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1958

VOLUME R-18

RADIO
DIAGRAMS

and Servicing Information

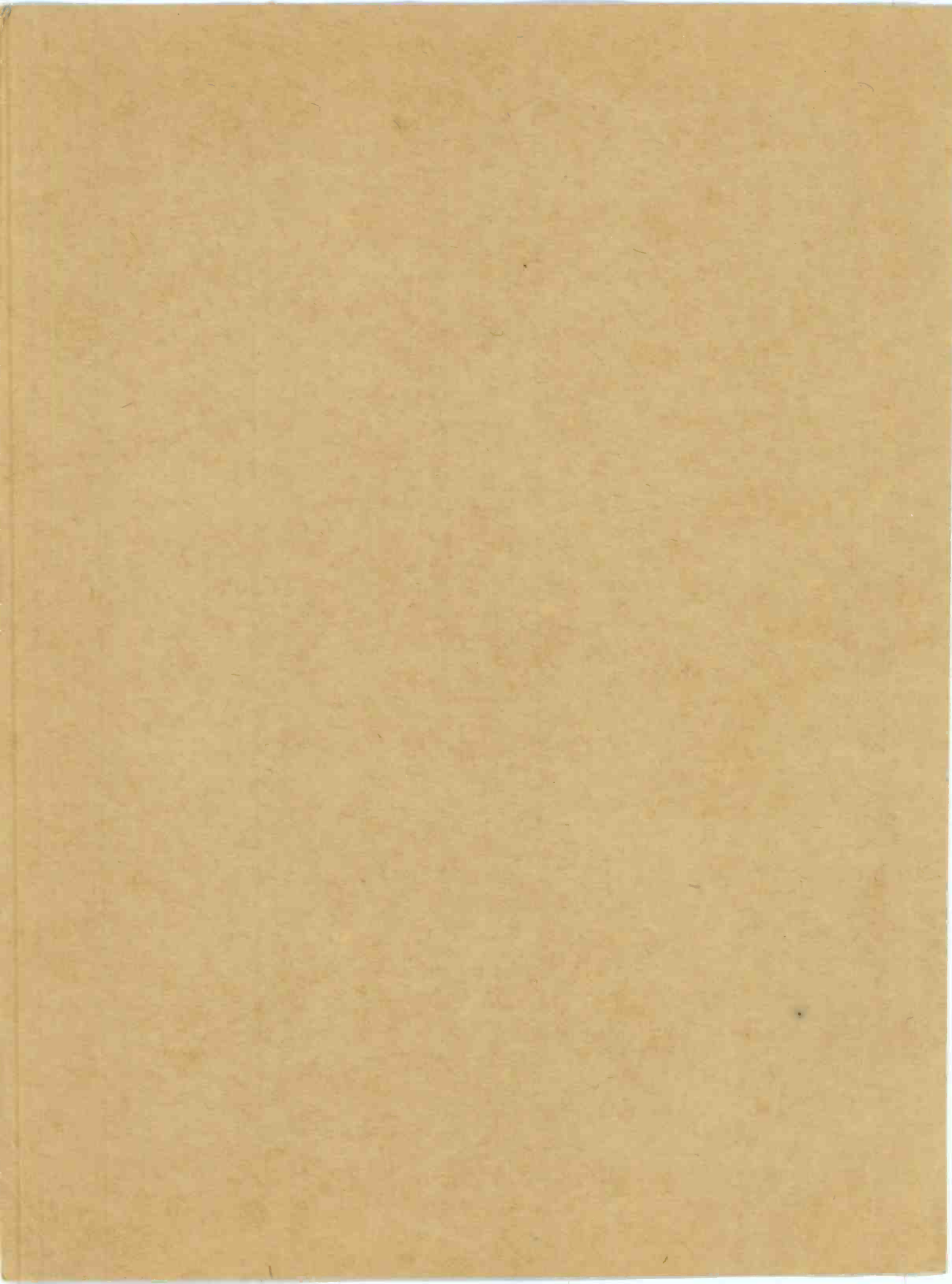


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M. N. BEITMAN

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SUPREME PUBLICATIONS



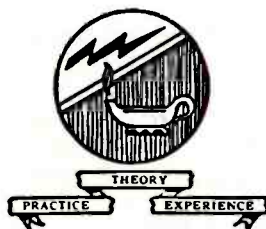
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**RADIO
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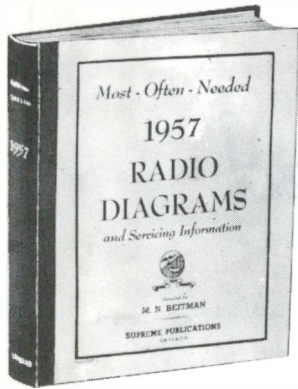
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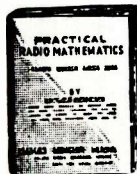
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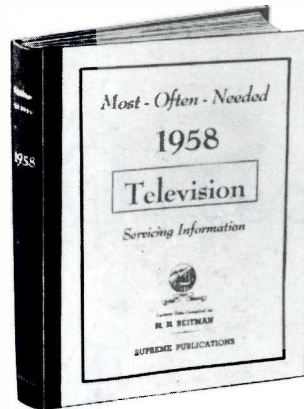
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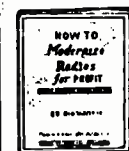
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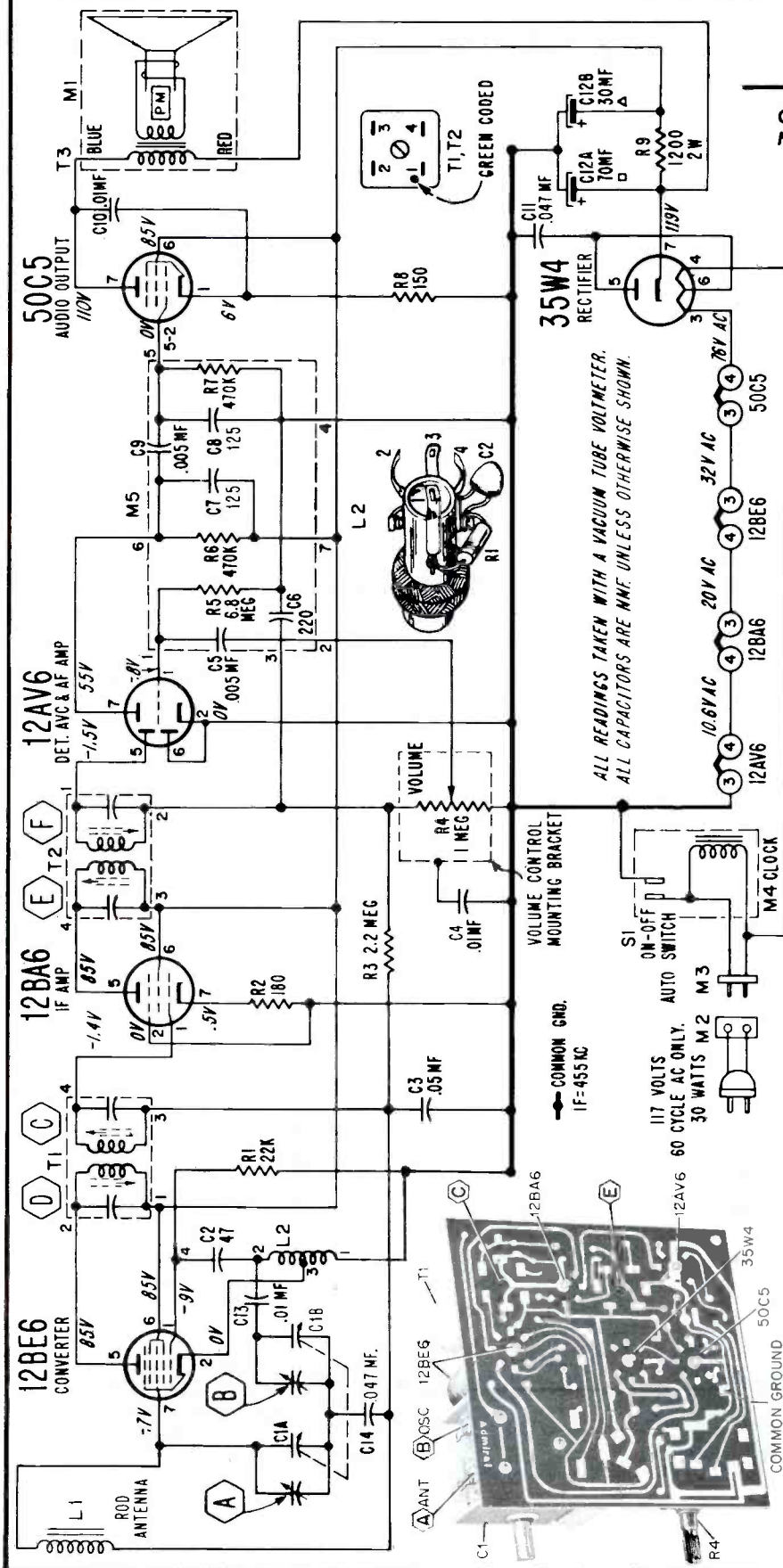
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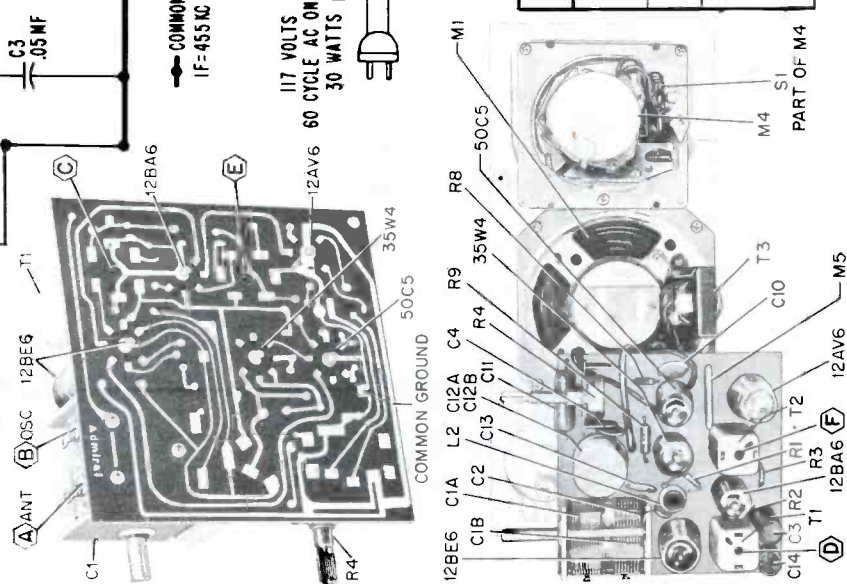
CHASSIS 5C4
MODELS 263 • 264 • 265 • 268



ALIGNMENT PROCEDURE

STEP	CONNECTION OF SIGNAL GENERATOR	SIGNAL GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
1	Through a .1 mf capacitor to stator, Antenna section of gang tuning capacitor	455 KC	Gang fully open	"E", "E", "D" and "C" for maximum output
2	Same as "STEP 1"	1620 KC	Gang fully open	"B" for maximum output
3	Radiated Signal. Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal pickup.	1400 KC	Tune in on generator signal	"A" for maximum output

*Adjustments "C" and "E" made from underside of chassis.



Admiral

CHASSIS 200 and 4W2
MODELS 202 • 215 • 217 • 218

(Continued on page 5)

CHASSIS IDENTIFICATION

To determine whether the chassis is a 4W2 or 200 series, check the label pasted inside of the cabinet back cover. This label identifies the chassis by number. If the label has been torn out or otherwise removed, the chassis used can be determined by the clearance between the printed wiring board and the top of the cabinet. On the 4W2 chassis there is enough space for storing the power line cord above wiring board. On 200 chassis, line cord is stored below chassis.

