cabinet Front: green (SC14)	78K37862	Bracket, plated panel support (SC14 Series & SC16 Series)		
1V640937	Cabinet Front: pink (SC14)	14M638220	Insulator, antenna atk (SC14 Series & SC16 Series)		
1V641150	Cabinet Front: peach (SC16)				
3V641151	Cabinet Front: antique white (SC16)				
1V640938	Cabinet Rear: antique white (SC14 Series)				

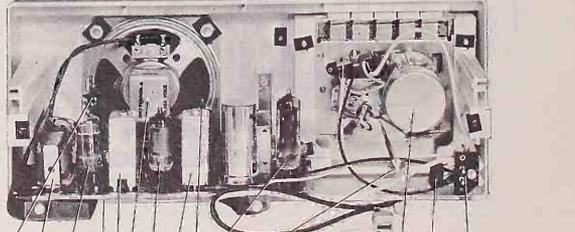
*See Item, Appears in Key List for First Time



SC13 SERIES PARTS LOCATIONS

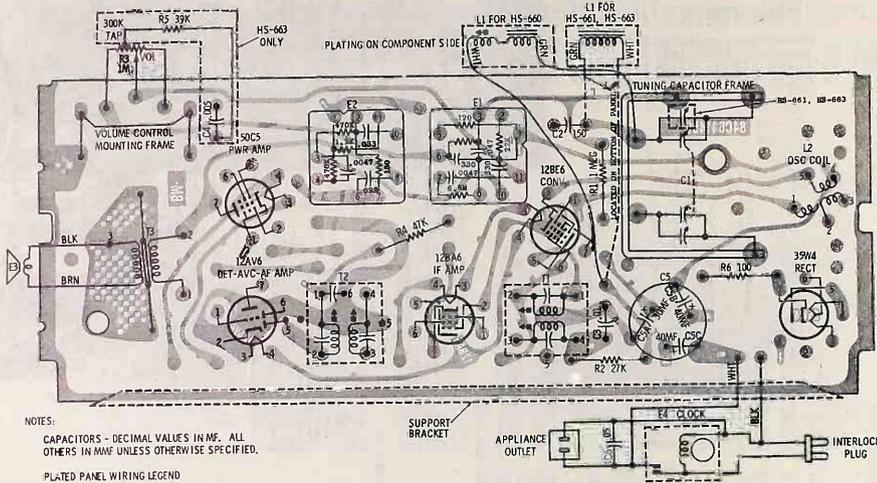


SC14 SERIES PARTS LOCATIONS



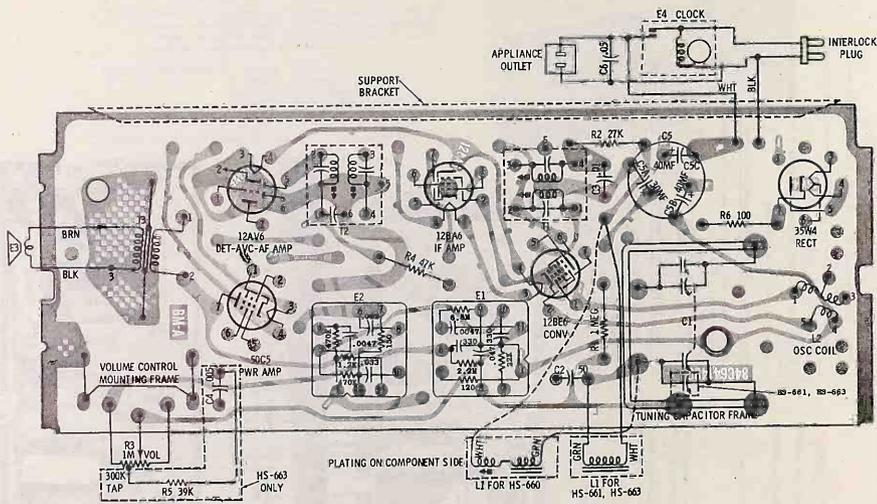
SC16 SERIES PARTS LOCATIONS

CHASSIS HS-660, 661, 663

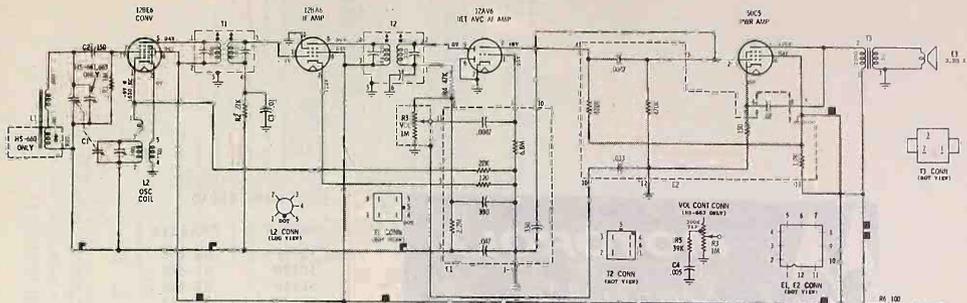


NOTES:
CAPACITORS - DECIMAL VALUES IN MF. ALL OTHERS IN MMF UNLESS OTHERWISE SPECIFIED.
PLATED PANEL WIRING LEGEND
■ - B+ □ - AVC ○ - FILAMENT

HS-660, 661 & 663 PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)



HS-660, 661 & 663 PLATED PANEL WIRING AS VIEWED FROM BOTTOM



NOTES
 CAPACITORS - Declared values in μF , all others in MUF unless otherwise specified.
 VOL TAGS - Measured from point indicated to chassis with a VTVM, $\pm 20\%$, no signal input.
 INPUT VOLTAGE - 120V AC ONLY
 TUNING RANGE - 530KC TO 1430KC IF = 455KC

PLATED PANEL WIRING LEGEND
 ■ 6P
 ■ AVC
 ▲ FILAMENT

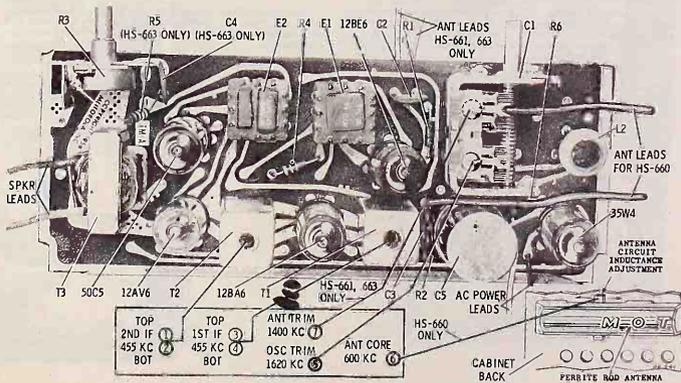
SCHEMATIC DIAGRAM

ALIGNMENT

Alignment on HS-661 and HS-663 can be performed without removing chassis from cabinet. Use an isolation transformer between the power line and the receiver. If not available, connect low side of signal generator to B- through a .1 mf capacitor. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overload.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	"	5	"
ANTENNA ADJUSTMENT (HS-660)					
3.	Radiation loop*	600 Kc	Tune for max	6	With radio installed in cabinet, adjust for maximum.
ANTENNA ADJUSTMENT (HS-661, 663)					
3.	Radiation loop*	1400 Kc	Tune for max	7	Adjust for maximum.

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



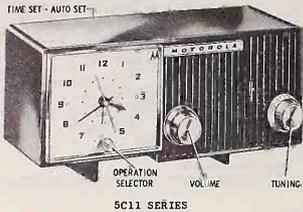
HS-660, 661 & 663 ALIGNMENT POINTS & PARTS LOCATIONS



HOME RADIO

MODELS	CHASSIS
5C11E	HS-658
5C12M	HS-658
5C12P	HS-658
5C12W	HS-658

SUPERSEDES 5C11 & 5C12 SERIES PRELIMINARY SERVICE MANUAL PART NO. 68P642573.



5C11 SERIES



5C12 SERIES

GENERAL INFORMATION

TYPE - Clock model superheterodyne receiver with plated circuit chassis and loop antenna. These receivers have an electric clock for automatically controlling radio operation. Model 5C12 also has an appliance outlet (located on back of receiver) and a sleep control on the clock.

POWER SUPPLY - 120 volts, 60 cycle AC only; 35 watts

TUBE COMPLEMENT - 12BE6 Converter
 12BA6 IF amp
 12AV6 Det-AVC-1st AF amp
 50C5 Pwr amp
 35W4 Rectifier

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

SERVICE NOTES

USE OF ISOLATION TRANSFORMER

The chassis of this receiver is connected directly to the power line, however, the power cord circuit is broken by an interlock when the cabinet rear cover is removed. When servicing or aligning this chassis, an isolation transformer should be inserted between the power line and the chassis.

DISASSEMBLY INSTRUCTIONS

To Remove Chassis

1. Remove cabinet back screws and remove cabinet back.
2. Pull off the two control knobs from the front of the radio.
3. From front, remove the Phillips head screw near tuning shaft.
4. From rear, remove chassis mounting screw from the ear of the volume control.
5. Unsolder power leads from connector strip located behind clock and also unsolder speaker leads from speaker.
6. Remove chassis from cabinet.

To Remove Clock Crystal

1. Pull off clock knobs. Insert a screwdriver between the cabinet and the right-hand edge of the clock crystal (near number 3) to release catch.
2. Pry the crystal out with the screwdriver.

To Remove Clock

1. Remove clock crystal (see above).
2. Remove mounting screws from the interlock plug and the connecting strip.
3. Remove two speednuts from the rear of clock and pull clock out through front of radio.

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 connecting wires and making wiring more uniform.
2. The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.
3. Reference to the schematic diagram, plated panel wiring diagram, and to chassis, will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated panel 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.

COMPONENT REPLACEMENT

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P68536) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.

SAFETY PRECAUTIONS

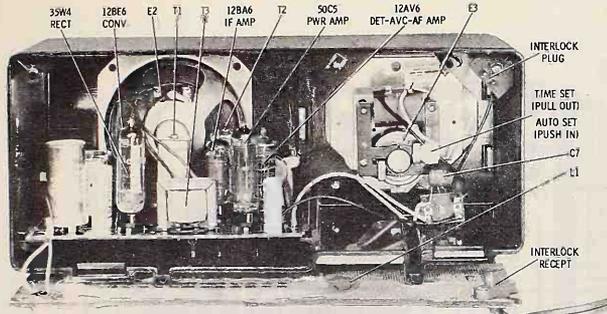
1. Do not service the chassis on a metal plate because of the possibility of a short circuit.
2. Use caution when handling the chassis with power applied because all high voltage leads are exposed.

REPLACEMENT PARTS LIST

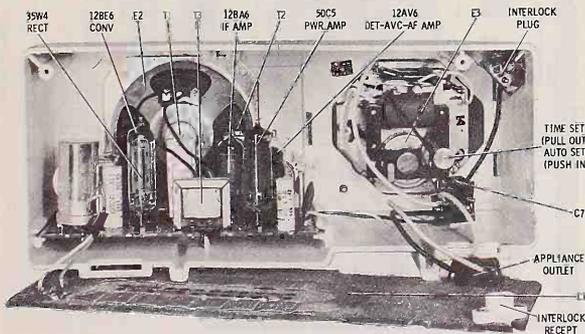
NOTE: When ordering parts, specify model number of set in addition to part number and description of part.

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.

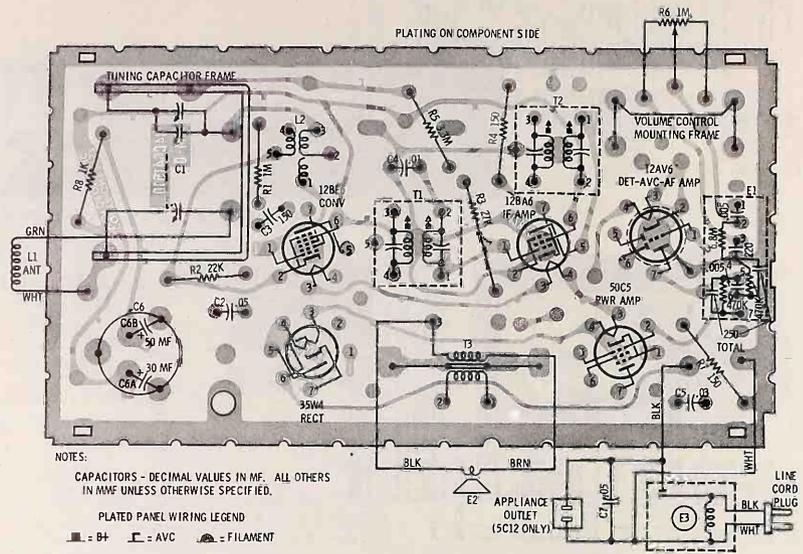
Ref. Part No.	Part Number	Description	Ref. Part No.	Part Number	Description
ELECTRICAL PARTS			31A636820 Strip, conn (connects radio to clock - SC11 series, SC12 Series)		
C-1	188632926	Capacitor, variable; 2 gang	CABINET PARTS		
C-2	8K121268	Capacitor, paper tub; .05 mfd 400V	1V641060		Cabinet Assembly; black; incl nameplate (SC11B)
C-3	21K127652	Capacitor, cer disc; 150 mfd 500V	1V641047		Cabinet Assembly; mahogany; incl nameplate (SC12A)
C-4	21K128053	Capacitor, cer disc; .01 mfd 500V	1V641048		Cabinet Assembly; pink; incl nameplate (SC12B)
C-5	8K122285	Capacitor, paper tub; .03 mfd 400V	1V640109		Cabinet Assembly; antique white; incl name plate (SC12C)
C-6	2M632915	Capacitor, electrolytic; 30-50u/150v	1V632104		Cabinet Back Assembly; incl ll & line cord (SC11B)
C-7	8K128690	Capacitor, mylar; .05 mfd 400V	1V643103		Cabinet Back Assembly; incl ll & line cord (SC12A)
R-1	518635833	Printed Capacitor - Resistor Plate	1V641034		Cabinet Back Assembly; incl ll & line cord (SC12B, SC12C)
S-2	50K28565	Speaker; 7# 4"; 3.2 ohm VC	61K640888		Crystal; clock (SC11B)
E-3	72K640910	Clock Assembly; Telechron (SC11E)	61K640889		Crystal; clock (SC12A)
	72K640909	Clock Assembly; Telechron (SC12B)	61K640870		Crystal; clock (SC12B, SC12C)
	72K640908	Clock Assembly; Telechron (SC12C, SC12D)	36K642116		Knob, clock; clear (SC11 Series)
L-1		Loop Ant (See Cab Back Assembly)	36K641340		Knobs, clock (SC12 Series)
L-2	24K636206	Coil, oscillator	36K617750		Knob, tuning; clear (SC11 Series, SC12 Series)
Resistors - Note: All resistors are insulated carbon type unless otherwise specified.			36K637751		Knob, volume; clear (SC11 Series, SC12 Series)
R-1	6K122224	1 meg 20% 1/2W	30K632572		Line Cord; with plug & interlock recept (SC11 Series)
R-2	6K121800	25,000 20% 1/2W	30K641345		Line Cord; with plug & interlock recept (SC12A)
R-3	6K121300	27,000 10% 1/2W	30B641341		Line Cord; with plug & interlock recept (SC12B, SC12C)
R-4	6K121797	150 10% 1/2W	45122228		1/2" Washer; .486 out (glassine mtg)
R-5	6K119407	3.3 meg 20% 1/2W	33A640889		Nameplate
R-6	24K638592	Volume Control; 1 meg	36K30019		Receptacle; appliance outlet (SC12 Series only)
R-7	6K124797	150 10% 1/2W	54K29570		Rivet (line cord mtg)
R-8	6B119404	1000 20% 1W	38122517		Screw, machine; # - 2 x 1 (chassis mtg)
T-1	24K838015	Transformer, 1st IF; 455 Kc	38121113		Screw, tapping; #6 x 1/2 (cab back mtg)
T-2	24K638560	Transformer, 2nd IF; 455 Kc	38122516		Screw, tapping; #6 x 3/8 (chassis mtg)
T-3	25K638564	Transformer, output	2X736822		Spacers; (clock mtg)
MECHANICAL PARTS			4K631873		Washer; felt (mounts inside control knobs)
84C641510		Plated Panel Board; less all components	LIMITED REPLACEMENT PARTS		
Note: When ordering, specify part number (and letter - if any) found on original board, and mention model number of this set. If part number is different from that found in this parts list, order by complete part number found on board and mention model number of this set.			Note: The volume of replacement on the following part is small, consequently, it is suggested that ordering be done only as required.		
28A632030		Plug, line cord (interlock - SC11 Series, SC12 Series)	29A690085		Lug, clinch (gn appliance outlet - SC12 Series)
54K63273		Rivet, shrouding (tube socket center)			
28A632710		Shield, tube (spring type)			
90K25616		Socket, tube; 7 pin 6AU			



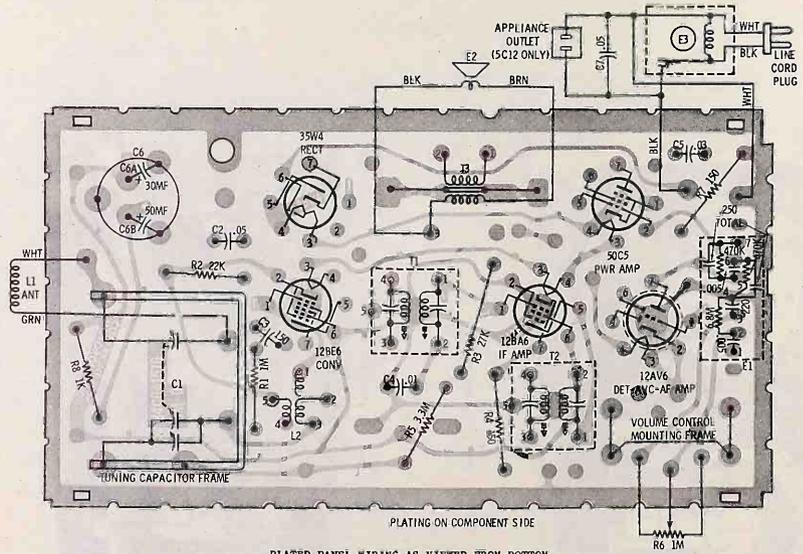
SC11 PARTS LOCATIONS

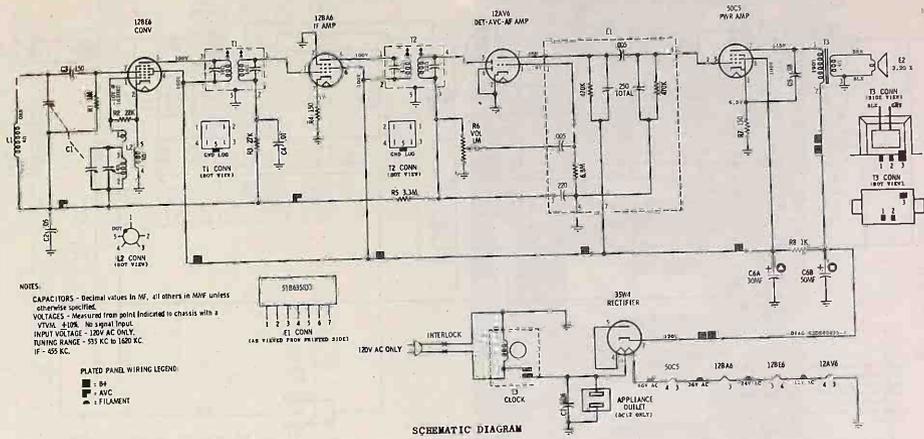


SC12 PARTS LOCATIONS



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)





NOTES:
 CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated in chassis with a VOM on 500V. No signal input.
 INPUT VOLTAGE - 120V AC ONLY.
 TUNING RANGE - 555 KC to 1500 KC.
 IF - 455 KC.

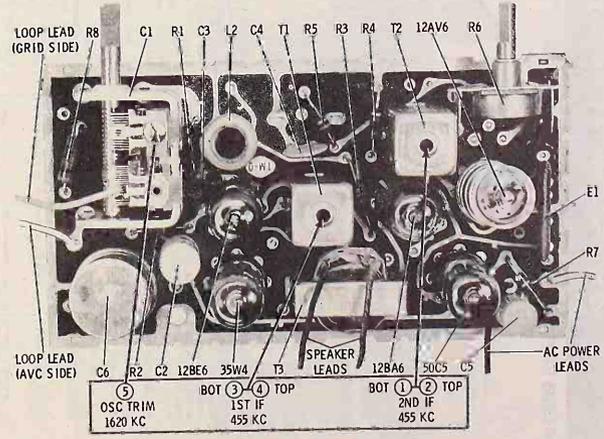
PLATED PANEL WIRING LEGEND:
 ■ 2 BA
 ■ 2 AVC
 ■ 1 FILAMENT

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. Temporarily connect speaker thru jumper and connect AC leads. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .40 volts on output meter to prevent overloading.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Grid of conv (pin 7, 12BE6) thru .1 mf & B-	1620 Kc	Fully open	5	Adjust for maximum.



ALIGNMENT POINTS & PARTS LOCATIONS



SUPERSEDES 5T11 PRELIMINARY SERVICE MANUAL PART NO. 68P642569

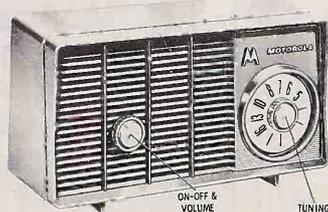
GENERAL INFORMATION

TYPE - AC/DC table model superheterodyne receiver with plated circuit chassis, modular components and ferrite loop antenna.

TUBE COMPLEMENT - 12BE6 Converter
12EA6 IF amp
12AV6 Det.-AFC.-AF amp
50Q5 Pwr amp
35W4 Rectifier

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts AC/DC; 35 watts



5T11 SERIES

SERVICE NOTES

USE OF ISOLATION TRANSFORMER

The chassis of this receiver is connected directly to the power line; however, the power cord circuit is broken by an interlock when the cabinet rear cover is removed. When servicing or aligning this chassis from AC, an isolation transformer should be inserted between the power line and the chassis.

TO REMOVE CHASSIS FROM CABINET

1. Remove the two screws that hold the cabinet back cover in place, and remove back cover.
2. Do not attempt to remove tuning knob from front of radio, as it is held in place with a speed clip from inside of cabinet. (See Tuning Knob Removal section.)
3. From rear of radio, remove the two chassis mounting screws from gang mounting bracket and ear of volume control.
4. Remove plated circuit chassis by taking hold of gang condenser and the volume control, and sliding out of cabinet. Volume knob will come off without marring the cabinet.

TO REMOVE TUNING KNOB

1. Remove chassis from cabinet. (See Chassis Removal section.)
2. From rear of radio, remove speed clip from manual tuning knob.

HOME RADIO

MODELS	CHASSIS
5T11G	HS-652
5T11M	HS-652
5T11R	HS-652
5T11W	HS-652

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 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 panel wiring diagram, and to chassis, will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated panel 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.

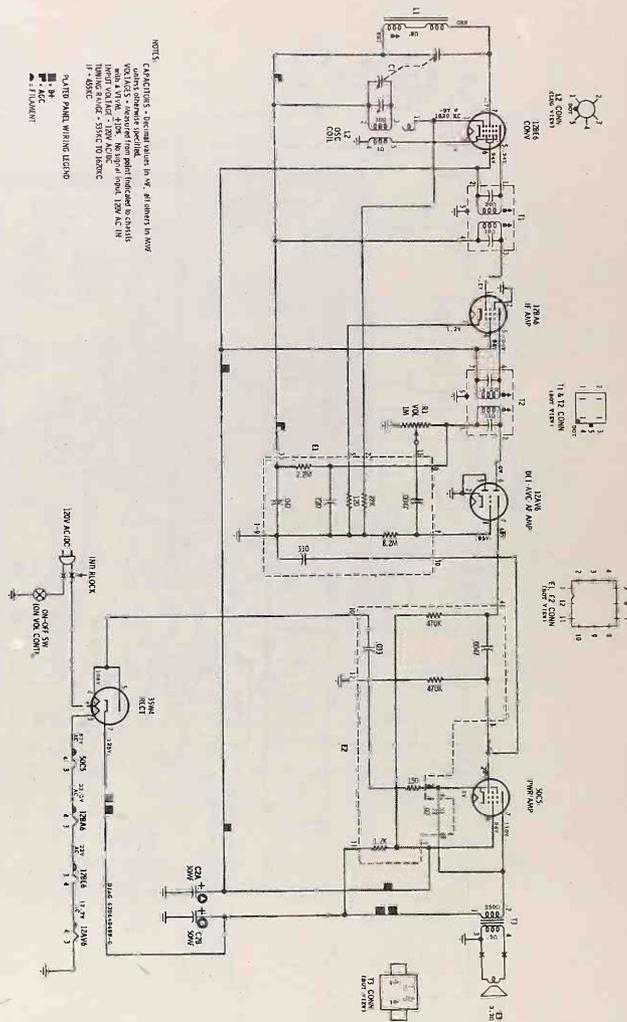
COMPONENT REPLACEMENT

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 68P636534) for recommended tools and procedures to be used when servicing Motorola plated circuit chassis.

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.

SCHEMATIC DIAGRAM

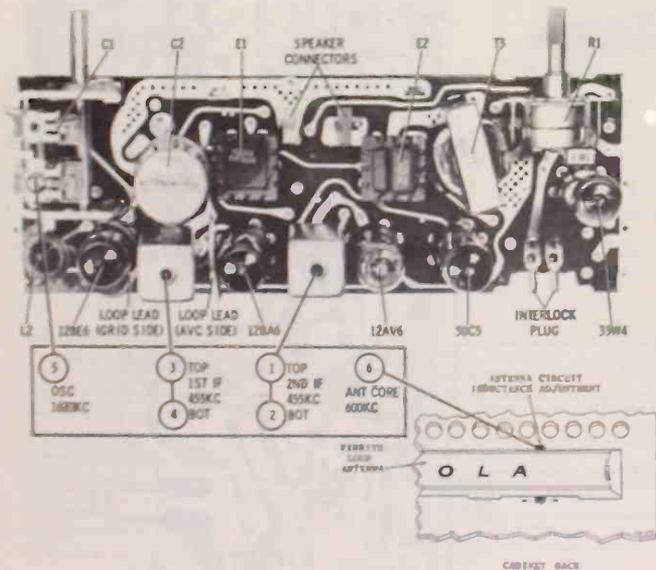


ALIGNMENT

Use an isolation transformer between the power line and the receiver. If not available, connect low side of signal generator to B- through a 100 ohm resistor. Connect a low range output meter across speaker voice coil and volume control to measure. Adjust generator output to maximum if it reads an output meter to prevent overloading.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (all cycles read)	GAIN SETTING	ADJUST	REMARKS
1 ST ALIGNMENT	Grid of mixer (pin 7, 12BA6) thru .1 mf & .5"	475 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum.
2 ND ALIGNMENT	Grid of mixer (pin 7, 12BA6) thru .1 mf & .5"	1620 Kc	"	"	"
SYSTEMS ADJUSTMENT	Reduction loop*	500 Kc	Tune for max.	5	With radio certified in column, adjust low maximum.

*Connect generator output across 2ND detector, 5 turn loop and couple inductively to receiver loop. Keep loops at least 1/2" apart.

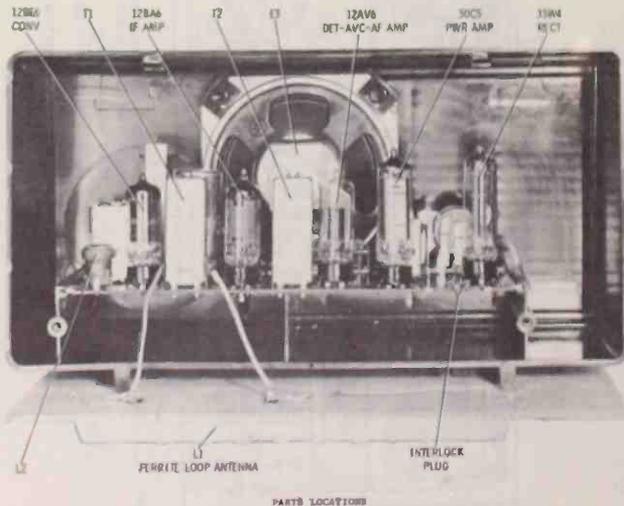


ELECTRICAL POINTS & PARTS LOCATIONS

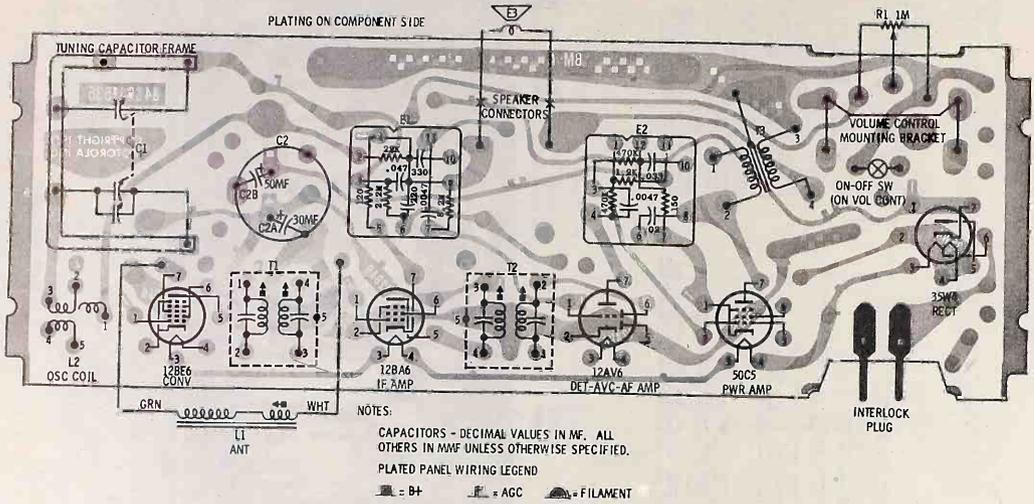
REPLACEMENT PARTS LIST

NOTE: When ordering parts, specify model number of set or addition to part number and description of set, electronic parts of equivalent rating and tolerance of equivalent alignment. The components listed in this list are Motorola items unless otherwise specified and applicable to the model or models indicated. For complete complete data refer to the appropriate Motorola and the latest Motorola parts replacement.

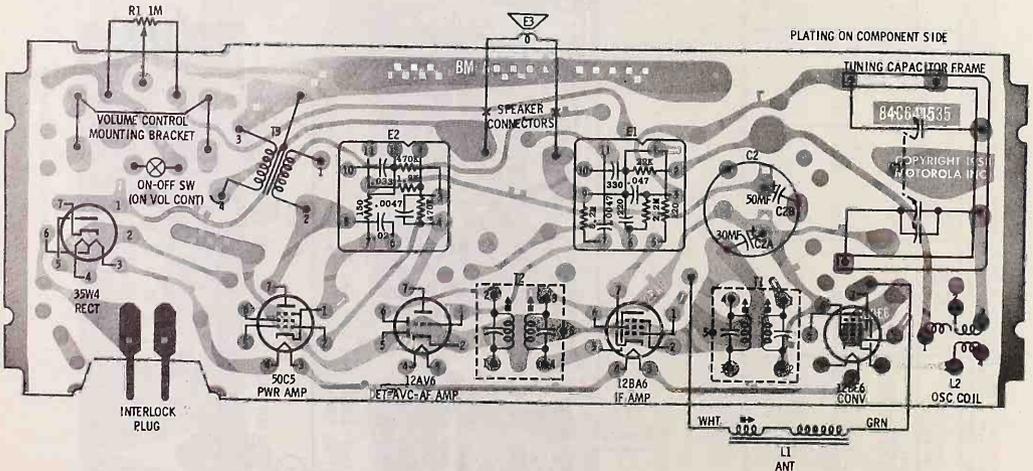
Qty. Req.	Part Number	Description	Qty. Req.	Part Number	Description
ELECTRICAL PARTS					
C-1	20040003	Transformer, variable, 4 amp			
C-2	20040010	Transformer, audio-output, 20-0-20/150V			
E-1	50020000	Resistor, impedance			
D-1	50020001	Resistor, 500 ohms, 1/2 W, 5% imp. tol.			
D-2	50020002	Capacitor, electrolytic, low leakage type assembly			
E-1	50020000	Capacitor, 100 pF			
E-2	50020001	Capacitor, 100 pF			
E-3	50020002	Capacitor, 100 pF			
E-4	50020003	Capacitor, 100 pF			
E-5	50020004	Capacitor, 100 pF			
E-6	50020005	Capacitor, 100 pF			
E-7	50020006	Capacitor, 100 pF			
E-8	50020007	Capacitor, 100 pF			
E-9	50020008	Capacitor, 100 pF			
E-10	50020009	Capacitor, 100 pF			
E-11	50020010	Capacitor, 100 pF			
E-12	50020011	Capacitor, 100 pF			
E-13	50020012	Capacitor, 100 pF			
E-14	50020013	Capacitor, 100 pF			
E-15	50020014	Capacitor, 100 pF			
E-16	50020015	Capacitor, 100 pF			
E-17	50020016	Capacitor, 100 pF			
E-18	50020017	Capacitor, 100 pF			
E-19	50020018	Capacitor, 100 pF			
E-20	50020019	Capacitor, 100 pF			
E-21	50020020	Capacitor, 100 pF			
E-22	50020021	Capacitor, 100 pF			
E-23	50020022	Capacitor, 100 pF			
E-24	50020023	Capacitor, 100 pF			
E-25	50020024	Capacitor, 100 pF			
E-26	50020025	Capacitor, 100 pF			
E-27	50020026	Capacitor, 100 pF			
E-28	50020027	Capacitor, 100 pF			
E-29	50020028	Capacitor, 100 pF			
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E-39	50020038	Capacitor, 100 pF			
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E-42	50020041	Capacitor, 100 pF			
E-43	50020042	Capacitor, 100 pF			
E-44	50020043	Capacitor, 100 pF			
E-45	50020044	Capacitor, 100 pF			
E-46	50020045	Capacitor, 100 pF			
E-47	50020046	Capacitor, 100 pF			
E-48	50020047	Capacitor, 100 pF			
E-49	50020048	Capacitor, 100 pF			
E-50	50020049	Capacitor, 100 pF			
E-51	50020050	Capacitor, 100 pF			
E-52	50020051	Capacitor, 100 pF			
E-53	50020052	Capacitor, 100 pF			
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E-69	50020068	Capacitor, 100 pF			
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E-91	50020090	Capacitor, 100 pF			
E-92	50020091	Capacitor, 100 pF			
E-93	50020092	Capacitor, 100 pF			
E-94	50020093	Capacitor, 100 pF			
E-95	50020094	Capacitor, 100 pF			
E-96	50020095	Capacitor, 100 pF			
E-97	50020096	Capacitor, 100 pF			
E-98	50020097	Capacitor, 100 pF			
E-99	50020098	Capacitor, 100 pF			
E-100	50020099	Capacitor, 100 pF			



PARTS LOCATIONS



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)



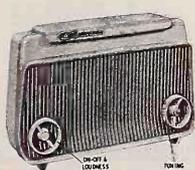
PLATED PANEL WIRING AS VIEWED FROM BOTTOM



MOTOROLA

Service Manual

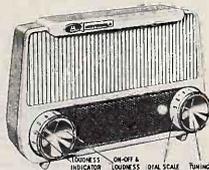
SUPERSEDES PRELIMINARY SERVICE MANUAL PART NO. 68P642570.



5T12 SERIES



5T13 SERIES



5T14 SERIES

GENERAL INFORMATION

TYPE - AC/DC table model superheterodyne receiver with plated circuit chassis and ferrite loop antenna. This set features a push-pull type On-Off & Loudness control. The push-pull feature eliminates the necessity of re-adjusting the loudness every time the radio is turned on. To turn radio ON, pull the LOUDNESS knob out; to turn radio OFF, push the same knob in.

TUBE COMPLEMENT - 12BE6 Converter
12BA6 IF amp
12AV6 Det-AVC-AF amp
50C5 Per amp
35W4 Rectifier

TUNING RANGE - 535 to 1620 Kc IF - 455 Kc

POWER SUPPLY - 120 volts AC/DC; 35 watts

USE OF ISOLATION TRANSFORMER

The chassis of this receiver is connected directly to the power line, however, the power cord circuit is broken by an interlock when the cabinet rear cover is removed. When servicing or aligning this chassis from AC, an isolation transformer should be inserted between the power line and the chassis.

DISASSEMBLY INSTRUCTIONS

To Remove Chassis From Cabinet

Remove two cover mounting screws on bottom of cabinet; separate rear cover from front section and unscrew (from inside rear cover) the lead lug which connects chassis to cabinet back.

On Model 5T12 Series:

1. Remove the two control knobs from front of radio.
2. From rear of cabinet, remove screw from gang mounting bracket and also from ear of loudness control.
3. Remove the two screws that mount the plated panel bracket to cabinet.

SERVICE NOTES

1. Unsolder speaker leads, antenna leads and remove chassis from cabinet.

On Model 5T13 and 5T14 Series:

1. Remove the insert knob sections on the Loudness control and the dial scale. (The two control knobs are each composed of two sections.)
2. Remove dial scale knob and the screw (located behind knob) that mounts chassis to cabinet.
3. From front of cabinet, unscrew palmnut from Loudness control. It is not necessary to remove the Loudness Indicator knob in order to remove the chassis.
4. From rear of cabinet, remove the two screws that mount the plated panel bracket to cabinet.
5. Unsolder speaker leads, antenna leads, and 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

HOME RADIO

MODELS	CHASSIS
5T12B	HS-653
5T12M	HS-653
5T12P	HS-653
5T12W	HS-653
5T13P	HS-654
5T13S	HS-654
5T14GW	HS-654
5T14W	HS-654

NOTES

CONNECTIONS - Indicated values in μ C, all others in MMF.

VOLTAGES - Measured from point indicated to B- with a VOM, 250K, 500K, or 1M input impedance. Line voltage with a VOM, 250K, 500K, or 1M input impedance. Line voltage INPUT VOLTAGE - 120V AC/DC.

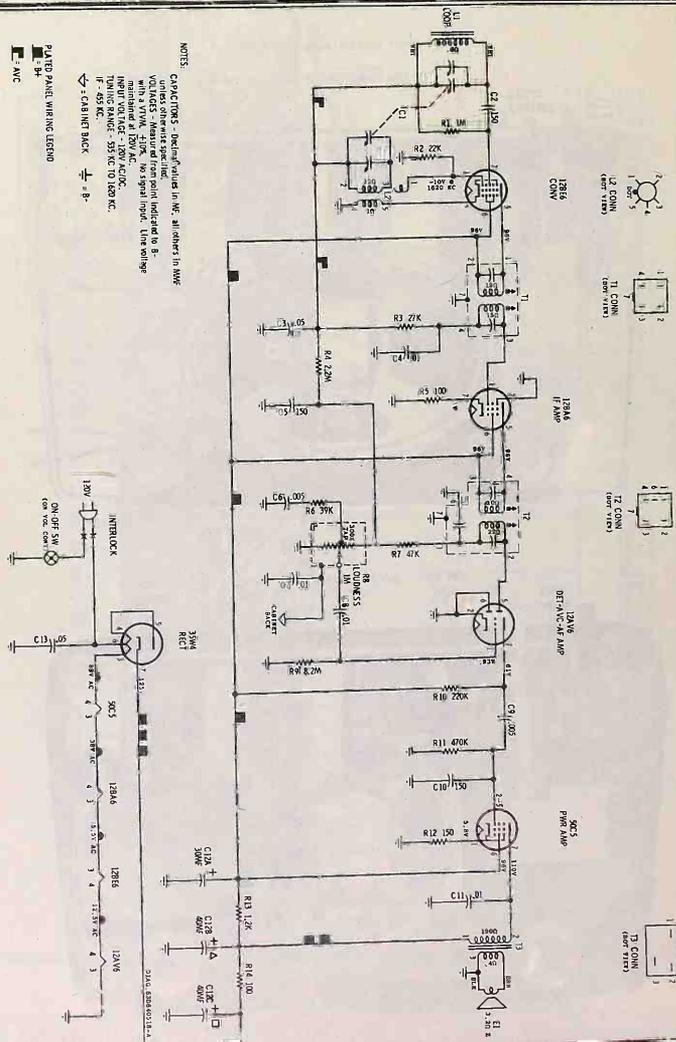
TUNING RANGE - 535 KC TO 1620 KC.

TO CABINET BACK \pm 8"

PLATED PANEL WIRING LEGEND

□ 12A
■ 12B
□ 12C
■ FILAMENT

SCHEMATIC DIAGRAM



connecting wires and making wiring more uniform.

2. The metal plating extends through all the holes on the chassis, connecting circuits on the top with those on the bottom.

3. Reference to the schematic diagram, plated panel wiring diagrams, and to chassis, will permit the circuit to be traced easily.

NOTE: To facilitate servicing, phantom views showing plated panel 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.

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
			8K636314	Rivet, shield (tube socket center)	
			9K616609	Socket, tube: 7 pin min	

ELECTRICAL PARTS

C-1	1B8640822	Capacitor, variable: 2 gang (5T12 Series)
C-2	1V6410933	Capacitor, variable: 5 mfd (5T12 & 5T14 Series)
C-3	21K127653	Capacitor, cer disc: 150 mfd 500V
C-3	8K121268	Capacitor, paper tub: .05 mf 400V
C-4	21K128284	Capacitor, cer disc: .01 mf 500V
C-5	21K127652	Capacitor, cer disc: 150 mfd 500V
C-6	21K623223	Capacitor, cer disc: .005 mf 500V
C-7	21K128284	Capacitor, cer disc: .01 mf 500V
C-8	21K128284	Capacitor, cer disc: .01 mf 500V
C-9	21K127652	Capacitor, cer disc: 150 mfd 500V
C-10	21K127652	Capacitor, cer disc: .01 mf 500V
C-11	21K532472	Capacitor, electrolytic: 30-60-60mf/150V
C-12	23B639494	Capacitor, electrolytic: 30-60-60mf/150V
C-13	8K121268	Capacitor, paper tub: .05 mf 400V
E-1	50K640764	Speaker, PM: 4"; 3.2 ohm VC (5T12 Series)
E-2	50K640832	Speaker, PM: 4 x 6"; 3.2 ohm VC (5T13 & 5T14 Series)

d-1	1V641136	Antenna, ferrite rod (5T12 Series)
d-2	1V641138	Antenna, ferrite rod (5T13 & 5T14 Series)

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

R-1	6K122224	1 meg 20% 1/2W
R-2	6K139405	22,000 20% 1/2W
R-3	6K121200	27,000 10% 1/2W
R-4	6K13927	2.2 meg 20% 1/2W
R-5	6K62296	100 10% 1/2W
R-6	6K122511	39,000 10% 1/2W
R-7	8K121287	47,000 20% 1/2W
R-8	1B8640763	Loudness Control & Switch: 1 meg; tap at 300K (5T12 Series)
R-9	1B8640959	Loudness Control & Switch: 1 meg; tap at 300K (5T13 & 5T14 Series)
R-10	6R5385	8.2 meg 10% 1/2W
R-10	6R6015	220,000 20% 1/2W
R-11	6K139406	470,000 20% 1/2W
R-12	6K124797	1500 10% 1/2W
R-13	6R5770	1200 10% 1W
R-14	6R5235	100 10% 1/2W
T-1	24K630016	Transformer, 1st IF: 455 Kc
T-2	24K630262	Transformer, 2nd IF: 455 Kc
T-3	25K640763	Transformer, output (5T12 Series)
T-4	25K640839	Transformer, output (5T13 & 5T14 Series)

MECHANICAL PARTS

23A63568	Contact AC Interlock
1V641112	Plated Panel Board: less all components; incl AC contacts and 84K643249 plated panel board.

NOTE: When replacing the plated panel, Part Number 84K643249 is used as replacement for 84K640824 & 84K663195. This panel replaces the two earlier versions. In the first version, the support bracket and the edge plating were connected to B. In the second version, the support bracket and edge plating were removed electrically from B. In the third version, the support bracket and edge plating were connected to B. thru a capacitor (C7). The physical placement of the components is the same in all versions. When replacing panel, solder plated panel support bracket to points A & B as indicated on Plated Panel Wiring Diagram.

*N8 Item, Appears in any List for First Time

COMPONENT REPLACEMENT

Refer to "Plated Chassis Servicing Techniques" manual (Motorola Part No. 18P636336) for recommended tools and procedures to be used when servicing Motorola Plated circuit chassis.

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.

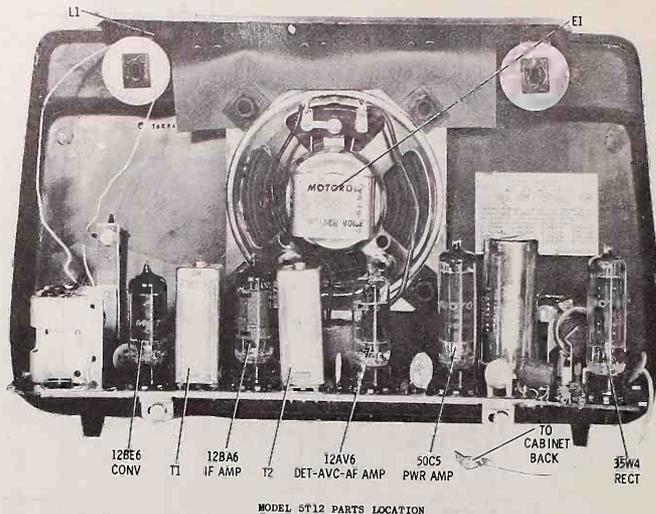
CABINET PARTS

1V641118	Cabinet Front: blue (5T12)
1V641120	Cabinet Front: mahogany (5T12)
1V641121	Cabinet Front: antique white (5T12)
1V641198	Cabinet Front: pink (5T12)
1V641197	Cabinet Front: maple sugar (5T13)
1V641131	Cabinet Front: green (5T14)
1V641132	Cabinet Front: antique white (5T14)
1S641006	Cabinet Rear: antique white (5T12)
1S641009	Cabinet Rear: mahogany (5T12)
1S641008	Cabinet Rear: gray (5T12, 5T13)
1S641007	Cabinet Rear: metallic wood (5T12)
1S641008	Cabinet Rear: black & gold (5T13)
1S641009	Cabinet Rear: antique white (5T14 Series)
28637286	Clip, speed (latch mtg - not in all sets)
28637708	Clip, speed (sprit mtg)
13C640990	Grille, trim (5T14 Series)
38C641061	Knob, dial scale: antique white (5T13 & 5T14)
38E641082	Knob, dial scale: maple sugar (5T13)
38E641083	Knob, dial scale: green (5T14)
38C641024	Knob, loudness indicator: antique white (5T13 & 5T14)
38E641025	Knob, loudness indicator: maple sugar (5T13)
38E641026	Knob, loudness indicator: green (5T14)
38E64097	Knob, tuning: antique white (5T12 Series)
38E641021	Knob, tuning: clear (5T13 Series)
38C641020	Knob, tuning: clear (5T14 Series)
38D640996	Knob, On-off & loudness: antique white (5T12 Series)
38E641023	Knob, On-off & loudness: clear (5T13 Series)
38C641022	Knob, On-off & loudness: clear (5T14 Series)
38E640843	Line Cord: white (5T12, 5T13, 5T14)
38E640844	Line Cord: brown (5T12)
38E640845	Line Cord: white (5T13 & 5T14 Series)
38E640846	Line Cord: brown (5T13)
257051	Paintnut: 3/8-32 x 9/16 (vol cont mtg - 5T13 & 5T14)
35120646	Screw, lock: 6-32 x 3/16 (gang brkt mtg - 5T12 Series)
35128636	Screw, tapping: #8 x 3/8 (cab back mtg)
35122516	Screw, tapping: #8 x 3/8 (chassis mtg - 5T12 & 5T14 Series)
35122355	Screw, tapping: #6 x 1/2 (cover latch spring mtg - not in all sets)
44639847	Washer, cup (cover latch spring mtg - not in all sets)
42B640989	Spring, cover latch
78E40906	Stand, cabinet: chrome (5T12 Series)
78E40907	Stand, cabinet: gold (5T13 & 5T14 Series)

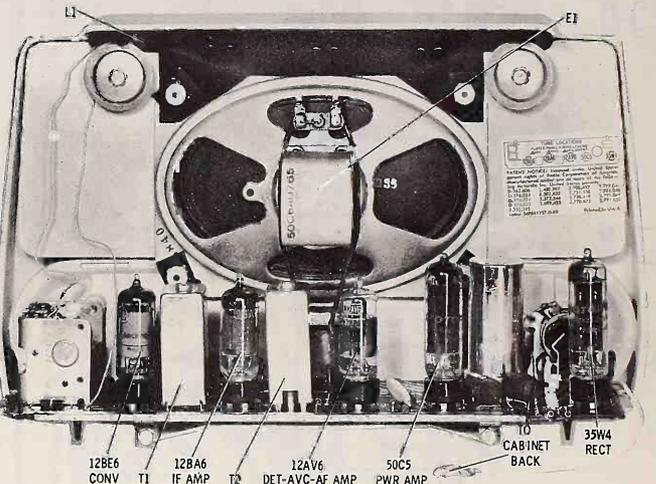
LIMITED REPLACEMENT PARTS

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

78E40975	Bracket, plated panel support (5T12 Series)
*78E40976	Bracket, plated panel support (5T13 & 5T14 Series)
*42E43259	Clip, plastic (brkt mtg - 5T13 & 5T14 Series)
32B640979	Gasket, trim grille (5T14 Series)



MODEL 5T12 PARTS LOCATION



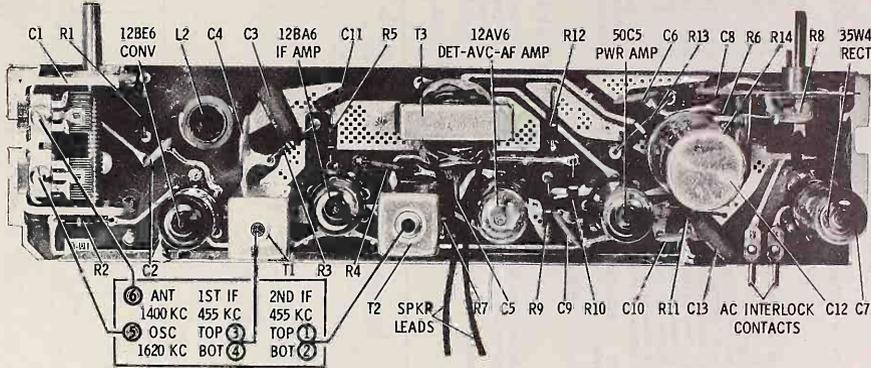
MODEL 5T13 & 5T14 PARTS LOCATION

ALIGNMENT

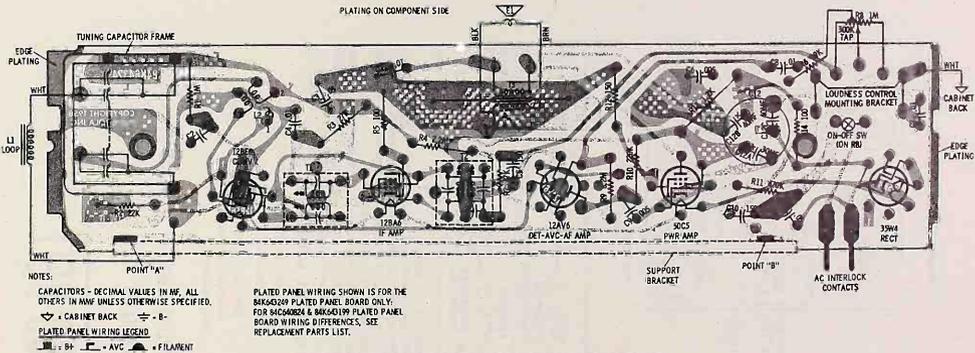
Use an isolation transformer between the power line and the receiver. If not available, connect low side of generator to B- through a .1 mf capacitor. Connect a low range output meter across speaker voice coil and set volume control to maximum. Attenuate generator output to maintain .4 volts on output meter to prevent overloading the receiver.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS
IF ALIGNMENT					
1.	12BE6 grid (pin 7) thru .1 mf & B-	455 Kc	Fully open	1, 2, 3 & 4	Adjust for maximum
RF ALIGNMENT					
2.	Radiation loop*	1620 Kc	Fully open	5	Adjust for maximum
3.	"	1400 Kc	Tune for max	6	"

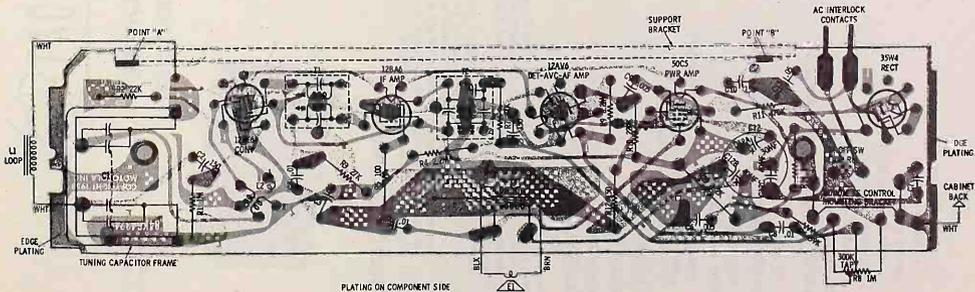
*Connect generator output across 5" diameter, 5 turn loop and couple inductively to receiver loop. Keep radiation loop at least 12" from receiver loop.



ALIGNMENT POINTS & PARTS LOCATIONS



PLATED PANEL WIRING AS VIEWED FROM TOP (COMPONENT SIDE)



PLATED PANEL WIRING AS VIEWED FROM BOTTOM

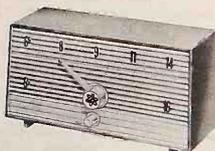


12333 W. Olympic Blvd.
Los Angeles 64

SERVICE MANUAL

TABLE MODEL RADIO 5R5

Manual BC-57
Oct. 10, 1958



Oscillator Coil:
Primary, 1 ohm
Secondary, 10 ohms

Loop Antenna:
Resistance, 5 ohms

ALIGNMENT PROCEDURE:

The alignment of the set is accomplished by following the steps in the chart below. Connect output meter to speaker voice coil. Use isolation transformer, if available, for shock protection.

Each adjustment should be made using a minimum input signal. Connect oscillator through a .01 mfd capacitor in step one; loose-couple oscillator lead in steps two and three.

Step	Connect Test Oscillator To	Test Oscillator Frequency	Radio Dial Setting	Adjust
1.	Pin 1, V-1 (12BE6)	455 Kc.	540 Kc.	S-1, S-2, S-3, & S-4 for MAX.
2.	Loose-couple to antenna	1620 Kc.	1620 Kc.	C-2B for MAX.
3.	ditto	1500 Kc.	Tune to Osc. Signal	C-1B for Max.

GENERAL DESCRIPTION:

Model 5R5 is a five tube superheterodyne radio receiver. The cabinet is plastic and is available in a variety of colors. The electron tubes are of the standard miniature type, connected for AC-DC operation. A permanent magnet speaker is employed. There are two controls, the tuning knob with sweep pointer, and the volume control with sweep pointer, and the volume control with sweep pointer, and the volume control with sweep pointer.

The antenna is a high impedance pancake type loop mounted on the back of the set. If an external antenna is required, couple it to the loop as directed on back.

SPECIFICATIONS (to nearest 1/4 in.):
DIMENSIONS: 5 1/4 h by 10 1/4 w by 4 1/4 dp
WEIGHT: 3.3 lb

ELECTRICAL RATINGS:

Line voltage, 110-120 volts AC or DC
Power consumption, 27 watts
(Reverse power plug for minimum hum.)

TUNING FREQUENCY RANGE:
540 to 1620 Kc.

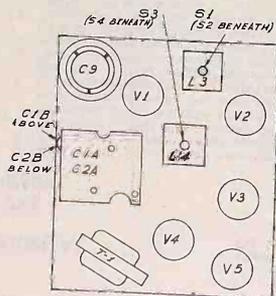
ELECTRICAL POWER OUTPUT, MAXIMUM:
1.7 watts

SPECIAL SERVICING INFORMATION:

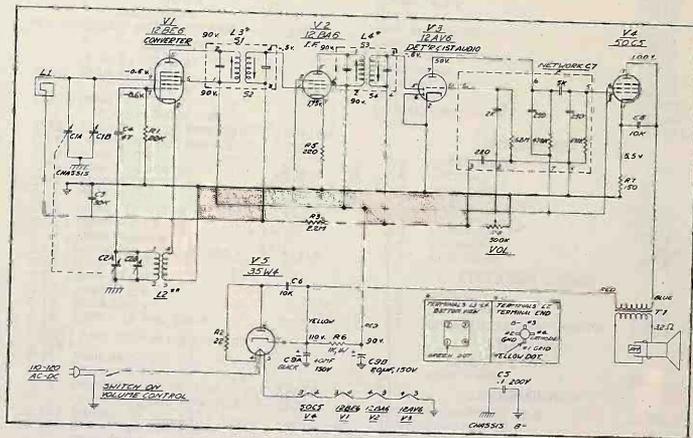
DC RESISTANCE MEASUREMENTS:

1st I-F Coil:
Primary, 19 ohms
Secondary, 19 ohms

2nd I-F Coil:
Primary, 19 ohms
Secondary, 19 ohms



Adjustments, Model 5R5



Schematic, Model 5R5

Socket voltages measured as follows:

- Line voltage, 117 volts AC.
- Volume control at maximum.
- VTVM between socket terminal and B minus bus.
- Only DC voltages measured. Allow 10% tolerance.

REPLACEABLE PARTS

CAPACITORS

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
C-1A	Variable, RF section	23556
C-1B	Trimmer, RF section	
C-2A	Variable, osc section	23652A
C-2B	Trimmer, osc section	
C-3	Ceramic, 30,000 mmf	23651
C-4	Ceramic, 47 mmf, 20%, N1400	23707
C-5	Paper, molded case, .1 mfd, 200 v	23631
C-6	Ceramic, 10,000 mmf	23630B
C-7	Network	24163C
C-8	Same as C-6	
C-9 (A&B)	Electrolytic, 40-20 mfd/150 v	

RESISTORS

1/2 watt, 20%, unless specified

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
R-1	22,000 ohms	73141
R-2	22 ohms	73105
R-3	2.2 megohms	73165
R-4	See CONTROLS	
R-5	220 ohms	73117
R-6	1000 ohms, 1 watt	73325
R-7	150 ohms	73115

ELECTRON TUBES

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
V-1	Converter	12BE6
V-2	I-F amplifier	12BA6
V-3	Detector & 1st Audio	12A6
V-4	Audio output	50C5
V-5	Rectifier	35W4

MISCELLANY

DESCRIPTION	PACKARD BELL PART NUMBER
Cabinet, specify color	21152B
Cord, AC power, 6 ft	32032A
KNOB	
Tuning (specify color)	52246
Volume (specify color)	52247
Speaker, 4 in. PM, 3.2 ohms	83019
Transformer, audio output (T-1)	
2500 to 3.2 ohms	89487

CONTROL

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
R-4	Volume, 500,000 ohms w/sw	25062E

COILS

REFERENCE SYMBOL	DESCRIPTION	PACKARD BELL PART NUMBER
L-1	Loop antenna	29361
L-2	Oscillator coil	29157B
L-3	1st I-F	29155
L-4	2nd I-F	29156



SERVICE MANUAL

**MODELS 11RP6S, 11RP7S, 11RP8S, & 11RP9S
COMBINATION RADIO-PHONOGRAPHS**

12333 W. Olympic Blvd.
Los Angeles 64

(CHASSIS 11HF1S)

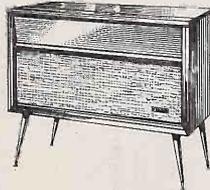
Manual BC-56
Nov. 1, 1958



Model 11RP6S



Model 11RP7S



Model 11RP8S



Model 11RP9S

GENERAL DESCRIPTION:

Models 11RP6S, 11RP7S, 11RP8S, and 11RP9S are radio-phon combinations, each using the same chassis, 11HF1S. The illustrations above show the external differences, and the list of replaceable parts, points out other variations, such as speaker complement and record changer.

The chassis contains eleven electron tubes, and is designed to receive AM and FM radio as well as to reproduce recordings. Stereophonic records may be played with the addition of an external amplifier, as described in the section headed "Stereophonic Operation."

Antennas for both AM and FM are built in the sets, but terminals are provided for an outside FM antenna which may be needed in weak-signal areas.

SPECIFICATIONS:

CABINET DIMENSIONS & FINISHES

Model	Height	Width	Depth	Finishes
11RP6S	14" ¹ / ₂	24"	18"	MOC*
11RP7S	26" ¹ / ₂	24"	18"	WMOC
11RP8S	21" ¹ / ₂	38"	18"	MOCSc
11RP9S	33"	31"	20"	MOCFp

*M — Mahogany, O — Oak, C — Colonial
W — Walnut, Sc — Scandia, Fp — French Prov.
† Plus legs, 12"
‡ Plus legs, 6"
§ Plus legs, 10"

Cabinet dimensions are to nearest inch, and vary somewhat with the style of the cabinet.

SHIPPING WEIGHTS:

11RP6S: 60 lb.
11RP7S: 90 lb.
11RP8S: 100 lb.
11RP9S: 100 lb.

ELECTRICAL RATINGS:

Line voltage, 110-120 v, 60 cycles only
Power consumption: 75 watts

TUNING FREQUENCY RANGE:

AM radio: 530 to 1620 kc
FM radio: 88 to 108 mc

WATTS OUTPUT:

1% distortion: 6 watts
10% distortion: 10 watts
Peak output: 18 watts

SPEAKERS & ELECTRON TUBES:

See parts list.

STEREOPHONIC OPERATION:

Stereophonic recordings may be reproduced with the aid of an external amplifier-speaker system. This system is connected to either the OUTPUT LO or the OUTPUT HI according to the setting of the switch (see next paragraph).

The switch at the rear of the set has three positions:
Position 1: AM-FM HI. The tuner output, besides going thru the regular speaker-amplifier system in set, is amplified and piped to the OUTPUT HI for use with the remote system. See Position 3.

Position 2: STEREO LO. Stereo signal from cartridge goes directly, without amplification, to OUTPUT LO. This output is for use with an external system with enough gain that preamplification of the stereo signal is not required. In this position OUTPUT HI is dead.

Position 3: AM-FM LO, STEREO HI. Stereo output of cartridge is preamplified, and appears at OUTPUT HI. (Use position 2 and STEREO LO unless gain of external system is insufficient.)

In position 3 the tuner output, at a lower level than in position 1, appears at OUTPUT LO. This is for a remote system with high gain.

DC RESISTANCE MEASUREMENTS:

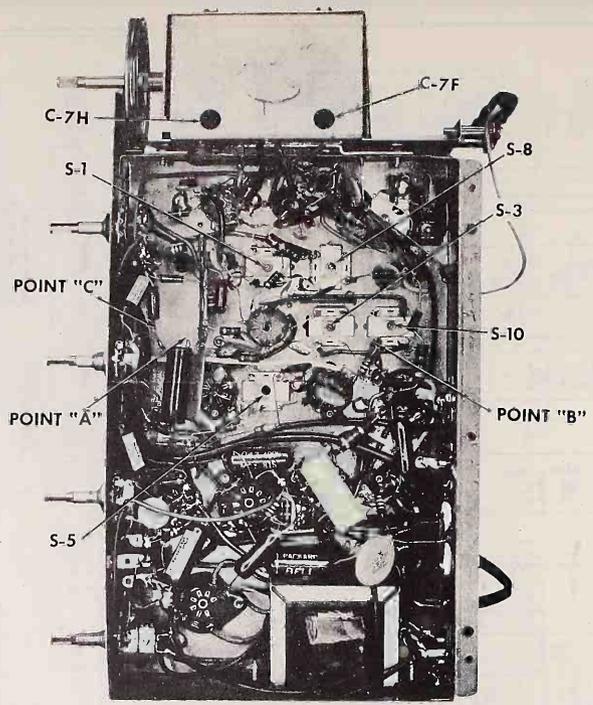
(Coils not listed have negligible resistance).

- L-2, choke, 2 ohms
- L-4, 1st I-F, FM, primary 1.5 ohms, sec., 1.5 ohms.
- L-5, 2nd I-F, FM, primary 2.5 ohms, sec., 0.75 ohms.
- L-6, ratio detector, primary 3.2 ohms, sec., 0.25 ohms
- L-7 and L-10 chokes, 0.5 ohms
- L-8, 1st I-F, AM, primary 16 ohms, sec., 16 ohms
- L-9, 2nd I-F, AM, primary 16 ohms, sec., 16 ohms
- L-11, ferroloop, 0.3 ohms
- L-13, oscillator, AM, primary 8.5 ohms, sec., 0.6 ohms

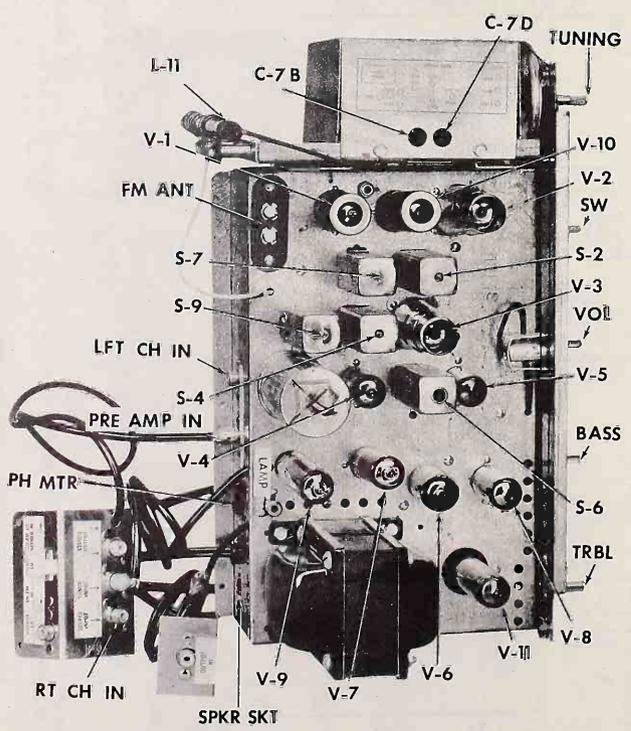
REPLACEABLE PARTS

CAPACITORS			
C-1	Ceramic, 1000 mmf, GMV, disc	23860	
C-2	Same as C-1		
C-3	Ceramic, 5000 mmf, GMV, disc	23931	
C-4	Same as C-1		
C-5	Ceramic, 47 mmf, 20%	23912	
C-6	Ceramic, 330 mmf, 20%	23944	
C-7	Variable, four section w/trimmers	23547C	
C-7 A & B	= FM RF w/trimmer		
C-7 C & D	= FM osc w/trimmer	C-25	
C-7 E & F	= AM RF w/trimmer		
C-7 G & H	= AM osc w/trimmer		
C-8	Same as C-3		
C-9	Same as C-1		
C-10	Same as C-3		
C-11	Same as C-3		
C-12	Ceramic, 10,000 mmf, 500 v	23632	
C-13	Same as C-1		
C-14	Ratio detector network	23627A	
C-15	Electrolytic, 5 mfd/50 v	24164	
C-16	Paper, .047 mfd, 400 v	23124	
C-17	Paper, 1 mfd, 400 v	23126	
C-18	Same as C-16		
C-19	Not used		
C-20A	Electrolytic, 25 mfd/25 v		
C-20B	Electrolytic, 40 mfd/350 v	24092	
C-20C	Electrolytic, 40 mfd/350 v		
C-20D	Electrolytic, 20 mfd/350 v		
C-21	Same as C-3		
C-22	Same as C-1		
C-23	Ceramic, 10,000 mmf, 25 v min	23612	
C-24	Not used		
C-25	Trimmer, 5 to 25 mmf (= C-7D)	23428	
C-26	Ceramic, 4.7 mmf, 10%, NPO	23978	
C-27	Same as C-5		
C-28	Ceramic, 1.5 mmf, 10%	23866	
C-29	Same as C-1		
C-30	Same as C-1		
C-31	Same as C-23		
C-32	Ceramic, 220 mmf, 20%	23915	
C-33	Same as C-3		
C-34	Not used		
C-35	Paper, .022 mfd, 200 v	23103	
C-36	Same as C-23		
C-37	Same as C-35		
C-38	Same as C-23		
C-39	Electrolytic, 25 mfd/25 v	24006	
C-40	Same as C-16		
C-41	Same as C-3		
C-42	Ceramic, 470 mmf, 20%	23916	
C-43	Paper, .022 mfd, 400 v	23122	
C-44	Same as C-16		
C-45	Paper, 1 mfd, 100 v	23040	
C-46	Ceramic, 50,000 mmf, 25 v min	23614	
C-47	Same as C-5		
C-48	Same as C-1		
C-49 (A & B)	Ceramic, dual .01 mfd, AC	23982A	
CONTROLS			
R-33	500,000 ohms, tapped 100K, volume		25057
R-37	500,000 ohms, treble, w/switch		25039A
R-39	500,000 ohms, bass		25038A
COILS			
L-1	Antenna, FM		29426
L-2	Choke, 1 microhenry		29124
L-3	RF, FM		29158
L-4	1st I-F, FM		29148
L-5	2nd I-F, FM		29152
L-6	Ratio detector		29084
L-7	Choke, 4.7 microhenry		29145
L-8	1st I-F, AM		29066
L-9	2nd I-F, AM		29067
L-10	Same as L-7		
L-11	Loop antenna, AM		29358A
L-12	Oscillator, FM		29242A
L-13	Oscillator, AM		29229B
RESISTORS			
R-1	1/2 watt, 10% unless specified		73016
R-2	180 ohms		73033
R-3	4700 ohms		73167
R-4	3.3 megohms, 20%		73025
R-5	1000 ohms		73014
R-6	120 ohms		73011
R-7	68 ohms		73014
R-8	10,000 ohms		73037
R-8	820 ohms		73024.

MODELS 11RP65, 11RP75, 11RP85, 11RP95



Chassis 11HF15, Top View



Chassis 11HF15 Bottom View

MISCELLANY

32031	Cord, AC power, 8 ft.
38170	Dial, tuning
40003	Drive cord, 31 in.
52205	Knob, Treble, Bass, or Switch
52206	Knob, Volume or Tuning
54002	Lamp, T-47, compartment
54006	Lamp, T-51, dial

RECORD CHANGER:

58076	Model 11RP6S: V-M 1210 changer with Electro-Voice stereo cartridge model 0166 with dual sapphire needle
58076	Model 11RP7S: V-M 1210 changer with Electro-Voice stereo cartridge model 0126 with dual sapphire needle
58077	Model 11RP8S: Garrard RC-121 changer with Electro-Voice stereo cartridge model 0126 with diamond & sapphire needle
63045	Model 11RP9S: V-M 1210 changer with Electro-Voice stereo cartridge model 0126 with diamond & sapphire needle
58056-1	Spindle, 45 rpm Spindle:clip: 28#52
66013	Plug, speaker (Used w/shield 78026)
67041	Pointer

SPEAKERS (Impedance of each = 8 ohms)

83110	11RP6S: 4 in. PM (resonance 900 cycles)
83111	4 in. PM (resonance 1200 cycles)
83121	6 x 9 in. oval PM (resonance 110 cycles)
83110	11RP7S: 4 in. PM (resonance 900 cycles)
83111	4 in. PM (resonance 1200 cycles)
83211	11RP8S: 5 in. PM (resonance 85 cycles)
83211	5 in. PM (resonance 900 cycles)
83212	5 in. PM (resonance 1200 cycles)
83807	12 in. PM (resonance 55 cycles)
86072	11RP9S: Same as in 11RP8S
79109	Switch, AM-FM-Phono
	Socket, phono

73028	1800 ohms
73161	1 megohm, 20%
73045	Not used
73045	47,000 ohms
73153	220,000 ohms, 20%
	Same as R-9
73049	100,000 ohms
73157	470,000 ohms, 20%
73221	470 ohms, 1 watt
73035	6800 ohms
73022	Same as R-10
	560 ohms
	Not used
	Same as R-16
	Same as R-10
	Same as R-20
73041	22,000 ohms
73036	8200 ohms
	Same as R-10
73221	6800 ohms, 1 watt
73165	2.2 megohms, 20%
73155	330,000 ohms, 20%
	Not used
	Same as R-30
	See CONTROLS
	Same as R-12
73169	4.7 megohms
73026	1200 ohms
	See CONTROLS
	Same as R-13
	See CONTROLS
	Same as R-25
	Not used
73158	550,000 ohms, 20%
	Same as R-13
73055	330,000 ohms (10%)
	Same as R-10
	Same as R-25
73237	10,000 ohms, 1 watt
73635	2500 ohms, 5 watts
	Same as R-48

TRANSFORMERS

T-1	Output, 10,000 ohms to 8 ohms	89460
T-2	Power	89075
	Primary: 117 volts	
	Secondary: 550 volts CT @ 70 ma	
	6.3 volts @ 4 1/2 amp	

ELECTRON TUBES

V-1	FM RF amplifier	6AU6
V-2A	FM mixer	1/2 12AT7
V-2B	FM oscillator	1/2 12AT7
V-3A	1st I-F amplifier	1/2 6E8
V-3B	AFC	1/2 6E8
V-4	2nd I-F amplifier, AM detector	6AU6
V-5	Ratio detector	6AL5
V-6	2nd audio & stereo preamplifier	12AX7 or ECC83
V-7	Power amplifier	6AQ5
V-8	1st audio amplifier	6AU6
V-9	Power amplifier	6AQ5
V-10	AM converter	6BE6
V-11	Rectifier	6X4

BE SURE TO ALIGN AM SECTION FIRST

DUMMY ANTENNA	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RADIO RECTIFIER DIAL SETTING	VTVM CONNECTION	ADJUST	NOTES
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ALIGNMENT OF I-F, AM SECTION

1. .01 mfd in series with gen. output	Pin 7 of V-10 (grid 3, 6BE6)	455 kc modulated with 400 cps	Low frequency end point	Negative to pt. B, positive to ground	S-7, S-8, S-9, & S-10 for MAX	Reduce signal generator output to lowest usable level
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ALIGNMENT OF R-F, AM SECTION

2. None	Loose couple to loop	1620 kc modulated with 400 cps	High frequency end point	Ditto	C7-H for MAX	None
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ALIGNMENT OF I-F, FM SECTION

3. None	Ditto	1500 kc modulated with 400 cps	Tune in signal	Ditto	C7-F for MAX	None
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ALIGNMENT OF R-F, FM SECTION

4. .01 mfd in series with gen. output	Pin 2 of V-2A (grid 1, 6BE6)	10.7 mc, unmodulated (1/2 12AT7)	Low frequency end point	Ditto	S-1, S-2, S-3, & S-4 for MAX	Reduce signal generator output to less than one volt at pt. B
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ALIGNMENT OF I-F, FM SECTION

5. Ditto	Ditto	Ditto	Ditto	Negative to pt. "A", positive to ground	S-5 for MAX	None
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ALIGNMENT OF R-F, FM SECTION

6. Ditto	Ditto	Ditto	Ditto	Negative to pt. "A", positive to ground	S-6 for ZERO	A plus or minus reading will be obtained on each side of setting.
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ALIGNMENT OF R-F, FM SECTION

7. 150 ohms in each lead	FM antenna terminal	106 mc, unmodulated	106 mc	Negative to pt. "A", positive to ground	C7-D (=C25) for MAX	None
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ALIGNMENT OF R-F, FM SECTION

8. Ditto	Ditto	Ditto	Ditto	Ditto	C7-B for MAX	Remove shield and adjust core of L1,2 for MAX VTVM reading.
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ALIGNMENT OF R-F, FM SECTION

9. Ditto	Ditto	92 mc, unmodulated	92 mc	Ditto	Ditto	None
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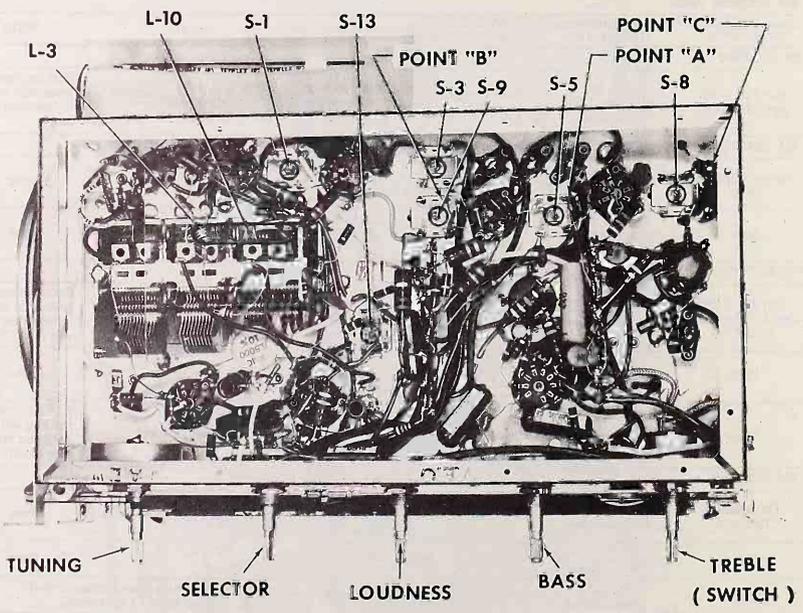
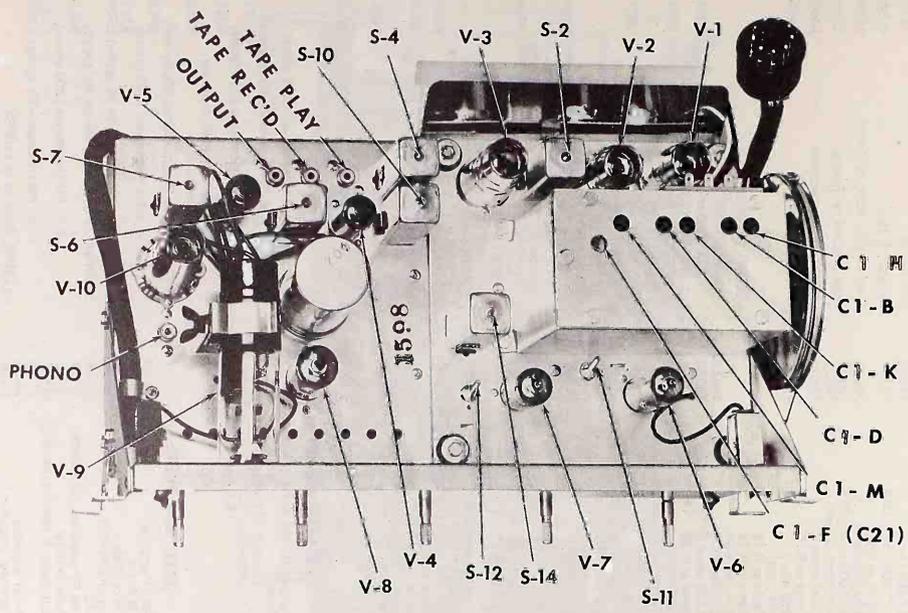
ALIGNMENT OF R-F, FM SECTION

10. Ditto	Ditto	Ditto	Ditto	Ditto	Ditto	None
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ALIGNMENT OF R-F, FM SECTION

11. REPEAT STEPS 7 THRU 10 UNTIL NO FURTHER INCREASE IN VTVM READING OCCURS.						Wet wax on L3 and expand or compress for MAX VTVM reading. Wax to prevent howl.
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Equipment Required: Signal generator, AM; two 150 ohm 1/2 watt resistors; one .01 mfd, 600 volt paper capacitor.

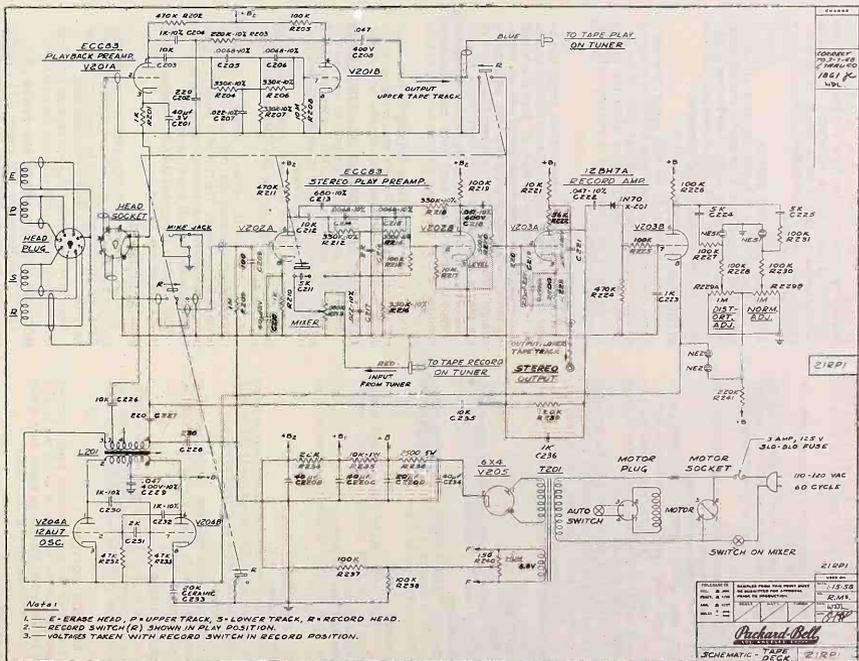


Tuner, Top and Bottom Views (FOLDOUT)
(Access Holes Indicated)

DUMMY ANTENNA	SIGNAL GENERATOR CONNECTION	SIGNAL GENERATOR FREQUENCY	RADIO RECEIVER DIAL SETTING	VTVM CONNECTION	ADJUST	NOTES
ALIGNMENT OF I-F₂ AM SECTION						
1. .01 mfd in series with gen. output	Pin 7 of V-7 (grid 3, 6BE6)	455 kc, modulated with 400 cps	Low frequency end point	Negative to pt "B" thru 4.7 megohms, positive to ground	S-9, S-10, S-13, & S-14 for MAX	Reduce signal generator output to lowest usable level
ALIGNMENT OF R-F, AM SECTION						
2. None	Loose-couple to loop	1620 kc, modulated with 400 cps	High frequency end point	Ditto	C1-M for MAX	None
3. None	Ditto	1500 kc, modulated with 400 cps	Tune in signal	Ditto	C1-H & C1-K for MAX	None
4. None	Ditto	600 kc, modulated with 400 cps	600 kc	Ditto	S-12 & S-11 for MAX	None
5. REPEAT STEPS 2 THRU 4 UNTIL NO FURTHER INCREASE IN VTVM READING OCCURS.						
ALIGNMENT OF I-F, FM SECTION						
6. .01 mfd in series with gen. output	Pin 7 of V-2A (grid, FM mixer, 1/2 12AT7)	10.7 mc, unmodulated	Low frequency end point	Negative to pt "A" thru 4.7 megohms, positive to ground	S-1, S-2, S-3, S-4, S-5, & S-6 for MAX	Reduce signal generator output to less than one volt at pt. "A"
7. Ditto	Ditto	Ditto	Ditto	Positive to pt "C" thru 4.7 megohms, negative to ground	S-7 for MAX	Detune S-8 slightly before adjusting S-7
8. Ditto	Ditto	Ditto	Ditto	Ditto	S-8 for min	None
ALIGNMENT OF R-F, FM SECTION						
9. 150 ohms in each lead	FM antenna terminal	106 mc, unmodulated	106 mc	Negative to pt "A" thru 4.7 megohms, positive to ground	C1-F (= C21) for MAX	None
10. Ditto	Ditto	Ditto	Ditto	Ditto	C1-D & C1-B for MAX	None
11. Ditto	Ditto	92 mc, unmodulated	92 mc	Ditto	Compress or expand coil L-10 for MAX VTVM reading	
12. Ditto	Ditto	Ditto	Ditto	Ditto	Compress or expand coil L-3 for MAX VTVM reading	
13. REPEAT STEPS 9 THRU 13 UNTIL NO FURTHER INCREASE IN VTVM READING OCCURS.						

ALIGNMENT CHART

Equipment Required: Signal generator, AM; two 150 ohm 1/2 watt resistors; one .01 mfd, 600 volt paper capacitor, one 4.7 megohm resistor.



Tape Deck, Schematic

Tape Deck

THE TAPE DECK IS FOUND ONLY ON MODEL 21RP1 BUT THIS SECTION MAY BE USEFUL IN USING AN EXTERNAL TAPE RECORDER WITH THE 16RP1.

MIXER control is used to add phono or radio output to microphone recording.

LEVEL control adjusts volume to correct level for tape recording as indicated by the NORMAL and DISTORT lamps. It also controls volume of stereo output when playing binaural tapes.

DISTORT adjustment, NORMAL adjustment, and HUM adjustment are concealed.

CONNECTORS (cable with pin-plug)

1. RED cable: to TAPE REC'D on tuner chassis. Receives audio signal for recording on tape.
2. BLUE cable: to TAPE PLAY on tuner chassis. Feeds output of playback preamplifier to tuner chassis, then to power chassis.
3. STEREO OUTPUT. Feeds pre-amplified output of binaural head to external amplifier and speaker.

MICROPHONE JACK. Besides microphone supplied, any high impedance crystal, ceramic, or dynamic microphone may be plugged into this receptacle.

PUSH BUTTONS

Stop Button
The STOP button should be depressed before each operation and when the machine is not in use.

Record Button
Depress the RECORD button for recording a tape. The red SAFETY lever must be held to the right before the RECORD button can be depressed.

Play Button
Depress the PLAY button for playing back a recording. Adjust the VOLUME control and TONE controls on the tuner chassis.

Rewind and Forward Buttons
These wind the tape in either direction at high speed.

RECORD LEVEL INDICATORS

Distort Indicator
The DISTORT lamp indicates when tape is being overloaded while recording. Adjust the LEVEL control so that faint flashes occur at loudest sounds.

Normal Indicator
The NORMAL lamp indicates correct recording level. Adjust the LEVEL control until the NORMAL lamp flashes regularly.

TAPE INDEX TIMER

Set both the large and small dials of the timer to zero after threading a reel of tape. After each selection is recorded, note the timer readings for future reference.

SPEED CONTROL BUTTON

The pointer on the speed control knob indicates the speed (inches per second) at which the tape is passing by the heads. To change speed, turn speed control knob after depressing stop button.

SAFETY LEVER

The safety lever locks the RECORD button to prevent accidental erasing. Push "S" lever to the right and hold while depressing the RECORD button.

PAUSE BUTTON

To stop the travel of the tape while recording or playing, push the PAUSE button. To lock, push it to the rear and move it to the right. The purpose of this control is to allow for the adjustment of recording volume before the tape is set in motion, to eliminate commercials from a radio recording, or lulls from a recorded conversation.

AUTOMATIC SHUT-OFF SWITCH

The mechanism is automatically shut off unless tape is threaded in front of the plastic shut-off lever. Should tape break, or the supply wheel become empty, the mechanism will shut off automatically and will remain so until the machine is rethreaded.

STEREOPHONIC TAPES

Stereophonic tapes of the type called "stacked", or "in line", may be played on the 21RP1 by attaching an additional amplifier and speaker system to the jack marked STEREO OUTPUT. This allows the second soundtrack to be amplified and reproduced simultaneously with the first.

THREADING THE TAPE

With STOP button depressed, place empty reel on right hand (take-up) spindle. Place a full reel of tape on left hand (supply) spindle, so that it unwinds counterclockwise. Thread tape, glossy side out, following threading line (embossed in plastic escutcheon) straight through the slot in the covers and in front of the plastic automatic shut off lever. Place tape in front of chrome plated tape guide and insert free end of tape into hub slot of right hand reel. Wind right hand reel one or two turns counterclockwise to take up slack.

Detailed instructions for performing the various operations of recording, playback, etc., are given in the operating instructions supplied with the set.