SERVICING

Replace resistors and capacitors by clipping out the defective part and leaving the pigtail leads as long as possible. Then, solder the replacement part onto the remaining pigtail leads.

Remove components such as coils, IF transformers, and tube sockets by alternately heating and loosening each pin. Brush away melted solder as each pin is heated.

Use a low wattage soldering iron, 35 watts or less.

ALIGNMENT PROCEDURE

- When this set is aligned while operating on the AC power line, an isolation transformer should be used. If an isolation transformer is not available, connect a .1 mfd. capacitor in series with the signal generator low side to B minus (pin 7 of 1U5 tube).
- Set Volume control to maximum.
- DO NOT connect earth ground to common ground (see figs. 2 and 4).

- 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 with 3/32" wide blade to avoid splitting slotted cores on IF transformers.
- Repeat adjustments to insure good results.

Step	Dummy Antenna in Series with Signal Generator	Connection of Signal Generator (High Side)	Signal Generator Frequency	Receiver Gang Setting	Adjustment Description	Adjustment Designation	Type of Adjustment
1	.1 mfd. capacitor	Stator of antenna tuning capacitor	455 KC	Gang fully open	2nd IF 1st IF	"A", "B", "C" and "D"	Maximum output
2	Loop of several turns of wire, or place generator lead close to receiver for adequate signal pickup.	No actual connection (signal by radiation)	1620 KC	Gang fully open	Oscillator (on gang)	"E"	"Same as Step 1"
3	"Same as Step 2"	"Same as Step 2"	1400 KC	Tune in on generator signal	Antenna (on gang)	"F"	"Same as Step 1"
4 200 chassis only	"Same as Step 2"	"Same as Step 2"	600 KC	"Same as Step 3"	Antenna peaking coil	"G"	"Same as Step 1"
5 200 chassis only	Repeat Steps 3 and 4 until proper tracking is achieved.						

*Adjustments "B" and "D" on chassis 4W2 are made from foil side. Adjustments "B" and "C" on chassis 200 are made from foil side. Remove chassis to make these IF transformer adjustments.