ADJUSTMENT OF RECORDING INDICATOR LIGHTS

Set MIXER and VOLUME controls to maximum. Inject 30 millivolts at 1000 cycles into TAPE REC'D plug (red cable). Set NORMAL adjustment so that NORMAL light just flickers.

Increase voltage to 0.5 volts (1000 cycles). Set DISTORT adjustment so that DISTORT light just flickers or goes out.

As a further check, advance voltage to one volt (1000 cycles) and turn VOLUME to minimum. Now advance it (clockwise). The NORMAL should light between one-quarter and one-half turns, and the DISTORT between one-half and three-fourths.

Turn VOLUME full up and MIXER to minimum. Both lamps should now be out.

HUM ADJUSTMENT

Turn on receiver and tape mechanism. Set SELECTOR switch to TAPE position and turn the TREBLE, BASS and LOUDNESS controls to maximum. Then adjust HUM control (R-23B) for minimum hum.

Reverse AC power cord plug and readjust HUM control. Use plug position that produces the least hum.

MECHANICAL ADJUSTMENTS AND PARTS LIST

See Service Manual on V-M models 711 and 750 (published by V-M Corporation) for mechanical adjustments and parts list.

Packard-Bell Factory Service Depts. will be supplied with a copy of the V-M manual.

REPLACEABLE PARTS, TUNER CHASSIS

REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER	REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
	RESISTORS (1/2 w unless specified) (10% unless specified)				
R-1	470,000 ohms, 20%	73157	R-60	2700 ohms	73030
R-2	68 ohms	73011	R-61	150,000 ohms, 1 watt	73251
R-3	Same as R-1		R-62	Same as R-32	
R-4	3.3 megohms, 20%	73167	R-63	Same as R-27	
R-5	180 ohms	73016	R-64	2200 ohms	73029
R-6	180 ohms (w/ coil) See coil L-4	73016	R-65	Same as R-61	
R-7	47,000 ohms	73045	R-66	Same as R-15	
R-8	100 ohms	73013		CONTROLS	
R-9	Same as R-8		R-42	1 megohm, tapped, volume	25044
R-10	10,000 ohms, 2 watts	73437	R-48	5 megohms, w/ switch, treble	25522
R-11	Same as R-10		R-51	5 megohms, bass	25521
R-12	1000 ohms	73025		CAPACITORS	
R-13	220,000 ohms, 20%	73153	C-1	Variable, 6-gang w/ trimmers	23552
R-14	27,000 ohms	73042		Sec. A-B — FM antenna & trimmer	
R-15	150,000 ohms, 5%	73051-1		Sec. C-D — FM RF & trimmer	
R-16	Same as R-15			Sec. E-F — FM osc & trimmer C-21	
R-17	68,000 ohms	73047		Sec. G-H — AM antenna & trimmer	
R-18	220 ohms	73017		Sec. J-K — AM RF & trimmer	
R-19	Same as R-1			Sec. L-M — AM osc & trimmer	
R-20	10,000 ohms, 1 watt	73237	C-2	Ceramic, 220 mmf, 20%	23915
R-21	Not used		C-3	Ceramic, 5000 mmf, +80, —20%, working voltage, 25 v minimum, 1/4 in. dia.	23611
R-22	560 ohms	73022	C-4	Ceramic, 10,000 mmf, 25 v, 3/8 in. dia (see p/m 4)	23612
R-23	1 megohm, 20%	73161	C-5	Same as C-3	
R-24	15,000 ohms, 1 watt	73239	C-6	Ceramic, 100 mmf, 20%	23914
R-25	22,000 ohms	73041	C-7	Same as C-6	
R-26	6800 ohms, 2 watts	73435	C-8	Ceramic, 5000 mmf, GMV	23931
R-27	2.2 megohms, 20%	73165	C-9	Ceramic, 1 mmf, 10%	23603
R-28	Same as R-13		C-10	Same as C-6	
R-29	Same as R-13		C-11	Ceramic, 330 mmf, 20%	23944
R-30	Same as R-27		C-12	Ceramic, 1000 mmf, GMV	23860
R-31	Not used		C-13	Same as C-12	
R-32	47,000 ohms, 1 watt	73245	C-14	Ceramic, 100 mmf, 5%, N470	23616
R-33	Same as R-27		C-15	Same as C-3	
R-34	470 ohms	73021	C-16	Same as C-12	
R-35	Same as R-20		C-17	Same as C-8	
R-36	Same as R-1		C-18	Same as C-4	
R-37	10,000 ohms	73037	C-19	Same as C-8	
R-38	Same as R-25		C-20	Ceramic, 10,000 mmf, GMV	23862
R-39	15,000 ohms, 2 watts	73439	C-21	Trimmer for C-1, sec F, 3 to 12 mmf, NPO	23432
R-40	100,000 ohms, 20%	73149	C-22	Same as C-6	
R-41	Same as R-7		C-23	Same as C-20	
R-42	See CONTROLS		C-24	Ceramic, 47 mmf, 20%	23912
R-43	Same as R-40		C-25	Same as C-12	
R-44	1800 ohms	73028	C-26	Same as C-12	
R-45	Not used		C-27	Same as C-6	
R-46	Same as R-40		C-28	Same as C-4	
R-47	Same as R-20		C-29	Ceramic, 4.7 mmf, 10%, NPO	23978
R-48	See CONTROLS		C-30	Same as C-24	
R-49	Same as R-23 (see p/m 3)		C-31	Same as C-12	
R-50	390,000 ohms (see p/m 3)	73056	C-32	Tweet filter, see diagram	23930
R-51	See CONTROLS		C-33	Same as C-20	
R-52	Same as R-40		C-34	Ceramic, 15 mmf, 20%	23910
R-53	330,000 ohms, 20%	73155	C-35	Same as C-2	
R-54	Same as R-25		C-36	Paper, .047 mfd, 200 v	23105
R-55	Same as R-32		C-37	Paper, .047 mfd, 400 v, 10%	23324
R-56	4.7 megohms, 20%	73169	C-38	Ceramic, 5000 mmf, 10%	23986
R-57	Same as R-27 (see p/m 1)		C-39	Same as C-34	
R-58	Same as R-23 (in 6E5 skt)				
R-59	Same as R-7				

REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER	REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
C-40	Same as C-24		L-7	2nd I-F, AM	29067
C-41	Same as C-8		L-8	3rd I-F, FM	29096
C-42	Same as C-8		L-9	Discriminator	29092B
C-43	Same as C-20		L-10	Oscillator, FM (see p/m 2)	29238B
C-44	Same as C-36		L-11	Antenna, AM	29357
C-45	Same as C-4		L-12	RF, AM	29143
C-46	Same as C-36		L-13	Oscillator, AM	29237
C-47	Same as C-6		L-14	1st I-F, AM	29093
C-48A	Electrolytic, 40 mfd, 450 v		MISCELLANEOUS PARTS		
C-48B	Electrolytic, 40 mfd, 450 v	24147	Cartridge	GE # C-1D3SC	63037
C-48C	Electrolytic, 20 mfd, 450 v		Alt:	GE # 4-GC-1D3SC	63038
C-49	Paper, .022 mfd, 400 v	23122	Changer, record		58066A
C-50	Ceramic, 82 mmf, 10%			(Garrard RC-121)	
C-47	Same as C-6	23964	Dial, glass		38162A
C-51	Same as C-12		Dial, paper		65221
C-52	Ceramic, 2000 mmf, 20%	23839	KNOBBS		
C-53	Same as C-4		Treble, Bass, Loudness & Selector		52205
C-54	Paper, .1 mfd, 200 v	23107	Tuning		52206
C-55	Same as C-20		Magic Power-Minder		52210
C-56	Same as C-20		Lamp, T-47		54002
C-57	Same as C-12		Plug, spkr		86013
C-58	Same as C-52		Plug, used w/shield (78026)		
C-59	Same as C-12		Pointer		67044A
C-60	Same as C-8		Socket, phono		79109
C-61	Same as C-8		SPEAKERS (Impedance of each: 8 ohms)		
C-62	Same as C-8		5" PM, 900 cps resonance		83211
L-1	Antenna, FM	29425B	5" PM, 1200 cps resonance		83212
L-2	Choke, RF	29145	5" PM, 1200 cps resonance		83808
L-3	RF coil, FM	29144D	Switch, band		86061
L-4	Choke, suppressor	29146	Switch, power-minder		86064
L-5	1st I-F, FM	29148	(Cover: 86064-1)		
L-6	2nd I-F, FM	29148			

REPLACEABLE PARTS, POWER SUPPLY

REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER	REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
C-101	Ceramic, 470 mmf, 20%	23916	R-114	Same as R-113	
C-102	Paper, .1 mfd, 400 v	23126	R-115	Same as R-113	
C-103A	Electrolytic, 40 mfd, 450 v		R-116	Same as R-113	
C-103B	Electrolytic, 40 mfd, 450 v	24147	R-117	Same as R-105	
C-103C	Electrolytic, 20 mfd, 450 v		R-118	Wirewound, 125 ohms, 10 watts	73718
C-104	Paper, .1 mfd, 600 v	23145	R-119	Wirewound, 1000 ohms, 5 watts	73621
C-105	Same as C-104		R-120	Wirewound, 2000 ohms, 5 watts	73631
C-106	Electrolytic, 250 mfd, 25 v	24144	R-121	10 ohms	73001
C-107	Ceramic, dual 10,000 mmf, AC	23982A	TRANSFORMERS		
C-108	Electrolytic, 40 mfd, 450 v	24143	T-101	Output	89478A
C-109	Electrolytic, 5 mfd, 25 v, non-polarized	24146	T-102	Power	89063
RESISTORS					
(10% unless specified)					
R-101	1500 ohms	73027	ELECTRON TUBES		
R-102	470,000 ohms, 20%	73157	V-101A	Audio amplifier	
R-103	270,000 ohms	73054	V-101B	Inverter	6AN8
R-104	1.2 megohms	73062	V-102	Output	6V6-GT
R-105	680 ohms, 1 watt	73223	V-103	Output	6V6-GT
R-106	47 ohms	73009	V-104	Output	6V6-GT
R-107	47,000 ohms, 5%, 1 watt	73245-1	V-105	Output	6V6-GT
R-108	Same as R-107		V-106	Rectifier	5U4-GB
R-109	Same as R-107		MISCELLANEOUS PARTS		
R-110	Same as R-103		Cord, AC		32011
R-111	Same as R-103		Socket, 4-pin AC		79180
R-112	820 ohms, 2 watts	73424	Socket, phono		79005
R-113	1000 ohms	73025	Socket, power		79122
			Socket, speaker		79004

REPLACEABLE PARTS, TAPE DECK

RESISTORS			CAPACITORS		
REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER	REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
R-201	1000 ohms	73025	C-201	Electrolytic, 40 mfd, 3 volts	24150
R-202	470,000 ohms, 20%	73157	C-202	Ceramic, 220 mmf, 20%	23915
R-203	220,000 ohms	73053	C-203	Ceramic, 10,000 mmf, GMV	23862
R-204	330,000 ohms	73055	C-204	Ceramic, 1000 mmf, 10%	23983
R-205	100,000 ohms	73049	C-205	Paper, .0068 mfd, 10%, 200 v	23176
R-206	Same as R-204		C-206	Same as C-205	
R-207	Same as R-204		C-207	Paper, .022 mfd, 10%, 200 v	23177
R-208	10 megohms, 20%	73173	C-208	Paper, .047 mfd, 20%, 400 v	23124
R-209	1 megohm, 20%	73161	C-209	Ceramic, 100 mmf, 20%	23914
R-210	Same as R-201		C-210	Same as C-201	
R-211	Same as R-202		C-211	Ceramic, 5000 mmf, GMV	23931
R-212	Same as R-204		C-212	Same as C-203	
R-213	See CONTROLS		C-213	Ceramic, 680 mmf, 10%	23892
R-214	Same as R-204		C-214	Same as C-205	
R-215	Same as R-205		C-215	Same as C-205	
R-216	Same as R-204		C-216	Ceramic, 2000 mmf, 20%	23839
R-217	Same as R-204		C-217	Same as C-207	
R-218	Same as R-208		C-218	Paper, .047 mfd, 10%, 400 v	23324
R-219	Same as R-205		C-219	Same as C-202	
R-220	See CONTROLS		C-220A	Electrolytic, 25 mfd, 25 v	
R-221	10,000 ohms	73037	C-220B	Electrolytic, 40 mfd, 350 v	24092
R-222	56,000 ohms	73046	C-220C	Electrolytic, 40 mfd, 350 v	
R-223	2200 ohms	73029	C-220D	Electrolytic, 20 mfd, 350 v	
R-224	Same as R-202		C-221	Same as C-208	
R-225	Same as R-205		C-222	Same as C-218	
R-226	Same as R-205		C-223	Same as C-204	
R-227	Same as R-205		C-224	Same as C-211	
R-228	Same as R-205		C-225	Same as C-211	
R-229A)			C-226	Same as C-203	
R-229B)	See CONTROLS		C-227	Same as C-202	
R-230	Same as R-205		C-228	Same as C-202	
R-231	Same as R-205		C-229	Same as C-218	
R-232	47,000 ohms	73045	C-230	Same as C-204	
R-233	Same as R-232		C-231	Same as C-216	
R-234	22,000 ohms	73041	C-232	Same as C-204	
R-235	10,000 ohms, 1 watt	73237	C-233	Ceramic, 20,000 mmf, 20%	23972
R-236	2500 ohms, 5 watts	73635	C-234	Electrolytic, 40 mfd, 450 v	24143
R-237	Same as R-205		C-235	Same as C-203	
R-238	Same as R-205		C-236	Ceramic, 1000 mmf, GMV	23860
R-239	120,000 ohms	73050	DIODE		
R-240	See CONTROLS		X-201	Crystal diode 1N70	72040
R-241	Same as R-203		COILS, TRANSFORMERS		
			L-201	Coil, bias oscillator	29240
			T-201	Transformer, power	89068
			MISCELLANY		
			(in addition to Miscellany listed under Tuner and Power Supply sec.)		
			Fuse, 3 amp, 125 volt, slo-blo		45043
			Jack, microphone		51005
			Knob, mixer and volume		52205
			Lamp, neon, NE-51		54009
			Lamp, neon, NE-52		54010
			Microphone, w/plug		57013
			Shield, noise tube		78114
			Switch, pushbutton		86307
R-213	500,000 ohms, mixer, w/ switch	25048	CONTROLS		
R-220	500,000 ohms, recording level	25058	R-213	500,000 ohms, mixer, w/ switch	25048
R-229A	1 megohm, distort adjust		R-220	500,000 ohms, recording level	25058
R-229B	1 megohm, normal adjust	Dual 25050	R-229A	1 megohm, distort adjust	
R-240	150 ohms, hum control	25943	R-229B	1 megohm, normal adjust	
			R-240	150 ohms, hum control	25943



Packard Bell
ELECTRONICS

12333 W. Olympic Blvd.
Los Angeles 64

SERVICE MANUAL
TABLE MODEL RADIO 6R1
CLOCK RADIO MODEL 6RC1

Manual BC-50
Jan. 15, 1958



GENERAL

The circuit used in both models is a six tube super-heterodyne receiver circuit with an untuned RF stage. Standard miniature tubes are connected for AC-DC operation. Sixty cycle AC is required for clock operation.

The schematic diagram is the same for both models except for the addition of the timer (clock) motor, nite-lite, and second speaker to model 6RC1.

The 6R1 has one 6 by 4 in. oval speaker, while the 6RC1 contains two 3 in. speakers. The latter are connected in series, with a red dot indicating the input side for proper phasing.

The nite-lite in the 6RC1 is turned on by the push-pull switch on the volume control. In the 6R1 this switch is the radio ON-OFF control.

CLOCK OPERATING INSTRUCTIONS

Operating instructions are attached to the bottom of the clock radio and are repeated here.

Radio knobs:

Left is volume control and switch (pull out) for nite-lite. Right is tuning.

Clock knobs:

Left is sleep switch, for 0 to 60 min. Right is control knob.

STEP FOR	PROCEDURE
1. Radio only shut-off	Set control knob to ON and adjust tuning and volume.
2. Radio with shut-off	Turn set on with sleep switch, tune station and set sleep switch to interval desired before shut-off. (60 min = 180°)
3. Automatic turn-on	After step 1, set alarm and turn control knob to AUTO.
4. Automatic turn-on with buzzer	After step 3, turn control knob to ALARM. Buzzer will follow radio turn-on by 10 minutes.
5. Automatic shut-off and turn-on	After step 2, set control knob to either AUTO or ALARM.

To service tubes, remove two hex head screws at rear of cabinet, and slide entire chassis and front panel out of cabinet.

SPECIFICATIONS: (both models unless noted)

CABINET DIMENSIONS (to nearest 1/4 in.):
6 in. h by 12 1/2 in. w by 6 in. d

SHIPPING WEIGHT:

Radio 6R1: 8 lb.
Clock radio 6RC1: 8 lb

ELECTRICAL RATINGS:

Line voltage 110-120 volts AC or DC (must be 60 cycle AC for clock radio)
Power consumption, 30 watts for radio, 32 watts for clock radio.

TUNING FREQUENCY RANGE:

540 to 1620 kc.

POWER OUTPUT, MAXIMUM:

1.9 watts

SPEAKER DATA:

See parts table, also general description above.

SPECIAL SERVICING INFORMATION:

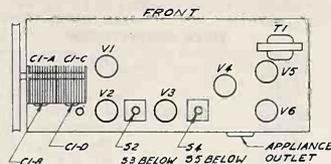
OSCILLATOR GRID VOLTAGES, Pin 1, V-2:
(Measured using a VTVM with input impedance of more than 10 megohms. Line voltage 117 volts AC.)

1500 kc	-5.5 volts DC (rms)
1000 kc	-5.5 volts
750 kc	-5.0 volts
540 kc	-4.8 volts

ALIGNMENT PROCEDURE:

The alignment of the set is accomplished by following the steps in the chart below. Connect output meter to speaker voice coil. Use isolation transformer between radio and power line to reduce shock hazard.

Each adjustment should be made using a minimum input signal. Connect test oscillator through a .01 mfd capacitor to the point indicated below. Ground lead of oscillator is connected to B minus bus.



Adjustments

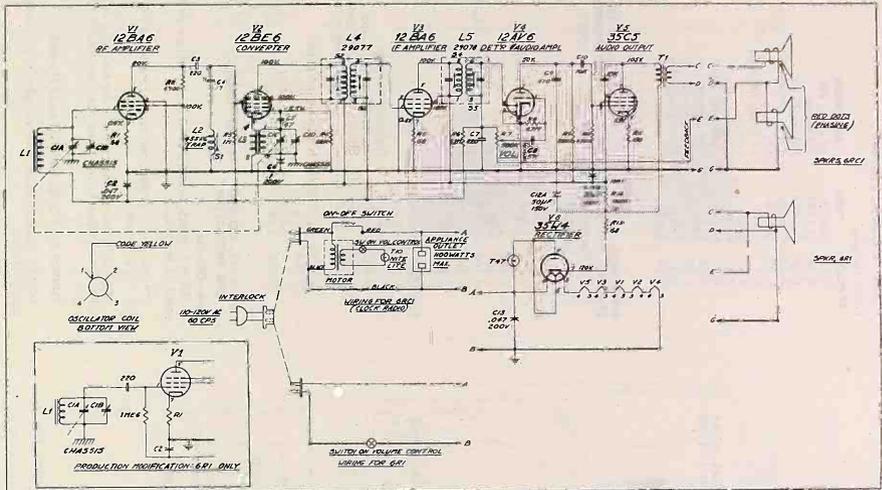
Step	Connect Test Oscillator to	Test Oscillator Frequency	Radio Dial Setting	Adjust
1.	Pin 1, V-1 (12BA6)	455 kc	540 kc	S-1 for minimum
2.	ditto	ditto	ditto	S-2, S-3, S-4, & S-5 for MAXIMUM
3.	ditto	1620 kc	Tune to	C1-D for MAXIMUM
4.	Loose-couple to antenna	1500 kc	1620 kc oscillator	C1-B for MAXIMUM

REPLACEABLE PARTS

MODELS 6R1 & 6RC1

Parts are common to both models unless noted.

REFERENCE SYMBOL	RESISTORS (Rating 1/2 watt unless noted)	PACKARD-BELL PART NUMBER	REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
L-4	1st I-F	73011	L-4	1st I-F	29077
L-5	2nd I-F	73033	L-5	2nd I-F	29078
T-1	Transformer, output 2500 to 3.2 ohms	73161	T-1	Transformer, output 2500 to 3.2 ohms	89417A
SPEAKERS					
Model 6R1	Oval, 6 x 4 in., one used Impedance 3.2 ohms	73041	Model 6R1	Oval, 6 x 4 in., one used Impedance 3.2 ohms	83122
Model 6RC1	Three in. dia., two used Impedance of ea., 3.2 ohms	73165	Model 6RC1	Three in. dia., two used Impedance of ea., 3.2 ohms	83120
KNOBBS					
Both models	Tuning & Volume	73169	Both models	Tuning & Volume	52227A
6RC1 only	Timer knob (two used)	73153	6RC1 only	Timer knob (two used)	52226B
MISCELLANY					
C-1 (A, B, C, D)	Variable, two gang & trimmers	73157	Cabinet Cord, AC power	6R1 (#18 AWG)	21142D
C-2	Paper, molded case, .047 mfd, 200 volts	73015	6R1 (#18 AWG)	6RC1 (#16 AWG)	32029A
C-3	Ceramic, 220 mmf, 20%	73016	Dial Escutcheon, front	6R1	32028A
C-4	Ceramic, 47 mmf, 20%	73017	6R1	6RC1	38161A
C-5	Same as C-4	73018	Light, dial, T-47	Light, "Nite-Lite", T-43	41140C
C-6	Paper, molded case, .1 mfd, 220 volts	73019	(On 6RC1 only)	(On 6RC1 only)	41124D
C-7	Same as C-3	73020	Timer (clock)	Timer (clock)	54002
C-8	Ceramic, 5000 mmf, GMV	73021	(On 6RC1 only)	(On 6RC1 only)	58064A
C-9	Ceramic, 470 mmf, 20%	73022	Plug, AC interlock	Plug, AC interlock	66047
C-10	Ceramic, 10,000 mmf, GMV	73023	Pointer	Pointer	67045A
C-11	Same as C-10	73024	Pulley	Pulley	69003C
C-12 (A & B)	Dual 50 mfd/150 volts	73025	Socket, AC appliance	Socket, AC appliance	79096
C-13	Same as C-2	73026	ELECTRON TUBES		
L-1	Loop, ferrite	29358	V-1	R-F Amplifier	12BA6
L-2	Trap, 455 kc	29088	V-2	Converter	12BE6
L-3	Oscillator coil	29229B	V-3	I-F Amplifier	12BA6
			V-4	Detector and Audio Amplifier	12AV6
			V-5	Audio output	35C5
			V-6	Rectifier	35W4



Note production modification at lower left on 6R1 only.

Schematic, 6R1 & 6R1. Note differences in speaker section and AC power input section in the two circuits.

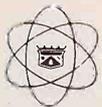
DC RESISTANCE MEASUREMENTS:

1st I-F Coil (29077):
 Primary, 12 ohms
 Secondary, 13 ohms

2nd I-F Coil (29078)
 Primary, 13 ohms
 Secondary, 13 ohms

Oscillator Coil (29229B)
 Primary, 1 ohm
 Secondary, 5.5 ohms

Loop antenna:
 Resistance, 0.3 ohms



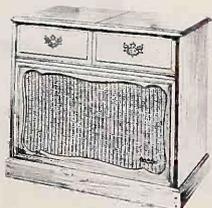
Packard Bell ELECTRONICS

SERVICE MANUAL

MODEL 16RP1 COMBINATION PHONO-RADIO MODEL 21RP1 COMBINATION PHONO-RADIO-TAPE RECORDER

12333 West Olympic Blvd.
Los Angeles 64, Calif.

MANUAL BC-46
MARCH 1, 1958



Colonial Finish (Mahogany Similar)



Walnut or Oak Finish

GENERAL DESCRIPTION:

Model 16RP1 is a high-fidelity combination phono-graph and radio (AM and FM) containing a total of sixteen electron tubes, including rectifier. Separate treble and bass controls are provided, and the ON-OFF switch is the push-pull type, operated by the treble control knob. The selector switch has six positions, two for AM and FM radio, three for record reproduction (AES, LP, and 78), and one for tape playback from an external tape recorder.

The record changer is automatic, four speed, with a spindle provided for 45 rpm records. Antennas for both AM and FM are built-in the set, but in fringe areas a separate antenna may be needed for FM reception.

A special feature is the "Magic Power Minder" switch which may be set to turn off power after last record is completed.

Provision is made for connecting additional speakers if desired. Connections for four, eight, or sixteen ohms impedance are available.

Model 16RP1 is divided into two chassis: the tuner chassis and the power supply chassis. The former contains the AM and FM circuitry, plus two stages of audio to the output receptacle. The power supply chassis, besides furnishing power to the system, contains the push-pull parallel output stages.

Model 21RP1 consists of the two chassis comprising the 16RP1 plus a tape recorder and associated amplifier on a third chassis, the tape deck. This has five additional tubes, making the total twenty-one.

A block diagram illustrates the functions of the component circuits for both the 16RP1 and 21RP1.

SPECIFICATIONS:

(Apply to both the 16RP1 and 21RP1 unless noted)

CABINET FINISHES:

Mahogany, Oak, Colonial, and Walnut

CABINET DIMENSIONS:

Height, 32 3/4 in.

Width, 37 in.

Depth, 21 1/2 in.

CHASSIS DIMENSIONS:

Tuner chassis 13" w by 5" h by 8 1/2" d

Power chassis: 13" w by 5 1/2" h by 6" d

Tape deck (in 21RP1 only):

14" w by 8" h by 8" d (excluding reels)

SHIPPING WEIGHT:

16RP1, 160 lb.; 21RP1, 180 lb.

ELECTRICAL RATINGS:

Line voltage, 110-120 volts AC, 60 cycles only.

Power consumption:

16RP1, 180 watts; 21RP1, 265 watts

TUNING FREQUENCY RANGE:

AM radio, 530 to 1620 kc

FM radio, 88 to 108 mc

OUTPUT:

20 watts at less than 1% distortion

30 watts at less than 10% distortion

40 watts peak

AMPLIFIER FREQUENCY RESPONSE:

20 to 50,000 cps @ 1 watt w/ less than 1% distortion

30 to 15,000 cps @ 20 watts w/ less than 1% distortion

± 1 db from 15 to 30,000 cps at 1 watt

INTERMEDIATE FREQUENCIES:

AM, 455 kc; FM 10.70 mc

TUBE COMPLEMENT:

Tuner chassis:

SYMBOL	TUBE	FUNCTION
V-1	6BQ7A	RF ampl, FM
V-2A	1/2 12A7	FM mixer
V-2B	1/2 12A7	FM oscillator
V-3A	1/2 6U8	1st I-F amplifier
V-3B	6AU6	AFC
V-4	6AU6	I-F ampl; AM det r
V-5	6AU6	Limiter
V-6	6BA6	RF ampl, AM
V-7	6BE6	Converter, AM
V-8A	1/2 12A7	Audio ampl
V-8B	1/2 12A7	Audio ampl
V-9	6E5	Tuning indicator
V-10	12AX7	Phono pre-amp

CRYSTAL DIODES

REFERENCE SYMBOL	DESCRIPTION	PACKARD-BELL PART NUMBER
X-1	Crystal, Amperex 1N542	72027
X-2	(matched pair)	

Power supply chassis:

V-101	6AN8	Audio ampl & inverter
V-102	6V6-GT	Parallel push-pull output
V-103	6V6-GT	
V-104	6V6-GT	
V-105	6V6-GT	
V-106	5U4-GB	Rectifier

Tape deck (in model 21RP1 only):

V-201	(A & B)	Playback pre-amp
V-202A	1/2 ECC83	
V-202B	1/2 ECC83	
V-203A	1/2 12BH7A	Stereo OR mic pre-amp
		Stereo pre-amp OR mixer
		Stereo output OR recording
		amp
V-203B	1/2 12BH7A	Recording amplifier
V-204	(A & B)	Bias oscillator
V-205	6X4	
		Rectifier

CONTROLS, CONNECTORS, SWITCHES, AND INDICATORS:

Tuner Chassis

TREBLE, BASS, and LOUDNESS knobs are indicated by markings.

ON-OFF switch is push-pull type operated by TREBLE control knob.

SELECTOR switch has positions for FM radio, AM radio, Tape playback, and three positions for phono-graph.

TUNING knob is for both AM and FM radio.

POWER CABLE plugs into receptacle on power supply chassis.

PHONO receptacle receives pin-plug from record player cartridge.

OUTPUT receptacle feeds output of audio ampli-

fier in tuner through cable to dual push-pull power amplifier and speakers.

TAPE REC'D receptacle feeds output of radio or phono to MIXER in tape deck in Model 21RP1, or to any external tape recorder used with model 16RP1.

TAPE PLAY receptacle receives input from tape playback pre-amplifier in tape deck (Model 21RP1) or other tape output (Model 16RP1).

TUNING INDICATOR tube allows visual control for accurate frequency adjustment.

Power Supply Chassis

INPUT receptacle receives audio signal from tuner chassis for final amplification and output.

EXTERNAL SPEAKER connections are provided for attaching an additional speaker (s) if desired. Binding posts are marked for speaker impedances of 4, 8, or 16 ohms.

SPEAKER socket and SPEAKER plug are both on this chassis, as are the PHONO AC plug and socket.

TAPE RECORDER AC socket is used with tape deck or other tape recorder.

POWER RECEPTACLE feeds power thru cable attached to tuner.

RECORD CHANGER

The operation of the record changer is covered by the booklet furnished with the set and printed by the manufacturer (Garrard) of the changer. An important adjunct to the changer is the Magic Power-Minder switch described immediately below.

MAGIC POWER-MINDER

A special feature of your instrument is the Magic Power-Minder switch. This is controlled by the knob near the left rear corner of the record changer. There are two positions of this knob: MAN'L and AUTO.

(Be sure to distinguish between this switch and the AUTO-MANUAL switch on the changer plate.)

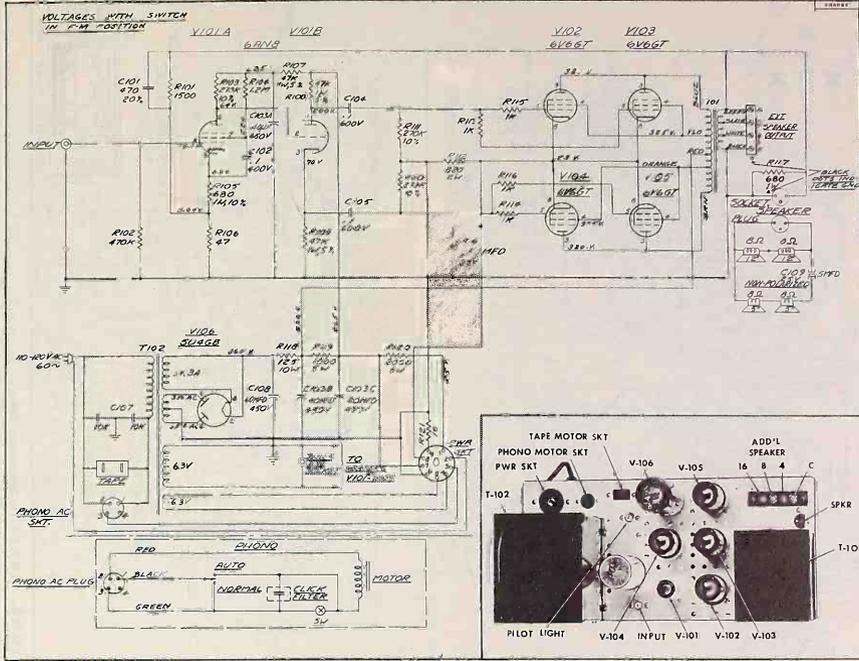
When the Magic Power-Minder is in MAN'L position, changer will turn off after last record but set will remain on.

When the Magic Power-Minder is in AUTO position, entire set will turn off after last record.

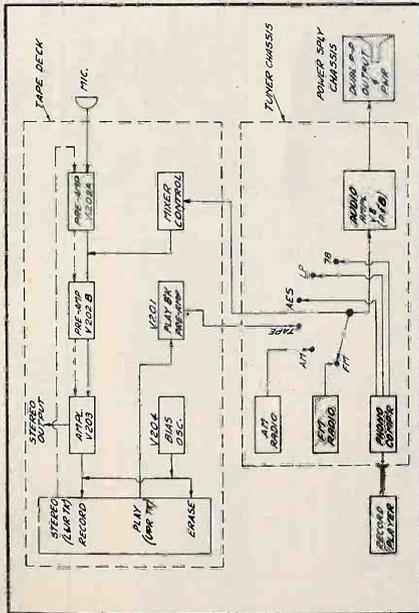
Leave the Magic Power-Minder knob in MAN'L position unless it is desired to turn off entire set after last record.

To use this automatic power-off feature, the record player must be in operation automatically (records stacked, switch ON CHANGER set to AUTO, and control knob set to START). Then the Magic Power-Minder knob is turned to AUTO and the set left to turn itself off.

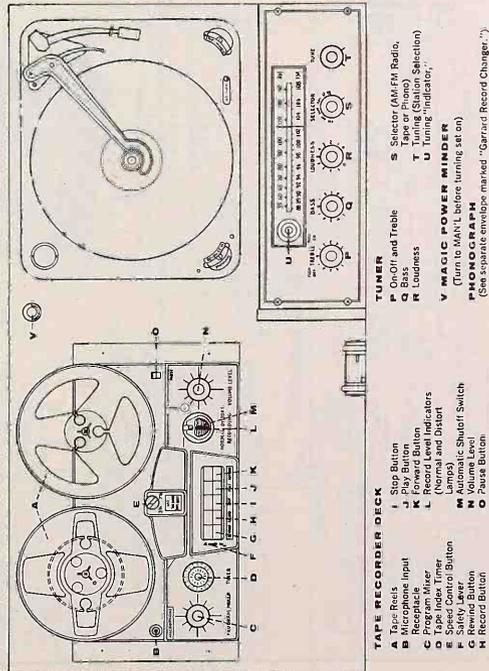
SWITCHING TO "AUTO" WHILE CHANGER IS NOT OPERATING WILL TURN OFF THE SET.



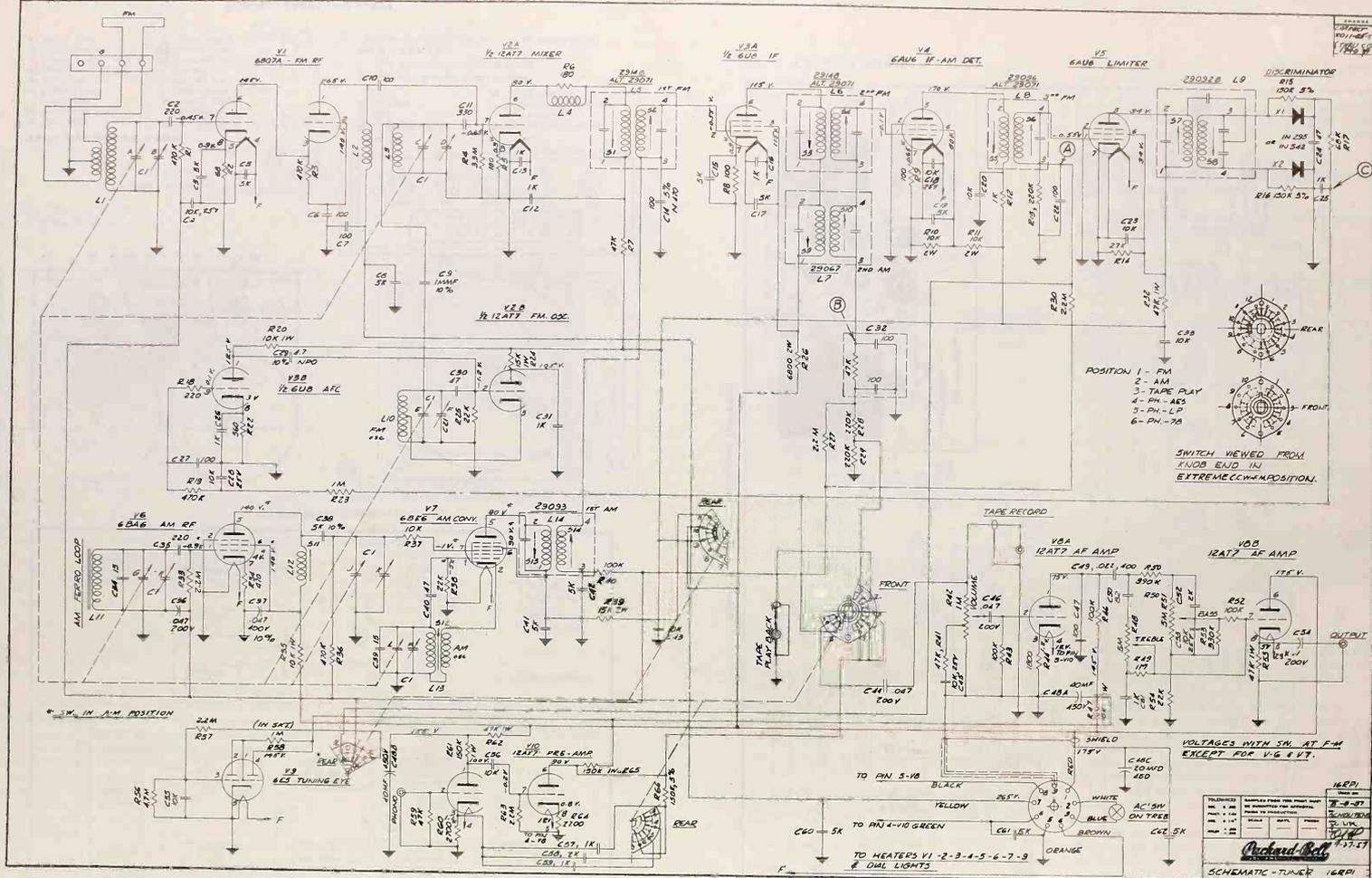
Power Supply, Schematic and Top View



21RP1 Block Diagram



Controls, 16RP1 and 21RP1

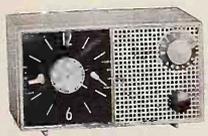


PRODUCTION MODIFICATIONS, 16RP1 Schematic, Tuner

- 1. Resistor R-57 changed from 1 megohm to 2.2 megohms (CO 1598)
- 2. Coil, FM oscillator, L-10, diameter changed. Part number now 29238B. (CO 1673)
- 3. Capacitor, C-50, 100 mfd, changed to 82 mfd. Resistor, R-50, 270,000 ohms, changed to 390,000 ohms. Resistor, R-49, 220,000 ohms, changed to 1 megohm. (CO 1680)
- 4. Capacitors C-4, C-18, C-28, C-45, & C-53 were changed in voltage rating to 25 volts to reduce the physical size. The capacity value (.01 mfd) was not changed. (CO 1723)

<p>16RP1 7E-8-57 Schematic, Tuner 25.10K 11/17/57</p> <p>Packard Bell Schematic - Tuner 16RP1</p>	<p>RESISTORS - 1/4 W - 1/2 W - 1 W - 2 W - 5 W - 10 W - 25 W - 50 W - 100 W - 250 W - 500 W - 1000 W</p> <p>RESISTOR TOLERANCES - 1% - 5% - 10% - 20% - 50% - 100%</p> <p>CAPACITORS - 50V - 100V - 250V - 500V - 1000V</p> <p>CAPACITOR TOLERANCES - 5% - 10% - 20% - 50% - 100%</p> <p>COILS - 5% - 10% - 20% - 50% - 100%</p> <p>TRANSFORMERS - 5% - 10% - 20% - 50% - 100%</p>
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PHILCO HOME RADIO
SERVICE MANUAL
 MODELS F-743, F-750,
 F-752, F-754 and F-758



Model F-743



Model F-750



Model F-752



Model F-754



Model F-758

SPECIFICATIONS

- Cabinet**—Plastic, table models.
- Circuit**—5 tube superheterodyne (including rectifier).
- Frequency Range**—540 KC to 1620 KC.
- Intermediate Frequency**—455 KC.
- Audio Output**—9 watt.
- Power Consumption**—30 watts.
- Operating Voltage**—105 to 120 volts, 60 cycles.
- Aerial**—High impedance loop mounted on inside of cabinet back.
- Philco Tubes**—12BE6, oscillator converter; 12BA6, 4-F amplifier; 12AV6, 2nd detector, AVC, 1st audio; 50C3, audio output and 35W4, rectifier.
- Dial Lighting**—Models F-754 and F-758 have illuminated dials.
- Timer**—Model F-743 uses a Telechron C103 F-750, code 124, uses a Telechron "J" F-750, code 126, uses a Westclox TS4 F-752 uses a Telechron C103 F-754 uses a Telechron C103 F-758 uses a Telechron C103
- Speakers**—All models except F-758 employ one 4-in. pm speaker; Model F-758 uses a 2½-in. x 10-in. speaker.
- Slow-off**—All models except F-750 have the on-off switch in the filament return line. When the switch is opened, the set fades out rather than cuts off. Model F-750 has a conventional switching arrangement located in the B—line.

ALIGNMENT PROCEDURE

- Radio Controls**—Set volume control to maximum. Set tuning control as indicated in chart.
- Output Meter**—Connect across voice coil terminals.
- Signal Generator**—Connect generator and set frequency as indicated in chart. Use modulated output, 30%.
- Output Level**—During alignment, adjust signal-generator output to hold output-meter reading below .5 volts.

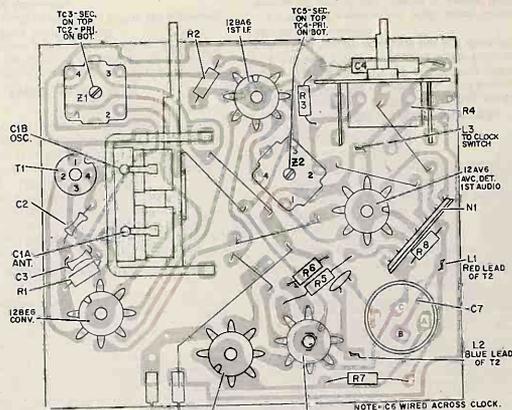
ALIGNMENT CHART

STEP	SIGNAL GENERATOR	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1.	Connection to Radio	500 kc.	Tuning gang fully open.	Adjust tuning cores, in order given, for maximum output. TC3 and TC5 are located on top of transformers.	TC3—2nd 1-f sec. TC4—2nd 1-f pri. TC2—1st 1-f sec. TC2—1st 1-f pri.
2.	Radioing loop (See Note below).	1620 kc.	1620 kc.	Adjust for maximum output.	CI-B—osc.
3.	Same as step 2.	1600 kc.	1600 kc.	Adjust for maximum output.	CI-A—aerial

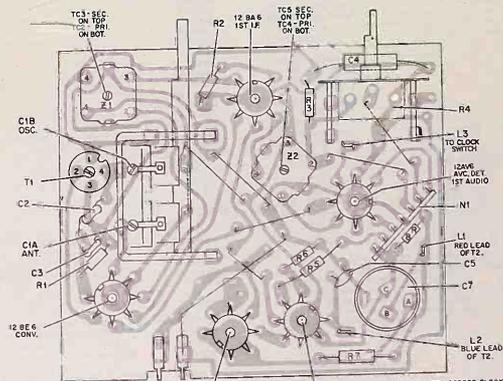
NOTE: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads, and place near radio loop. For proper adjustment of the oscillator trimmer, fully open the tuning gang and insert a .006 inch non-metallic shim between the lead of the rotor and the top of the stator plates. Close the tuning gang sufficiently to hold the shim in place, and then remove the shim without disturbing the gang setting.

HOME RADIO MODELS F-743, F-750, F-752, F-754 and F-758

PR-3175



Printed Panel Component Layout — Model F-750



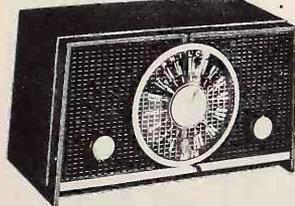
Printed Panel Component Layout — Models F-754 and F-758

NOTE

Printed panel component layout for Models F-743 and F-752 is similar to that of Models F-754 and F-758 except for the foil arrangement at pins 4, 5 and 6 of the 35W4. The foil arrangement of the 35W4 in Models F-743 and F-752 is similar to that of the Model F-750. This change is to accommodate the pilot light. (See schematic diagram.)

PHILCO HOME RADIO SERVICE MANUAL

AM/FM MODEL F-974



Model F-974

SPECIFICATIONS

Cabinet—Plastic table model—Ebony or Maroon.

Circuit—Seven-tube superheterodyne plus selenium rectifier.

Frequency Ranges—Tuning drive ratio 12:1
Broadcast—540-1620 KC
FM—88-108 MC

Audio Output—1 watt

Operating Voltage—105 - 120 volts, a.c./d.c.

Power Consumption—40 watts

Antenna—AM—Built in high impedance, pancake loop

FM—Line cord with provision for connecting external antenna.

Intermediate Frequency—AM 455 KC
FM 10.7 MC

Philco Tubes—12AT7 FM R-F and converter, 12BA6 FM IF amplifier, 12BE6 AM converter-oscillator, 12BA6 FM-AM IF amplifier, 12AU6 FM limiter, 1978 FM discriminator
—AM detector — AVC — 1st audio, 35C5 audio output.

AM ALIGNMENT PROCEDURE

The AM alignment should be completed before the FM alignment is made. Before beginning the alignment, allow the receiver and test equipment to warm up for fifteen minutes.

DIAL POINTER—With the gang fully closed, adjust the pointer to be vertical.

RADIO CONTROLS—Set the volume control to maximum, set the function switch to AM and the tuning control as indicated.

OUTPUT INDICATOR—Connect either an a.c. voltmeter or an oscilloscope across the voice coil terminals.

SIGNAL GENERATOR—Use an AM r-f signal generator with modulated output.

OUTPUT LEVEL—During alignment, maintain the output below 4 volts a.c.

PHILCO
Factory-Supervised
Service

CAUTION—To avoid shock hazard, the receiver should be connected to the a.c. line through an isolation transformer.

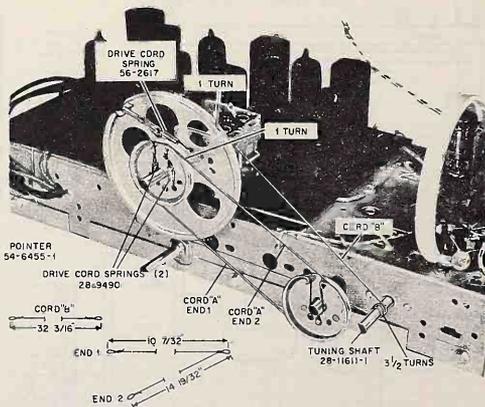
1. Connect generator, through a .05 mfd condenser, to grid, pin 7, of the AM converter, S-3. Connect ground lead to chassis.
2. Set generator to 455 kc, tuning gang fully closed and adjust, in order given, TC14, TC13, TC12 and TC11 for maximum output. Repeat until no further gain is indicated.
3. Connect generator to radiating loop. Set generator to 1600 kc. Set receiver to 1600 kc as indicated by pointer. Adjust VC2B for maximum.
4. Set generator to 1400 kc. Tune receiver to signal and adjust VC2A for maximum.

FM ALIGNMENT PROCEDURE

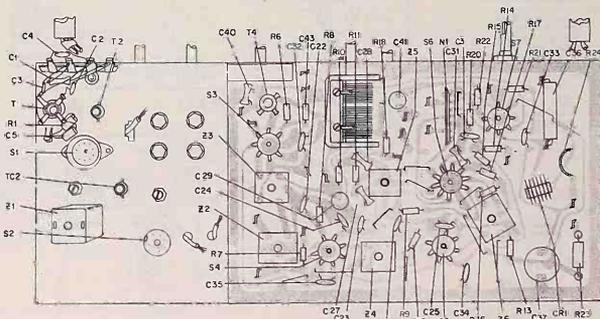
AM Broadcast Section should be aligned first

1. Calibrate the scope for 2 volts P/P.
2. Connect the scope, through a 100,000 ohm isolating resistor, to junction of R12 and C26. Scope ground lead to chassis.
3. Connect the signal generator to bottom of T1 secondary (junction of T1 with R1 and C5). Generator ground lead to chassis.
4. Inject marker signal, 10.7 mc (unmodulated).
5. Inject sweep signal, 10.7 mc, approximately 150 kc total deviation (do not over sweep).
6. Adjust cores TC8, TC7, TC6, TC5, TC4 and TC3 for maximum amplitude, symmetrical curve with the 10.7 mc marker at top of curve. Adjust input signal to maintain output, as shown on scope, below 2 volts peak during alignment. Repeat step 6 until no further gain is obtained.
7. Calibrate the scope for 5 volts P/P.
8. Change the scope connections to L10 (FM audio output to function switch).
9. Remove sweep signal. Inject 10.7 mc, 30% AM modulated signal. Adjust TC10 for minimum indication between peaks. See note below.
10. Inject 10.7 mc sweep signal and adjust TC9 for maximum symmetrical output.
11. Touch up cores as in Step 6 plus TC9 for a symmetrical, maximum amplitude, discriminator curve. To check alignment, discriminator curve should not shift in frequency with an increase in signal input (below overload). If a shift does occur, the LF is not properly aligned, particularly the first stage, TC3 and TC4.
12. Inject 108.5 mc, 30% AM modulated signal, through an antenna matching network to the receiver antenna terminals.
13. Open tuning condenser. Insert a 6 mil, non-metallic, shim between stator and rotor of the FM gang and close gang against shim. Adjust VC3 for minimum indicating between peaks.
14. With tuning condenser fully closed, inject 87.75 mc, 30% AM modulated, signal and adjust TC2 for minimum indication between peaks. See note below.
15. Inject 91 mc, sweep signal and with tuning gang tuned to 91 mc, adjust TC1 for maximum output. See note below.

NOTE: Signal input must be as low as possible in order to obtain a sharp indication. In some cases it may be necessary to set signal generator to the first sub-harmonic.



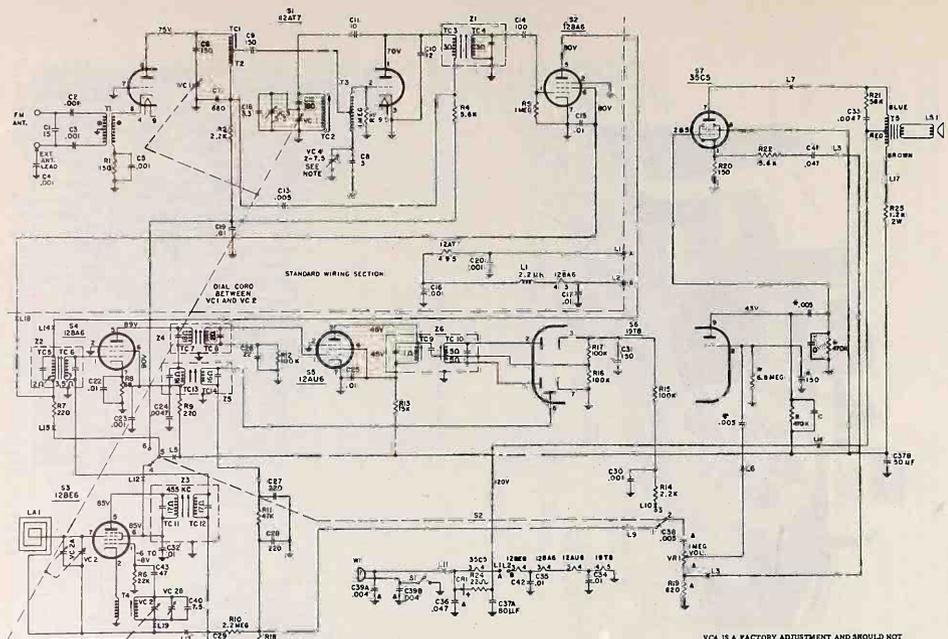
Drive Cord Installation Details



Chassis and Printed Panel Component Layout View

PHILCO HOME RADIO MODEL F-974, AM/FM RECEIVER

PR-3178

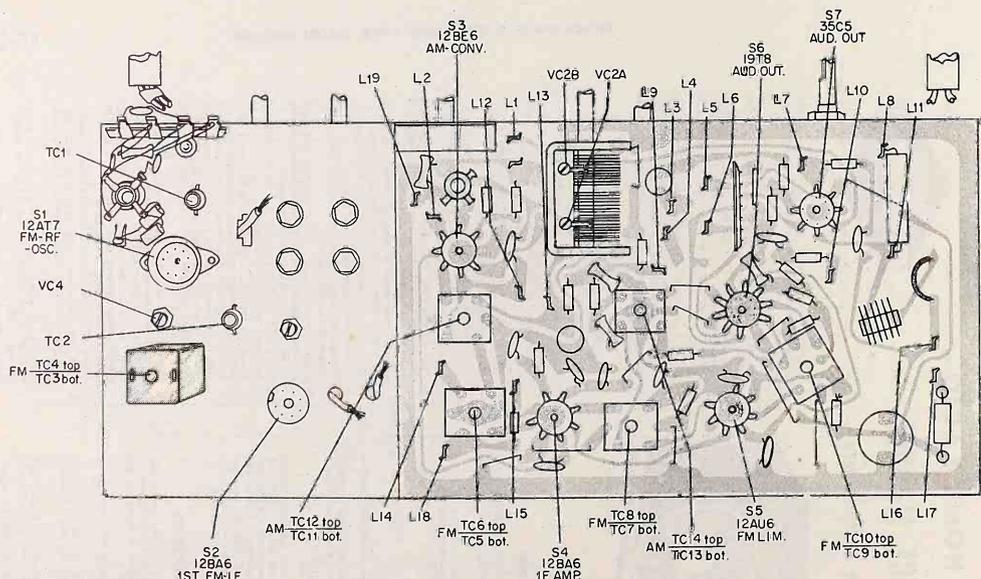


* COUPLATE N1
 ▲ PART OF STANDARD WIRING
 ● INDICATES LUGS THAT USE CONDENSERS C - D = 250 pF

ALL RESISTORS ARE 1/2 WATT, 10% UNLESS OTHERWISE NOTED.
 ALL CAPACITORS ABOVE 1 ARE IN pF UNLESS OTHERWISE NOTED. ALL CAPACITORS BELOW 1 ARE nF.

VC4 IS A FACTORY ADJUSTMENT AND SHOULD NOT REQUIRE FUTURE ADJUSTMENT UNLESS REPLACED. IT MINIMIZES OSCILLATION RADIATION TO ADJUST TUNE RANGE TO 100 MC AND ADJUST VC4 FOR MINIMUM INDICATION ON A FIELD STRENGTH METER TUNED TO THE OSC FREQ.

Schematic Diagram Model F-974



Top View — Showing Alignment Points, Tube Locations and Tie Lugs

IDENTIFICATION OF PRINTED PANEL TIE LUGS

- | | | | | | |
|----|---|-----|---|-----|---|
| L1 | Filament lead from pin 4 of S7 (35C5) to pin 5 of S1 (12AT7) | L7 | Blue lead from audio output T-5, to plate, pin 7 of S7 | L13 | Loop antenna return to A.V.C. |
| L2 | Filament lead from pin 3 of S2 (12BA6) to pin 3 of S3 (12BE6) | L8 | Bare wire from panel ground to chassis ground | L14 | Blue lead from plate, pin 5 of S2, to 2nd FM I.F. transformer, Z1 |
| L3 | Green lead to bottom of VR1 from C41 | L9 | Yellow lead, AM audio to lug 1 of S2 from junction of R11, C28, R10 and R18 | L15 | Red lead (B+) from lug 5 of S2 to R7 |
| L5 | Red lead (B+) from lug 5 of S2 to screen of S7 and terminal 8 of N1 | L10 | Brown lead from AC inltrick to C36 | L16 | Red lead from junction of R24 and C37A to audio output, T5 |
| L6 | Yellow lead from arm of VR1 to terminal 2 of N1 | L11 | Brown lead from AC inltrick to C36 | L17 | Brown lead from audio output, T5, to R23 |
| | | L12 | Red lead (B+) from lug 4 of S2 to AM converter screen, pin 6, and Z3 | L18 | Orange lead (B+) to pin 6 of S2 |
| | | | | L19 | Blue lead to L13 |

REPLACEMENT PARTS LIST

Reference Symbol	Description	Service Part No.	Reference Symbol	Description	Service Part No.
C1	Condenser, FM antenna, 15 mm, ceramic	62-015409011	CR1	Selenium rectifier, 100 ma	24-8064.4
C2	Condenser, FM antenna coupling, .001 mid, ceramic	30-1267.4	L1	Choke, filament de-coupling, 2.2 mh	31-4423.8
C3	Condenser, FM antenna coupling, .001 mid, ceramic	30-1267.4	LA1	Loop antenna, Am	76-11504
C4	Condenser, antenna lead, .001 mid, ceramic	30-1267.4	LC	Interlock connector, AC	27-2420.0
C5	Condenser, input cathode by-pass, .001 mid, ceramic	62-210001011	LS1	Spokee, 5" pm, 3.2 ohm V.C. impedance	45-9723
C6	Condenser, gang DC isolation, 150 mm, mica	30-1237.13	N1	Resistor-condensy network, audio stage	30-6027
C7	Condenser, r.f. coil signal return, 680 mm, mica	60-10485411	R1	Resistor, FM R.F. cathode, 150 ohms	66-1162340
C8	Condenser, mixer coil signal return, 5 mm, ceramic	30-1237.14	R2	Resistor, FM R.F. B—de-coupling, 2200 ohms	66-222340
C9	Condenser, interstage coupling, 150 mm, mica	30-1237.13	R3	Resistor, FM R.F. B—de-coupling, 2700 ohms	66-5102340
C10	Condenser, mixer plate by-pass, 12 mm, ceramic	62-015000011	R4	Resistor, mixer B—de-coupling, 5600 ohms	66-216340
C11	Condenser, osc. coupling, 10 mm, ceramic	62-010409001	R5	Resistor, FM I.F. grid return, 1 megohm	66-510340
C12	Condenser, gang DC isolation, 180 mm, 5%, special mica	30-1237.6	R6	Resistor, FM I.F. B—de-coupling, 220 ohms	66-222340
C13	Condenser, B+ neutralization, .005 mid, disk	30-1238.1	R7	Resistor, AVC filter, 2.2 megohms	66-222340
C14	Condenser, I.F. grid coupling, 100 mm, ceramic	62-110009001	R8	Resistor, I.F. cathode bias, 68 ohms	66-088340
C15	Condenser, I.F. screen by-pass, .01 mid, ceramic	30-1238.2	R9	Resistor, I.F. B—de-coupling, 720 ohms	66-122340
C16	Condenser, filament by-pass, .001 mid, ceramic	62-210001011	R10	Resistor, AVC filter, 2.2 megohms	66-222340
C17	Condenser, filament by-pass, .01 mid, disk	30-1238.2	R11	Resistor, AM I.F. filter, 47,000 ohms	66-347340
C18	Condenser, FM temperature compensating, 3.3 mid, disk	30-1236.14	R12	Resistor, 3rd FM I.F. grid return, 100,000 ohms	66-410340
C19	Condenser, B+ by-pass, .01 mid	30-1238.2	R13	Resistor, 3rd FM I.F. B—de-coupling, 15,000 ohms	66-222340
C20	Condenser, filament by-pass, .001 mid	30-1237.4	R14	Resistor, de-emphasis, 2200 ohms	66-105340
C21	Condenser, 2nd I.F. cathode by-pass, .01 mid, disk	30-1262.8	R15	Resistor, de-emphasis, 100,000 ohms	66-102340
C22	Condenser, 2nd I.F. screen de-coupling, .001 mid, disk	30-1262.12	R16	Resistor, discriminator, 100,000 ohms	66-102340
C23	Condenser, 2nd I.F. B+ de-coupling, .0047 mid, disk	30-1262.3	R17	Resistor, discriminator, 100,000 ohms	66-102340
C24	Condenser, 2nd I.F. B+ de-coupling, .0047 mid, disk	30-1262.3	R18	Resistor, AM detector load, 470,000 ohms	66-473340
C25	Condenser, 3rd I.F. screen de-coupling, .01 mid, disk	30-1262.8	R19	Resistor, audio feedback, 820 ohms	66-102340
C26	Condenser, 2nd I.F. grid by-pass, 22 mm, disk	30-1262.19	R20	Resistor, output cathode bias, 150 ohms	66-152340
C27	Condenser, AM I.F. filter, 220 mm, disk	30-1262.23	R21	Resistor, tone compensation, 56,000 ohms	66-358340
C28	Condenser, AM I.F. filter, 220 mm, disk	30-1262.23	R22	Resistor, tone compensation, 56,000 ohms	66-358340
C29	Condenser, A.V.C. by-pass, .047 mid, moulded	30-4883.28	R23	Resistor, feedback, tone circuit 5600 ohms	66-258340
C30	Condenser, de-emphasis, .001 mid, disk	30-1262.12	R24	Resistor, B+ filter, 1200 ohms, 2 watts	66-152340
C31	Condenser, de-emphasis, 150 mm, disk	30-1262.24	R25	Resistor, rectifier current limiting, 72 ohms	31-134.21
C32	Condenser, AM mixer screen de-coupling, .01 mid, disk	30-1262.8	S1	Switch, on-off	Part of VR1
C33	Condenser, tone compensation, .0047 mid, disk	30-1262.3	S1	Switch, AM, FM	42-2038.3
C34	Condenser, filament by-pass, .01 mid, disk	30-1262.8	T1	Transformer, FM antenna	32-4711.1
C35	Condenser, filament by-pass, .01 mid, disk	30-1262.8	T2	Transformer, FM i-f.	32-4717.1
C36	Condenser, AC by-pass, .047 mid, tubular	30-4650.43	T3	Transformer, FM osc.	32-4711.61
C37	Condenser, electrolytic, 2 section filter, 80/50, 150 WVDC	30-2353.9	T4	Transformer, AM osc.	32-4653.8
C38	Condenser, audio coupling, .005 mid, disk	30-1238.1	T5	Transformer, audio output	32-878.1
C39	Condenser, line by-pass, .004/.004 mid, dual disk	30-1266.1	TC1	Tuning gang, 2 section, FM	37-278.2
C40	Condenser, Osc. temp. compensating, 7.5 mm, ceramic	30-1234.83	TC2	Tuning gang, 2 section, AM	31-8232.10
C41	Condenser, tone control, .047 mid, moulded	30-4883.45	VC3	Variable condenser, FM osc., 5-1.0 mmi	31-8232.10
C43	Condenser, AM osc. coupling, 47 mm, ceramic	30-1230.4	VCC4	Variable condenser, osc. bridge capacitor, 27.5 mmi	31-8232.23
			VR1	Volume control, 1 meg	41-4420.0
			Z1	Transformer, 1st FM	32-4715.1
			Z2	Transformer, 2nd FM	32-4715.1
			Z3	Transformer, 1st AM	32-4583.17
			Z4	Transformer, 3rd FM	32-4712.2
			Z5	Transformer, 2nd AM	32-4583.17
			Z6	Transformer, 4th FM discriminator	32-4714.2
				Printed Panel	34-9963.3

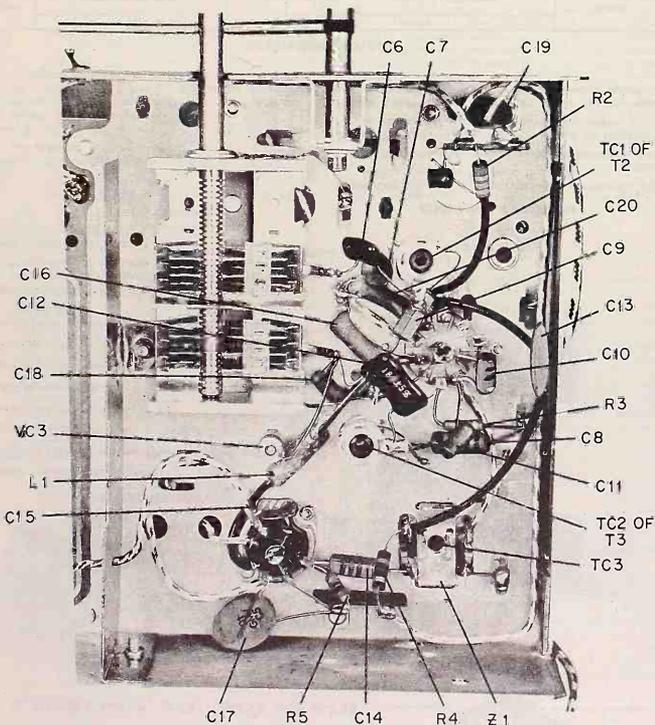
CABINET MISCELLANEOUS PARTS

Description	Service Part No.	Description	Service Part No.
Cabinet, Ebony	11294.1	Shield, tube 12AT7	56-5628.5
Knobs, 2 used, volume and tuning, ebony	54-6093.16	Shield, tube 12BE5	56-5629.13
Knob, AM-FM switch, ebony	54-6456.1	Socket, 9 pin min., 12AT7, chassis mtg.	57-6203.19
Knob, 2 used, volume and tuning, maroon	54-6093.16	Socket, 7 pin min., 12BE5, chassis mtg.	57-6203
Knob, AM-FM switch, maroon	54-6456.1	Socket, 7 pin min., panel mtg., 4 used	57-8309.1
Patent	54-6456.2	Socket, 9 pin min., panel mtg., 1578	57-5059.2
Cabinet back and loop Assy.	76-10263.1	Spring, drive cord tension, 2 used	83-5430
Scale	54-6455.1	Spring, drive cord tension, 1 used	56-2817
FM antenna Assy.	41-3791.4	Shaft, tuning	28-1161.1
		Ring, retaining	1W6078A.3

PRODUCTION CHANGES

- C8 was changed from 10 μ f to 5 μ f and VC4 was added.
- C1 was moved from the coil side to the antenna side of C2 and C3.
- A .001 condenser, C4 from the antenna lead to ground was removed in later production and the antenna transformer (T1) was wired with an unbalanced input instead of a balanced input. (ground connection changed from center tap to lower end of primary).
- A 1000 μ f feed thru condenser was removed from the screen grid circuit of the 12BE5 (S2).
- C15 was changed from a 680 μ f condenser to a .01 mid condenser.

Bottom View — Model F-974, FM Chassis Components



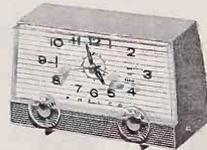
-PHILCO HOME RADIO-

SERVICE MANUAL

—MODELS G-749, G-751, G-753 and G-755



Model G-749



Model G-751



Model G-753



Model G-755

SPECIFICATIONS

- Cabinet**—Plastic, table models.
- Circuit**—5 tube superheterodyne (including rectifier).
- Frequency Range**—540 KC to 1620 KC.
- Intermediate Frequency**—455 KC.
- Audio Output**—9 watt.
- Power Consumption**—30 watts.
- Operating Voltage**—105 to 120 volts, 60 cycles.
- Aerial**—High impedance loop mounted on inside of cabinet back.
- Philco Tubes**—12BE6, oscillator converter; 12BA6, I-F amplifier; 12AV6, 2nd detector; AVC, 1st audio; 50C5, audio output and 35W4, rectifier.
- Timer**—Model G-749 uses a Telechron J2
G-751 uses a Telechron J3
G-753 uses a Telechron J3
G-755 uses a Westclox fully automatic push button timer.
- Speakers**—All models employ one 4-in., 3.2 ohm V.C., pm speaker.
- Slow-off**—All models except G-749 have the on-off switch in the filament return line. When the switch is opened, the set fades out rather than cuts off. Model G-749 has a conventional switching arrangement located in the B—line.

ALIGNMENT PROCEDURE

- Radio Controls**—Set volume control to maximum. Set tuning control as indicated in chart.
- Output Meter**—Connect across voice coil terminals.
- Signal Generator**—Connect generator and set frequency as indicated in chart. Use modulated output, 30%.
- Output Level**—During alignment, adjust signal-generator output to hold output-meter reading below 5 volts.

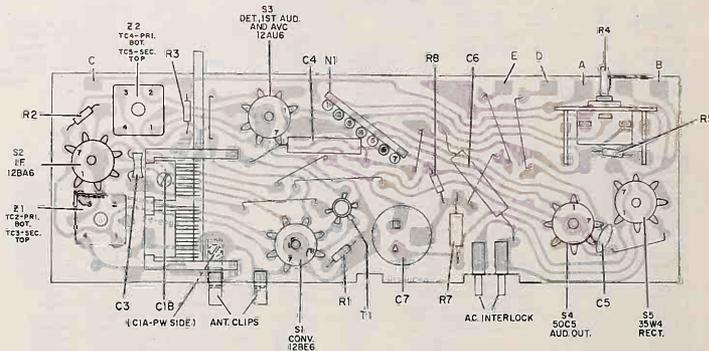
ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1.	Ground lead to B—; output lead through a .1 mf condenser to grid [pin 7] of 12BE6 or top of i-f tuning condenser.	455 kc.	Tuning gang fully open.	Adjust tuning cores, in order given, for maximum output. TC3 and TC5 are located on top of transformers.	TC5—2nd i-f sec. TC4—2nd i-f pri. TC3—1st i-f sec. TC2—1st i-f pri.
2.	Radiating loop [See Note below].	1620 kc.	1620 kc.	Adjust for maximum output.	C1—osc.
3.	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C1-A—aerial

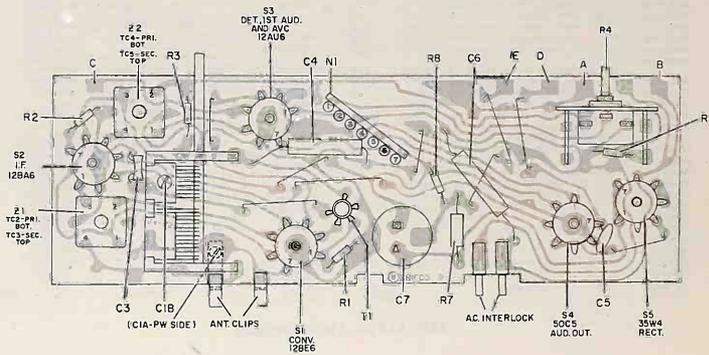
NOTE: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads, and place near radio loop. For proper adjustment of the oscillator trimmer, fully open the tuning gang and insert a .006 inch non-metallic shim between the heel of the rotor and the top of the stator plates. Close the tuning gang sufficiently to hold the shim in place, and then remove the shim without disturbing the gang setting.

HOME RADIO MODELS G-749, G-751, G-753 and G-755

PR-2252



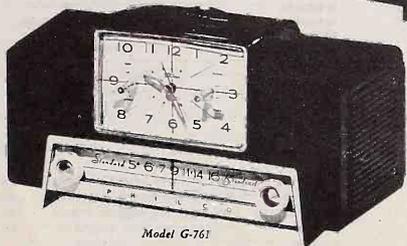
Printed Panel Component Layout — Model G-749



Printed Panel Component Layout — Models G-751, G-753 and G-755

- PHILCO HOME RADIO
SERVICE MANUAL

MODEL G-761 and G-963



SPECIFICATIONS

Cabinet: Plastic, table model; Model G-963 has a rotary dial scale with a 5:1 drive ratio. Model G-761 has a slide rule dial with a 6:1 drive ratio.

Circuit: Six tube superheterodyne, including a tuned RF stage.

Frequency Coverage: 535KC to 1620KC.
Intermediate Frequency: 455KC.

Audio Output: 0.9 watts.

Operating Voltage: Model G-963—105 to 120 volts, AC-DC; Model G-761—105 to 120 volts, AC.

Aerial: High impedance loop mounted on back.

Speakers: (2) 4" pm speakers, each with 3.2 ohm voice coil.

Philco Tubes: 12BA6 RF Amplifier, 12BE6 Oscillator-Converter, 12BA6 IF Amplifier, 12AV6 Detector—AVC-1st Audio, 35C5 Audio Output, 35W4 Rectifier and a type 47 Dial Light.

Timer: G-761 only—A fully automatic Telechron (type C-103) internal timer and clock. Includes Sleep-Switch, Buzzer Alarm, and "Lullaway" Slow Shut-off.

SPEAKER PHASING

When either or both of the paralleled speakers are replaced or reconnected, it is possible to cause weak out-

put and distortion unless properly connected.

G-761—Since the speakers are mounted in opposite ends of the cabinet, the speakers must be connected "in proper phase." The common lead between the two speakers should connect from the V.C. lug with the green dot of one speaker to the unmarked V.C. lug on the other.

G-963—Since the speakers are both mounted on the cabinet front, the speakers must also be connected "in proper phase." The green V.C. lugs of the speakers are connected together and the unmarked lugs connect together.

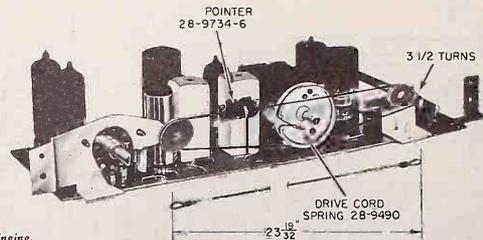
**ALIGNMENT PROCEDURE
GENERAL**

Radio Controls—Set volume control to maximum. Set radio tuning as directed in the alignment chart.

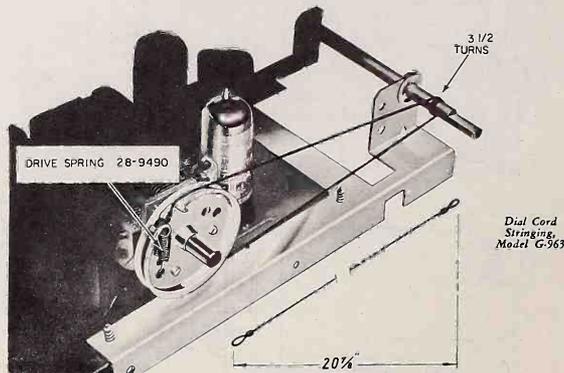
Output Indicator—Connect output indicator (either an oscilloscope or a 1000 ohms/volt a-c meter) across speaker voice-coil terminals.

Signal Generator—Use an AM r-f generator connected as indicated in the alignment chart.

Output level—During alignment, attenuate the signal generator output to maintain radios' output, as shown on meter or scope, below 0.4 volt.



Dial Cord Stringing, Model G-761



Dial Cord Stringing, Model G-963

ALIGNMENT CHART

Step	Signal Generator	Freq.	Dial Setting	Special Instructions	Adjust
1	Ground lead to B—, Output lead through a .01 mfd cond. to pin 7 (input grid of 12BE6 converter)	455KC	Gang fully open	Adjust, in order given, for max. output	Sec. 2nd IF, top Z3 Pri. 2nd IF, bot. Z3 Sec. 1st IF, top Z2 Pri. 1st IF, bot. Z2
2	Radiating loop. See Note 1 below	1620KC	620KC See Note 2 below	Adjust for max. output	C1C, osc. trimmer
3	Same as step 2	1520KC	Tune radio to gen. signal	Adjust for max. output	C1B, mixer grid trimmer C1A, ant. trimmer
4	Same as step 2	580KC	Tune radio to gen. signal	Adjust for max. output	Sec. RF trans, top Z1
5	Repeat steps 3 and 4 until no further improvement is obtained.				

Note 1: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads and place near radio loop antenna.

Note 2: To set the tuning gang to 1620KC—place a 6 mil shim between rotor and stator; turn rotor until shim is held in place, remove shim.

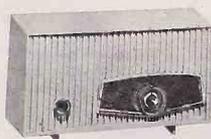
PHILCO HOME RADIOS

SERVICE MANUAL

MODELS G-820, G-822, G-824,
G-826 and G-828



Model G-820



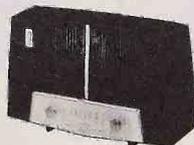
Model G-822



Model G-824



Model G-826



Model G-828

SPECIFICATIONS

CABINET—Plastic, table models.

CIRCUIT—5-tube superheterodyne (including rectifier).

FREQUENCY RANGE—540 KC to 1620 KC.

INTERMEDIATE FREQUENCY—455 KC.

AUDIO OUTPUT—9 watt.

POWER CONSUMPTION—30 watts.

OPERATING VOLTAGE—105 to 125 volts, AC-DC.

AERIAL—High Impedance loop mounted on inside of back.

PHILCO TUBES—12BE6, oscillator-converter; 12BA6, 1-F amplifier; 12AV6, 2nd detector, AVC, 1st audio; 50C5, audio output and 35W4, rectifier.

DIAL LIGHTING—Models G-826 and G-828 have illuminated dials.

SPEAKER—Model G-826 employs two 4-in. p-m speakers in parallel. Model G-828 employs one 6-in. p-m speaker and one 4½-in. p-m speaker connected in parallel. The others use one 4-in. p-m speaker.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Ground lead to B-; output lead through a .1 mf condenser to grid (pin 7) of 12BE6.	455 KC	Tuning gang fully open.	Adjust tuning cores, in order given, for max. output. TC3 and TC5 are located on top of transformers.	TC4—2nd i-f sec. TC3—2nd i-f pri. TC2—1st i-f sec. TC1—1st i-f pri.
2	Radiating loop. (See Note below).	1620 KC	1620 KC*	Adjust for maximum output.	C1-B—osc.
3	Same as step 2.	1500 KC	1500 KC	Adjust for maximum output.	C1-A—aerial

NOTE: Make up a 6-8 turn, 6-inch diameter loop from insulated wire, connect to signal-generator leads, and place near radio loop.

* For proper adjustment of the oscillator trimmer, fully open the tuning gang and insert a .006-inch non-metallic shim between the heel of the rotor and the top of the stator plates. Close the tuning gang sufficiently to hold the shim in place, and then remove the shim without disturbing the gang setting.

ALIGNMENT PROCEDURE

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

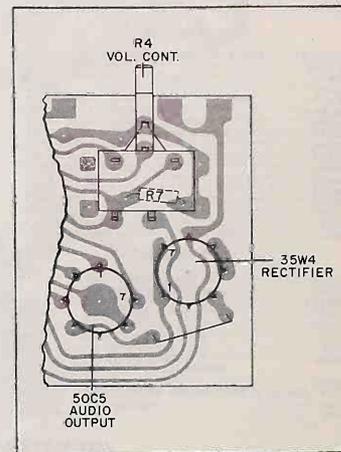
OUTPUT METER—Connect across voice coil terminals.

SIGNAL GENERATOR—Connect generator and set frequency as indicated in chart. Use modulated output, 30%.

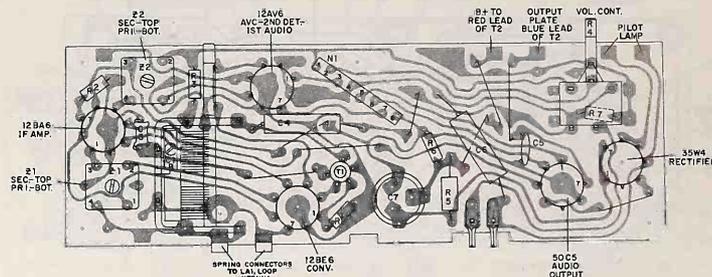
OUTPUT LEVEL—During alignment, adjust signal-generator output to hold output-meter reading below 5 volts.

SPEAKER PHASING (Models G-826 and G-828 only)

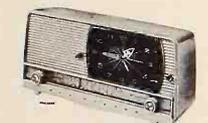
When replacing or reconnecting the two, parallel speakers, it is possible that an out-of-phase condition may exist. This is readily apparent by weak output and serious distortion. To correct, interchanging the leads to one of the speakers.



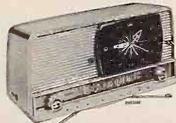
Partial Printed Panel Showing G-820, G-822 and G-824 AC Input Circuit Foil Difference



Printed Panel Component Layout—Models G-820, G-822, G-824, G-826 and G-828
(See Figure Above for G-820, G-822 and G-824 AC Input Difference)



9-C-7 Series—The "Herald"
Model 9-C-7EE—Antique White
Model 9-C-7FE—Pink and White
Model 9-C-7LE—Turquoise and White



9-C-8 Series—The "Bulletin"
Model 9-C-8FE—Pink and White
Model 9-C-8I—Two-tone Gray
Model 9-C-8ME—Maple and White



RCA VICTOR

A-C Operated Clock-Radio 9-C-7 SERIES, 9-C-8 SERIES Chassis No. RC-1166B SERVICE DATA — 1958 No. 3 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
CAMDEN 8, N. J.
FOR
RCA VICTOR RADIO AND "VICTROLA" DIVISION
RADIO CORPORATION OF AMERICA

TUNING RANGE	540-1,600 kc
INTERMEDIATE FREQUENCY	455 kc
TUBE COMPLEMENT	
(1) RCA 12BE6	Converter
(2) RCA 12BA6	I.F. Amplifier
(3) RCA 12AV6	Det.-A.V.C.-A.P. Amp.
(4) RCA 50C5	Output
(5) RCA 35W4	Rectifier
POWER SUPPLY RATING	
115 volts, 60 cycles, a. c.	35 watts
Caution: Do not connect to a d. c. power supply.	

SPECIFICATIONS

LOUD SPEAKER	
Size and type	4 in. P.M.
Voice coil impedance	3.2 ohms at 400 cycles
POWER OUTPUT	
Undertuned	1.0 watts
Maximum	1.3 watts
TUNING DRIVE RATIO	9½:1 (4¾ turns of knob)
WEIGHT	6 lbs. net
CABINET DIMENSIONS	
Model 9-C-7	Height 8¾" Width 12¾" Depth 6"
Model 9-C-8	Height 7¾" Width 12¾" Depth 6"

DESCRIPTION

The "9-C-7 Series" and the "9-C-8 Series" are five-tube (including rectifier) table model clock-radios designed for operation on a 115 volt 60 cycle power supply. The cabinet completely encloses the radio chassis and clock, using a molded hood instead of a conventional back cover. The chassis and clock are mounted in a plastic "cradle" which comprises the cabinet bottom and front. The plastic slide rule dial is heat-sealed to the cradle. The 9-C-8 Series has a decorative metal base attached to the bottom of the cabinet.

The chassis is of the "printed wiring" type in which all electrical components except loop antenna and speaker are mounted on an insulation plate. A conventional superheterodyne circuit is employed using 150-milliamperere series-string miniature tubes. All wiring, except for external leads, is "printed" on the underside of the insulation plate. The switching type phone input jack is accessible at the left side of the cabinet.

The clock-timer features not only the commonly accepted self-starting type of clock with sweep-second hand but also a clock-controlled switch which will: (1) turn the radio (and appliance if desired) off after a period of operation of up to 60 minutes; (2) turn the radio (and appliance if desired) on at a

time predetermined up to 11 hours in advance, and (3) sound an alarm (if desired) at the predetermined time. Lover type function knobs are used for maximum ease of operation.

An appliance outlet having a rated capacity of 1100 watts is wired in parallel with the radio, allowing an appliance to be connected and the clock-timer set to turn the appliance on at a predetermined time.

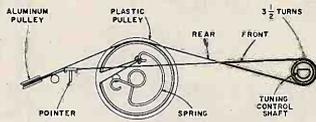
9-C-7 Series, 9-C-8 Series

Alignment Procedure

Test Oscillator—For all alignment operations, connect the high side of the test oscillator to the "common negative wiring." If a power supply isolation transformer is not available for use during service, an isolating capacitor should be used between the low side of the test oscillator and the "common negative wiring."

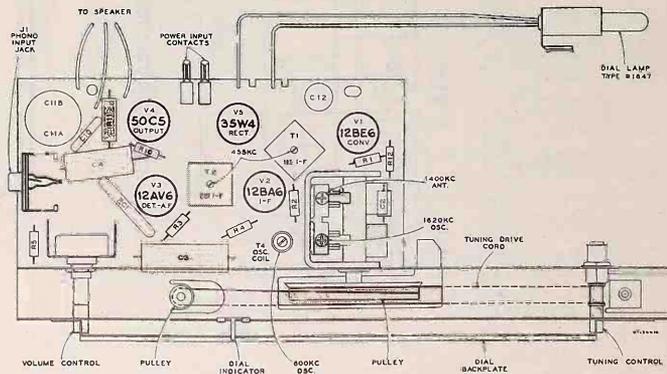
If an audio output meter is used for alignment indication, keep the oscillator output as low as possible to avoid a-v-c action.

Dial Indicator—With tuning condenser plates fully meshed, set left hand edge of dial indicator to the calibration mark on the dial backplate.



ASSEMBLY SHOWN WITH TUNING CONDENSER PLATES FULLY MESHED.

Tuning Drive Cord Assembly



Complete Chassis Assembly—View from Component Side

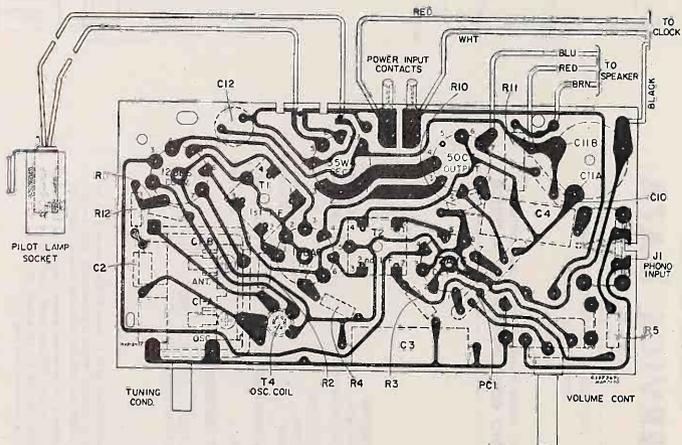
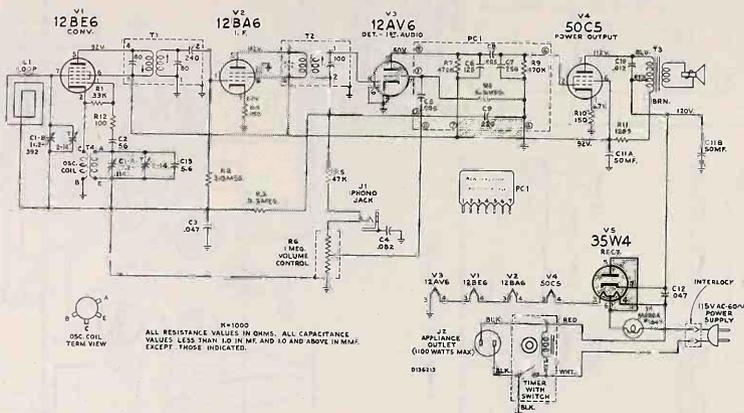
Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for next step
1	12BA6-I.F. grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T1 (tap) last 1/2" trans.
2	Stator of C1-3 through .01 mfd.			T1 (top next to bottom) last 1/2" trans.
3		1,820 kc	Gang 8 1/2" open	see Chapter C-4
4	Short wire placed near loop to radiate signal	1,400 kc	1,400 kc (nearest)	see Chapter C-8
5		600 kc	600 kc signal	see next T-4 (rock gang)
6				Repeat steps 3, 4, and 5

Servicing Precaution

The "common negative wiring" of these receivers is connected directly to one side of the AC power supply. Service should not be attempted by anyone not thoroughly familiar with the precautions necessary when working on this type of circuit.

An isolation transformer (115 v./115 v.) should be connected between the AC power line and the power attachment cord of the radio before performing any service on the radio.

9-C-7 Series, 9-C-8 Series



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 techniques outlined in "RCA Radio and Victrola Service Tips" Volume VI—Issue 6—Dated August 25, 1955.

OPERATING INSTRUCTIONS

To Set Clock Time—Push in and turn TIME SET knob (at back of cabinet).

To Set Alarm Time—Turn TIME SET knob counterclockwise (at back of cabinet).

RADIO OPERATION

To Play the Radio—With phono input cable removed from PHONO INPUT socket, move SERVICE lever to "ON." Turn TUNING knob to select desired station and adjust VOLUME as desired. Move SERVICE lever to "OFF" when through listening.

Always remove phono input cable from PHONO INPUT socket when radio operation is desired.

To Set Radio for "SLEEP" Operation—Move SLEEP lever for desired playing time (up to 60 minutes). Turn TUNING knob to select desired station and adjust VOLUME as desired. "SLEEP" operation can be used individually, in conjunction with "Wake-up" operation or with "Alarm" operation.

For "Wake-up" or "Alarm" Operation—With SERVICE lever at "ON," tune in the desired station and adjust volume level. Move SERVICE lever to "AUTO" for "Wake-up" operation only or to "ALARM" for "Wake-up" operation in conjunction with alarm buzzer. The alarm buzzer will start a few minutes after radio starts to play. To stop alarm buzzer, move SERVICE lever to any position other than "ALARM."

IMPORTANT—Keep SERVICE lever at "OFF" position when instrument is not in use.

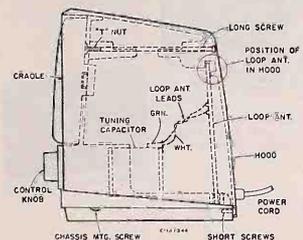
REMOVAL OF CABINET HOOD

Remove two screws at bottom rear of hood and one screw (loop) at top rear of hood. The time-set knob is not removable. Pull bottom of hood away from chassis cradle to disengage power interlock. Lift hood up and to the rear.

ASSEMBLING CABINET HOOD TO CHASSIS CRADLE

Place loop antenna in retaining slots at rear of cradle, pull top of antenna to the rear. Place hood over antenna so that top edge of antenna will first contact back of hood. Lower hood so that top edge of antenna will be engaged by positioning boss inside of hood. Push hood forward. Refer to illustration below. Position the power cord plug, which is attached to the hood, to the power input contacts on the chassis. Push plug firmly on to the contacts.

Make certain that edges of hood are properly seated on chassis cradle before tightening screws. The long screw at the top rear of the hood should be tightened with care; excessive tightening may break chassis cradle.



Cabinet Assembly

APPLIANCE OPERATION

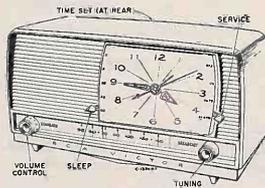
To Turn Appliance on Automatically—Turn TIME-SET knob to desired starting time. Move SERVICE lever to "AUTO" or "ALARM." Plug appliance into APPLIANCE outlet. With this setting, the appliance will operate continuously after starting time unless disconnected or SERVICE lever is moved to "OFF."

To Time Appliance Operation—With SERVICE lever at "OFF," plug appliance to be timed into APPLIANCE outlet. Move SLEEP lever for desired operating time (up to 60 minutes).

PHONOGRAPH OPERATION

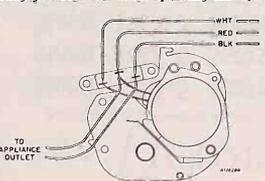
To Play Records—With phono input cable inserted into PHONO INPUT socket and SERVICE lever at "ON," turn VOLUME knob clockwise about one-half turn and adjust later as desired. Connect phonograph attachment power cord into APPLIANCE outlet. Play records according to phonograph attachment instructions.

To Wake-Up to Record Music—Turn TIME-SET knob to desired starting time. Before retiring, operate record player as described above to adjust volume level. Select and load records desired and start record player into automatic operation. Move SERVICE lever to "AUTO" or "ALARM" just as needle lands on first record.



REMOVAL OF CHASSIS FROM CRADLE

Remove volume and tuning control knobs. Disconnect clock leads at chassis. Disconnect three speaker leads. Remove one screw at outside of cradle (close to speaker). Remove one screw at bottom of cradle (right end). Swing right end of chassis (as viewed from rear) to the rear of the cradle. Disengage chassis from cradle by moving sideways.



Clock Connections

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLY					
	103200	Capacitor—Variable tuning capacitor		103200	Socket—Tube socket, 7 pin miniature for V4 and V5
C1A, C1B	100085	Capacitor—Fixed, ceramic, 56 mmf. ±10%, 500 v.		76332	Spring—Dial cord tension spring
C2	73553	Capacitor—Fixed, paper, 0.047 mf. ±20%, 400 v.		77585	Washer—C type retaining washer for tuning control drive shaft
C3	103191	Capacitor—Fixed, paper, 0.082 mf. ±10%, 400 v.	T3	79283	SPEAKER ASSEMBLY
C4		Part of PC1		103669	Transformer—Output transformer
C5 to C9 incl. C10	103205	Capacitor—Fixed, paper, 0.012 mf. ±10%, 400 v.			Speaker—4" P.M. speaker complete with cone—LESS output transformer
C11A, C11B, C12	103197	Capacitor—Electrolytic, 50/50 mf. 150/150 v.	J2	103376	MISCELLANEOUS
C13	103239	Capacitor—Fixed, paper, 0.047 mf. ±20%, 400 v.		103376	Connector—2-contact female appliance outlet—LESS mounting bracket
C13	103440	Capacitor—Fixed, ceramic, 5.6 mmf. ±0.3 mmf., 500 v. coeff. N-3300		103186	Cable—AC power cable and plug
J1	103199A	Connector—2 contact closed circuit female phono connector		Y7005	Case—Plastic case back—antique white for Model 9C7EE
J2	103376	See "Miscellaneous"		Y7007	Case—Plastic case back—pink—for Model 9C7FE
L1	105823	Antenna—Antenna loop and mounting board		Y7008	Case—Plastic case back—turquoise for Model 9C7LE
PC1	103205	Circuit—Printed circuit consisting of R7, R8, R9, C5, C6, C7, C8 and C9		Y7008	Case—Plastic case front—antique white—for Models 9C7EE, 9C7LE, 9C7FE
R1	502333	Resistor—Fixed, composition, 35,000 ohms, ±20%, 1/2 w.		Y7001	Case—Plastic case back—pink—for Model 9C8FE
R2, R3	502533	Resistor—Fixed, composition, 3.3 megohms, ±20%, 1/2 w.		Y7002	Case—Plastic case back—dark gray—for Model 9C8J
R4	502110	Resistor—Fixed, composition, 100 ohms, ±20%, 1/2 w.		Y7000	Case—Plastic case back—maple sugar—for Model 9C8ME
R5	502347	Resistor—Fixed, composition, 47,000 ohms, ±20%, 1/2 w.		Y7003	Case—Plastic case front—antique white—for Models 9C8FE, 9C7LE, and 9C8ME
R6	103214	Control—Volume control		Y7004	Case—Plastic case front—light gray—for Model 9C8J
R7 to R9 incl. R10	103205	Part of PC1		105825	Clock—Radio clock-timer 100/125 v. 60 cycle
R11	512212	Resistor—Fixed, composition, 150 ohms, ±10%, 1/2 w.		103227	Dial—Plastic tuning control dial with AM calibration
R12	502110	Same as R4		74839	Fastener—Metal fastener for cabinet base—9C8 Series
T1	103226	Transformer—1st I.F. transformer		105826	Knob—Time-set control knob for clock-timer
T2	103207	Transformer—2nd I.F. transformer		103228	Knob—Tuning control knob—antique white—with spring—all models except 9C8J
T3	79283	Part of "Speaker Assembly"		105872	Knob—Tuning control knob—light gray—with spring—for 9C8J
T4	103204	Coil—Wavelength coil		103229	Knob—Volume control knob—antique white—with spring—all models except 9C8J
	103533	Board—Printed circuit board chassis assembly including I.F. transformers, oscillator coil, printed audio circuit, interlock contacts, tube sockets, fixed resistors & capacitors—less tubes, tuning capacitor, phono connector, pilot light assembly, volume control, capacitors C4 & C13		105871	Knob—Volume control knob—light gray—with spring—for 9C8J
	103215	Bracket—Dial plate mounting bracket with pulley		103218	Plate—RH or LH aluminum slot finish cover plate for case front (2 req'd)
	103192	Bushing—Tuning control shaft bushing		103908	Nut—Special brass tee nut for case front and back mounting screw
	103206	Contact—Single contact mate—for AC power input (2 req'd)		103978	Nut—Spectral, retainer for speaker (2 req'd)
	72953	Cord—Dial drive cord, 250' spool (approx. 34 inches req'd)		105968	Retainer—Clock-timer window retainer (2 req'd)
	103211	Lamp—Miniature bayonet type 1847		103219	Screw—#8-32 x 3/34" round head screw for case front and back mounting
	103216	Plate—Dial backplate with gray decorative lines		401069	Spring—Retaining spring for volume control or tuning control knobs
	103213	Pointer—Dial pointer		103253	Support—Metal support for cabinet base—9C8 Series
	103198	Pulley—2.69" O.D. phenolic dial cord pulley		8078	Washer—Spring washer for cabinet base—9C8 Series
	103212	Shaft—Tuning control drive shaft		105827	Window—Plastic window for clock-timer
	100643	Socket—Pilot lamp socket with leads			
	103201	Socket—Tube socket, 7 pin miniature for V1, V2, and V3			



RCA VICTOR

AC-DC-Battery Portable Radio

MODEL 1-BX-5 SERIES

MODEL 1-BX-6 SERIES

MODEL 1-BX-7 SERIES

Chassis Nos. RC-1183, RC-1183A, RC-1183B

SERVICE DATA

— 1958 No. 5 —

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE COMPANY
CAMDEN 8, N. J.

FOR
RCA VICTOR RADIO AND "VICTROLA" DIVISION
RADIO CORPORATION OF AMERICA

Specifications

TUNING RANGE 540-1,600 kc

INTERMEDIATE FREQUENCY 455 kc

LOUDSPEAKER

Size and Type 4 in. P.M.
Voice Coil Impedance 32 ohms at 400 cycles

POWER OUTPUT (Battery operation)

Undistorted 140 milliwatts
Maximum 225 milliwatts
Power output on power line operation is approx. 10% less.

TUBE COMPLEMENT

(1) RCA 1R5 Converter
(2) RCA 1U4 1F. Amplifier
(3) RCA 1U5 Det.—AVC—1st A.F.
(4) RCA 3V4 Output
A selenium rectifier is used.

Power Line Operation

A power cord is stored inside the cabinet. To open the cabinet, pull backwards on the top of the cabinet back. It is secured by means of two spring clips and catches on the inside of the cabinet. Remove the plug of the power cord from its socket on the chassis and insert the plug into a convenient electrical power outlet. A notch in the left side of the cabinet allows the back to be closed with the cord passing through.

Note: If reception is not obtained on DC, reverse plug in power outlet. On AC operation, reversal of the plug may reduce hum.

POWER SUPPLY RATING
Power Line Operation
115 volts, d. c. or 50 to 60 cycles a. c. 35 watts
or
Battery Operation
"A" Battery, RCA #VS 065 7.5 volts, 53 ma.
"B" Battery, RCA #VS 219 90 volts, 12 ma.
Battery life approx. 35 hrs. intermittent service

TUNING DRIVE RATIO

1-BX-5, 1-BX-6 Series 1:1 (direct drive)
1-BX-7 Series 6:1 (3 turns of knob)

WEIGHT (Approx.)

Without battery 4½ lbs. With battery 5½ lbs.

DIMENSIONS (Overall)

Height 7½ in. Width 10½ in. Depth 3½ in.

Battery Operation

Place the power cord plug in the socket provided on the top of the chassis. Wind the power cord around the two small spools attached to the cabinet back.

Alignment Procedure

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

Battery operation of the receiver is preferable during alignment. On AC operation, it may be necessary to connect the low side of the test oscillator to "common negative."

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

Step	Connect High Side of Sig. Gen. to—	Sig. Gen. Output	Dist. Point Setting	Adjust to: Max. Output
1	Remove chassis from case			
2	Pin # 6 of 1U4 tube in series with 01 mfd.	455 kc	Quiet point near 1600 kc	T2 2nd I. F. Trans.
3	Connection lug of C1A in series with 01 mfd.			T1 1st I. F. Trans.
4	Install chassis in case. On 1-BX-6 and 1-BX-7 Series, fasten antenna leads in slots provided in cabinet.			
5		1620 kc	Gang fully open	C1-B (sec.)
6	Short wire placed near antenna for radiated signal	1400 kc	1400 kc signal	C1-A (ant.)
7		600 kc	600 kc signal	T4 (sec.) rock gang
8	Repeat steps 5, 6 and 7.			

CAUTION

AN ISOLATION TRANSFORMER SHOULD BE USED FOR THE RECEIVER WHEN BENCH SERVICE IS BEING PERFORMED AND THE RECEIVER IS BEING OPERATED FROM AN A-C POWER LINE.

Circuit Description

These instruments are three-way "personal" portable radio receivers using four miniature tubes and a selenium rectifier.

The receiver circuit is a conventional superheterodyne including pentagrid converter, 4I amplifier stage, combined detector—o.v.c.—first audio stage and a power amplifier.

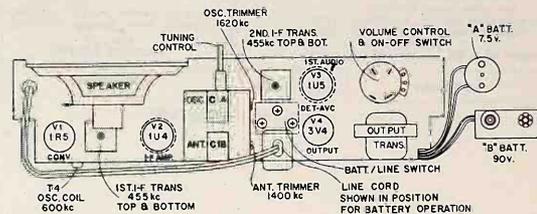
Switching from battery operation to power line operation is accomplished by inserting the line plug in the chassis to actuate the LINE-BATTERY switch. The line plug is non-polarized.

Critical Lead Dress

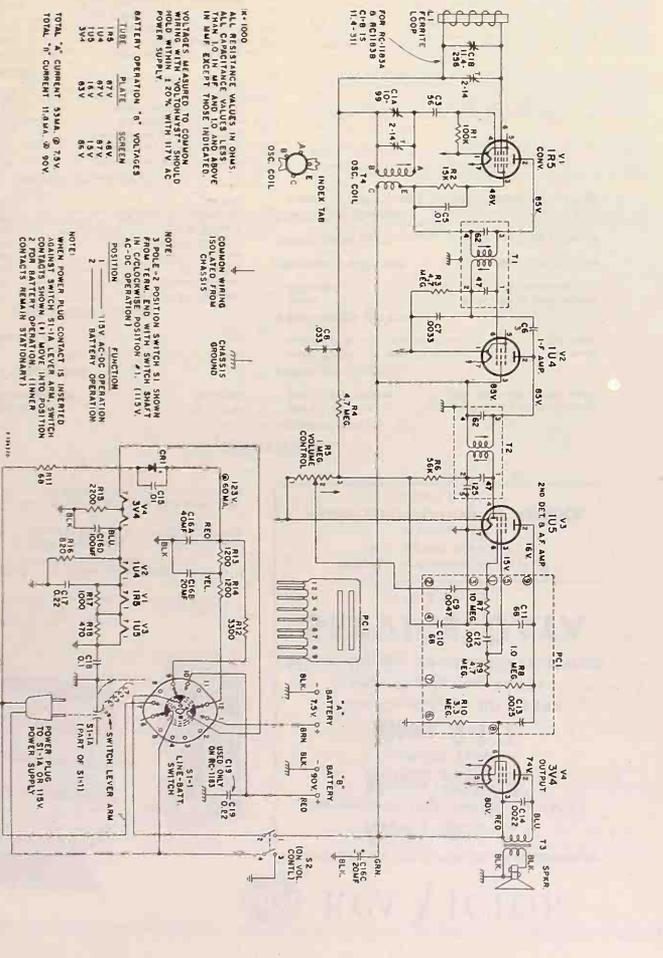
1. Dress ballast resistors R12, R13, R14 and fuse resistor R11 such that they do not contact other leads or short to chassis cover.
2. Make lead from V2-2 to T2-3 as short as possible and dress down toward chassis. Also keep other leads away.
3. Solder C5 with short lead at V2-2 and dress down towards chassis.
4. Dress leads into lanes below selenium rectifier such that they do not contact rectifier plates.
5. Dress leads at volume control such that they clear cabinet enclosure when chassis is mounted in the cabinet.
6. Dress oscillator lead from osc. coil to gang away from metal as much as practicable.
7. Dress lead from antenna section of gang to V1-6 between 1U4 tube shield and 1st I-F transformer and away from top of chassis.
8. Make sure speaker is grounded to chassis.
9. Dress blue lead of output transformer to 3V4 plate toward rear portion of chassis.
10. Dress loop leads into slots provided in cabinet. Excess lead should be on outside of chassis.

To Remove Cabinet Back

With the back fully open, grip the cabinet with thumb pressing forward against case front and fingers pressing backward against case back. Insert a screwdriver under one hinge and pry the center of the hinge out of the opening in the cabinet while maintaining pressure on the back with the fingers and on the cabinet with the thumb. Repeat this procedure with the other hinge. Pull the back straight to the rear using both hands.



Tube and Trimmer Locations



Replacement Parts

SYMBOL No.	STOCK NO.	DESCRIPTION	SYMBOL No.	STOCK NO.	DESCRIPTION
		CHASSIS ASSEMBLIES			
		RC-1183 for I-BX-5 Series		79263	Shield-Tube shield for V2
		RC-1183A for I-BX-6 Series		75780	Socket-Tube socket 7 pin miniature for V1 and V3
		RC-1183B for I-BX-7 Series		77087	Socket-Tube socket 7 pin miniature for V2
				71194	Socket-Tube socket 7 pin miniature for V1
				77620	Washer-Nylon insulating washer for tuning capacitor (2 req'd)
		SPEAKER ASSEMBLY			
				79666A	Speaker-4" FM speaker complete with cone
		MISCELLANEOUS			
				105951	Antenna-Ferrite antenna and case assembly for Models 1BX62, 1B34, 1B357, 1B378 and 1B379—Antique white carried in stock for replacement
				105927	Antenna-Ferrite antenna rod assembly for Models 1B357 and 1B359
				Y0303	Case-Case front and back assembly—maple tan and antique white for Model 1B357
				Y7010	Case-Case front and back assembly—light turquoise and antique white for Model 1B359
				Y7011	Case-Case front and back assembly—antique white and down green for Model 1B362
				Y7012	Case-Case front and back assembly—antique white and pink for Model 1B364
				Y7013	Case-Case front and back assembly—antique white and honey yellow for Model 1B367
				Y7014	Case-Case front and back assembly—louvre beige and flame for Model 1B378
				Y7015	Case-Case front and back assembly—louvre beige and light turquoise for Model 1B379
				101877	Catch-Case front and back catch (2 req'd)
				105953	Dial-Aluminum foil tuning control dial with calibrations and markings for Models 1B362, 1B364 and 1B367
				105952	Gride-Case front grill and screen assembly for Models 1B378 and 1B379
				105949	Handle-Carrying handle for Models 1B362, 1B367, 1B378 and 1B379
				105950	Handle-Carrying handle for Models 1B362, 1B367, 1B378 and 1B379—antique white carried in stock for replacement
				105930	Indicator-Tuning control indicator—flame red for vernier tuning control knob—Models 1B378 and 1B379
				105269	Insulator-Soft rubber insulator for mounting ferrite antenna rod #105937
				105939	Knob-Tuning control knob—antique white with spring—for Models 1B357 & 1B359
				105931	Knob-Tuning control knob—antique white with spring—for Models 1B362, 1B364 and 1B367
				105632	Knob-Vernier tuning control knob—louvre beige with spring—for Models 1B378 and 1B379
				105928	Knob-Volume control knob—antique white with spring—for Models 1B367, 1B369, 1B372, 1B374 and 1B375
				105929	Knob-Volume control knob—louvre beige with spring—for Models 1B378 and 1B379
				79744	Relaxer-Formed wire hings relaxer for case front and case back (2 req'd)
				105943	Retainer-Retaining spring for vernier tuning control knob #105930
				101878	Spring-Retaining spring for vernier tuning control knob #105930
				101069	Spring-Retaining spring for volume control knob (2 req'd)
				105935	Spring-Phenolic stop for antenna assembly—Models 1B362, 1B364, 1B367, 1B378 and 1B379
				101875	Spring-Phenolic stop for antenna assembly—Models 1B362, 1B364, 1B367, 1B378 and 1B379
				105942	Washer-Phenolic retaining washer for AC power cable (2 req'd)
				101876	Washer-Spring washer for antenna assembly—Models 1B362, 1B364, 1B367, 1B378 and 1B379
				105941	Insulator-Phenolic insulator for tuning capacitor



RCA VICTOR

Stereophonic High-Fidelity Combination

MODEL SHC-8

Stereophonic High-Fidelity Victrola®

MODEL SHP-8

AM-FM Tuner

MODEL 9-T-2

Tuner Chassis No. RC-1155AX

Amp. Chassis No. RS-171

Record Changer RP-205C-2X, RP-205E-2X

SERVICE DATA

- 1958 No. 13 -

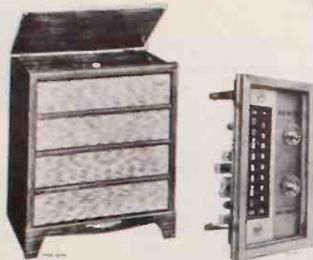
PREPARED BY COMMERCIAL SERVICE

RCA SERVICE COMPANY

A DIVISION OF

RADIO CORPORATION OF AMERICA

CAMDEN 8, N. J.



Model SHC-8 The "Man. VIII D"
Model SHP-8 The "Mark VIII"
Mahogany, Oak, Maple or Walnut

Model 9-T-2
AM-FM Tuner

Model SHC-8 is a combination radio-phonograph. It is a combination of Model SHP-8 and Model 9-T-2.

Model SHP-8 is a phonograph using AF amplifier chassis RS-171, record changer RP-205C-2X or RP-205E-2X and four speakers.

Model 9-T-2 is an AM-FM tuner using tuner chassis RC-1155-AX. It is an accessory designed for installation in Model SHP-8.

SPECIFICATIONS

TUNING RANGE
Standard Broadcast (AM) 540-1600 kc
Frequency Modulation (FM) 88-108 mc

INTERMEDIATE FREQUENCIES
AM 455 kc FM 10.7 mc

TUBE COMPLEMENT

TUNER CHASSIS RC-1155AX

- (1) RCA 6BE6 R.F. Amplifier
- (2) RCA 19X8 Mixer-Oscillator
- (3) RCA 12BA6 I.F. Amplifier
- (4) RCA 12AU6 FM I.F. Amplifier
- (5) RCA 12AU6 FM I.F. Amplifier
- (6) RCA 12AL5 F.M. Detector
- (7) RCA 12AV6 AM Det.-AVC—Phase Inv.
- (8) RCA 35W4 Rectifier

AMPLIFIER CHASSIS RS-171

- (1) RCA 6CG7 Two-channel A.F. Pre-amplifier
- (2) RCA 6CG7 Two-channel 1st A.F. Amplifier
- (3) RCA 6CG7 Two-channel 2nd A.F. Amplifier
- (4) RCA 6V6GT Left Channel A.F. Output
- (5) RCA 6V6GT Right Channel A.F. Output
- (6) RCA 5Y3GT Rectifier

RECORD CHANGER

Turntable speed 16 $\frac{1}{2}$, 33 $\frac{1}{3}$, 45 or 78 r.p.m.
Record capacity Up to 8 $\frac{1}{2}$ inch
or twelve 10 inch,
or ten 12 inch,
or ten 10 in. and 12 in. internorm.

Pickup (Stock No. 106770) Stereophonic Ceramic

LOUDSPEAKERS
Two 12" FM "woolers" 6.8 ohms each @ 400 cycles
Two 3 $\frac{1}{2}$ " FM "tweeters" 6.8 ohms each @ 3000 cycles

POWER SUPPLY RATING
Model SHC-8: 115 volts, 60 cycles 140 watts
Model SHP-8: 115 volts, 60 cycles 105 watts

AUDIO POWER OUTPUT
Stereo 7 watts max. on each channel
Monaural 14 watts maximum

FREQUENCY RESPONSE 45 cycles to 20,000 cycles

TUNING DRIVE RATIO 7 $\frac{1}{2}$:1 (3 $\frac{1}{2}$ turns of knob)

DIMENSIONS (Overall)
Height 32" Width 28 $\frac{1}{2}$ " Depth 17 $\frac{1}{2}$ "

ALIGNMENT INDICATORS:

An RCA VoltOhmyst® or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone controls to mid-position.

SIGNAL GENERATOR:

For all alignment operations, connect the low side of the signal generator to the receiver chassis. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

AM Alignment FUNCTION SWITCH IN AM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 1 of V3 in series with 50 mfd	455 kc (mod.)	Outlet point at high freq. end	T4 bottom core (sec.) T4 top core (pri.)
2	Top lug (No. 4) an AM RF coil	1620 kc (mod.)	1620 kc (gang open)	T2 bottom core (sec.) T2 top core (pri.)
3	Short wire placed near loop for radioed signal	1400 kc (mod.)	1400 kc signal	C1A-T (osc.) C1A-T (ant.) C1C-T (T.I.)
4		600 kc (mod.)	600 kc signal	L5 (osc.) L5 (ant.) L4 (RF)
5				
6				
7				Repeat steps 4, 5 and 6 until maximum gain is obtained.

Oscillator frequency is above signal frequency on both AM and FM.

ALIGNMENT PROCEDURE

FM SWEEP ALIGNMENT:

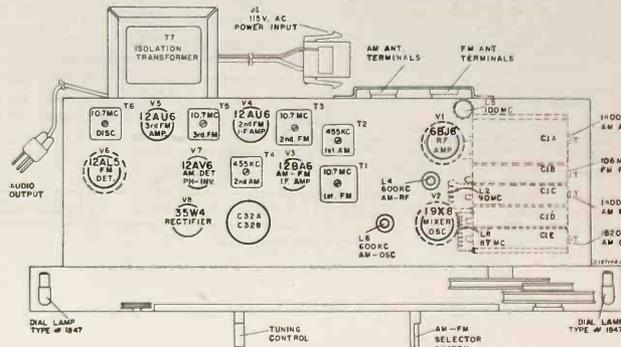
If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C23, adjusting discriminator T6 top core for 10.7 mc crossover, and T6 bottom core for balanced peaks. Peak separation should be approximately 330 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 220K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

FM Alignment FUNCTION SWITCH IN FM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for max. output
1	Pin No. 1 of V5-12A06			T6 top core for zero d.c. across C23 T6 bottom core for maximum d.c. at junction of R15 and R19
2	Pin No. 1 of V4-12AU6	10.7 mc	Outlet point at low frequency end	T75 top core
3	Pin No. 1 of V5-12BA6			T3 top core T3 bottom core
4	C1-B Stator			T1 top core T1 bottom core
5		87 mc (gang closed)	87 mc (gang closed)	9FM R.F. L5
6		106 mc	106 mc signal	9FM R.F. C1B-L5
7	FM Ant. terminals thru 270 ohm resistor	90 mc	90 mc signal	9FM R.F. L1
8				Repeat steps 6 and 7 until maximum gain is obtained.
9		100 mc	100 mc signal	9FM ant. coil L5

If necessary for accurate peaking, the winding in the same transformer and being peaked should be loaded with a 600 ohm resistor.
Connect VoltOhmyst to pin 1 of V5 through a 220K isolating resistor with $\frac{1}{4}$ inch maximum exposed lead at grid terminal end. Output adjusted for 1 volt a.c. across VoltOhmyst lead away from input circuits.

NOTE—FM coils L8, L2 and L5 are adjusted by increasing or decreasing spacing between turns.



RC-1155AX Tuner Chassis—View Showing Location of Tubes and Controls

DESCRIPTION

Model SHC-8 is a radio-phonograph. It is a combination of Model SHP-8 and Model 9-T-2.

Model SHP-8 is a phonograph designed for use with either stereophonic records or monaural records. The instrument employs audio amplifier chassis RS-171, record changer RP-205C-2X or RP-205E-2X, two 12-inch wide-range speakers and two 3 1/2-inch tweeters mounted on plastic housings to give panoramic distribution of the higher frequencies.

The tuner chassis provides R-F amplification on both AM and FM operation. The FM antenna input is broad-banded and resonates to the appropriate center of the FM band. The mixer is pentode connected for AM operation and triode connected for FM operation. AM I-F circuits use a conventional I-F amplifier and a diode detector which provides AVC voltage. FM I-F circuits include three I-F amplifiers without AVC and a discriminator detector. An item of unusual interest is the inclusion of an A.F. phase inverter in the chassis. This simplifies switching between stereo and monaural operation in the audio chassis. AC supply voltage for the 35W4 rectifier tube and the series connected tube heaters is obtained from an isolation transformer.

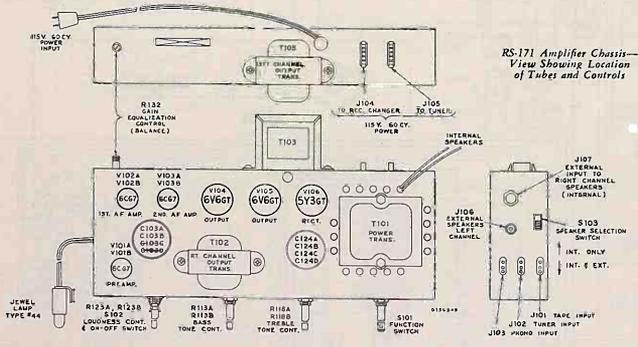
A five-position audio function switch is contained in the audio amplifier chassis and permits use of a tape recorder in conjunction with either radio or phono functions. This chassis has two single-

ended amplifiers for dual-channel amplification of stereophonic sound from records or tapes. The outputs of these two single-ended amplifiers are reconnected as a push-pull amplifier when using the instrument for monaural reproduction. Three 6CG7 tubes (dual triode) provide three stages of dual-channel AF amplification; a 6VGT tube is used for power output in each channel. Negative feedback, applied to each third AF amplifier, is derived from the secondaries of the two output transformers.

A dual loudness control and dual tone controls are used to provide equal and simultaneous regulation of volume and tone in each amplifier channel. A gain equalization control in the input of the right channel 3rd AF amplifier stage permits the right channel (internal speakers) output to be balanced with left channel (external speakers) output.

A speaker selection switch (one system or two system) is used to connect the two amplifier channels in parallel when internal speakers only are used. Provision is made to use this instrument as a companion speaker in conjunction with other amplifiers when so desired.

A four-speed record changer (16 2/3, 33 1/3, 45 and 78 r.p.m.) is used which is designed for use with either stereophonic or monaural records. It utilizes a ceramic two-stylus pickup having two elements and two audio outputs.



RS-171 Amplifier Chassis—
View Showing Location
of Tubes and Controls

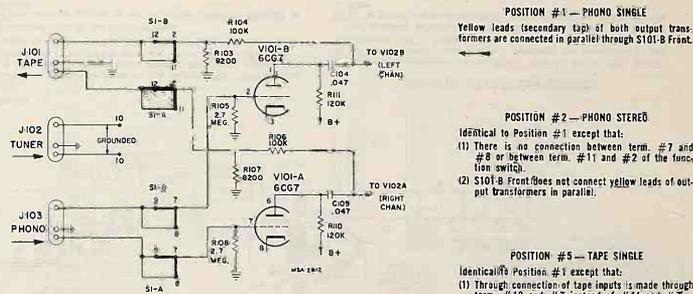
CRITICAL LEAD DRESS

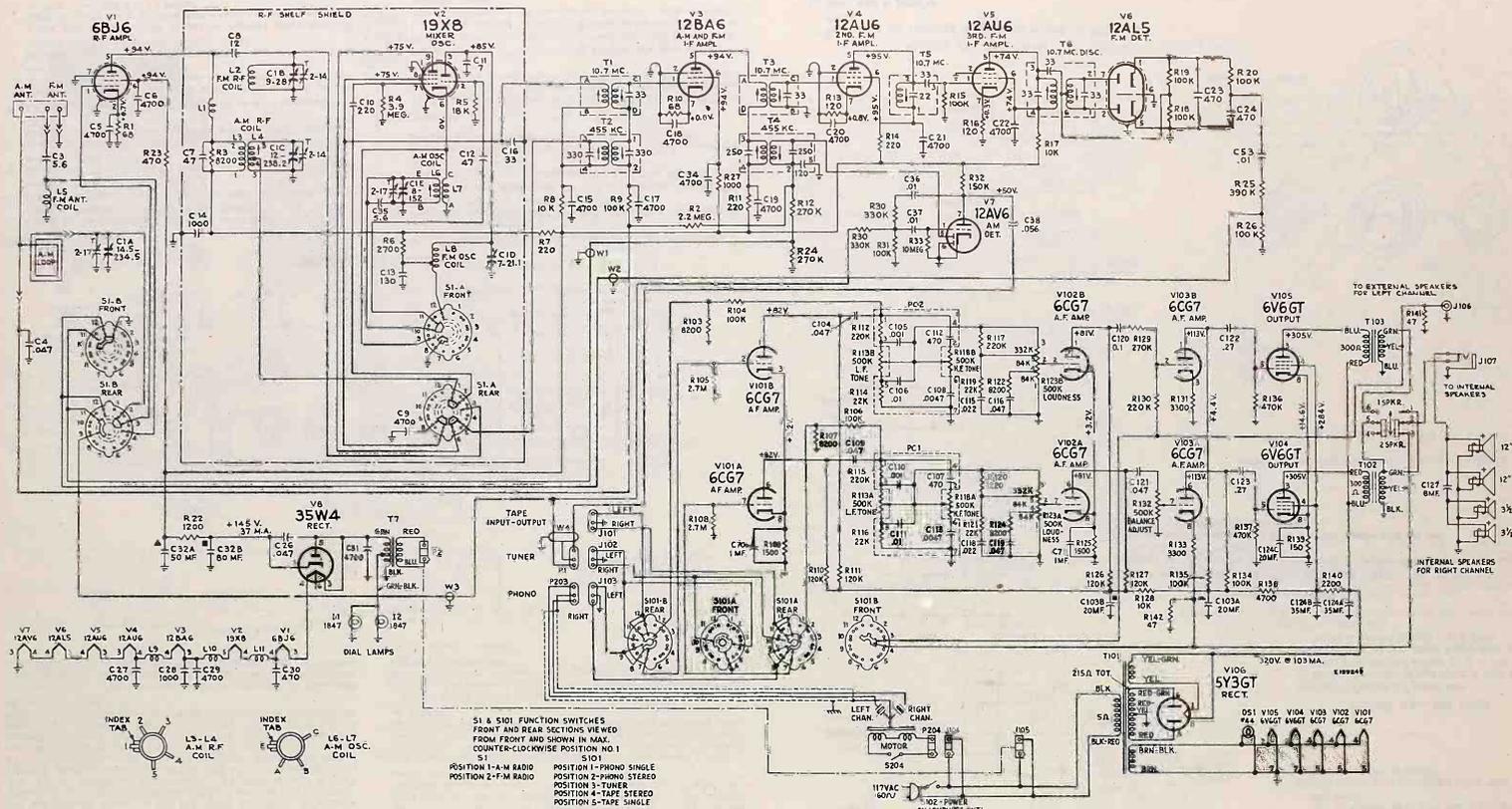
- All FM IF transformer grid and plate leads should be short and direct as possible and kept low, near chassis.
- R18 and R19 leads should be kept as short as possible on T6 terminal 6 side.
- Keep leads V5 pin 5, to T6 term 1, as short as possible and low near chassis.
- Dress C33 down on chassis and against terminal board. Run filament lead between V5 and V5 on side of V6 socket opposite C33.
- All bypass capacitors should have leads as short as possible.
- Green lead from AM oscillator stator gang terminal to AM oscillator coil should be dressed against front of shield box and up above filament choke.
- RF plate choke L1 should be dressed at least 1/4" away from AM R.F. coil L4 and at least 1/4" from shield.
- Mixer grid condenser C10 should be dressed away from FM oscillator gang stator terminal and away from leads connecting to terminals 8 and 9 of V2 socket.

- Filament chokes L10 and L11 should be raised a minimum of 1/16" above chassis.
- Oscillator grid condenser C12 should have short leads and be dressed away from filament choke L10.
- Keep wires and components away from 4200 ohm resistor R22.
- C24 should ground in hole near terminal 5 of V6 with short leads.
- Heavy buss lead from terminal 6 of V2 to S1-A terminal 9 should be short and direct.

CHASSIS RS-171

- The following components, R103, R104, R105, R111 and C104, in the preamplifier (V101) circuit should have relatively short leads and be dressed away from R106, R107, R108, R110 and C109.
- Stand PC101 and PC102 vertically between the tone controls.
- Dress all wires and components away from R140 (2200 ohms).
- Leads from function switch to V101 should be dressed down to chassis and against chassis apron; maintain some separation between wires.





FOR RECORD CHANGER INFORMATION—
REFER TO "RP-205 SERIES SERVICE DATA"
AND TO "RP-205 SERIES SERVICE
DATA SUPPLEMENT"

Complete Schematic Diagram

The output to a tape recorder at the TAPE INPUT/OUTPUT jack (J102) is two-channel stereophonic when stereophonic records are being played (function switch must be set to PHONO STEREO).

The output to a tape recorder is monoaural on both channels when:

- (1) Monoaural records are being played.
- (2) When function switch is set at either PHONO SINGLE or TUNER.

SPEAKER SELECTION SWITCH

The speaker selection switch (S103) must be set at "INT. ONLY" at all times except when external speakers are connected to the left channel "EXT." speaker jack.

The speaker selection switch (S103) must be set at "INT. & EXT." to permit stereophonic sound reproduction from either records or tape.


RCA VICTOR

Stereophonic High-Fidelity Combination

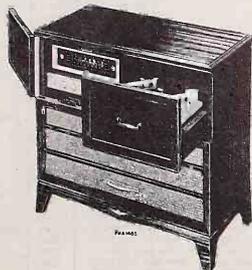
MODEL SHC-4

Tuner/Amp. Chassis No. RC-1168C

Record Changer RP-205G-1

SERVICE DATA

- 1958 No. 14 -

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

Model SHC-4 The "Mark IV"
Mahogany, Maple or Oak

SPECIFICATIONS**TUNING RANGE**

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.

INTERMEDIATE FREQUENCIES

AM 455 kc. FM 10.7 mc.

TUNE COMPLEMENT

(0) RCA 6CB5 R.F. Amplifier
(2) RCA 6X8 Mixer & Oscillator
(3) RCA 6BA6 I.F. Amplifier
(4) RCA 6AU6 2nd F.M. I.F. Ampl. (5) RCA 6AU6 3rd F.M. I.F. Ampl.
(6) RCA 6AL5 Ratio Detector
(7) RCA 6AV6 A.M. Det.—A.V.C.—Ph. Inv.
(8) RCA 6AL7-GT Tuning Eye
(9) RCA 5A5A Rectifier
(10) RCA 6CG7 Two-channel Audio Presamp.
(11) RCA 6CG7 Two-channel Audio Ampl.
(12) RCA 6CG7 Two-channel Audio Ampl.
(13) RCA 6V6GT Left Channel Output
(14) RCA 6V6GT Right Channel Output

POWER SUPPLY RATING

115 volts, 60 cycles, 145 watts (includes record changer)

TUNING DRIVE RATIO 74:1 (3% turns of knob)**RECORD CHANGER**

Turntable speed 16%, 33%, 45 or 78 r.p.m.
Record capacity Up to fifteen 7 inch or twelve 10 inch or ten 12 inch or ten 10 inch and 12 inch Internized
Pickup Stock No. 106770 Stereophonic, Ceramic

AUDIO POWER OUTPUT 14 watts maximum**FREQUENCY RESPONSE** 45 cycles to 20,000 cycles**LOUDSPEAKERS**

Two 12" PM "woofers" 8 ohms @ 400 cycles
Two 3 1/2" PM "tweeters" 6-8 ohms @ 3000 cycles

CABINET DIMENSIONS

Height, 34 1/4" Width, 38" Depth, 16 1/2"

DESCRIPTION

The "MARK IV" is a stereophonic high-fidelity combination instrument consisting of a tuner/amplifier, stereophonic record changer and four speakers all in one cabinet.

The tuner/amplifier incorporates a tuned r.f. stage, mixer/oscillator, one stage of AM i.f. amplification and three stages of FM i.f. amplification. Audio amplification is twin-channel for stereophonic reproduction. Each audio channel consists of preamplifier, two stages of voltage amplification and, 6V6GT power output. Inverse feedback, derived from the secondaries of the two output transformers, is applied to the third a.f. amplifiers.

The circuit is designed to enable tape recordings to be made from either records (either monaural or stereo) or radio programs. The program being recorded can be monitored on the speakers.

A two-pushbutton switch, located above the tuning dial, is used to select either MONAURAL or STEREO audio output. This switch permits stereo reproduction from stereophonic sources and yet retaining many of the advantages of push-pull operation when monaural sources are used. A "left channel" external speaker system must be used in conjunction with the "MARK IV" when stereophonic sound is desired.

A two-position slide-type switch, located on the back of the chassis, is used to permit operating the two audio output channels in parallel when a "left channel" speaker system is not connected.

Provision is made for use of this instrument as a companion speaker unit in conjunction with stereoscope players.

Signal Generator

For alignment operations connect the low side of the signal generator to the receiver chassis. The output of the signal generator should always be controlled to prevent over-loading or excessive AVC action.

Alignment Indicators

For measuring the developed d-c voltage across R45 or R47 during FM alignment an RCA VoltOhmyst® or an equivalent meter should be used.

The RCA VoltOhmyst can also be used to indicate audio output voltage across the voice coil or developed voltage on the AVC bus.

Alignment Sequence

There is a slight interaction between AM and FM adjustments on the tuning condenser; if a large amount of adjustment is required of any circuit, all others should be checked in the following order:

FM I.F. AM I.F. AM Osc. ant. and r.f.

FM Osc. ant. and r.f. Final adjustment of AM ant. trimmer should be made with chassis and antenna in cabinet.

ALIGNMENT PROCEDURE**FM Alignment**

RANGE SWITCH IN FM POSITION
VOLUME CONTROL MAXIMUM—TONE CONTROL CENTER

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Zero reading of I.F. meter with 0.1 mid.	Adjust for peak output
1	Pin #1 of V5 (3rd F.M. I.F. amp. section with 0.1 mid.)	10.7 mc.	Signal point at low freq. end	
2	Connect VoltOhmyst across R45 or R47 resistor. Adjust Sig. gen. output to give 6 volts d-c on VoltOhmyst.			T8 top core for max. d-c voltage across R45 or R47
3	Connect VoltOhmyst from chassis to junction of R46 and C33			T8 bottom core for 0 volts d-c
4	Connect VoltOhmyst to pin #1 of V5			
5	Slide of IF transformer with 0.1 mid.			↑↑T7 top core, T5 top & bottom cores
6	Slide of IF transformer with 0.1 mid.	10.7 mc.	Quiet point at low freq. end	↑↑T3 top and bottom cores
7		30 mc.		Remove bottom core, read C4
8	FM Ant. terminals thru I.F. chassis in each side of line	100 mc.	100 mc. balance	Replace bottom antenna, C2, ant., C8
9		30 mc.		T1 core, T2 r.f.
10	Repeat steps 2, 3 and 5 until further adjustment does not improve calibration.			

* Use ceramic disc capacitor with short leads.

†† Alternate loading may be necessary to provide accurate observation of peaks. Alternate loading involves the use of a 270 ohm resistor to load the plate winding while the grid winding of the SAME TRANSFORMER is being peaked. Then the grid winding is loaded with the resistor while the plate winding is peaked. Only one winding is loaded at any one time.

It is possible to run the IF transformer cores all the way through the coil winding and obtain a second peak. This will cause serious overcoupling and should be avoided by using a marked adjusting stick. The correct peak is always the first peak obtained when the core is started in from the "backed all the way out" position.

** Note: FM antenna, mixer and oscillator coils are adjustable by increasing or decreasing the spacing between turns. The location of the tap on the antenna coil is 3/4 turn to 1/2 turn from the ground end.

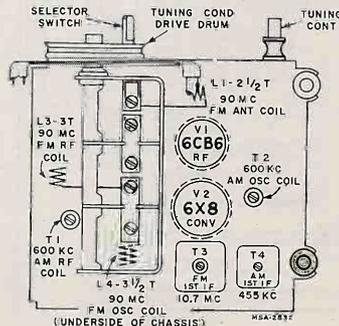
Oscillator frequency is above signal frequency on both AM and FM.

Oscilloscope Alignment

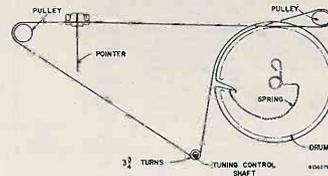
It is preferable to use a sweep generator and oscilloscope for aligning I.F. and R.F. circuits to obtain a visual observation of curve shape during alignment.

With FM sweep generator connected between FM ant. (#3) terminal and chassis, and oscilloscope connected between the junction of R40-C33 and chassis, the overall FM linearity may be observed. There should be a peak-to-peak separation of 250 kc. with 50,000 microvolts input.

For FM alignment of the ratio detector, connect oscilloscope to junction of R40-C33 as in alignment table, adjusting T8 top and bottom cores for 10.7 mc. crossover and balanced peaks. When aligning other FM tuned circuits, connect oscilloscope to pin #1 of V5 (3rd F.M. I.F.) and maximum C23. Follow alignment table sequence, adjusting for maximum gain and symmetry.



FM Coil Locations



TUNING DRIVE CORD ASSEMBLY SHOWN WITH RANGE IN CLOSED POSITION

Dial Cord and Drive Assembly

ALIGNMENT PROCEDURE—LEAD DRESS

AM Alignment

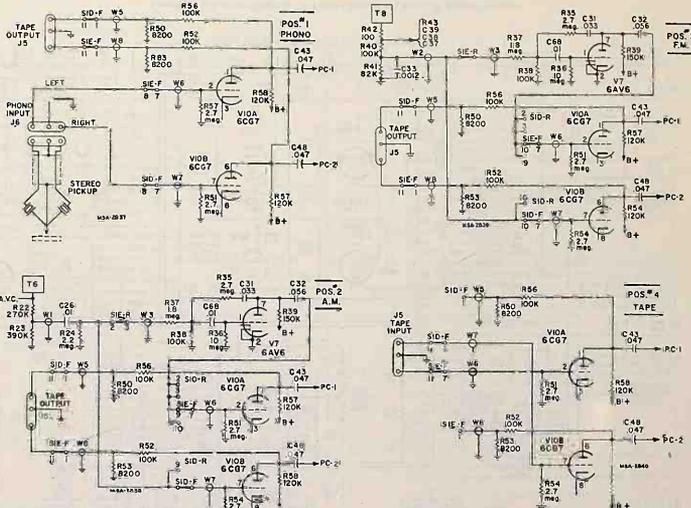
RANGE SWITCH IN AM POSITION

Step	Connect high side of sec. gwa. to—	Sig. gen. output (500 cy. modulation)	Turn radio dial to—	Adjust for peak output
1	Pin 1 of V3 6B46 is wired with .01 mfd.	455 kc.	Quiet point at low freq. end	T6 bottom core (prt.) T5 top core (sec.)
2	T1 turns 4 in series with .01 mfd.			T4 top core (sec.) T4 bottom core (prt.)
3			1620 kc. gang fully open	C17
4			1400 kc.	1400 kc. signal C9 coil
5	AM terminal on coil input strip		Shunt a 10,000 ohm resistor across the r.f. section (C1C) of the gang.	
6			600 kc.	600 kc. signal T2 core (Rock gang.)
7			Remove the 10,000 ohm resistor and peak T1 r.f. at 600 kc.	
8			Repeat 3, 4, 5, 6 and 7	

The RF transformer (T1) and the oscillator coil (T2) cores should be adjusted on the peak obtained with the core coming out the lug end of the coil. When adjusting from the top of the chassis, this is the peak with the core farthest into the coil.

Critical Lead Dress

1. Dress R16, R33, R83 and R87 up in the air and away from all other components.
2. Dress R51 and R54 down against chassis and keep leads short.
3. Keep leads of C33 and C39 short and dress these components down against chassis.
4. Keep all I.F. bypass capacitor leads short.
5. Dress power line leads away from all audio leads at loudness control.
6. Do not relocate ground straps from chassis to R.F. shield.
7. Lead from terminal "B" of 1st FM I.F. transformer to switch should be 3 inches \pm 1/4".
8. Dress all components and wiring away from V1 grid circuit.
9. Dress R42 down against chassis.
10. Leads of R40 and R43 joining to R42 should be as short as possible.
11. Keep knob light leads away from audio leads on same terminal board.
12. Dress audio capacitors down against chassis and away from heater leads wherever possible.
13. Replace all shields securely if it has been necessary to remove them.



Simplified Schematic Diagrams of Audio Circuit

CHANNEL GAIN EQUALIZATION

A gain equalization control is provided to enable the gain of the RIGHT CHANNEL (internal speakers) to be balanced with the gain of the LEFT CHANNEL (external speakers). This equalization control (R78) is located on the back of the chassis. When adjusting this control, five conditions must exist:

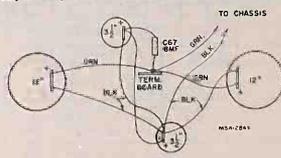
1. A monaural signal input must be used. This should be a monaural test record; use a frequency test record when measuring with an output meter or use a music record for listening test.
2. The function switch must be in #1 position (PHONO).
3. The STEREO pushbutton must be depressed. This enables the two channels to have independent outputs.
4. The speaker selection switch must be in the "INT. & EXT. SPEERS." position. This is necessary for the two channels to have independent outputs.
5. Both internal and external speaker systems must be connected or the outputs loaded equally with resistors. If output is measured with an output meter, a channel having no speakers connected will have an abnormally high output voltage reading.

Adjust the equalization control (R78) to obtain right channel output equal to left channel output. The left channel gain is not adjustable.

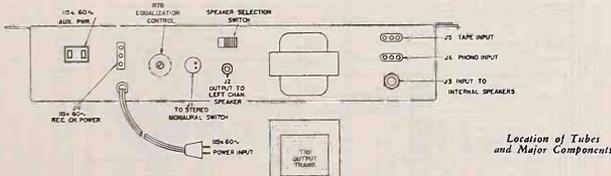
NOTES

It is not necessary to measure the audio output while making the equalization adjustment; sufficient accuracy can usually be had by listening. This is best done by playing a monaural record with the left channel speaker placed for stereo listening. Adjust the balance control until the sound appears to be coming from a point midway between the two speakers.

If the external speaker system is other than 3.5 ohms impedance, the output voltages will not be equal for equal power output.

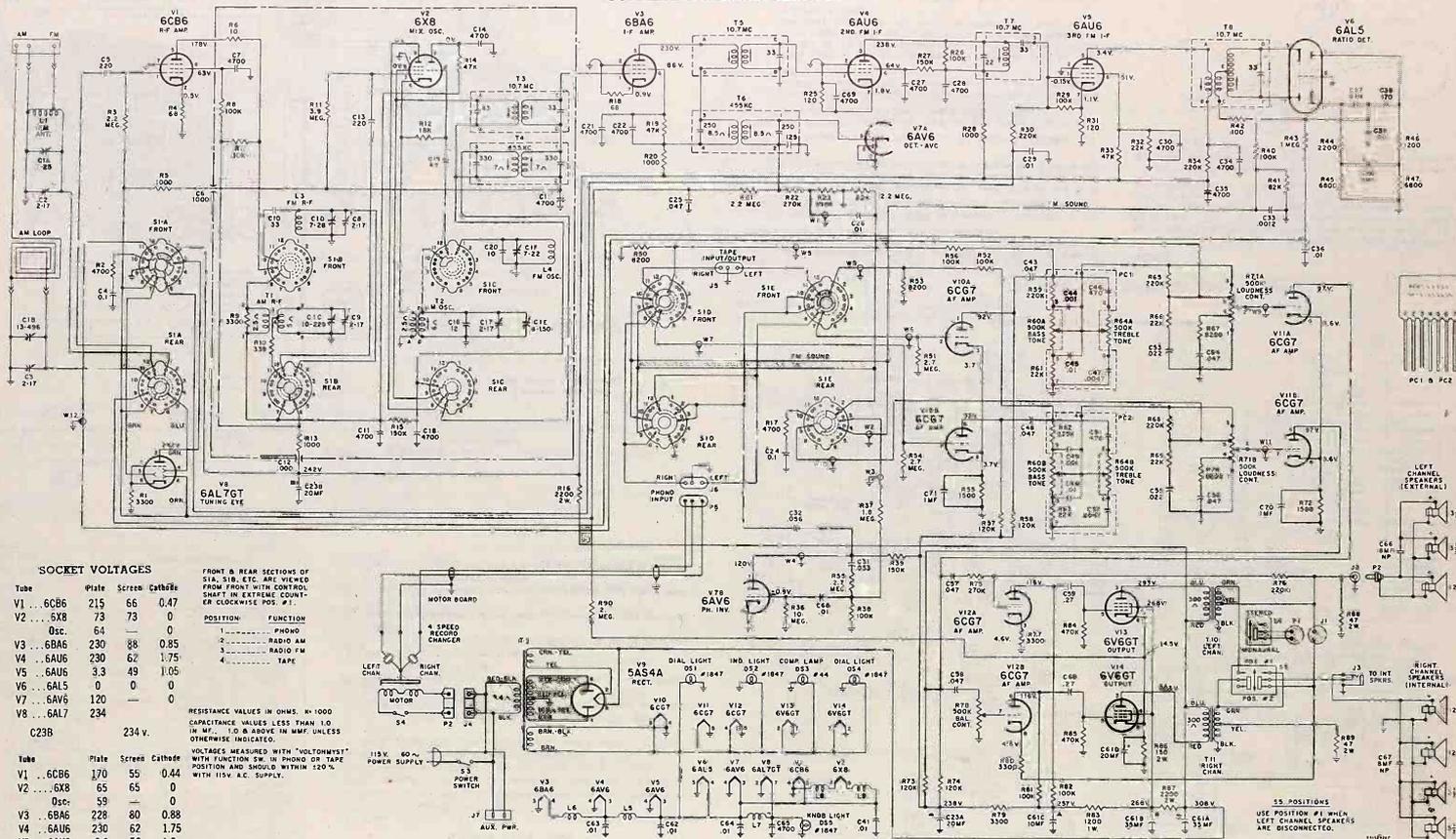


Speaker Wiring Assembly



Location of Tubes and Major Components

COMPLETE SCHEMATIC DIAGRAM



SOCKET VOLTAGES

Tube	Plate	Screen	Cathode
V1 ... 6CB6	215	66	0.47
V2 ... 6X8	73	73	0
Osc.	64	—	—
V3 ... 6BAG	230	88	0.85
V4 ... 6AUG	230	67	1.75
V5 ... 6AUG	3.3	49	1.05
V6 ... 6AL5	0	0	0
V7 ... 6AV6	120	—	—
V8 ... 6AL7	234	—	—

FRONT & REAR SECTIONS OF S1A, S1B, ETC. ARE VIEWED FROM FRONT WITH CONTROL SWITCH IN EXTREME COUNTERCLOCKWISE POS. #1

POSITION	FUNCTION
1	PHONO
2	RADIO AM
3	RADIO FM
4	TAPE

RESISTANCE VALUES IN OHMS, K=1000 CAPACITANCE VALUES LESS THAN 1.0 IN M.F., 1.0 & ABOVE IN M.M.F. UNLESS OTHERWISE INDICATED.

VOLTAGES MEASURED WITH "HOLLOWTEST" WITH FUNCTION SW. IN PHONO OR TAPE POSITION AND SHOULD WITHIN 20% WITH 115V. AC SUPPLY.

Tube	Plate	Screen	Cathode
V1 ... 6CB6	170	55	0.44
V2 ... 6X8	65	65	0
Osc.	59	—	—
V3 ... 6BAG	228	80	0.88
V4 ... 6AUG	230	62	1.75
V5 ... 6AUG	3.6	50	1.0
V6 ... 6AL5	0	0	0
V7 ... 6AV6	120	—	—
V8 ... 6AL7	232	—	—

C23B 232 v.

Voltages for V9 through V14 for all functions are as indicated on the schematic diagram.

"STEREO-MONAUURAL" PUSHBUTTON SWITCH

When the "Stereo" pushbutton is depressed, the two amplifier channels are permitted to act independently for reproduction of stereophonic sound. Must be depressed for stereo.

When the "Monaural" pushbutton is depressed, the secondaries of the two output transformers are connected in parallel to obtain many of the advantages of push-pull operation.

The heater voltage of the mixer/oscillator tube (6X8) is approx. 0.4 volt lower than other tubes. This is due to the filament choke coils L8 and L9.

Complete Schematic Diagram - Tuner/Amplifier Chassis & Record Changer

"INT. & EXT. - INT. ONLY" SLIDE SWITCH

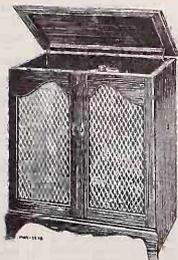
This switch, located on the back of the chassis is used to permit operating the two audio output channels in parallel when a "left channel" speaker system is not connected.

REPLACEMENT PARTS

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
CHASSIS ASSEMBLY					
RC4168C					
CAPACITORS:					
C1A thru C1F	103354	Variable tuning (includes C2, C3, C8, C9, C17)	R1	502223	3200 ohms, ±10%
C2, C3	75531	Part of C1A, B, C, D, E, F	R2	502247	4700 ohms, ±10%
C4	71502	Paper, 0.1 mf., ±10%, 200 v.	R4	502058	68 ohms, ±10%
C5	105660	Ceramic, 220 mmf., ±10%, 500 v., Coel.—750	R5	502210	1000 ohms, ±20%
C7	73473	Feed thru, 1000 mmf., ±10%, 0—500 v.	R6	502010	10 ohms, ±20%
C8, C9	73473	Ceramic, 0.0047 mf., ±10%, 500 v., Coel.—750	R7	502210	10,000 ohms, ±10%
C10	76739	Part of C1A, B, C, D, E, F	R8	502410	100,000 ohms, ±10%
C11	73473	Ceramic, 22 mmf., ±10%, 500 v., Coel.—750	R9	502223	3200 ohms, ±10%
C12	105660	Feed thru, 1000 mmf., ±10%, 0—500 v.	R10	502133	320 ohms, ±10%
C13	71520	Ceramic, 220 mmf., ±10%, 500 v., Coel.—750	R11	502539	3.9 megohms, ±10%
C14	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R12	502218	1000 ohms, ±20%
C15	73662	Ceramic, 47 mmf., ±10%, 500 v., Coel.—750	R13	502210	1000 ohms, ±20%
C16	76349	Ceramic, 12 mmf., ±10%, 500 v., Coel.—300	R14	512347	47,000 ohms, ±20%, 1 w.
C17	39668	Part of C1A, B, C, D, E, F	R15	512415	150,000 ohms, ±20%, 1 w.
C18	73473	Mica, 0.0047 mf., ±10%, 0—500 v.	R16	502222	2200 ohms, ±10%, 1 w.
C19	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R17	502247	4700 ohms, ±10%
C20	32098	Ceramic, 10 mmf., ±0.5 mmf., 500 v., Coel.—750	R18	502058	68 ohms, ±10%
C21	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R19	502247	47,000 ohms, ±10%
C22A, C22B	106210	Electrolytic, 20/20 ml., 400/400 v.	R20	502210	1000 ohms, ±20%
C23	72621	Paper, 0.1 mf., ±10%, 200 v.	R21	502222	2.2 megohms, ±20%
C24	73558	Paper, 0.047 mf., ±10%, 500 v.	R22	502427	270,000 ohms, ±10%
C25	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R23	502435	390,000 ohms, ±10%
C26	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R24	502522	2.2 megohms, ±20%
C27, C28	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R25	502115	120 ohms, ±10%
C29	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R26	502410	100,000 ohms, ±10%
C30	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R27	502415	150,000 ohms, ±10%
C31	100289	Paper, 0.03 mf., ±10%, 400 v.	R28	502210	1000 ohms, ±20%
C32	102594	Paper, 0.05 mf., ±10%, 400 v.	R29	502410	100,000 ohms, ±10%
C33	105579	Paper, 0.0012 mf., ±10%, 400 v.	R30	502422	220,000 ohms, ±10%
C34, C35	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R31	502112	120 ohms, ±10%
C36	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R32	502222	22,000 ohms, ±10%
C37, C38	39644	Mica, 470 mmf., ±10%, 300 v.	R33	512347	47,000 ohms, ±20%, 1 w.
C39	103166	Ceramic, 100 mmf., ±20%, 500 v.	R34	502058	68 ohms, ±10%
C40	79181	Electrolytic, 1 ml., ±10%, 100 v.	R35	502527	2.2 megohms, ±10%
C41	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R36	502510	10 megohms, ±10%
C42	105240	Paper, 0.01 mf., ±10%, 400 v.	R37	502518	12 megohms, ±10%
C43	105240	Paper, 0.01 mf., ±10%, 400 v.	R38	502410	100,000 ohms, ±10%
C44 thru C47	105240	Part of PC1	R39	502415	150,000 ohms, ±10%
C48	105240	Paper, 0.047 mf., ±10%, 400 v.	R40	502410	100,000 ohms, ±10%
C49 thru C53	79343	Part of PC2	R41	502382	82,000 ohms, ±10%
C54	73558	Paper, 0.047 mf., ±10%, 200 v.	R42	502510	100,000 ohms, ±10%
C55	73558	Paper, 0.047 mf., ±10%, 200 v.	R43	502510	100,000 ohms, ±10%
C56	73558	Paper, 0.047 mf., ±10%, 200 v.	R44	502222	2200 ohms, ±10%
C57, C58	105240	Paper, 0.047 mf., ±10%, 400 v.	R45	502258	6800 ohms, ±10%
C59, C60	78531	Paper, 0.27 mf., ±10%, 400 v.	R46	502212	1000 ohms, ±10%
C61, B, C, D	101414	Electrolytic, 35/35/10/20 ml., 400/400/350/25 v.	R47	502268	6000 ohms, ±10%
C62, C63	73960	Ceramic, 0.01 mf., ±10%, 500 v.	R48	502282	8200 ohms, ±10%
C64	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R49	502227	22,000 ohms, ±10%
C65	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R50	502232	22,000 ohms, ±10%
C66	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R51	502227	22,000 ohms, ±10%
C67	101000	Part of Speaker Assembly	R52	502232	22,000 ohms, ±10%
C68	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R53	502292	8200 ohms, ±10%
C69	73473	Ceramic, 0.0047 mf., ±10%, 0—500 v.	R54	502327	22,000 ohms, ±10%
C70, C71	105772	Electrolytic, 1 mf., 50 v.	R55	502215	100,000 ohms, ±10%
			R56	502410	100,000 ohms, ±10%
			R57, R58	502412	120,000 ohms, ±10%
			R59	502410	100,000 ohms, ±10%
			R60, R60B	106336	Control—Dual bass
			R61	106336	Part of PC1
			R62, R63	864A, R64B	Part of PC2
			R64, R64B	106335	Control—Dual treble
			R65	502422	220,000 ohms, ±10%
			R66	502322	22,000 ohms, ±10%
			R67	502282	8200 ohms, ±10%
			R68	502422	220,000 ohms, ±10%
			R69	502322	22,000 ohms, ±10%
			R70	502282	8200 ohms, ±10%
			R71A, R71B	106336	Control—Dual volume with push-pull "on-off" switch (S)
			R72, R74	502215	1500 ohms, ±10%
			R73	502422	220,000 ohms, ±10%
			R75	502422	220,000 ohms, ±10%

REPLACEMENT PARTS — Continued

SYMBOL NO.	STOCK NO.	DESCRIPTION	SYMBOL NO.	STOCK NO.	DESCRIPTION
R77	502223	3200 ohms, ±10%			
R78	106212	Control—Gain Equalization			
R79, R80	502223	3200 ohms, ±10%			
R81, R82	502410	100,000 ohms, ±10%			
R83	512121	1200 ohms, ±10%, 1 w.			
R84, R85	502447	470,000 ohms, ±10%			
R86	522115	150 ohms, ±20%, 2 w.			
R87	522222	2200 ohms, ±10%, 2 w.			
R88, R89	522047	47 ohms, ±10%, 1 w.			
R90	521922	22 megohms, ±10%			
S1A thru S1E	106445	Switch—Function—4 position rotary type			
S3	46760	Part of RT1A and RT1B			
S5	76337	Switch—Speakers selection, D.P.D.T. slide type			
T1	76339	Coil—AM RF			
T2	76337	Coil—AM detector			
T3	76339	Transformer—1st FM IF			
T4	76335	Transformer—1st AM IF			
T5	76329	Transformer—2nd FM IF			
T6	76328	Transformer—2nd AM IF			
T7	79393	Coil—3rd FM IF			
T8	77930	Transformer—FM radio detector			
T9	106334	Transformer—Power			
T10, T11	106211	Transformer—Output			
	101344	Bushing—RF shield mounting (2 req'd)			
	102139	Clips—AC power cable and plug			
	70392	Coil—AM, 2nd AM, and 3rd FM IF transformer			
	79395	Transformer—Output			
	106289	Clip—Mounting and detent for loudness control and Agilent switch			
	58552	Connector—3 contact female socket for magic eye			
	502112	120 ohms, ±10%			
	73553	Coil—Dist. drive (250 loop spool)			
	74659	Form—Rubber—RF shield mounting (2 req'd)			
	101558	Grain—Stainless steel for power cable (1st)			
	100270	Plate—Dist. backplate with pulleys and brackets			
	106337	Plate—Dist. backplate with pulleys and brackets			
	105910	Plate—Dist. backplate with pulleys and brackets			
	103827	Pulley—Aluminum 1/2" O.D. Igr. dist. backplate			
	103099	Shield—Tuning control			
	20708	Shield—For connector #8592			
	73584	Shield—For V1			
	76331	Shield—For V2			
	78972	Shield—For V10			
	100642	Socket—Lamp socket and lead assembly			
	104810	Socket—Lamp socket and twin lead assembly			
	100441	Socket—Lamp socket (rounded bakelite) with leads and brackets			
	74179	Socket—1 pin miniature for V1			
	77937	Socket—1 pin miniature for V3, V4, V5, V6 and V7			
	31251	Socket—Octal for V9			
	100787	Socket—Octal for V10 and V14			
	76336	Socket—3 pin miniature for V2			
	76971	Socket—3 pin miniature for V10			
	100474	Socket—3 pin miniature for V12 and V13			
	77585	Washer—C: type retaining for tuning control			
RECORD CHANGER WIRING					
P2	105344	Connector—2 contact male phono power			
P6	74882	Connector—3 contact male pickup cable			
	100211	Connector—Closed end, for motor leads			
SPEAKER ASSEMBLY					
C67	105209	Capacitor—Ceramic, 8 mf., 10 v., AC			
	105913	Case—One and voice coil kit for 12" speaker, stamped 961283-3 code 234			
	100009	Case—One and voice coil kit for 12" speaker, stamped 961283-3 code 274			
	100467	Housing—Plastic housing for 3W" speakers			
	105935	Speaker—3W" P.M.			
	100897	Speaker—12" P.M.			
MISCELLANEOUS					
	105685	Antenna—AM loop			
	77726	Connector—2 contact male for "large-mount" switch cabinet			
	106497	Switch—Function "stereo-monoaural" push-button type			
	100523	Mount—Terminal board for FM antenna coil			
	103911	Bracket—Knob escutcheon mounting			
	106897	Button—"Manual" push button			
	106364	Button—"Auto" push button			
	X140	Cabinet—Mahogany			
	X141	Cabinet—Maple			
	X436B	Cabinet—Oak			
	71892	Catch—Cabinet door			
	30716	Clip—Magic eye tube mounting—less wing screw			
	X2732	Grid—Grille for mahogany cabinet			
	X3725	Grid—Grille for maple and oak cabinets			
	74752	Connector—2 contact male for FM antenna coil			
	74862	Connector—2 contact male for AM loop antenna coil			
	104320	Cover—Cabinet back			
	601688	Cushion—Felt for record changer drawer			
	106855	Door—Tuning			
	23750	Door—Cabinet door with record changer drawer—1 set—less hardware—for mahogany cabinet			
	X3972	Door—Cabinet door with record changer drawer—1 set—less hardware—for oak cabinet			
	106534	Escutcheon—Control dial			
	106259	Escutcheon—Control knob			
	104175	Escutcheon—Stress switch			
	102429	Eyelet—Metal chassis mounting			
	75548	Grommet—Rubber—chassis mounting (4 req'd)			
	76308	Hinge—Cabinet door (2 set)			
	79957	Insulator—Rubber for record changer mounting dial			
	103928	Jewel—For control knob escutcheon			
	103923	Knob—Function			
	102924	Knob—Tune bass			
	103921	Knob—Tuning			
	103922	Knob—Volume			
	103625	Mount—Stress orthopedic high density RCA, V10			
	32223	Nut—Retaining for knob escutcheon jewel			
	74788	Nut—Retaining for AMIF			
	76994	Nut—#10-32 (RF) record changer mounting stud			
	106426	Ornamen—"V" shape			
	X3759	Panel—Record changer drawer back for mahogany cabinet			
	X3760	Panel—Record changer drawer back for maple cabinet			
	X3761	Panel—Record changer drawer back for oak cabinet			
	106346	Panel—Cabinet door and record changer drawer			
	103912	Reflector—Plastic for knob lamp			
	104159	Roller—Nylon, for record changer drawer slider			
	76583	Shield—W: type, for magic eye mounting clip			
	103927	Shield—Rubber for magic eye tube			
	104223	Slide—Extension slide for record changer drawer (1 req'd)			
	104128	Spring—Control spring for mounting record changer			



Model SHC-7 The "Mark VII D"
Model SHP-7 The "Mark VII"
Mahogany, Maple or Cherry

Model SHC-7 is a combination radio-phonograph. It is a combination of Model SHP-7 and Model 9-T-2.

Model SHP-7 is a phonograph using AF amplifier chassis RS-171, record changer RP-205G-1 and four speakers.

Model 9-T-2 is an AM-FM tuner using tuner chassis RC-1155B; it is an accessory designed for installation in Model SHP-7.



RCA VICTOR

Stereophonic High-Fidelity Combination

MODEL SHC-7

Stereophonic High-Fidelity Victrola®

MODEL SHP-7

Tuner Chassis No. RC-1155B

Amp. Chassis No. RS-171

Record Changer RP-205G-1

SERVICE DATA

— 1958 No. 15 —

PREPARED BY COMMERCIAL SERVICE

RCA SERVICE COMPANY

A DIVISION OF

RADIO CORPORATION OF AMERICA

CAMDEN 8, N. J.

SPECIFICATIONS

TUNING RANGE

Standard Broadcast (AM) 540-1600 kc
Frequency Modulation (FM) 88-108 mc

INTERMEDIATE FREQUENCIES

AM 455 kc FM 10.7 mc

TUBE COMPLEMENT

TUNER CHASSIS RC-1155B

- (1) RCA 6B8 R.F. Amplifier
- (2) RCA 18X8 Mixer-Oscillator
- (3) RCA 12BA6 I.F. Amplifier
- (4) RCA 12AU6 FM I.F. Amplifier
- (5) RCA 12AU6 FM I.F. Amplifier
- (6) RCA 6Z4A5 F.M. Detector
- (7) RCA 12AV6 AM Det.-AVC—Phase Inv.
- (8) RCA 35W4 Rectifier

AMPLIFIER CHASSIS RS-171

- (1) RCA 6CG7 Two-channel A.F. Preamplifier
- (2) RCA 6CG7 Two-channel 1st A.F. Amplifier
- (3) RCA 6CG7 Two-channel 2nd A.F. Amplifier
- (4) RCA 6V6GT Left Channel A.F. Output
- (5) RCA 6V6GT Right Channel A.F. Output
- (6) RCA 5Y3GT Rectifier

RECORD CHANGER

Turntable speed 16%, 33½, 45 or 78 r.p.m.
Record capacity Up to fifteen 7 inch
or twelve 10 inch,
or ten 12 inch,
or ten 10 in. and 12 in. Intermixed.
Pickup (Stock No. 106770) Stereophonic Cerofamic

LOUDSPEAKERS

Two 12" PM "woofers" 6.8 ohms each @ 400 cycles
Two 3½" PM "tweeters" 6.8 ohms each @ 3000 cycles

POWER SUPPLY RATING

Model SHC-7: 115 volts, 60 cycles 140 watts
Model SHP-7: 115 volts, 60 cycles 105 watts

AUDIO POWER OUTPUT

Stereo 7 watts max. on each channel
Monaural 14 watts maximum

FREQUENCY RESPONSE

..... 45 cycles to 20,000 cycles/ø

TUNING DRIVE RATIO

..... 7½:1 (3¾ turns of knob)

DIMENSIONS (Overall)

Height 32½" Width 29½" Depth 17½"

AM/FM TUNER CHASSIS RC-1155B

This chassis is identical to Chassis RC-1155AX except for a slight difference in finish of the dial backplate and the wood frame surrounding the dial.

MODEL 9-T-2

Except for the use of Chassis RC-1155B instead of RC-1155AX, Model 9-T-2 as used in Model SHC-7 is identical to Model 9-T-2 as used in Model SHC-8.

FOR ADDITIONAL INFORMATION
REFER TO SERVICE DATA 1958 NO. 13
(SHC-8, SHP-8, 9-T-2)

FOR RECORD CHANGER INFORMATION
REFER TO "RP-205 SERIES SERVICE DATA"
AND TO "RP-205 SERIES SERVICE DATA SUPPLEMENT"

REPLACEMENT PARTS

AM/FM TUNER CHASSIS
RC-1155B

Same as previously listed for RC-1155AX in Service Data 1958 No. 13 (SHC-8, SHP-8, 9-T-2)

EXCEPT

Stock No. X3971 Frame is used in place of X3823 Frame.

AMPLIFIER CHASSIS

RS-171

Same as previously listed for RS-171 in Service Data 1958 No. 13 (SHC-8, SHP-8, 9-T-2).

RECORD CHANGER WIRING, SPEAKER ASSEMBLY

Same as previously listed in Service Data 1958 No. 13 (SHC-8, SHP-8, 9-T-2).

MISCELLANEOUS

STOCK NO.	DESCRIPTION	STOCK NO.	DESCRIPTION
101050	Antenna—AM loop	105448	Knob—Function
104531	Bracket—Mounting for interior light	106666	Knob—Loudness
100523	Board—Terminal for FM antenna cable	104798	Knob—Tuning
104796	Bushing—Rubber, for mounting tuner chassis	X3974	Lid—For cherry bisque cabinet
X4428	Cabinet—Cherry Bisque	X3973	Lid—For mahogany cabinet
X4427	Cabinet—Mahogany	X3975	Lid—For maple cabinet
X4430	Cabinet—Maple	73634	Nut—Retainer for speaker
X3723	Cloth—Cabinet grille	76894	Nut—#10-32 for record changer mounting stud #78339
74752	Connector—2 contact male for FM antenna cable	106601	Full—Decorative door pull
74882	Connector—3 contact (polarized) male for AM loop antenna cable	104421	Spring—For lid support
X3800	Cover—Polystyrene bottom for tuner compartment	104128	Spring—For mounting record changer
100459	Cushion—Lid	74734	Spring—Retaining for control knobs
108425	Escutcheon—Control knob	104124	Stud—Record changer mounting—front and rear positions
101051	Hinge—Lid—cherry and maple cabinets	78339	Stud—Record changer mounting—side positions
102420	Hinge—Lid—mahogany cabinet	104422	Support—Lid
79957	Insulator—Rubber, for record changer mounting stud (4 req'd)	79340	Washer—Fiber, for record changer mounting stud #78339
13103	Jewel—Lamp cap	103928	Washer—Nylon for control knobs
104787	Knob—AM/FM function	78753	Washer—Rubber, for record changer mounting stud #78339
104127	Knob—Bass or treble	104540	Window—For interior light



RCA VICTOR

Stereophonic High-Fidelity Combination

MODELS SHC-2, SHC-3

Tuner/Amp. Chassis No. RC-1168C

MODEL SHC-6

Tuner/Amp. Chassis No. RC-1168D

Record Changer RP-205G-1

SERVICE DATA

— 1958 No. 17 —

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



Model SHC-2
The "Mark II"
Mahogany or Cherry



Model SHC-3
The "Mark III"
Mahog., Oak or Wal.



Model SHC-6
The "Mark VI"
Mahog., Oak or Wal.

SPECIFICATIONS

TUNING RANGE

Standard Broadcast (AM) 540-1,600 kc.
Frequency Modulation (FM) 88-108 mc.

INTERMEDIATE FREQUENCIES

AM 455 kc. FM 10.7 mc.

TUBE COMPLEMENT

- | | |
|-----------------|---------------------------|
| (1) RCA 6CB6 | R.F. Amplifier |
| (2) RCA 6X8 | Mixer & Oscillator |
| (3) RCA 6BA6 | I.F. Amplifier |
| (4) RCA 6AU6 | 2nd F.M. I.F. Ampl. |
| (5) RCA 6AU6 | 3rd F.M. I.F. Ampl. |
| (6) RCA 6AL5 | Ratio Detector |
| (7) RCA 6AV6 | A.M. Det.—A.V.C.—Ph. Inv. |
| (8) RCA 6AL7-GT | Tuning Eye |
| (9) RCA 5A5A4 | Rectifier |
| (10) RCA 6CG7 | Two-channel Audio Preamp. |
| (11) RCA 6CG7 | Two-channel Audio Ampl. |
| (12) RCA 6CG7 | Two-channel Audio Ampl. |
| (13) RCA 6V5GT | Left Channel Output |
| (14) RCA 6V5GT | Right Channel Output |

POWER SUPPLY RATING

115 volts, 60 cycles, 145 watts (includes record changer)

TUNING DRIVE RATIO 7½:1 (3¼ turns of knob)

RECORD CHANGER

Turntable speed 16½, 33½, 45 or 78 r.p.m.
Record capacity Up to fifteen 7 inch or
twelve 10 inch or
ten 12 inch or
ten 10 inch and 12 inch intermixed

PICKUP STOCK NO. 106770

Stereophonic Ceramic

AUDIO POWER OUTPUT 14 watts maximum

FREQUENCY RESPONSE 45 cycles to 20,000 cycles

LOUDSPEAKERS

Two 12" PM "woolers" 8 ohms @ 400 cycles
Two 9½" PM "tweeters" 8 ohms @ 3,000 cycles

CABINET DIMENSIONS

SHC-2: Height 36" Width 37½" Depth 19"
SHC-3: Height 35" Width 41½" Depth 18½"
SHC-6: Height 31" Width 39½" Depth 17½"

DESCRIPTION

Models SHC-2, SHC-3 and SHC-6 are stereophonic high-fidelity combination instruments, each consisting of a tuner/amplifier, stereophonic record changer and four speakers all in one cabinet.

The tuner/amplifier incorporates a tuned r.f. stage, mixer/oscillator, one stage of AM i.f. amplification and three stages of FM i.f. amplification. Audio amplification is twin-channel for stereophonic reproduction. Each audio channel consists of preamplifier, two stages of voltage amplification and 6V5GT power output. Inverse feedback, derived from the secondaries of the two output transformers, is applied to the third a.f. amplifiers.

A switch is used to select either MONAURAL or STEREO audio output. On Models SHC-2 and SHC-3 this switch is a two-position type and is located above the tuning dial. On Model SHC-6 this switch is a slide type and is located in the record changer compartment. This switch permits stereo reproduction from stereophonic sources and yet retaining many of the advantages of push-pull operation when monaural sources are used. A "left channel" external speaker system must be used in conjunction with the combination instrument when stereophonic sound is desired.

Models SHC-2, SHC-3 and SHC-6 are radio/phonograph instruments very similar to Model SHC-4.

Tuner/amplifier chassis RC-1168C is used in Models SHC-2, SHC-3 and SHC-4. Tuner/amplifier chassis RC-1168D is used in Model SHC-6; it differs from RC-1168C only in the omission of the indicator lamp and the knob lamp.

FOR ADDITIONAL INFORMATION
REFER TO SERVICE DATA PREVIOUSLY
ISSUED FOR MODEL SHC-4.

PARTS LIST ADDITIONS (All models)

On original production, a two-piece motif was used; on late production a one-piece motif is used. This one-piece motif (Stock No. 106789) can be used to replace the two-piece motif.

Stock No.	Description
106789	Motif—"Dual Amplifier Stereo—Orthophonic High-Fidelity RCA Victor"
74879	Connector—2-contact female for FM antenna cable (part of chassis assembly)

FOR RECORD CHANGER INFORMATION— REFER TO "RP-205 SERIES SERVICE DATA" AND TO "RP-205 SERIES SERVICE DATA SUPPLEMENT"

The following "MISCELLANEOUS" items are used on Model SHC-2 but not on Model SHC-4. Refer to replacement parts listing of Model SHC-4 for all other items.

STOCK NO.	DESCRIPTION
X4426	Cabinet—Cherry
X4425	Cabinet—Mahogany
104850	Cap—L.H. trim for knob escutcheon or "Victrola" drawer escutcheon
104861	Cap—R.H. trim for knob escutcheon or "Victrola" drawer escutcheon
X3978	Door—L.H. and R.H.—less hardware, for cherry cabinet
X3977	Door—L.H. and R.H.—less hardware, for mahogany cabinet
X3980	Drawer—Record changer mounting—less hardware— for cherry cabinet
X3979	Drawer—Record changer mounting—less hardware— for mahogany cabinet
106590	Escutcheon—Control knob
106591	Escutcheon—"Victrola" drawer
102849	Panel—Record changer drawer back—mahogany only attached for replacement
106592	Pull—Door pull with key (RH and LH) (1 set)
102848	Slider—For record changer drawer (2 req'd)

The following "MISCELLANEOUS" items are used on Model SHC-3 but not on Model SHC-4. Refer to replacement parts listing of Model SHC-4 for all other items.

STOCK NO.	DESCRIPTION
X4485	Cabinet—Mahogany
X4487	Cabinet—Oak
X4486	Cabinet—Walnut
X5045	Cloth—For speaker baffle and cabinet door
103771	Clip—Retaining for cabinet back cover latch pin
X5035	Doors—With cloth and back panel—less hinges for mahogany cabinet
X5035	Doors—With cloth and back panel—less hinges for oak cabinet
X5034	Door—With cloth and back panel—less hinges for walnut cabinet
106763	Escutcheon—Control knob
106773	Latch—For cabinet back cover
71892	Latch—For cabinet door
X5042	Legs—Front legs and cross bar assembly for mahogany cabinet (1 set)
X5044	Legs—Front legs and cross bar assembly for oak cabinet (1 set)
X5043	Legs—Front legs and cross bar assembly for walnut cabinet (1 set)
X5039	Leg—Rear leg for mahogany cabinet
X5041	Leg—Rear leg for oak cabinet
X5040	Leg—Rear leg for walnut cabinet
101859	Spring—Extension for cabinet back cover latch

The following "MISCELLANEOUS" items are used on Model SHC-6 but not on Model SHC-4. Refer to replacement parts listing of Model SHC-4 for all other items.

STOCK NO.	DESCRIPTION
X4497	Cabinet—Mahogany—less legs
X4498	Cabinet—Oak—less legs
X4499	Cabinet—Walnut—less legs
103771	Clip—Tubular for back cover latch pin
X5045	Cloth—Grille for cabinet
106800	Escutcheon—Control Knob
106801	Escutcheon—"Stereo Monaural," for slide switch (SS)
101051	Hinge—Cabinet lid
106773	Latch—For cabinet back cover
23050	Leg—Metal—for cabinet
74712	Nut—Retainer for motif
104423	Nut—For cabinet leg mounting
106810	Support—Cabinet lid
33900	Switch—"Stereo/Monaural" function switch (SS) slide type



RCA VICTOR

Stereophonic High-Fidelity Combination

MODEL SHC-9

Stereophonic High-Fidelity Victrola®

MODEL SHP-9

AM-FM Tuner

MODEL 9-T-2

Record Storage Cabinet

MODEL SHR-9

Auxiliary Speaker Cabinet

MODEL SHS-9

Benches

MODELS SHB-1, SHB-2

Tuner Chassis No. RC-1155B

Amp. Chassis No. RS-171A

Record changer RP-205G-1

SERVICE DATA

- 1958 No. 19 -

PREPARED BY COMMERCIAL SERVICE

RCA SERVICE COMPANY

A DIVISION OF

RADIO CORPORATION OF AMERICA

CAMDEN 8, N. J.



Model SHC-9 The "Mark IX D"
Model SHP-9 The "Mark IX"
Model SHS-9—Same as above except that cabinet top does not open.
Ebony, Mahogany, Oak or Walnut

Model 9-T-2
AM-FM Tuner

Model SHC-9 is a combination radio-phonograph. It is a combination of Model SHP-9 and Model 9-T-2.
Model SHP-9 is a phonograph using AF amplifier chassis RS-171A record changer RP-205G-1 and three speakers.
Model SHS-9 is an auxiliary speaker cabinet using three speakers.
Model 9-T-2 is an AM-FM tuner using tuner chassis RC-1155B; it is an accessory designed for installation in Model SHP-9.

SPECIFICATIONS

TUNING RANGE
Standard Broadcast (AM) 540-1600 kc
Frequency Modulation (FM) 88-108 mc

INTERMEDIATE FREQUENCIES
AM 455 kc FM 10.7 mc

TUBE COMPLEMENT
TUNER CHASSIS RC-1155B
(1) RCA 6B8E R.F. Amplifier
(2) RCA 19X8 Mixer-Oscillator
(3) RCA 12BA6 I.F. Amplifier
(4) RCA 12AU6 FM I.F. Amplifier
(5) RCA 12AU6 FM I.F. Amplifier
(6) RCA 12AL5 F.M. Detector
(7) RCA 12AV6 AM Det.-AVC—Phase Inv.
(8) RCA 35W4 Rectifier

RECORD CHANGER
Turntable speed 16 $\frac{2}{3}$, 33 $\frac{1}{3}$, 45 or 78 r.p.m.
Record capacity Up to fifteen 7 inch or twelve 10 inch, or ten 12 inch, and 12 in. intermixed.
Pickup (Stock No. 106770) Stereophonic Ceramic

FREQUENCY RESPONSE 50 cycles to 20,000 cycles
TUNING DRIVE RATIO 7 $\frac{1}{2}$:1 (3 $\frac{1}{2}$ turns of knob)

DIMENSIONS (Overall)
SHC-9, SHP-9, SHR-9 Height: 32 $\frac{1}{2}$ " Width: 29 $\frac{1}{2}$ " Depth: 16 $\frac{1}{2}$ "
or SHS-9 with legs
SHB-1, SHB-2 Height: 14 $\frac{1}{2}$ " Width: 29 $\frac{1}{2}$ " Depth: 16 $\frac{1}{2}$ "
SHB-1, SHB-2 Length: 60 $\frac{1}{2}$ " Width: 17 $\frac{1}{2}$ "

AMPLIFIER CHASSIS RS-171A
(1) RCA 6CG7 Two-channel A.F. Pre-amplifier
(2) RCA 6CG7 Two-channel 1st A.F. Amplifier
(3) RCA 6CG7 Two-channel 2nd A.F. Amplifier
(4) RCA 6V6GT Left Channel A.F. Output
(5) RCA 6V6GT Right Channel A.F. Output
(6) RCA 3Y3GT Rectifier

POWER SUPPLY RATING
Model SHC-9: 115 volts, 60 cycles 140 watts
Model SHP-9: 115 volts, 60 cycles 105 watts

LOUDSPEAKERS
One 12" FM "wooler" 3.2 ohms @ 400 cycles
Two 3 $\frac{1}{2}$ " FM "tweeters" 5.8 ohms each @ 3000 cycles

ALIGNMENT PROCEDURE

ALIGNMENT INDICATORS:

An RCA VoltOhmyst® or equivalent meter is necessary for measuring developed d-c voltage during FM alignment. Connections are specified in the alignment tabulation. An output meter is also necessary to indicate maximum audio output during AM alignment. Connect the output meter across the speaker voice coil. The RCA VoltOhmyst can also be used as an AM alignment indicator, either to measure audio output or to measure AVC voltage. When audio output is being measured, the volume control should be turned to maximum. Adjust tone controls to mid-position.

SIGNAL GENERATOR:

For all alignment operations, connect the low side of the signal generator to the receiver chassis. If output measurement is used for AM alignment, the output of the signal generator should be kept as low as possible to avoid AVC action.