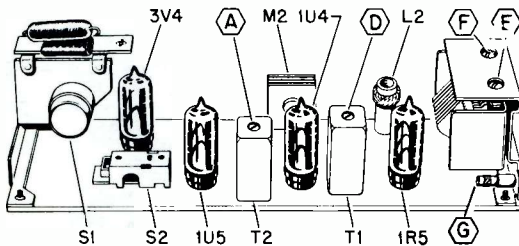


Figure 1. Top View of Chassis 200. Tube Locations and Alignment Points Shown.

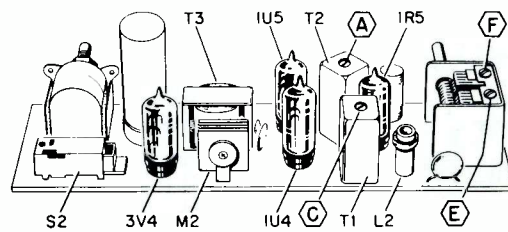


Figure 3. Top View of Chassis 4W2. Tube Locations and Alignment Points Shown.

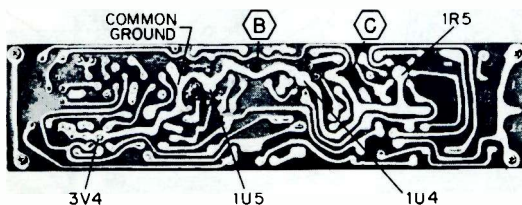


Figure 2. Bottom View of Chassis 200. Tube Locations and Alignment Points Shown.

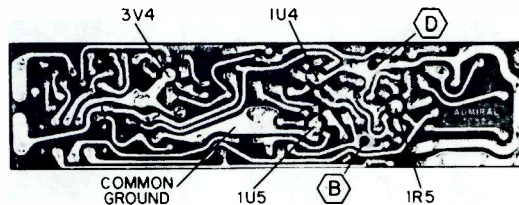


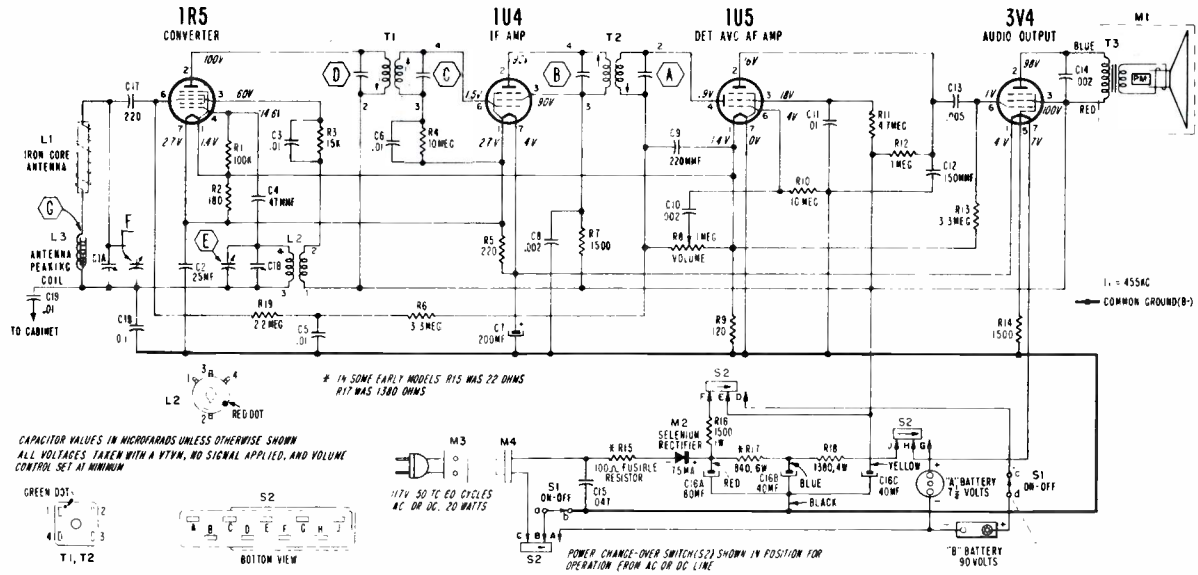
Figure 4. Bottom View of Chassis 4W2. Tube Locations and Alignment Points Shown.

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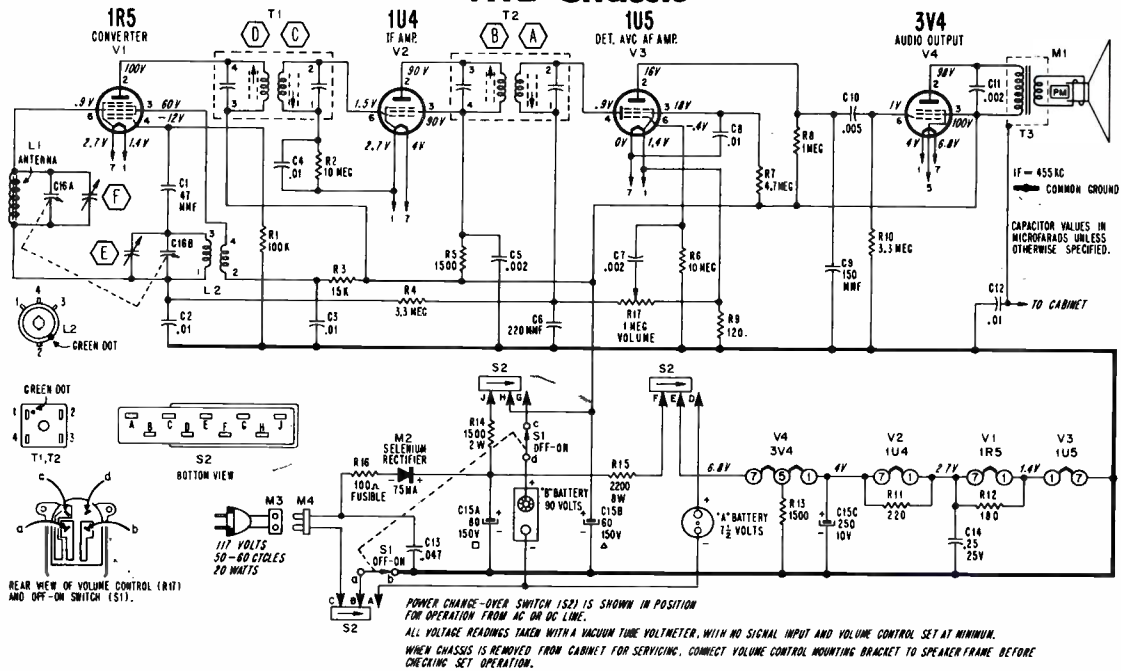
CHASSIS 200 and 4W2
MODELS 202 • 215 • 217 • 218

(Continued from page 4)

200 Chassis



4W2 Chassis



REMOVING THE CHASSIS

1. Remove Tuning knob and Volume Control knob by working them forward and off their shafts.
2. Open cover on rear of cabinet.
3. On front of cabinet, *loosen*, but do not remove, two screws adjacent the tuning shaft.
4. *Loosen*, but do not remove, the hexnut that secures volume control shaft to cabinet front.
5. On chassis 4W2 only, remove Phillips screw that holds chassis to rear of speaker.
6. On 200 series chassis, remove the 1U4 vacuum tube. Remove the Phillips screw that connects through middle of selenium rectifier.
7. To prevent damage, hold the printed wiring board while removing the two screws and hex-nut located on cabinet front.
8. Gently lift the printed wiring board from within the case.
9. By straightening the four prongs which hold speaker frame to cabinet, the speaker may be removed.

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Chassis 5B4 and 5D4, Continued on page 7.

MODEL	COLOR	CHASSIS
242	Maroon	5B4
244	White & Pink	
245	Red & White	
248	Green & White	
275	Red & White	5D4
278	Green & White	
279	Gray & White	

SERVICING

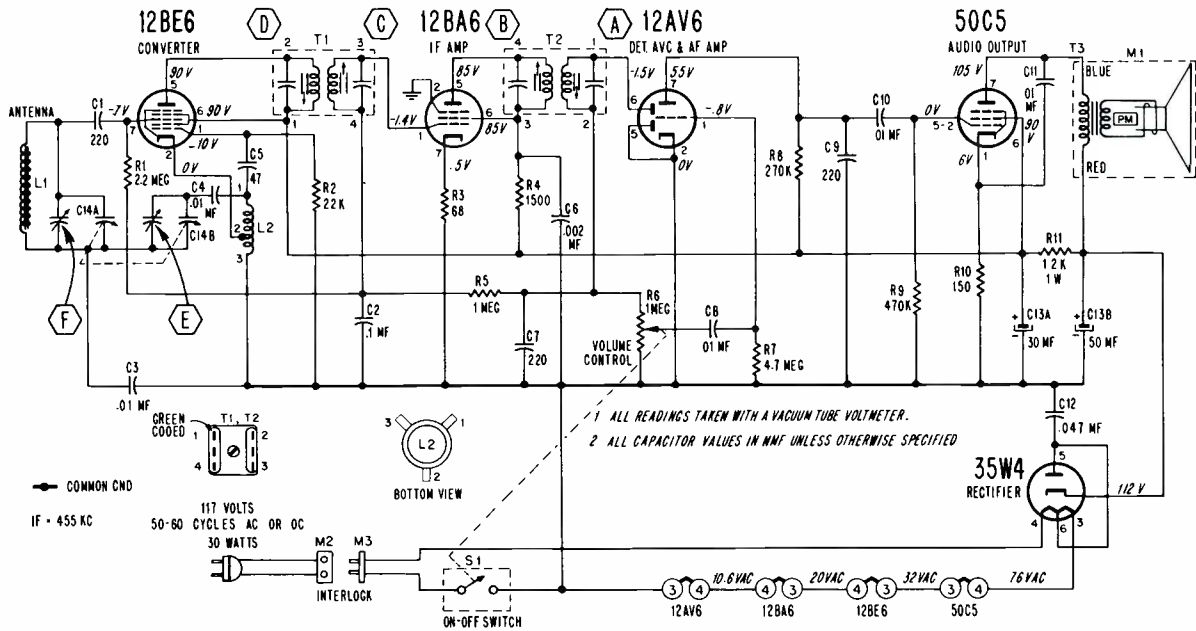
Figure 2, refers to the foil side of the printed circuit board. It shows alignment points, tube locations, and location of the common ground line.

Figures 3 and 4, refer to the 5B4 and 5D4 chassis respectively.

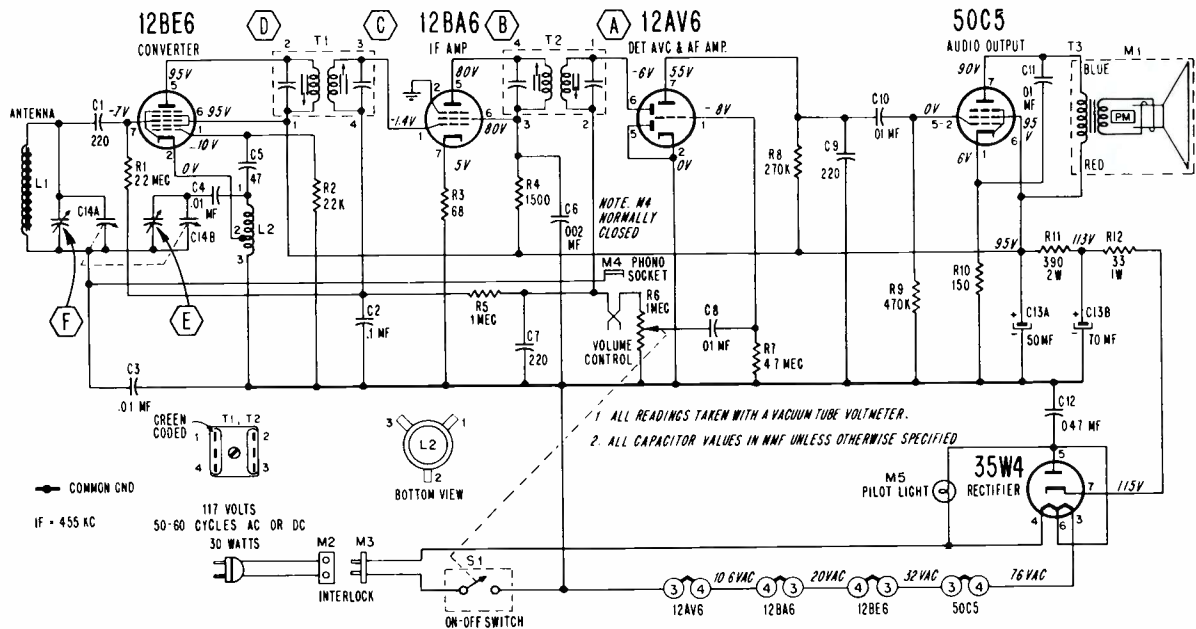
Figures 3 and 4 show the location of all resistors, capacitors, coils and transformers.

To further simplify parts identification and location, schematic symbol numbers are printed adjacent to respective components on the printed circuit board.

5B4



5D4



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CHASSIS 5B4, 5D4
 MODELS 5B4 (242 • 244 • 245 • 248) (Continued from page 6)
 5D4 (275 • 278 • 279)

REMOVING THE CHASSIS

1. Disconnect line cord and remove the two screws located near the front on cabinet bottom. See figure 1.
2. Loosen the two chassis retaining screws on the back of cabinet until they are held by only the last threads.
3. While steadying the cabinet, apply pressure to the loosened chassis screws with thumbs. Since the chassis is secured to the panel, this assembly will slide forward.
4. Remove the loosened chassis screws.
5. Remove chassis and panel assembly by grasping

the control knobs and pulling free from front of cabinet.