FM SWEEP ALIGNMENT:

If an FM sweep generator is used for FM alignment, adjust for 10.7 mc, 0.4 mc sweep. Connect oscilloscope across C23, adjusting discriminator T6 top core for 10.7 mc crossover, and T6 bottom core for balanced peaks. Peak separation should be approximately 0.30 kc. When aligning the other FM tuned circuits, connect oscilloscope lead through a 220K resistor to pin 1 of V5. Follow alignment table sequence, adjusting for maximum gain and symmetrical curves.

FM Alignment

FUNCTION SWITCH IN FM POSITION

Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 1 of V5-12AV6			T6 top core for zero d.c. across C23 T6 bottom core for maximum d.c. at junction of R18 and R19
2	Pin No. 1 of V4-12AU6	10.7 mc		Quiet point at low frequency end T7 top core
3	Pin No. 1 of V3-12BA6			T3 top core T3 bottom core
4	C1-B Stator			T1 top core T1 bottom core
5		87 mc	87 mc (gang closed)	FM osc. L8
6		106 mc		FM R.F. C19-D
7	FM Ant. terminals thru 250 ohm resistor	90 mc	90 mc	FM R.F. L2
8		Repeat steps 6 and 7 until maximum gain is obtained		
9		100 mc	100 mc	FM ant. coil L5

AM Alignment

FUNCTION SWITCH IN AM POSITION

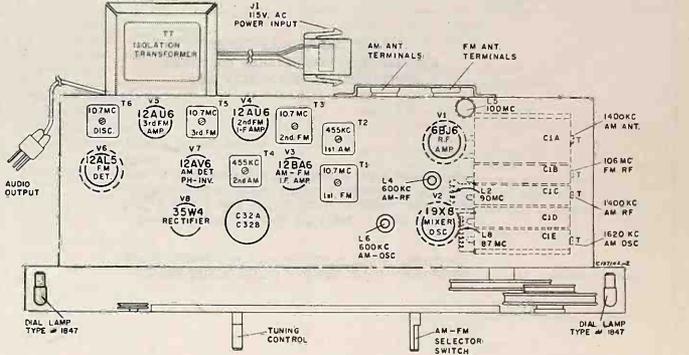
Steps	Connect high side of sig. gen. to—	Sig. gen. output	Turn radio dial to—	Adjust for peak output
1	Pin No. 1 of V3 in series with 0.01 microfarad	455 kc. (mod.)		T4 bottom core (sec.) T4 top core (pri.) T2 bottom core (sec.) T2 top core (pri.)
2	Top lug (No. 4) on AM RF coil	1620 kc. (mod.)	1620 kc. (gang open)	C1-E (osc.)
3		1400 kc. (mod.)	1400 kc. signal	C1-A, T. (ant.) C1-C, T. (f.)
4	Short wire placed near loop for radiated signal	600 kc. (mod.)	600 kc. signal	L6 (osc.) (rock gang) L4 (RF)
5				
6				
7				

Repeat steps 4, 5 and 6 until maximum gain is obtained

Oscillator frequency is above signal frequency on both AM and FM

*If necessary for accurate peaking, the winding in the same transformer not being peaked should be loaded with a 600 ohm resistor.
†Connect VoltOhmyst to pin 1 of V5 through a 220K isolating resistor with $\frac{1}{4}$ inch maximum exposed lead at grid terminal end. Output adjusted for 1 volt d.c. Direct VoltOhmyst lead away from input circuits.

NOTE—FM coils L8, L2 and L5 are adjusted by increasing or decreasing spacing between turns.



RC-1155B Tuner Chassis—View Showing Location of Tubes and Controls

DESCRIPTION

Model SHC-9 is a radio-phonograph. It is a combination of Model SHP-9 and Model 9-T-2.

Model SHP-9 is a photograph designed for use with either stereophonic records or monaural records. The instrument employs audio amplifier chassis RS-171A, record changer RP-205G-1, one 12-inch wide-range speaker and two 3½-inch tweeters mounted on plastic housings to give panoramic distribution of the higher frequencies.

The tuner chassis provides RF amplification on both AM and FM operation. The FM antenna input is broad-banded and resonates to the approximate center of the FM band. The mixer is pentode connected for AM operation and triode connected for FM operation. AM I-F circuits use a conventional I-F amplifier and a diode detector which provides AVC voltage. FM I-F circuits include three I-F amplifiers without AVC and a discriminator detector. An item of unusual interest is the inclusion of an A.F. phase inverter in this chassis. This simplifies switching between stereo and monaural operation in the audio chassis. AC supply voltage for the 35W4 rectifier tube and the series connected tube heaters is obtained from an isolation transformer.

A five-position audio function switch is contained in the audio amplifier chassis and permits use of a tape recorder in conjunction with either radio or phono functions. This chassis has two single-

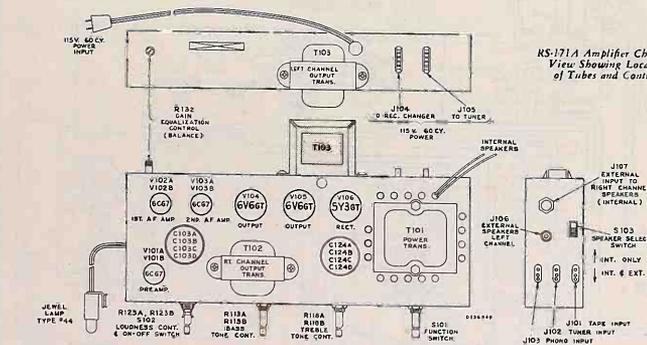
ended amplifiers for dual-channel amplification of stereophonic sound from records or tapes. The outputs of these two single-ended amplifiers are reconnected as a push-pull amplifier when using the instrument for monaural reproduction. Three 6C67 tubes (dual triode) provide three stages of dual-channel AF amplification; a 6V6GT tube is used for power output in each channel. Negative feedback, applied to each third AF amplifier, is derived from the secondaries of the two output transformers.

A dual loudness control and dual tone controls are used to provide equal and simultaneous regulation of volume and tone in each amplifier channel. A gain equalization control in the input of the right channel 3rd AF amplifier stage permits the right channel (internal speakers) output to be balanced with left channel (external speakers) output.

A speaker selection switch (one system or two system) is used to connect the two amplifier channels in parallel when internal speakers only are used. Provision is made to use this instrument as a companion speaker in conjunction with other amplifiers when so desired.

A four-speed record changer (16 2/3, 33 1/3, 45 and 78 r.p.m.) is used which is designed for use with either stereophonic or monaural records. It utilizes a ceramic two-stylus pickup having two elements and two audio outputs.

RS-171A Amplifier Chassis—
View Showing Location
of Tubes and Controls



CRITICAL LEAD DRESS

CHASSIS RC-M558

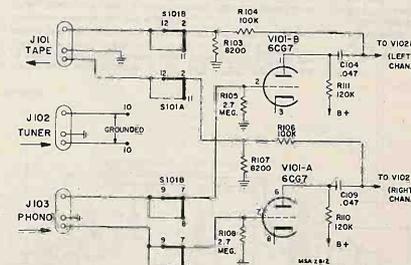
- All FM I-F transformer grid and plate leads should be short and direct as possible and kept low, near chassis.
- R18 and R19 leads should be kept as short as possible on T6 terminal 5 side.
- Keep leads V5 pin 5, to T6 term. 1, as short as possible and low near chassis.
- Drass C33 down on chassis and against terminal board. Run filament lead between V5 and V6 on side of V6 socket opposite C33.
- All bypass capacitors should have leads as short as possible.
- Green lead from AM oscillator stator gang terminal to AM oscillator coil should be dressed against front of shield box and up above filament choke.
- RF plate choke L1, should be dressed at least ¼" away from AM RF coil L4 and at least ¼" from shield.
- Mixer grid condenser C10 should be dressed away from FM oscillator gang stator terminal and away from leads connecting to terminals 8 and 9 of V2 socket.

- Filament chokes L10 and L14 should be raised a minimum of 1/16" above chassis.
- Oscillator grid condenser C12 should have short leads and be dressed away from filament choke L10.
- Keep wires and components away from 1200 ohm resistor R22.
- C24 should ground in hole near terminal 5 of V6 with short leads.
- Heavy buss lead from terminal 6 of V2 to S1-A terminal 9 should be short and direct.

CHASSIS RS-171A

- The following components, R102, R104, R105, R111 and C104, in the preamplifier (V101) circuit should have relatively short leads and be dressed away from R106, R107, R108, R110 and C108.
- Stand PC101 and PC102 vertically between the tone controls.
- Dress all wires and components away from R140 (1200 ohms).
- Leads from function switch to V101 should be dressed down to chassis and against chassis apron; maintain some separation between wires.

SHC-9, SHP-9, SHS-9, 9-T-2



POSITION #1—PHONO SINGLE

Yellow leads (secondary tap) of both output transformers are connected in parallel through S101-B front.

POSITION #2—PHONO STEREO

Identical to Position #1 except that:

- There is no connection between term. #7 and #8 or between term. #11 and #2 of the function switch.
- S101-B front does not connect yellow leads of output transformers in parallel.

POSITION #5—TAPE SINGLE

Identical to Position #1 except that:

- Through connection of tape inputs is made through term. #12 and #7 instead of #11 and #7.
- Yellow leads of both output transformers are connected in parallel through S101-B front.

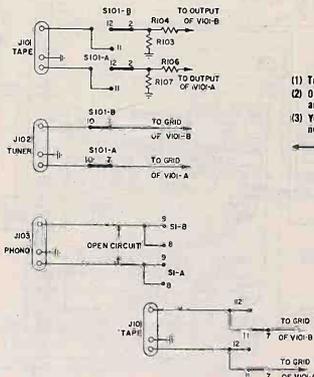
POSITION #3—TUNER

(1) Tuner input is connected to grids of V101-A and V101-B.

(2) Output to tape recorder (U101) is connected to outputs of V101-A and V101-B as in Position #1.

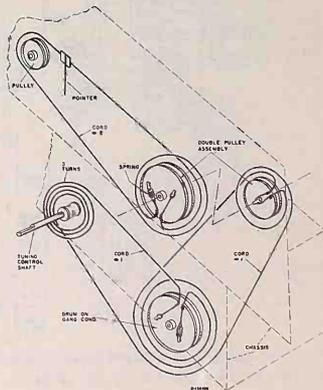
(3) Yellow leads (secondary tap) of both output transformers are connected in parallel through S101-B front.

Simplified Schematic Diagrams of Function Switch in
Amplified Chassis RS-171A

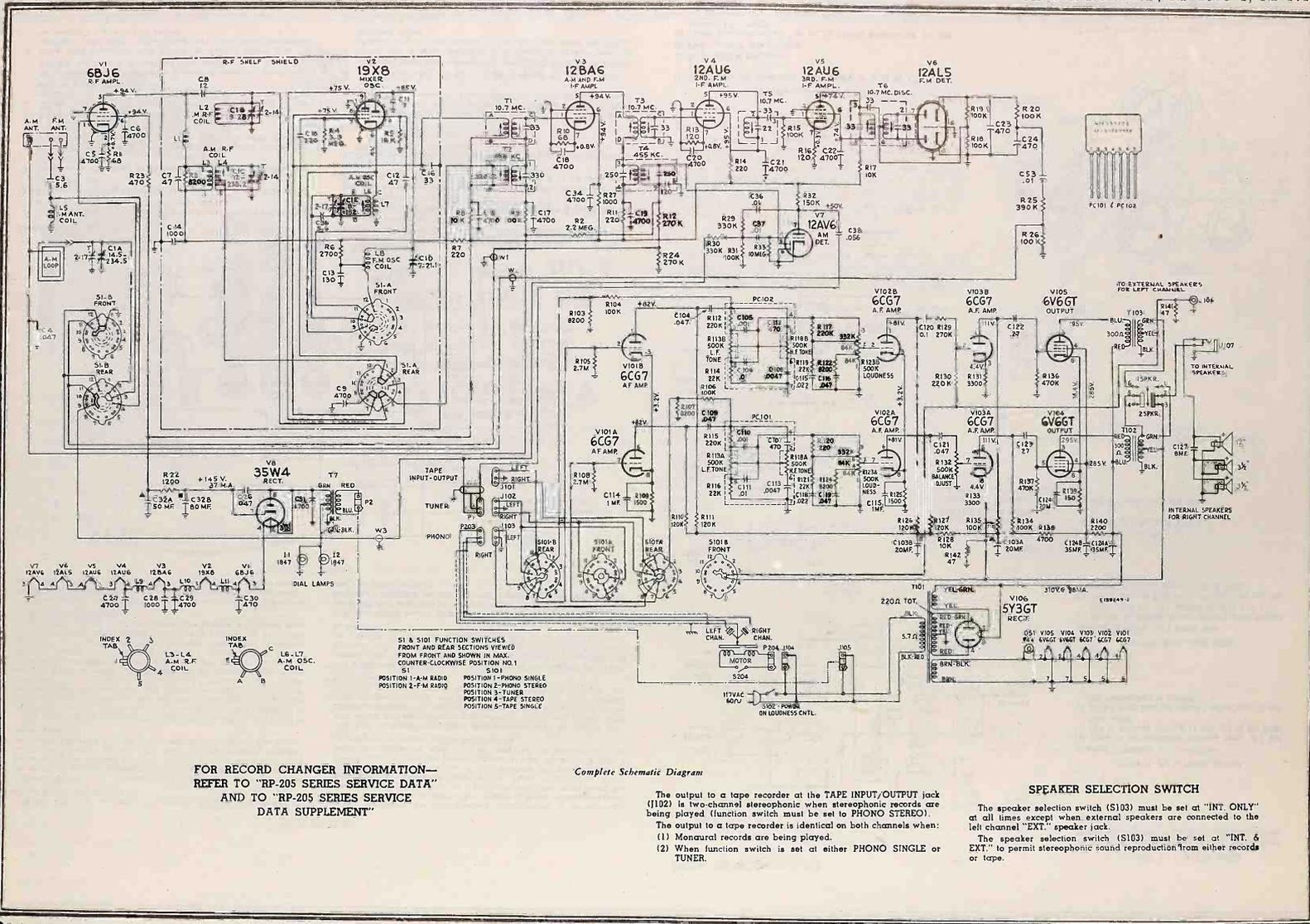


POSITION #4—TAPE STEREO

- Tape inputs are connected independently to grids of V101-A and V101-B.
- Tuner input is grounded.
- Phono input is open circuited.
- Yellow leads (secondary tap) of the output transformers are not connected in parallel.



Tuning Drive Cord Assembly



528.53420

MODEL
NUMBERS

9024

9025

PARTS LIST

for

Silvertone

CLOCK RADIO

SILVERTONE CLOCK-RADIO RECEIVER CHASSIS NUMBER 528.53420

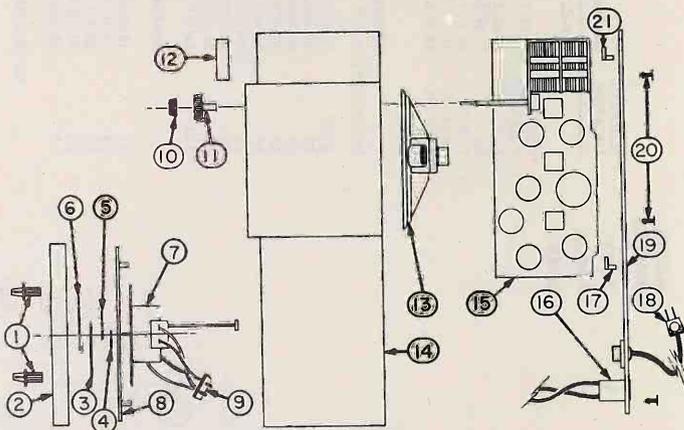


FIG. 1. EXPLODED VIEW OF CABINET PARTS

CABINET PARTS LIST

MODEL NO. MODEL NO.
9024 9025
BROWN IVORY

Key No.	Part No.	Part No.	Description
1.	52-1057-0	52-1057-0	Knob, Clock Control (2)
2.	48-158-1	48-158-1	Window, Clock
3.	52-70-1	52-70-1	Hand, Minute
4.	52-66-1	52-66-1	Hand, Alarm Set
5.	52-71-1	52-71-1	Hand, Hour
6.	52-69-1	52-69-1	Hand, Second
7.	59-134	59-134	Timer, Clock (Inc. 3, 4, 5 and 6)
8.	67-653-0	67-653-0	Face, Clock
9.	45-160-3	45-160-3	Receptacle, AC Interlock
10.	52-702-0	52-702-0	Knob, Volume
11.	52-703-0	52-703-0	Knob, Tuning
12.	48-143-1	48-143-1	Window, Dial Scale
13.	33-295-4	33-295-4	Speaker, 5", (Inc. T3)
14.	42-59-1	42-60-1	Cabinet
15.			Chassis, Radio
16.	45-17-3	45-17-3	Outlet, Appliance
17.	11-1692	11-1692	Bracket, Board and Back Support
18.	23-26-0	23-26-0	Line Cord and Plug
19.	82-8-1	82-8-1	Antenna Loop and Cabinet Back
20.	22-2-5	22-2-5	Clip, Cabinet Back Retainer
21.	11-1412	11-1412	Bracket, Board Retainer

CHASSIS 528.53420

SILVERTONE CLOCK-RADIO RECEIVER CHASSIS NUMBER 528.53420

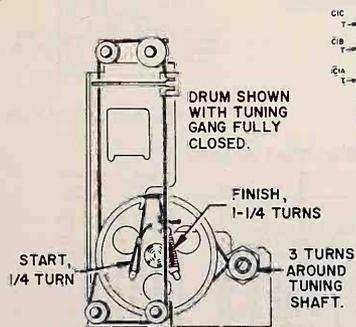


FIG. 2. DIAL STRINGING DIAGRAM

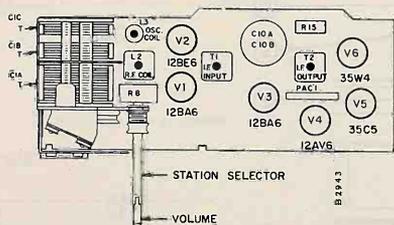


FIG. 3. TOP VIEW OF CHASSIS

CHASSIS PARTS LIST

Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
CAPACITORS					
C1, A, B & C	19-24-3	Variable, Tuning	T2	10-95-2	Transformer, I.F. Output
C2	20-47-1	Tubular, .047 mfd., 200 v.	T3	80-14-1	Transformer, Audio Output (Mounted on Speaker)
C3, C5	15-10217	Disc, .001 mfd., 500 v., GMV	L1	82-8-1	Loop Antenna and Cabinet Back
C4	15-470118	Disc, 47 mmfd., 500 v., N3300	L2	10-23-0	Coil, R.F., with cover
C6	15-10116	Disc, 100 mmfd., 500 v.	L3	10-35-4	Coil, Oscillator
C7	15-50217	Disc, .005 mfd., 600 v., GMV	MISCELLANEOUS CHASSIS PARTS		
C8	15-20317	Disc, .02 mfd., 500 v., GMV	11-1694	Bracket, Volume Control	
C9	15-60216	Disc, .006 mfd., 500 v., 20% GP	39-9-1	Pulley, Idler	
C10 A & B	18-58-5	Electrolytic, 30 mfd., 150 v., (A) 70 mfd., 150 v. (B)	39-2-1	Shaft, Tuning Pulley	
RESISTORS					
(All resistors 1/2 w., 10% unless otherwise noted)					
R1	60-82001	82 ohm	70-201-0	Spring, Tuning Shaft Retainer	
R2, R3	60-10401	100K ohm	51-109	Cord, Dial (29")	
R4	60-22302	22K ohm, 20%	70-295-0	Spring, Extension	
R5	60-68001	68 ohm	11-1693	Bracket, Dial Scale Mounting	
R6	60-22502	2.2 megohm, 20%	67-632-0	Dial Scale	
R7	60-47301	47K ohm	22-15-1	Clip, Dial Scale Mounting (2)	
R8	24-276-0	1 megohm, VOLUME	52-15-1	Pulley	
R9	60-12101	120 ohm	45-22-2	Socket, Tube (V1, V3)	
R10	60-10321	10K ohm, 2 w.	45-23-2	Socket, Tube (V5, V6)	
R11	60-10211	1K ohm, 1 w.	45-49-2	Socket, Tube (V2, V4)	
R12	60-27001	27 ohm	71-69-0	Shield, Tube (2)	
RC1	13-14-3	Ceramic Coupling Unit	45-7-4	Socket, Pilot Light	
TRANSFORMERS AND COILS					
T1	10-94-2	Transformer, I.F. Input	89-7	Pilot Light, #47 Bayonet	
			33-295-4	Speaker, 5", (Inc. T3)	
			23-26-0	Line Cord and Plug	

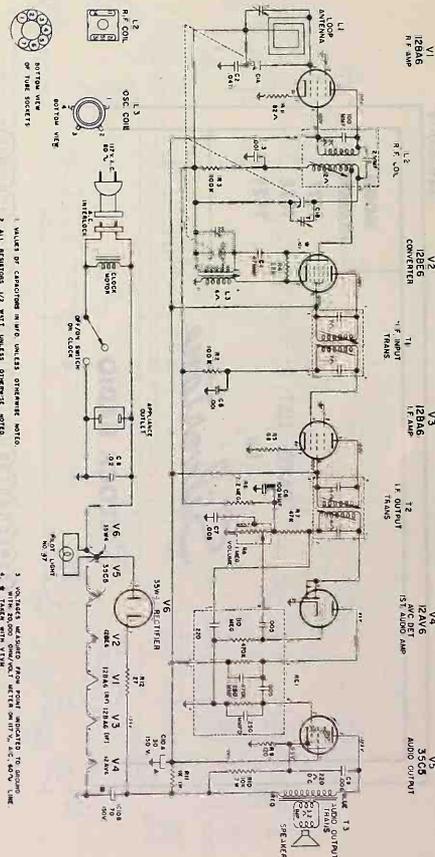


FIG. 4. SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.53420

1. VALUES OF CAPACITORS IN MICRO-UNITS UNLESS OTHERWISE NOTED.
2. ALL RESISTORS 1/2 WATT UNLESS OTHERWISE NOTED.

3. TUBES ARE SHOWN FROM REAR ASPECT TO SHOW PIN LOCATIONS.
4. 8 TUBES WITH VOLTAGE INDICATED.

528.53410

**MODEL
NUMBERS**

**9027
9028
9029**

**PARTS LIST
for**

Silvertone

CLOCK RADIO

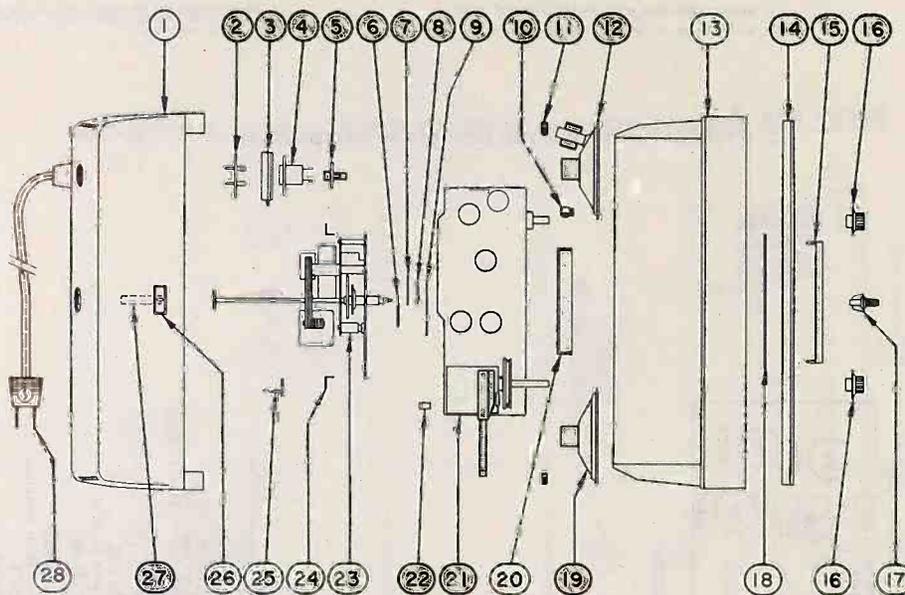


FIG. 1. EXPLODED VIEW OF CABINET PARTS

CABINET PARTS LIST

REF. NO.	PART NO.	DESCRIPTION
1.	21-352-0	Cover, Cabinet, Brown, Model No. 9027
	21-353-0	Cover, Cabinet, Ivory, Model No. 9028
	21-354-0	Cover, Cabinet, Pink, Model No. 9029
2.	45-56-3	Receptacle, Interlock
3.	11-1298	Bracket, Interlock
4.	45-161-3	Receptacle, Appliance Outlet
5.	45-58-3	Receptacle, Phono Input
6.	52-66-1	Hand, Alarm Set
7.	52-65-1	Hand, Hour
8.	52-64-1	Hand, Minute
9.	52-63-1	Hand, Sweep Second
10.	22-23-3	Clamp, Cable
11.	77-28-0	Spacer, Speaker Mounting (2)
12.	33-364-4	Speaker, 4" PM (Inc. Output Transformer)
13.	40-37-1	Grille and Base, Cabinet
14.	67-650-0	Dial Scale and Trim Strip
15.	48-157-1	Window, Timer
16.	52-1093-0	Knob, Tuning and Volume (2)
17.	52-1057-0	Knob, Timer (2)
18.	67-8-1	Insert, Clock Face (Daylight)
19.	33-363-4	Speaker, 4" PM
20.	44-34-0	Baffle, Light
21.	*	Chassis, Radio
22.	11-1297	Bracket, Chassis Mounting
23.	59-133	Timer, Clock (Inc. 6, 7, 8, 9 and Panel-escnt Light)
24.	11-860	Bracket, Timer Mounting (4)
25.	76-37-0	Strip, Terminal
26.	52-1092-0	Button, "SNOOZ-ALARM"
27.	22-173-0	Retainer, "SNOOZ-ALARM" Button
28.	23-43-0	Line Cord and Plug

* Not Supplied as a Repair Part.

CHASSIS 528.53020

SILVERTONE PORTABLE RADIO CHASSIS NUMBER 528.53020

CHASSIS PARTS LIST

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
C1	20-94-0	Disc., .001 mfd., G.P., 20%	R6	60-47011	47 ohm, 1 w.
C2 A & B	18-55-2	Variable Tuning (Part of T1)	RC1	13-14-3	Couple
C3	14-2718	Variable Tuning, 200 v.	TRANSFORMERS AND COILS		
C4	15-50217	Disc., .05 mfd., 500 v., G.M.V.	T1	10-22-0	Transformer, Antenna (inc. C1)
C5	15-50216	Disc., .005 mfd., 500 v., G.P., 20%	T2	10-46-2	Transformer, I.F.
C6 A, B, C	18-48-5	Electrolytic, 30 mfd., 150 v. (A); 50 mfd., 150 v. (B); 20 mfd., 50 v. (C)	T3	80-1-1	Transformer, Audio Output
C7	15-20317	Disc., .02 mfd., 500 v., G.M.V.	LI	10-30-4	Coil, Oscillator
RESISTORS					
(All resistors 1/2 w., 10% unless otherwise stated)					
R1	60-22301	22K ohm	MISCELLANEOUS CHASSIS PARTS		
R2	60-22501	2.2 megohm	11-833	Bracket, Timer Mounting	
R3	24-263-0	1 megohm, VOLUME	11-1018	Bracket, Volume Control	
R4	60-12101	120 ohm	11-1019	Bracket, Chassis Retainer	
R5	60-10211	1K ohm, 1 w.	33-260-4	Speaker, 4" PM, 3.2 ohm (inc. T3)	
			45-48-2	Socket, 7 Pin Miniature (V1, V2)	
			45-23-2	Socket, 7 Pin Miniature (V3, V4)	

CABINET PARTS LIST

DESCRIPTION	MODEL	MODEL
	7016 A	7016 B
	GREY	WALNUT
	PART NO.	PART NO.
Cabinet	42-43-1	42-11-1
Escutcheon, Timer Face	40-16-0	40-16-0
Grill Cloth	98-56-0	98-56-0
Clack Mechanism (inc. Hands)	59-114	59-102
Hand, Alarm Set	52-17-1	52-85-1
Hand, Second	52-80-1	52-80-1
Hand, Hour	52-82-1	52-84-1
Hand, Minute	52-81-1	52-83-1
Knob, Volume	52-999-0	52-649-0
Knob, Tuning	52-1000-0	52-786-0
Knob, Clock Switch	52-650-0	52-650-0
Cabinet Back	21-340-0	21-340-0
Line Cord and Plug	23-216-0	23-216-0

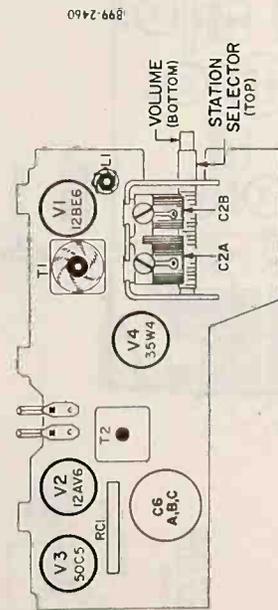


FIG. 1. TOP VIEW OF CHASSIS

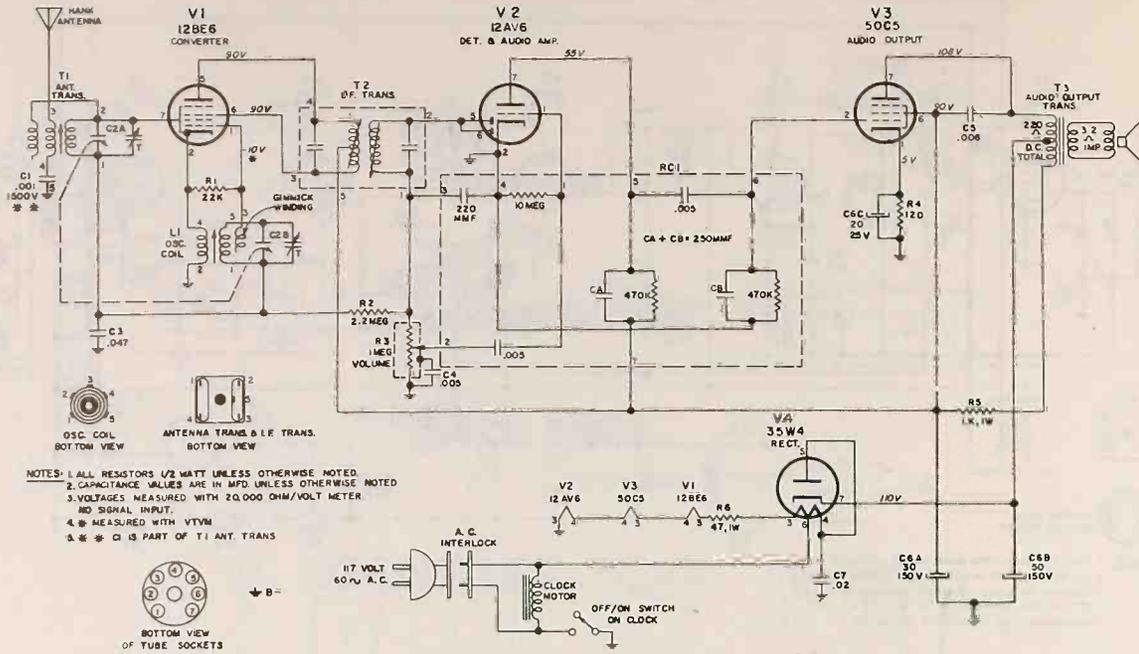


FIG. 2. SCHEMATIC DIAGRAM OF CHASSIS 528.53020

MODEL NUMBERS
7016A
7016B

(Revised) 528.53200

MODEL
NUMBERS

8019

8020

9017

PARTS LIST
for*Silvertone*[®]

CLOCK RADIO

SILVERTONE CLOCK-RADIO RECEIVER CHASSIS NUMBER 528.53200

CABINET PARTS LIST

Ref. No.	Description	MODEL NO.	MODEL NO.	MODEL NO.
		8019 BROWN CABINET Part No.	8020 IVORY CABINET Part No.	9017 BROWN CABINET Part No.
1.	Mechanism, Timer (Includes 2, 3, 4 and 5)	59-109	59-109	59-127
2.	Hand, Alarm Set	52-23-1	52-23-1	52-66-1
3.	Hand, Hour	52-57-1	52-57-1	52-46-1
4.	Hand, Minute	52-15-1	52-15-1	52-47-1
5.	Hand, Second	52-24-1	52-24-1	52-78-1
6.	Window, Timer	48-146-1	48-146-1	48-150-1
7.	Cabinet	42-36-1	42-37-1	42-46-1
8.	Knob, Clock	52-784-0	52-784-0	52-650-0
9.	Knob, Volume	52-932-0	52-932-0	52-1030-0
10.	Knob, Tuning	52-933-0	52-933-0	52-1029-0
11.	Logo, "Silvertone"	40-21-2	40-21-2	40-51-2
12.	Speaker, 4" PM, 3.2 ohm (Including T3) Baffle, Speaker (Not illustrated)	33-327-4	33-327-4	33-327-4
13.	Chassis, Radio	44-11*0	44-11-0	---
14.	Bracket, Chassis Retainer	11-1169	11-1169	11-1169
15.	Line Cord and Plug	23-216-0	23-216-0	23-43-0
16.	Clip, Cabinet Back Retainer	22-2-5	22-2-5	22-2-5
17.	Clip, Timer Mounting (Not illustrated)	22-417-2	22-417-2	---
	Back and Antenna Loop (L1)	82-126-1	82-126-1	82-2-1
	Owners Manual and Service Data Sheet	38-2051	38-2051	38-2297

* Not supplied as a repair part.

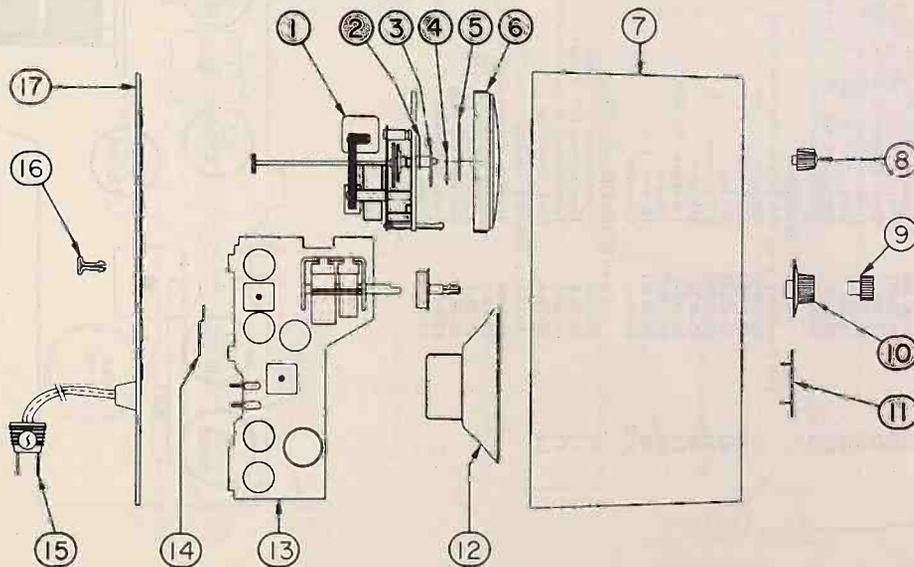
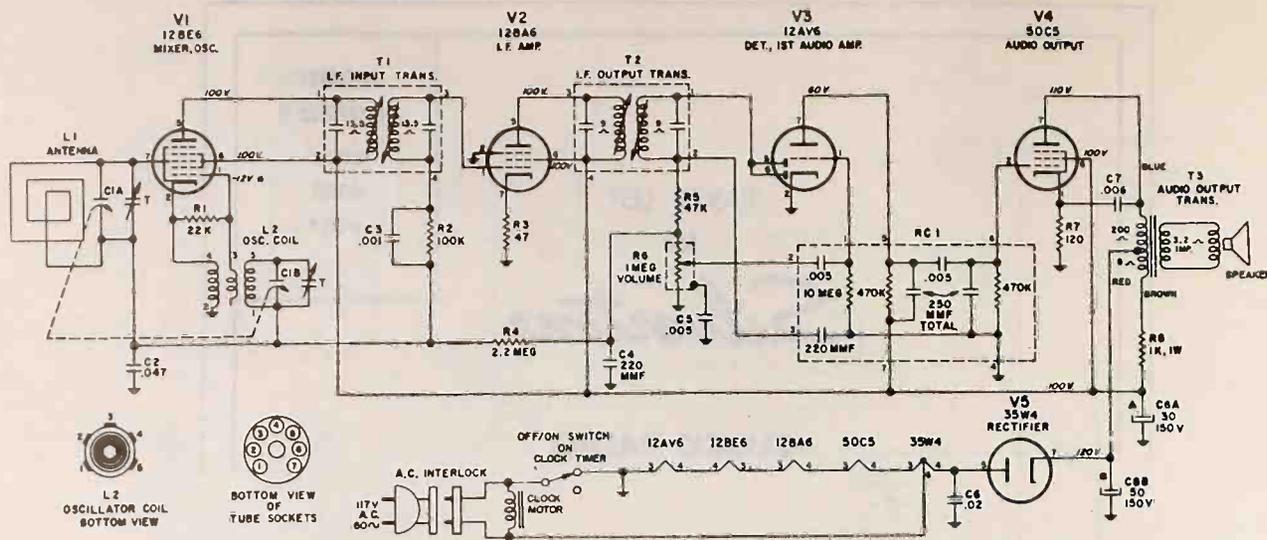


FIG. 1. EXPLODED VIEW OF CABINET



- NOTES:
1. VALUES OF CAPACITORS IN MFD, UNLESS OTHERWISE NOTED.
 2. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED.
 3. VOLTAGE MEASURED FROM POINT INDICATED TO GROUND WITH 20,000 OHM/VOLT METER ON 117V. A.C. LINE.
 4. R MEASURED WITH ELECTRONIC VOLT METER.

FIG. 3. SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.53200

SILVERTONE CLOCK-RADIO RECEIVER CHASSIS NUMBER 528.53200

CHASSIS PARTS LIST

Schematic Location	Part No.	Description
C1 A & B	19-65-2	Variable, Tuning
C2	16-47328	Tubular, .047 mfd., 200 v.
C3	15-10217	Disc, .001 mfd., 500 v., GMV
C4	15-22111	Disc, 220 mfd., 500 v., 10% CP
C5	15-50217	Disc, .005 mfd., 500 v., GMV
C6	15-20317	Disc, .02 mfd., 500 v.
C7	20-85-0	Disc, .006 mfd., 500 v. (Spec. no sub.)
C8 A & B	18-49-5	Electrolytic, 30 mfd., 150 v. (A) 50 mfd., 150 v. (B)
R1	60-22301	(All Resistors 1/2 w., 10% unless otherwise noted)
R2	60-10401	22K ohm
R3	60-47001	100K ohm
R4	60-47001	47 ohm
R5	60-22501	2.2 megohm
R6	60-47301	47K ohm
R7	24-288-0	1 megohm VOLUME
R8	60-12101	120 ohm
R9	60-10211	1K ohm, 1 w.
RC1	13-14-3	Couplate
T1	10-73-2	TRANSFORMERS AND COILS
T2	10-72-2	Transformer, I.F. Input
T3	10-72-1	Transformer, I.F. Output
L2	80-38-1	Transformer, Audio Output (Mounted on Speaker)
	10-30-4	Coil, Oscillator
	11-1168	MISCELLANEOUS CHASSIS PARTS
	45-22-2	Bracket, Volume Control Mtg.
	45-23-2	Socket, Tube (V1, V2)
	45-49-2	Socket, Tube (V4, V5)
	45-9-0	Plug, Connector, AC Interlock
	71-121-0	Tube Shield

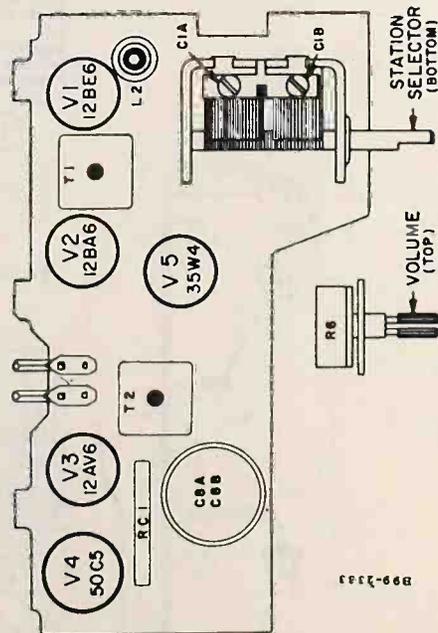


FIG. 2. TOP VIEW OF CHASSIS

528.53350

MODEL
NUMBERS

9214

9215

9217A

9218B

PARTS LIST

for

Silvertone

MODEL NO. & PART. OFF.

3WAY

PORTABLE RADIO

SILVERTONE PORTABLE RADIO CHASSIS NUMBER 528.53350

CABINET PARTS LIST

Ref. No.	Description	MODEL	MODEL	MODEL	MODEL
		9214 COCO A Part No.	9215 AQUA Part No.	9217A CHARCOAL GREY Part No.	9218A CORAL Part No.
1.	Trim Strip (Grille)	---	40-85-3	40-105-3	40-105-3
2.	Grille, Front	40-29-1	40-30-1	40-41-1	40-41-1
3.	Chassis	---	---	---	---
4.	Retainer, Chassis	22-180-0	22-180-0	22-180-0	22-180-0
5.	Knob, Off/On-Volume	52-1067-0	52-1068-0	52-1068-0	52-1068-0
6.	Hinge, Clip (2)	22-77-1	22-77-1	22-77-1	22-77-1
7.	Insulator, Switch	37-46-0	37-46-0	37-46-0	37-46-0
8.	Retainer, Door Catch	22-165-0	22-165-0	22-165-0	22-165-0
9.	Retainer, Door Spring	22-164-0	22-164-0	22-164-0	22-164-0
10.	Door, Rear Compartment	21-322-0	21-323-0	21-385-0	21-386-0
11.	Power Cord and Plug	23-40-0	23-40-0	23-40-0	23-40-0
12.	Cabinet	42-57-1	42-58-1	42-62-1	42-63-1
13.	Knob, Tuning	52-1065-0	52-1066-0	52-1066-0	52-1066-0
14.	Trim Strip (Handle)	---	---	40-106-3	40-106-3
15.	Retainer, Antenna (2)	22-163-0	22-163-0	22-163-0	22-163-0
16.	Ferrule, Speaker Mounting (2)	83-1236	83-1236	83-1236	83-1236
17.	Clamp, Cable	22-23-3	22-23-3	22-23-3	22-23-3
18.	Speaker (Inc. T3)	33-357-4	33-357-4	33-357-4	33-357-4
19.	Baffle, Grille	---	---	44-30-0	44-30-0
20.	Grille, Metal	---	---	40-43-1	40-43-1
21.	Logo, DUR-PAC	---	---	40-67-2	40-67-2

* Not Supplied as a Repair Part

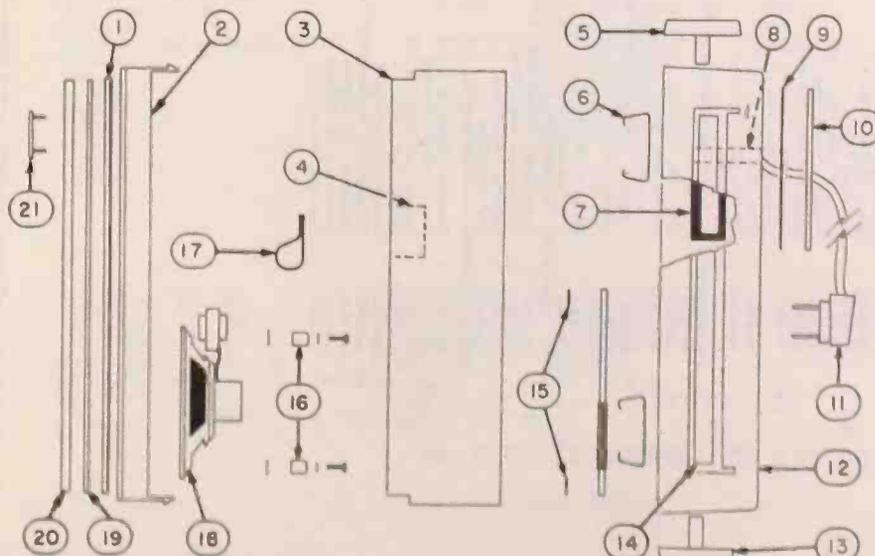


FIG. 1. EXPLODED VIEW OF CABINET

SILVERTONE PORTABLE RADIO CHASSIS NUMBER 528.53350

CHASSIS PARTS LIST

Schematic Location	Part No.	Description
C1	20-82-0	Disc, .02 mfd., 1400 v.
C2 A & B	19-71-2	Variable, Tuning
C3	20-70-0	Disc, .02 mfd., 500 v., GP
C4	20-51-1	Tubular, .1 mfd., 200 v.
C5	20-91-0	Disc, .005 mfd., 500 v., GP
C6 A, B & C	18-54-5	Electrolytic, 100 mfd., 10 v. (A); 30 mfd., 150 v. (B); 70 mfd., 150 v. (C)
C7	20-69-0	Disc, .002 mfd., 500 v., GP
C8	16-20343	Tubular, .02 mfd., 400 v.
R1	60-15201	(All resistors 1/2 w. 10% unless otherwise noted)
R2	60-10401	1.5K ohm
R3	60-22502	100K ohm
R4	60-10602	2.2 megohm, 20%
R5	24-310-0	10 megohm, 20%
R6	61-22-0	1 megohm VOLUME & OFF/ON Switch
R7	61-18201	160 ohm, 3 w.
R8	61-23-0	1.8K ohm
PAC 1	13-24-5	2K ohm, 10 w.
T1, T2	10-102-2	TRANSFORMERS AND COILS
T3	80-62-1	Transformer, 1st and 2nd I.F.
L1	82-143-0	Transformer, Audio Output
L2	10-45-4	Antenna, Ferrite Rod
SL1	83-1117	Coil, Oscillator
S2 A, B & C	69-275-0	MISCELLANEOUS CHASSIS PARTS
	45-128-2	Rectifier, Selenium
	45-126-2	Switch, AC-DC, Battery
	45-56-3	Socket, Tube (V1, V2, V3)
	45-59-3	Socket, Tube (V4)
	45-28-0	Receptacle, Line Cord
	45-75-5	Receptacle, Line Cord (Alta Part)
	37-47-0	Connector, "A" Battery
		Insulator, Switch

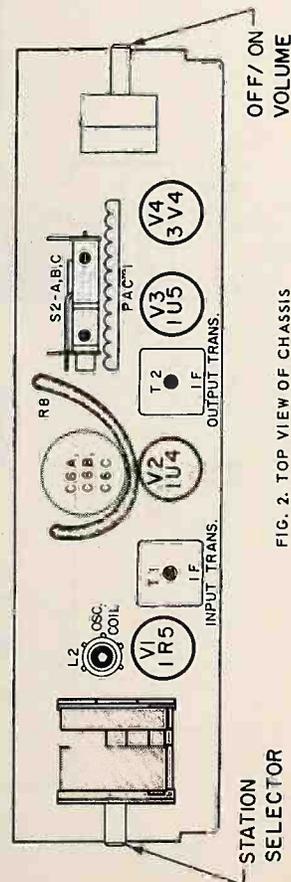
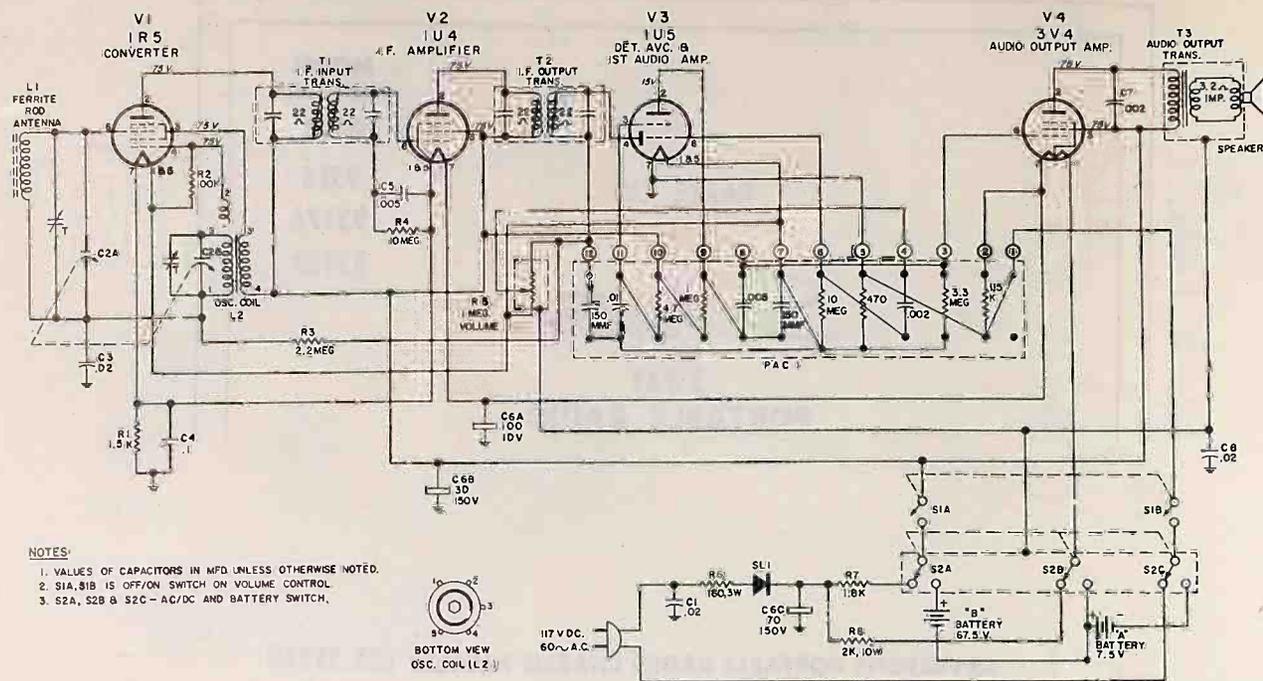


FIG. 2. TOP VIEW OF CHASSIS

©John F. Rider



- NOTES:
 1. VALUES OF CAPACITORS IN MFD UNLESS OTHERWISE NOTED.
 2. S1A, S1B IS OFF/ON SWITCH ON VOLUME CONTROL.
 3. S2A, S2B & S2C - AC/DC AND BATTERY SWITCH.

FIG. 3. SCHEMATIC DIAGRAM FOR SILVERTONE CHASSIS 528.53350

528.53370

MODEL
NUMBERS
9045
9046

PARTS LIST
for

Silvertone

RADIO-RECORD
CHANGER

PARTS LIST - RADIO CHASSIS 528.53370

SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION	SCHEMATIC LOCATION	PART NUMBER	DESCRIPTION
CAPACITORS					
C1, C6, C16	20-44-1	Tubular, .047 mfd., 400 v.	RC1	13-18-3	Couplate, Tone Compensator
C2A & B	19-74-2	Variable Tuning	RC2	13-16-3	Couplate, Push-Pull
C3, C12	15-47111	Disc., 470 mmfd., 500 v., 10%	TRANSFORMERS AND COILS		
C4	19-180-0	Trimmer, Antenna (Part of L1)	T1	10-81-2	Transformer, I.F. Input
C5, C9	20-47-1	Tubular, .047 mfd., 200 v.	T2	10-71-2	Transformer, I.F. Output
C7	15-151164	Disc., 150 mmfd., 500 v., N750	T3	80-69-1	Transformer, Audio Output
C8, C11	15-10316	Disc., .01 mfd., 500 v.	L1	82-126-0	Coil, Antenna, Ferrite Rod Type (Inc. C4)
C10	18-62-5	Electrolytic, 4 mfd., 150 v.	L2	10-34-4	Coil, Oscillator
C13A & B	18-58-5	Electrolytic, 30 mfd., 150 v. (A); 70 mfd., 150 v. (B)	MISCELLANEOUS CHASSIS PARTS		
C14 & C15	15-10216	Disc., .001 mfd., 500 v.	39-132-3		Tuning Shaft
C17	20-55-1	Tubular, .047 mfd., 400 v.	84-6439		Bracket, Dial Disc
RESISTORS					
(All resistors 1/2 w., 10% unless otherwise stated)					
R1, R11	60-22301	22K ohm	84-6440		Shaft & Pulley, Dial Disc
R2, R4	60-22502	2.2 megohm, 20%	22-49-1		Retainer, "C" Washer (4)
R3	60-15101	150 ohm	52-165-1		Dial Disc
R5	60-47302	47K ohm, 20%	45-7-3		Receptacle, AC Line
R6A & B	24-173-2	Tone Control, 500K ohm, BASS (a); 3 megohm TREBLE (b)	45-8-3		Socket, Phono Audio
R7	60-56501	5.6 megohm	45-61-3		Socket, Phono Motor
R8	24-330-0	1 megohm, VOLUME and OFF/ON Sw.	45-17-2		Socket, 7 Pin Miniature
R9	60-15501	1.5 megohm	45-18-2		Socket, 7 Pin Miniature Shield (3) (V1, V2 & V3)
R10	60-33401	330K ohm	45-116-2		Socket, 7 Pin Miniature
R12	60-47501	4.7 megohm	45-115-2		Socket, 7 Pin Miniature
R14	60-10501	1 megohm	51-105		Dial Cord (42-3/4")
R15	60-10101	100 ohm	69-270-0		Switch, RADIO-PHONO
R16	60-10211	1K ohm, 1w.	70-295-0		Spring, Dial Cord Tension (2)
R17	61-10-0	33 ohm, 3 w.	71-69-0		Tube, Shield (2)
R18	60-10401	100K ohm	83-1146		Selenium Rectifier (100MA)

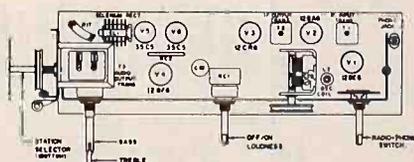


Fig. 1. Top View Chassis

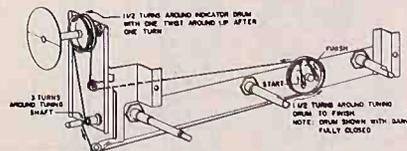
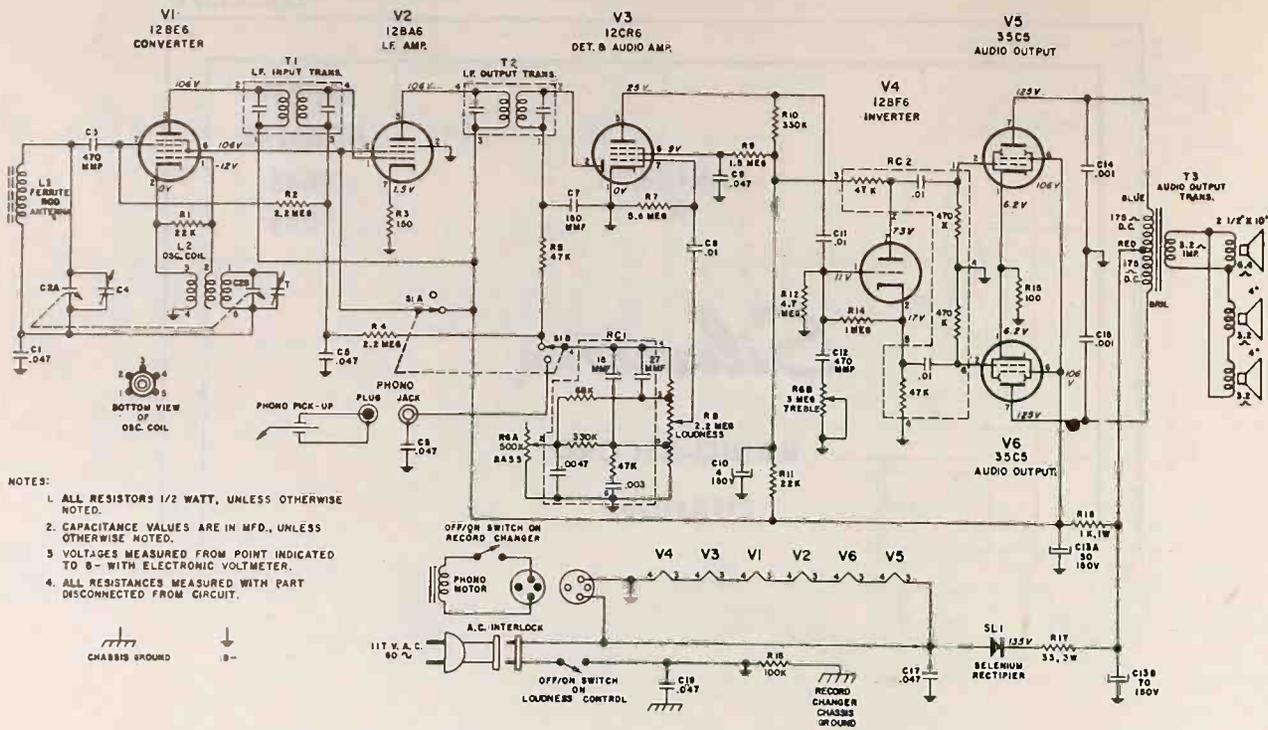


Fig. 2. Dial Stringing Diagram



- NOTES:
1. ALL RESISTORS 1/2 WATT, UNLESS OTHERWISE NOTED.
 2. CAPACITANCE VALUES ARE IN MFD., UNLESS OTHERWISE NOTED.
 3. VOLTAGES MEASURED FROM POINT INDICATED TO B- WITH ELECTRONIC VOLTMETER.
 4. ALL RESISTANCES MEASURED WITH PART DISCONNECTED FROM CIRCUIT.

Fig. 3. Schematic Diagram - Chassis 528.53370

SILVERTONE RADIO RECEIVER CHASSIS NUMBER 528.53370

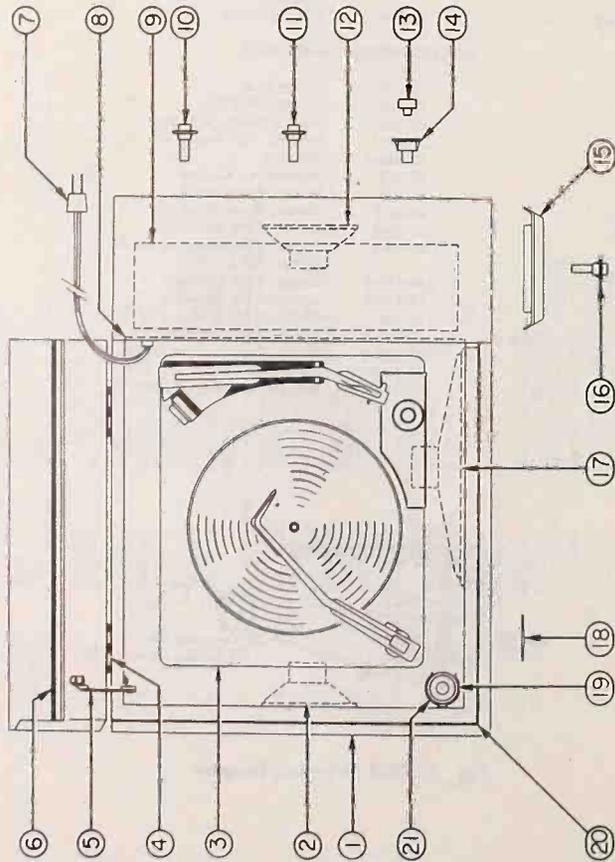


Fig. 4. Cabinet Parts Diagram

CABINET PARTS LIST

Key No.	Part No.	Description
1	42-64-3	Cabinet, Mahogany (Model 9045)
2	42-65-3	Cabinet, Lined Oak (Model 9046)
3	33-256-4	Speaker, 4" PM, 3.2 ohm
4	**	Record Changer
5	49-289	Hinge (2)
6	49-336	Lid Lift
7	40-58-3	Trim Strip
8	23-44-0	Line Cord
9	21-342-0	Cover, Radio Compartment
10	52-1088-0	Radio Chassis
11	52-1087-0	Knob, Radio--Phono
12	33-372-4	Knob, Off/On-Loudness
13	52-1089-0	Speaker, 4" PM, 3.2 ohm (with bracket)
14	52-837-0	Knob, Treble
15	48-149-0	Knob, Bass
16	52-1086-0	Escutcheon, Tuning
17	33-373-4	Knob, Tuning
18	40-348-2	Speaker, 2-1/2 x 10" PM, 6.4 ohm
19	84-6197	Logo, "Silvertone"
20	98-164-0	45 RPM Spindle Adaptor
21	22-66-3	Clamp, Spindle Adaptor

** Not Supplied As A Repair Part

528.53380

MODEL
NUMBERS

9061

9062

PARTS LIST
for
Silverstone
AM-FM
RADIO-RECORD CHANGER

CHASSIS PARTS LIST

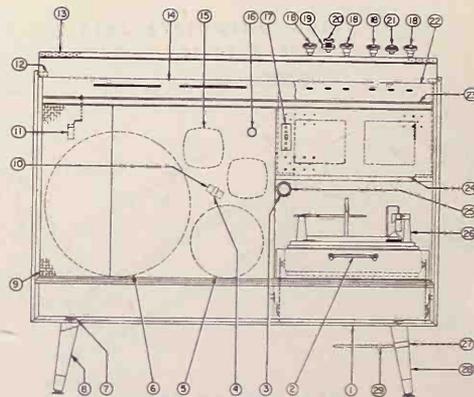
Schematic Location	Part No.	Description	Schematic Location	Part No.	Description
CAPACITORS			R59,R62	60-22401	220K ohm
(All Capacitors 500 v., 10% unless otherwise noted)			R63,R74		
C1,A,B,C,D,E	19-6-6	Tuning Trimmer, Part of C1A	R61	24-180-2	Boss Control
C3,C9,C14,C19	15-470611	Tubular, 47 mmfd.	R66,R67	60-12401	120K ohm
C4,C5,C7,C12			R70,R73	60-10102	100 ohm, 20%
C13,C22,C23			R71,R72	60-36125	360 ohm, 2 w., 5%
C26,C27,C28			R75	60-39201	3.9K ohm
C29,C30,C31	15-10316	Disc, .01 GP	TRANSFORMERS AND COILS		
C33,C34,C46			L1	10-3-1	Coil, Antenna (FM)
C49,C52,C53			L2	10-24-1	Coil, R.F. (FM)
C6	19-165-0	AM Antenna Trimmer	L3	10-47-4	Coil, Oscillator (FM)
C8,C35,C48	16-47348	Tub., .047 mfd.	L4	10-140-1	Coil, Choke
C10	20-45-0	Tub., 3.3 mmfd.	L5	10-46-4	Coil, Oscillator (AM)
C11,C15,C24	15-50216	Disc, .005 mfd., 20%	L6	10-129-1	Choke, R.F.
C16		Trimmer AM Osc. (Part of C1A)	L7	80-11-6	Filter Choke
C17	15-100611	Tub., 10 mmfd., NPO	T1,T2	10-44-2	Transformer, 1st & 2nd IF (FM)
C18	15-330611	Tub., 33 mmfd., NPO	T3	10-15-0	Transformer Ratio Detector (FM)
C20		Trimmer (Part of C1B)	T4	10-101-2	Transformer, 1st IF (AM)
C21	15-101618	Tub., 100 mmfd., N3300	T5	10-45-2	Transformer, 2nd IF (AM)
C25	20-27-0	Tub., 6.8 mmfd., NPO	T6	80-11-0	Transformer, Power
C32,C68	15-10116	Disc, 100 mmfd., 20%, GP	T7	80-24-1	Transformer, Audio Output
C36,C38,C39	15-27111	Disc, 270 mmfd., GP	MISCELLANEOUS CHASSIS PARTS		
C37	15-10261	Tub., .001 mfd., GP	11-1367		Bracket, Pilot Light (2)
C40	18-74-5	Electrolytic, 8 mfd., 50 v.	11-1369		Bracket, Tuning Eye
C41,C65	15-10211	Disc, .001 mfd.	11-1371		Bracket, Pointer Mounting
C42	15-47111	Disc, 470 mmfd., GP	11-1376		Bracket, Pointer Support
C43	15-15211	Disc, 1500 mmfd., GP	21-17-1		Shell, Connector
C44	15-60211	Disc, .006 mfd., GP	21-82-1		Shell, Connector
C45	20-647-1	Tub., .047 mfd., 600 v., 85 (Molded)	21-381-0		Cover, Volume Control Switch
C47,A,B,C	18-35-3	Electrolytic, 100 mfd., A; 40 mfd., B; 25 mfd., C; 350 v.	22-32-1		Clip, I.F. Mtg.
C50,C51,C55	15-47061	Tub., 47 mmfd., GP	22-74-1		Retaining Ring (2)
C54	15-20316	Disc, .02 mfd., 20%, GP	22-81-1		Retainer "C", Washer
C56,C57,C59	16-47258	Tub., .0047 mfd., 600 v., 20%, (Molded)	22-113-0		Tube Holder
C58	15-33111	Disc, 330 mmfd., GP	22-142-1		Spring Clip
C60,C61	16-22357	Tub., .022, 600 v., 20% (Molded)	23-18-0		Line Cord
C62	18-23-0	Electrolytic, 50 mfd., 25 v.	26-19-2		Threaded Bushing
C63,C64	16-33268	Tub., .0033 mfd., 1000 v., 20% (Molded)	31-322-0		Plate, Shield Cover
C66	19-3-5	Trimmer, Ceramic (FM Osc.)	37-6-0		Shield, Coil
C67	18-9-5	Electrolytic, 4 mfd., 150 v., NP	37-43-0		Insulator, Transformer
RESISTORS			37-53-0		Insulator, Tuning Eye Socket
(All Resistors 1/2 w., 10% unless otherwise noted)			39-9-1		Idler Pulley (4)
R1,R6,R16	60-22501	2.2 megohm	39-20-2		Crown Gear (Pulley Shaft)
R2,R15	60-10001	10 ohm	39-21-2		Crown Gear (Pointer Shaft)
R3	60-10501	1 megohm	39-40-1		Pulley & Shaft
R4	60-56101	560 ohm	39-147-3		Pointer Shaft
R5	60-68502	6.8 megohm, 20%	39-149-3		Gear Shaft
R7	60-68001	68 ohm	39-150-3		Shaft Idler Pulley (2)
R8	60-68301	68K ohm	44-43-1		Shield, Pilot Light (2)
R9,R24	60-10301	10K ohm	44-65-1		Heat Barrier
R10,R13	60-68311	68K ohm, 1 w.	45-4-2		Socket, Octal (Molded)
R11,R19,R28	60-10401	100K ohm	45-4-3		AC Power Receptacle
R12,R23	60-47101	470 ohm	45-7-0		Phono Plug (2)
R64,R65	60-22301	22K ohm	45-11-2		Socket (9 Pin) (Molded)
R14,R17	60-15001	15 ohm	45-12-2		Socket, 7 Pin (Molded) (3)
R18	60-15311	15K ohm	45-12-3		Socket, Double-Phono (2)
R20	60-10502	1 megohm	45-31-0		Plug, 6 Pin
R21	60-47401	470K ohm	45-33-2		Socket, 9 Pin (Molded) (2)
R22,R47	61-136-0	8K ohm, 15 w., w.w.	45-59-4		Socket, Pilot Light (Dial)
R25	60-47201	4.7K ohm	45-60-3		Socket, 6 Pin Wafer
R26	60-22311	22K ohm, 1 w.	45-62-3		Socket (6 Pin)
R27	60-68001	68 ohm	45-62-4		Socket, Pilot Light (Cabinet)
R29,R35,R40	60-27311	27K ohm, 1 w.	45-122-2		Socket, 9 Pin (Molded)
R30,R36	60-10201	1K ohm	45-123-2		Socket, 7 Pin (Molded)
R31,R42	60-10401	100K ohm	45-203-2		Socket, 7 Pin (Wafer) (3)
R32,R68,R69	60-39401	390K ohm	51-105		Dial Cord ((83"))
R33,R52	60-22502	2.2 megohm, 20%	69-269-0		Slide Switch
R34	60-22202	2.2K ohm, 20%	69-277-0		Selector Switch
R37	60-68301	68K ohm	69-278-0		Compensator Switch
R41,R60	60-56901	5.6 ohm	70-246-0		Spring, Ground Wiper
R43	60-68201	6.8K ohm	70-269-0		Spring, Dial Cord (Long)
R44,R45	60-12201	1.2K ohm	70-295-0		Spring, Dial Cord (Short)
R46	60-47502	4.7 megohm, 20%	71-69-0		Tube Shield (7 Pin)
R48,R49	61-137-0	900 ohm, 10 w., w.w.	71-80-0		Tube Shield (9 Pin)
R50	24-327-0	Stereo Balance Control	71-93-0		Shield, Tuner (Top)
R51	60-15401	150K ohm	77-162-0		Spacer (4)
R53	24-328-0	Volume Control	84-6415		Connector Receptacle
R54	60-33321	33K, 2 w.	84-6582		Bracket, Gear & Pointer Mtg.
R55	60-10602	10 megohm, 20%	84-6583		Pulley & Shaft
R56	60-27401	270K ohm	84-6586		Connector Cable
R57	24-181-2	Treble Control	84-6587		Pulley & Hub
R58			84-6668		Tracking Indicator
			84-6669		Idler Pulley (2)
			84-6672		Pointer (Cylinder)
			84-6675		Bottom Shield
			86-408		Spring Washer
			89-7		Pilot Lamp, #47 (3)

SILVERTONE AM-FM RADIO CHASSIS NUMBER 528.53380

SILVERTONE AM-FM RADIO CHASSIS NUMBER 528.53380

Ref. No.	Part No.	Description
1	42-79-3	Cabinet (Mahogany 9061)
2	42-80-3	Cabinet (Limed Oak 9062)
3	49-98	Drawer Pull
4	22-66-3	Clamp, Spindle Adaptor
5	22-20-1	Clip, Capacitor, Mounting
6	33-365-4	Speaker, 8" PM, 8 ohm
7	33-319-4	Speaker, 15" PM, 8 ohm
8	22-151-2	"Y" Nut, #10-32
9	19-401	Leg (Mahogany - Rear)
10	49-402	Leg (Limed Oak - Rear)
11	98-163-0	Grill Cloth
12	18-9-5	Cross over Capacitor, 4 mfd., NP
13	11-1377	Clip, Capacitor Mounting
14	49-392	Hinge Pin (2)
15	21-46-0	Control Panel Cover (Mahogany)
16	21-407-0	Control Panel Cover (Limed Oak)
17	31-511-0	Panel Background

Ref. No.	Part No.	Description
18	33-375-4	Tweeter, 5" PM
19	49-354	Knob, Phono Door
20	40-145-0	Escutcheon, Auto Power Control
21	52-1115-0	Knob, Indicating
22	52-1109-0	Knob, Station Selector
23	52-1132-0	Knob, OFF/ON Switch
24	52-1131-0	Knob, Dual
25	67-654-0	Dial Scale
26	22-56-5	Dial Scale Cushion
27	..	Radio Chassis
28	84-6299	45 RPM, Spindle Adaptor (Cat. No. 57-5774)
29	..	Record Changer
30	..	Leg Band (2)
31	40-102-3	Leg (Mahogany Front)
32	49-399	Leg (Mahogany Front)
33	49-401	Leg, (Limed Oak Front)
34	40-107-3	Red, Leg Support
35	21-397-0	Back, Phono Compartment



50	84-6384	Phono Pull-Out Unit
51	37-32-3	Grommet Pass Thru (2)
52	84-6349	Carriage Frame
53	84-6385	Hinge (RH)
54	62-115-0	Bumper Plug (2)
55	11-1280	Cross Brace (2)
	84-6335	Wing Nut (2)

56	77-24-0	Spacer (2)
57	26-28-2	Bushing, Spring Anchor (2)
58	86-394	Flatwasher (Nylon) (2)
59	70-338-0	Spring (2)
60	21-377-0	Bottom Panel
61	84-6386	Hinge (LH)
	62-1160	Bumper Plug (Rear) (2)



Spartan

RADIO CHASSIS — 51 SERIES

GENERAL

This manual covers the 51 series radio chassis, versions 51-01AA thru 51-11AA and also the 51-03BA version. Three complete electrical parts lists and 3 schematics are shown to provide complete coverage. On the 51-03BA version an electrical change has been

made regarding the AC switch on the rear of the band switch. This switch was eliminated and a double-throw switch used on the Bass control as an Off-On switch. This change is shown on the schematic diagram on page 10.

SPECIFICATIONS

Tuning Frequency Range:	AM Detector (crystal)	IN34A	
Broadcast Band	540-1620 KC	Tuning Eye†	6E5
FM Band	88-108 MC	Audio Amp*	6AV6
Intermediate Frequency	455KC/10.7 MC	Audio Amp**	(1/2) 6U8
Tubes:	Audio Amp***	(1/2) 12AX7	
FM RF Amplifier	6C45	Phase Inverter**	(1/2) 6U8
AM RF Amplifier	6BZ6	Cathode Follower***	(1/2) 12AX7
FM Mixer & Osc.	6U8	Audio Output*	6AQ5
AM Converter	6BE6	Push-Pull Audio Output**	(2) 6AQ5
IF Amplifier	6BA6	Rectifier***	5Y3
FM Driver	6BA6	†Not used on 51-01, 02, 07, 09 & 11	
Ratio Detector	6AL5	*Used only on 51-02	
		**Used only on 51-01, 04, 07, 09 & 11	
		***Used only on 51-03, 05 & 08	

CHASSIS DIFFERENCES

Chassis No.	Tuning Eye	Output	Chassis No.	Tuning Eye	Output
51-01	No	Push-Pull	51-07	No	Push-Pull
51-02	No	Single Endred	51-08	Yes	None
51-03	Yes	None	51-09	No	Push-Pull
51-04	Yes	Push-Pull	51-10	Not Released	*
51-05	Yes	None	51-11	No	Push-Pull
51-06	Not Released				

MAINTENANCE MANUAL 109

DIAL STRINGING INSTRUCTIONS

DIAL CORD PLACEMENT

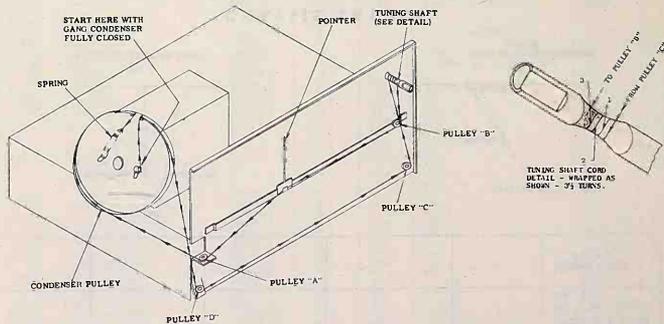
Select a 50-inch length of dial cord and tie a small loop at each end. Turn the tuning gang fully out of mesh and hook one end of the cord over the metal hook on the condenser pulley nearest the front of the chassis and proceed with the stringing as shown in the drawing below.

DIAL POINTER PLACEMENT

Place the dial pointer onto the pointer slide and turn the tuning gang completely in mesh. Lace the dial cord around the three hooks on the front of the pointer and with the tuning condenser still fully in mesh, slide the pointer over until it lines up with the last dial calibration mark at the low frequency end of the broadcast band. This completes the assembly.

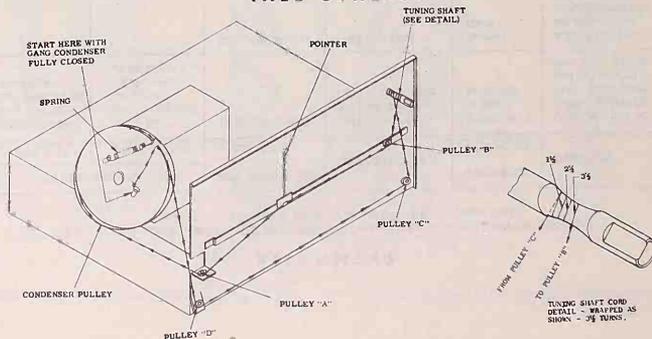
DIAL STRINGING GUIDE

(51-03, 51-05 & 51-08)



DIAL STRINGING GUIDE

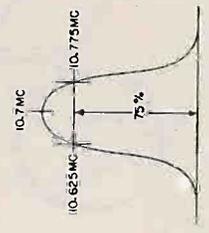
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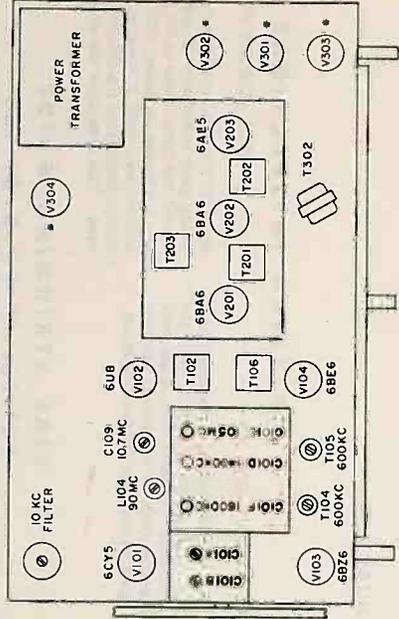
ALIGNMENT

FM I-F AND RATIO DETECTOR ALIGNMENT (Using Sweep Generator and Oscilloscope).
 Note: Place 1 megohm resistor in series with hot scope lead.

COUPLE TO:	SWEEP GENERATOR		SET RECEIVER DIAL TO:	ADJUSTMENTS	CONNECT SCOPE TO	REMARKS
	COUPLE TO:	FREQUENCY				
6CY5 (pin 5) thru .01 mfd and 1000 ohms in series	10.7 mc (-.3 mc sweep) couple a marker sig. to 6CY5 pin 5	10.7 mc	Low end of dial	T201, T102 top and bottom slugs T203 bottom slug	From pin 5 to pin 4 of PC202	Open one end of C204. Adjust for max. amplitude and symmetry. See fig. 1 below.
"	"	"	Low end of dial	T203 top slug	Across C203	Adjust for best amplitude and straightest slope. See fig. 2.
"	"	"	Low end of dial	T203 bottom slug	"	Adjust for best symmetry about 10.7 mc. See fig. 2.
"	"	"	-----	-----	-----	Repeat steps 1, 2 and 3.



CHASSIS LAYOUT



ALIGNMENT

AM ALIGNMENT
 Set band switch to AM position. Check dial pointer positioning.

COUPLE TO:	SIGNAL GENERATOR		SET RECEIVER DIAL TO:	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
	COUPLE TO:	FREQUENCY				
6BE6 (pin 7) thru .01 mfd	455 kc (modulated)	1400 kc	Near 1000 kc (free of interference)	T202, T106, top and bottom slugs	Across rotor coil	Adjust for max. output
AM ant. term. thru 10 mmf	1400 kc (modulated)	1400 kc	1400 kc	C101F C101D C101B	"	"
"	600 kc (modulated)	600 kc	600 kc	T105, T104	"	Adjust for max. output. Repeat steps 2 and 3.
"	"	"	-----	-----	-----	Repeat steps 2 and 3.

FM ALIGNMENT (Using AM Signal Generator and VTVM)
 Set band switch to FM position. Note: Place a 1 megohm resistor in series with hot side of VTVM.

COUPLE TO:	SIGNAL GENERATOR		SET RECEIVER DIAL TO:	ADJUSTMENTS	CONNECT OUTPUT METER	REMARKS
	COUPLE TO:	FREQUENCY				
6CY5 (pin 5) thru .01 mfd	10.7 mc unmodulated	10.7 mc	Low end of dial	T201, T102 top & bottom slugs and T203 bottom slug	From pin 5 to pin 4 of PC202	Adjust for max neg. reading on VTVM.
"	"	"	Low end of dial	T203 top slug	Across C203	Tune for zero VTVM. (Point where voltage swings pos. or neg.)
"	"	"	Low end of dial	Repeat steps 1 & 2	Repeat steps 1 & 2	Repeat steps 1 & 2
FM ant. term. in series with 120 ohms (high side) 150 ohms (low side)	107 mc	107 mc	107 mc	C109 C101A C101C	From pin 5 to pin 4 of PC202	Adjust for max. neg. reading on VTVM.
"	89 mc	89 mc	89 mc	L104 (osc. coil)	"	"
"	"	"	-----	-----	-----	Repeat two preceding steps.

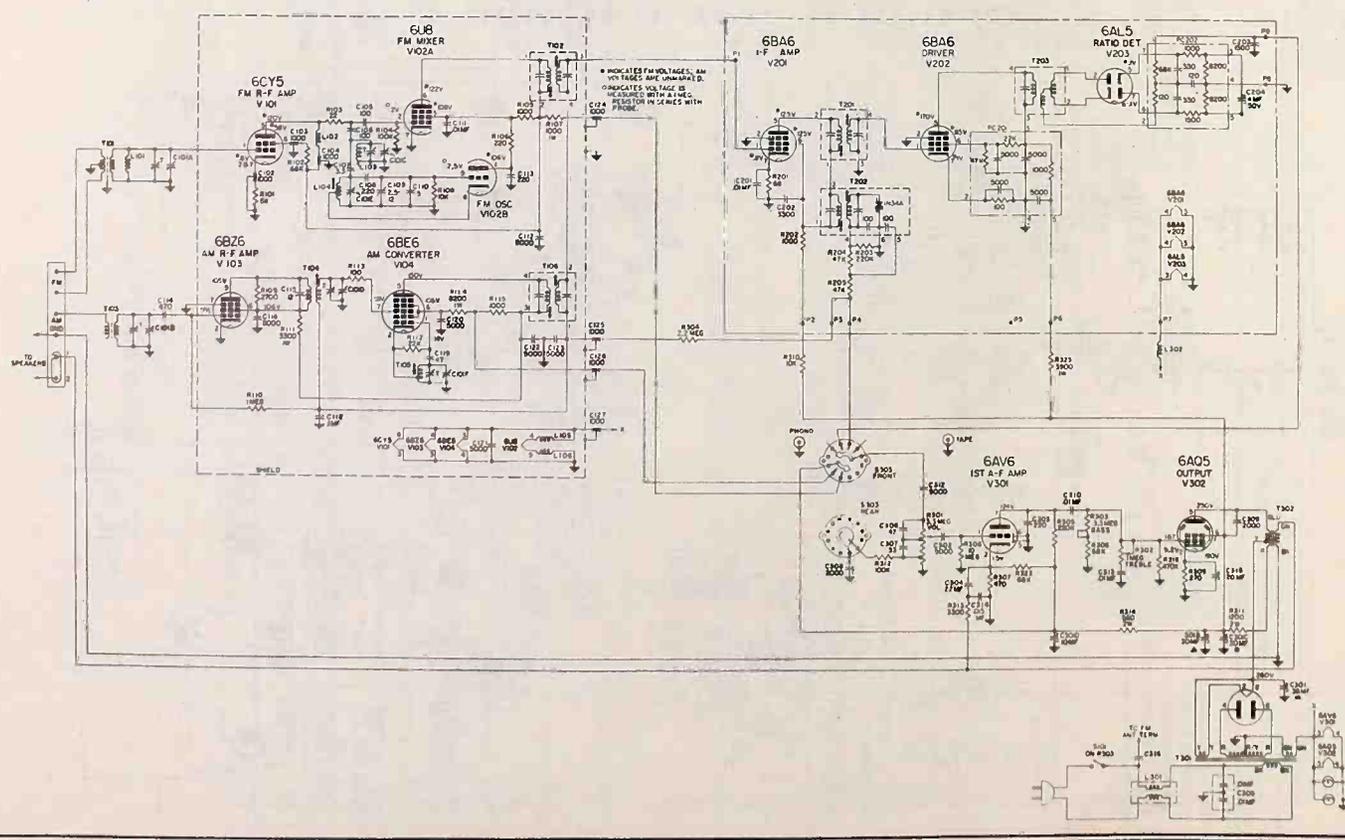
PARTS LIST (51-02)

SYMBOL	DESCRIPTION	PART NO.	LIST
T101	TRANSFORMERS-COILS-CHOKES		
T102	FM Input	360491-4	1.00
T103	1st FM I-F	360626-1	1.60
T104	Mod Antenna Assembly	360746-1	3.50
T105	AM R-F	360753-1	1.35
T106	AM Oscillator	360752-1	.65
T107	1st AM I-F	360911-1	1.40
T108	2nd FM I-F	360749-1	2.65
T109	2nd AM I-F	360748-1	2.65
T203	Ratio Detector	300164-1	12.00
T302	Power	320267-1	15
L101	FM Antenna	360750-1	1.15
L102	FM Choke	360522-9	.30
L103	FM R-F	360751-1	.15
L104	RF Choke	360522-9	.30
L105	RF Choke	360522-9	.30
L106	RF Choke	360522-9	.30
L301	AC Line Choke	360653-1	.30
L302	RF Choke	360522-9	.30
C101	Tuning Capacitor	260147-1	6.75
C102	Feed Thru, 1000 mf	250276-2	.20
C103	Feed Thru, 1000 mf	250276-1	.20
C104	Feed Thru, 1000 mf	250276-1	.25
C105	Mica, 100 mmf	250187-53	.25
C106	Mica, 100 mmf	250187-53	.25
C107	Mica, 2.2 mmf	250221-118	.35
C108	Mica, 220 mmf	250187-57	.30
C109	Cer., 5 mmf - 5%	250089-138	.20
C110	Capacitor, mid-freq.	250187-50	.20
C111	Capacitor, mid-freq.	250187-50	.20
C112	Mica, 220 mmf	250187-57	.35
C113	Mica, 470 mmf	250189-102	.25
C114	Cer., 12 mmf - 8%	250088-179	.20
C115	Cer., 5000 mmf	250175-30	.40
C116	Mylar, 1 mfd - 100V	250261-125	.20
C117	Cer., 5000 mmf	250175-30	.20
C118	Cer., 5000 mmf	250175-30	.20
C119	Cer., 5000 mmf	250175-30	.20
C120	Cer., 5000 mmf	250175-30	.20
C121	Cer., 5000 mmf	250175-30	.20
C122	Cer., 5000 mmf	250175-30	.20
C123	Cer., 5000 mmf	250175-30	.20
C124	Cer., Feed Thru, 1000 mf	250276-1	.25
C125	Cer., Feed Thru, 1000 mf	250276-1	.25
C126	Cer., Feed Thru, 1000 mf	250276-1	.25
C127	Cer., Feed Thru, 1000 mf	250276-1	.25
C201	Ceramic, .0033 mf	250234-66	.25
C202	Ceramic, .0015 mf	250234-154	.25
C203	Ceramic, .0015 mf	250234-146	.25
C204	Electrolytic 4 mf - 50V	270559-9	1.10
R101	68	230104-48	2.00
R102	8K	230104-42	2.00
R103	220	230104-42	2.00
R104	100K	230104-86	2.00
R105	1000	230104-82	2.00
R106	220	230104-54	2.00
R107	1000 - 1W	230106-82	2.50
R108	10K	230104-74	2.00
R109	2700	230104-74	2.00
R110	3300 - 1W	230104-98	2.00
R111	22K	230105-68	2.50
R112	22K	230104-78	2.00
R113	100	230104-50	2.50
R114	8200 - 1W	230105-73	2.50
R115	1000	230104-62	2.00
R201	680	230104-46	2.00
R202	1000	230104-46	2.00
R203	20K	230104-90	2.00
R204	47K	230104-82	2.00
R205	47K	230104-82	2.00
R301	Loudness Control (3.3 meg)	230131-13	81.25
R302	Treble Control (1 meg)	220072-36	81.25
R303	Bass Control (3.3 meg)	220072-21	81.25
R304	2.2 meg	230104-90	2.00
R305	100K	230104-90	2.00
R306	100K	230104-90	2.00
R307	470	230104-110	2.00
R308	68K	230104-58	2.00
R309	270	230104-84	2.00
R310	10K - 2W	230104-55	2.00
R311	1200 - 2W	230106-1074	3.50
R312	330K	230104-88	2.00
R313	330	230104-88	2.00
R314	560 - 2W	230106-1059	3.50
R315	560 - 2W	230104-84	2.00
R316	470K	230104-84	2.00
R317	68K	230104-84	2.00
R318	3900 - 1W	230105-69	3.50

PRICES FOR RESISTORS ARE FOR A PACKAGE OF 10 UNLESS INDICATED BY @.
 MISCELLANEOUS PARTS LIST
 (ALL CHASSIS)

SYMBOL	DESCRIPTION	PART NO.	LIST
PC202	Printed Circuit	250254-1	1.15
SW303	Photo & Tape Input	180546-1	.20
SW303	Pilot Light #1847	180161-17	.20
SW303	Band Switch	180284-1	2.75
SW303	Band Switch (51-02 & 04)	180284-2	1.75
SW303	Band Switch (51-03BA)	180284-1	1.75
PC201	Printed Circuit	250255-1	1.15

SCHEMATIC DIAGRAM (51-02)



COMPLETE SERVICE INFORMATION

CHASSIS 1-629-1,-2

for

CHASSIS: 1-629-1,-2
MODELS: 1107 & 2108

July 1958



SYLVANIA HOME ELECTRONICS, a division of Sylvania Electric Products Inc., Service Dept., Batavia, N. Y.