6. To replace, position chassis and panel assembly inside the cabinet and secure the panel and chassis assembly to the cabinet with the proper screws.

TO REMOVE CHASSIS FOR SERVICING TUBES

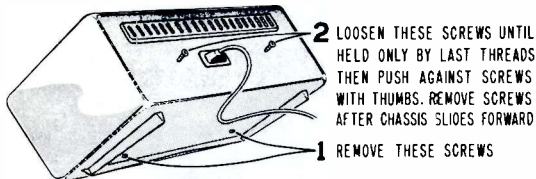


Figure 1. Rear View of Cabinet Showing Chassis Mounting Screws.

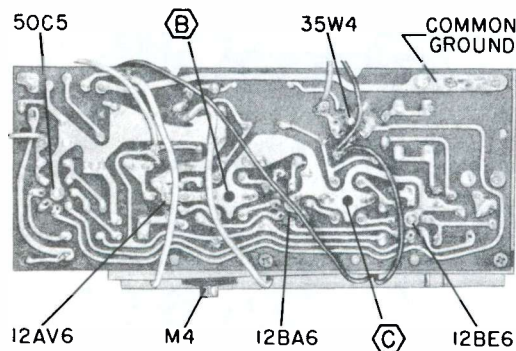


Figure 2. Bottom View of 5D4 Chassis Showing Alignment Points and Tube Locations. 5B4 chassis has same location for tubes and alignment points. Common ground is also the same.

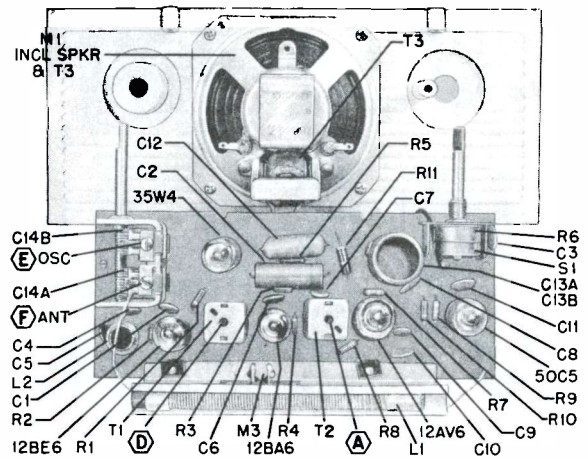


Figure 3. Top View of 5B4 Chassis Showing Location of Components and Alignment Points.

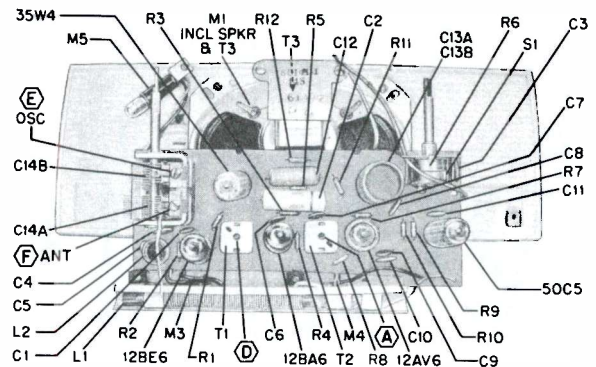


Figure 4. Top View of 5D4 Chassis Showing Location of Components and Alignment Points.

ALIGNMENT PROCEDURE

- Use an isolation transformer if available; otherwise, connect a .1 mfd. capacitor in series with low side of signal generator and connect to common ground (see figure 2). Caution: Do not connect a ground wire to common ground.
- 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 with a blade 3/32" wide for aligning 1F transformers.
- Repeat adjustments to insure good results.

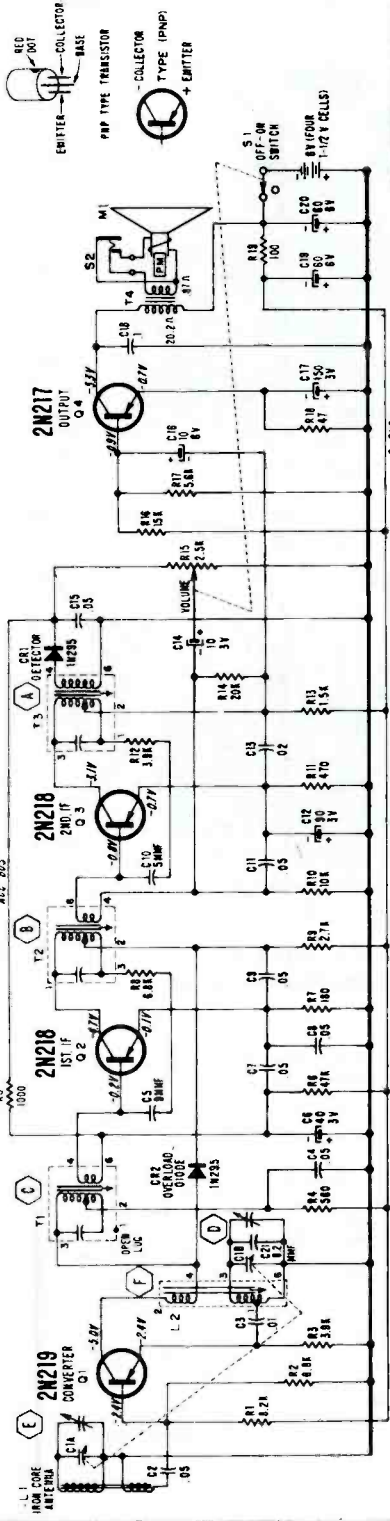
STEP	CONNECTION OF SIGNAL GENERATOR	SIGNAL GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
1	Through a .1 mf capacitor to stator, Antenna section of gang tuning capacitor	455 KC	Gang fully open	"A", "B", "C" and "D" for maximum output
2	Same as "STEP 1"	1620 KC	Gang fully open	"E" for maximum output
3	Radiated Signal. Loop of several turns of wire, or place generator lead close to receiver loop for adequate signal pickup.	1400 KC	Tune in on generator signal	"F" for maximum output

*Adjustments "B" and "C" made from underside of chassis; see figure 2.

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CHASSIS 4P2

MODELS 4P21 • 4P22 • 4P24 • 4P28



TOTAL CURRENT DRAIN WITH NO SIGNAL & VOLUME CONTROL AT MINIMUM: 170mA

IF - 455 KC.

COMMON GROUND CHARACTER VALUES IN MICROGRADS UNLESS OTHERWISE SPECIFIED.