SPECIFICATIONS

FREQUENCY RANGE.....540 KC to 1650 KC
POWER SUPPLY.....117V, 60 Cycles
POWER CONSUMPTION.....35 Watts
INTERMEDIATE FREQUENCY (IF).....455 KC
SPEAKER.....4" PM

TUBE COMPLEMENT

V1 Oscillator/Mixer.....12AU6
V2 Detector, 1st AF Amplifier.....12AT6
V3 AF Output.....6X4
V4 Rectifier.....35W4

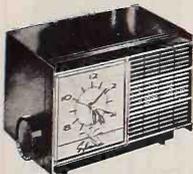
ALIGNMENT PROCEDURE PRELIMINARY INSTRUCTIONS

Connect an isolation transformer between power line and radio chassis. Utilize a test bench with a non-conductive work surface during all electrical tests on receiver.

1. Disconnect power line plug from power outlet.
2. Pull out on Volume and Station Selector knobs until free from respective shafts.
3. Remove screws securing back cover and remove back cover as far as permissible without unsoldering antenna leads from chassis.
4. Disconnect speaker leads at tie points (3) and (4). NOTE: On models incorporating a clock, also unsolder clock leads at tie points (5), (6) and (7). Remove screw and clip securing chassis and remove chassis from cabinet.
5. Remove speaker from cabinet if spare speaker of the exact type (with output transformer connected) is not available.
6. Reconnect output transformer to tie points (3) and (4). (On models incorporating a clock, also place a jumper wire across tie points (6) and (7). Reconnect back cover interlock assembly to chassis. Stand radio chassis in such a manner to facilitate under Chassis IF Alignment. (cont-over)



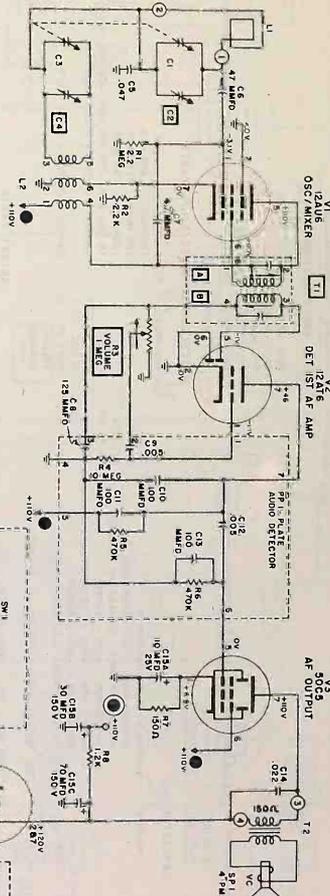
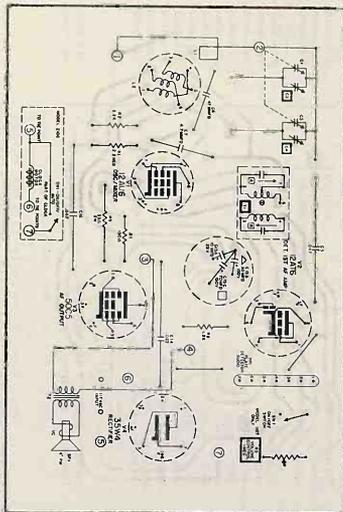
MODEL 1107



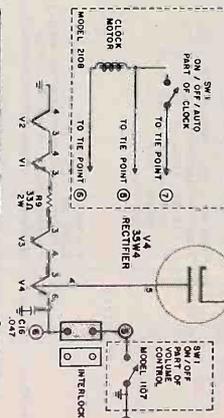
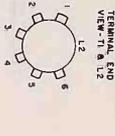
MODEL 2108

CLOCK REMOVAL

1. Remove back cover and chassis as outlined under "Preliminary Instructions" in the alignment procedure.
2. Remove the On/Off/Auto knob by pulling straight outward.
3. Carefully depress side of clock crystal until tabs on crystal clear slots in cabinet. Remove crystal.
4. Remove clock hands by pulling straight out. NOTE: For correct position when replacing clock hands, rotate alarm set knob counterclockwise until a click is heard. Stop rotation at this point and place alarm and hour hand pointing in the 6 o'clock direction, the minute and sweep hand in the 12 o'clock direction.
5. Compress four (4) spring clips securing clock to cabinet then remove clock.
6. For clock replacement, reverse the above procedure.



L2 RESISTANCE		T1 RESISTANCE	
BETWEEN TERMINALS	RES.	BETWEEN TERMINALS	RES.
2 & 6	250	6 & 7	250
2 & 6	250	6 & 7	250
6 & 7	300	6 & 7	250



SYLVANIA RADIO PAGE 25-1

CHASSIS 1-629-1, -2

REPLACEMENT PARTS LIST

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS		
	170-0019	VARIABLE TUNING CAPACITOR
C1, C3		ANTENNA GANG, OSCILLATOR GANG
C2, C4		ANTENNA TRIMMER, OSCILLATOR TRIMMER
C5		.047 MFD - 20% - 400V - PAPER
C6		47 MMFD - 10% - 400V - CERAMIC
C7		4.7 MMFD - 10% - 400V - CERAMIC
C8, C9, C10	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"
C11, C12, C13	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"
C14		.022 MFD - 20% - 400V - PAPER
C15	161-3035	3 SECTION ELECTROLYTIC
A		10 MFD. 25V
B		30 MFD. - 150V
C		70 MFD. - 150V
C16		.047 MFD - 20% - 400V - PAPER
RESISTORS		
R1		2.2 MEGOHM - 20% - 1/4W
R2		2.200 OHM - 10% - 1/4W
R3	157-0050	1 MEGOHM-VOLUME/ON/OFF-CONTROL-MODEL 1107
R3	157-0051	1 MEGOHM-VOLUME CONTROL-MODEL 2108
R4, R5, R6	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"
R7		150 OHM - 10% - 1/4W
R8		1.200 OHM - 10% - 1/4W
R9		33 OHM - 10% - 2W

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
COILS AND TRANSFORMERS		
L1	PART OF BACK COVER	ANTENNA - LOOP
L2	113-0044	COIL - OSCILLATOR
T1	121-0107	TRANSFORMER - IF
T2	143-0045	TRANSFORMER - AUDIO OUTPUT (SPEAKER MOUNTED)

MISCELLANEOUS ELECTRICAL PARTS

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
PP1	190-0028	PLATE - AUDIO DETECTOR
C8, C9		125 MMFD. . .005 MFD.
C10, C11		100 MMFD. . .100 MMFD.
C12, C13		.005 MFD. . .100 MMFD.
R4, R5, R6		10 MEG OHM, 470,000 OHM, 470,000 OHM
SW1	PART OF CLOCK	SWITCH - ON/OFF - MODEL 2108
SW1	PART OF VOLUME CONTROL	SWITCH - ON/OFF - MODEL 1107

CABINET PARTS

DESCRIPTION	MODELS	
	1107	2108
CABINET - MOLDED	813-0117	813-0118
CABLE - AC POWER	195-0001	195-0001
COVER - INTERLOCK (INCLUDES ANTENNA AND AC CABLE)	582-0032	582-0033
CRYSTAL - CLOCK		717-0004
FACE - CLOCK		721-0020
HAND - MINUTE		206-0002
HAND - HOUR		206-0003
HAND - SWEEP		206-0004
HAND - ALARM		206-0005
KNOB - TUNING	741-0042	741-0042
KNOB - VOLUME	742-0022	742-0022
KNOB - CLOCK CONTROL		740-0170
SHAFT - EXTENSION - TIME SET		493-0128
SPEAKER - 4" PM	539-0429	539-0429

CHASSIS PARTS

DESCRIPTION	1107	2108
SOCKET - TUBE - 7 PIN MINIATURE	412-0040	412-0040
TERMINAL - AC PRONG	487-0040	487-0040

SCHEMATIC NOTES:

- VOLTAGES MEASURED TO NEGATIVE "B" USING SYLVANIA "POLYMER", LINE VOLTAGE 117VAC AND SIGNAL INPUT KEPT TO MINIMUM.
- COIL AND TRANSFORMER RESISTANCES ARE AVERAGE VALUES AND ARE TAKEN WITH COMPONENT CONNECTED IN THE CIRCUIT.
- INTERMEDIATE FREQUENCY 455KC.
- ENCIRCLED NUMBERS CORRESPOND WITH TIE POINTS ON PRINTED BOARD.
- VOLTAGE SOURCE IS INDICATED BY ENCIRCLED SYMBOL (⊙); CORRESPONDING SYMBOL WITHOUT CIRCLE (•) INDICATES VOLTAGE TIE POINTS.
- ⊖ DESIGNATES NEGATIVE "B".

PRELIMINARY INSTRUCTIONS (CONT'D)

- Apply 117V. to chassis. Set signal generator for an RF output signal amplitude modulated (AM) by 400 cycles. Allow radio chassis and signal generator several minutes warm-up time. During alignment, keep signal generator output at lowest level that gives perceptible audio output.
 - Use either an audible check or an AC voltmeter connected across speaker voice coil to indicate output. Adjust volume control to full volume.
- NOTE: The following alignment procedure was performed using Sylvania test equipment.

STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST FOR MAXIMUM OUTPUT
1.	Set variable tuning capacitor fully open (minimum capacity).	SIGNAL GENERATOR - "Hot" lead through a .1 Mfd. capacitor to tie point number (1). Ground lead to negative "B". Set generator to 455 KC. AC VOLTMETER - Across speaker voice coil.	T1-B - Bottom core T1-A - Top core Repeat for optimum performance.
2.	Same as step 1.	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to 1650 KC. AC VOLTMETER - across speaker voice coil.	C4 - trimmer
3.	Set variable tuning capacitor to the 600 KC position, (plates meshed approximately 3/16"). Adjust this setting slightly to eliminate any interfering signals.	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to a frequency corresponding to receiver tuning capacitor setting (until signal is heard through receiver speaker). AC VOLTMETER - Across speaker voice coil.	C2 - trimmer

COMPLETE SERVICE INFORMATION

for

CHASSIS: 1-630-1,-2
MODELS: 1108 & 2109

CHASSIS 1-630-1,-2

July 1958



SYLVANIA HOME ELECTRONICS, a division of Sylvania Electric Products Inc., Service Dept., Batavia, N.Y.

SPECIFICATIONS

FREQUENCY RANGE.....540 KC to 1650 KC
POWER SUPPLY.....117 Volts
POWER CONSUMPTION.....35 Watts
INTERMEDIATE FREQUENCY (IF).....455 KC
SPEAKER.....4" PM

TUBE COMPLIMENT

V1 Oscillator/Mixer.....12BE6
V2 IF Amplifier.....12BA6
V3 Detector, AVC, 1st AF Amplifier.....12AT6
V4 AF Output Amplifier.....50C5
V5 Rectifier.....35W4

ALIGNMENT PROCEDURE PRELIMINARY INSTRUCTIONS

Connect an isolation transformer between power line and radio chassis. Utilize a test bench with a non-conductive work surface during all electrical tests on receiver.

1. Disconnect power line plug from power outlet.
2. Pull out on Volume and Station Selector Knobs until free from respective shafts.
3. Remove screws securing back cover and remove back cover as far as permissible without unsoldering antenna leads from chassis.
4. Disconnect speaker leads at tie points (3) and (4). NOTE: On models incorporating a clock, also unsolder clock leads at tie points (5), (6) and (7). Remove screw and clip securing chassis and remove chassis from cabinet.
5. Remove speaker from cabinet if spare speaker of the exact type (with output transformer connected) is not available.
6. Reconnect output transformer to tie points (3) and (4). (On models incorporating a clock, also place a jumper wire across tie points (5) and (7).) Reconnect back cover interlock assembly to chassis. Stand radio chassis in such a manner to facilitate under chassis IF alignment. (CONT. D-OVER)



MODEL 1108



MODEL 2109

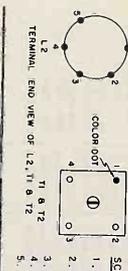
CLOCK REMOVAL

1. Remove back cover and chassis as outlined under "Preliminary Instructions" in the alignment procedure.
2. Cut retaining washer on volume knob to facilitate knob removal, then remove knob. (Replace washer when reinstalling knob.)
3. Remove Sleep Switch and On/Off/Auto Knobs by pushing straight outward.
4. Carefully depress top of clock crystal until tabs on crystal clear slots in cabinet. Remove crystal.
5. Remove clock hands by pulling straight out. NOTE: For correct position when replacing clock hands, rotate (very slowly counterclockwise) the alarm set knob until two (2) clicks are heard. Stop rotation at this point and place the alarm and hour hand pointing in the 6 o'clock direction, the minute and sweep hand in the 12 o'clock direction. Use care so as not to bend hands.
6. Compress four (4) spring clips securing clock to cabinet then remove clock.
7. For clock replacement, reverse the above procedure.

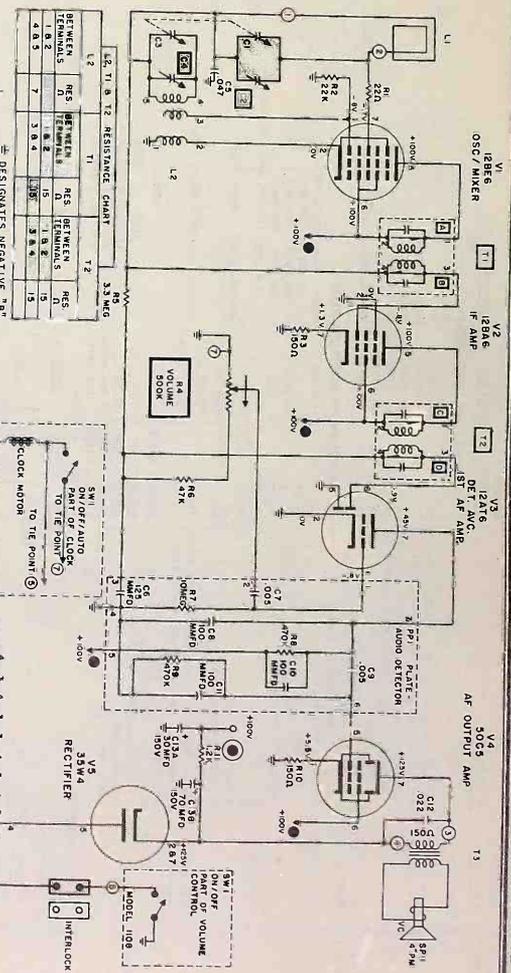
PRELIMINARY INSTRUCTIONS (cont. of)

7. Apply 117V. to chassis. Set signal generator for an RF output signal amplitude modulated (AM) by 400 cycles. Adjust radio chassis and signal generator until signal warm-up time. During alignment of signal generator output at lowest test level, that gives perceptible audio output.

NOTE: The following procedure was performed using Sylvania test equipment.



1. VOLTAGE MEASURED TO NEGATIVE "B" INPUT TERMINAL OF V1 USING SYLVANIA "POLYMER" LINE VOLTAGE 117VAC AND SIGNAL IN CIRCUIT.
2. COIL AND TRANSFORMER RESISTANCES ARE AVERAGE VALUES AND ARE TAKEN WITH COMPONENT CONNECTED TO THE POINT.
3. INTERMEDIATE FREQUENCY 455KC.
4. VOLTAGE SOURCE ENCLOSED SYMBOL. (CORRESPONDING SYMBOL WITHOUT CIRCLE.)
5. INDICATES VOLTAGE TIE POINTS.



CHASSIS 1-630-1, -2

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS			COILS AND TRANSFORMERS		
	170-0019	VARIABLE TUNING CAPACITOR - MODEL 1108	L1	PART OF BACKCOVER	LOOP - ANTENNA
C1, C3	170-0029	VARIABLE TUNING CAPACITOR - MODEL 2109	L2	113-0045	COIL - OSCILLATOR
C2, C4		ANTENNA GANG, OSCILLATOR GANG	T1	121-0108	TRANSFORMER - 1ST IF
C5		ANTENNA TRIMMER, OSCILLATOR TRIMMER	T2	121-0108	TRANSFORMER - 2ND IF
C6, C7, C8	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"	T3	143-0045	TRANSFORMER - AUDIO OUTPUT (SPEAKER MOUNTED)
C9, C10, C11	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"	MISCELLANEOUS ELECTRICAL PARTS		
C12		.047 MFD - 20% - 400V. - PAPER	PP1	190-0028	PLATE - AUDIO DETECTOR
C13	161-2016	2 SECTION ELECTROLYTIC	C6, C7		125 MMFD. .005 MFD
A		30 MFD - 150V.	C8, C9		100 MMFD. .005 MFD
B		70 MFD - 150V.	C10, C11		100 MMFD. 100 MMFD
C14		.047 MFD - 20% - 400V. - PAPER	R7, R8, R9		10 MEGOHM 470,000 OHM, 470,000 OHM
RESISTORS			SW1	PART OF CLOCK	SWITCH - ON/OFF - MODEL 2109
R1		22 OHM - 20% - 1/4W.	SW1	PART OF VOLUME CONTROL	SWITCH - ON/OFF - MODEL 1108
R2		22,000 OHM - 10% - 1/4W.	CHASSIS PARTS		
R3		150 OHM - 10% - 1/4W.	MODEL		
R4	157-0041	500,000 OHM - CONTROL - VOLUME/ON/OFF MODEL 1108	DESCRIPTION		
R4	157-0052	500,000 OHM - CONTROL - VOLUME MODEL 2109		1108	2109
R5		3.3 MEGOHM - 20% - 1/4W.	SHIELD - TUBE - V2, V3	482-0012	482-0012
R6		47,000 OHM - 20% - 1/4W.	SOCKET - TUBE - 7 PIN MINIATURE	412-0040	412-0040
R7, R8, R9	PART OF PP1	SEE "MISCELLANEOUS ELECTRICAL PARTS"	STRAP - GROUND - TUBE SHIELD - V2, V3	499-0014	499-0014
R10		150 OHM - 20% - 1/4W.	TERMINAL - AC PRONG	487-0040	487-0040
R11		1,200 OHM - 10% - 1/4W.			

CABINET PARTS

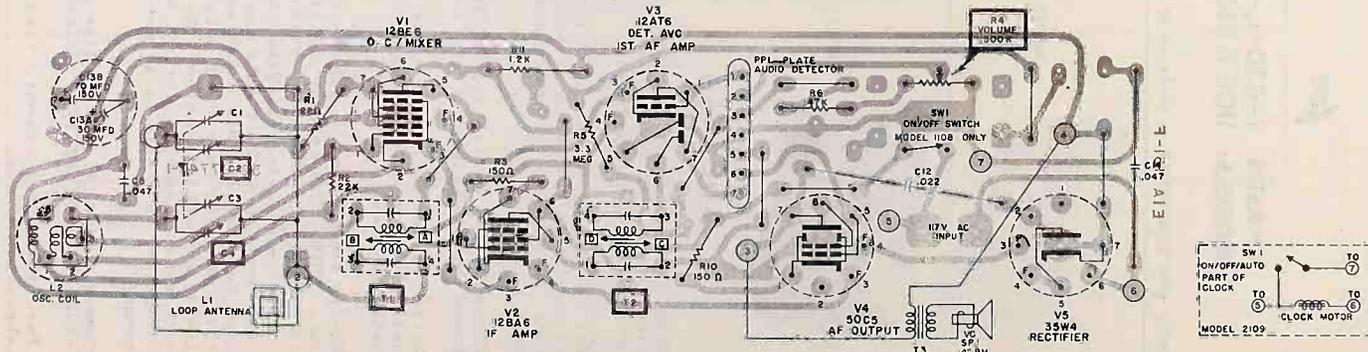
DESCRIPTION	1108WH	1108BL	1108RE	2109BL	2109RE	2109WH
CABINET - MOLDED	813-0119					813-0128
CABINET - PAINTED		813-0121	813-0122			
CABINET - PAINTED (INCLUDES CLOCK FACE)				813-0120	813-0123	
CABLE - AC POWER	195-0001	195-0001	195-0001	195-0001	195-0001	195-0001
CRYSTAL - CLOCK				717-0005	717-0005	717-0005
FACE - CLOCK				721-0021	721-0021	721-0023
HAND - HOUR				206-0006	206-0006	206-0010
HAND - MINUTE				206-0007	206-0007	206-0011
HAND - ALARM				206-0008	206-0008	206-0008
HAND - SWEEP				206-0009	206-0009	206-0009
KNOB - TUNING	741-0043	741-0044	741-0045	741-0044	741-0045	741-0068
KNOB - VOLUME/ON/OFF	742-0023	742-0025	742-0026			
KNOB - VOLUME				742-0024	742-0024	742-0024
KNOB - CLOCK CONTROL - ON/OFF				740-0170	740-0170	740-0170
KNOB - CLOCK CONTROL - SLEEP				740-0205	740-0205	740-0205
NAMEPLATE - SYLVANIA	818-0147	818-0148	818-0149			
SHAFT - EXTENSION - TIME SET				493-0131	493-0131	493-0131
SPEAKER - 4" PM	539-0429	539-0429	539-0429	539-0429	439-0429	539-0429
COVER - INTERLOCK (INCLUDES ANTENNA AND AC CABLE)	582-0034	582-0034	582-0034	582-0035	582-0035	582-0035

ALIGNMENT SETUP NOTES

TEST EQUIPMENT HOOKUP

ADJUST FOR MAXIMUM OUTPUT

1.	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - "Hot" lead through .1 Mfd. capacitor to junction of R1 (22 Ohm) and pin 7 of V1 (12BE6); ground lead to (negative "B"). Set generator to 455 KC. AC VOLTMETER - across speaker voice coil.	T2-D - Bottom core T2-C - Top core T1-B - Bottom core T1-A - Top core Repeat for optimum performance.
2.	Same as step 1.	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to 1650 KC. AC VOLTMETER - Across speaker voice coil.	C4 trimmer
3.	Set variable tuning capacitor to 600 KC position, plates meshed approximately 3/16 inch. Adjust this setting slightly to eliminate any interfering signals.	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to a frequency corresponding to receiver tuning capacitor setting (until signal is heard through receiver speaker). AC VOLTMETER - Across speaker voice coil.	C2 trimmer



COMPLETE SERVICE INFORMATION

for

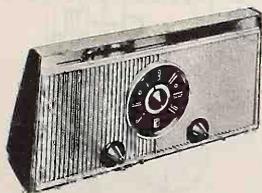
CHASSIS: 1-631-1
MODELS: 1303

RADIO
CHASSIS 1-631-1

October 1958



SYLVANIA HOME ELECTRONICS, a division of Sylvania Electric Products Inc., Service Dept., Batavia, N.Y.



MODEL 1303

CHASSIS REMOVAL PROCEDURE

1. Disconnect power line plug from power outlet.
2. Remove volume and tone knobs by pulling straight out.
3. Remove (3) three screws securing back cover to cabinet and remove back cover.
4. Remove screw securing interlock mounting plate to cabinet.
5. Remove screw and clip securing chassis to cabinet. Remove chassis by sliding straight back until mounting slots are cleared.
6. To replace chassis reverse the above procedure. When replacing chassis, make certain that slot in the variable tuning arm engages peg on the variable tuning pulley. NOTE: Speaker and dial lamp lead length permit removal of chassis from cabinet with components connected in circuit. If complete disassembly is necessary, identify speaker leads and unsolder at tie points (1), (2) and (3), remove screw securing pilot lamp mounting bracket to cabinet and remove chassis.

CAUTION: Do not operate receiver with speakers disconnected.

SPECIFICATIONS

FREQUENCY RANGE.....540 KC to 1650 KC
POWER SUPPLY.....117 Volts
POWER CONSUMPTION.....35 Watts
INTERMEDIATE FREQUENCY (IF).....455 KC
SPEAKERS.....2 - 4" PM

TUBE COMPLIMENT

V1 Oscillator/Mixer.....12BE6
V2 IF Amplifier.....12BA6
V3 Detector, AVC, 1st AF Amplifier.....12AT6
V4 AF Output Amplifier.....50C5
V5 Rectifier.....35W4

ALIGNMENT PROCEDURE

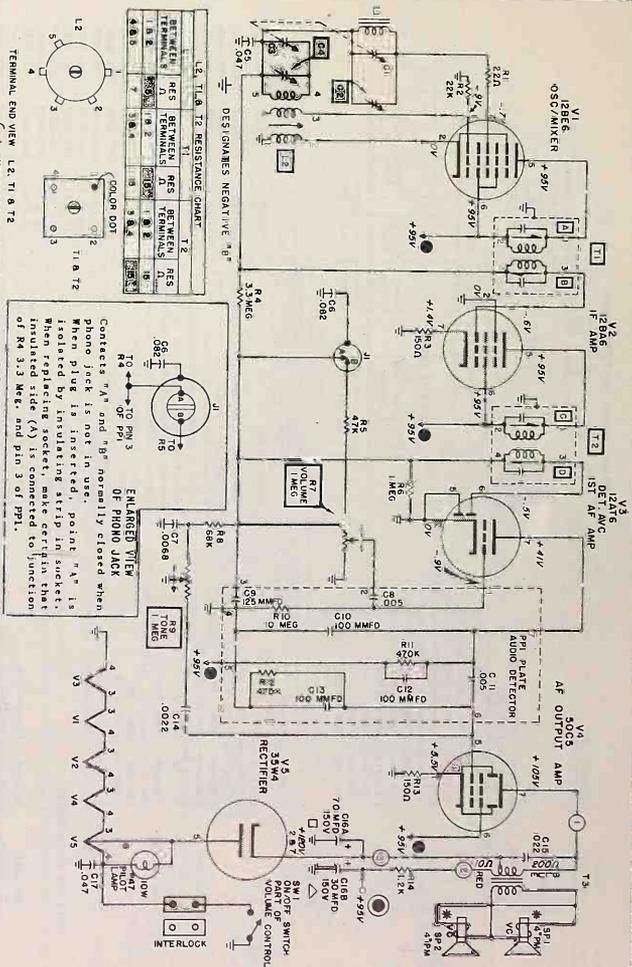
PRELIMINARY INSTRUCTIONS

Connect an isolation transformer between power line and radio chassis. Utilize a test bench with a non-conductive work surface during all electrical tests on receiver.

1. Disconnect power line plug from power outlet.
2. Remove chassis as outlined under "Chassis Removal Procedure".
3. Stand radio chassis in such a manner to facilitate under Chassis IF Alignment.
4. Apply 117V. to chassis. Set signal generator for an RF output signal amplitude modulated (AM) by 400 cycles. Allow radio chassis and signal generator several minutes warm-up time. During alignment, keep signal generator output at lowest level that gives perceptible audio output.
5. Use either an audible check or an AC voltmeter connected across speaker voice coil to indicate output. Adjust volume control to full volume. NOTE: the following procedure was performed using Sylvania Test Equipment.

SCHEMATIC NOTES:

1. VOLTAGES MEASURED TO NEGATIVE "B" USING SYLVANIA "POTENTIESTER". LINE VOLTAGE 117V AC AND SIGNAL INPUT REPT TO MINIMUM.
2. COIL AND TRANSFORMER RESISTANCES ARE AVERAGE VALUES AND ARE TAKEN WITH COMPONENTS CONNECTED IN CIRCUIT.
3. INTERMEDIATE FREQUENCY 455 KC.
4. ENCIRCLED NUMBERS CORRESPOND WITH THE POINTS ON PRINTED CIRCUIT BOARD.
5. ENCIRCLED SQUARES CORRESPOND WITH THE POINTS ON PRINTED CIRCUIT BOARD.
6. * INDICATES COLOR DOT ON SPEAKERS FOR CORRECT PHASING.



CHASSIS 1-631-1

SCHEMATIC LOCATION

SERVICE PART NO.

DESCRIPTION

MISCELLANEOUS ELECTRICAL PARTS

CAPACITORS

C1, C3	170-0030	VARIABLE TUNING CAPACITOR
C2	PART OF C1	ANTENNA TRIMMER
C4	PART OF C3	OSCILLATOR TRIMMER
C5		.047 MFD - 20% - 400V. - PAPER
C6		.082 MFD - 20% - 400V. - PAPER
C7		.0068 MFD - 20% - 500V. - CERAMIC
C8, C9, C10		SEE "MISCELLANEOUS ELECTRICAL PARTS"
C11, C12, C13		SEE "MISCELLANEOUS ELECTRICAL PARTS"
C14		.0022 MFD - 20% - 400V. - PAPER
C15		.022 MFD - 20% - 400V. - PAPER
C16	161-2016	2 SECTION ELECTROLYTIC
A		70 MFD - 150V.
B		30 MFD - 150V.
C17		.047 MFD - 20% - 400V. - PAPER

RESISTORS

R1		22 OHM - 20% - 1/4W.
R2		22,000 OHM - 20% - 1/4W.
R3		150 OHM - 20% - 1/4W.
R4		3.3 MEGOHM - 20% - 1/4W.
R5		47,000 OHM - 20% - 1/4W.
R6		1 MEGOHM - 20% - 1/4W.
R7	152-0054	1 MEGOHM - VOLUME CONTROL
R8		68,000 OHM - 20% - 1/4W.
R9	PART OF VOLUME CONT.	1 MEGOHM - TONE CONTROL
R10, R11, R12		SEE "MISCELLANEOUS ELECTRICAL PARTS"
R13		150 OHM - 20% - 1/4W.
R14		1,200 OHM - 10% - 1W.

COILS AND TRANSFORMERS

L1	581-0015	ANTENNA - FERRITE ROD
L2	113-0046	COIL - OSCILLATOR
T1	121-0108	TRANSFORMER - 1ST IF
T2	121-0108	TRANSFORMER - 2ND IF
T3	143-0052	TRANSFORMER - AUDIO OUTPUT (SPEAKER MOUNTED)

PP1	190-0028	PLATE - AUDIO DETECTOR
C8, C9		.005 MFD. 125 MMFD
C10, C11		100 MMFD. .005 MFD
C12, C13		100 MMFD. 100 MMFD
R10, R11		10 MEGOHM. 470,000 OHM
R12		470,000 OHM
SW1	PART OF VOLUME CONT.	SWITCH - ON/OFF
J1	417-0030	SOCKET - PHONO INPUT

CHASSIS PARTS

487-0050	CLAMP - PLASTIC - ANTENNA RETAINER
482-0016	SHIELD - TUBE
412-0051	SOCKET - TUBE - 7 PIN MINIATURE
487-0040	TERMINAL - AC PRONGS
411-0035	SOCKET - PILOT LAMP

CABINET PARTS

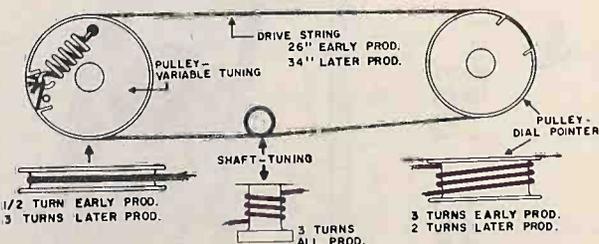
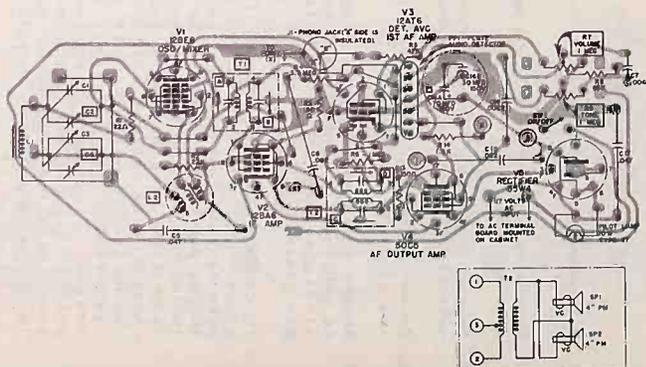
DESCRIPTION	1303RE	1303TU	1303YE
ARM - VARIABLE CAPACITOR DRIVE	473-0005	473-0005	473-0005
BACKGROUND - DIAL	727-0009	727-0009	727-0009
BAFFLE - SPEAKER	776-0011	776-0011	776-0011
BOARD - TERMINAL - INTERLOCK	415-0029	415-0029	415-0029
CABINET - BACK	822-0029	822-0031	822-0033
CABINET - FRONT - INCLUDES OVERLAY	822-0028	822-0028	822-0028
CABINET - TOP	822-0030	822-0032	822-0034
CABLE - ASSEMBLY - POWER	195-0019	195-0020	195-0021
CREST - SYLVANIA	818-0169	818-0169	818-0169
DIAL AND DRIVE MOUNT	722-0069	722-0069	722-0069
KNOB - DUMMY	740-0225	740-0225	740-0225
KNOB - TONE AND ON/OFF	740-0223	740-0223	740-0223
KNOB - TUNING	740-0222	740-0222	740-0222
KNOB - VOLUME	740-0224	740-0224	740-0224
POINTER - DIAL	792-0023	792-0023	792-0023
PULLEY - DIAL POINTER	494-0033	494-0033	494-0033
PULLEY - VARIABLE TUNING	493-0147	493-0147	493-0147
RETAINER - LINE CORD	554-0086	554-0086	554-0086
SHAFT - POINTER	493-0146	493-0146	493-0146
SHAFT - TUNING	493-0075	493-0075	493-0075
SPEAKER - 4" PM (INCLUDES TRANSFORMER)	539-0431	539-0431	539-0431
SPEAKER - 4" PM	539-0432	539-0432	539-0432
SPRING - TENSION - DRIVE STRING	496-0023	496-0023	496-0023

ALIGNMENT SETUP NOTES

TEST EQUIPMENT HOOKUP

ADJUST FOR MAXIMUM OUTPUT

1.	Set variable tuning capacitor plates fully open (minimum capacity).	SIGNAL GENERATOR - "Hot" lead through .1 Mfd capacitor to junction of R1 (22 Ohm) and pin 7 of V1 (12BE6); ground lead to (negative "B"). Set generator to 455 KC.	T2 - D Bottom Core T2 - C Top Core T1 - B Bottom Core T1 - A Top Core Repeat for optimum performance.
2.	Same as step 1	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to 1650 KC.	C4 Trimmer
3.	Set variable tuning capacitor to 600 KC position, plates fully meshed except for approximately 3/16 inch. Adjust this setting slightly to eliminate any interfering signal.	SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to a frequency corresponding to receiver tuning capacitor setting (until signal is heard through receiver speaker).	C2 Trimmer
4.	Same as step 3 - 600 KC position.	SIGNAL GENERATOR - Same as step 3.	L2 (Oscillator coil) while simultaneously rocking tuning capacitor through the 600 KC position.



DIAL STRINGING

©John F. Rider

3. Stand radio chassis in such a position to facilitate under Chassis IF Alignment. Apply 117V. to chassis. Set signal generator for an RF output signal amplitude modulated (AM) by 400 cycles. Allow radio chassis and signal generator several minutes warm up time. During alignment, keep signal generator output at lowest level that

gives perceptible audio output.

4. Use either an audible check or an AC voltmeter connected across speaker voice coil to indicate output. Adjust volume control to full volume.

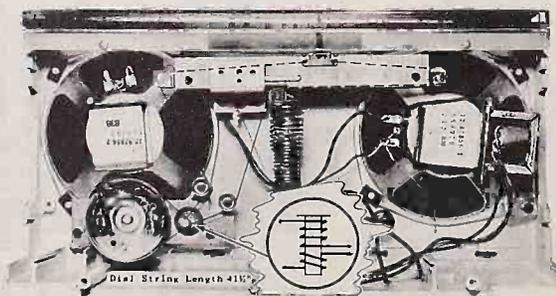
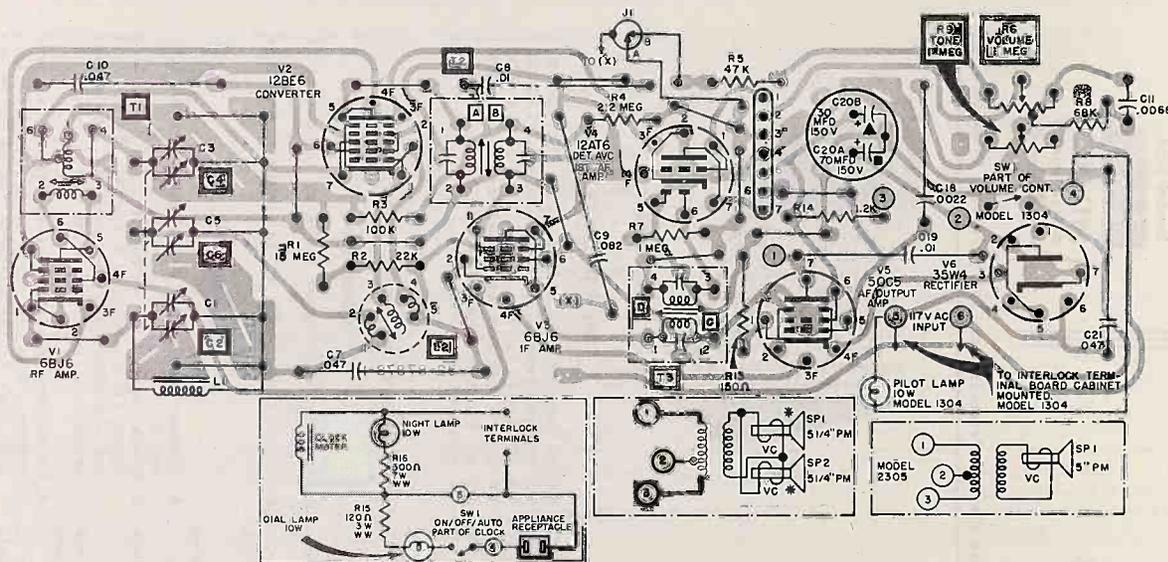
NOTE: The following procedure was performed using Sylvania test equipment.

ALIGNMENT SETUP NOTES

TEST EQUIPMENT HOOKUP

ADJUST FOR MAXIMUM OUTPUT

<p>1. Set variable tuning capacitor plates fully open (minimum capacity).</p>	<p>SIGNAL GENERATOR - "Hot" lead through a .1 Mfd. capacitor to pin 7 of V2 (12BE6); ground lead to (negative "B"). Set generator to 455 KC.</p> <p>AC VOLTMETER - Across speaker voice coil.</p>	<p>T3-D - Bottom core T3-C - Top core T2-B - Bottom core T2-A - Top core</p> <p>Repeat for optimum performance.</p>
<p>2. Same as step 1.</p>	<p>SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to 1650 KC.</p> <p>AC VOLTMETER - Across speaker voice coil.</p>	<p>C6 trimmer</p>
<p>3. Set variable tuning capacitor to 1400 KC.</p>	<p>SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to 1400 KC.</p> <p>AC VOLTMETER - Across speaker voice coil.</p>	<p>C4 trimmer C2 trimmer</p> <p>While rocking variable tuning capacitor through 1400 KC.</p>
<p>4. Set variable tuning capacitor to 600 KC position, plates fully meshed except for approximately 3/16 inch. Adjust this setting slightly to eliminate any interfering signals.</p>	<p>SIGNAL GENERATOR - Radiate signal to receiver through a loop of several turns of wire. Set generator to a frequency corresponding to receiver tuning capacitor setting (until signal is heard through receiver speaker).</p> <p>AC VOLTMETER - Across speaker voice coil.</p>	<p>L2 - Oscillator coil T1 - RF coil</p> <p>While rocking variable tuning capacitor through 600 KC.</p>

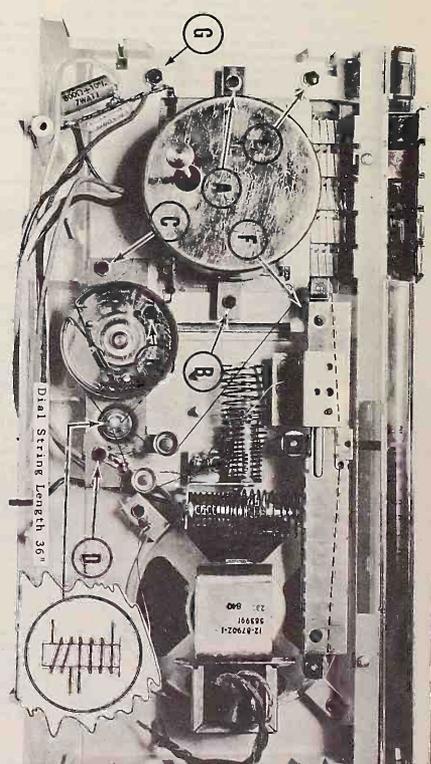


MODEL 1304 - DIAL DRIVE & SPEAKER ASSEMBLY

SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION	SCHEMATIC LOCATION	SERVICE PART NO.	DESCRIPTION
CAPACITORS					
C1, C2	170-0031	VARIABLE TUNING CAPACITOR	L1	591-0016	COIL - FERRITE ROD - ANTENNA
C1, C4		ANTENNA GANG, ANTENNA TRIMMER	L2	113-0046	COIL - OSCILLATOR
C5, C6		RF GANG, RF TRIMMER	T1	113-0017	TRANSFORMER - RF
C7		OSCILLATOR GANG, OSCILLATOR TRIMMER	T2	121-0110	TRANSFORMER - 1ST IF
C8		.047 MFD. - 20V. - 400V. - PAPER	T3	123-0109	TRANSFORMER - 2ND IF
C9		.01 MFD. - 20V. - 400V. - PAPER	T4	143-0005	TRANSFORMER - AUDIO OUTPUT (SPEAKER MOUNTED)
C10		.087 MFD. - 20V. - 400V. - PAPER	MISCELLANEOUS ELECTRICAL PARTS		
C11		.047 MFD. - 20V. - 400V. - PAPER	PH1	190-0028	PLATE - AUDIO DETECTOR
C12, C13, C14		.0058 MFD. - 20V. - 400V. - CERAMIC	C12, C13		500 MFD. 125 MFD.
C15, C16, C17		SEE "MISCELLANEOUS ELECTRICAL PARTS"	C14, C15		100 MFD. .005 MFD.
C18		.0022 MFD. - 20V. - 400V. - PAPER	C18, C17		100 MFD., 100 MFD.
C19		.01 MFD. - 20V. - 400V. - PAPER	R10, R11, R12		10 MEGOHM. 470,000 OHM, 470,000 OHM
C20	161-2016	2 SECTION ELECTROLYTIC	SW1		
A		30 MFD. - 150V.	PART OF		
B		.047 MFD. - 20V. - 400V. - PAPER	VOLUME CONTROL		
RESISTORS					
R1		15 MEGOHM - 20% - 1/2"	SW1		SWITCH-ON/OFF - MODEL 1304
R2		25,000 OHM - 20% - 1/2"	PART OF		
R3		100,000 OHM - 20% - 1/2"	CLOCK		
R4		2.2 MEGOHM - 20% - 1/2"	SWITCH-ON/OFF/AUTO - MODEL 1305		
R5		47,000 OHM - 20% - 1/2"	LAMP - 10 WATT		
R6		1 MEGOHM - VOLUME CONTROL	CHASSIS PARTS		
R7	152-0055	INCLUDES TONE AND ON/OFF MODEL 1304	417-0030	SOCKET - PHONE JACK	
R8	152-0057	INCLUDES TONE AND ON/OFF MODEL 1304	487-0030	CLAMP - PLASTIC - ANTENNA RETAINER	
R9		88,000 OHM - 20% - 1/2"	489-0016	SHIELD - TUBE	
R10, R11, R12		SEE "MISCELLANEOUS ELECTRICAL PARTS"	412-0051	SWITCH - TUBE - 7 PH. MIN.	
R13		150 OHM - 10% - 1/2"	487-0040	TERMINAL - AC PRONG	
R14		120 OHM - 10% - 3/4" W.W. - MODEL 2305 ONLY			
R15	189-0064	500 OHM - 10% - 7/8" W.W. - MODEL 2305 ONLY			
R16	189-0065	500 OHM - 10% - 7/8" W.W. - MODEL 2305 ONLY			

CABINET PARTS

DESCRIPTION	1304RE	1304TU	1304VE	2305RE	2305TU	2305VE
REAR-DRIVE/VARIABLE TUNING	472-0065	473-0006	473-0004	473-0006	473-0008	473-0090
BACKGROUND - DIAL	728-0002	728-0002	728-0002	728-0003	728-0003	728-0003
BOARD-TERMINAL, INTERLOCK	415-0019	415-0029	415-0029	415-0029	415-0029	415-0028
BUTTONS - SLEEP/ON/OFF/RADIO/RADIO ALARM						
CABINET - BACK	822-0029	822-0031	822-0033	822-0037	822-0038	822-0039
CABINET - FRONT	822-0035	822-0036	822-0038	822-0039	822-0039	822-0038
CABLE - AC PAPER	195-0019	195-0020	195-0021	195-0019	195-0020	195-0021
CHASSIS - STEEL	818-0170	818-0170	818-0170	818-0169	818-0169	818-0169
CRYSTAL - CLCC						
DIAL - STRAINING	722-0070	722-0070	722-0070	722-0071	722-0071	722-0071
Knob - Dummy	740-0270	740-0270	740-0270	740-0271	740-0271	740-0271
Knob - TONE	740-0273	740-0273	740-0273	740-0273	740-0273	740-0273
Knob - Tuning	740-0272	740-0272	740-0272	740-0274	740-0274	740-0274
Knob - Volume	740-0274	740-0274	740-0274	740-0274	740-0274	740-0274
OVERLAY - BUTTON - ON	792-0024	792-0024	792-0024	792-0024	792-0024	792-0024
PAINTER - SLIDE						
PULLEY - VARIABLE TUNING	493-0148	493-0148	493-0148	493-0148	493-0148	493-0148
RETAINING - LINE CHM	554-0086	554-0086	554-0086	554-0086	554-0086	554-0086
SWAYT - EXTENSION - TIME SET	493-0149	493-0149	493-0149	493-0149	493-0149	493-0149
SWAYT - TUNING	493-0148	493-0148	493-0148	493-0149	493-0149	493-0149
SOCKET - PILOT LIGHT	411-0036	411-0036	411-0036	411-0037	411-0037	411-0037
SOCKET - 2 PHONO - APPLIANCE RECEPTACLE						
SPEAKER - 1" PH (INCLUDES TRANSFORMER)	539-0570	539-0570	539-0570	539-0570	539-0570	539-0570
SPEAKER - 5 1/4" PH (TRANSFORMER)	539-0578	539-0578	539-0578	539-0578	539-0578	539-0578
SPRING - TENSION - DIAL STRING	496-0023	496-0023	496-0023	496-0023	496-0023	496-0023
TRIM - FRANG	818-0171	818-0171	818-0171	818-0171	818-0171	818-0171
TRIM - CHEST - BOTTOM	818-0173	818-0173	818-0173	818-0173	818-0173	818-0173
TRIM - CASE - TOP	818-0172	818-0172	818-0172	818-0172	818-0172	818-0172



MODEL 2305 - CLOCK, DIAL DRIVE & SPEAKER ASSEMBLY

CLOCK REMOVAL PROCEDURE

1. Remove backcover and chassis as outlined under "Chassis Removal Procedure."
2. Remove tuning knob by pulling straight out and clock control knobs by pulling straight up.
3. Carefully depress top of clock crystal until crystal clears slots in cabinet. Remove crystal.
4. Remove screws (A) and (B) to remove back cover of clock.
5. Remove screws (C) and (D) securing tuning pulley to cabinet and move to one side.
6. Identify and unsolder at clock terminals (4) leads from chassis to clock.
7. Remove nuts (E), (F), (G) and (H) securing clock to cabinet.
8. Pull out slightly at bottom of clock and then down until clock clears cabinet.
9. To replace clock, reverse the above procedure. Make certain clock leads are soldered to correct terminals. Restring dial cord if necessary.

WG
No. 10-475

MODEL NO. DC2836B

FACTS ABOUT YOUR NEW TRUETONE FM AND BROADCAST RADIO Instructions for Installation, Operation, and Service

CHECK YOUR LINE VOLTAGE

Unless otherwise marked this radio must be operated on a supply of 105-125 volts AC, 50-60 cycles or 105-125 volts DC. Do not connect the radio to a wall outlet unless certain that the power supply is correct for the receiver. If in doubt, telephone your local power company before inserting the plug. Radios of this model which are to be used on other power supplies are marked accordingly.

BROADCAST BAND

540-1600 KILOCYCLES-This band is calibrated in channel numbers. To obtain the kilocycle number add two zeros to the dial number. Thus when the dial pointer is at 12 on the dial, the radio is tuned to 1200 kilocycles.

ON-OFF SWITCH AND VOLUME CONTROL

The On-Off switch and Volume control are operated by the same knob. To turn the radio on, turn the knob clockwise until a click is heard. Allow approximately 30 seconds for the tubes to heat. Then continue to turn the knob clockwise to increase the volume.

AM - FM SWITCH

This control has two positions, AM & AM. Turn the knob to the extreme right for AM (broadcast) reception and to the extreme left for FM (frequency modulation) reception.

FM BAND

88 - 108 MEGACYCLES-This band is calibrated in megacycles and covers the frequency modulation band of 88-108 megacycles. Reception in this band is usually limited to "line of sight" distances between the transmitting and receiving antennas. This is normally up to about 30 miles with approximately 45 miles being the extreme range.

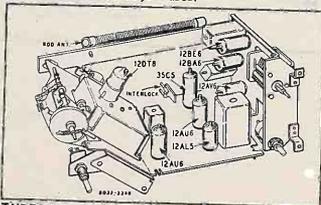
TUNING KNOB (FM OR AM)

Use this knob to tune in the desired station. Turn the knob until the station is heard. Then slowly rotate it back and forth until the signal is clearest and strongest. If signal is too strong, reduce it by means of the volume control, not by using the tuning knob.

ANTENNA

Two built-in antennas are incorporated in the receiver. A Truetone Stratoscope Antenna for the broadcast range and an FM antenna for the FM (frequency modulation) range. When operating the radio with the built-in antennas, directional effects are obtained. Better reception of distant stations and reduction of local interference may be obtained by rotating the radio until the desired signal is at a maximum. However, in some locations for the reception of FM stations, an outside antenna is essential. A folded dipole with a 300 ohm line lead-in should be used. It must be

carefully installed according to the directions furnished with it and connected to the FM terminals at the rear of the receiver. It should be remembered in conjunction with the erection of an FM folded dipole antenna that FM reception is usually limited to "line of sight" distances or up to 45 miles. Before erecting a special antenna for FM reception it is best to make certain that an FM station exists in your area.



TUBES

The type designation of each tube is stamped on the tube. The correct positions in which the tubes must be installed are shown in the tube position illustration.

All tubes must be in their sockets to operate the radio.

The tubes in the radio should be checked periodically by taking them out and having them tested. To reach the tubes for servicing, remove the two screws from the rear of the cabinet. Then remove cabinet front.

When replacing the tubes, be sure that they are inserted in the proper sockets. To install a tube into a miniature type tube socket, line up the tube prongs with the holes in the socket and then gently push the tube down until it is held firmly in the socket.

IF THE RADIO FAILS TO OPERATE SATISFACTORILY

Recheck the foregoing instructions. If the radio still does not appear to operate satisfactorily, proceed as follows:

FIRST-Check Power Supply. Be sure there is power at the convenience outlet to which the radio is connected. To determine this, connect a lamp to the outlet and see whether or not the lamp lights.

Check the voltage and frequency of the power supply with that shown on the power rating label on the radio. If there is any doubt concerning the power supply, withdraw the plug from the outlet and consult the local power company before reinserting the plug.

SECOND-Check Tube Positions. See that the tubes are in the correct sockets as shown in the illustration.

Make certain that the tubes are operating. (Glass tubes will light very dimly.)

MODEL NO. DC2836B

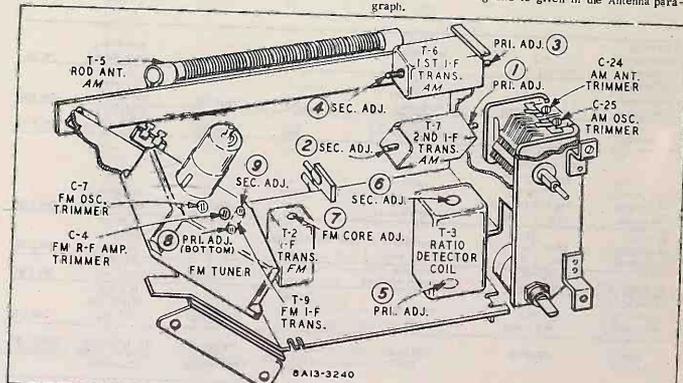
THIRD-Check Antenna. If an outside antenna is being used, inspect the antenna system to see that it is in good condition and not grounded at any point.

FOURTH-Test Tubes. Remove the tubes from the radio, take them to your local radio dealer and have them tested either by means of a tube tester or by inserting them in a radio that is operating satisfactorily.

FIFTH-Service. If the radio does not function properly after the above procedure has been followed and the tubes have been tested, get in touch with the dealer from whom the radio was purchased or call in a competent radio technician.

FAULTY FM RECEPTION

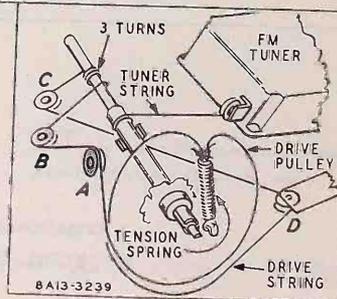
The requirements for FM reception are more critical than for Standard band broadcast or short wave reception. This includes the area in which the receiver is located, the type of antenna used, the distance the receiver is located from the station to be received and other factors not encountered in Standard band broadcast reception. It is to be noted that reception in the high frequency FM band is usually limited to "line of sight" distances or up to about 45 miles. Also tall buildings or other structures between the transmitter and the receiver may be found to affect reception. Reception under these conditions will sometimes be helped by the addition of an external folded dipole antenna with a 300 ohm line lead-in. Information concerning this is given in the Antenna paragraph.



DRIVE CORD REPLACEMENT

Replacement of the drive cord may be accomplished as shown in the illustration. For this purpose use the drive cord assembly listed in the replacement parts list. Then install the string as shown, winding three turns clockwise around the tuning shaft with the turns progressing toward the rear of the chassis. After the cord is installed rotate the tuning shaft several times in order to take up any slack in the cord.

The string from the FM tuner to the tuning shaft is wound 2 turns counter-clockwise and then tied to the clip.



WG
No. 10-475

MODEL NO. DC2836B

TUBE COMPLEMENT

- 1-12DT8 R-F Amplifier & Mixer
- 1-12AU6 FM I-F Amplifier
- 1-12AU6 FM I-F Amplifier
- 1-12AL5 FM Detector
- 1-12BE6 AM Converter
- 1-12BA6 AM I-F Amplifier
- 1-12AV6 AM Detector & 1st Audio Amplifier
- 1-35C5 Audio Output

- Speaker - 4 X 6 inch P.M. Dynamic.
- Frequency Ranges
Broadcast 540-1600 KC
Frequency Modulation 88-108 MC
- Intermediate Frequency -
AM 455 K C - FM 10.7 MC

ELECTRICAL SPECIFICATIONS

Power Input -
105-125 volts AC
50-60 cycles or 105-125 volts DC

Power Output -
2 watts maximum
1.3 watt 10% distortion

Selectivity - AM - 45 KC broad 1000 times down,
and 8 KC at two times down,
I.F. FM - 200 KC broad at 2 times down
I.F. FM - 900 KC broad at 100 times down

AM Sensitivity - (For 50 Milliwatts output)
25 microvolts average

FM Sensitivity - (For 50 Milliwatts output)
25 microvolts average

ALIGNMENT PROCEDURES

AM STAGES

The following is required for aligning:

An All Wave Signal Generator Which Will Provide an Accurately Calibrated Signal at the Test Frequencies as listed.

Volume Control Maximum all Adjustments.

Connect Radio Chassis to Ground Post of Signal Generator with a Short Heavy Lead.

Allow Chassis and Signal Generator to "Heat Up" for Several Minutes.

Output Indicating Meter, Non-Metallic Screwdriver, Dummy Antenna = 1. mc.

SIGNAL GENERATOR

FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	CONNECT TO GROUND	GANG CONDENSER SETTING	ADJUST	ADJUST FOR
455KC	Control Grid 12BA6 Pin No. 1	.1mf	Chassis Base	Rotor Fully Open	2nd I. F. Pri. (1) and Sec. (2)	Maximum Output
455KC	Control Grid 12BE6 Pin No. 7	.1mf	Chassis Base	Rotor Fully Open	1st I. F. Pri. (3) and Sec. (4)	Maximum Output
455 KC	Control Grid 12BE6 Pin No. 7	.1mf	Chassis Base	Rotor Fully Open	2nd. I. F. Pri. (1) and Sec. (2)	Maximum Output
1620 KC	Control Grid 12BE6 Pin No. 7	.1 mf	Chassis Base	Rotor Fully Open	Oscillator C-25	Maximum Output
1400 KC	See Note A		See Note A	Set Pointer to 1400 KC	Antenna C-24	Maximum Output

Note A - Connect generator leads across a 6" diameter loop of wire and place near AM antenna.

ALIGNMENT PROCEDURES

FM STAGES

The following is required for aligning:

An accurately calibrated signal generator providing unmodulated signals at the test frequencies listed below. Dummy antennas, 5000 mmf and 300 ohms.

V.T.V.M. having a range of approximately 5 volts.

Allow chassis and signal generator to heat up for several minutes.

SIGNAL GENERATOR

FREQUENCY SETTING	CONNECT GENERATOR OUTPUT TO	THROUGH DUMMY ANTENNA	BAND SWITCH SETTING	DIAL SETTING	ADJUST	ADJUST FOR
10.7 MC	Pin 1 of 2nd 12AU6 (Note 3)	5000 mmf	FM	Extreme Clockwise Rotation	Ratio Det. Pri. (5)	Maximum Deflection (Note 1)
10.7 MC	Pin 1 of 2nd 12AU6	5000 mmf	FM	Extreme Clockwise Rotation	Ratio Det. Sec. (6)	Maximum Deflection (Note 2)
10.7 MC	Pin 1 of 1st 12AU6 (Note 4)	5000 mmf	FM	Extreme Clockwise Rotation	2nd I. F. Adj. (at top only) (7)	Maximum Deflection (Note 1)
10.7 MC	FM Antenna Terminals	300 ohms	FM	Extreme Clockwise Rotation	1st I. F. Adj. Pri. (8) and Sec. Adj. (7) Ratio Det. Pri. (5)	Maximum Deflection (Note 1)
10.7 MC	FM Antenna Terminals	300 ohms	FM	Extreme Clockwise Rotation	In order shown	(Note 2)
108 MC	FM Antenna Terminals	300 ohms	FM	Pointer to 108 mc. on dial	Osc. Trimmer C-7	Maximum Deflection (Note 1)
98 MC	FM Antenna Terminals	300 ohms	FM	Pointer to 98 mc. on dial	R.F. Trimmer C-4	Maximum Deflection (Note 1)

FM ALIGNMENT NOTES

NOTE 1 - Connect V.T.V.M. common lead to chassis. Connect D.C. probe to Pin 7 of 12AL5. Input should be adjusted for approximately 4.5V. output.

point of above 2 resistors and connect D.C. probe to junction point of C-18 and R-8. Adjust ratio detector secondary for zero voltage.

NOTE 2 - Connect 2 100 Kohms .5 watt resistors in series and connect from pin 7 of 12AL5 to chassis. Connect V.T.V.M. common lead to mid

NOTE 3 - 12AU6 nearest ratio detector (T-3).

NOTE 4 - 12AU6 nearest I.F. transformer FM (T-2).

MODEL NO. DC2836B

REPLACEMENT PARTS LIST FOR DC2836B

Ref. No.	Description	Approximate Selling Price
MISCELLANEOUS		
12A531	4" x 6" PM Speaker	
25A1163	Tuner, F-M	11.50
66X18	Selenium Rectifier	2.55
70X5	Resistor-Capacitor Assembly	.65
3A486	Tube Socket (12AV6-35C4)	.15
3A491	Tube Socket (12AL5-12AU6-12BE6-12BA6)	.15
4X1165	Crest	.55
13X615-3	Line Cord Assembly	.65
10X93	Drive Cord Assembly	.65
28X603	Spring, Drive Cord	.05
20X1660	Ring, Compression (10A911 Knob)	.05
28X635	Spring (10A910-1 & 10A912-1 Knob)	.05
24A88	Switch, AM-FM	
10A910-1	Knob, Dial Scale FM	
10A911	Knob, Tuning	
10A912-1	Knob, Dial Scale AM	
10A914	Knob, On-Off and Switch	
S-38A586	Front Baffle & Grille Cloth Assembly	
S-38A587	Assembly, Cabinet Shell (Charcoal)	
CAPACITORS		
C-1		
C-2		
C-3		
C-4		
C-5		
C-6		
C-7	Part of 25A1163 FM Tuner Assembly	
C-8		
C-9		
C-10		
C-11		
C-12		
C-15		
C-33	47X507 5K mmf 500 V Ceramic	.30
C-38		
C-13	47X670 47 mmf Ceramic	.20
C-14	Part of T-2	
C-16	Part of T-3	
C-17	47X623 390 mmf 350 V Ceramic	.30
C-18	47X575 2700 mmf 500 V Ceramic	.25
C-19	45X423 5 mf 50 V Dry Electrolytic	.90
C-20	RCP10M2103M .01 mf 200 V Molded Tubular	.25
C-21A		
C-21B	Part of 76X5 (See Miscellaneous)	
C-21C		
C-22	RCP10M4103M .01 mf 400 V Molded Tubular	.25
C-23A		
C-23B	14A232 Gang Condenser Assembly	3.35
C-24		
C-25	Part of Gang Condenser Assembly	
C-26		
C-29	RCP10M2473M .047 mf 200 V Molded Tubular	.30
C-27		
C-28	Part of T-6	
C-30		
C-31	Part of T-7	
C-32		
C-34	RCP10M4473M .047 mf 400 V Molded Tubular	.30
C-35A		
C-35B	45X444 70 mf 150 V	
C-36	50 mf 150 V Dry Electrolytic	
C-37	80X15 680 mmf 500 V Ceramic	
C-39		

Prices Shown Are Approximate and Subject to Change Without Notice.

MODEL NO. DC2836B

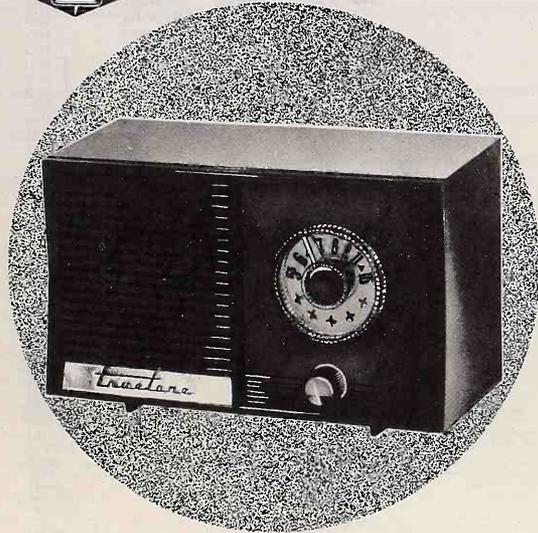
REPLACEMENT PARTS LIST FOR DC2836B

Ref. No.	Description	Approximate Selling Price
RESISTORS		
R-1		
R-2	B84103 10 K 0.5 Carbon	.15
R-3	Part of 25A1163 FM Tuner Assembly	
R-4		
R-6	B84680 68 0.5 Carbon	.15
R-5		
R-7	B85102 1K 0.5 Carbon	.10
R-8	B84273 27 K 0.5 Carbon	.15
R-9		
R-14	B84223 22 K 0.5 Carbon	.15
R-10	B85106 10 Meg. 0.5 Carbon	.10
R-11A		
R-11B	Part of 76X5 (See Miscellaneous)	
R-12	B84181 180 0.5 Carbon	.15
R-13	B85330 33 0.5 Carbon	.10
R-15	B84121 120 0.5 Carbon	.15
R-16		
R-20	B85225 2.2 Meg. 0.5 Carbon	.10
R-17	56X399 500 K Volume Control	4.20
R-18	43X386 22 Wirewound (Fuse Type)	
R-19	C84122 1.2 K 1.0 Carbon	.20
TRANSFORMERS & COILS		
L-1	9A2408 Oscillator Coil	.85
L-2	Part of 25A1163 FM Tuner Assembly	
T-2	9A2309 Coil, I-F FM	1.00
T-3	9A2260 Ratio Detector	3.25
T-4	51X188 Output Transformer	1.75
T-5	9A2409 Rod Antenna	1.70
T-6	9A2343 Coil, 1st I-F A-M	1.20
T-7	9A2344 Coil, 2nd I-F A-M	1.30
T-9	Part of 25A1163 FM Tuner Assembly	

Manual No. 10-477



INSTALLATION, OPERATING and SERVICE INSTRUCTIONS



MODELS DC2980A (White) & DC2981A (Red)

HGR
No. 10-477

MODEL NOS. DC2980A & DC2981A

Factory Model 462
4 Tube, Including Rectifier

INSTALLATION

Place the receiver upright on a table or other level surface convenient to a power outlet. Do not place it on or near a radiator or heater.

This receiver is designed to operate from a 117 Volt AC or DC source of supply. On AC, improved reception may sometimes be obtained by turning the plug halfway around and reinserting it into the power outlet. Try it both ways and leave it in the position which gives the best reception. On DC, the receiver will operate with the plug inserted in only one position.

ANTENNA

This Radio is equipped with a built-in loop antenna which will produce satisfactory reception from nearby stations. This antenna may be somewhat directional and in some installations the signal may be improved by turning the cabinet in various directions.

This receiver is designed to operate without a ground connection and no attempt should be made to use one.

OPERATION

Insert the power cord plug into the power receptacle. Turn the receiver on, by turning the Volume Control knob at the left clockwise until a click is heard. In about 30 seconds the set will be in operating condition. Turning the Volume to the right or clockwise increases the volume.

Tune in stations by turning the large upper knob. The numbers on the tuning scale show Kilocycles with the last two ciphers left off. For example number 9 is the location of 900 Kilocycles. As you have tuned in the station desired move the tuning knob to the position which produces the deepest rounded tones with a minimum background noise and clearest reception.

The tuning scale shows the "CD" Civil Defense Emblem at Conelrad Frequencies 540 and 1240 Kilocycles. In a Civil Defense emergency tune to either of these frequencies to receive defense news, instructions and information.

To turn the receiver off, turn the volume knob to the left or counter clockwise position until a click is heard.

In locations where signals of low strength prevail signals can be increased by adding a length of wire running around the room floor and around the window frames. Attach this wire to the lead provided in the back of the receiver.

ELECTRICAL SPECIFICATIONS

Power Supply	117 Volts D.C., or 117 Volts, 50-60 Cycles A.C.
Frequency Range	535 to 1650 K C
Intermediate Frequency	455 K C
Tuning	Two gang capacitor
Speaker	4 inch PM, 3.2 ohm voice coil impedance
Power Consumption	30 Watts
Power Output	1 watt undistorted, 1.5 watt maximum
Sensitivity	3000 Microvolts at 50 milliwatts Output
Selectivity	120 kc. broad at 1000 times signal at 1000 kc.

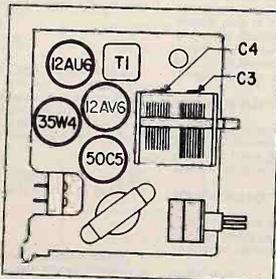
TUBE COMPLEMENT

12AU6	Mixer and Oscillator
12AV6	Detector, A.V.C. and 1st Audio
50 C5	Audio Output
35W4	Power Rectifier

MODEL NOS. DC2980A & DC2981A

TUBES

This receiver is shipped with the tubes in their proper sockets. If for some reason tubes have been removed, make certain they are reinserted into their proper sockets as shown below.



TUBE LAYOUT

ALIGNMENT PROCEDURE

PRELIMINARY:

Output meter connection	Across 3.2 ohm speaker voice coil
Output meter reading to indicate 0.05 watt across speaker voice coil	0.4 volt
Generator Modulation	30%, 400 cycles
Position of volume control	maximum (fully clockwise)
Position of pointer with Rotor full open (Plates out of mesh)	1650 kc

ALIGNMENT PROCEDURE CHART

STEP	CONNECT HIGH SIDE OF SIGNAL GENERATOR TO-	SET SIGNAL GENERATOR TO-	TURN RECEIVER DIAL TO-	ADJUST THE FOLLOWING FOR MAXIMUM OUTPUT. (KEEP SIGNAL GENERATOR AS LOW AS POSSIBLE.)
1	ANTENNA SECTION TUNING CONDENSER IN SERIES WITH .1 MFD COND.	456 KC	FULL CLOCKWISE POSITION (CONDENSER PLATES) FULLY OPEN)	BOTTOM 8 TOP OF T-1 IN SAME ORDER (I.F. TRANSFORMER)
2		1650 KC		C4 (OSCILLATOR TRIMMER)
3	USE RADIATED SIGNAL	1500 KC	MAXIMUM SIGNAL APPROX. 1500 KC	C3 (ANTENNA TRIMMER)
4				REPEAT STEPS 2 AND 3

Align for maximum output. Reduce input as needed to keep output near 0.4 volts.

Always keep the output from the generator at its lowest possible value.

The alignment procedure should be done in the order given for greatest accuracy.

MODEL NOS. DC2980A & DC2981A

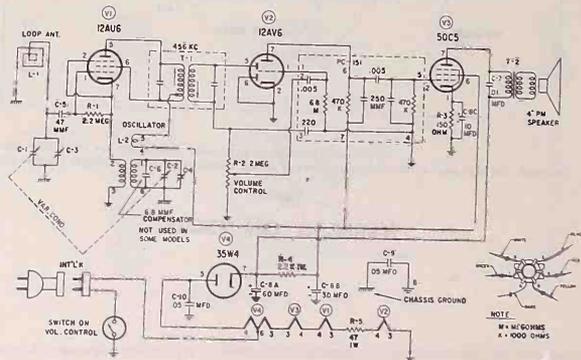
REPLACEMENT PARTS LIST

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

REF. NO.	PART NO.	DESCRIPTION	APPROXIMATE SELLING PRICE
RESISTORS			
R1	180-107	2.2 Megohms ± 20%, 1/2 w	.08
R2	120-117	Volume Control, 2 Megohms, (with Switch)	1.10
R3	180-111	150 ohms ± 20%, 1/2 w	.08
R4	180-101	2200 Ohms ± 20%, 1/2 w	.08
R5	180-185	47 Ohms ± 10%, 1/2 w	.14
CONDENSERS			
C1, C2, C3, C4	160-129	245-102 MMFD Variable	2.64
C5	156-107	50 MMFD	.16
C6	168-102	6.8 MMFD	.16
C7	158-102	.01 MFD	.18
C8	150-141	60-30-10/150 V, Electrolytic	1.50
C9	152-111	.05/400 V	.26
C10	152-111	.05/400 V	.26
PC151	166-111	Couplate	.82
CABINET AND ACCESSORIES			
	220-152	Knob, Tuning - clear	.56
	220-122	Knob, Volume - clear	.26
	210-142R	Cabinet - Red (with dial)	4.00*
	210-142W	Cabinet - White (with dial)	4.00*
	215-164	Dial Insert	.26
	185-128	Line Cord	.72
	175-137	Speaker - 4" - Alnico V	3.86*
COILS AND TRANSFORMERS			
T1	130-106	Transformer, IF	1.50
T2	138-130	Transformer, Output ≈ 2500/3.2 Ohms	1.66
L1	134-112	Loop, with back	1.24*
L2	136-139	Oscillator Coil	.94

* Federal Excise Tax Included

Prices Shown Are Approximate and Subject to Change Without Notice.



RETRA SOURCE NO 786

PART NO 230-304

CODE 467

SCHEMATIC

DRAWN 11-22-57 AECHECK 377 497

STOCK NO. DC2988A

Factory Model 816
6 Tubes, Including Rectifier

ELECTRICAL SPECIFICATIONS

Power Supply	105-120 Volts AC-DC
Frequency Range	540-1650 Kilocycles
Intermediate Frequency	456 Kilocycles
Sensitivity	.20 microvolts on ferrite loop for 50 MW output
Selectivity	.8 Kilocycles 2X-20 Kilocycles 10X at 456 Kilocycles
Tuning	.3 Gang Capacitor
Speaker	.62" Alnico, 3.2 Ohm voice coil
Power Consumption	.35 Watts
Power Output	1.5 Watt undistorted

TUBE COMPLEMENT

12BA6	R.F. Amplifier
12BE6	Oscillator and Mixer
12BA6	I.F. Amplifier
12AV6	Detector A.V.C. and 1st Audio
35C5	Audio Output
35W4	Power Rectifier

STOCK NO. DC2988A

TUBES

This receiver is shipped with the tubes in their proper sockets. If for some reason tubes have been removed, make certain they are reinserted in their proper sockets as shown below.

GENERAL DESCRIPTION

DESCRIPTION

This receiver is equipped with a six tube radio receiver incorporating a tuned radio frequency amplifier which is capable of receiving weak stations with minimum noise background. This radio frequency stage increases selectivity - the ability to separate a signal from one station to another - minimizing interference. Background signal interference is also eliminated.

This receiver makes use of the very latest advances achieved in the field of high fidelity sound reproduction. Great strides have been made in present day reproduction of sound which is now accomplished with lower distortion and a finer balance between bass frequencies and treble frequencies. Among high fidelity enthusiasts this balance between bass and treble tones is referred to as loudness contour. A tone control that enables the listener to tailor the treble response to their taste has been incorporated in this receiver. The deep console like bass response achieved in this Truetone table receiver - accomplished by Basso-sonic circuitry and special speaker characteristics - represents a distinct advance in the field of table radios.

INSTALLATION

Place the receiver upright on a table or other level surface convenient to a power outlet. Do not place it on or near a radiator or heater.

This receiver is designed to operate from a 117 Volt AC or DC source of supply. On AC, improved reception may sometimes be obtained by turning the plug halfway around and reinserting it into the power outlet. Try it both ways and leave it in the position which gives the best reception. On DC, the receiver will operate with the plug inserted in only one position.

ANTENNA

This Radio is equipped with a built-in ferrite loop antenna which will produce satisfactory reception. This antenna may be somewhat directional and in some installations the signal may be improved by turning the cabinet in various directions.

This receiver is designed to operate without a ground connection and no attempt should be made to use one.

OPERATION

Make sure that "Phono-Radio Switch" in back of receiver is moved to the right - the Radio position. Turn the receiver on, by pulling the bottom volume control knob out until a click is heard. In about 30 seconds the set will be in operating condition. Turning the volume control knob to the right, or clockwise, increases the volume.

Tune in stations by turning the top tuning knob at the right. The number on the tuning scale show Kilocycles with the last two ciphers left off. For example number 9 is the location of 900 Kilocycles. As you have tuned in the station desired move the tuning knob to the position which produces the deepest rounded tones with a minimum background noise and clearest reception.

The tuning scale 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 turn the receiver off, push lower volume knob in. When Radio is turned on by pulling this knob outward again, the volume level will return to your previous setting.

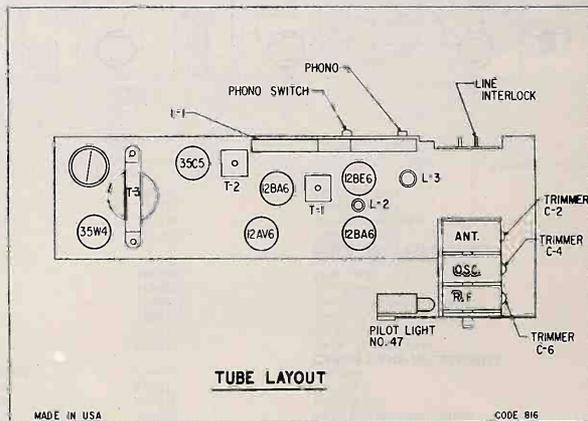
TONE CONTROL

The center knob is the tone control. To increase bass response, rotate this control counter-clockwise, or to the left. To increase treble response, rotate this control to the right, or clockwise.

PHONOGRAPH - STEREO CONNECTION

To play records through this radio connect the "pick-up plug" from the record player to the jack to "Phono-Stereo" socket at the rear of the receiver. Move phono-radio switch to the left (looking at back of cabinet) turn bottom volume control knob in counter clockwise position. Phonograph volume increases with counter clockwise movement of this bottom volume control knob.

This radio can be used for the second channel of a stereo phonograph by having the "pick-up plug" of stereo equipment channel 2 inserted in the phono-stereo socket provided in the back of the receiver. The "pick-up plug" of either a phonograph or the second channel stereo can remain attached to the receiver. In order to restore operation as a radio, return phono-radio switch to the right move bottom volume control clockwise.



TUBE LAYOUT

ALIGNMENT PROCEDURE

The alignment of the receiver below indicates the method for obtaining maximum sensitivity and lowest noise pickup.

- (1) Connect output meter across voice coil of receiver. Use oxide rectifier type with 0-1 volt scale.
- (2) Use isolation transformer to keep power line ground off chassis.

(3) Use the minimum amount of signal necessary. Keep generator as far away as possible if the shielding is inadequate.

- (4) Use .4 volts as reference level.
- (5) Volume and tone controls set in maximum position.

STOCK NO. DC2988A

HG
No. 10-485

	SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS	ADJUST FOR
IF	456 KC Approx. 500 Microvolts	C5 Section Variable and Pin 3 12AV6	Top and Bottom T1 and T2	Maximum Output
RF	SIGNAL GENERATOR FREQUENCY	POSITION OF GANG	CONNECT TO	ADJUST
	1650 KC	Fully Open	Same as	C4 Trimmer for maximum output
	540 KC	Fully Closed	for IF Position	Check for range only
	4500 KC	Set for Maximum Signal	Spray signal into loopstick using 6 turns across generator output. Couple close enough to get signal.	C2-6 Trimmer maximum output
	600 KC	Set for Maximum Signal	As Above	Adj. L-2 Slug for maximum

Check tracking, using slicer or Ferrite stick and Aluminum Plate 4" square.

STOCK NO. DC2988A

PARTS PRICE LIST

When ordering parts, specify stock number, model number and part number.

RESISTORS

Ref. No.	Part No.	Description	Approximate Selling Price
R1	180-117	330 Ohms 1/2 Watt 10%	.10
R2	180-107	2.2 Megohms 1/2 Watt 20%	.08
R3	180-102	22K 1/2 Watt 20%	.08
R4	180-190	10K 1/2 Watt 20%	.10
R5	180-148	220 Ohms 1/2 Watt 10%	.10
R6	180-107	2.2 Megohms 1/2 Watt 20%	.10
R7	180-140	680 Ohms 1/2 Watt 5% Critical	.08
R8	120-127	4 Megohm Volume Control with Switch	1.26
R9	180-135	6.8 Megohm 1/2 Watt 20%	.08
R10	180-110	470 K Ohms 1/2 Watt 20%	.08
R11	180-111	150 Ohms 1/2 Watt 20%	.08
R12	180-110	470 K Ohms 1/2 Watt 20%	.08
R13	180-184	1000 Ohms 1 W WW 10%	.18
R14	120-138	Tone Control 100 K Ohms	.80
R15	180-115	15K Ohms 1/2 Watt 10% Critical	.10
R16	180-109	330 K 1/2 Watt 20%	.08
R17	180-159	1800 Ohms 1/2 Watt 10%	.10

CONDENSERS

Ref. No.	Part No.	Description	Approximate Selling Price
C1-2-3	160-130	Variable Condenser 3/sec Planetary	4.66
4-5-6	156-111	220 MMF Disc 400V	.16
C-7	152-104	.05 MFD 200 WV (small)	.22
C8	152-102	.1 MFD 200 WV (small)	.34
C9	152-102	.022 MFD 400 WV (small)	.20
C10	156-111	220 MMF DISC 400V	.16
C11	156-111	.01 MFD "X" CAP-400V	.16
C12	152-102	.022 MFD 400 WV (small)	.20
C13	152-109	.05 MFD 400 WV (small)	.28
C14	152-109	.05 MFD 400 WV (small)	.28
C15	152-109	.05 MFD 400 WV (small)	.28
C16	152-109	.05 MFD 400 WV (small)	.28
C17A, C17B	150-142	Electrolytic 100 x 80 - 150 WV w/strap	1.76
C18	152-102	.1 MFD - 200 WV (small)	.34
C19	152-102	.022 MFD - 400 WV (small)	.20
	166-107	PC-50 Couplate Tweet Filter	.36

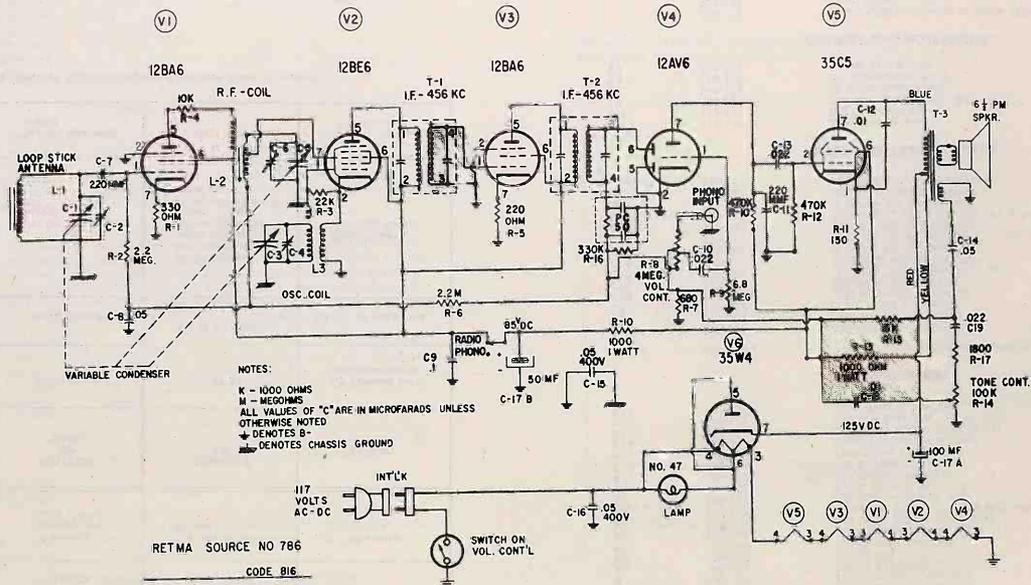
COILS AND TRANSFORMERS

Ref. No.	Part No.	Description	Approximate Selling Price
L-1	132-140	Loop Ferrite Rod	*1.92
L-2	132-139	RF Coil (with R4)	1.16
L3	136-141	Oscillator Coil (with R3)	1.44
T1	130-114	IF Transformer No. 1	1.28
T2	130-114	IF Transformer No. 2	1.28
T3	138-131	Output Transformer	*3.20

CABINET AND ACCESSORIES

210-155	Cabinet Shell - Ebony, in carton (230-174)	*5.20
205-126	Panel Insert	*2.20
205-130	Control Panel Insert, Crystal	*.32
205-134	Panel Insert, Plate	*.74
215-105	Indicator Bar, Tuning Dial	*.28
220-158	Knob (Volume & Tone)	.32
220-159	Calibration Disc	.54
220-160	Knob (Tuning Planetary)	.32
250-342	WA Crest	.34
170-140	Phono Jack	.10
140-116	No 47 Pilot Light	.25
140-134	Pilot Light Assembly	.48
180-128	Line Cord (Push-in Interlock) 6' 0"	.70
175-139	Speaker - PM - 6 1/2"	*6.10
125-111	Slide Switch	.36

* Federal Excise Tax Included.



NOTES:
 K - 1000 OHMS
 M - MEGOHMS
 ALL VALUES OF "C" ARE IN MICROFARADS UNLESS OTHERWISE NOTED
 ↓ DENOTES B-
 ⊥ DENOTES CHASSIS GROUND

RETMA SOURCE NO 786
 CODE 916
 PART NO 250-349

SCHEMATIC NO. DC2988A
 DRAWN 3-19-58 BY APPROVED

STOCK NO. DC2989A

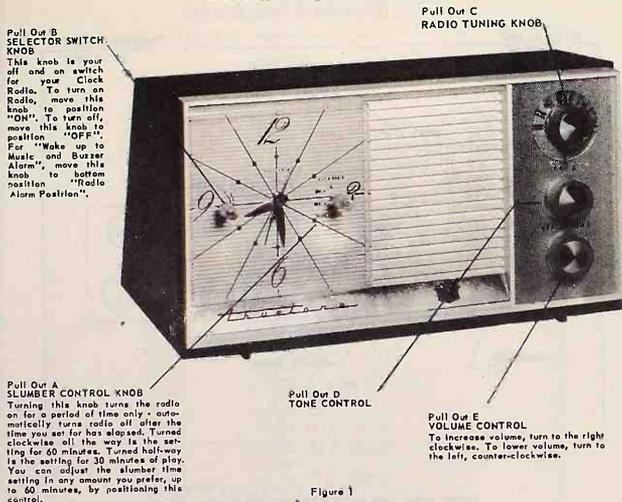


Figure 1

DESCRIPTION

This Clock Radio is equipped with a six tube radio receiver incorporating a tuned radio frequency amplifier which is capable of receiving weak stations with minimum noise background. This radio frequency stage increases selectivity - another - minimizing interference. Background signal interference is also eliminated.

This Clock Radio makes use of the very latest advances achieved in the field of high fidelity sound reproduction. Great strides have been made in present day reproduction of sound which is now accomplished with lower distortion and a finer balance between bass frequencies and treble frequencies. Among high fidelity enthusiasts this balance between bass and treble tones is referred to as loudness contour. A tone control that enables the listener to tailor the treble response to his taste has been incorporated in this receiver. The deep console like bass response achieved in this Tru-tone Clock Radio - accomplished by Basso-ionic circuitry and special speaker characteristics - represents a distinct advance in the field of Clock Radios.

INSTALLATION

Place the receiver upright on a table or other level surface convenient to a power outlet. Do not place it on or near a radiator or heater.

This receiver is designed to operate on 117 Volt AC only. Improved reception may sometimes be obtained by turning the plug halfway around and reinserting it into the power outlet. Try it both ways and leave it in the position which gives the best reception.

ANTENNA

This Radio is equipped with a built-in ferrite loop antenna which will produce satisfactory reception from nearby stations. This antenna may be somewhat directional and in some installations the signal may be improved by turning the cabinet in various directions.

This receiver is designed to operate without a ground connection and no attempt should be made to use one.

TO SET THE CLOCK

Your self-starting Telechron movement will begin operating when the set is plugged into the AC outlet. Check the clock by noting the rotation of the Sweep Second Hand. Set the clock to the correct time by means of the "Alarm and Time Set Knob" in the back of the cabinet. Gently pull this knob back - away from the cabinet - which engages the hands of the clock, enabling you to set the clock to the correct time. See Figure 2 on following page.

STOCK NO. DC2989A

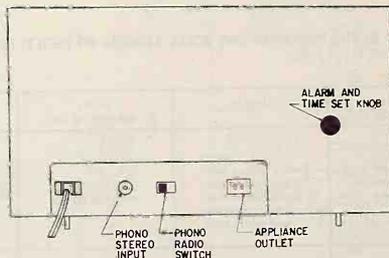


Figure 2

TO PLAY THE RADIO AT ANY TIME

To turn on the radio, turn the "Selector Switch Knob" to the "ON" position. Rotate "Volume Control Knob" - in lower right hand corner - to 3/4 rotation position.

Tune in stations by turning the "Radio Tuning Knob" located at the top right hand corner. The numbers on the Tuning Scale show Kilocycles with the last two cyphers left off. For example, number 9 is the location of 900 Kilocycles. As you have tuned in the stations desired, move the Tuning Knob to the position which produces the deepest rounded tones with a minimum background noise and clearest reception.

The Tuning Scale shows the "CD" Civil Defense emblem at Conifrad Frequencies 640 and 1240 Kilocycles. In a Civil Defense emergency tune to either of these frequencies to receive defense news, information in instructions.

Adjust the Volume Control by turning the bottom "Volume Knob" to the volume desired.

To turn off the radio, turn the "Selector Switch Knob" to the "OFF" position. See Figure 1.

TO GO TO SLEEP BY MUSIC

Turn the "Slumber Control Knob" to the desired play time, up to 60 minutes, as shown in Figure 1. If you wish to turn the radio off before end of setting turn "Slumber Control Knob" counter clockwise.

TO WAKE UP TO MUSIC(=w/ or without Buzzer Alarm)

1. Adjust the volume and tune the radio to the desired station you would like to hear in the morning.
2. Set the Red Alarm Setting Hand to the time you want to be awakened. Gently move the "Alarm and Time Set Knob" forward to the front of the cabinet, which engages the Red Alarm Setting Hand, enabling you to set the alarm for the time you want to be awakened. See Figure 2.

3. With Buzzer Alarm move "Selector Switch Knob" (see Figure 1) to right, or clockwise "Radio Alarm" position. The Buzzer will come on ten minutes after the radio has been turned on automatically.
4. To turn off Radio and Buzzer, move the "Selector Switch Knob" clockwise to "OFF" position.
5. Without Buzzer Move this "Selector Switch Knob" clockwise to "Auto-Radio" position.

OPERATION OF APPLIANCE OUTLET

An electrical appliance outlet is provided in the back of the receiver for connecting an electric lamp or an electrical appliance up to rating of 1100 Watts. This Appliance Outlet is shown in Figure 2.

To turn off appliance connected to the outlet, turn the "Selector Switch Knob" to "OFF" and remove appliance plug.

STONE CONTROL

The center knob (see figure 1) is the Tone Control. To increase bass response, rotate this control counter clockwise, or to the left. To increase treble response, rotate this control clockwise, or to the right.

PHONOGRAPH - Stereo Connection

To play records through this radio connect the "pick-up plug" from the record player to the jack to "Phono-Stereo" socket at the rear of the receiver. Move phono-radio volume control knob in counter clockwise position. Phonograph volume increases with counter clockwise movement of this bottom volume control knob.

STOCK NO. DC2989A

either a phonograph or the second channel stereo can remain attached to the receiver. In order to restore operation as a radio, return phono-radio switch to the right - move bottom volume control clockwise.

This radio can be used for the second channel of a stereo phonograph by having the "pick-up plug" of stereo equipment channel 2 inserted in the Phono-Stereo socket provided in the back of the receiver. The "pick-up plug" of

SERVICE DATA

ELECTRICAL SPECIFICATIONS

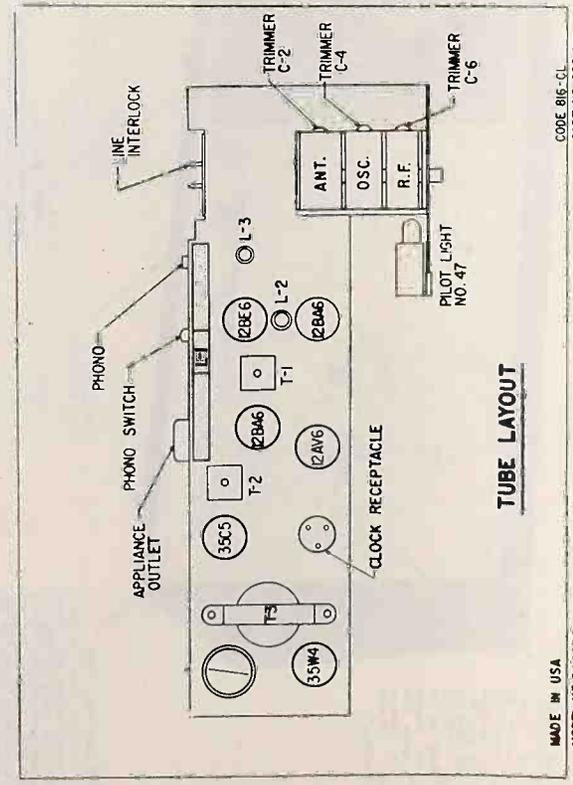
- Power Supply.....117 Volts AC 60 cycles only
- Power Consumption.....As Radio 35 Watts
-With Appliance 1100 Watts maximum
- Frequency Range.....540-1650 Kilocycles
- Intermediate Frequency.....456 Kilocycles
- Sensitivity.....20 microvolts on ferrite loop for 50 MW output
- Selectivity.....8 Kilocycles 2X-20 Kilocycles
-10X at 456 Kilocycles
- Tuning.....2 Gang Capacitor 32
- Speakers.....6" x 4" Alnico 1.5 Watt undistorted
- Power Output.....1.5 Watt undistorted

TUBE COMPLEMENT

- 12BA6.....RF Amplifier
- 12BE6.....Oscillator and Mixer
- 12AV6.....I.F. Amplifier
- 35C5.....Detector A.V. C. and 1st. Audio
- 35W4.....Audio Output
- 35W4.....Power Rectifier

TUBES

This receiver is shipped with the tubes in their proper sockets. If for some reason tubes have been removed, make certain they are reinserted in their proper sockets as shown below.



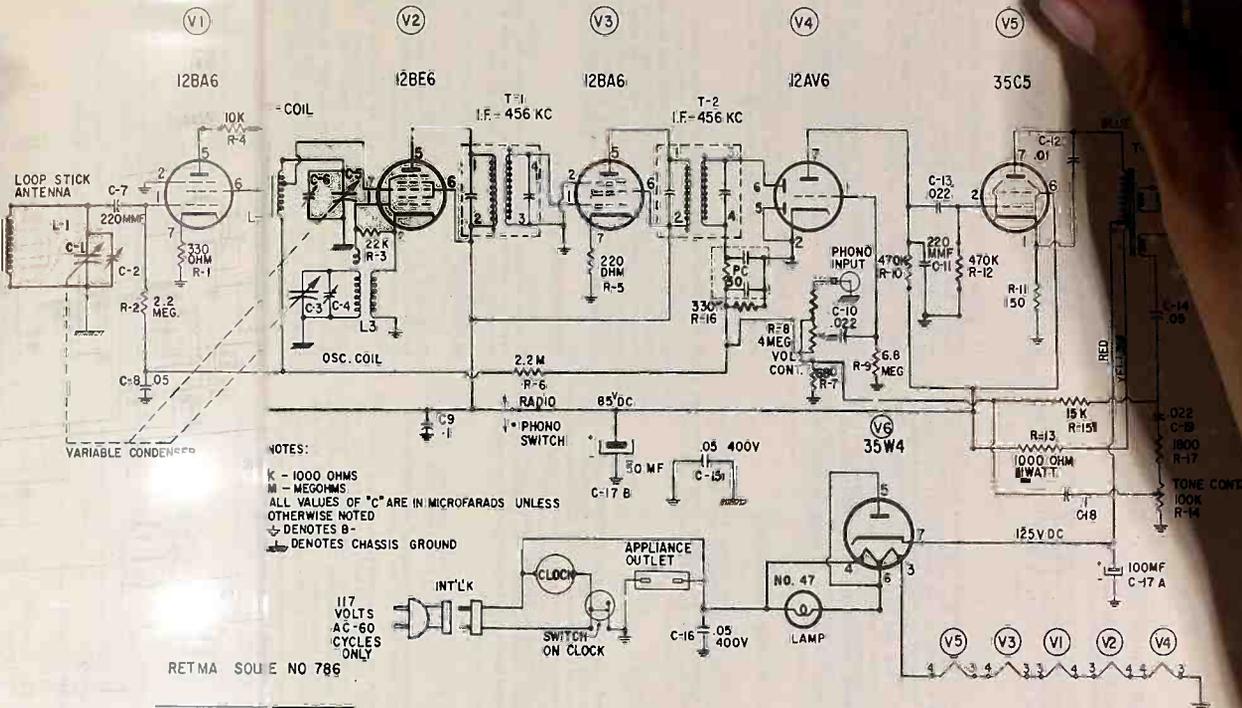
MADE IN USA
MODEL NO. DC2989A
CODE 816-CL
PART NO. 250-352

**STOCK NO. DC2989A
ALIGNMENT PROCEDURE**

- The alignment of the receiver below indicates the method for obtaining maximum sensitivity and lowest noise pickup.
- (1) Connect output meter across voice coil of receiver. Use oxide rectifier type with 0-1 volt scale.
 - (2) Use isolation transformer to keep power line ground off chassis.
 - (3) Use the minimum amount of signal necessary. Keep generator as far away as possible if the shielding is inadequate.
 - (4) Use .4 Volts as reference level.
 - (5) Volume and tone controls set in maximum position.

SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS	ADJUST FOR	
IF	456 KC Approx. 500 Microvolts	C5 section variable and Pin 3 12AV6	Top and Bottom T1 and T2	Maximum Output
	SIGNAL GENERATOR FREQUENCY	POSITION OF GANG	CONNECT TO	ADJUST
RF	1650 KC	Fully Open	Same as for IF Position.	C4 Trimmer for maximum output
	540 KC	Fully Closed		Check for range only
	1500 KC	Set for Maximum signal	Spray signal into loopstick using 6 turns across generator output. Couple close enough to get signal	C2-6 Trimmer maximum output
	600 KC	Set for Maximum signal	as above	ADJ. L-2 Slug for maximum

CHECK TRACKING, USING SLICER OR FERRITE STICK AND ALUMINUM PLATE 4" SQUARE



NOTES:
 K - 1000 OHMS
 M - MEGOHMS
 ALL VALUES OF "C" ARE IN MICROFARADS UNLESS OTHERWISE NOTED
 ⊕ DENOTES B+
 ⊕ DENOTES CHASSIS GROUND

RETMA SOL E NO 786

PART NO 250

SCHEMATIC NO. DC 2989A
 CODE 816-CL

STOCK NO. DC2989A
REPLACEMENT PARTS PRICE LIST

When ordering parts, specify stock no., model no., and part no.

Part No.	Description	Approximate Selling Price
R1	330 Ohms 1/2 Watt, 10%	.08
R2	2.2 Megohms 1/2 Watt, 20%	.08
R3	10K 1/2 Watt, 20%	.10
R4	10K 1/2 Watt, 10%	.10
R5	220 Ohms 1/2 Watt, 10%	.20
R6	680 Ohms 1/2 Watt, 5% Critical	1.26
R7	4 Megohms Volume Control no switch	.08
R8	6.8 Megohm, 1/2 Watt, 20%	.08
R9	470K Ohms, 1/2 Watt, 20%	.08
R10	150 Ohms, 1/2 Watt, 20%	.08
R11	470 K Ohms, 1/2 Watt, 20%	.08
R12	1000 Ohms, 1W, W, 10%	.18
R13	Tone Control, 400 K Ohms	.80
R14	18K Ohms, 1/2 Watt, 10% Critical	.10
R15	330K, 1/2 Watt, 20%	.08
R16	1800 Ohms, 1/2 Watt, 10%	.10
R17	1800 Ohms, 1/2 Watt, 10%	.10
C1	Variable Condenser, 3/sec, Planetary	4.66
C2	220 MMF Disc 400V	.16
C3	.05 MFD 200 WV (small)	.22
C4	.1 MFD 200 WV (small)	.34
C5	.022 MFD 400 WV (small)	.20
C6	220 MMF DISC 400V	.16
C7	.01 MFD "K" CAP-400V	.18
C8	.022 MFD, 400 WV (small)	.20
C9	.05 MFD, 400 WV, (small)	.28
C10	.05 MFD, 400 WV, (small)	.28
C11	.05 MFD, 400 WV, (small)	.28
C12	Electrolytic 100 x 50 - 250 WV W/Strip	1.76
C13	.1 MFD - 200 WV (small)	.34
C14	.022 MFD - 400 WV (small)	.20
C15	PC-50 Couplate tweest filter	.36
C16	100MF C-17 A	.36
C17	100MF C-17 A	.36
C18	100MF C-17 A	.36
C19	100MF C-17 A	.36
L1	Loop Ferrite Rod	1.92
L2	Rf Coil (with R4)	1.16
L3	Oscillator Coil (with R3)	1.44
T1	I.F. Transformer #1	1.28
T2	I.F. Transformer #2	1.28
T3	Output Transformer	3.20
V1	12BA6	5.20
V2	12BE6	2.20
V3	12BA6	.32
V4	12AV6	.74
V5	35C5	.28
V6	35W4	.32
V7	35W4	.32
V8	35W4	.25
V9	35W4	1.10
V10	35W4	1.10
V11	35W4	6.10
V12	35W4	6.10
V13	35W4	.36
V14	35W4	.36
V15	35W4	.36
V16	35W4	.36
V17	35W4	.36
V18	35W4	.36
V19	35W4	.36
V20	35W4	.36
V21	35W4	.36
V22	35W4	.36
V23	35W4	.36
V24	35W4	.36
V25	35W4	.36
V26	35W4	.36
V27	35W4	.36
V28	35W4	.36
V29	35W4	.36
V30	35W4	.36
V31	35W4	.36
V32	35W4	.36
V33	35W4	.36
V34	35W4	.36
V35	35W4	.36
V36	35W4	.36
V37	35W4	.36
V38	35W4	.36
V39	35W4	.36
V40	35W4	.36
V41	35W4	.36
V42	35W4	.36
V43	35W4	.36
V44	35W4	.36
V45	35W4	.36
V46	35W4	.36
V47	35W4	.36
V48	35W4	.36
V49	35W4	.36
V50	35W4	.36
V51	35W4	.36
V52	35W4	.36
V53	35W4	.36
V54	35W4	.36
V55	35W4	.36
V56	35W4	.36
V57	35W4	.36
V58	35W4	.36
V59	35W4	.36
V60	35W4	.36
V61	35W4	.36
V62	35W4	.36
V63	35W4	.36
V64	35W4	.36
V65	35W4	.36
V66	35W4	.36
V67	35W4	.36
V68	35W4	.36
V69	35W4	.36
V70	35W4	.36
V71	35W4	.36
V72	35W4	.36
V73	35W4	.36
V74	35W4	.36
V75	35W4	.36
V76	35W4	.36
V77	35W4	.36
V78	35W4	.36
V79	35W4	.36
V80	35W4	.36
V81	35W4	.36
V82	35W4	.36
V83	35W4	.36
V84	35W4	.36
V85	35W4	.36
V86	35W4	.36
V87	35W4	.36
V88	35W4	.36
V89	35W4	.36
V90	35W4	.36
V91	35W4	.36
V92	35W4	.36
V93	35W4	.36
V94	35W4	.36
V95	35W4	.36
V96	35W4	.36
V97	35W4	.36
V98	35W4	.36
V99	35W4	.36
V100	35W4	.36

* Federal Excise Tax included

STOCK NO. DC2989A

either a phonograph or the second channel stereo can remain attached to the receiver. In order to restore operation as a radio, return phono-radio switch to the right - move bottom volume control clockwise.

This radio can be used for the second channel of a stereo phonograph by having the "pick-up plug" of stereo equipment channel 2 inserted in the Phono-Stereo socket provided in the back of the receiver. The "pick-up plug" of

SERVICE DATA

ELECTRICAL SPECIFICATIONS

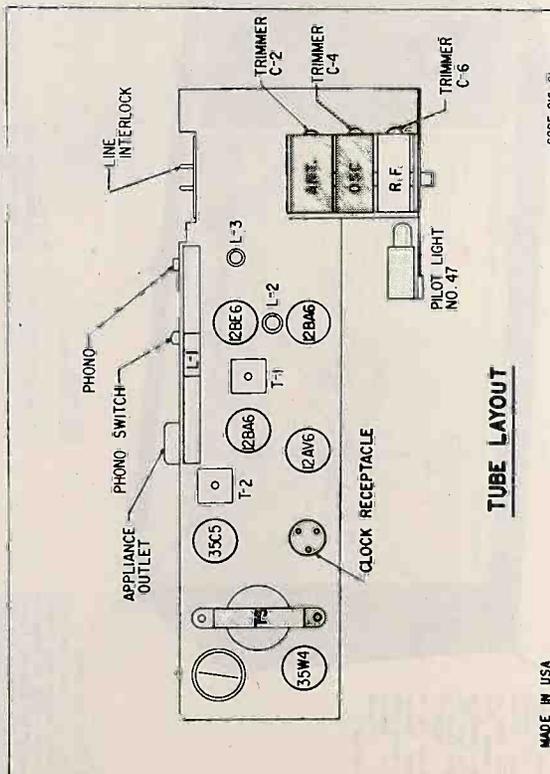
- Power Supply.....117 Volts AC 60 cycles only
- Power Consumption.....As Radio 35 Watts
-With Appliance 1100 Watts maximum
- Frequency Range.....540-1650 Kilocycles
- Intermediate Frequency.....456 Kilocycles
- Sensitivity.....20 microvolts for 50 mW output
- Selectivity.....8 Kilocycles 2x-20 Kilocycles
-10X at 456 Kilocycles
- Tuning.....3 Gang Capacitor 3.2
- Speaker.....6" x 4" Alnico V, Ohm voice coil
- Power Output.....1.5 Watt undistorted

TUBE COMPLEMENT

- 12BA6.....RF Amplifier
- 12BE6.....Oscillator and Mixer
- 12BA6.....I.F. Amplifier
- 32CS.....Detector A.V. C. and 1st Audio Output
- 35W4.....Power Rectifier

TUBES

This receiver is shipped with the tubes in their proper sockets. If for some reason tubes have been removed, make certain they are reinserted in their proper sockets as shown below.



MADE IN USA
MODEL NO DC 2989A
CODE 916-CL
PART NO. 250-352

STOCK NO. DC2989A

ALIGNMENT PROCEDURE

- The alignment of the receiver below indicates the method for obtaining maximum sensitivity and lowest noise pickup.
- (1) Connect output meter across voice coil of receiver. Use oxide rectifier type with 0-1 volt scale.
 - (2) Use isolation transformer to keep power line ground off chassis.
 - (3) Use the minimum amount of signal necessary. Keep generator as far away as possible if the shielding is inadequate.
 - (4) Use .4 Volts as reference level.
 - (5) Volume and tone controls set in maximum position.

	SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS	ADJUST FOR
IF	456 KC Approx. 500 Microvolts	C5 section variable and Plug 3 12AV6	Top and Bottom T1 and T2	Maximum Output
	SIGNAL GENERATOR FREQUENCY	POSITION OF GANG	CONNECT TO	ADJUST
RF	1650 KC	Fully Open	Same as for IF Position	C4 Trimmer for maximum output
	540 KC	Fully Closed		Check for range only
	1500 KC	Set for Maximum signal	Spray signal into loopstick using 6 turns across generator output. Couple close enough to get signal	C2-6 Trimmer maximum output
	600 KC	Set for Maximum signal	as above	ADJ .1-2 Slug for maximum

CHECK TRACKING, USING SLICER OR FERRITE STICK AND ALUMINUM PLATE 4" SQUARE

STOCK NO. DC2989A

REPLACEMENT PARTS PRICE LIST

When ordering parts, specify stock no., model no., and part no.

Approximate
Selling
Price

RESISTORS			
R1	180-117	330 Ohms 1/2 Watt 10%	.10
R2	180-107	2.2 Megohms 1/2 Watt 20%	.08
R3	180-102	22K 1/2 Watt 20%	.08
R4	180-190	10K 1/2 10%	.10
R5	180-148	220 Ohms 1/2 Watt 10%	.10
R6	180-107	2.2 Megohms 1/2 Watt 20%	.08
R7	180-140	680 Ohms 1/2 Watt 5% Critical	.20
R8	120-141	4 Megohms Volume Control no switch	1.26
R9	180-135	6.8 Megohm, 1/2 Watt, 20%	.08
R10	180-110	470K Ohms, 1/2 Watt, 20%	.08
R11	180-111	150 Ohms, 1/2 Watt, 20%	.08
R12	180-110	470 K Ohms, 1/2 Watt, 20%	.08
R13	180-184	1000 Ohms, 1W, WW, 10%	.18
R14	120-158	Tone Control, 100 K Ohms	.80
R15	180-115	15K Ohms, 1/2 Watt, 10% Critical	.10
R16	180-109	330K, 1/2 Watt, 20%	.08
R17	180-159	1800 Ohms, 1/2 Watt, 10%	.10

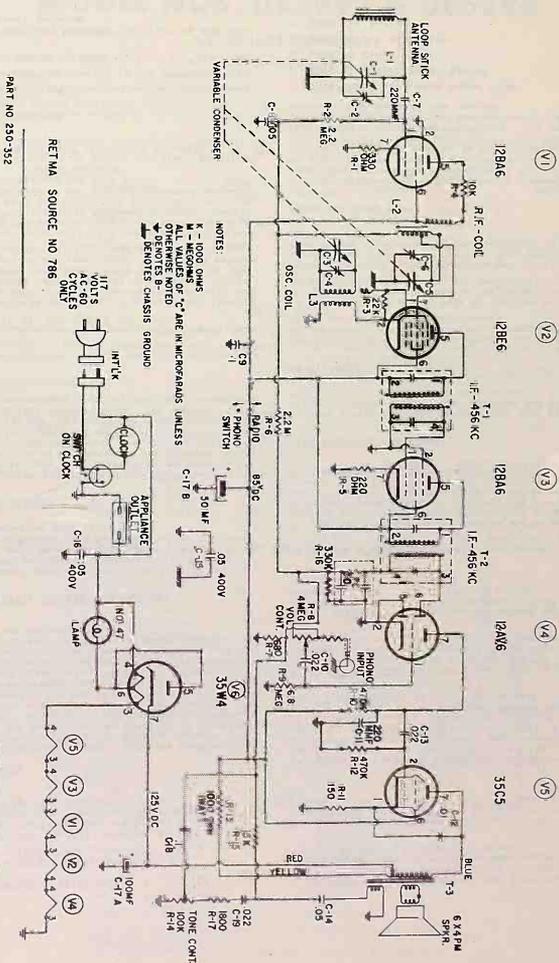
CONDENSERS			
C1-2-3-4-5-6	160-130	Variable Condenser, 3/sec, Planetary	4.66
C7	156-111	220 MMF Disc 400V	.16
C8	152-104	.05 MFD 200 WV (small)	.22
C9	152-122	.1 MFD 200 WV (small)	.34
C10	152-102	.022 MFD 400 WV (small)	.20
C11	56-111	220 MMF DISC 400V	.16
C12	158-102	.01 MFD "K" CAP-400V	.18
C13	152-102	.022 MFD, 400 WV (small)	.20
C14	152-109	.05 MFD, 400 WV, (small)	.28
C15	152-109	.05 MFD, 400 WV, (small)	.28
C16	152-109	.05 MFD, 400 WV (small)	.28
C17A, C17B	150-142	Electrolytic 100 x 50 - 150 WV W/Strap	1.76
C18	152-122	.1 MFD - 200 WV (small)	.34
C19	152-102	.022 MFD - 400 WV (small)	.20
	166-107	PC-50 Couplate tweeter filter	.36

COILS & TRANSFORMERS			
L1	132-240	Loop Ferrite Rod	*1.92
L2	132P139	RF Coil (with R4)	1.16
L3	136-141	Oscillator Coil (with R3)	1.44
T1	130-114	IF Transformer #1	1.32
T2	130-114	IF Transformer #2	1.28
T3	138-131	Output Transformer	*3.20

MISCELLANEOUS

210-154	Cabinet Shell Ebony in carton (230-175)	*5.20
205-127	Panel Insert Clock	*2.20
205-129	Crystal, Clock Insert	.32
205-134	Panel Insert Plate	.28
215-165	Indicator Bar, Tuning Dial	.74
220-158	Knob (Volume & Tone)	1.32
220-159	Calibration Disc	.34
220-160	Knob (Tuning Planetary)	.32
170-140	Phono Jack	.10
140-116	No 47 Pilot Light	.48
140-134	Pilot Light Assy.	.68
185-131	Line Cord 16 Gauge 6 ft. Interlock	1.10
175-140	Speaker - PM - 6" x 4"	6.10
125-111	Slide Switch	.36

*Federal Excise Tax Included



PART NO 230-132

RETMA SOURCE NO 786

SCHEMATIC NO. DC2989A
CODE 816-CL

STOCK NO. DC2989A

This radio can be used for the second channel of a stereo phonograph by having the "pick-up plug" of stereo equipment channel 2 inserted in the Phono-Stereo socket provided in the back of the receiver. The "pick-up plug" of

either a phonograph or the second channel stereo can remain attached to the receiver. In order to restore operation as a radio, return phono-radio switch to the right - move bottom volume control clockwise.

SERVICE DATA

ELECTRICAL SPECIFICATIONS

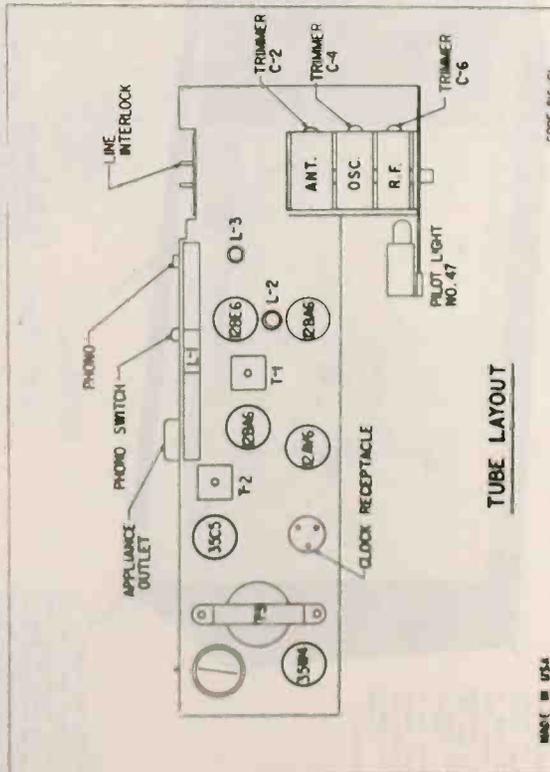
- Power Supply.....117 Volts AC 60 cycles only
- Power Consumption.....As Radio 35 Watts
- Frequency Range.....340-1650 Kilocycles
- Intermediate Frequency.....456 Kilocycles
- Sensitivity.....30 microvolts on ferrite loop
- Selectivity.....8 Kilocycles at 20 dB output
- Tuning.....100 to 456 Kilocycles
- Speaker.....6" x 4" Alnico V, Ohm voice coil
- Power Output.....1.5 Watt undistorted

TUBE COMPLEMENT

- 12BA6.....RF Amplifier
- 12BE6.....Oscillator and Mixer
- 12AV6.....Detector A.V. C. and 1st Audio
- 35C.....Audio Output
- 35B.....Power Rectifier

TUBES

This receiver is shipped with the tubes in their proper sockets. If for some reason tubes have been removed, make certain they are reinserted in their proper sockets as shown below.

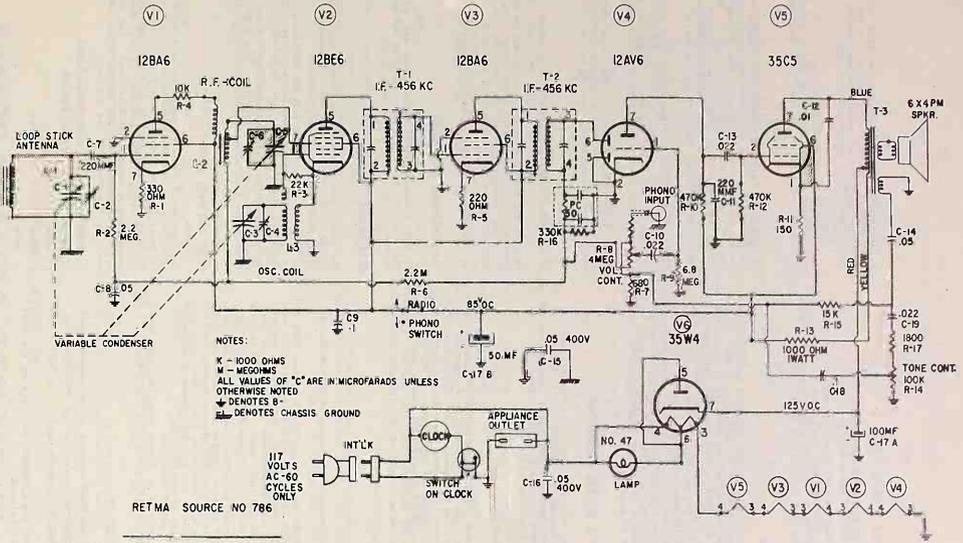


**STOCK NO. DC2989A
ALIGNMENT PROCEDURE**

- The alignment of the receiver below indicates the method for obtaining maximum sensitivity and lowest noise pickup.
- (1) Connect output meter across voice coil of receiver. Use oxide rectifier type with 0-1 volt scale.
 - (2) Use isolation transformer to keep power line ground off chassis.
 - (3) Use the minimum amount of signal necessary. Keep generator as far away as possible if the shielding is inadequate.
 - (4) Use .4 Volts as reference level.
 - (5) Volume and tone controls set to maximum position.

IF	SIGNAL GENERATOR FREQUENCY	CONNECTION TO RADIO	ADJUSTMENTS	ADJUST FOR
	456 KC Approx. 500 Microvolts	C5 section variable and Pts 3 12AV6	Top and Bottom T1 and T2	Maximum Output
RF	SIGNAL GENERATOR FREQUENCY	POSITION OF GANG	CONNECT TO	ADJUST
	1650 KC	Fully Open	Same as for IF Position	C4 Trimmer for maximum output
	540 KC	Fully Closed		Check for range only
	1500 KC	Set for Maximum signal	Spray signal into loopstick using 6 turns across generator output. Couple close enough to get signal	C2-6 Trimmer maximum output
	600 KC	Set for Maximum signal	as above	ADJ L-2 Slug for maximum

CHECK TRACKING, USING SLICER OR FERRITE STICK AND ALUMINUM PLATE 4" SQUARE



RETMA SOURCE NO 786

PART NO 250-352

SCHEMATIC NO. DC 2989A
CODE 816-CL

STOCK NO. DC2989A
REPLACEMENT PARTS PRICE LIST

When ordering parts, specify stock no., model no., and part no.

Part No.	Description	Approximate Selling Price
R1	330 Ohms 1/2 Watt, 10%	.10
R2	2.2 Megohms 1/2 Watt 20%	.08
R3	22K 1/2 Watt 20%	.08
R4	220 Ohms 1/2 Watt 20%	.10
R5	220 Ohms 1/2 Watt, 10%	.08
R6	2.2 Megohms 1/2 Watt, 20%	.08
R7	680 Ohms 1/2 Watt 5% Critical	.20
R8	100 Ohms 1/2 Watt, 20%	.08
R9	6.8 Megohms, 1/2 Watt, 20%	1.08
R10	470K Ohms, 1/2 Watt, 20%	.08
R11	470 Ohms, 1/2 Watt, 20%	.08
R12	100 Ohms, 1/2 Watt, 10%	.18
R13	1000 Ohms, 1W, WW, 10%	.80
R14	Tone Control, 100 K Ohms	.80
R15	330K Ohms 1/2 Watt, 10%	.10
R16	330K 1/2 Watt, 10%	.10
R17	1800 Ohms, 1/2 Watt, 10%	.10
C1-2, 3, 4, 5, 6	Variable Condenser, 3/sec, Planetary	4.66
C7	220 MMF Disc, 400V	1.16
C8	1.0 MFD 200 WV (small)	.12
C9	1.1 MFD 200 WV (small)	.12
C10	.022 MFD 400 WV (small)	.20
C11	220 MMF DISC, 400V	.16
C12	.022 MFD, 400 WV (small)	.18
C13	.022 MFD, 400 WV (small)	.28
C14	.05 MFD, 400 WV, (small)	.28
C15	.05 MFD, 400 WV, (small)	.28
C16	Electrolytic 100 x 50 - 150 WV W/Strap	1.78
C17A, C17B	1.1 MFD - 200 WV (small)	.34
C18	.022 MFD - 400 WV (small)	.20
C19	PC-50 Composite tweet filter	.36
L1	Loop Ferrite Rod	1.80
L2	RF Coil (with R4)	1.16
L3	Oscillator Coil (with R3)	1.44
L4	IF Transformer #1	1.58
L5	IF Transformer #2	1.58
L6	Output Transformer	3.20
L7	1.38-1.31	
L8	1.02-1.40	
L9	1.82-1.39	
L10	1.36-1.41	
L11	1.44-1.44	
L12	1.30-1.14	
L13	1.38-1.31	
L14	210-154	
L15	205-157	
L16	205-157	
L17	205-134	
L18	215-165	
L19	220-189	
L20	220-160	
L21	170-140	
L22	170-140	
L23	140-124	
L24	185-131	
L25	175-140	
L26	145-111	
L27	210-154	
L28	205-157	
L29	205-157	
L30	205-134	
L31	215-165	
L32	220-189	
L33	220-160	
L34	170-140	
L35	170-140	
L36	140-124	
L37	185-131	
L38	175-140	
L39	145-111	
L40	210-154	
L41	205-157	
L42	205-157	
L43	205-134	
L44	215-165	
L45	220-189	
L46	220-160	
L47	170-140	
L48	170-140	
L49	140-124	
L50	185-131	
L51	175-140	
L52	145-111	
L53	210-154	
L54	205-157	
L55	205-157	
L56	205-134	
L57	215-165	
L58	220-189	
L59	220-160	
L60	170-140	
L61	170-140	
L62	140-124	
L63	185-131	
L64	175-140	
L65	145-111	
L66	210-154	
L67	205-157	
L68	205-157	
L69	205-134	
L70	215-165	
L71	220-189	
L72	220-160	
L73	170-140	
L74	170-140	
L75	140-124	
L76	185-131	
L77	175-140	
L78	145-111	
L79	210-154	
L80	205-157	
L81	205-157	
L82	205-134	
L83	215-165	
L84	220-189	
L85	220-160	
L86	170-140	
L87	170-140	
L88	140-124	
L89	185-131	
L90	175-140	
L91	145-111	
L92	210-154	
L93	205-157	
L94	205-157	
L95	205-134	
L96	215-165	
L97	220-189	
L98	220-160	
L99	170-140	
L100	170-140	
L101	140-124	
L102	185-131	
L103	175-140	
L104	145-111	
L105	210-154	
L106	205-157	
L107	205-157	
L108	205-134	
L109	215-165	
L110	220-189	
L111	220-160	
L112	170-140	
L113	170-140	
L114	140-124	
L115	185-131	
L116	175-140	
L117	145-111	
L118	210-154	
L119	205-157	
L120	205-157	
L121	205-134	
L122	215-165	
L123	220-189	
L124	220-160	
L125	170-140	
L126	170-140	
L127	140-124	
L128	185-131	
L129	175-140	
L130	145-111	
L131	210-154	
L132	205-157	
L133	205-157	
L134	205-134	
L135	215-165	
L136	220-189	
L137	220-160	
L138	170-140	
L139	170-140	
L140	140-124	
L141	185-131	
L142	175-140	
L143	145-111	
L144	210-154	
L145	205-157	
L146	205-157	
L147	205-134	
L148	215-165	
L149	220-189	
L150	220-160	
L151	170-140	
L152	170-140	
L153	140-124	
L154	185-131	
L155	175-140	
L156	145-111	
L157	210-154	
L158	205-157	
L159	205-157	
L160	205-134	
L161	215-165	
L162	220-189	
L163	220-160	
L164	170-140	
L165	170-140	
L166	140-124	
L167	185-131	
L168	175-140	
L169	145-111	
L170	210-154	
L171	205-157	
L172	205-157	
L173	205-134	
L174	215-165	
L175	220-189	
L176	220-160	
L177	170-140	
L178	170-140	
L179	140-124	
L180	185-131	
L181	175-140	
L182	145-111	
L183	210-154	
L184	205-157	
L185	205-157	
L186	205-134	
L187	215-165	
L188	220-189	
L189	220-160	
L190	170-140	
L191	170-140	
L192	140-124	
L193	185-131	
L194	175-140	
L195	145-111	
L196	210-154	
L197	205-157	
L198	205-157	
L199	205-134	
L200	215-165	
L201	220-189	
L202	220-160	
L203	170-140	
L204	170-140	
L205	140-124	
L206	185-131	
L207	175-140	
L208	145-111	
L209	210-154	
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L211	205-157	
L212	205-134	
L213	215-165	
L214	220-189	
L215	220-160	
L216	170-140	
L217	170-140	
L218	140-124	
L219	185-131	
L220	175-140	
L221	145-111	
L222	210-154	
L223	205-157	
L224	205-157	
L225	205-134	
L226	215-165	
L227	220-189	
L228	220-160	
L229	170-140	
L230	170-140	
L231	140-124	
L232	185-131	
L233	175-140	
L234	145-111	
L235	210-154	
L236	205-157	
L237	205-157	
L238	205-134	
L239	215-165	
L240	220-189	
L241	220-160	
L242	170-140	
L243	170-140	
L244	140-124	
L245	185-131	
L246	175-140	
L247	145-111	
L248	210-154	
L249	205-157	
L250	205-157	
L251	205-134	
L252	215-165	
L253	220-189	
L254	220-160	
L255	170-140	
L256	170-140	
L257	140-124	
L258	185-131	
L259	175-140	
L260	145-111	
L261	210-154	
L262	205-157	
L263	205-157	
L264	205-134	
L265	215-165	
L266	220-189	
L267	220-160	
L268	170-140	
L269	170-140	
L270	140-124	
L271	185-131	
L272	175-140	
L273	145-111	
L274	210-154	
L275	205-157	
L276	205-157	
L277	205-134	
L278	215-165	
L279	220-189	
L280	220-160	
L281	170-140	
L282	170-140	
L283	140-124	
L284	185-131	
L285	175-140	
L286	145-111	
L287	210-154	
L288	205-157	
L289	205-157	
L290	205-134	
L291	215-165	
L292	220-189	
L293	220-160	
L294	170-140	
L295	170-140	
L296	140-124	
L297	185-131	
L298	175-140	
L299	145-111	
L300	210-154	
L301	205-157	
L302	205-157	
L303	205-134	
L304	215-165	
L305	220-189	
L306	220-160	
L307	170-140	

MODEL NOS. DC5992 & DC5994

Instructions for Installation, Operation and Service

GENERAL DESCRIPTION

This high fidelity AM-FM Radio-Phono combination is a ten (10) tube (including rectifier) plus four (4) diodes, chassis. It has a four (4) speed automatic record changer. Controls are provided for tuning, bass, treble, loudness, AM and FM radio separately. Special features include true adaptability to STEREO DISC REPRODUCTION, separate variable tone controls for treble, bass and loudness. A tape input jack; plus extension speaker out-put jack. * A switch, which in conjunction with the Stereo amplifier jack, makes it possible to receive simultaneous AM-FM broadcasts. It has four (4) matched speakers, two (2) 8" woofers and two (2) 3 1/2" tweeters that are connected by a crossover network which feeds the highs and lows into the proper speakers. A spindle for playing 45 RPM records automatically without using adapters is included. * This feature functions only when set has been adapted to Stereo Disc Reproduction.

CHECK YOUR LINE VOLTAGE

This radio must be operated on a 105 to 125 volt, 60 cycle AC supply only. If there is any doubt, consult the local power company before inserting the plug.

BROADCAST BANDS - AM -540 to 1620 Kilocycles
FM - 88 to 108 Megacycles

BASE AND TREBLE CONTROLS

By using the two tone controls, bass and treble, the high and low tones can be increased or decreased to suit your individual listening pleasure. To bring out the full richness of the bass instruments turn the bass control clockwise. For the full brilliance of the treble instruments, and for overtones of all instruments, turn the treble control clockwise. See ON-OFF-BASS CONTROL and RECORD CHANGER instructions for other functions of bass control.

ON-OFF-BASS CONTROL

The ON-OFF and BASS CONTROL is operated by the same knob. To turn the set "ON", pull up on knob. Allow approximately 30 seconds for tubes to heat. To turn set "OFF", push down. This type of control allows the set to be turned on and off without changing a pre-set position of the bass control.

STEREOPHONIC SOUND

This unit is truly adaptable to stereo disc reproduction with the use of an additional amplifier, speaker system and stereo cartridge. A switch is provided on the back of the cabinet for separation of second phono channel and AM radio. Plug a connecting cable from the second amplifier-speaker unit into the stereo-amp jack. When the switch is in the phono position the unit is then ready for playing stereo records. This unit has been designed so that with the switch in the radio position it can receive both an AM and an FM broadcast simultaneously. When both an AM and an FM station are broadcasting the two channels of a stereophonic recording, it will be possible to use the set as a stereophonic receiver. Turn the HI-FI selector Switch to "FM". Tune the

FM program as usual on the HI-FI set. Tune the AM program with the "AM" dial but adjust the volume and tone with the controls on your second amplifier. When this set is adapted for stereophonic sound, it is also possible to receive an FM program in one room while receiving an AM program on the remote speaker unit in another room.

FM RADIO OPERATION

First turn set "ON" as outlined in "ON-OFF-BASS" CONTROL. Then turn SELECTOR knob to FM position, tune to desired FM station using the FM DIAL knob, turn SELECTOR knob to AFC position which automatically locks the station in and keeps it from drifting. Adjust the BASS and TREBLE controls to the most pleasing balance.

FM ANTENNA

Intervening hills or other obstructions may reduce the signal strength in your area. If you are within the normal range of an FM Station and do not get good reception, it may be necessary to use the outdoor FM Antenna. It is advisable also to use the outdoor FM Antenna in noisy areas or when reception from greater distances is desired.

The built-in Air Wave FM Antenna is usually adequate for reception of FM signals of normal strength within a line of sight distance of 30-40 miles from the broadcasting station.

Connections for the outdoor FM Antenna are provided on the back of the set.

AM RADIO OPERATION

First turn set "ON" as outlined in "ON-OFF-BASS" CONTROL. Then turn SELECTOR knob to AM position, tune to desired AM station using the AM DIAL knob. Set the BASS and TREBLE control to the most pleasing balance.

AM ANTENNA

The built-in Air Wave Antenna is sufficient for receiving local and powerful distant stations. To receive less powerful or more distant stations, attach an AM outdoor antenna to the AM antenna terminal on the back of the radio. The use of the antenna also will improve reception in noisy locations.

THE CHASSIS SPECIFICATIONS

POWER SUPPLY - 117 V.A.C. 60 Cycles-Radio 75 Watts

Phono 90 Watts

FREQUENCY RANGES - AM-540 to 1620 KC

FM- 88 to 108 MC

I.F. FREQUENCY - AM - 455 KC FM - 10.7 MC

AMPLIFIER FREQUENCY RESPONSE - 30 - 17,000 Cycles

POWER OUTPUT - 17 watts maximum.

8 watts at less than 1% distortion.

LOUDSPEAKERS - 2, 8" woofers and

2, 3 1/2" tweeters.

TUBES - Ten (10) including rectifier plus four Diodes.

Two 6BQ6 tubes are used for Push-Pull output.

RECORD CHANGER - 1210A-132

CARTRIDGE - ASTATIC-DUAL SAPPHIRE

#97B Powerpoint

NOTE: The needles on this cartridge are not replaceable, as the cartridge and needle are on one unit. It will be necessary, therefore, to replace the complete cartridge when a needle is worn.

THE SPEAKERS

The four (4) permanent magnet speakers used in this reproducer are designed for optimum speaker performance. The speaker system consists of one eight inch "woofer" designed to reproduce the low frequencies, another eight inch speaker to reproduce the "middle-range". The two (2) 3 1/2" "tweeters" reproduce the high frequencies and are spaced to aid in proper sound dispersion. All are connected by a crossover net-work as explained in General Description. In addition, an extension speaker jack is located on the back of the set to which an additional speaker may be connected.

CONELRAD (CIVIL DEFENSE INFORMATION)

When broadcast stations must leave the air because of a national emergency, CONELRAD (Civil Defense Information) will be broadcast. This information is broadcast on 640 or 1240 Kc indicated by the Civil Defense symbol on your radio dial.

THE RECORD CHANGER

This four speed (16-33-45-78) TRUETONE automatic record changer has been especially engineered for the reproduction of both monaural and STEREO records. It maintains constant speed even when records are changing. Internex 10" and 12" records of the same speed. Balanced turntable has smooth operating noise-free motor. Muting switch. The changer itself shuts off automatically after the last record has been played.

LOADING

1. Lift record support arm clear of center spindle and swing it all the way to the right.
2. Place records on the spindle, allowing them to rest on spindle itself. Steady records with one hand and swing record support arm back to center. Ten and twelve inch records may be intermixed, provided all are of the same speed. This 45 RPM spindle or record adapter discs in all 45 RPM records.
3. The power point cartridge contains two needles. Standard 78 RPM records require one needle and long playing 16, 33-1/2 and 45 RPM require another needle. To change from one needle to the other, push the lever on the side of the tone arm downward and under to the other side of the tone arm.

NOTE: When needle is in proper position, the lever will read "78" or "LP" (Long Play Records).

AUTOMATIC OPERATION

1. Turn the MOTOR SPEED control to the proper speed.
2. Turn the SELECTOR control to the PHONO position.
3. Turn the RECORD CHANGER control to "REJ." and release.
4. Adjust TONE and LOUDNESS controls to the most pleasing tonal balance.

5. To turn changer off before the last record has been played, remove any remaining records, return record support arm to center and turn record changer control to "REJ." position and release.

Be sure to push ON-OFF-BASS Control all the way down when through playing records on radio, and turn the changer speed selector to the "S-78" position.

IF MECHANISM FAILS TO CHANGE NEXT RECORD - An old record may not have the eccentric cycling grooves needed for automatic changing. Some recordings and some 7 inch 78 RPM (children's records) will not be in the stack, turn the RECORD CHANGER Control to "REJ." and release, to start the automatic cycling.

TO REJECT A RECORD - If you do not want to hear the record that is playing turn the RECORD CHANGER Control to "REJ." and release. The pickup arm will lift and the next record will drop into position.

MANUAL OPERATION - By leaving the record support arm in its place at left of the changer instead of putting it on the spindle, records may be played manually.

EXTENSION SPEAKER (Optional)

To play the speakers in the console and the extension speaker at the same time, place phono plug in the extension speaker jack all the way. To play the extension speaker only, place the switch to extension speaker position. To play the speakers in the console only, remove the extension speaker plug.

TAPE RECORDER (Optional)

To play a tape recorder through your set, place the selector switch to the "Tape" position and plug tape recorder into input jack on back of set.

MAINTENANCE

The pickup arm of the record changer may be moved in any direction at any time without damaging the cycling mechanism or the adjustments.

If the pickup arm should fail to function or neglect to cycle, your records may be the cause. Some records are not standard or are imperfect. Noisy scratching while the phonograph is playing indicates worn records or needle. Some records will last longer than others, even though all are given the same use.

TUBES AND DIAL LAMPS

The type designation of each tube is stamped on the tube. The correct positions in which the tubes must be installed are shown in the tube position illustration. All tubes must be in their sockets to operate the radio. Use only No. 12 dial lamps for replacement of burned out dial lamp. Use only GE No. 47 for replacement of the indicator lamp, located in the front of the cabinet.

- 1 6AQ6/ECC85 used with Tuner #1023
- 1 6BT8 used with Tuner #1023A
- 1 6BE6 AM Converter
- 1 6BA6 AM-I-F Amplifier
- 1 6AV6 1st Audio

MODEL NOS. DC5992 & DC5994

MODEL NOS. DC5992 & DC5994

ALIGNMENT PROCEDURE AM STAGES

- 12AU7 2nd Audio & Phase Splitter
- 6BQ5 Audio Output (push-pull)
- 6CB6 FM-I-F Amplifier used with #1023 Tuner
- 6AU6 FM-I-F Amplifier used with #1023A Tuner
- EZ81 Rectifier
- 1N636 AM Detector Diode
- 1N636 FM Detector Diode
- Spec. Junction Diode
- #12 Dial Lamp
- #47 Indicator Lamp

- CUSTOMERS may order all replacement parts from any Western Auto Store or Associate Store. Each store has an up-to-date price list on replacement parts.
- Company and Associate Stores may order any part shown in any Western Auto Replacement Parts and Price Lists from these Parts Warehouses:

Western Auto Parts Warehouse
2610 Grand Avenue
Kansas City 8, Missouri

Western Auto Parts Warehouse
1227-29 First Avenue South
Birmingham, Alabama

Western Auto Parts Warehouse
1217 Alhambra Avenue
Sacramento, California

Western Auto Parts Warehouse
3142-44 West Liberty
Pittsburgh, Pennsylvania

CARE AND MAINTENANCE

This instrument has been designed and constructed to render trouble-free performance with a minimum of care or maintenance and under normal conditions will not require any special attention. If reception is poor or radio will not operate, the following action is recommended:

- Be sure the radio is connected and operated as described in this folder.
- See if there is power at the wall outlet by disconnecting radio and connecting a lamp to the same outlet.
- If radio programs cannot be tuned in when the tuning knob is rotated, note if the SELECTOR is turned to the position you wish to have function.
- Check for a corroded or loose connection on the outside antenna (if one is used) and be sure it is not grounded.
- Inspect tubes to be sure each is firmly seated in its socket. It is well to first disconnect the power cord from wall outlet.
- A tube may be faulty. A qualified radio serviceman will test the tubes. Failure to replace the tubes in proper sockets may result in serious damage. To install a tube into a miniature type tube socket, line up the tube prongs with the holes in the socket and then gently push the tube down until it is held firmly in the socket.
- The cabinet has a rubbed and waxed finish. Care for it as you would any other piece of fine furniture. Remove film or dust and restore original lustre by merely wiping the cabinet with a polishing cloth. CAUTION - Do not place the set too near a hot radiator or where it will be exposed to direct sunlight.
- If performance is still unsatisfactory, get in touch with the store or dealer from whom the set was purchased.

HOW AND WHERE TO ORDER REPLACEMENT PARTS

To eliminate error and to speed delivery of replacement parts always include the following information on your order.

- Complete identification of the Radio-Phonograph for which the part is wanted.
 - Name Item Phonograph
 - Model Number-DC5992 Mehog. DC5994 Oak
 - Serial Number
- Best possible identification of the part itself.
 - Part Number
 - Part Name
 - If necessary, return the old part as sample.

The following is required for aligning:

An All Wave Signal Generator which will provide an accurately calibrated signal at the test frequencies as listed.

Output indicating Meter, Non-Metallic Screwdriver, Dummy Antenna--1 mf. Volume Control Maximum all Adjustments.

FREQUENCY SETTING	SIGNAL GENERATOR CONNECT TO	DUMMY ANTENNA	GANG SETTING	ADJUST FOR	ADJUST FOR	NOTES
455KC	Pin 7 (Control Grid) of V-4	.1 MFD	Open	A7-A8 A9-A10	Max. Output	
1620KC	Yellow Wire on L5	1,MMF*	Open	A6	Max. Output	*2 Turns insulated wire may be used
1400KC	Yellow Wire on L5	1,MMF*	Max. Output 1400KC	A5	Max. Output	

FM STAGES

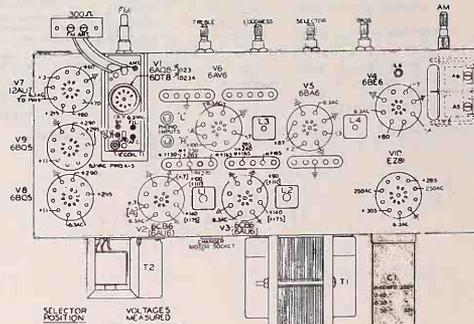
The following is required for aligning:

An accurately calibrated Signal Generator providing unmodulated signals at the test frequencies listed below.

Non-Metallic Screwdriver.

Dummy Antennas and I-F Loading Resistor--5000 ohms.

FREQ.	SIGNAL GENERATOR OUTPUT	DUMMY ANTENNA THROUGH	DIAL SETTING	CONNECT TO	ADJUST FOR	ADJUST FOR	NOTES
10.7 MC	Pin 1 V-2	5000 MMF	Extreme Clockwise Rotation	Junction of C10 & R9	A1-A2-A4	Maximum Voltage	Adjust input signal for 1.5 to 3. volts deflection
10.7 MC	Pin 1 V-2	5000 MMF	Extreme Clockwise Rotation	Junction of C14 & R13	A-3 (Top L2)	0. Volta (Balance)	
100 MC	Ant. Terminal	300 OHM	Tune for 100 MC	Junction of C10 & R9	T1 in FM Tuner	Maximum Voltage	Rock tuner while making this adjustment



SELECTOR POSITION
FM
AM
PHONO
VOLTAGES MEASURED
V1-V2-V3-TUNER
V4-V5
V6-V7-V8-V9-V10

[] INDICATES VOLTAGES MEASURED WITH V2-V3 6AU6'S AND #1023A FM TUNER.
[] INDICATES CHASSIS GROUNDING.
ALL MEASUREMENTS WITH 117 VAC, NO SIGNAL AND V.T.V.M. TO CHASSIS.

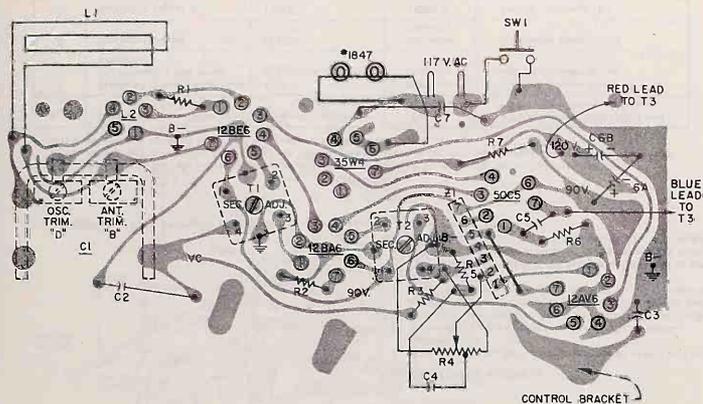


Figure 3 - Bottom view of chassis

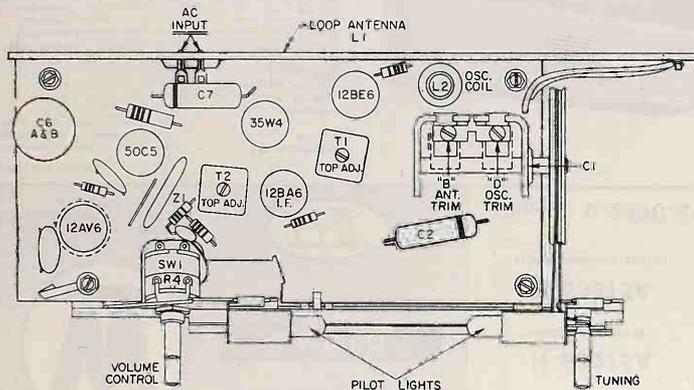


Figure 4 - Top view of chassis

PARTS LIST

When ordering parts, specify part number, description and model number of set.

CABINET AND MISCELLANEOUS

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
†		58V120H02		Background, foil	.40
		513V017H01		Cabinet, H-632T5A (Mocha & White)	7.95
		513V017H02		Cabinet, H-633T5A (Turquoise & White)	7.95
		V-15765-1	770V415H01	Contact, male	.10
		751V000A01		Cord, AC power (snap-in)	1.12
		V-3219		Cord, dial straining, 100' spool	1.57
†		558V083H06		Dial	.45
†		558V185H01		Dial-background	.15
†		558V153H02		Front, cabinet	2.75
		783V061H01		Insert, special	.35
		550V082H01		Knob, tuning and volume	.22
		756V501H02		Lamp, pilot lamp, # 1847	.22
		558V089H01		Pointer	.05
		761V075H56		Screw, 3/4" (mounts cabinet)	.40
		783V055H06		Shaft, tuning	.20
		751V513H01		Socket, 7 pin (50C5)	.17
		751V513H04		Socket, snap-in (35W4)	.17
		751V513H05		Socket, snap-in (12BE6 & 12BA6)	.45
		751V546H01		Socket, snap-in (12AV6)	.80
		751V529H01		Socket, dial light	8.75
		570V051H01	770V250H03	Speaker, 10" x 2 5/8" PM (includes T3)	.10
		V-6795-3		Spring-dial drive	.05
		763V000H24		Washer, "C" tuning shaft	

CHASSIS PARTS LIST

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
	C1	330V011H01		Capacitor, variable	Tuning	3.20
	C2	210V111H05		Capacitor, .05 mfd, 200V	AVC bypass	.27
	C3	215V300H03		Capacitor, .01 mfd, ceramic	B- to bracket	.35
	C4	215V104A72	R2CC63Y5Y472M	Capacitor, .0047 mfd, ceramic	Tone compensation	.17
	C5	215V306H03		Capacitor, .01 mfd, 1.4KV, ceramic	Audio output	.22
	CGA / C6B	218V043H01		Capacitor, 50 mfd, 150 V, Electrolytic	Filter	1.57
	C7	210V204A73	RCP10W6473M	Capacitor, .047 mfd, 400V	Line by-pass	.40
	L1	317V006H06		Loop (includes bracket & aux. outlet)	Antenna	1.40
	L2	230V004H02		Coil	Oscillator	.95
	R1	250V222A23	RC20AE223K	Resistor, 22K ohms, 1/2W	Osc. grid	.06
	R2	250V231A01	RC20AE101M	Resistor, 100 ohms, 1/2W	1st IF bias	.05
	R3	250V223A35	RC20AE335K	Resistor, 3.3 megohms, 1/2W	AVC filter	.09
	R4	270V039H01		Control, 500K (includes SW1)	Volume	1.70
	R5	250V226A89	RC20AE683K	Resistor, 68K ohms, 1/2W	Tone compensation	.05
	R6	250V221A81	RC20AE181K	Resistor, 180 ohms, 1/2W	Bias audio output	.10
	R7	250V331A52	RC30AE152M	Resistor, 1.5K ohms, 1W	Supply filter	.10
	SW1	270V039H01		Switch, Push-pull (includes R4)	AC off-on	1.70
	T1	V-15547-1	235V023H11	Transformer, 1F	1st 1F	1.57
	T2	V-15547-1	235V023H12	Transformer, 1F	2nd 1F	1.57
	T3	570V051H01		Transformer, audio (includes speaker)	Audio output	8.75
	Z1	219V001H01		Couplate	Audio detector	.95

† New part number listed for the first time in Westinghouse television or radio service information.



Westinghouse

RADIO
SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
METUCHEN, N. J.

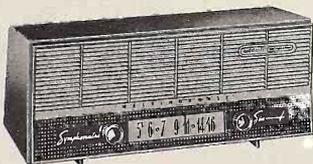


MODELS

H-636T6A (Ivory and white)

H-637T6A (Coral and white)

Chassis V-2391-6



SPECIFICATIONS

Frequency Range	540 to 1600 Kc.
Intermediate Frequency	455 Kc.
Tube Complement:	
1 12BA6	RF Amp.
1 12BE6	Converter
1 12BA6	IF Amp.
1 12AV6	Det., AVC and 1st AF Amp.
1 35CS	Output Amp.
1 35W4	Rectifier
Power Output:	
Undistorted	0.9 watts
Maximum	1.5 watts
Loudspeaker:	10" x 2 5/8" FM
Operating Voltage	105 to 120 volts, 50-60 cycle AC or DC
Power Consumption	35 watts

PRINTED BOARD REMOVAL

1. Remove the two 3/16" screws located at either end of the cabinet rear.
2. Remove the screw on the bottom of the cabinet.
3. Separate the cabinet front from the cabinet back to expose the radio chassis. (The two 3/16" screws can be

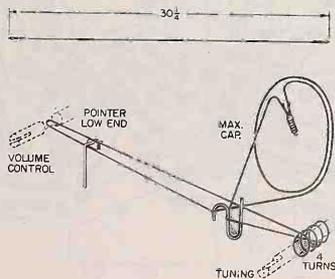


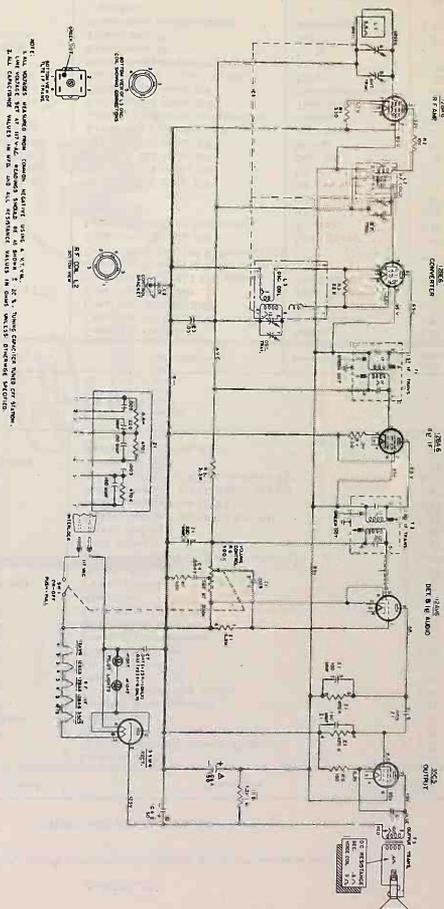
FIGURE 1 - DIAL STRINGING

4. Use a conventional TV AC interlock line cord to power the radio while servicing. It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

STEP	CONNECT SIGNAL	SIG. GEN. FREQ.	RADIO DIAL SETTING	V.T.V.M. ACROSS VOICE COIL ADJUST FOR MAX. OUTPUT and T1 in order given.*
1	Pin No. 7 of the 12BE6 through a 200 mfd. cap.	155Kc	minimum cap.	
2	Slide of antenna (A) through a 200 mfd. capacitor	1625Kc	minimum capacity	Oscillator Trimmer (F)
3	Same as Step 2	1400Kc	1400Kc	RF Trimmer (D)
4	Radiated signal	1400Kc	1400Kc	Ant. ana Trimmer (G)

ALIGNMENT PROCEDURE
It is recommended that the chassis be isolated from the power line by means of an isolation transformer. While making the following adjustments, keep the volume control set for maximum output and the signal strength control set for maximum signal.
It is recommended to avoid AVC action. In this alignment procedure, the use of a signal generator snugly fits the slot in the powdered iron core to avoid to prevent clipping of the slot.

FIGURE 2 - SCHEMATIC DIAGRAM





Westinghouse SERVICE MANUAL radio



SERVICE DEPARTMENT • TELEVISION-RADIO DIVISION
WESTINGHOUSE ELECTRIC CORP. METUCHEN, N. J.

MODELS

H-649T7

(Ivory)

H-650T7

(Charcoal)

CHASSIS V-2392

SPECIFICATIONS

OPERATING VOLTAGES	105 to 120 volts DC or 50 to 60 cycles AC
POWER CONSUMPTION	37 Watts
POWER OUTPUT	
Maximum	2.5 Watts
Undistorted	1.5 Watts
TUNER FREQUENCY RANGES:	
AM	540 to 1600 kc
FM	88 to 108 mc
INTERMEDIATE FREQUENCIES	
AM	455 kc
FM	10.7 mc



TUBE COMPLEMENT

12BA6	FM RF Amplifier
12AT7	FM Mixer-Oscillator
12AU6	1st FM IF Amplifier & AM Converter
12BA6	2nd FM IF Amplifier & 1st AM IF Amplifier
12AL5	FM Detector
12AV6	AM Detector & 1st Audio Amplifier
50C5	Audio Output

PHONOGRAPH INPUT INFORMATION

The audio amplifier section of the receiver can be used as a phonograph amplifier by inserting the plug from the phonograph output into the receptacle on the rear of the receiver. The AM-FM-PHONO switch should be set to the PHONO position.

The phonograph should employ either a crystal or ceramic type cartridge for best results. If hum is being picked up by the phonograph try reversing the AC plug of the phonograph in the AC power outlet, and/or the radio power plug.

FM ANTENNA INFORMATION

The receiver is shipped from the factory with the FM antenna connection in the internal position. The FM antenna connections are located on the back of the AM loop antenna and are accessible through a hole in the rear cover. When the captivated shorting bar connects the center and right hand terminals the FM input is connected to the AC power line through capacitor C33. The AC power line hence serves as the FM antenna.

When using an external FM antenna, disconnect the captivated shorting bar from the center terminal. Connect a 300 ohm antenna across the center and left hand terminals.

CHASSIS REMOVAL

1. Remove the two $3\frac{1}{2}$ " long screws located at either end of the cabinet rear.
2. Remove the short screw located in the center of the cabinet rear and the screw on the bottom of the cabinet.
3. Separate the cabinet front from the cabinet back to expose the radio chassis. (The two $3\frac{1}{2}$ " screws can be used to do this by pushing on both at same time).
4. Use a conventional TV AC interlock line cord to power the radio while servicing. It is recommended that the chassis be isolated from the power line by means of an isolation transformer.

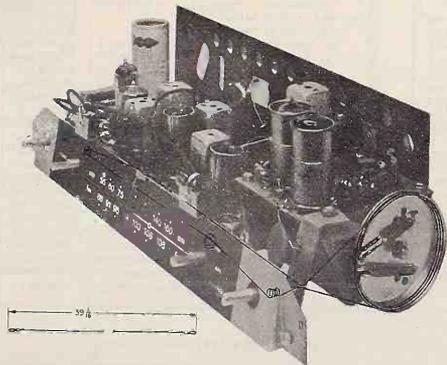


Figure 4 Dial string arrangement

AM ALIGNMENT

AM ALIGNMENT

1. Connect V.T.V.M. as indicated in the AM alignment chart.
2. Use signal generator covering 455 kc to 1700 kc, AM modulated, with adjustable output attenuator.
3. Set the volume control R22 at maximum.
4. Set switch SW1 at AM.
5. Keep the signal generator output voltage level low to avoid AVC action.
6. Set C38 (tuning capacitor) to minimum.

AM ALIGNMENT CHART

Step	Connect Signal Generator to:	Signal Generator Frequency	C38 Setting	V.T.V.M. Connection	Adjustment
1	High side thru .1 mfd to stator "A" of C38. Low side to tuning capacitor frame (B-)	455 kc modulated	Min.	Volume knob, speaker coil	Primary and secondary of T5 and T3 for maximum output
2	"	1625 kc modulated	"	"	C38 "D" for maximum output
3	Radiated signal	1400 kc modulated	Tune for signal	"	C38 "B" Rock in for maximum output

FM ALIGNMENT

FM ALIGNMENT

1. Don't attempt FM alignment until the AM alignment has been completed.
2. Connect two 100k ohm resistors from test point "C" (pin No. 7 12AL5) to ground as shown in schematic.
3. Use V.T.V.M. connected as indicated in the FM alignment chart.
4. Use a signal generator with output frequencies of 10.7 mc and 80 to 110mc. Generator should have an adjustable output attenuator.
5. Set the volume control R22 at maximum.
6. Set the switch SW1 to the FM position.
7. Keep the signal generator output voltage level low to avoid overload.

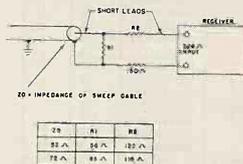


Figure 5 Impedance matching network

FM ALIGNMENT CHART

Step	Connect Signal Generator to:	Signal Generator Frequency	V.T.V.M. Connection	Adjustment
1	High side of generator to lug F or H of SW1	10.7 mc unmodulated	Min.	Secondary of T4 (top adj.) for zero voltage
2	"	"	"	Between point "C" and ground
3	"	10.7 mc unmodulated input increased 10X	"	Between points "A" and "B"
4	"	"	"	Between point "C" and ground
5	REMOVE THE TWO 100K OHM RESISTORS			
6	Across FM antenna with proper termination see fig. 5	98 mc unmodulated	98 mc	Between point "C" and ground
7	"	"	"	"
8	"	108.5 mc unmodulated	Min.	"
9	"	87.5 mc unmodulated	Max.	"
10	REPEAT STEPS 8 AND 9 UNTIL NO FURTHER CHANGE			
11	ACROSS FM antenna with proper termination	106 mc unmodulated	Tune for signal	Between point "C" and ground
12	"	90 mc unmodulated	"	"
13	CHECK STEPS 8 AND 9 AND TOUCH UP IF NECESSARY			

MISCELLANEOUS AND MODEL PARTS

When ordering parts, specify part number, description of part and model number.
Do not order by model number alone.
Where applicable, prices include Federal Excise Tax.

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
†		513V017H13	V-15705-1	Cabinet shell, Ivory, H649T7	4.90
†		513V017H16		Cabinet shell, Charcoal, H650T7	4.90
		770V415H01		Contact, male, AC power	.10
		781V042H01		Coupling, flexible variable gang to pulley shaft	.05
		751V000A01		Cord, AC power, snap-in	1.12
		V-321		Cord, dial drive, 100 foot spool	1.57
†		558V118H01		Dial, plastic front	1.30
†		558V175H01		Dial, background, scale	.25
†		558V153H01		Front, cabinet	3.00
†		783V061H01		Insert, mounts cabinet front	.35
†		550V082H01	Knob, AM-FM Tuning, Volume & Tone	.35	
†		550V082H02	Knob, AM-FM-Phono selector	.40	
†		756V501H07	Lamp, pilot light, W#1828	.95	
†		768V015H18	Nut, speed, secures AM loop	.05	
†		558V089H01	Name-plate, Wide-Fi 10" Speaker	.27	
†		558V172H01	Pointer	.20	
†		783V055H09	Shaft, tuning	.40	
		751V513H05	Socket, 7 pin, center shield, 12AL5	.17	
		751V513H07	Socket, 7 pin, 50C5	.20	
		751V546H01	Socket, 7 pin, shielded, 12AV6, 12AU6 & 12BA6	.45	
†		751V549H01	Socket, 7 pin, shielded, 12BA6	.45	
†		751V549H03	Socket, 9 pin, shielded, 12AT7	.45	
		751V520H01	Socket, dial light	.80	
		770V250H03	Spring, dial drive	.10	
		570V024H01	Speaker, 10" x 2 5/8"	10.12	

CHASSIS PARTS LIST

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
R1	250V234A76	RC20AE475K		Resistor, 4.7 megohms, 1/2W	FM RF grid	.05
R2	250V226A81	RC20AE681K		Resistor, 680 ohms, 1/2W	FM RF screen decoup.	.17
R3	250V231A03	RC20AE103K		Resistor, 10K ohms, 1/2W	AM converter cathode	.05
R4	250V226A81	RC20AE681K		Resistor, 680 ohms, 1/2W	FM osc. plate decoup.	.17
R5	250V223A35	RC20AE335K		Resistor, 3.3 megohms, 1/2W	FM mixer grid	.12
R6	250V221A03	RC20AE103K		Resistor, 10K ohms, 1/2W	FM osc. grid	.05
R7	250V226A81	RC20AE681K		Resistor, 680 ohms, 1/2W	FM mixer plate	.17
R8	250V221A25	RC20AE125K		Resistor, 1.2 megohms, 1/2W	12AU6 grid	.12
R9	250V226A81	RC20AE681K		Resistor, 680 ohms, 1/2W	12AU6 plate decoup.	.17
R10	250V224A70	RC20AE470K		Resistor, 47 ohms, 1/2W	1F amp. cathode	.05
R11	250V226A81	RC20AE681K		Resistor, 680 ohms, 1/2W	1F amp. plate decoup.	.17
R12	250V222A25	RC 0AE225M		Resistor, 2.2 megohms, 1/2W, 20%	AVC filter	.06
R13	250V214A74	RC20AE474J		Resistor, 470K ohms, 1/2W, 5%	AVC filter	.22
R14	250V222A23	RC20AE223K		Resistor, 22K ohms, 1/2W	FM detector	.07
R15	250V222A21	RC20AE221K		Resistor, 220 ohms, 1/2W	FM audio coupling	.05
R16	250V214A81	RC30AE181K		Resistor, 180 ohms, 1W	Audio output cathode	.12
R17	250V226A83	RC20AE683K		Resistor, 680 ohms, 1/2W	Tone compensation	.05
†	R18	251V020H15		Resistor, 1K ohms, 5W	B+ filter	.40
†	R19	251V023H20		Resistor, 22 ohms, glassohm	Rectifier protection	.40
†	R20	250V436A81	RC40AE681K	Resistor, 680 ohms, 2W	Pilot lamp dropping	.25
†	R21	250V436A81	RC40AE681K	Resistor, 680 ohms, 2W	Volume	.25
†	R22	270V039H01		Control, 500K ohms (includes SW2)	Volume	1.70
†	R23	270V039H07		Control, 1 megohm	Tone	.95
†	R24	250V214A81	RC30AE181K	Resistor, 180 ohms, 1W	B+ filter	.12
†	R25	250V224A70	RC20AE470K	Resistor, 47 ohms, 1/2W	12AU6 cathode bias	.05

CHASSIS PARTS LIST -- Continued

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
†	C1	213V182H01		Capacitor, 10 mmf, 10%, mica	Impedance matching	.25
†	C2	213V182H01		Capacitor, 100 mmf, 10%, mica	Impedance matching	.25
†	C3	215V11A01		Capacitor, .001 mf, ceramic	FM ant. coupling	.20
†	C4	215V308H02		Capacitor, .001 mf, ceramic, GMV	FM RF amp. screen	.22
†	C5	215V102A22	R2CC62YSY222M	Capacitor, .0022 mf, ceramic, 20%	FM RF amp. screen	.22
†	C6	219V025H02		Capacitor, .0015 mf, feed thru	B+ RF amp.	.20
†	C7	215V308H02		Capacitor, .001 mf, ceramic, GMV	FM osc. plate	.20
†	C8	215V300H45		Capacitor, 47 mmf, 10%, N750	Osc. grid	.20
†	C9	217V01A09		Capacitor, 1 mmf, 10%, ceramic	Osc. injection	.85
†	C10	215V104A10	R2CC61YSY471M	Capacitor, 470 mmf, ceramic, 20%	FM RF coupling	.20
†	C11	219V025H02		Capacitor, .0015 mf, feed thru	B+ FM mixer	.20
†	C12	215V308H02		Capacitor, .001 mf, ceramic, GMV	Filament by-pass	.20
†	C13	210V111H06		Capacitor, .047 mf, 600 V, 20%	AM RF return	.25
†	C14	215V014A70	R1CC62G470K	Capacitor, 47 mmf, 10%, ceramic	12AU6 grid coupling	.17
†	C15	215V102A22	R2CC62YSY222M	Capacitor, .0022 mf, ceramic, 20%	12AU6 screen by-pass	.22
†	C16	215V102A22	R2CC62YSY222M	Capacitor, .0022 mf, ceramic, 20%	1F AM screen by-pass	.22
†	C17	215V308H02		Capacitor, .001 mf, ceramic	FM detector	.20
†	C18	210V111H05		Capacitor, .05 mf	AVC filter	.27
†	C19	215V306H03		Capacitor, .01 mf, 1.4 KV, ceramic	Control bracket to B+	.35
†	C20	215V300H03		Capacitor, .01 mf, 150 V, elect.	B+ filter	2.10
†	C21A	218V033H01	early production only	Capacitor, 80 mf, 150 V, elect.	B+ filter	2.10
†	C21B	218V033H01		Capacitor, .005 mf, ceramic	Tone	.20
†	C22	215V308H04		Capacitor, .01 mf, 1.4 KV, ceramic	Control bracket to B-	.35
†	C23	215V306H02		Capacitor, .047 mf, 600 V	Line by-pass	.35
†	C24	210V214A73		Capacitor, .0015 mf, feed thru	Filament FM tuner	.20
†	C25	219V025H02		Capacitor, .0015 mf, feed thru	Filament FM tuner	.20
†	C26	219V025H02		Capacitor, .0015 mf, feed thru	Filament FM tuner	.20
†	C27	219V025H02		Capacitor, .0015 mf, feed thru	Filament FM tuner	.20
†	C28	215V308H04		Capacitor, .005 mf, ceramic	Filament by-pass	.20
†	C29	215V308H04		Capacitor, .005 mf, ceramic	Filament by-pass	.20
†	C30	215V308H04		Capacitor, .005 mf, ceramic	Filament by-pass	.20
†	C31	215V308H04		Capacitor, .005 mf, ceramic	Filament by-pass	.20
†	C32	218V012H13		Capacitor, 4 mf, electrolytic, 50 V	FM detector	1.85
†	C33	213V182H02		Capacitor, 47 mmf, mica, 20%	Line by-pass	.20
†	C34	215V308H04		Capacitor, .005 mf, ceramic	Filament by-pass	.20
†	C35	215V300H46		Capacitor, 8.2 mmf, ±5%, N470	FM osc. grid	.20
†	C36	330V015H01		Capacitor, variable	FM tuning	3.75
†	C37	330V015H01		Capacitor, variable	AM tuning	3.10
†	C38	330V015H04		Capacitor, variable	AM tuning	3.10
†	C39	215V308H04		Capacitor, .005 mf, ceramic	1F amp. screen	.20
†	C40	215V308H04		Capacitor, .005 mf, ceramic	FM mixer plate	.20
†	C41	215V307H01		Trimmer, 1.5-6 mmf	FM oscillator	.35
†	C42	215V308H04		Capacitor, .005 mf, ceramic	FM B+ decoupling	.20
†	C43	218V022H01		Capacitor, 20 mf, electrolytic, 175 V	B+ filter	1.29
†	C44	218V012H01		Capacitor, 40 mf, electrolytic, 25 V	Audio output cathode	1.35
†	L1	230V065H01		Coil, antenna	FM RF input	.45
†	L2	230V056H17		Coil, RF (includes 820 ohm resistor)	FM mixer plate	.20
†	L3	230V056H02		Coil, RF reactor, 1.1 uh	Filament choke	.35
†	L4	230V056H02		Coil, RF reactor, 1.1 uh	Filament choke	.35
†	L5	V-9099-5	230V028H05	Coil, RF reactor, 2.7 uh	RF choke	.20
†	L6	V-9099-5	230V028H05	Coil, RF reactor, 2.7 uh	RF choke	.20
†	L7	787V087H01		Loop antenna assembly	AM loop	2.25
†	S1	756V027H01		Switch	Selector	2.10
†	S2	270V039H01		Switch, push-pull (part of R22)	On-off	1.70
†	T1	235V039H01	V-9688	Transformer, 10.7 mc	FM mixer plate	1.00
†	T2	235V037H02		Transformer, 10.7 mc	2nd FM IF	1.65
†	T3	235V044H01		Transformer, 455 kc	1st AM IF	0.65
†	T4	235V035H01		Transformer, 10.7 mc	FM detector	2.30
†	T5	235V038H02		Transformer, 455 kc	2nd AM IF	1.50
†	T6	230V045H01		Coil	RF FM plate	.90
†	T7	230V045H02		Coil	FM oscillator	.90
†	T8	230V044H01		Coil	AM oscillator	.90
†	T9	430V051H01		Transformer	Audio output	1.75
†	Z1	219V019H01		Packaged circuit	Audio coupling	.95
†	Z2	219V020H01		Packaged circuit	FM demphasis	.75
†	Z3	219V022H01		Packaged circuit	AM sweet filter	.45
†	X1	295V012H01		Rectifier, selenium	AC rectifier	2.75

† New Part number listed for the first time in Westinghouse Television or Radio-Service Information. Prices are subject to change without notice. All resistors are 10% unless otherwise specified.

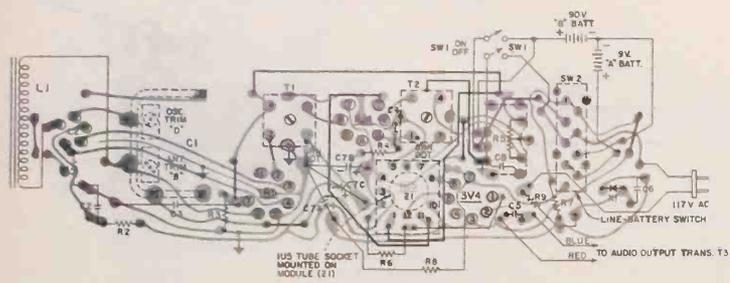


Figure 3 - Bottom view of chassis with components shown symbolically

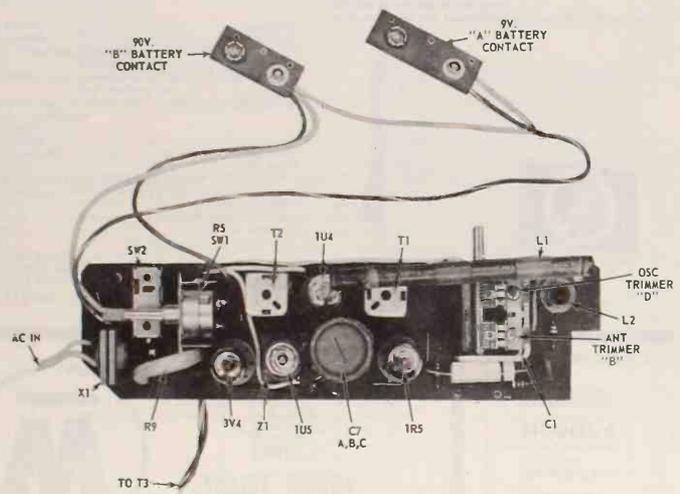


Figure 4 - Top view of chassis

ALIGNMENT

While making the following adjustments, keep the volume control set at maximum output and the signal generator output attenuated to avoid AVC action.

Step	Connect Signal to:	Signal Generator Frequency	Radio Dial	Adjust for Maximum Output
1	Stator of ant. tuning cap. "A" thru a .01 mfd capacitor	455 kc	Min. cap.	Top and bottom slugs of T2 and T1 in order given
2	"	1625 kc	Min. cap.	Osc. trimmer "D"
3	Radiated sig.	1400 kc	1400 kc	Antenna trimmer "B"

It is recommended that a fibre aligning tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot in the IF transformer.

MODULE SERVICING INFORMATION

The Detector-First Audio Amplifier stage of this receiver has been modularized to provide greater reliability, compactness and ease of servicing. All the components of this stage, including the tube socket, are contained in this packaged circuit.

The module consists of five printed circuits, stacked, one on top of another. Each printed circuit is made up of a ceramic wafer with more than one component (capacitors or resistors) printed on the wafer. The five stacked wafers are connected together by twelve riser wires. At the top of the module, seven of the risers connect to the tube socket. At the bottom of the module the riser wires are extended so that they can be soldered directly into the printed circuit board.

Because the module is a complete unit, it is easier to service and replace than the individual components. A bottom view of the module is shown on the schematic

diagram (figure 2). A key (notch) on one side of the module indicates pin #1 of the module. With exception of pin #9 all the riser wires are soldered into the printed circuit chassis. The components contained in the module are shown on the schematic enclosed in dashed lines. The corresponding riser numbers are shown as they enter the circuit.

It is not recommended that the module itself be serviced. It is rather difficult to replace components within the module. If the trouble is localized to the module it is recommended that the module be replaced.

To replace a module cut the riser wires at the base of the module, where they enter the printed circuit board. Remove the remaining wires from the board with the soldering iron (low wattage type). Observing the correct position of the module key, install the new module in the holes in the board and solder in place.

MODEL PARTS LIST

When ordering parts, specify part number, description of part and model number.
Do not order by model number alone.
Where applicable, prices include Federal Excise Tax.

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
†		770V565H01		Bracket, handle	.10
†		778V104H01		Bracket Assy., AC receptacle	.45
†		559V027H01		Catch Assy., H-659P4	1.00
†		559V027H02		Catch Assy., H-660P4	1.00
†		513V028H01		Cabinet Assy., Mocha & White, H-659P4	8.75
†		513V028H02		Cabinet Assy., Red & White, H-660P4	8.75
†		759V042H02		Cable, Batteries	.70
†		751V009H01		Cord, AC power	.75
†		558V159H01		Handle	.65
†		558V166H01		Insignia	.45
†		550V096H02		Knob, volume	.55
†		550V088H02		Knob, tuning	.75
†		770V520H01		Spring, hinge	.10
†		751V513H04		Socket, 7 pin - 3V4	.17
†		751V513H05		Socket, 7 pin, shielded, 1U4, 1R5	.17
†		570V050H01		Speaker, 4" PM (includes T3)	6.00

CHASSIS PARTS LIST

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
†	C1	330V014H02		Capacitor, variable	Tuning	.40
	C2	215V111A01	R2CC63Z5Z103P	Capacitor, .01 mf, ceramic GMV	Osc. plate by-pass	.20
†	C3	210V111H08		Capacitor, .15 mf, 200 V, tubular	IF Amp. grid bias	.35
	C4	215V112A22	R2CC62Z5Z222P	Capacitor, .0022 mf, ceramic, 500 V	IF Amp. screen by-pass	.17
	C5	215V308H04		Capacitor, .005 mf, ceramic, 500 V	Audio output	.20
	C6	215V111A03	R2CC63Z5Z103P	Capacitor, .01 mf, ceramic, 500 V	Rectifier by-pass	.20
†	C7A	218V025H18		Capacitor, 80 mf, 150 V, electrolytic	AC filter	2.45
†	C7B			Capacitor, 250 mf, 150 V, electrolytic	AC filter	2.45
†	C7C			Capacitor, 60 mf, 150 V, electrolytic	AC filter	2.45
	C8	215V306H03		Capacitor, .01 mf, 1.4 kv	Bracket to ground	.35
	R1	250V231A04	RC20AE104M	Resistor, 100K ohms, ½W, 20%	Osc. grid	.05
	R2	250V234A73	RC20AE473J	Resistor, 47K ohms, ½W, 5%	Osc. screen	.17
	R3	250V226A81	RC20AE681K	Resistor, 680 ohms, ½W	IF grid bias	.17
	R4	250V234A72	RC20AE472J	Resistor, 4.7K ohms, ½W, 5%	IF Amp. plate	.12
†	R5	270V027H06		Control, 1 megohm (includes SW1)	Volume	1.95

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location of Function	List Price
	R6	250V222A70	RC20AE270K	Resistor, 27 ohms, ½W	3V4 filament	.06
	R7	250V228A21	RC20AE821K	Resistor, 820 ohms, ½W	B- filter	.12
†	R8	251V026H01		Resistor, 2K ohms, 7W, ballast	Filament dropping	.70
†	R9	251V025H02		Resistor, 150 ohms, 3W, ballast	Selenium protection	.55
	R10	250V211A56	RC20AE156J	Resistor, 15 megohms, ½W, 5%	Audio output grid	.20
†	L1	310V041H01		Loop, iron-core	Antenna	1.80
†	L2	230V063H01		Coil	Oscillator	.95
†	SW1	270V027H06		Switch (includes R5)	On-off	1.95
†	SW2	756V030H01		Switch	AC battery	1.45
†	T1	235V043H01		Transformer, 455 kc	1st IF	1.60
†	T2	235V043H02		Transformer, 455 kc	2nd IF	1.60
†	T3	570V050H01		Transformer (includes speaker)	Audio output	6.00
†	X1	295V014H01		Rectifier, selenium	AC rectifier	2.00
†	Z1	219V026H01		Module, used with 1U5	Audio circuit	2.30

† New part listed for the first time in Westinghouse Television or Radio Service Information.
Prices are subject to change without notice.
All resistors are 10% unless otherwise specified.