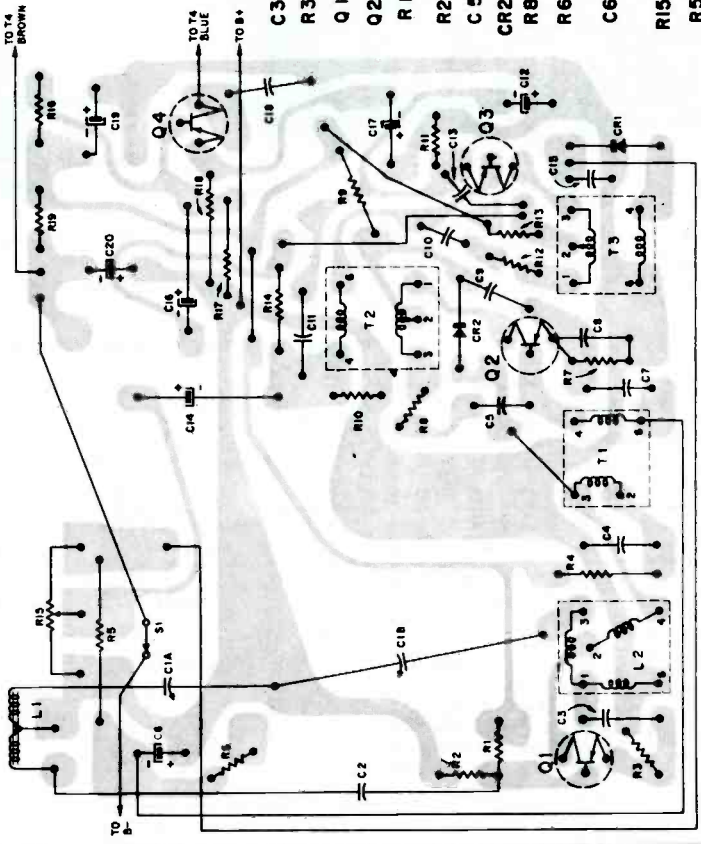
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I.F. 455 KC.

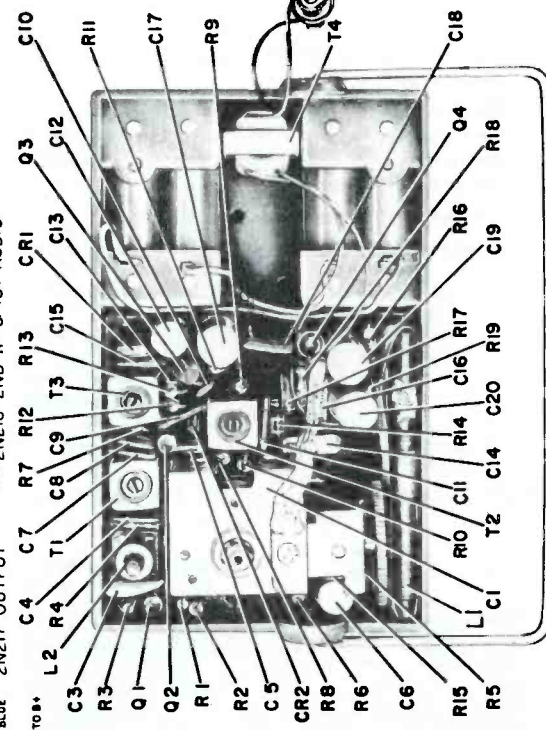
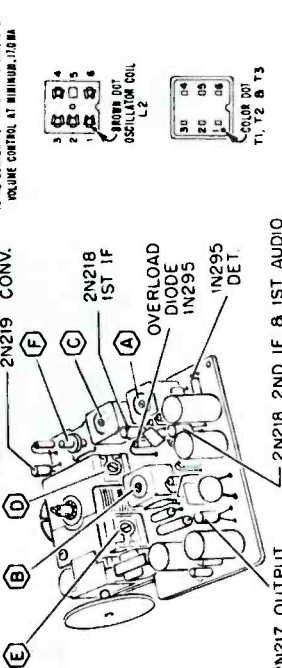
COMMON GROUND CHARACTER VALUES IN MICROGRADS UNLESS OTHERWISE SPECIFIED.

IF - 455 KC.

TOTAL CURRENT DRAIN WITH NO SIGNAL & VOLUME CONTROL AT MINIMUM: 170mA

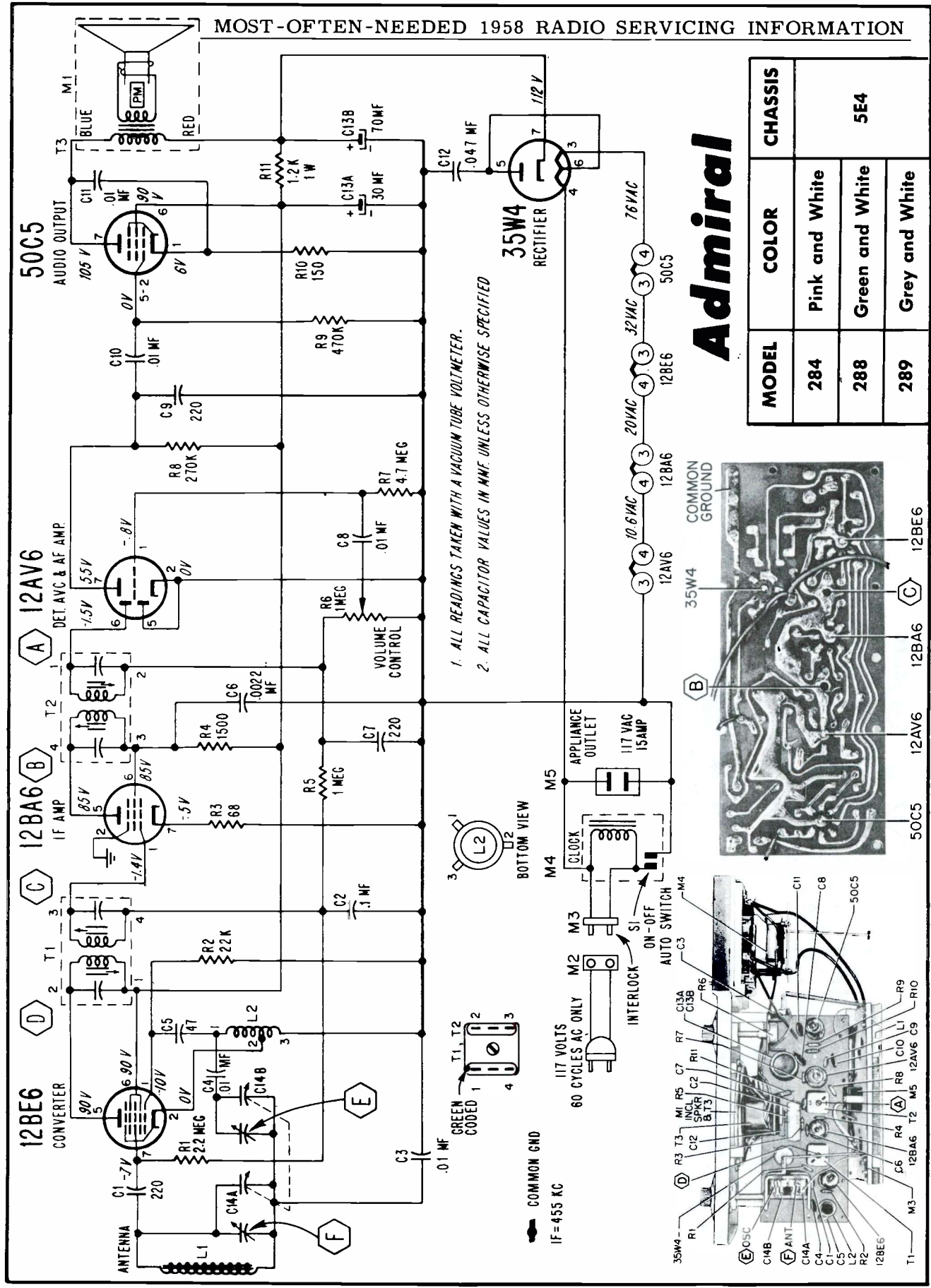


View of printed Wiring Board. NOTE: Gray area represents printed wiring, black symbols and lines represents components, wiring and connections on opposite side.