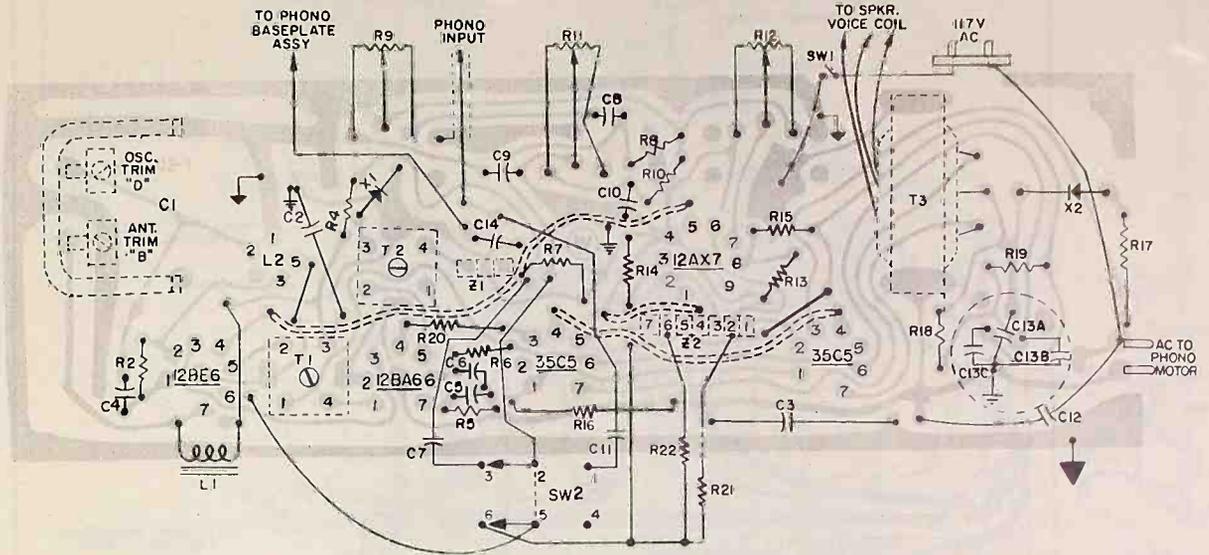


FIGURE 2. BOTTOM VIEW OF V-2503-1 PRINTED CIRCUIT BOARD SHOWING TOP PARTS AS SCHEMATIC SYMBOLS

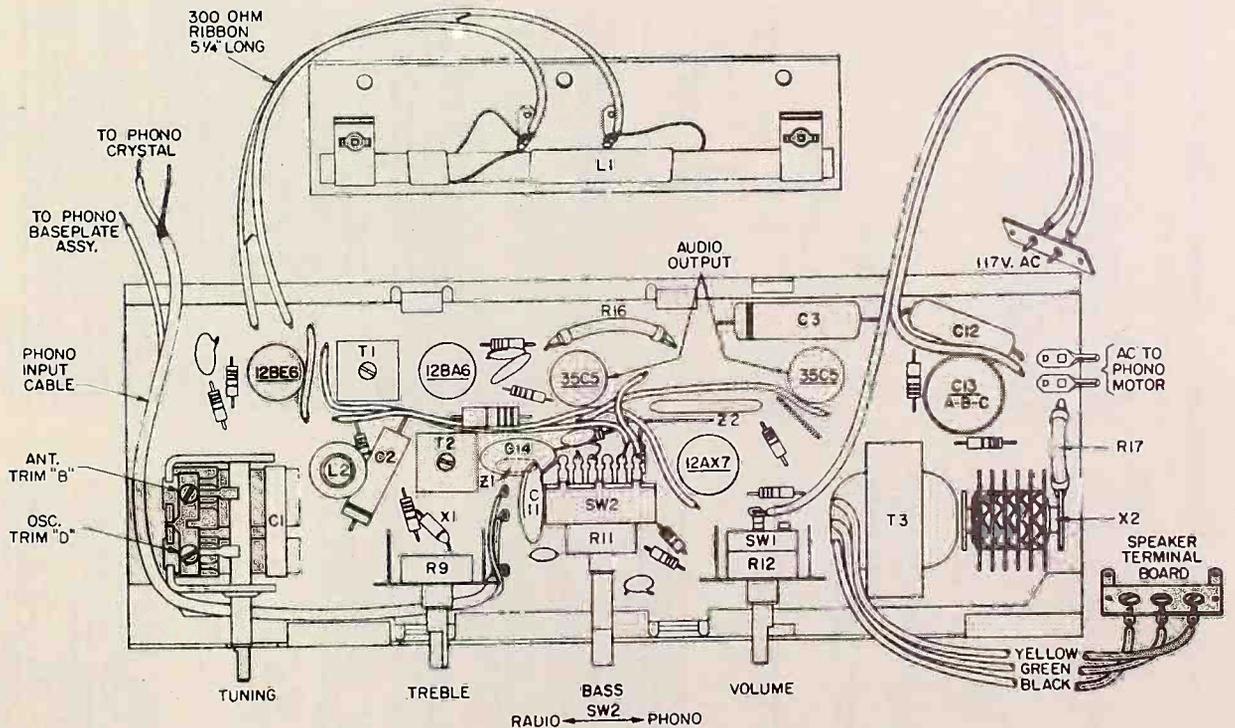
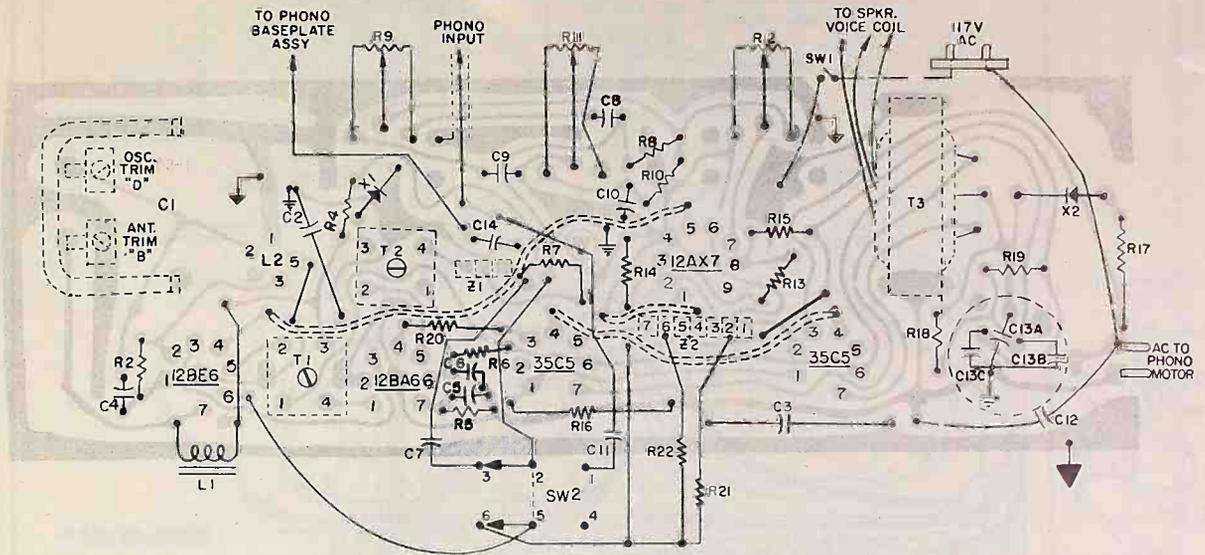


FIGURE 3. TOP VIEW OF V-2503-1 CHASSIS



V2503-1

FIGURE 2. BOTTOM VIEW OF V-2503-1 PRINTED CIRCUIT BOARD SHOWING TOP PARTS AS SCHEMATIC SYMBOLS

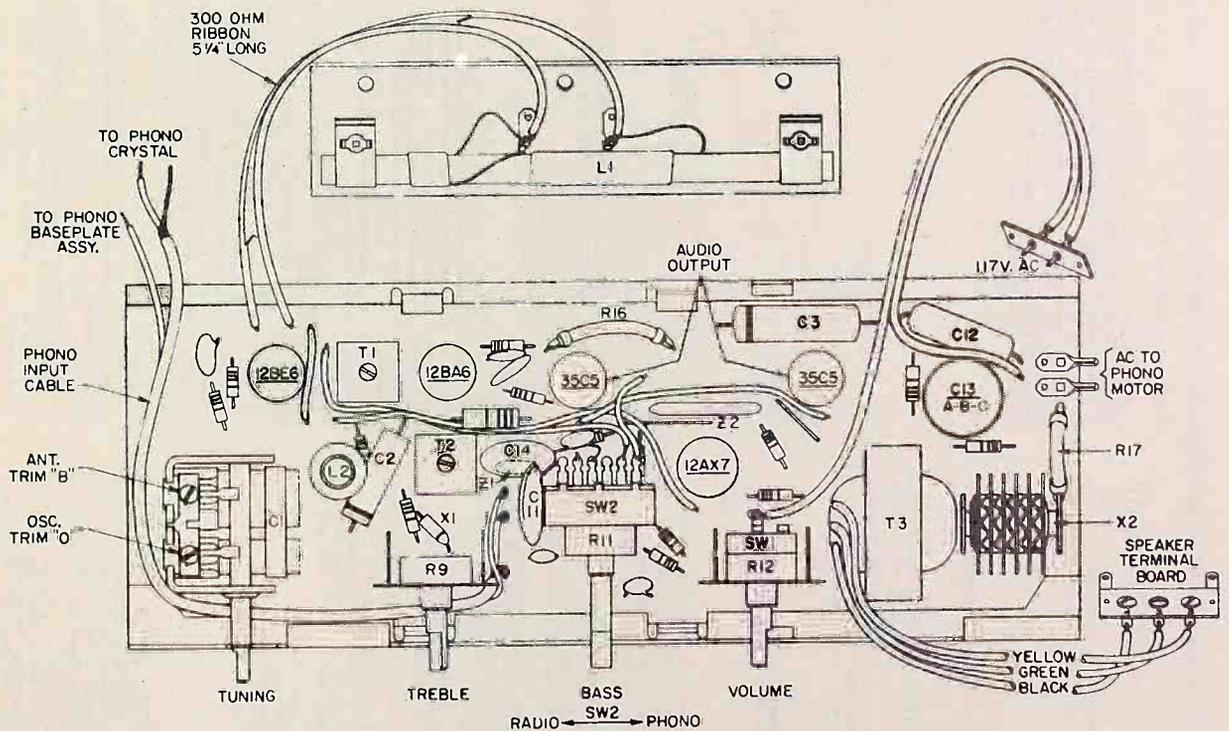


FIGURE 3. TOP VIEW OF V-2503-1 CHASSIS

AUDIO PACKAGED CIRCUIT

In early production of the V-2503-1 chassis, audio packs were used. This unit has two packs of 250 ohm resistors. The later production unit has terminals 2 and 5 and 6. In later production a new packaged circuit will be used. When used, the new packaged circuit number will be 219V024H02. If the old packaged circuit is to be replaced, remove the old, and install the new 100K ohm resistors.

SPECIFICATIONS	
Operating voltage.....	105 to 120 volts, 60 cycles AC
AC power consumption.....	50 watts
Radio (amplifier) with phono motor in operation.....	70 watts
Output impedances (across audio output transformer secondary):	
Terminals 2 and 4.....	12.8 ohms
Terminals 3 and 4.....	6.4 ohms
Audio output power.....	3.5 watts
Maximum.....	3.5 watts
Frequency response.....	Flax from 100 to 15,000 cps, ±2 db at 1 watt output
Speakers:	
One 8" PM.....	Low frequency
Two 4" PM.....	High frequency
Frequency range of radio.....	540 to 1600 kc
Record Changer.....	Collario Conquest
Phono cartridge.....	Electro-Voice No. 0156-TUL (needle not removable — entire cartridge must be replaced)

TUBE REPLACEMENT

To check or replace tubes, remove the five wood screws which secure the cover back located inside the record changer well.

CHASSIS REMOVAL

Note: It is not necessary to completely remove the chassis. The chassis may be removed from the cabinet to make repairs in most instances, although the chassis will not fit if it is removed from the cabinet and record player.

1. Remove all top-head wood screws from the bottom of the cabinet, the baffles. (If the baffle fits snugly, push it out from the rear of the cabinet using a screwdriver or similar tool).
2. Remove two screws which hold the chassis to the front panel.
3. Remove the other two screws which hold the chassis to the other under the TUNING control. **IMPORTANT: When removing the screws, support the chassis with one hand to prevent it from tilting.**
4. To test the equipment, by performing at this time through an isolation transformer.

- TO COMPLETELY REMOVE THE CHASSIS, CONTINUE AS FOLLOWS:**
5. Remove the two screws which hold the chassis to the front panel board to the interlock bracket. (Figure 4)
 6. Remove the two hex-head screws which secure the AC loop antenna.
 7. Remove the two hex-head wood screws which secure the speaker terminal board to the cabinet rear.
 8. Remove the speaker leads from the speaker terminal board.
 9. Remove the two screws which secure the speaker terminal board to the cabinet rear.
 10. Disconnect the AC lead to the phono motor at the speaker terminal board.
 11. Remove the chassis.

RADIO-PHONO SWITCH

A RADIO-PHONO switch of novel design is used in models HR112AN and HR113AN. This switch is coupled to the BASS control. When the BASS control is turned to its click is heard, the equipment is switched to the RADIO position. The BASS control will then affect the radio sound when the BASS control is turned to its extreme clockwise position (to the point where a click is heard), the equipment will then affect the radio sound. The BASS control will then affect the radio sound when the BASS control is turned to its extreme clockwise position. In the PHONO position, B is removed from the screen of the 12BE6 oscillator to prevent leak-through of broadcast signals during phono operation.

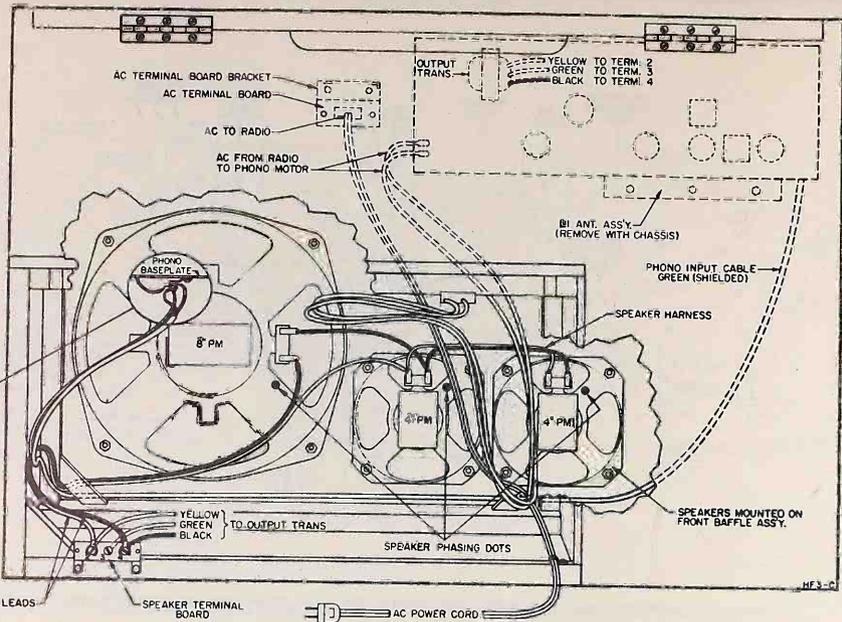


FIGURE 4. REAR VIEW OF CABINET, MODELS HR112AN AND HR113AN, SHOWING SPEAKER CONNECTIONS

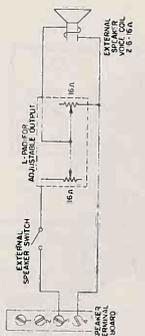


FIGURE 5. METHOD FOR CONNECTING AN EXTERNAL SPEAKER, WITH SWITCH AND L PAD

REMOTE SPEAKER

To add additional speakers to High Fidelity models HR112AN or HR113AN, the Westinghouse Remote Speaker System, models HE123, HE124 or HE135, is recommended. This system includes complete installation instructions.

1. Use an external speaker with a voice coil impedance of not less than six ohms.
2. Remove the internal speaker lead (from the speaker mounted in the HR112AN or HR113AN cabinet) from the speaker terminal board.
3. Connect this lead to terminal 3.
4. Connect the remote speaker or speakers in parallel to terminals 3 and 4 on the speaker terminal board.
5. Note: The L pad shown, which is NOT sold by Westinghouse, may be purchased from a local parts dealer.

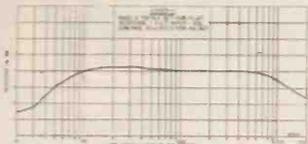


FIGURE 6. FREQUENCY RESPONSE CURVE

SPEAKER PHASING

When two or more speakers are used in the same listening area, speaker phasing is an important consideration. When two speakers are said to be in phase, the cones of both speakers move in and out at the same instant when audio voltage is simultaneously fed to both speakers. Speakers which are mounted close to each other must be connected in phase to produce good quality sound. Speakers may be phased using the battery method suggested under SPEAKER PHASING METHOD, or a "cut and try" method may be employed. The latter method simply means listening to the sound, then reversing the voice coil leads of one of the speakers. If reversing the leads improves the sound, speakers are connected properly. When more than two speakers are used, the battery method is more practical.

If two speakers are to be separated from each other by some distance, a "cut and try" phasing method may be desirable. As indicated in figure 7 the sound from one speaker, located at a greater distance from the listener, reaches the listener an instant later than sound from the closer speaker. For this reason, it is desirable to experiment with speaker location and phasing. The speaker hook-up (location and voice coil connection) which sounds best is the one to use.

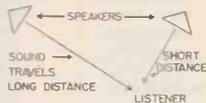


FIGURE 7. SPEAKER LOCATION AFFECTS SOUND QUALITY

SPEAKER PHASING METHOD

(Figure 8)

The following method may be used when an auxiliary speaker is to be added or a replacement speaker installed. This method involves the use of a nine volt battery.

All terminal references mentioned here refer to those shown in figure 8.

1. Disconnect one voice coil lead of speaker A.
 2. Connect the battery to speaker A, as shown by the solid-line battery leads. Note whether the speaker cone moves in or out when the battery is connected.
 3. Remove the battery leads from the speaker A voice coil. Connect the battery leads to the speaker B voice coil so that the cone of speaker B moves in the same direction as did the cone of speaker A. For example, if the speaker A cone had moved in, connect the speaker B voice coil to the battery so that the speaker B cone also moves in. To achieve this result, it may be necessary to connect terminal 3 to positive and 4 to negative or (reversing the leads) 3 to positive and 4 to negative.
 4. Connect both speaker voice coils in parallel so that the cones of both speakers move in the same direction when the battery is connected to the paralleled voice coils. For example, if * connected to terminal 1 caused speaker A cone pull-in, and * connected to terminal 3 caused speaker B cone pull-in, connect terminals 1 and 3 together. (The remaining voice coil leads are then connected together).
 5. Connect the paralleled voice coils to the output transformer secondary, terminals 1 and 5.
- The phasing technique described above may be adapted to the installation of more than one additional speaker.

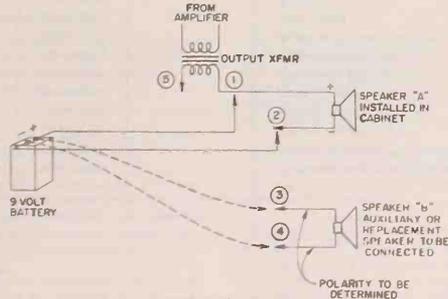


FIGURE 8. SPEAKER PHASING METHOD

AM ALIGNMENT

Preliminary Instructions

1. Remove chassis as described under CHASSIS REMOVAL.
2. Use an isolation transformer between the AC input of the equipment and the AC source. Connect AC and turn on equipment.
3. During alignment, leave the LOUDNESS control set at maximum volume. The signal generator output level should be kept sufficiently attenuated to avoid AVC action.

4. Turn the BASS control to its extreme counterclockwise position so that SW 2 is switched to the RADIO position. Then, turn the BASS control to approximately mid-range. (The equipment will remain in the RADIO position. The action of this switch and control is explained under RADIO-PHONO SWITCH in this manual).
5. Connect a 12 or 15 ohm, 4 watt resistor between terminals 2 and 4 on the speaker terminal board.
6. Use a non-metallic alignment tool which fits snugly into the adjustment slot. A properly fitting alignment tool prevents damage to the slotted iron core.

AM ALIGNMENT CHART

Connect VTVM across terminals 2 and 4

Step	Connect Signal Generator Output To:	Sig. Gen. Freq.	Radio Dial Setting	Adjust Following for Maximum VTVM Reading
1	Stator of antenna tuning capacitor (A) thru a 200 mfd capacitor.	455 kc	Minimum capacity	Top slug of T2. Bottom slug of T2. Top slug of T1. Bottom slug of T1.
2	"	1625 kc	Minimum capacity	Oscillator trimmer (D)
3	Disconnect signal generator. Leave signal generator output lead several feet from receiver antenna so that radiated signal is picked up.	1400 kc	1400 kc	Antenna trimmer (B)

MODEL PARTS

HR112AN - mahogany

HR113AN - oak

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
+		559V028H01		Baffle and grille cloth assembly	5.95
+		516V053H01		Cabinet, mahogany, HR112AN	35.80
+		516V053H02		Cabinet, oak, HR113AN	36.75
		770V415H01	V-15765-1	Contact, male, AC to phono	.10
+		751V008H01		Cord, AC power	.85
		768V080H05		Hinge, but, HR112AN	.57
		768V080H06		Hinge, but, HR113AN	.57
+		550V084H01		Knob, on-off-volume, base and treble	.45
		550V030H01		Knob, tuning	.50
		550V019H01		Knob, dial	.45
+		518V001H11		Leg, HR112AN	2.00
+		518V001H12		Leg, HR113AN	2.00
		754V003A01		Receptacle, power cord	.17
		751V513H01		Socket, 7 pin molded 35C5	.17
+		751V551H01		Socket, 9 pin, 12AX7	.20
		751V513H05		Socket, 7 pin, 12BE6 and 12BA6	.17
+		570V048H01		Speaker, 8 inch PM	9.50
+		570V049H01		Speaker, 4 inch PM	3.95
		770V454H04		Support, lid, HR112AN	.90
		770V454H03		Support, lid, HR113AN	1.07
+		558V126H03		Trim, plastic angle	.65
+		558V165H01		Trim, handle	2.20

CHASSIS PARTS

V-2503-1 chassis

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Function	List Price
+	C1	330V010H02		Capacitor, variable two gang	Tuning	3.75
	C2	210V054A73		Capacitor, .047 mf 400V	AVC	.22
	C3	210V214A73		Capacitor, .047 mf 600V	B- to chassis	.35
	C4	215V014A70	R1CC62R2G470K	Capacitor, disc, 47 mmf, 20%	Oscillator grid	.17
	C5	215V114A72	R2CC62Z5Z472P	Capacitor, disc .0047 mf	IF cathode	.17
	C6	215V103A32		Capacitor, disc, 3300 mmf	IF neutralizing	.27
	C7	215V114A72	R2CC62Z5Z472P	Capacitor, disc .0047 mf	Detector coupling	.17
	C8	215V102A21	R2CC61Y5Y221M	Capacitor, disc, 220 mmf	Treble control	.22
+	C9	215V103A31		Capacitor, disc, 330 mmf	Treble control	.20
	C10	215V101A02	R2CC62Y5Y102M	Capacitor, disc 1000 mmf	Bass control	.22
	C11	215V201A03		Capacitor, disc .01 mf 1.4 KV	Phono coupling	.35
	C12	210V024A73	RCP10W6473M	Capacitor, molded .047 mf 600V	Across AC line	.22

CHASSIS PARTS (Con't.)

V-2503-1 chassis

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Function	List Price
+	C-13A					
+	C-13B	218V025H17		Capacitor, electrolytic 80-60-10 mf 150V	Filter	2.50
+	C-13C					
	C14	215V201A03		Capacitor, .01 mf disc, 1.4 KV	Phono base plate	.35
+	L1	310V030H01		Loop antenna, iron core		2.10
+	L2	230V061H01		Coil, oscillator		.90
<i>All resistors are rated at 1/2 watt, 10% unless otherwise noted</i>						
	RW	250V231A01	RC20AE101M	Resistor, 100 ohms	Oscillator cathode	.05
	R2	250V222A23	RC20AE223K	Resistor, 22K ohms	Oscillator grid	.07
	R3	250V224A70	RC20AE470K	Resistor, 47 ohms	Oscillator grid	.05
	R4	250V223A35	RC20AE335K	Resistor, 3.3 megohms	AVC	.12
	R5	250V226A80	RC20AE680K	Resistor, 68 ohms	IF cathode	.04
	R6	250V221A02	RC20AE102K	Resistor, 1K ohms	12BA6 screen	.12
	R7	250V224A74	RC20AE474K	Resistor, 470K ohms	Diode load	.05
	R8	250V224A74	RC20AE474K	Resistor, 470K ohms	Tone compensation	.05
+	R9	270V027H07		Control, 3.3 megohms	Treble	1.10
	R10	250V221A84	RC20AE184K	Resistor, 180K ohms	Bass compensation	.05
+	R11	270V052H01		Control, 3.3 megohms, 1/2W, includes SW2	Bass	2.00
+	R12	270V027H08		Control, 1 megohms, includes SW1	Volume	1.63
	R13	250V224A71	RC20AE471K	Resistor, 470 ohms	12AX7	.12
	R14	250V221A82	RC20AE182K	Resistor, 1.8K ohms	12AX7 cathode	.05
	R15	250V226A83	RC20AE683K	Resistor, 68K ohms	12AX7 cathode	.05
+	R16	251V023H19		Resistor, 120 ohms, 1.5W, 10% glassohm	Cathode output	.40
+	R17	251V023H13	V-6067-12	Resistor, 15 ohms, 2W, glassohm	Selenium protection	.27
	R18	250V222A71	RC20AE271K	Resistor, 270 ohms	AC filter	.10
	R19	250V221A82	RC20AE182K	Resistor, 1.8K ohms	AC filter	.05
+	R20	250V426A80		Resistor, 68 ohms, 2W 10%	Filament series	.35
	R21	250V221A04	RC20AE104K	Resistor, 100K ohms	Plate load	.12
	R22	250V221A04	RC20AE104K	Resistor, 100K ohms	Plate load	.12
+	SW1	270V027H08		Switch, on-off, part of R12		1.65
+	SW2	270V052H01		Switch, radio-phonograph, part of R11		2.00
+	T1	235V042H01		Transformer, 1st IF (455 KC)		1.50
+	T2	235V042H02		Transformer, 2nd IF (455KC)		1.50
+	T3	430V058H01		Transformer, audio		3.20
	X1	295V002H01		Crystal, diode		1.25
+	X2	295V012H02		Rectifier, selenium, 150 ma		2.85
+	Z1	219V033H02		Packaged circuit, detector filter		1.75
+	Z2	219V024H01		Packaged circuit, audio		1.75

+ New part number listed for the first time in Westinghouse television or radio service information.



Westinghouse

RADIO
SERVICE MANUAL

SERVICE DEPARTMENT
RADIO-TELEVISION DIVISION
WESTINGHOUSE ELECTRIC CORP.
PITTSBURGH, PA.



MODELS

H662P4
(Charcoal and White)

H663P4
(Spruce Green and White)

H664P4
(Lemon Yellow and White)

CHASSIS V-2394-2

SPECIFICATIONS

Frequency Range	540 to 1600 kc
Intermediate Frequency	455 kc
Tube Complement:	
1 1B5	Converter
1 1U4	I.F. Amplifier
1 1U5	Detector AVC and 1st Audio Amplifier
1 5Y4	Audio Output
Power Consumption (AC Operation)	35 Watts
Audio Power Output (AC Operation)	
Maximum	300 Watts
Undistorted	150 Watts
Speaker	4" PM
Power Supply:	
Battery Operation:	
1 "A" Battery (9V) Eveready #276, Burgess #D6, Ray-O-Vac #169, General #98	
1 "B" Battery (90V) Eveready #479, Burgess #P60, Ray-O-Vac #214, General #176	
Current Consumption (Battery Operation)	
"A" Battery .....	.050 Amp.
"B" Battery .....	.009 Amp.



MODULE SERVICING INFORMATION

The Detector-First Audio Amplifier stage of this receiver has been modularized to provide greater reliability, compactness and ease of servicing. All the components of this stage, including the tube socket, are contained in this packaged circuit.

The module consists of five printed circuits, stacked, one on top of another. Each printed circuit is made up of a ceramic wafer with more than one component (capacitors or resistors) printed on the wafer. The five stacked wafers are connected together by twelve riser wires. At the top of the module, seven of the risers connect to the tube socket. At the bottom of the module the riser wires are extended so that they can be soldered directly into the printed circuit board.

Because the module is a complete unit, it is easier to service and replace than the individual components. A bottom view of the module is shown on the schematic diagram

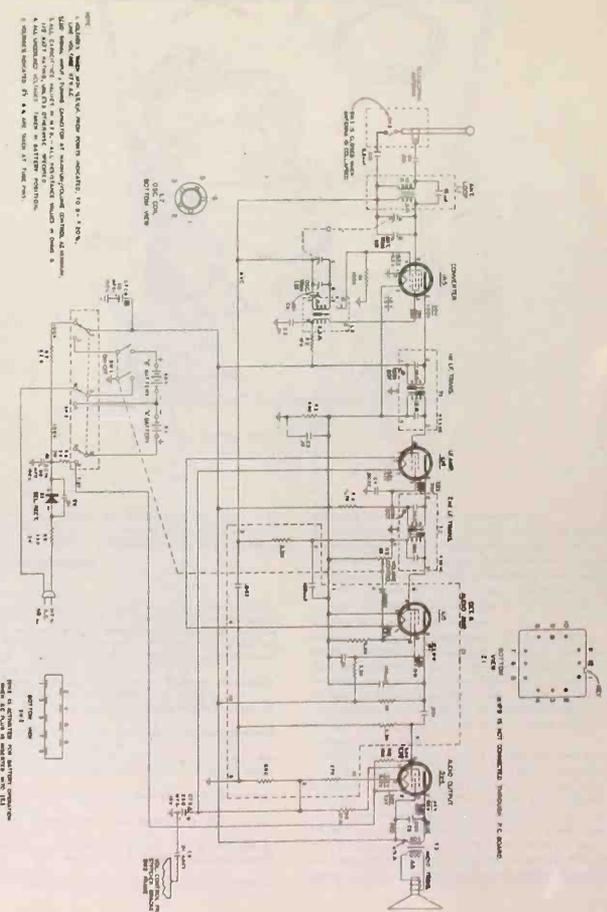
(Figure 1). A key (notch) on one side of the module indicates pin #1 of the module. With exception of pin #9 all the riser wires are soldered into the printed circuit chassis. The components contained in the module are shown on the schematic enclosed in dashed lines. The corresponding riser numbers are shown as they enter the circuit.

It is not recommended that the module itself be serviced. It is rather difficult to replace components within the module. If the trouble is localized to the module it is recommended that the module be replaced.

To replace a module cut the riser wires at the base of the module, where they enter the printed circuit board. Remove the remaining wires from the board with the soldering iron (low wattage type). Observing the correct position of the module key, install the new module in the holes in the board and solder in place.

V-2394-2

Figure 1 - Schematic Diagram



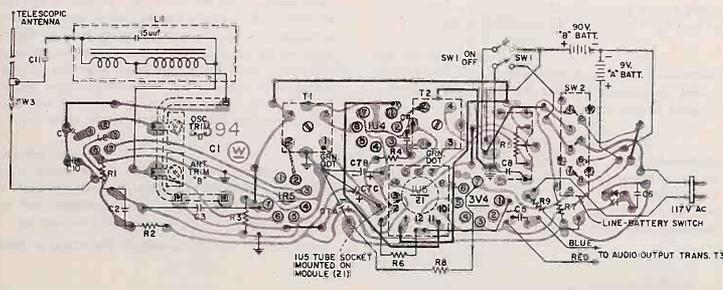


Figure 2 - Bottom view of chassis with components shown symbolically

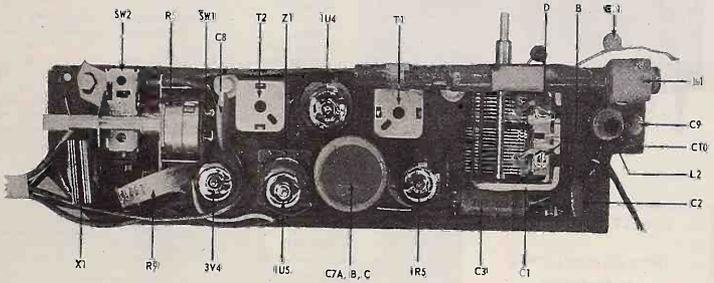


Figure 3 - Top view of chassis

CHASSIS REMOVAL

1. Press in the two cabinet release buttons on either side of the receiver case. Open the case to expose the chassis and batteries.
 2. Unsnap the battery cable assemblies from the "A" and "B" batteries.
 3. Remove the two self-tapping screws securing the AC receptacle.
 4. Disengage the volume control knob from the control shaft. This knob is captivated and thus will remain in the case when the chassis is removed.
 5. Remove the battery leads from under the two retaining bands.
 6. Unsolder the wire to the telescoping antenna. Unsolder the loop antenna end of capacitor C11 (.001 mf).
 7. Remove the two self-tapping screws securing the chassis bracket to the top of the case.
 8. Carefully slide the chassis out from the receiver case.
- When servicing, with the receiver connected to the AC power line, use an isolation transformer between the AC line and the receiver. To replace the chassis, reverse the above procedure. Be careful to correctly seat the chassis in the cabinet mounting grooves.

ANTENNA INFORMATION

This receiver employs two antennas. One is a horizontal ferrite-core and the other a vertical telescoping antenna. The telescoping antenna has 5 sections and when fully

extended is 38" long. The telescoping antenna is inductively and capacitively coupled to the grid of the RF amplifier. It is connected to a primary winding, wound on the ferrite rod antenna and tightly coupled to the tuned secondary. The high ends of the windings are coupled together through a .15 mmf capacitor. In this manner a constant high impedance is presented to the telescoping antenna over the entire AM band. For low AM frequencies the signal is predominantly coupled inductively while high AM frequencies are primarily coupled capacitively.

When extended, the telescoping antenna represents 15 mmf capacity to earth ground. In the recessed position this is reduced to approximately 7 mmf. Hence, to maintain a constant capacity, an 8.2 mmf capacitor is placed in shunt with the antenna, in the recessed position (SW3). The telescoping antenna should therefore be used in either the fully extended or fully recessed positions for optimum results, not in some intermediate position.

The telescoping antenna serves as a non-directional pickup. This means that the radio can be rotated to any position without encountering nulls (dead spots) as usually found with conventional loop or ferrite-core antennas. In areas of high ambient electrical noise level, it may be found advantageous to keep the telescoping antenna in its fully recessed position for best performance.

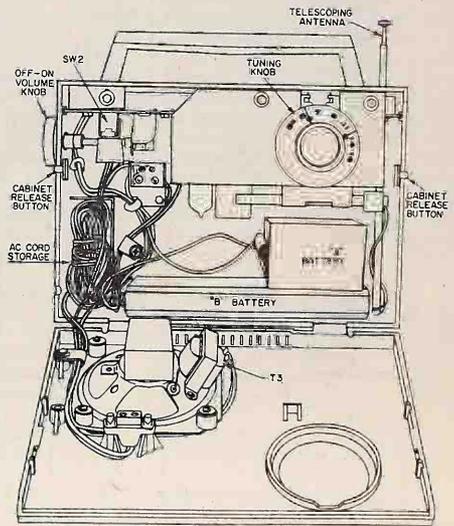


Figure 4 - View of receiver with case opened

ALIGNMENT

While making the following adjustments, keep the volume control set at maximum output and the signal generator output attenuated to avoid AVC action.

If the receiver is powered from the 117 volt AC line, it is recommended that an isolation transformer be used between the receiver and the AC line.

Step	Connect Signal to:	Signal Generator Frequency	Radio Dial	Adjust for Maximum Output
1	Stator of tuning capacitor (F) through a .01 mf capacitor.	455KC	Minimum capacity	Top and bottom slugs of T2 & T1 in order given
2	Capacitor C11 as shown in Figure 5 through a 15 mmf capacitor.	1625KC	Minimum capacity	Oscillator trimmer "C"
3	Same as step #2	1400KC	1400KC	RF trimmer "F" and antenna trimmer "B"
4	Same as step #2	600KC	600KC	L2
*	Repeat steps 2, 3 & 4 until no further change is noted			

It is recommended that a fibre aligning tool, that snugly fits the slot in the powdered iron core, be used, to prevent chipping of the slot in the IF transformers and coils.

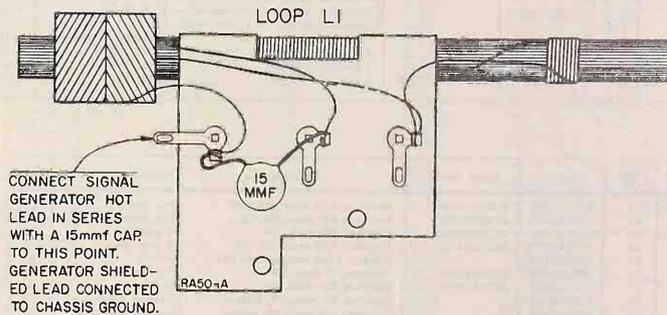


Figure 5 - Signal generator connection in step 2 of alignment procedure

MODEL PARTS LIST

When ordering parts, specify part number, description of part and model number.
Do not order by model number alone.
Where applicable, prices include Federal Excise Tax.

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	List Price
		318V004H01		Antenna, telescoping	3.00
		770V565H01		Bracket, handle	.10
		778V104H01		Bracket assy., AC receptacle	.45
†		513V028H03		Cabinet, H662P4, Charcoal & White	10.00
†		513V028H04		Cabinet, H663P4, Spruce Green & White	10.00
†		513V028H05		Cabinet, H664P4, Lemon Yellow & White	10.00
		759V042H02		Cable, batteries	.70
†		559V027H03		Catch assy., H662P4	1.00
†		559V027H04		Catch assy., H663P4	1.00
†		559V027H05		Catch assy., H664P4	1.00
		770V588H01		Contact, antenna (secured to inside of cabinet)	.20
		751V009H01		Cord, AC power	.75
		555V028H01		Escutcheon	.65
		558V159H01		Handle	.45
		558V166H01		Insignia	.55
		550V096H01		Knob, volume	.55
		550V087H01		Knob, dial	.55
		550V088H01		Knob, tuning	1.00
		558V162H03		Nameplate, handle	.85
		768V044H09		Nut (captures dial knob)	.05
		783V079H01		Nut, brass sleeve (mounts telescoping antenna)	.10
		751V513H04		Socket, 7 pin (3V4)	.17
		751V513H05		Socket, 7 pin (1R5 & 1U4)	.17
		570V050H01		Speaker, 4" PM (includes T3)	6.00
		770V520H01		Spring, hinge	.10
		763V000H95		Washer (captures volume knob)	.05

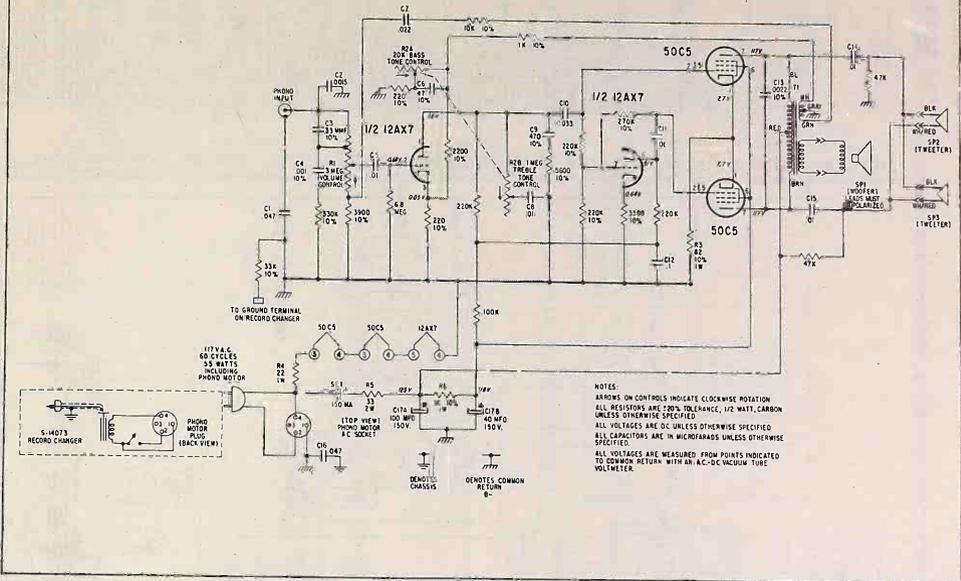
CHASSIS PARTS LIST

Resistors are 1/2 watt, 10% unless otherwise specified.

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
†	C1	330V008H03		Capacitor, variable	Tuning	3.75
	C2	215V111A03	R2CC63Z5Z103P	Capacitor, .01 mf, ceramic GMV	Osc. plate by-pass	.20
	C3	210V111H08		Capacitor, .15 mf, 200 V, tubular	IF Amp. grid bias	.35
	C4	215V112A22	R2CC62Z5Z222P	Capacitor, .0022 mf, ceramic, 500 V	IF Amp. screen	.17
	C5	215V308H04		Capacitor, .005 mf, ceramic, 500 V	Audio output	.20
	C6	215V111A03	R2CC63Z5Z103P	Capacitor, .01 mf, ceramic, 500 V	Rectifier by-pass	.20
	C7A	218V025H18		Capacitor, 80 mf, 150 V, electrolytic Capacitor, 250 mf, 150 V, electrolytic Capacitor, 60 mf, 150 V, electrolytic	AC filter	2.45
	C7B					
	C7C					
	C8	215V306H03		Capacitor, .01 mf, 1.4 kv	Bracket to ground	.35
	C9	215V300H48		Capacitor, .001 mf	Osc. padder	.20
	C10	215V300H46		Capacitor, 8.2 mmf	Ant. loop	.20
	C11	215V111A02	R2CC61Z5Z102P	Capacitor, .001 mf	Ant. loop	.17

New Part	Ref. No.	Part No.	Equiv. Part No.	Description	Location or Function	List Price
	R1	250V231A04	RC20AE104M	Resistor, 100K ohms, 1/2W, 20%	Osc. grid	.05
	R2	250V234A73	RC20AE473J	Resistor, 37K ohms, 1/2W, 5%	Osc. screen	.17
	R3	250V226A81	RC20AE681K	Resistor, 680 ohms, 1/2W	IF grid bias	.17
	R4	250V234A72	RC20AE472J	Resistor, 4.7K ohms, 1/2W, 5%	IF Amp. plate	.12
	R5	270V027H06		Control, 1 megohm (includes SW1)	Volume	1.95
	R6	250V222A70	RC20AE270K	Resistor, 27 ohms, 1/2W	3V4 filament	.06
	R7	250V228A21	RC20AE821K	Resistor, 820 ohms, 1/2W	B+ filter	.12
	R8	251V026H01		Resistor, 2K ohms, 7W, ballast	Filament dropping	.70
	R9	251V020H55		Resistor, 150 ohms, 5W, ballast	Selenium protection	.35
†	R10	250V211A56	RC20AE156J	Resistor, 15 megohms, 1/2W, 5%	Audio output grid	.20
	L1	310V031H01		Loop, (includes 15 mmf capacitor)	Antenna	2.00
†	L2	230V067H01		Coil	Oscillator	1.20
	SW1	270V027H06		Switch, (includes R5)	On-off	1.95
	SW2	756V030H01		Switch	AC battery	1.45
	SW3	318V004H01		Switch, (includes telescoping antenna)	Antenna	3.00
	T1	235V043H01		Transformer, 455 kc	1st IF	1.60
	T2	235V043H02		Transformer, 455 kc	2nd IF	1.60
	T3	370V050H01		Transformer, (includes speaker)	Audio output	6.00
	X1	295V014H01		Rectifier, selenium	AC rectifier	2.00
	Z1	219V026H01		Module, used with 1U5	Audio circuit	2.30

† New part listed for the first time in Westinghouse Television or Radio Service Information.
Prices are subject to change without notice.



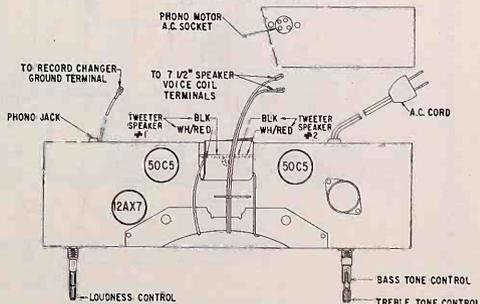
ZENITH RADIO CORPORATION MODELS HF110G & J CHASSIS 3Z04

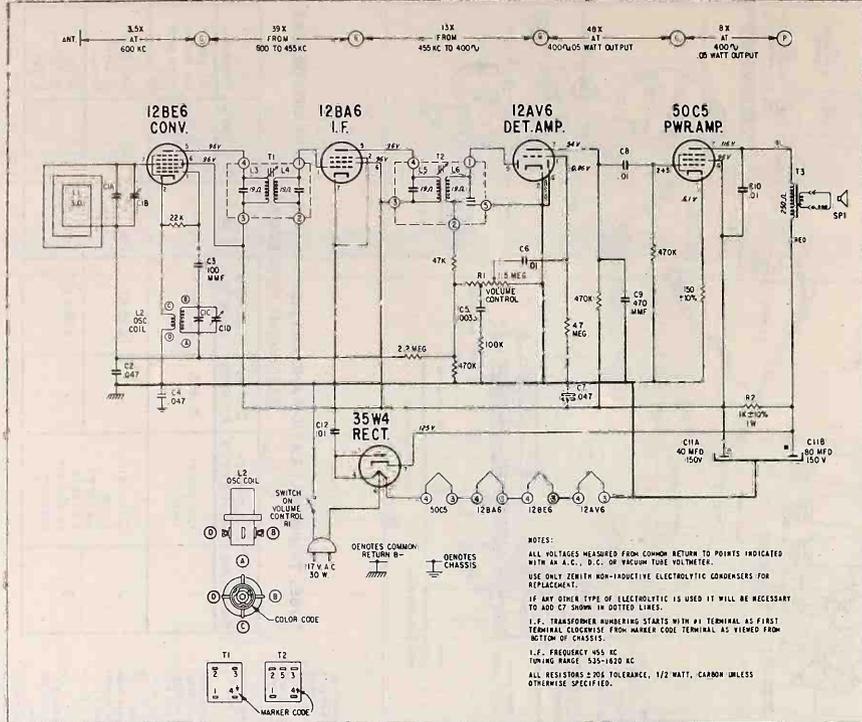
PART NO.	DIA. NO.	DESCRIPTION	PRICE
11-100		Line Cord	1.00
14-135	C5, 8, 11,		
22-11	C10	.001 mfd. ceramic disc. 1KV (5 used)	.30
22-12	C2	.0015 mfd. ceramic disc. 500V	.25
22-16	C9	470 mmf. ceramic disc. 800V	.25
22-17	C4	.001 mfd. ceramic disc. 1KV	.25
22-1777	C12	1/2 mfd. tubular - 200V	.35
22-2765	C6	1/2 mfd. tubular - 200V	.35
22-2792	C1, 16	.047 mfd. tubular - 200V (2 used)	.35
22-2807	C7	.022 mfd. tubular - 200V	.35
22-2839	C13	.0022 mfd. tubular - 200V	.25
22-2863	C1	33 mmf. ceramic disc. 500V	.25
22-2864	C17A, B	Electrolytic 400/150V, 100/150V	2.50
44-25		Phono jack	.25
54-139		3/8-32 x 9/16 hex palmot (1 mts. ea. 63-403 & 4004)	.01
54-267		5-32 x 5/16 hex palmot (used on 114-510)	.01
63-965	R6	1000 ohm 1/2W ins. 10%	.25
63-1757		220 ohm 1/2W ins. 10%	.25
63-1785		1000 ohm 1/2W ins. 10%	.17
63-1799		3300 ohm 1/2W ins. 10%	.17
63-1806		3300 ohm 1/2W ins. 10%	.17
63-1810		3900 ohm 1/2W ins. 10%	.17
63-1817		5600 ohm 1/2W ins. 10%	.17
63-1827		10K ohm 1/2W ins. 10%	.17
63-1848		33K ohm 1/2W ins. 10%	.17
63-1856		47K ohm 1/2W ins. 20% (2 used)	.17
63-1870		100K ohm 1/2W ins. 20%	.17
63-1883		220K ohm 1/2W ins. 10%	.17
63-1884		220K ohm 1/2W ins. 20% (2 used)	.17
63-1887		270K ohm 1/2W ins. 10%	.17
63-1890		330K ohm 1/2W ins. 10%	.17
63-1947		6.8 megohm 1/2W ins. 20%	.17
63-3197	R4	22 ohm 1/2W ins. 20%	.25
63-3636	R3	82 ohm 1/2W ins. 10%	.25
63-3637	R2A, B	1 megohm treble - 20K (less)	.25
63-3687	R1	1 megohm volume control	.25
63-3643	R5	33 ohm 2W ins. 20%	.34
78-275		Electrolytic socket	.05
78-402		Contact socket	.15
78-810		7 Pin miniature tube socket (1 mts. ea. 50C5)	.25
78-846		9 Pin miniature tube socket (mts. 12AX7)	.25
83-1119		Insulating strip	.05
83-2115		7 Lug terminal strip	.15
83-2216		7 Lug terminal strip	.10
83-2307		4 Lug terminal strip	.10
83-2454		4 Lug terminal strip (2 used)	.10
83-2494		Insulating strip	.05
83-2530		Armie strip	.10
83-2628		1 Lug terminal strip	.10
83-2635		5 Lug terminal strip	.10
86-251		Terminal (part of S-24248)	.05
93-2		Bress washer (2 mts. 95-1481)	.05
95-1481	T1	Output transformer	4.00
114-510		6-32 x 1-5/8 x 1/2 hex hd. mech. screw (mts. 212-18)	.05
125-96		Strain relief grommet	.10
212-18	SE1	Selenium rectifier	2.35
5-24248		Wire & terminal assem.	

PART NO.	DIA. NO.	DESCRIPTION	PRICE
14-2405G		Table Cabinet - Model HF110G	
14-2405J		Table Cabinet - Model HF110J	
16-1449		Packing Carton	
19-298		Mounting Clip (mts. S-41437)	.20
24-922		Chassis Cover - Model HF110J	
24-924		Chassis Cover - Model HF110G	
36-210		Cabinet Handle (part of 14-2405G)	
36-211		Cabinet Handle (part of 14-2405J)	
40-157		Lid Support Hinge (part of 14-2405, G & J)	1.30

PART NO.	DIA. NO.	DESCRIPTION	PRICE
40-189		Hinge (2 part of 14-2405 G & J)	.30
44-1318		Knob - Volume & Tone HF110J	.25
46-2001		Knob - Volume & Tone HF110G	.25
45-795	SP1	75" P.M. Speaker	8.50
54-10		3-3/4 x 3/4 Hex. Nut (part of 14-2405 G & J)	.03
54-424		8-32 x 1/32 Hex. Palmot (3 mts. 49-795)	.25
57-1721		Emblem Plate (part of 14-2405 G & J)	.03
70-215		6 x 3/8 Phils. Rd. Hd. Wood Screw (6 used on 14-923 & 924)	.04
70-249		6 x 7/8 Phils. Oval Hd. Wood Screw (4 used on 14-2405 G & J)	.04
83-765		Armie strip (2 used)	.03
83-1475		Phone Shipping Strip (2 used)	.05
83-2335		Phone Shipping Strip (2 used)	.05
83-2761		Terminal (4 used)	.05
86-254		6 Finishing Washer (1 used on ea. 70-239)	.15
92-1173		Fibre Washer (2 part of S-14083)	.03
97-260		Handle Stud (2 part of 14-2405 G & J)	.25
97-511		8-32 x 1-1/8 Swedge Hd. Mech. Screw (3 part of 24-2405 G & J)	.03
112-1038		Record Changer Mip. Screw (2 part of S-14083)	.04
112-1142		S-20 x 95 Phils. Rd. Hd. Self Tap Screw (mts. 19-298)	.04
114-329		6-18 x 3/8 x 1/2 Hex. Hd. Self Tap Screw (2 mts. ea. S-23829)	.04
114-478		10-32 x 1/8 Slot Hd. Mech. Screw-Flat washer. etc. (6 used on 3Z04)	.03
142-87		Dual Cartridge (Sapphire-Sapphire)	3.95
156-65		Cover Latch (2 part of 14-2405J)	1.50
159-94		Plug Button (4 used on 14-2405 G & J)	1.10
159-95		Plug Button Screen (2 used on 14-2405 G & J)	.55
166-114		Plastic Bumper (6 part of 14-2405 G & J)	.05
188-102		Knob Retaining Ring (1 part of ea. S-43478, 43479, 44126 & 44127)	.55
188-195		Retaining Ring (2 part of S-14083)	.10
202-1162		Instruction Book	.30
S-14083		Record Changer	1.00
S-23829	SP2, 3	45 RPM Record Adapter	2.95
S-41427		Cartridge Holder (part of S-14083)	1.10
S-42308		Knob & Ring Assem.	.25
S-43478		Knob & Ring Assem.	.25
S-44126		Knob Ring Assem. Tone HF110G	
S-44127		Knob & Ring Assem. Dummy HF110G	

NOTES
 ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION
 ALL RESISTORS ARE 20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
 ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED
 ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
 ALL VOLTAGES ARE MEASURED FROM POINTS INDICATED TO COMMON CHASSIS WITH AN A.C. MEDIUM TIME VOLTMETER



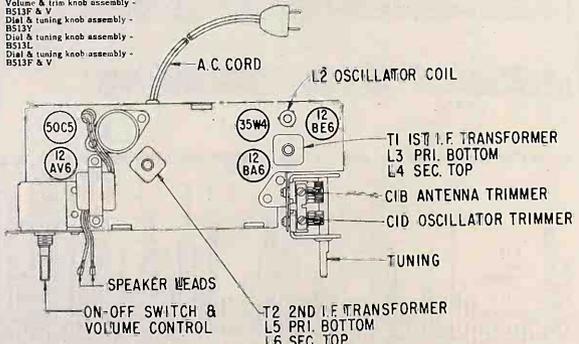


ZENITH RADIO CORPORATION MODEL B513Y, L, F, V CHASSIS 5B01

CHASSIS PARTS		
PART NO.	DIA. NO.	DESCRIPTION
11-85		Line cord & plug
12-2323		Waveform mtg. bracket
12-2677		Variable capacitor mtg. bracket
12-2678		Volume control mtg. bracket
19-238		Coil mounting clip (part of S-4391D)
23-1	C6, 8	01 mfd. ceramic disc capacitor - 500V (4 used)
22-5	C3	100 mfd. ceramic disc capacitor - 500V
22-6	C9	470 mfd. ceramic disc capacitor - 1KV
22-11	C5	3033 mfd. ceramic disc capacitor - 500V
22-2351		Electrolytic capacitor - 40/150 80/150
22-2392	C2, 4, 7	047 mfd. paper dielectric capacitor - 500V (2 used)
22-3098	C1, B	Two section variable capacitor C, D
54-139		3/8-32x1/16 paint (mts. 63-4404)
63-645	R2	1500 ohm ins. 1/2W 10%
63-1750		150 ohm ins. 1/2W 10%
63-1842		22 K ohm ins. 1/2W 10%
63-1856		47 K ohm ins. 1/2W 20%
63-1870		100 K ohm ins. 1/2W 20%
63-1898		470 K ohm ins. 1/2W 20% (3 used)
63-1926		2.2 megohm ins. 1/2W 20%
63-1940		4.7 megohm ins. 1/2W 20%
63-404	R1	Volume control & switch
74-275		Electrolytic capacitor socket
78-831		Seven contact wafer tube socket
78-889		Seven contact wafer tube socket (3 used)
78-990		Seven contact wafer tube socket
83-2132		Single lug terminal strip
86-199		Terminal block-proof (used with 114-275)
86-237		Connector terminal (2 used)
94-295		Gang capacitor mtg. bushing (3 used)
95-1594	T1	1st I.F. transformer
95-1595	T2	2nd I.F. transformer
95-1637	T3	Output transformer
113-78		6-32x1/8 AF hex. hd. mach. screw - lockwasher att. (2 used on 22-3098)
114-78		8-18x5/16 AF hex. hd. self-tapping screw (1 used on 12-2323, and 2 on 12-2677 & 2079)
114-365		8-12x3/8 hex. hd. self-tap screw - flat washer att. (used on S4517)
114-542		6-32x1/8 hex. hd. mach. screw (used on 22-3098)
125-94		Rubber grommet (3 used)
125-96		Strain relief grommet
149-211		Iron core (part of S-4391D)
S-4391D	L2	Oscillator coil
S-44517	L1	Wave magnet

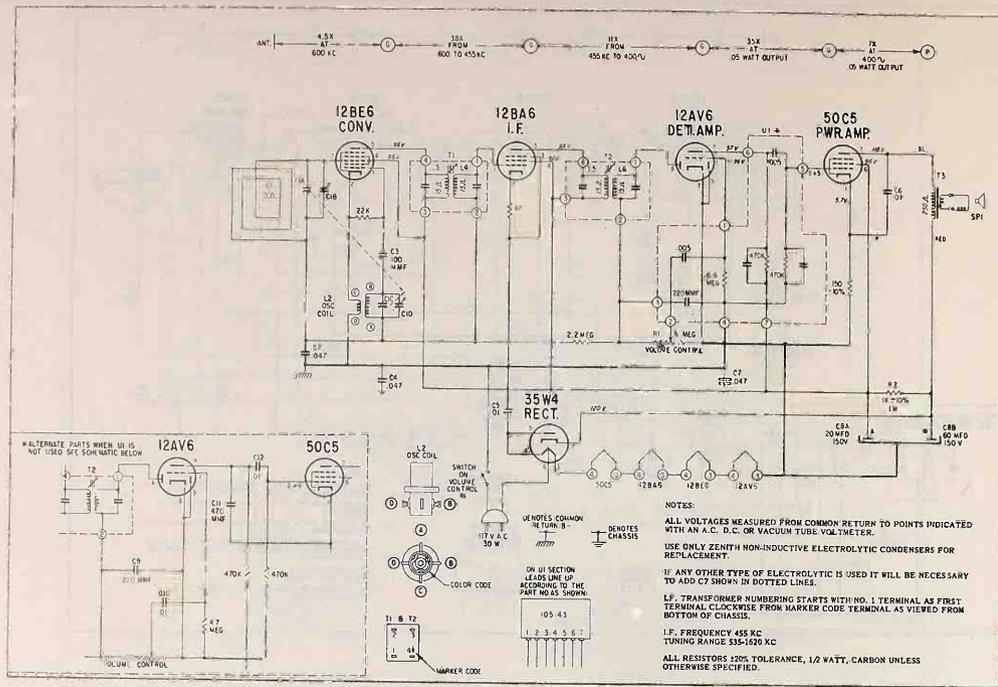
CABINET PARTS		
PART NO.	DIA. NO.	DESCRIPTION
114-523		8-18x7/16 hex. hd. self-tapping screw - flat washer att. (4 used on 49-869)
114-537		8-32x1/2 slotted hex. hd. mach. screw - flat washer att. (4 used on S301)
126-896		Heat shield
136-210		Cabinet grille - B513Y
138-211		Cabinet grille - B513F & V
138-212		Knob clamping ring (used on S-44790 & S-44792)
188-135		Knob clamping ring (used on S-44803 & S-44805)
207-1396		Instruction book
2-26270		Terminal strip
S-44790		Volume & trim knob assembly - B513Y
S-44791		Volume & trim knob assembly - B513F & V
S-44792		Volume & trim knob assembly - B513F & V
S-44803		Dial & tuning knob assembly - B513Y
S-44804		Dial & tuning knob assembly - B513F
S-44805		Dial & tuning knob assembly - B513F & V

I.F. TRANSFORMERS:
The I.F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers, the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.



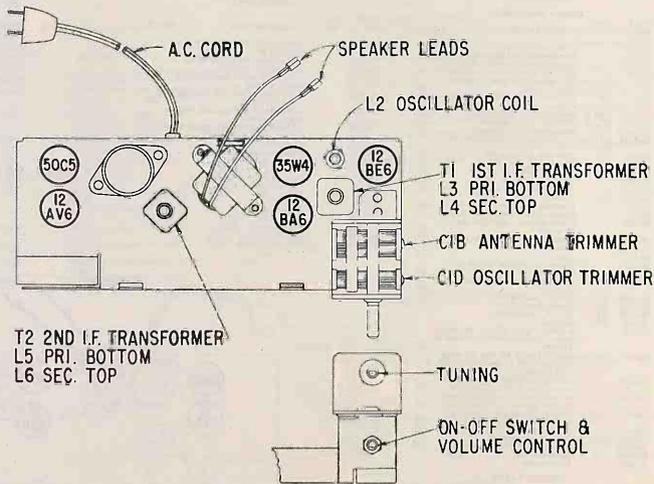
ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	5 Mfd.	455 Kc.	600 Kc.	L3, L4, L5, L6	Align I.F. for max. output.
2	One Turn Loop	-	1600 Kc.	1600 Kc.	C1D	Set Osc. to Dial Scale.
3	Coupled Lo. closely to Wave Magnet.	-	1400 Kc.	1400 Kc.	C1B	Align Antenna Stage.



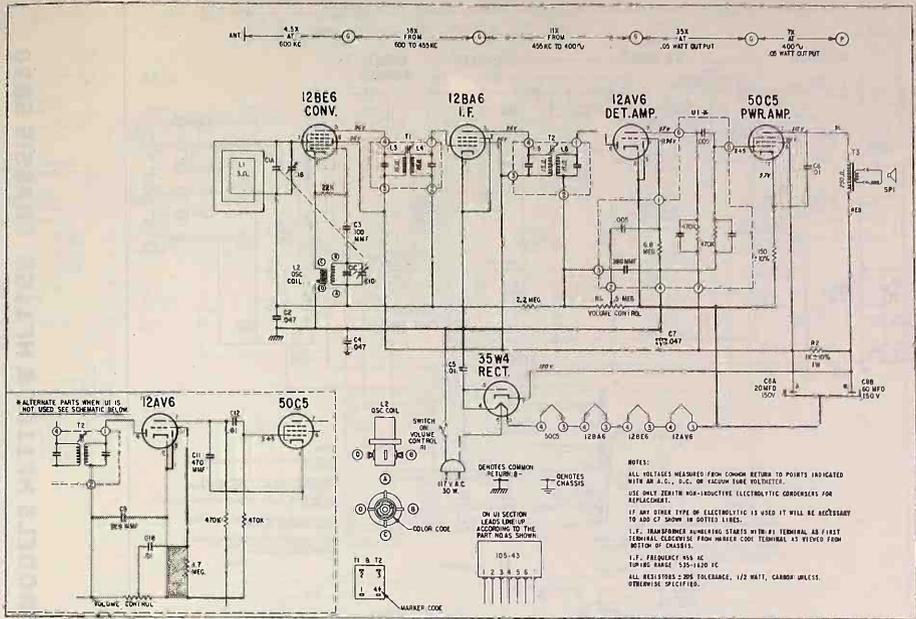
MODELS B511 B, P, L, V CHASSIS 5B10

CHASSIS PARTS		
PART NO.	DESCRIPTION	PRICE
11-85	Line cord & plug	.75
12-2323	Wavemagnet mtg. bracket	.15
12-2667	Variable capacitor mtg. bracket	.10
12-238	Coil mfg. clip (part of S-43910)	.10
22-3	.01 mfd. ceramic disc capacitor - 500V (2 used)	.30
22-5	100 mfd. ceramic disc capacitor - 350V	.25
22-2202	C8A, B Electrolytic - 20/150 60/150	2.15
22-2792	C4 .047 mfd. paper - 200V	.30
22-3038	C1A, B, C, D Two section variable capacitor	.30
63-665	R2 1000 ohm resistor 1/2W Ins. 10%	.25
63-1730	47 ohm 1/2W Ins. 20%	.17
63-1750	150 ohm resistor 1/2W Ins. 10%	.17
63-1842	22 K ohm resistor 1/2W Ins. 20%	.17
63-1926	2.2 megohm resistor 1/2W Ins. 20%	.17
63-4440	R1 Volume control & switch	.17
78-275	Electrolytic socket	.05
78-831	Seven contact wafer tube socket (3 used)	.15
78-989	Seven contact wafer tube socket (3 used)	.15
78-990	Terminal	.03
86-30	Connector terminal (2 part of 95-1626)	.03
86-247	Conng. capacitor mtg. bushing (3 used)	.05
94-295	T1 1st I.F. transformer	2.50
95-1504	T2 2nd I.F. transformer	.05
95-1626	T3 Output transformer	.05
95-1636	T4 I.F. transformer	.05
105-43	UI1 Integret	.03
113-78	8-18x11/32x1/4 AF hex. hd. self-tap screw - lockwasher att. (1 used on 12-2723, & 2 used on ea. 12-2367 & 22-3038)	.03
114-365	8-32x3/8 hex. hd. self-tap screw (used on 12-2723)	.05
114-542	6-32x1/2 hex. hd. mach. screw (used on 22-3038)	.03
125-94	Rubber grommet (3 used)	.03
125-96	Strain relief grommet	.10
145-211	Iron core (part of S-43910)	.10
S-43910	L2 Oscillator coil assembly	
S-44171	L1 Wavemagnet assembly	
CABINET PARTS		
12-2666	Grille mtg. bracket (2 used)	
14-2456	Plastic table cabinet - B511B	6.00
14-2457	Plastic table cabinet - B511P	6.00
14-2458	Plastic table cabinet - B511L	6.00
14-2459	Plastic table cabinet - B511V	6.00
16-1470	Packing carton	
46-2012	Tuning knob	
46-2013	Volume control knob	5.00
49-838	4 1/2" speaker	
57-2498	Emblem plate	.35
80-1063	Knob retaining spring	.10
93-1182	Strive washer	.03
112-1170	8-32x2 3/4 phillips pan hd. mach. screw (2 used)	
114-423	8-18x5/16x1/4 AF hex. hd. self-tapping screw (2 used)	.03
114-507	8-18x3/8 sid. hex. hd. self-tap screw (4 used)	.03
114-637	8-32x1/2 slotted hex. hd. mach. screw - flat washer att. (3 used)	
126-896	Heat shield	
138-186	Cabinet grille - B511B	
138-187	Cabinet grille - B511P, V	
138-188	Cabinet grille - B511L	
207-1380	Instruction book	



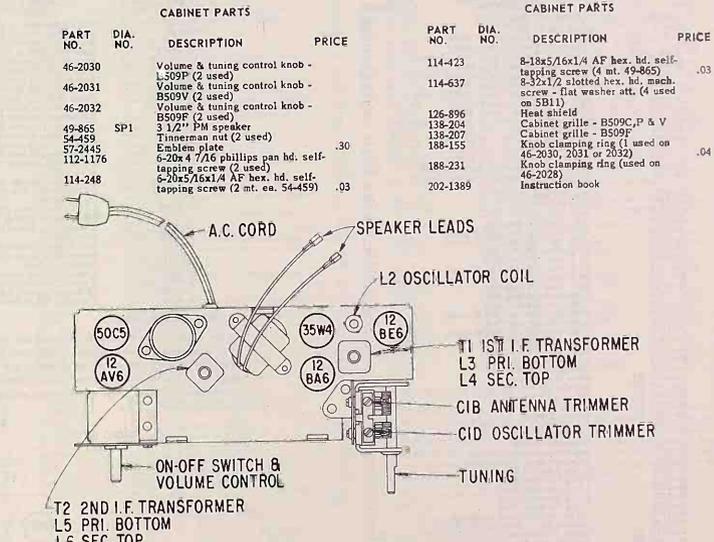
ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Sig. Frequency	Set Dial At	Trimmers	Purpose
1	Converter Grid	5 Mfd.	455 Kc.	600 Kc.	L3, L4, L5, L6	For I.F. Alignment.
2	One Turn Loop Coupled	—	1600 Kc.	1600 Kc.	C1D	Set Oscillator to Dial Scale
3	Loosely to Wave Magnet	—	1400 Kc.	1400 Kc.	C1B	Align Antenna Stage



MODELS B509C, P, V, F CHASSIS 5B11

CHASSIS PARTS			CABINET PARTS				
PART NO.	DIA. NO.	DESCRIPTION	PRICE	PART NO.	DIA. NO.	DESCRIPTION	PRICE
11-85		Line cord & plug	.65	46-2030		Volume & tuning control knob - B509P (2 used)	
12-2323		Wavemagnet mtg. bracket	.15	46-2031		Volume & tuning control knob - B509P (2 used)	
12-2677		Variable capacitor mtg. bracket		46-2032		Volume & tuning control knob - B509P (2 used)	
12-2678		Volume control mtg. bracket	.10	49-865	SP1	3 1/2" PM speaker	
19-238		Coil mtg. clip (part of S-43910)		54-459		Tinnerman nut (2 used)	
22-3	C5,6	.01 mfd. ceramic disc capacitor - 500V (2 used)	.30	57-2445		Emblem plate	.30
22-5	C3	100 mfd. ceramic disc capacitor - 500V	.25	112-1176		6-20x4 7/16 phillips pan hd. self-tapping screw (2 used)	.03
22-2202	C8A,B	Electrolytic - 20/50 60/150	2.15	114-248		8-18x5/16x1/4 AF hex. hd. self-tapping screw (2 mt. ea. 54-459)	.03
22-2792	C2,4	.047 mfd. paper dielectric capacitor - 200V (2 used)	.7				
22-3096	C1A,B, C,D	Two section variable capacitor	3.25				
54-139		3/8x3x9/16 palnut (mts. 63-4401)	.03				
63-965	R2	1000 ohm resistor 1W ins. 10%	.25				
63-1750		150 ohm resistor 1/2W ins. 10%	.17				
63-1842		22 K ohm resistor 1/2W ins. 20%	.17				
63-1926		2.2 megohm resistor 1/2W ins. 20%	.17				
63-4401	R1	Volume control & switch	.05				
78-275		Electrolytic socket					
78-831		Seven contact wafer tube socket (3 used)	.15				
78-989		Seven contact wafer tube socket (3 used)	.15				
78-990		Seven contact wafer tube socket	.15				
86-199		Terminal (used with 114-275)	.03				
86-237		Connector terminal (2 part of 95-1626)	.03				
94-295		Gang capacitor mtg. bushing (3 used)	.05				
95-1504	T1	1st I.F. transformer	2.50				
95-1626	T3	Output transformer					
95-1636	T2	2nd I.F. transformer					
105-43	U1	Integret					
115-78		6-32x5/16x1/4 AF hex. hd. mech. screw - lockwasher att. (2 used on 22-3096)	.03				
114-78		8-18x5/16x1/4 AF hex. hd. self-tapping screw (1 used on 12-2323, 2 on 12-2677 & 3 on 12-2678)	.03				
114-365		6-32x3/8 hex. hd. self-tap screw - flat washer att. (used on S-44383)	.05				
114-542		6-32x1/2 hex. hd. self-tapping screw - flat washer att. (used on 22-3096)	.03				
125-94		Rubber grommet (3 used)	.03				
125-96		Strain relief grommet	.10				
149-85		Iron core (part of S-43910)	.10				
S-43910	L2	Oscillator coil assembly					
S-44336		Electrically capacitor & clamp assembly					
S-44383	L1	Wavemagnet assembly					



ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Sig. Frequency	Set Dial At	Trimmers	Purpose
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	L3, L4, L5, L6	For I.F. Alignment to Dial Scale
2	One Turn Loop Coupled Loosely to Wave Magnet	—	1600 Kc.	1600 Kc.	C1D	Set Oscillator to Dial Scale
3	Wave Magnet	—	1400 Kc.	1400 Kc.	C1B	Align Antenna

CABINET PARTS			
14-2491		Plastic table cabinet - B509C	5.50
14-2492		Plastic table cabinet - B509P	5.50
14-2493		Plastic table cabinet - B509V	5.50
14-2494		Plastic table cabinet - B509F	5.50
16-1489		Packing carton	
27-259		Pointer indicator disc	
46-2028		Dial knob	
46-2029		Volume & tuning control knob - B509C	

ZENITH RADIO CORPORATION MODELS SF119, SF120 & SF125 CHASSIS 5B23

TO THE SERVICEMAN:

Models SF119, SF120, and SF125 are identical electrically except for cabinet styling, speaker systems and Model SF125 uses a chrome changer.

Chassis 5B23 is a complete high-fidelity amplifier and in addition has a cathode follower which feeds audio energy to remote amplifier and speaker units SR510 or SR515.

The wires to the stereo cartridge should be connected as follows: "Red" wire to "R" terminal of cartridge, "Black" to "outer" terminal and "White" wire to "L" terminal of cartridge.

It is most important that coded speaker leads be connected to coded terminals on speakers for proper polarity within the speaker group. In addition to this, when these units are used in conjunction with remote amplifier and speaker units, SR510 or SR515 as a Stereo Combination, it is then most important that the speaker groups be in phase with each other. An excellent method to determine if the speaker groups are in phase with each other is to play either a stereo or monaural record with the record compensator in RIAA position, with the tone controls on both units in mid position and with the audio outputs from each unit at the same level. Under these conditions, the sound should appear to come from a point midway between the two units. If the sound comes from one other point than mid-point then one speaker group is out of phase with the other and you should check speaker polarity.

If one or both of the 6B05 output tubes are replaced, it will be necessary to connect a DC volt meter across the balance terminals and adjust the balance control for minimum voltage.

PART NO.	DIA. NO.	CABINET PARTS Models SF119, E & R DESCRIPTION	PRICE
14-2518		Record player cabinet - SF119	112-1038
14-2518R		Record player cabinet - SF119R	112-1142
14-2518E		Record player cabinet - SF119E	112-1142
16-1498		Packing carton	114-329
19-298		Mounting clip (mts. S-43992)	.20
22-2945	C24,25	Electrolytic capacitor 3 mfd. - 30V	1.25
40-195		Lid hinge (part of 14-2518, R)	.60
40-197		Lid hinge (part of 14-2518, E & R)	.60
40-202		Lid support hinge (part of 14-2518 & R)	.60
40-203		Lid support hinge (part of 14-2518E)	.60
46-1997		Volume control knob (remote)	138-198
46-2081		Control knob (4 used)	.75
46-2096		Volume control knob	188-195
49-870		12" PM speaker	202-1350
49-856	SP2	5" PM speaker	7.00
54-10		8-32 x 1/8 Hex. nut (4 part of 14-2518, E & R)	.03
54-34		6-32 x 1/4 Hex. nut-steel (4 part of 14-2518, E & R & 4 mts. 49-856)	.03
54-312		Speed nut - finnerman (2 part of 14-2518, E & R)	.03
54-424		8-32 x 11/32 Hex. palnut washer type (4 mts. 49-870)	.03
57-2498		Emblem plate (part of 14-2518, E & R)	.35
57-2561		Name plate (part of 14-2518, E & R)	1.00
83-765		Armitie strip (3 used)	.03
83-765		Phono shipping strip (2 used)	.03
83-2762		Phono shipping strip	.15
86-237		Connector terminal (4 part of S-23071)	.05
86-254		Connector terminal (2 part of S-23071)	.05
93-1260		Fibre washer (2 used on S-14091)	.03
112-789		8-32 x 1-3/8 Swedge hd. mach. screw (4 part of 14-2518, E & R)	.03
112-943		6-32 x 1" Swedge hd. mach. screw (part of 14-2518, E & R)	.03
112-1038		Record changer mtg. screw (2 part of S-14091)	.15
112-1142		5-20 x 1/2 Phillip rd. hd. self-tapping screw (mts. 19-298)	.04
114-329		6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	.03
114-386		Chassis mtg. screw (4 used)	.10
115-34		4-40 x 5/32 Fill. hd. mach. screw (2 mts. 142-92)	.25
126-780		Heat shield	.25
142-92		Dual pick-up cartridge (Sapphire-Sapphire)	21.50
188-195		Retaining ring (2 used on S-14091)	.03
202-1350		Instruction book	.50
S-14901		Four speed record changer	7.00
S-23071		Speaker lead & terminal assembly	.45
S-26657		Terminal strip assembly (2 part of 49-856)	.20
S-43992		45 RPM record adapter assembly	2.95
S-26657		Terminal strip assembly (part of 49-856)	.20
S-43992		45 RPM record adapter	2.95

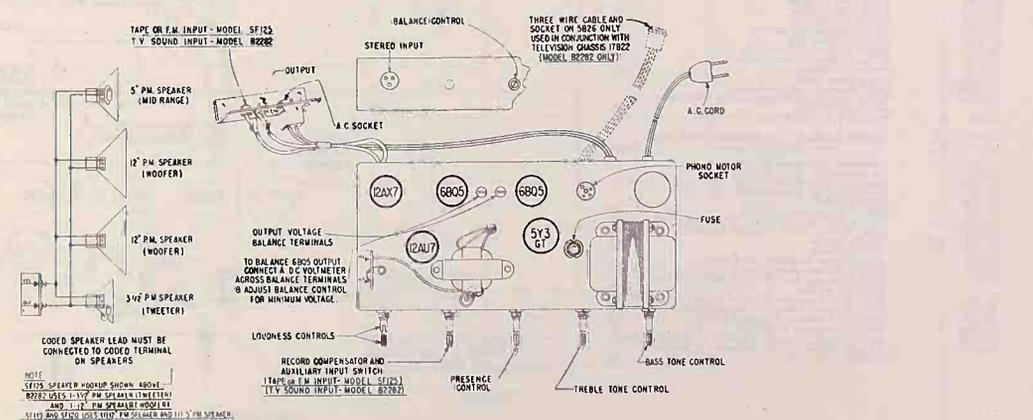
PART NO.	DIA. NO.	CABINET PARTS Models SF120 E & R DESCRIPTION	PRICE
14-2519E		Record player cabinet - SF120E	112-943
14-2519R		Record player cabinet - SF120R	112-1038
16-1499		Packing carton	112-1038
19-298		Mounting clip (mts. S-43992)	.20
22-2945		3 mfd. electrolytic capacitor - 30V (part of 49-856)	1.25

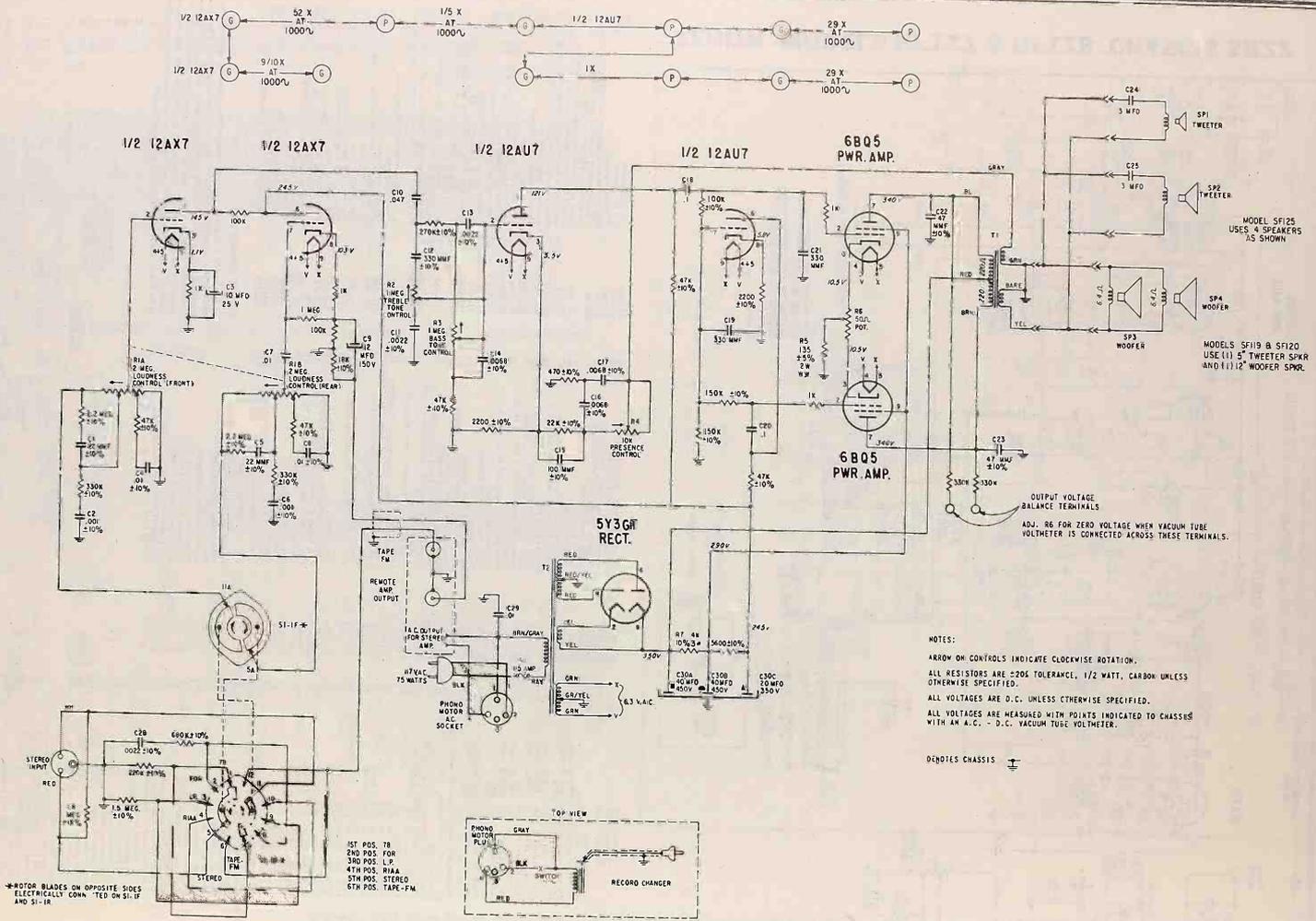
PART NO.	DIA. NO.	CABINET PARTS Models SF120 E & R DESCRIPTION	PRICE
40-195		Lid hinge (2 part of 14-2519R)	.60
40-197		Lid hinge (2 part of 14-2519E)	.60
40-202		Lid support hinge (part of 14-2519R)	.60
40-203		Lid support hinge (part of 14-2519E)	.60
46-1997		Volume control knob (remote)	.50
46-2081		Control knob	.75
46-2096		Volume control knob (4 used)	.75
49-850		5" PM speaker	5.50
49-856		12" PM speaker	7.00
49-871		12" PM speaker	7.00
54-10		8-32 x 1/8 Hex nut (4 part of 14-2519E&R)	.03
54-34		6-32 x 1/4 Hex nut (8 part of 14-2519E&R and 4 mts. ea. 49-850 & 49-856)	.03
54-312		Speed nut - finnerman (2 part of 14-2519E & R)	.03
54-424		8-32 x 11/32 Hex palnut washer type (4 mts. 49-871)	.03
57-2498		Emblem plate (part of 14-2519E & R)	.35
57-2561		Name plate (part of 14-2519E & R)	1.00
83-765		Armitie strip (3 used)	.03
83-765		Phono shipping strip (2 used)	.03
83-2762		Phono shipping strip	.15
86-237		Connector terminal (6 used)	.03
86-254		Connector terminal (2 used)	.05
86-312		Terminal shake proof	.03
93-1260		Fibre washer (2 used on S-14091)	.03
96-177		Cabinet leg (4 part of 14-2519E)	.15
112-789		8-32 x 1-3/8 Swedge hd. mach. screw (4 part of 14-2519E & R)	.03
112-943		6-32 x 1" Swedge hd. mach. screw (8 part of 14-2519E & R)	.03
112-1038		Record changer mtg. screw (2 part of S-14091)	.15
112-1142		5-20 x 1/2 Phillip rd. hd. self-tapping screw (mts. 19-298)	.04
114-329		6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	.03
114-386		Chassis mtg. screw (4 used)	.10
115-34		4-40 x 5/32 Fill. hd. mach. screw (2 mts. 142-92)	.25
126-780		Heat shield	.25
142-92		Dual pick-up cartridge (Sapphire-Sapphire)	21.50
188-195		Retaining ring (2 used on S-14091)	.03
202-1350		Instruction book	.50
S-14901		Four speed record changer	7.00
S-23071		Speaker lead & terminal assembly	.45
S-26657		Terminal strip assembly (2 part of 49-856)	.20
S-43992		45 RPM record adapter assembly	2.95
S-26657		Terminal strip assembly (part of 49-856)	.20
S-43992		45 RPM record adapter	2.95

PART NO.	DIA. NO.	CABINET PARTS Models SF125, E & R DESCRIPTION	PRICE
14-2401		Record player cabinet - SF125	112-789
14-2401E		Record player cabinet - SF125E	112-943
14-2401R		Record player cabinet - SF125R	112-1038
16-1440		Packing carton	112-1038
19-298		Mounting clip (mts. S-43992)	.20
22-2945	C24,25	3 mfd. electrolytic capacitor - 30V (1 part of ea. 49-856 & 49-846)	1.25
40-195		Lid hinge (2 part of 14-2401E & R)	.60
40-197		Lid support hinge (part of 14-2401E & R)	.60
40-210		Lid support hinge (part of 14-2401E)	.60
40-211		Lid support hinge (part of 14-2401E)	.60
46-1997		Volume control knob (remote)	.50
46-2081		Control knob (4 used)	.75
46-2096		Volume control knob	.75
49-846		5" PM tweeter speaker	7.00
49-852	SP3	12" PM speaker	7.00
49-853	SP4	12" PM speaker	16.00
49-856	SP2	5" PM speaker	16.00
54-10		8-32 x 1/8 Hex nut (8 part of 14-2401, E & R)	.03
54-34		6-32 x 1/4 Hex nut (6 part of 14-2401, E & R and 2 mts. ea. 49-846 & 49-856)	.03
54-312		Speed nut (2 part of 14-2401, E & R)	.03
54-424		8-32 x 11/32 Hex. palnut (4 mts. ea. 49-852 & 49-853)	.03
57-2498		Emblem plate (part of 14-2401, E & R)	.35
57-2561		Name plate (part of 14-2401, E & R)	1.00
83-765		Armitie strip (4 used)	.03
83-765		Phono shipping strip (2 used)	.03
83-2763		Phono shipping strip	.15
86-237		Connector terminal (8 used)	.03
86-237		Connector terminal (2 used)	.05
86-254		Terminal shake proof	.03
86-312		Terminal shake proof	.03
93-1260		Fibre washer (2 used on S-14090 or S-14093)	.03
112-789		8-32 x 1-3/8 Swedge hd. mach. screw (8 part of 14-2401, E & R)	.03
112-943		6-32 x 1" Swedge hd. mach. screw (6 part of 14-2402, E & R)	.03
112-1038		Record changer mtg. screw (2 used on S-14090 or S-14093)	.15
112-1142		5-20 x 1/2 Phis. rd. hd. self-tap screw (mts. 19-298)	.04

PART NO.	DIA. NO.	CABINET PARTS Models SF125, E & R DESCRIPTION	PRICE
114-329		6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	.03
114-386		Chassis mtg. screw (4 used)	.10
115-34		4-40 x 5/32 Fill. hd. mach. screw (2 mts. 142-92)	.25
126-780		Heat shield	.25
138-178		Metal grille (part of 14-2401, & R)	.50
138-179		Metal grille (part of 14-2401E)	.50
142-92		Dual pick-up cartridge (Sapphire-Sapphire)	21.50
159-91		Plug button (2 used)	.03
188-195		Retaining ring (2 used on S-14090 or S-14093)	.03
202-1350		Instruction book	.50
S-14090 or S-14093		4 Speed record changer	7.00
S-14093		4 Speed record changer	7.00

PART NO.	DIA. NO.	CHASSIS 5B23 DESCRIPTION	PRICE
11-103		Line cord & plug	.75
15-115		Fuse holder cap	.25
22-3	C7,29	.01 mfd. ceramic disc - 1KV (2 used)	.30
22-9	C15	100 mfd. ceramic disc - 500V	.25
22-17	C2	.001 mfd. ceramic disc - 1KV (2 used)	.25
22-18	C11,13,28	.0022 mfd. ceramic disc - 500V (3 used)	.25
22-2056	C9	12 mfd. electrolytic capacitor - 150V	1.20
22-2309	C12,19,21	330 mfd. ceramic - 500V (3 used)	.25
22-2376	C22,23	47 mfd. ceramic disc - 500V (2 used)	.25
22-2782	C18,20	1 mfd. paper - 600V (2 used)	.45
22-2794	C10	.047 mfd. paper - 600V	.35
22-2813	C4,8	.01 mfd. paper - 200V (2 used)	.25
22-2819	C14,16,17	.0068 mfd. paper - 200V (3 used)	.30
22-2903	C1	22 mfd. ceramic disc - 500V (2 used)	.25
22-3046	C30A,B,C	20-40 ufd. electrolytic - 350V-450V-450V	4.50
22-3076	C3	10 mfd. electrolytic capacitor - 30V	1.75
44-33		Connector jack (2 part of S-43879)	.15
52-797		Shielded lead	.50
54-139		3/8-32 x 9/16 Palnut (4 used)	.03
54-140		3/8-32 x 9/16 x 3/32 Tkk. hex. nut (used on 63-4373)	.06
54-382		Hex. nut (used on 62-17)	.06
62-17		Fuse receptacle	.40
63-1771		470 ohm 1/2W ins. 10%	.17
63-1786		1000 ohm 1/2W ins. 20% (4 used)	.17
63-1799		2200 ohm 1/2W ins. 10%	.17
63-1817		5600 ohm 1/2W ins. 10%	.17
63-1838		18 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% (5 used)	.17
63-1869		100K ohm 1/2W ins. 10%	.17
63-1870		100K ohm 1/2W ins. 20% (2 used)	.17
63-1876		150K ohm 1/2W ins. 10% (2 used)	.17
63-1883		220K ohm 1/2W ins. 10%	.17
63-1887		270K ohm 1/2W ins. 10%	.17
63-1890		330K ohm 1/2W ins. 10% (2 used)	.17
63-1891		330K ohm 1/2W ins. 20% (2 used)	.17
63-1904		680K ohm 1/2W ins. 10%	.17
63-1912		1 megohm 1/2W ins. 20%	.17
63-1918		1.5 megohm 1/2W ins. 10%	.17
63-1922		1.8 megohm 1/2W ins. 10%	.17
63-1925		2.2 megohm 1/2W ins. 10% (2 used)	.17
63-4064	R3	Bass tone control	1.40
63-4065	R2	Treble tone control	1.40
63-4066	R4	Presence control	1.40
63-4069	R7	4000 ohm 3W 10%	.45
63-4373	R1A,B	Dual volume control	2.75
63-4397	R5	135 ohm 2W 5%	.68
63-4402	R6	Current balance control	1.40
69-320		2/64 x 5/16 Rd. hd. mach. screw (2 used on 63-4373)	.15
78-402		4 contact socket	.20
78-402		Octal tube socket	.20
78-846		9 contact water tube socket (2 used)	.25
78-939		9 contact molded tube socket (2 used)	.40
78-1099		3 contact socket	.20
78-1116		A.C. socket & wire	.65
80-1249		Shaft friction spring	.15
80-1250		Sleeve friction spring	.15
83-2145		5 Lug terminal strip (2 used)	.10
83-2307		4 Lug terminal strip	.10
83-2612		2 Lug terminal strip	.05
83-2618		8 Lug terminal strip	.10
83-2627		2 Lug terminal strip	.05
83-2898		3 Lug terminal strip	.10
83-2915		4 Lug terminal strip	.10
85-607	S1	Record compensator switch	2.50
93-1179		Rubber washer (used on 62-17)	.03
93-1180		Lockwasher (used on 62-17)	.03
95-1603	T2	Power transformer	15.50
95-1604	T1	Output transformer	5.50
114-370		10-32 x 1/2 Hex. hd. self-tap screw flat washer att. (4 mts. 95-1603)	.05
125-96		Strain relief grommet (2 used)	.70
136-32	F1	Fuse 1 1/2 amp. - 3AG (2 used)	.15
S-43879		A.C. socket, jack & bracket assembly	.15





ZENITH RADIO CORPORATION MODEL S SF119, SF120 & SF125 CHASSIS 5B23

TO THE SERVICEMAN:

Models SF119, SF120, and SF125 are identical electrically except for cabinet styling, speaker systems and Model SF125 uses a chrome change.

Chassis 5B23 is a complete high-fidelity amplifier and in addition has a cathode follower which feeds audio energy to remote amplifier and speaker units SR510 or SR515.

The wires to the stereo cartridge should be connected as follows: "Red" wire to "R" terminal of cartridge, "Black" to "outer" terminal and "White" wire to "L" terminal of cartridge.

It is most important that caded speaker leads be connected to caded terminals on speakers for proper polarity within the speaker group. In addition to this, when these units are used in conjunction with remote amplifier and speaker units, SR510 or SR515 as a Stereo Combination, it is then most important that the speaker groups be in phase with each other. An excellent method to determine if the speaker units are in phase with each other is to play either a stereo or monaural record with the record compensator in RIAA position, with the tone controls on both units in mid position and with the audio outputs from each unit at the same level. Under these conditions, the sound should appear to come from a point midway between the two units. If the sound comes from any other point then mid-point then one speaker group is out of phase with the other and you should check speaker polarity.

If one or both of the 5B23 output tubes are replaced, it will be necessary to connect a DC volt meter across the balance terminals and adjust the balance control for minimum voltage.

PART NO.	DIA. NO.	CABINET PARTS Models SF119, E & R DESCRIPTION	PRICE
14-2518		Record player cabinet - SF119	112-1038
14-2518R		Record player cabinet - SF119R	112-1142
16-1499		Packing carton (part of SF119)	114-329
19-2298	C24,25	Mounting clip (mis. S-4399Z)	20
22-2945		3 mid. electrolytic capacitor - 30V (part of 49-856)	1.25
40-195		Lid hinge (part of 14-2518, R)	60
40-197		Lid support hinge (part of 14-2518)	60
40-202		Lid support hinge (part of 14-2518, R)	60
40-203		Lid support hinge (part of 14-2518E)	60
46-1997		Volume control knob (remote)	138-198
46-2081		Control knob (4 used)	75
46-2096		Volume control knob	75
49-856	SP2	12" PM speaker	188-195
54-10		8-32 x 1/2 Hex nut (4 part of 14-2518, E & R)	7.00
54-34		5" x 3/8 Hex nut (steel) (4 part of 14-2518, E & R & 4 mt. 49-856)	5.4399Z
54-312		Speed nut - 1/4" inner (part of 14-2518, E & R)	0.03
54-424		8-32 x 1/32 Hex. pin nut w/ sh. type (4 mt. 49-870)	0.03
57-2498		Emblem plate (part of 14-2518, E & R)	35
57-2561		Name plate (part of 14-2518, E & R)	1.00
63-765		Armitie strip (3 used)	15
83-2535		Phono shipping strip (2 used)	15
83-2762		Phono shipping strip (2 used)	15
86-237		Connector terminal (2 part of S-23071)	0.05
86-254		Connector terminal (2 part of S-23071)	0.05
93-1260		Fibre washer (2 used on S-14091)	0.03
112-789		8-32 x 1/32 Swedge hd. mach. screw (part of 14-2518, R)	1.25
112-943		8-32 x 1/2 Hex. pin nut w/ sh. type (4 mt. 49-870)	0.03
112-1038		Record changer mfg. screw (2 part of S-14091)	0.03
112-1142		5-20 x 3/8 Phillips rd. hd. self-tapping screw (mis. 19-298)	0.04
114-329		6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	0.10
114-386		Chassis mfg. screw (4 used)	0.10
115-24		640 x 5/32 Fill. hd. mach. screw (2 mts. 14-292)	0.03
126-780		Head shield	25
142-92		Dual pickup cartridge (Sapphire-Sapphire)	21.50
188-195		Retaining ring (2 used on S-14091)	0.03
202-1350		Instruction book	50
S-14901		Four speed record changer	57-2498
S-23071		Speaker lead & terminal assembly	45
S-26657		Terminal strip assembly (2 part of 49-856)	2.00
S-4399Z		45 RPM record adapter assembly	2.95
S-26657		Terminal strip assembly (part of 49-856)	2.00
S-4399Z		45 RPM record adapter	2.95

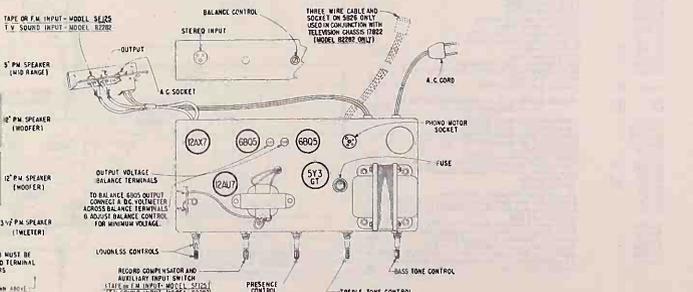
PART NO.	DIA. NO.	CABINET PARTS Models SF120 & R DESCRIPTION	PRICE
14-2519E		Record player cabinet - SF120E	112-943
14-2519R		Record player cabinet - SF120R	112-1038
16-1499		Packing carton	112-1142
19-2298		Mounting clip (mis. S-4399Z)	20
22-2945		3 mid. electrolytic capacitor - 30V (part of 49-856)	1.25

CABINET PARTS

MODEL SF120 E & R	DESCRIPTION	PRICE	PART NO.	DIA. NO.	CABINET PARTS Models SF125, E & R DESCRIPTION	PRICE
	Lid hinge (2 part of 14-2519R)	.60	114-329		6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	.10
	Lid support hinge (part of 14-2519E)	.60	114-386		Chassis mfg. screw (4 used)	.03
	Lid support hinge (part of 14-2519R)	.60	114-386		640 x 5/32 Fill. hd. mach. screw (2 mts. 14-292)	.03
	Volume control knob (remote)	.50	46-1997		Head shield	.25
	Control knob	.75	46-2081		Metal grille (part of 14-2401, & R)	.03
	Volume control knob (4 used)	1.38	46-2096		Metal grille (part of 14-2401, E & R)	.03
	12" PM speaker	5.50	49-856		Dual pickup cartridge (Sapphire-Sapphire)	21.50
	12" PM speaker	16.00	49-856		Plug button (2 used)	.10
	8-32 x 1/2 Hex nut (4 part of 14-2519E & R)	7.00	54-10		Retaining ring (2 used on S-14090 & S-14093)	.03
	8-32 x 1/2 Hex nut (8 part of 14-2519E & R & 4 mt. 49-856 & 49-856)	0.03	54-312		Instruction book	50
	Control knob	0.75	54-424		4 Speed record changer	57-2498
	8-32 x 1/32 Hex pin nut w/ sh. type (4 mts. 49-870)	0.03	54-424			
	Emblem plate (part of 14-2519E & R)	35				
	Name plate (part of 14-2519E & R)	1.00				
	Armitie strip (3 used)	15				
	Phono shipping strip (2 used)	15				
	Phono shipping strip (2 used)	15				
	Connector terminal (6 used)	0.05				
	Connector terminal (2 used)	0.05				
	Terminal shoke proof	0.11				
	Fibre washer (2 used on S-14091)	0.03				
	Cabinet leg (4 part of 14-2519E)	0.03				
	Cabinet leg (4 part of 14-2519E)	0.03				
	8-32 x 1/32 Swedge hd. mach. screw (4 part of 14-2519E & R)	1.25				
	8-32 x 1/2 Hex nut (8 part of 14-2519E & R)	0.03				
	Record changer mfg. screw (2 part of S-14091)	0.03				
	5-20 x 3/8 Phillips rd. hd. self-tapping screw (mis. 19-298)	0.04				
	6-18 x 3/8 AF hex. hd. self-tap screw (2 used on 5B23)	0.10				
	Chassis mfg. screw (4 used)	0.10				
	640 x 5/32 Fill. hd. mach. screw (2 mts. 14-292)	0.03				
	Head shield	0.25				
	Cabinet grille (part of 14-2519E)	0.03				
	Cabinet grille (part of 14-2519E)	0.03				
	Dual pickup cartridge (Sapphire-Sapphire)	21.50				
	Retaining ring (2 used on S-14090)	0.03				
	Instruction book	50				
	Four speed record changer	57-2498				
	Terminal strip assembly	2.00				
	45 RPM record adapter	2.95				

CABINET PARTS

MODEL SF125, E & R	DESCRIPTION	PRICE
	Record player cabinet - SF125	112-943
	Record player cabinet - SF125E	112-1038
	Record player cabinet - SF125R	112-1142
	Packing carton	114-329
	Mounting clip (mis. S-4399Z)	20
	3 mid. electrolytic capacitor - 30V (part of 49-856 & 49-846)	1.25
	Lid hinge (2 part of 14-2401, R)	60
	Lid hinge (2 part of 14-2401, E)	60
	Lid support hinge (part of 14-2401, R)	60
	Lid support hinge (part of 14-2401, E)	60
	Volume control knob (remote)	0.50
	Control knob (4 used)	0.75
	Volume control knob	0.75
	12" PM speaker	7.00
	12" PM speaker	16.00
	8-32 x 1/2 Hex nut (8 part of 14-2401, E & R)	7.00
	8-32 x 1/2 Hex nut (8 part of 14-2401, E & R & 4 mt. 49-846 & 4 mt. 49-856)	0.03
	Speed nut (2 part of 14-2401, E & R)	0.03
	8-32 x 1/32 Hex. pin nut (4 mts. 49-852 & 49-853)	0.03
	Emblem plate (part of 14-2401, E & R)	35
	Name plate (part of 14-2401, E & R)	1.00
	Armitie strip (4 used)	15
	Phono shipping strip (2 used)	15
	Phono shipping strip (2 used)	15
	Connector terminal (8 used)	0.05
	Connector terminal (2 used)	0.05
	Terminal shoke proof	0.11
	Fibre washer (2 used on S-14090 or S-14093)	0.03
	8-32 x 1/32 Swedge hd. mach. screw (8 part of 14-2401, E & R)	1.25
	8-32 x 1/2 Hex nut (8 part of 14-2401, E & R)	0.03
	Record changer mfg. screw (2 used on S-14090 or S-14093)	0.03
	5-20 x 3/8 Phillips rd. hd. self-tapping screw (mis. 19-298)	0.04



NOTE

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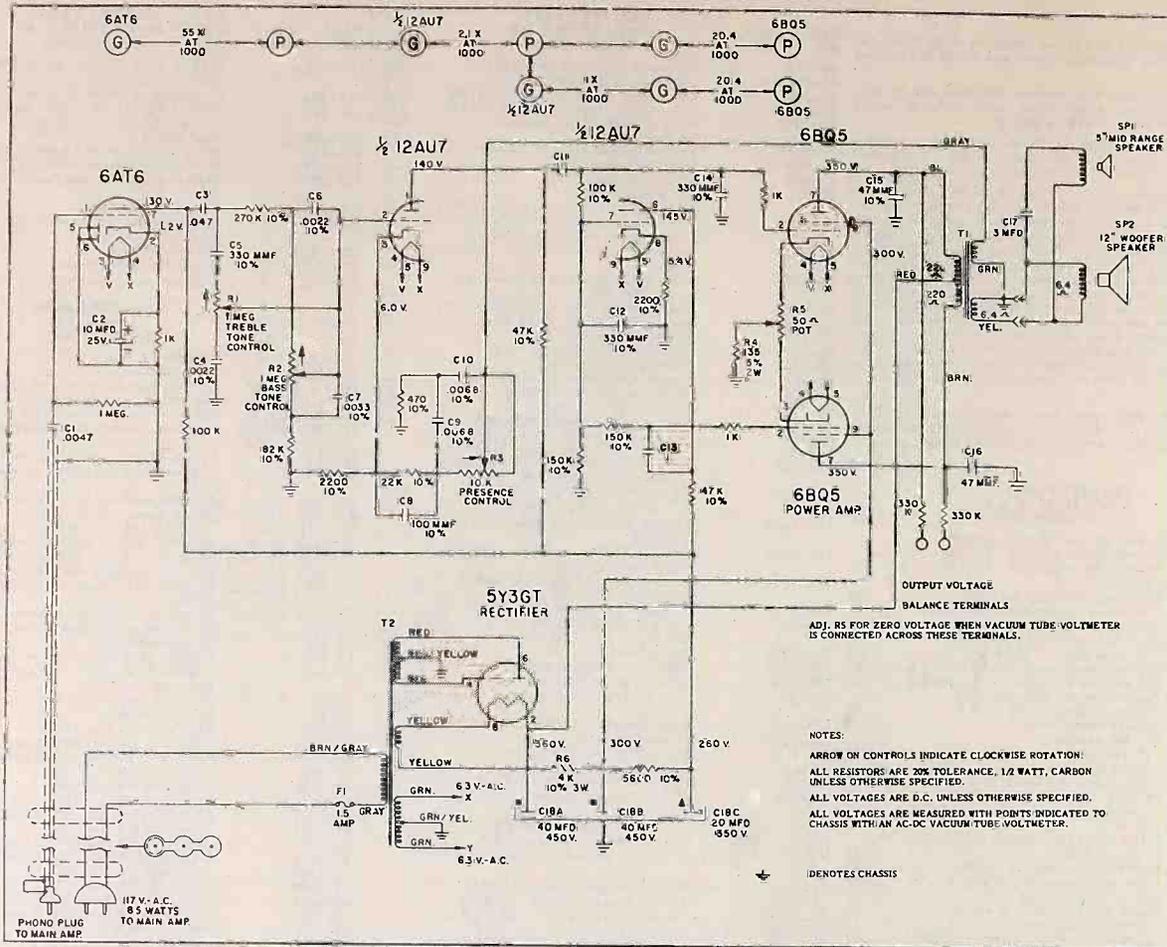
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NOTES:
 ARROW ON CONTROLS INDICATE CLOCKWISE ROTATION.
 ALL RESISTORS ARE 20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED.
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
 ALL VOLTAGES ARE MEASURED WITH POINTS INDICATED TO CHASSIS WITH AN AC-DC VACUUM TUBE VOLTMETER.
 DENOTES CHASSIS

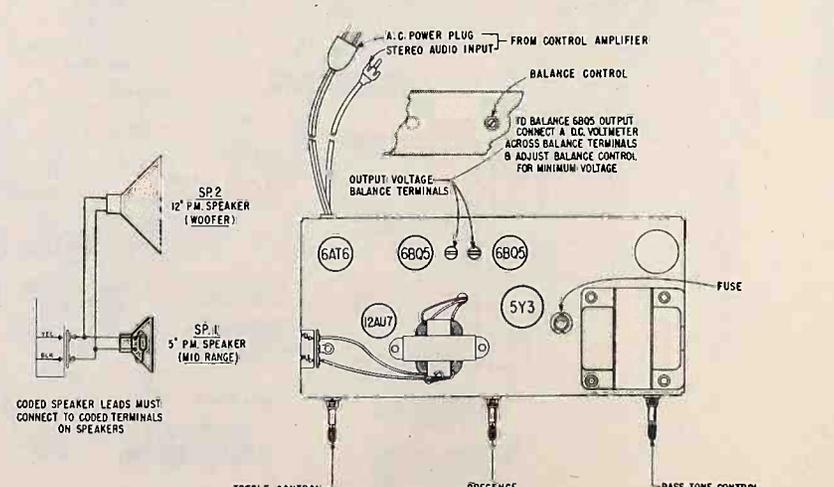
ZENITH RADIO CORPORATION MODELS SRS10 & SRS15 CHASSIS 5B24

PART NO.	DIA. NO.	CHASSIS 5B24 PARTS LIST DESCRIPTION	PRICE
15-115		Fusible Cap	.25
22-9	C8	100 mfd. Ceramic Disc Capacitor 500V	.25
22-14	C4	.0047 mfd. Ceramic Disc 1K V. Capacitor	.25
22-18	C4, 6	.0022 mfd. Ceramic Disc Capacitor 500V (2 used)	.25
22-239	CS, 12, 14	330 mfd. Ceramic Capacitor 500V (3 used)	.25
22-276	C15, 16	330 mfd. Ceramic Disc Capacitor 500V (2 used)	.25
22-297	C7	.0013 mfd. Ceramic Disc Capacitor 500V	.25
22-282	C11, 13	.1 mfd. Paper Dielectric Capacitor 600V (2 used)	.45
22-274	C3	.047 mfd. Paper Dielectric Capacitor 500V	.35
22-2819	C9, 10	.0048 mfd. Paper Dielectric Capacitor 200V (2 used)	.30
22-3046	C18B	Electrolytic Capacitor (20/350-40/450-40/450)	4.50
22-3076	C1	1.0 mfd. Electrolytic Capacitor 25V	1.75
54-139	C1	3/8-32 x 9/16 Palnut (1 used on en. 63-4064, 4065 & 4066)	.03
54-382		Hex Nut (used on 62-17)	.06
62-17		Fuse Receptacle	.40
63-1721		470 ohm Resistor 1/2W. Ins. 10%	.17
63-1784		1K ohm Resistor 1/2W. Ins. 20% (2 used)	.17
63-1799		2200 ohm Resistor 1/2W. Ins. 10% (2 used)	.17
63-1817		5600 ohm Resistor 1/2W. Ins. 10%	.17
63-1841		2K ohm Resistor 1/2W. Ins. 10%	.17
63-1855		47K ohm Resistor 1/2W. Ins. 10% (2 used)	.17
63-1866		82K ohm Resistor 1/2W. Ins. 10%	.17
63-1869		100K ohm Resistor 1/2W. Ins. 10%	.17
63-1870		100K ohm Resistor 1/2W. Ins. 20%	.17
63-1876		150K ohm Resistor 1/2W. Ins. 10% (2 used)	.17
63-1887		270K ohm Resistor 1/2W. Ins. 10%	.17
63-1891		330K ohm Resistor 1/2W. Ins. 20% (2 used)	.17
63-1892		1 megohm Resistor 1/2W. Ins. 20%	.17
63-4064	R2	Bias tone control	1.40
63-4065	R1	Treble tone control	1.40
63-4066	R3	Presence Control	1.40
63-4069	R6	6K ohm Resistor 3W. 10%	.68
63-4397	R4	15 ohm Resistor 2W. 5%	.68
63-4402	R5	Current Balance Control	1.40
78-755		Octal Tube Socket	.20
78-806		Miniature Seven Contact Water Tube Socket	.25
78-846		Naval Water Tube Socket	.25
78-939		Molded Tube Socket (9 contact), (2 used)	.40
80-2135		4 Lug Terminal Strip (2 used)	.10
81-2145		4 Lug Terminal Strip	.10
83-2307		4 Lug Terminal Strip	.10
83-2639		3 Lug Terminal Strip	.10
83-2898		3 Lug Terminal Strip Special	.10
83-2989		Cable Retaining Strip	.05
81-1779		Rubber Washer (used on 60-17)	.05
93-1180		1/2" Lockwasher (used on 62-17)	.05
95-1603	T2	Power Transformer	15.50
95-1623	T1	Output Transformer	5.75
102-3790		Local Speaker Lead Connection	.05
114-370		10-32 x 1/2 Hex Hd. self tapping screw (Flat washer on it) (4 mts. 95-1603)	.05
136-32	F1	Fuse 1 1/2 Amp. - Type 3AG	.15

PART NO.	DIA. NO.	MODEL SRS15, R CABINET PARTS LIST DESCRIPTION	PRICE
80-745		Cable Retaining Strip (2 used on 52-810)	.05
83-1475		Armita Strip (2 used)	.05
86-237		Cable Retaining Strip (4 used)	.05
86-254		Connector Terminal (2 used)	.05
112-789		8-32 x 1-3/8 Swdg Hd. Mech. Screw (4 part of 14-2517, E, H & R)	.03
112-943		6-32 x 1" Swedge Hd. Mech. Screw (4 part of 14-2517, E, H & R)	.03
114-51		6-32 x 3/8 x 1/2 AF Hex Hd. M.S. (2 mts. 80-2989)	.03
114-386		Chassis Mfg. Screw (4 used)	.10
114-453		8-18 x 3/8 Hex washer Hd. Self-tap screw (mts. 17-155)	.10
202-1395		Instruction Book	.20
5-23471		Speaker Lead & Terminal Assembly	.40
5-26657		Terminal Strip Assm. (part of 49-856)	.20
14-2514		Consolite Cbdt. Model SRS15	1.25
14-2514E		Consolite Cbdt. Model SRS15E	1.25
14-2514R		Consolite Cbdt. Model SRS15R	1.25
16-1494		Packing carton	.05
17-155		Cable Clamp (used on 52-810)	.10
22-2945	C17	Electrolytic Capacitor - 3 mfd., 30V (part of 49-856)	1.25
46-2081		Knob - Bass - Treble - Presence - Control	.75
49-852	SP2	12" PM Speaker	16.00
49-855	SP1	5" PM Speaker	7.00
52-810		AC Line Cord, Shielded Lead & Plug	7.00
54-10		1-32 x 1/2 Hex Nut (4 part of 14-2514, E & R and 4 mts. 49-856)	.03
54-34		8-32 x 1/2 Hex nut (4 part of 14-2514, E & R)	.03
54-312		Speed Nut (2 part of 14-2514, E & R)	.03
54-424		8-32 x 1 1/2 Hex. Palnut washer type (4 mts. 49-852)	.03
54-461		Speed nut (1 used on en. 114-51)	.05

PART NO.	DIA. NO.	MODEL SRS10, E, R, H CABINET PARTS LIST DESCRIPTION	PRICE
57-2498		Emblem Plate (part of 14-2514, E & R)	.35
57-2561		Home Plate (part of 14-2514, E & R)	1.00
72-127		8 x 1 1/2 Phillips Flat Hd. Wood Screw (2 used on 14-2514, E & R)	.05
83-765		Cable Retaining Strip (2 used)	.05
83-1475		Armita Strip (2 used)	.05
83-2989		Cable Retaining Strip (2 used)	.05
86-237		Connector Terminal (4 used)	.05
86-254		Connector Terminal (2 used)	.05
96-178		Cbdt. Leg (4 part of 14-2514E)	.05
96-201		Cbdt. Leg (4 part of 14-2514)	.05
96-177		Cbdt. Leg (4 part of 14-2514R)	.05
112-789		8-32 x 1-3/8 Swedge Hd. Mech. Screw (4 part of 14-2514, E & R)	.03
112-943		6-32 x 1" Swedge Hd. Mech. Screw (4 part of 14-2514, E & R)	.03
114-51		6-32 x 3/8 x 1/2 AF Hex Hd. M.S. (2 mts. 80-2989)	.03
114-386		Chassis mfg. screw (4 used)	.10
114-453		6-18 x 3/8 Hex Washer Hd. Self-tap screw (mts. 17-155)	.10
202-1395		Instruction Book	.20
5-23471		Speaker Lead & Terminal Assm.	.40
5-26657		Terminal Strip Assm. (part of 49-856)	.20

TO THE SERVICEMAN
 Models SRS10 and SRS15 use chassis 5B24. These units are to be used in conjunction with High Fidelity Models SF119, SF120, SF125, SF174, SF177, SF183, SF185 and SF189 to make a complete Stereophonic Sound System.
 There is a combined power and audio cable that connects chassis 5B24 to the High Fidelity Models. Chassis 5B24 obtains its A.C. power and audio from the companion High-Fidelity chassis.
 In the event one or both 6BQ5 tubes are replaced it will be necessary to balance the 6BQ5 output. To do this connect a D.C. Voltmeter across balance terminals and adjust the balance control for minimum voltage.



MODELS A624G, W & Y CHASSIS 6A03

CABINET PARTS

Part No.	Dis. No.	Description	Price
7-21		Detail	1.75
12-282E		Dimmer Control Mtg. Bracket	18
15-1228		Pecking Carton	18
19-202		Cable Clamp	18
46-1561		Alarm, Radio, Auto-off & Dimmer Control Knob	25
46-1562		Vol. & Tuning Control Knob	50
49-1118	SP1	4" P.M. Speaker	4.50
54-139		2/8-32 X 9/16 Palmst. (Mts. 63-2658)	01
64-270		6-32 X 1/2 Palmst. (1 used on Ea. 96-91)	01
64-284		4-40 X 1/4 Palmst. (3 joins S-24553, 19-206, & 93-2285)	01
97-1725		Front Panel	25
97-2724		Dial Background Plate	10
98-319		Point	40
83-2659	R4	Dimmer Control	1.40
78-1085		Dial Light Socket & Wire (Clock)	30
60-1102		Dial Crystal Ret. Spring	10
80-1138		Knob Ret. Spring (3 used)	02
83-2283		Terminal Strip	10
83-2280		Post Strip - Model A624Y	05
83-2651		Post Strip - Model A624G	05
83-2662		Post Strip - Model A624W	05
93-309		Lock Washer (1 used on Ea. 86-91)	01
93-309		1/2 X .120 X 3/8 Steel Washer (3 used)	01
96-91		Cabinet Leg (2 used)	30
100-51	PL2	Pilot Light Bulb	15
116-192		6-20 X 7/16 X 1/4 Hex. Hd. S/T Screw (1 used on Ea. 57-2274 & S-24553)	01
114-201		8-32 X 5/16 X 1/4 Hex. Hd. S/T Screw (Mts. 12-2328)	01
114-248		4-20 X 5/16 X 1/4 Hex. Hd. S/T Screw (1 used on S-22274, 6-2 Mt. Ea. S-24553 & 49-713)	01
114-448		10-32 X 1/2 Slot. Hex. Hd. Mech. Screw F/W Att. (2 Mt. S-24544)	03
114-492		6-20 X 3/8 Hex. Hd. S/T Screw F/W Att. (used on S-24553)	03
159-59		Trimout Stud (1 Mt. S-24544)	01
166-48		Leg Bumper (2 used)	01
188-194		Trim Ring (2 used on 192-224)	10
192-224		Dial Crystal	2.00
202-1313		Instruction Book	1.00
8-24553	U1	Clock Assembly	17.50
8-24554	L1	WAVEFORMER Ant. Assembly	11.75
8-40224		Cabinet & Grille Assm. - A624G	8.00
8-40243		Cabinet & Grille Assm. - A624W	8.00
8-40254		Cabinet & Grille Assm. - A624Y	8.00

CHASSIS 6A03 PARTS

11-111		Line Cord & Plug	1.25
11-115		Line Cord & Plug	1.25
18-249		Coil Mounting Clip (2 used)	05
22-3	C1, 6, 8, 10	01 Mfd. Ceramic Disc - 1KV (4 used)	30
22-6	CT	470 Mfd. Ceramic Disc - 1KV	25
22-231	C12A, 12B	Electrolytic 40/150V. 80/150V.	2.00
22-2792	C2, 4, 5, 11	047 Mfd. Paper - 500V. (3 used)	4.00
22-2879		Section Variable	6.00
54-139		7/8-32 X 9/16 Palmst. (Mts. 83-2661)	01
54-271		6-32 X 1/4 Palmst. (1 Mt. Ea. 95-1101 & 1102)	01
63-865	R2	1000 Ohm 1/2W. Ins. 10%	17
63-1712		18 Ohm 1/2W. Ins. 10%	17
63-1737		68 Ohm 1/2W. Ins. 20%	17
63-1750		150 Ohm 1/2W. Ins. 10%	17
63-1765		200 Ohm 1/2W. Ins. 20%	17
63-1786		1000 Ohm 1/2W. Ins. 20%	17
63-1833		15 K Ohm 1/2W. Ins. 20%	17
63-1842		22 K Ohm 1/2W. Ins. 20%	17
63-1856		47 K Ohm 1/2W. Ins. 20%	17
63-1888		470 K Ohm 1/2W. Ins. 20%. (2 used)	17
63-1928		2.2 Megohm 1/2W. Ins. 20%	17
63-1940		4.7 Megohm 1/2W. Ins. 20%	17
63-2661	R1	Volume Control	1.40
78-808		Tuning Shaft	10
78-275		Electrolytic Capacitor Socket	05
78-808		Miniature Tube Socket (4 used)	15
78-807		Miniature Tube Socket	15

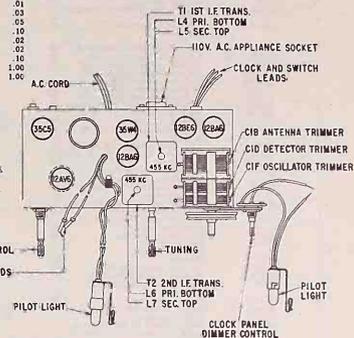
CHASSIS PARTS CONTINUED

Connector Socket	25
Miniature Midget Tube Socket	25
2 Contact Socket	30
Dial Light Socket & Wire	30
Dial Cord Tension Spring	04
1 Lug Terminal Strip	05
Line Cord Terminal Strip	10
Line Cord Insulation Strip	10
Radio Phone Switch	08
Terminal (used on 22-2879)	02
Brush Washer (2 Mt. 93-1818)	01
Insulating Washer	02
Gang Mounting Brackets (3 used)	51
Int. I. F. Transformer	3.00
2nd. I. F. Transformer	3.00
Output Transformer	1.15
Dial Light Bulb	15
6-32 X 7/16 Hex. Hd. Mech. Screw-L/W Att. (2 Mt. 22-2879)	02
6-32 X 7/16 Hex. Hd. Mech. Screw (Mts. 80-199)	03
Rubber Grommet (3 Mt. 22-2879)	03
Tabr Shield (used on 12A18)	01
Iron Core (used on 22-2879)	10
Iron Core (1 part of Ea. S-22851 & 22852)	02
Retaining Ring (used on 78-808)	10
Dial Cord & Eyelet Assm.	10
Detector Coil Assembly	1.00
Oscillator Coil Assembly	1.00

TO THE SERVICEMAN:

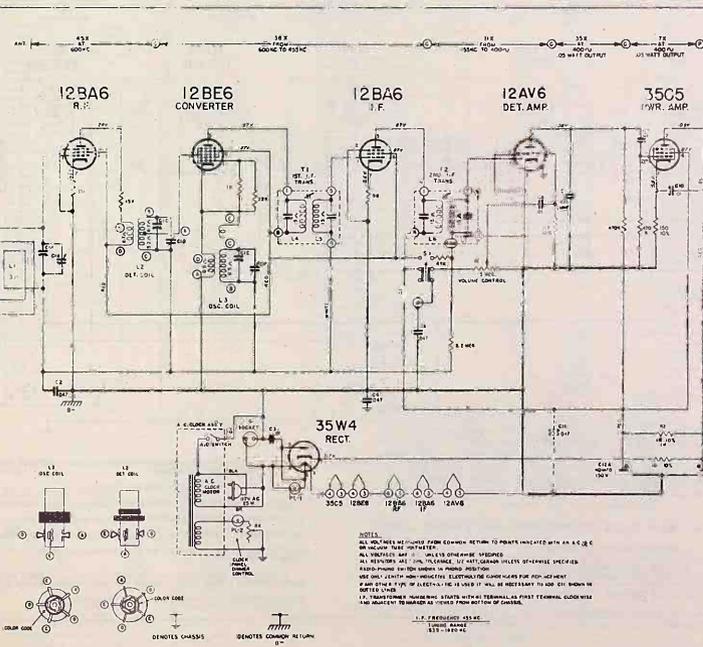
Clock and Timer Note:

The clock and timer assemblies used in this receiver are manufactured by Telechron. Face parts, such as hands, knobs, scales, bezel, etc., are not available through local Telechron service depots. We suggest that all clock and timer assemblies complete (less the rear cover and bushing) be returned to your local Zenith Distributor for repair or replacement. Be sure to pack all clock and timer assemblies individually and carefully to prevent damage in shipment.



ALIGNMENT PROCEDURE

Operation	Connect Oscillator #0	Dummy Antenna	Input Sig. Frequency	Set Dial At	Trimmers	Purpose
1	Converter Grid	.5 MFD.	455 Kc.	400 Kc.	L4, L5, L6, L7	For I.F. Alignment.
2	One Turn Loop Coupled	---	1600 Kc.	1600 Kc.	C1F	Set Oscillator to Dial Scale
3	Wave Magnet	---	1400 Kc.	1400 Kc.	C1B, C1B	Align Detector and Antenna Stage



ZENITH RADIO PAGE 25-13

CHASSIS 6B05

MODELS B615L, F, G CHASSIS 6B05

CHASSIS PARTS

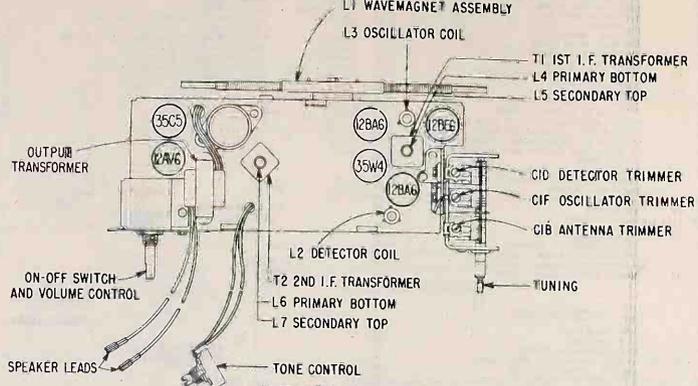
PART NO.	DIA. NO.	DESCRIPTION	PRICE
11-45		Line cord & plug	.75
12-3678		Volume control mtg. bracket	
12-3681		Tuning capacitor mtg. bracket	
12-3682		Antenna mtg. bracket	
19-238		Cad mtg. clip (1 part of ea. S-4391 & 4492)	.10
22-3	C6,9	500 mfd. ceramic disc capacitor - 30V (2 used)	.30
22-4	C12	5007 mfd. ceramic disc capacitor - 500V (2 used)	.25
22-5	C4,5	100 mfd. ceramic disc capacitor - 500V (2 used)	.25
22-6	C2,10	470 mfd. ceramic disc capacitor - 500V (2 used)	.25
22-2351	C15A,B	Electrolytic capacitor - 40/50 50/150	2.30
22-2670	C8	50/150 mfd. paper dielectric capacitor - 250V	.25
22-2792	C3,7,14	5047 mfd. paper dielectric capacitor - 200V (2 used)	.30
22-2811	C13	50 mfd. paper dielectric capacitor - 400V	.25
22-3101	C14,B, C,D,E	Three section variable capacitor	6.00
56-129		3/8-32x7/16 pannut (mts. 63-4408)	.03
63-1374	R3	1 K ohm resistor 1/2W ins. 20%	.25
63-1750		150 ohm resistor 1/2W ins. 10%	.17
63-1764		150 ohm resistor 1/2W ins. 10%	.17
63-1828		10 K ohm resistor 1/2W ins. 20%	.17
63-1842		22 K ohm resistor 1/2W ins. 20%	.17
63-1856		47 K ohm resistor 1/2W ins. 20%	.17
63-1869		100 K ohm resistor 1/2W ins. 10%	.17
63-1898		470 K ohm resistor 1/2W ins. 20% (3 used)	.17
63-1912		1 megohm resistor 1/2W ins. 20% (2 used)	.17
63-1926		2.2 megohm resistor 1/2W ins. 20%	.17
63-1940		4.7 megohm resistor 1/2W ins. 20%	.17
63-3840	R2	Tone control	1.40
63-4408	R1	Volume control & switch	.05
78-275		Electrolytic capacitor socket (seven contact)	.20
78-757		Miniature molded tube socket	.15
78-989		Miniature water tube socket (seven contact)	.15
78-990		Miniature water tube socket (seven contact)	.15
83-2307		Four lug terminal strip	.10
83-2967		Antenna tap strip (part of S-44810)	.15
86-81		Terminal	.03
86-199		Terminal (used on 22-3101)	.03
90-227		Terminal (2 used on 95-1643)	.03
94-295		Gang capacitor etc. washing	.05
95-1504	T1	1st I.F. transformer	2.50
95-1505	T2	2nd I.F. transformer	2.50
95-1643	T3	Output transformer	
113-78		6-32x11/2x1/4 AF hex. hd. mach. screw - lockwasher att. (2 used on 22-3101)	.03
114-78		8-32x11/2 AF hex. hd. self-tapping screw (1 used on 86-81, & 2 on ea. 12-3678 & 22-3101)	.03
114-365		8-32x3/8 hex. hd. self-tap screw - flat washer att. (used on S-44810)	.05
114-542		8-32x1/2 hex. hd. mach. screw (used on 22-3101)	.03
125-94		Rubber grommet (3 used on 22-3101)	.10
125-96		Strain relief grommet	.10
126-54		Tube shield	.10
149-211		Iron core (1 part of ea. S-4391 & 4492)	.10
S-43910	L3	Oscillator coil	
S-44810	L1	Antenna	
S-44923	L2	Detector coil	

CABINET PARTS

12-2679		Grille mtg. bracket (2 used)
12-2684		Grille mtg. bracket - bottom (2 used)
14-2507		Plastic tube cabinet - B615L
14-2508		Plastic tube cabinet - B615F
14-2509		Plastic tube cabinet - B615G
16-1906		Packing carton
46-2039		Dial knob - B615L
46-2040		Dial knob - B615F
46-2041		Dial knob - B615G
46-2056		Tone control knob - B615L
46-2067		Tone control knob - B615F
46-2068		Tone control knob - B615G
49-855	SP1	6 1/2" PM speaker
54-279		3/8-32x1/2x3/2 (th. hex. nut (used on 6B05)
57-245		Emblem plate
57-2632		Name plate (Zenith)
83-318		Felt strip (4 used)
112-1076		6-32x1/8 Phillips (11/16) hex. hd. self-tapping screw (2 used on ea. 12-2684) & 3/2x1/8 Phillips pan hd. mach. screw (2 used)

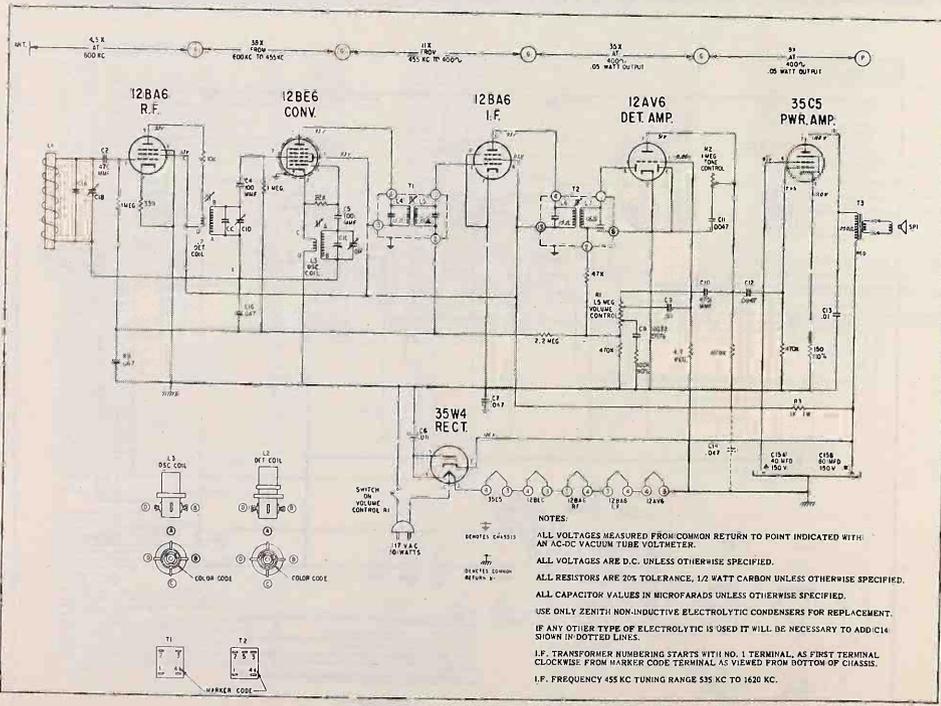
CABINET PARTS

6-32x3/8 Phillips pan hd. mach. screw (2 used on 138-21)	112-1185
6-32x1/2x1/4 AF hex. hd. self-tapping screw (2 used on 12-2679)	114-335
8-32x1/2 hex. hd. self-tapping screw - flat washer att. (4 set. 49-855)	114-481
8-32x1/2 notched hex. hd. mach. screw - flat washer att. (3 used on 6B05)	114-637
Heat shield	126-806
Cabinet grille - B615L	138-216
Cabinet grille - B615F	138-217
Cabinet grille - B615G	138-218
Knob clamping ring (1 used on ea. dial & volume knob)	188-192
Instruction book	202-1401
Terminal strip	S-26670
Volume control knob assembly - B615L	S-44969
Volume control knob assembly - B615F	S-44971
Volume control knob assembly - B615G	S-44973



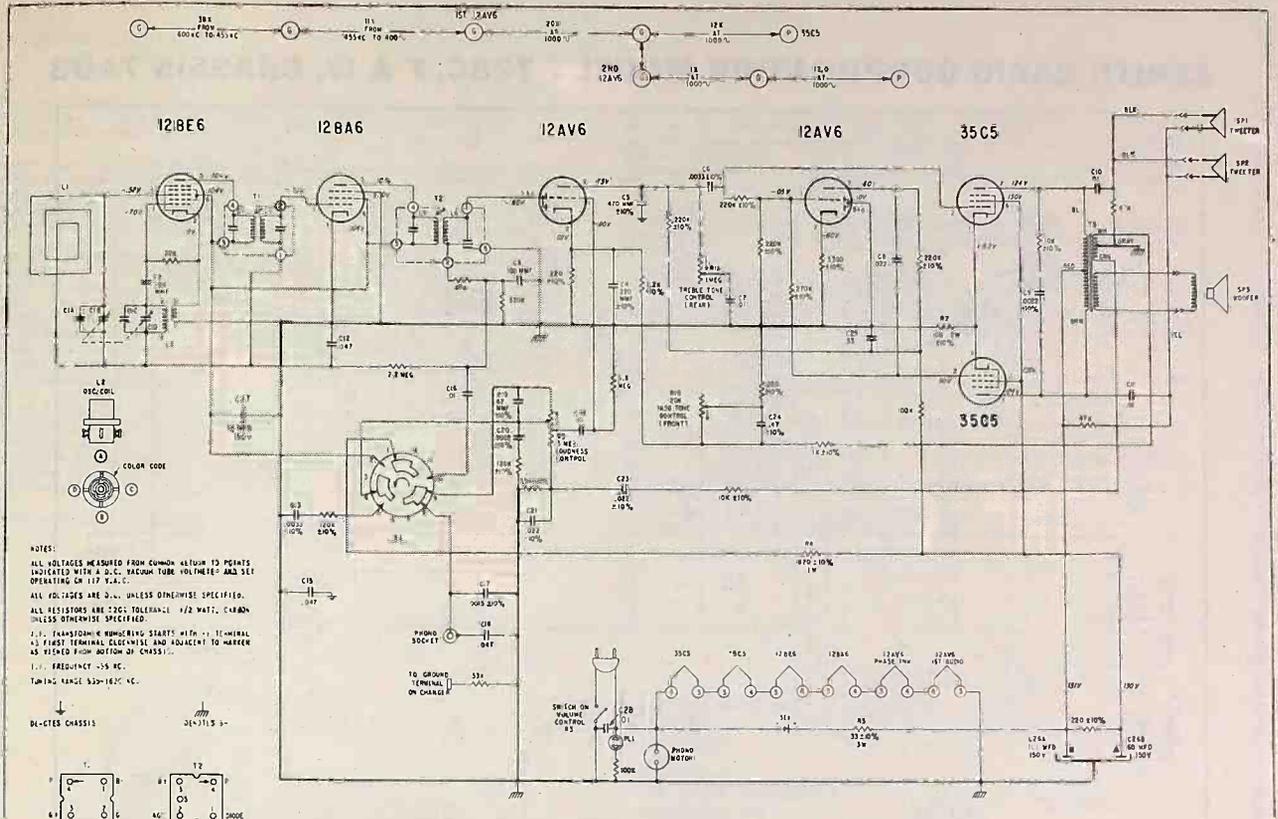
ALIGNMENT PROCEDURE

Operation	Connect Oscillator To	Dummy Antenna	Input Sig. Frequency	Tan. Dig. Af	Trimmers	Purpose
1	Converter Grid	.5 Mfd.	455 Kc.	600 Kc.	L4, L5, L6, L7	For I.F. Alignment.
2	One Turn Loop Coupled Loosely to Wave Magnet	—	1600 Kc.	1600 Kc.	C1F	Set Oscillator to Dial Scale
3	—	—	1400 Kc.	1400 Kc.	C1D, C1B	Align Detector and Antenna Stage



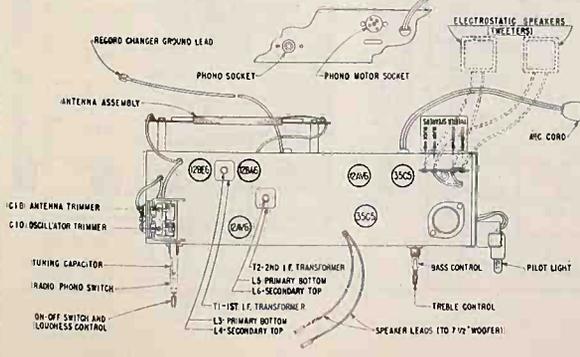
NOTES:
 ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINT INDICATED WITH AN AC OR VACUUM TUBE VOLTMETER.
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
 ALL RESISTORS ARE 20% TOLERANCE, 1/2 WATT CARBON UNLESS OTHERWISE SPECIFIED.
 ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.
 USE ONLY ZENITH NON-INDUCTIVE ELECTROLYTIC CONDENSERS FOR REPLACEMENT.
 IF ANY OTHER TYPE OF ELECTROLYTIC IS USED IT WILL BE NECESSARY TO ADD C14 SHOWN IN DOTTED LINES.
 I.F. TRANSFORMER NUMBERING STARTS WITH NO. 1 TERMINAL, AS FIRST TERMINAL CLOCKWISE FROM HARKER CODE TERMINAL AS VIEWED FROM BOTTOM OF CHASSIS.
 I.F. FREQUENCY 455 KC TUNING RANGE 535 KC TO 1620 KC.

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Zenith Radio Corporation Model HF660 Chassis 6B06

PART NO.	DIA. NO.	Chassis Parts Description	PRICE	PART NO.	DIA. NO.	Chassis Parts Description	PRICE	PART NO.	DIA. NO.	Chassis Parts Description	PRICE
11-103		Line cord & plug	1.00	63-4372	R3	Radio-phonograph switch & volume control & switch		19-298		Mounting clip (mts. S-41437)	.20
12-2329		Variable capacitor mtg. bracket	.10	78-229		Electrolytic socket	.05	24-295		Chassis cover	2.25
19-306		Coil mtg. clip	.10	78-402		4 Contact socket	.15	36-212		Cabinet handle (part of 14-2419F)	1.30
22-3	7,10,11,16	.01 Mfd. ceramic disc - 500V (3 used)	.10	78-806		7 Contact miniature wafer tube socket (5 used)	.10	40-157		Lid support hinge (part of 14-2419F)	.30
22-28	C2,3	100 Mfd. ceramic disc - 500V (2 used)	.25	78-807		7 Contact miniature wafer tube socket	.15	46-1992		Hinge (2 part of 14-2419F)	.30
22-12	C17	.0015 Mfd. ceramic disc - 500V	.25	83-2145		Pilot light socket & wire	.50	46-1993		Loudness & treble tone control knob	
22-18	C9,20	.0025 Mfd. ceramic disc - 500V (2 used)	.25	83-2145		5 Lug terminal strip (2 used)	.10	46-1994		Base tone control knob	
22-2321	C4	220 Mfd. ceramic disc - 500V	.25	83-2313		Insulating strip (phone jack)	.03	46-2021		Tuning knob	
22-2376	C19	.47 Mfd. ceramic disc - 500V	.25	83-2316		3 Lug terminal strip	.10	49-249		Radio-phonograph knob	
22-2670	C5,13	.0033 Mfd. ceramic disc - 500V (2 used)	.25	83-2364		6 Lug terminal strip (part of S-24659)	.05	54-30		7 1/2" PH speaker	.03
22-2755	C24	.47 Mfd. paper - 200V	.55	83-2365		7 Lug terminal strip	.10	61-849		8-32x1/4 Hex. nut (1 part of 14-2419F)	.03
22-2781		1 Mfd. paper - 400V	.55	83-2366		8 Lug terminal strip	.10	61-850		8-32x1/2 Hex. nut (4 mt. 49-849)	.03
22-2792	C12,15,18	.047 Mfd. paper - 200V (3 used)	.30	83-2367		9 Lug terminal strip	.10	62-851		6x3/8 Phila. rd. hd. wood screw (6 used on 24-299)	.04
22-2793		.047 Mfd. paper - 400V	.25	86-199		Terminal	.03	67-852		6x7/8 Phila. oral hd. wood screw (4 used on 14-2419F)	.04
22-2835	C8	1052 Mfd. paper - 400V	.25	86-237		Connector terminal (2 part of 95-1618)	.03	81-1475		Armita Strip (2 used)	.03
22-2807	C21,23	.022 Mfd. paper - 200V (2 used)	.25	86-294		Connector terminal (part of S-24248)	.01	83-2535		Armita Strip (2 used)	.03
22-3073	C1A,B,C,D	2 Section variable		94-299		Capacitor Mtg. bushing (3 mt. 22-3073)	.05	83-2761		Phone shipping strip (2 used)	.03
22-3078	C26A,B	60-100 Mfd. electrolytic - 150 V	3.00	95-1504	TI	1st. I. F. transformer	2.50	86-274		Phone shipping strip	.15
44-25		Phone Jack	.25	95-1596	TE	2nd. I. F. transformer	2.50	93-1173		Finishing washer - brass plate (1 used on 70-219)	.03
54-113		3/8 x 32 x 9/16 Palnut (1 mt. ea.)	.03	95-1618	PI	Audio output transformer	.21	93-1260		Fibre washer (2 part of S-14083)	.03
54-267		6-32 x 5/16 Palnut (used on 114-510)	.03	100-105	PI	Pilot light bulb - NE-51	.21	97-511		Fibre washer (2 part of 14-2419F)	.25
63-1744		100 Ohm 1/2W Ins. 20%	.17	113-34		Lockwasher att. (2 used on 22-3073)	.03	112-1038		8-32x1/8 Phila. rd. hd. mech. screw (4 part of 14-2419F)	.03
63-1757		220 Ohm 1/2W Ins. 10%	.17	114-201		6-32x1/2 Hex. hd. mech. screw (2 used on 22-3073)	.03	112-1038		Record changer mtg. screw (2 part of S-14083)	.15
63-1785		1 K Ohm 1/2W Ins. 10%	.17	114-293		6-32x1/4 Hex. hd. mech. screw (mts. 212-18)	.03	112-1142		5-20x1/2 Phila. rd. hd. self-tap screw (1 mt. 19-298)	.04
63-1799		2500 Ohm 1/2W Ins. 10%	.17	114-510		8-32x1/4 Hex. hd. self-tap screw (2 mt. S-24659)	.03	114-389		6-18x1/2 Hex. hd. self-tap screw (2 mt. S-24659)	.03
63-1806		3300 Ohm 1/2W Ins. 10%	.17	125-17		Rubber grommet (3 used)	.10	114-478		10-32x1/2 Hex. slot hd. mech. screw-latch washer att. (4 used on 6B06)	.03
63-1810		3900 Ohm 1/2W Ins. 10%	.17	125-96		Strain relief grommet	.10	156-45		Dial cartridge (magnite-magnite)	3.95
63-1827		10 K Ohm 1/2W Ins. 10%	.17	119-25		Iron core (part of S-24654)	.05	159-94		Cover latch (2 part of 14-2419F)	1.50
63-1828		10 K Ohm 1/2W Ins. 20%	.17	119-221	SE1	Spare sleeve (1 used on ea. 114-628)	.05	165-29		Plug button (4 used on 14-2419F)	.10
63-1871		47 K Ohm 1/2W Ins. 20% (3 used)	.17	212-18		Selenium rectifier	2.35	171-15		Metal glide (4 part of 14-2419F)	.25
63-1873		100 K Ohm 1/2W Ins. 20% (2 used)	.17	S-24248		Wire & terminal assembly - black	.85	188-195		Pilot light lens	.05
63-1883		220 K Ohm 1/2W Ins. 10% (4 used)	.17	S-24659		Oscillator coil	1.75	202-1375		Retaining ring (2 part of S-14083)	.03
63-1887		270 K Ohm 1/2W Ins. 10%	.17	S-24659		Antenna		202-1375		Instruction book	
63-1891		330 K Ohm 1/2W Ins. 20%	.17	14-2419F		CABINET PARTS		S-23389	SP1,2	Record changer	1.10
63-1906		2.2 Megaohm 1/2W Ins. 20%	.17	16-1463		Table cabinet		S-41437		Detector speaker (2 used)	2.95
63-1947		6.8 Megaohm 1/2W Ins. 20%	.17			Packing carton		S-42308		45 RPM record adapter	1.00
63-1947		100 Ohm 2W Ins. 10%	.34							Cartridge holder (part of S-14083)	
63-1973	R2	13 Ohm 3W Ins. 10%	.45								
63-2712	R5	500 Ohm 1W Ins. 10%	.45								
63-2821	R4	100 Ohm 1W Ins. 10%	.25								
63-4003	R1A,B	Dual tone control	2.75								



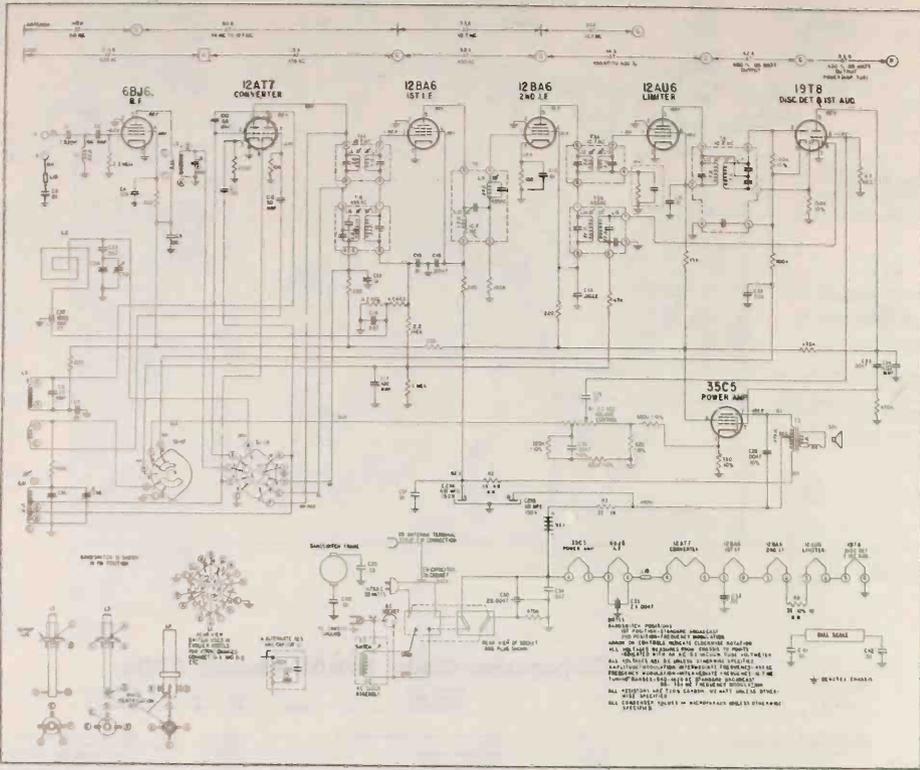
I. F. TRANSFORMERS:

The I. F. transformers incorporated in this receiver are of the new permeability tuned type. The advantage of an I.F. transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these I.F. transformers, the tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

TUBE, TRIMMER LOCATION AND DETAILED VIEW OF I.F. TRANSFORMERS.

OPERATION	CONNECT SCILL. TO	DUMMY ANTENNA	INPUT SIG. FREQUENCY	SET BEAT AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 Mfd.	555 Kc.	600 Kc.	L3, L4, L5, L6	Align I.F. for maximum output
2	One Tune Loop	—	1600 Kc.	1600 Kc.	C10	Set Oscillator to Dial Scale
3	—	—	1400 Kc.	1400 Kc.	C1B	Align Antenna Stage

ZENITH RADIO CORPORATION MODEL B728C, F & W, CHASSIS 7A03



PARTS LIST

PART NO.	QTY.	DESCRIPTION	PRICE
12-146	1	Tuner & Pilot Bracket Q used	80
17-247	1	Coil Slip, Clip	50
17-155	1	Pin Antenna Coil	50
17-156	1	Pin Antenna Coil	50
17-157	1	Pin Antenna Coil	50
17-158	1	Pin Antenna Coil	50
17-159	1	Pin Antenna Coil	50
17-160	1	Pin Antenna Coil	50
17-161	1	Pin Antenna Coil	50
17-162	1	Pin Antenna Coil	50
17-163	1	Pin Antenna Coil	50
17-164	1	Pin Antenna Coil	50
17-165	1	Pin Antenna Coil	50
17-166	1	Pin Antenna Coil	50
17-167	1	Pin Antenna Coil	50
17-168	1	Pin Antenna Coil	50
17-169	1	Pin Antenna Coil	50
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17-296	1	Pin Antenna Coil	50
17-297	1	Pin Antenna Coil	50
17-298	1	Pin Antenna Coil	50
17-299	1	Pin Antenna Coil	50
17-300	1	Pin Antenna Coil	50

TO THE SERVICE MAN:

The 7A03 chassis incorporates a superheterodyne circuit with two stages of IF, on the FM Band, and two stages on the AM Band. There is one stage of RF amplification on the FM Band.

When adjustments are made on the 7A03 or any AC-DC chassis, a line isolation transformer (110-V input to 110-V output) is recommended in order to avoid a "hot" chassis. If an isolation transformer is not available, check the AC voltage between chassis and bench ground, and if there is any indication of voltage, reverse the plug before handling the set.

The I.F. transformers and the discriminator transformer are the new permeability tuned type. The advantage of an IF transformer of this type is its extreme stability under various humidity and temperature conditions. The upper coil is the secondary and the lower the primary. When adjusting these IF and discriminator transformers, tuning wrench 68-19 can be inserted into the top slug, rotated until maximum output is obtained and then dropped down to the lower slug and the same operation repeated. The tuning wrench is so designed that turning one slug does not affect the adjustment of the other.

FM IF Alignment: Because of the wide band pass, it is desirable to use a FM signal generator and a cathode ray oscilloscope when aligning the FM IF channel. The instruction book for the Zenith Model 800 Signal Generator (Form Z8001) covers complete FM alignment procedure. If visual alignment equipment is unavailable, reasonably accurate alignment can be made by following the procedure outlined in this service note.

FM Discriminator Alignment: When the secondary of the discriminator is

aligned (operation 5) use sufficient signal input to get a good positive and negative indication before setting the slug for zero reading. A center zero indicating meter is recommended for this adjustment, but is not absolutely necessary. Reversing the leads of a non-zero center meter, or observing closely when the meter starts to go to the left (negative) of zero will give the same results.

Alignment of this chassis will, in most cases, be unnecessary unless an IF or RF transformer is replaced or the adjustments have been tampered with.

Correct alignment can only be made if the following procedure is followed:

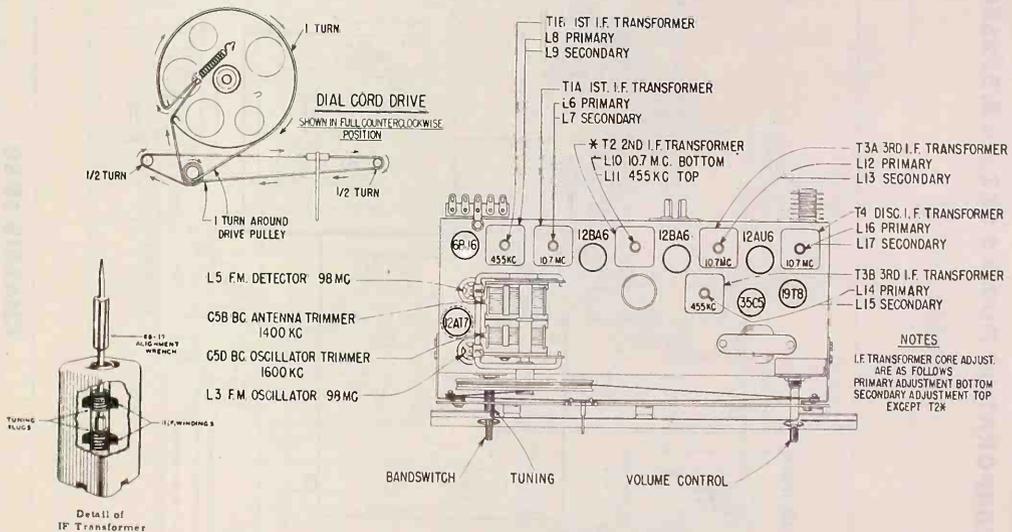
A vacuum tube voltmeter with an isolation resistor of 2,000,000 ohms in series with the hot lead will serve for FM adjustments. This lead should be shielded.

An AC output meter connected across the primary or secondary of the output transformer will be satisfactory for all AM adjustments.

The signal generator output should be kept just high enough to get an indication on the meter.

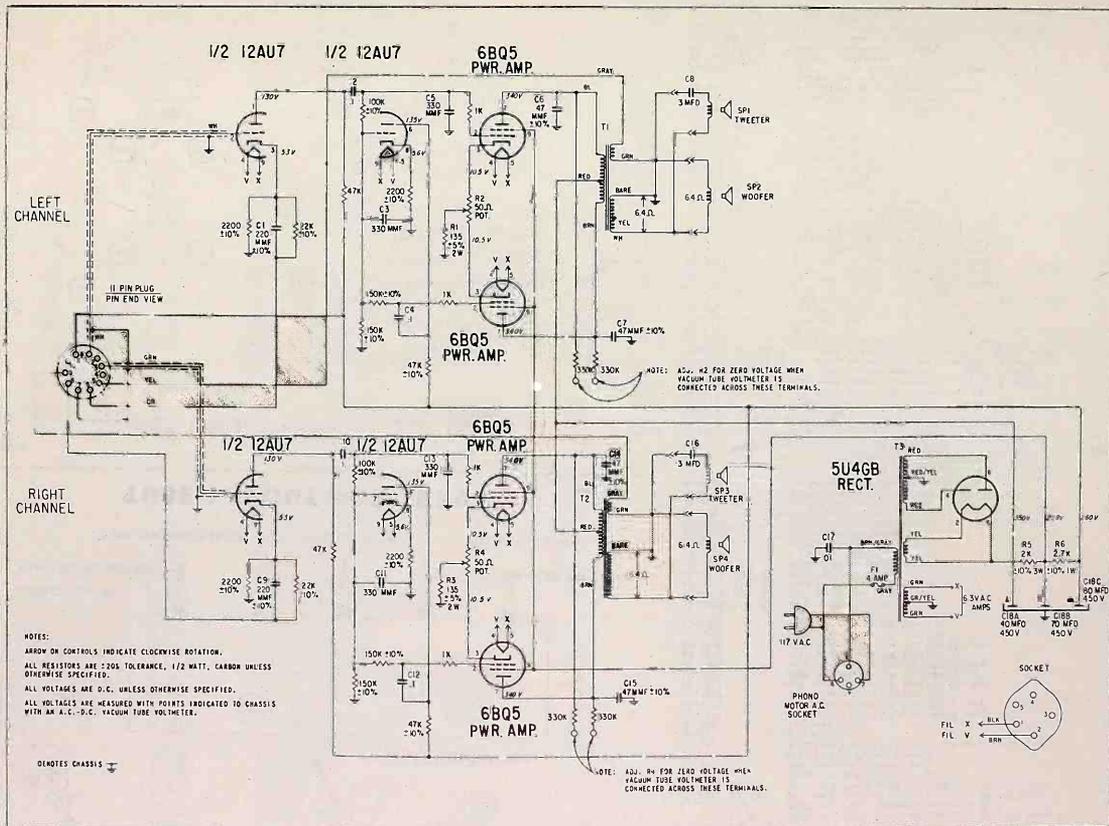
- (a) Vacuum Tube Voltmeter Lug 7 on discriminator transformer to chassis (half discriminator load).
- (b) Vacuum Tube Voltmeter Lug 5 on discriminator transformer to chassis (full discriminator load).
- (c) Vacuum Tube Voltmeter from Limiter Grid to Chassis.
- (d) Loosen Slugs by applying a hot iron to the cement.

TUBE AND TRIMMER LOCATION

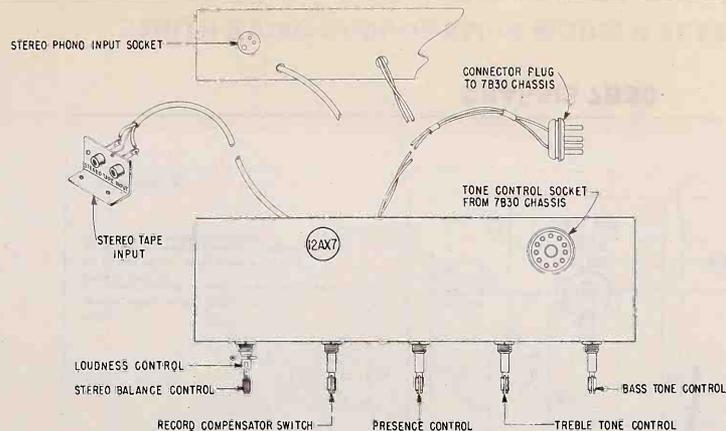


ALIGNMENT PROCEDURE

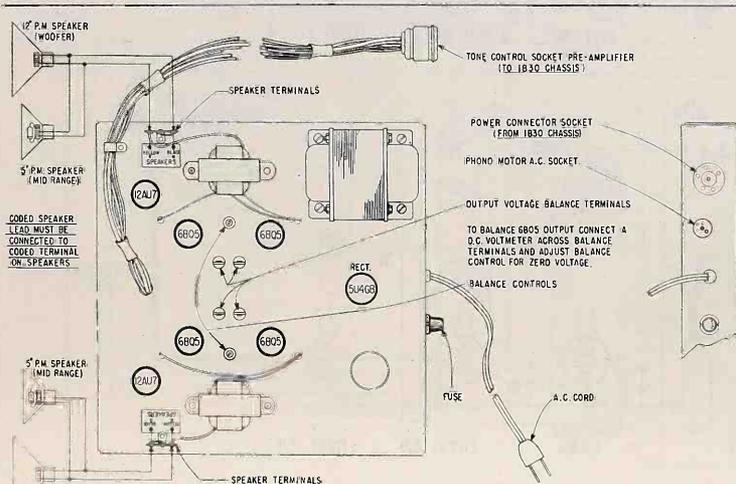
OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 2 12AT7 Converter	.05 Mid.	455 Kc. Modulated.	BC	600 Kc.	L8, 9, 11, 14, 15	Align I.F. channel for maximum output.
2	2 turns loosely coupled to wavemagnet		1600 Kc. Modulated.	BC	1600 Kc.	C5D	Set oscillator to dial scale.
3	2 turns loosely coupled to wavemagnet		1400 Kc. Modulated.	BC	1400 Kc.	C5B	Align antenna stage
4 (a)	Pin 1 (grid) on 12AU6 limiter	.05 Mid.	10.7 Mc. Unmodulated.	FM		L16 coil slug Primary diser.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter	.05 Mid.	10.7 Mc. Unmodulated.	FM		L17 coil slug sec. of diser.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd IF.	.05 Mid.	10.7 Mc. Unmodulated.	FM		L12 & L13 Prim. & Sec. of 3rd IF trans.	Align 3rd IF transformer for maximum reading.
7 (e)	Pin 1 (grid) on 12BA6 1st IF.	.05 Mid.	10.7 Mc. Unmodulated.	FM		L10 Prim. of 2nd IF transformer.	Align 2nd IF transformer for maximum reading.
8 (c)	Pin 2 (grid) on 12AT7 converter tube socket	.05 Mid.	10.7 Mc. Unmodulated.	FM		L6 & L7 Prim. & Sec. of 1st IF trans.	Align 1st IF transformer for maximum reading.
9 (c)	Antenna Post FM (Remove line ant.)	270 ohms	98 Mc. Unmodulated.	FM	98 Mc.	L3 Sec. Coil Slug	Set Oscillator to dial scale.
10 (c) (d)		270 ohms	98 Mc. Unmodulated.	FM	98 Mc.	L5 Det. Coil Slug	Align det. stage to maximum reading.



CHASSIS 7B30



TUBE LAYOUT FOR 1B30



TUBE LAYOUT FOR 7B30

PART NO.	DIA. NO.	DESCRIPTION	PRICE
22-3	C5, 18	.01 mfd. ceramic disc capacitor - 1KV (2 used)	.30
22-14	C6, 19	.0047 mfd. ceramic disc capacitor - 1KV (2 used)	.25
22-17	C7, 20	.001 mfd. ceramic disc capacitor - 1KV (2 used)	.25
22-2321	C22, 23	220 mmfd. ceramic capacitor 500V (2 used)	.25
22-2740	C13	Electrolytic capacitor 10 mfd. 350V	1.50
22-2825	C2, 3, 8, 9, 10, 11, 12, 14, 16, 20	.0047 mfd. Paper Dielectric capacitor 200V (10 used)	.30
22-2837	C24	.0022 mfd. Paper Dielectric capacitor 200V	.30
22-3042	C1, 15	39 mmfd. Gimmick capacitor 500V (2 used)	.25
22-3076	C4, 17	10 mfd. Electrolytic capacitor 250V (2 used)	.175
44-33		Connector Jack (2 part of S-44775)	.15
52-813		Two conductor shielded lead	
54-139		3/8-32 x 9/16 Polnut (4 used)	.03
54-140		3/8-32 x 9/16 x 3/32 Thk. Hex. Nut (mvs. 63-4373)	.06
58-158		5 Prong Plug	
58-220		11 Prong Plug	.55
63-1771		470 ohm resistor 1/2W. ins. 10% (2 used)	.17
63-1786		1K ohm resistor 1/2W. ins. 20% (2 used)	.17
63-1828		10K ohm resistor 1/2W. ins. 20% (2 used)	.17
63-1862		68K ohm resistor 1/2W. ins. 10% (2 used)	.17
63-1869		100K ohm resistor 1/2W. ins. 20% (2 used)	.17
63-1870		100K ohm resistor 1/2W. ins. 20% (2 used)	.17
63-1883		22K ohm resistor 1/2W. ins. 10%	.17
63-1890		330K ohm resistor 1/2W. ins. 10% (4 used)	.17
63-1904		680K ohm resistor 1/2W. ins. 10%	.17
63-1912		1 megohm resistor 1/2W. ins. 10%	.17
63-1918		1.5 megohm resistor 1/2W. ins. 10%	.17
63-4373	R1A, B	Dual Volume Control	2.75
63-4416	R3A, B	Dual Bass Tone Control	2.75
63-4418	R2A, B	Dual Treble Tone Control	2.75
63-4419	R4A, B	Dual Presence Control	2.75
78-846		Wafer Tube Socket (9 contact)	.25
78-1099		3 Contact Socket	.20
80-1249		Shaft Friction Spring	.15
80-1250		Sleeve Friction Spring	.15
83-2216		7 Lug Terminal Strip (4 used)	.15
83-2627		2 Lug Terminal Strip	.05
85-607	S1	Record Compensator Switch	.30
114-190		#20 x 1/2 x 1/4 F. Hex. Hd. Self-Tap. Screw (2 for 58-220)	2.00
5-44775		Stereo Jack & Bracket Assembly	.23

PART NO.	DIA. NO.	DESCRIPTION	PRICE
11-103		Line Cord & Plug	1.00
15-63		Plug Cap & Insulator (used on 78-987)	.30
15-115		Fuseholder Cap	.25
17-149		Cable Clamp	.05
22-3	C17	.01 mfd. ceramic disc capacitor - 1KV	.30
22-2309	C3, 5, 11, 13	330 mmfd. ceramic capacitor 500V (4 used)	.25
22-2321	C1, 9	220 mmfd. ceramic capacitor 500V (2 used)	.25
22-2376	C6, 7, 14, 15	47 mmfd. ceramic disc capacitor 500V (4 used)	.25
22-2782	C2, 4, 10, 12	1 mfd. Paper Dielectric Capacitor 600V (4 used)	.45
22-3108		Electrolytic capacitor - 4.40, 8.0 450V	.55
52-811		Shielded Lead	.55
52-812		Shielded Lead	.55
54-382		Hex Nut (used on 62-17)	.06
62-17		Fuse receptacle	.40
63-1573	R6	2700 ohm resistor 1W ins. 10%	.25
63-1786		1K ohm resistor 1/2W. ins. 20% (4 used)	.17
63-1799		2200 ohm resistor 1/2W. ins. 10% (4 used)	.17
63-1841		22K ohm resistor 1/2W. ins. 10% (2 used)	.17
63-1855		47K ohm resistor 1/2W. ins. 10% (4 used)	.17
63-1869		100K ohm resistor 1/2W. ins. 10% (2 used)	.17
63-1876		150K ohm resistor 1/2W. ins. 10% (4 used)	.17
63-1891		330K ohm resistor 1/2W. ins. 20% (4 used)	.17
63-4402	R2, 4	Current Balance Control (2 used)	1.40
63-4397	R1	155 ohm resistor 2W WW 5% (2 used)	.58
63-4417	R5	2000 ohm resistor 3W 10%	.45
78-402		4 contact socket	.25
78-755		Octal tube socket	.20
78-792		5 contact socket	.15
78-846		Novel tube socket (2 used)	.15
78-939		Novel Moulded Tube socket (4 used)	.40
78-987		Contact socket	.75
83-1475		Insulator strip	.03
83-2216		7 Lug Terminal strip (4 used)	.15
83-2639		3 Lug Terminal strip (2 used)	.05
83-2898		3 Lug Terminal strip special (3 used)	.10
93-1179		Rubber Washer (used on 62-17)	.03
93-1180		1/2" Internal Tooth Lockwasher (use on 62-17)	.03
95-1641	T3	Power Transformer	19.00
95-1642	T1, 2	Output Transformer (2 used)	6.00
102-3790		Label (speaker lead connection)	.05
114-635		10-16 x 1/2 Hex Hd. Self-Tap Screw (flat washer att.)	.10
125-96		(4 mts. 95-1641)	.05
136-31	F1	Stream Relief Grommet	.10
		Fuse 4 amp. type 3AG	.25

PART NO.	DIA. NO.	DESCRIPTION	PRICE
2-608		Cabinet Back SF2510, L & R	4.00
2-609		Cabinet Back SF2510R	4.00

14-2521	Record Player - Cabinet Model SF2510	
14-2521L	Record Player - Cabinet Model SF2510L	
14-2521R	Record Player - Cabinet Model SF2510R	
18-1502	Packing Carton	
19-295	Mounting Clip (mts. S-43992)	.20
22-2945	3 mid. Electrolytic capacitor - 30V (part of 49-856)	.60
40-1195	Lid Hinge (2 part of 14-2521, L & R)	.60
40-1172	Lid Support Hinge (part of 14-2521, L & R)	.60
46-1997	Volume Control Knob (Remote)	.75
46-2081	Control Knob (4 used)	.75
46-2098	Volume Control Knob	
49-856	S' 1" PM Speaker (2 used)	7.00
49-873	12" PM Speaker (2 used)	22.50
54-10	8-32 x 1/2 Hex Nut (8 part of 14-2521, L & R)	1.25
54-34	6-32 x 1/2 Hex Nut (8 part of 14-2521, L & R & 4 mts. ea. 49-856)	.03
54-312	Speed Nut (2 part of 14-2521, L & R)	.03
51-224	8-32 x 1 1/2 Hex Nut Washer (4 mts. ea. 49-873)	.03
57-2498	Emblon Plate (part of 14-2521, L & R)	.35
57-2561	Name Plate (part of 14-2521, L & R)	.05
72-127	7 x 1/2 Phillips Flat Hd. Wood Screw (4 used on 14-2521, L & R)	1.00
83-765	Armitie strip (3 used)	.03
83-1475	Armitie Strip (3 used)	.03
83-2535	Phone Shipping strip (2 used)	.03
83-2762	Phone Shipping Strip	.03
86-257	Connector Terminal (8 used)	.05
86-254	Connector Terminal (4 used)	.05
86-312	Terminal Shockproof (2 used)	.03
93-1240	Fibre Washer (2 used on S-14090 or S-14093)	.03
96-170	Cabinet Leg (4 part of 14-2521L)	
96-171	Cabinet Leg (4 part of 14-2521R)	
96-172	Cabinet Leg (4 part of 14-2521L)	
112-789	8-32 x 1-3/8 Swedge Hd. Mach. screw (8 part of 14-2521, L & R)	.03
112-843	6-32 Swedge Hd. Mach. screw (8 part of 14-2521, L & R)	.03
112-1038	Record Changer Mtg. Screw (2 used)	.15
112-1142	5-20 x 3/8 Phillips Rd. Hd. Self-Top. screw (mts. 49-298)	.03
114-405	Chassis mtg. screw (4 used)	.10
114-329	6-18 x 3/8 x 1/4 AF Hex. Hd. Self-Top. screw (2 used on 1B30)	.03
114-336	Chassis mtg. screw (4 mts. power supply)	.10
114-453	6-18 x 5/8 Slotted Hd. Washer Hd. Self-Top. screw (9 used)	.03
115-34	2-40 x 5/32 Fill. Hd. Mach. Screw (2 mts. 142-93)	.03
142-93	2-40 x 5/32 Phillips Flat Hd. Wood Screw (2 used on 1B30)	37.50
188-195	Retaining Ring (2 used on S-14090 or S-14093)	.03
202-1398	Instruction Book	
S-14090	Four Speed Record Changer	
S-14093	Four Speed Record Changer	
S-2657	Terminal Strip Assem. (1 ea. part of 49-856)	.30
S-4392	45 R.P.M. Record Adapter Assem.	2.95
S-4491	Final Power supply & amplifier (chassis model 7B30)	
S-4493	Final chassis assem. (Model 1B30)	

PART NO.		CABINET PARTS		PRICE
DIA. NO.		DESCRIPTION		
2-595		Models SF 2550 E, R		5.75
2-596		Cabinet Back Model SF 2550		5.75
2-597		Cabinet Back Model SF 2550E		5.75
14-2498		Console Cabinet Model SF 2550		
14-2498E		Console Cabinet Model SF 2550E		
14-2498R		Console Cabinet Model SF 2550R		
12-2690		Hold Down Bolt (2 used) (Shipping)		
16-1001		Packing Carton		
19-298		Mtg. clip (mts. 43992)		.20
22-2945	CB, 16	3 mid. Electrolytic capacitor 30V (part of 49-856)		1.25
33-185		Record Changer Mtg. frame		8.00
36-220		Record Changer Hinge		1.00
46-1997		Volume Control Knob (Remote)		.75
46-2081		Control Knob (4 used)		.75
46-2098		Volume Control Knob		
49-856		S' 1" PM Speaker (2 used)		7.00
49-873		12" PM Speaker (2 used)		22.50
54-10		8-32 x 1/2 Hex Nut (8 part of 14-2498, E & R)		.03
54-34		6-32 x 1/2 Hex Nut (8 part of 14-2498, E&R and 4 mts. ea. 49-856)		.03
54-312		Speed Nut (2 part of 14-2498, E & R)		.03
51-224		8-32 x 1 1/2 Hex Nut Washer (4 mts. ea. 49-873)		.03
57-1270		Strike Plate (2 part of 14-2498E)		.05
57-1284		Strike Plate (2 part of 14-2498R)		.05
57-2498		Emblon Plate (part of 14-2498, E & R)		.35
57-2561		Name Plate (part of 14-2498, E & R)		1.00
72-127		7 x 1/2 Phillips Flat Hd. Wood Screw (2 used 152-208)		.03
83-765		Armitie strip (6 used)		.03
83-2535		Phone shipping strip (2 used)		.03
83-3015		Wire strip		
83-3038		Friction strip - shipping (2 used)		
83-3039		Corrugated, Filler strip - shipping (2 used)		
86-237		Connector Terminal (3 used)		.05
86-254		Connector Terminal (5 used)		.03
86-255		Connector Terminal (3 used)		.03
93-1260		Fibre Washer (2 used on S-14090 or S-14093)		.03
93-1376		Spacer Washer (Shipping)		.70
96-193		Cab. Leg (4 part of 14-2498R)		
96-194		Cab. Leg (4 part of 14-2498E)		
96-195		Cab. Leg (4 part of 14-2498)		
112-789		8-32 x 1-3/8 Swedge Hd. Mach. Screw (8 part of 14-2498, E, E, R)		.03
112-852		6-18 x 5/8 Phil. Rd. Hd. Self-Top. screw (4 mts. S-18560 to 33-185)		.03
112-943		6-32 x 1 Swedge Hd. Mach. screw (8 part of 14-2498, E, E, R)		.03

112-1131	6-18 x 5/8 Phil. Flat Hd. Self-Top. screw (3 ea. mts. S-18560)	.03
112-1142	5-20 x 3/8 Phillips Rd. Hd. Self-Top. Screw (mts. 19-298)	.04
112-1194	Record Changer mtg. screw (2 used)	.60
113-65	8-32 x 1/4 x 1/4 AF Hex. Hd. Mach. screw (Lockwasher att.) (2 mts. 36-185)	.05
114-40	Chassis mtg. screw (4 used)	.10
114-329	6-18 x 3/8 x 1/4 AF Hex Hd. Self-Top. Screw (2 used)	.03
114-386	Chassis Mtg. Screw (4 mts. Power Supply)	.10
114-453	6-18 x 5/8 Slotted Hex Washer Hd. Self-Top. screw (9 mts. Cab. back)	.30
114-644	Special Hex Hd. Screw Red Finish on Hand - washer att. (used on 33-185)	.10
115-34	2-40 x 5/32 Fill. Hd. Mach. Screw (2 mts. 142-93)	.03
142-93	2-40 x 5/32 Phillips Cartridge (Diamond/Sapphire)	37.50
152-208	Wood Block (Record Changer Stop)	.50
156-33	Bullet Catch (2 part of 14-2498E)	.05
156-35	Bullet Catch (2 part of 14-2498R)	.05
188-195	Retaining Ring (2 used on S-14090 or S-14093)	.03
202-1398	Instruction Book	
S-14090	Four Speed Record Changer	
S-14093	Four Speed Record Changer	
S-18560	Record Changer Side Assem. (2 used)	2.75
S-2657	Terminal strip assem. (2 part of 49-856)	.30
S-4392	45 R.P.M. Record Adapter Assem.	2.95
S-4491	Final Power Supply & Amplifier Chassis - Model 7B30	
S-4493	Final Chassis Assem. - Model 1B30	

All prices shown are suggested retail prices which include Federal Manufacturers' Excise Tax where applicable - and are subject to change without notice.

TO THE SERVICEMAN:

Models SF2510, SF2510L, SF2510R, SF2550E and SF2550R are identical electrically. The only differences are in cabinet styling and chassis mounting.

Chassis 1B30-7B30 are complete high-fidelity stereophonic amplifiers. They use two 2-inch woofer and two 5-inch cone tweeter speakers.

The wires to the stereo cartridge should be connected as follows. "Red" wire to "R" terminal of cartridge, "Black" to "middle" terminal and "White" wire to "L" terminal of cartridge.

It is most important that coded speaker leads be connected to coded terminals on speakers for proper polarity within each speaker group. It is most important then that the speaker groups be in phase with each other. An excellent method to determine if the speaker groups are in phase is to play either a stereo or mono record with the record compensator in RIAA position, with the tone controls on both units in mid position and with the audio outputs from each speaker to group at the same level. Under these conditions, the sound should appear to come from a point midway between the two speaker groups. If the sound comes from any other point than mid-point then one speaker group is out of phase with the other and you should check speaker polarity.

If one or both of the 63Q5 output tubes in each final audio amplifier are replaced, it will be necessary to connect a DC volt meter across the balance terminals and adjust the balance control for minimum voltage.