Top View of Chassis Showing Parts Locations

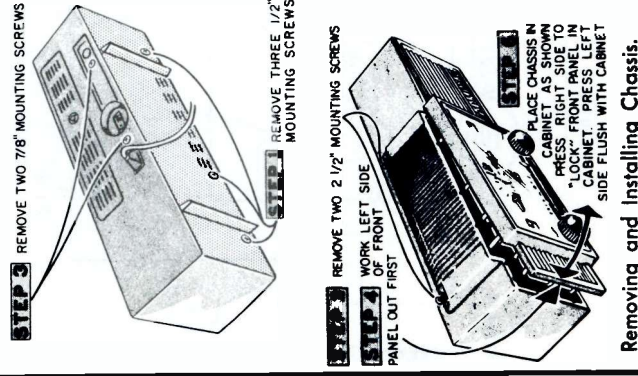
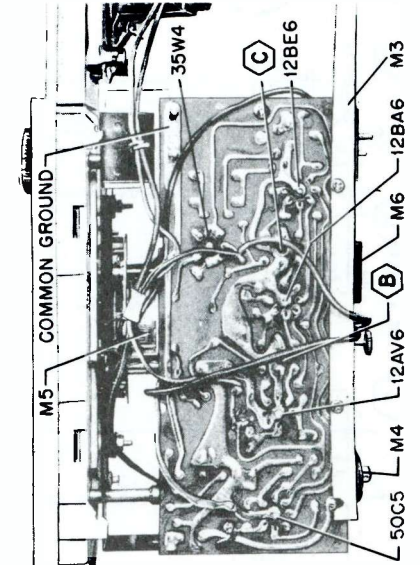
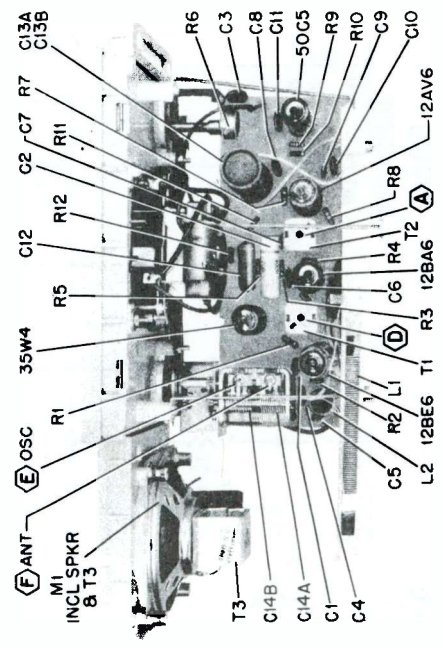
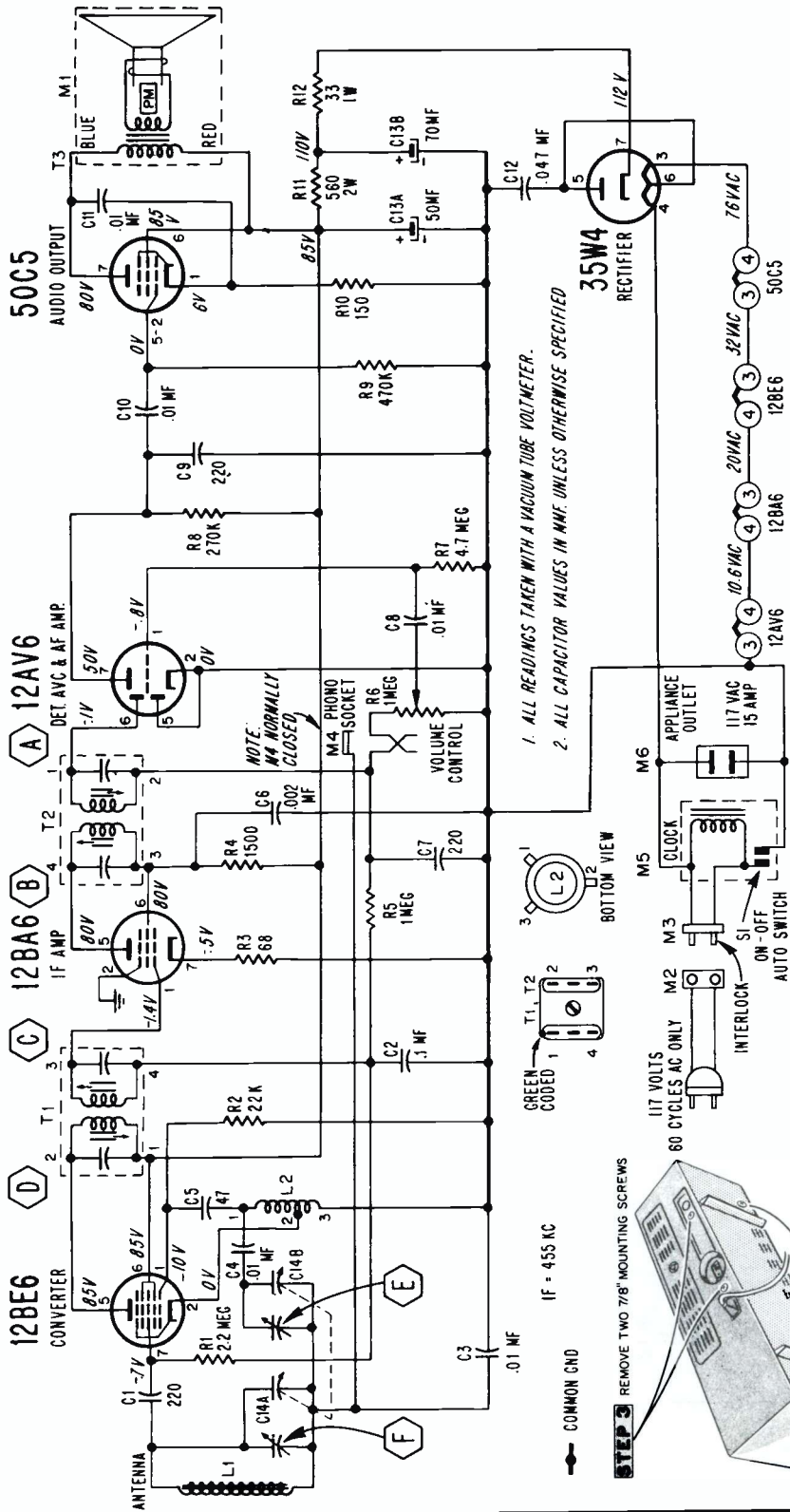
MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION



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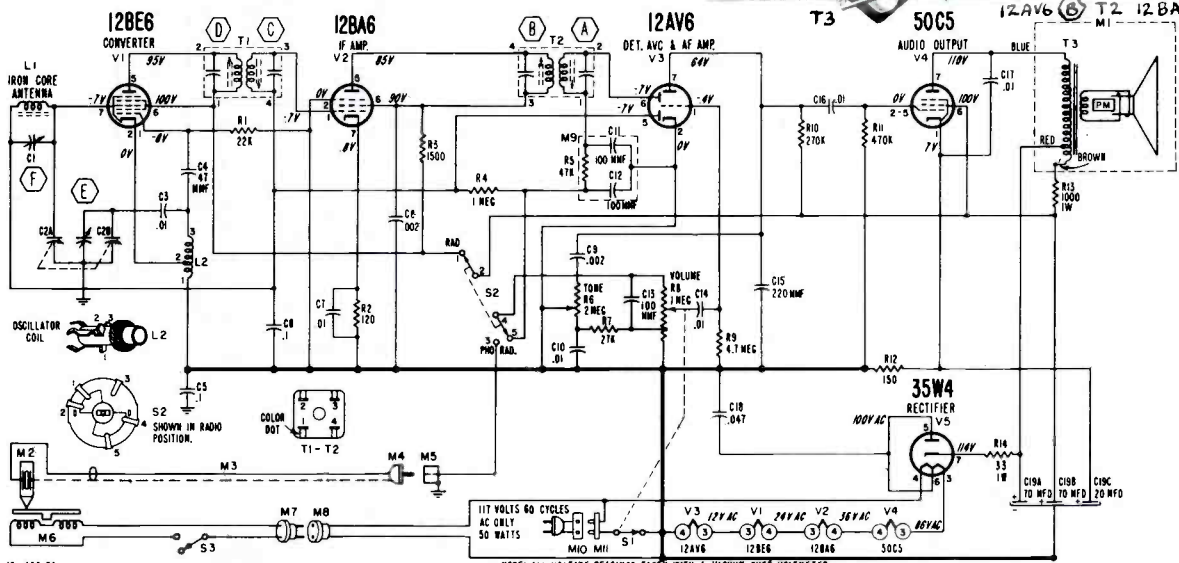
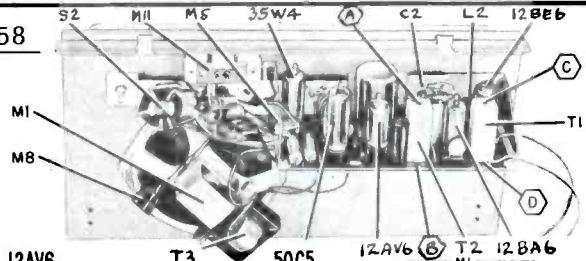
Admiral Chassis 5F4

Models 292, 296, 298, 299



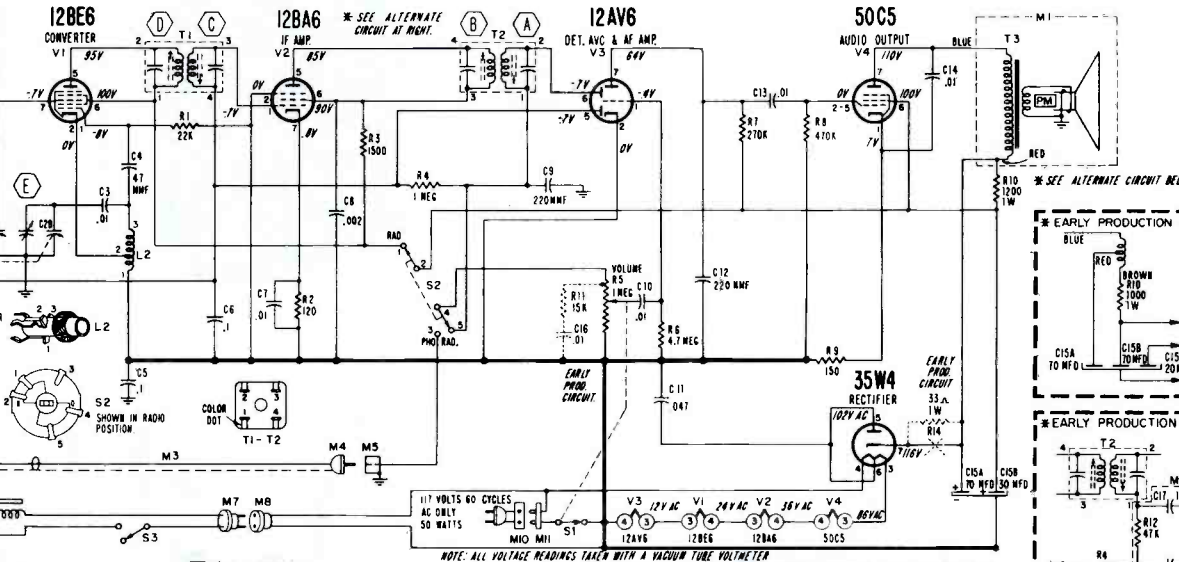
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CHASSIS 5RP4, 5RP4A
MODELS 5RP41, 5RP42



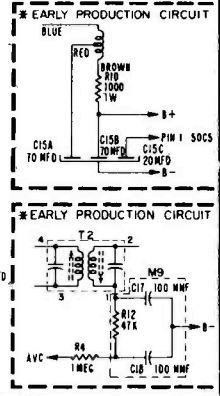
5RP4A

NOTE: ALL VOLTAGE READINGS TAKEN WITH A VACUUM TUBE VOLTMETER
* THESE READINGS WILL BE ZERO WHEN S2 IS IN "PHO" POSITION; OTHER DC READINGS MAY BE SLIGHTLY HIGHER.
ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

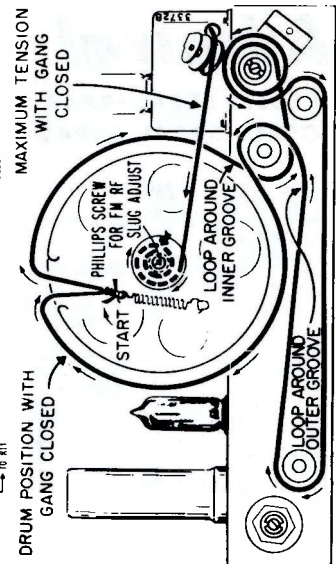
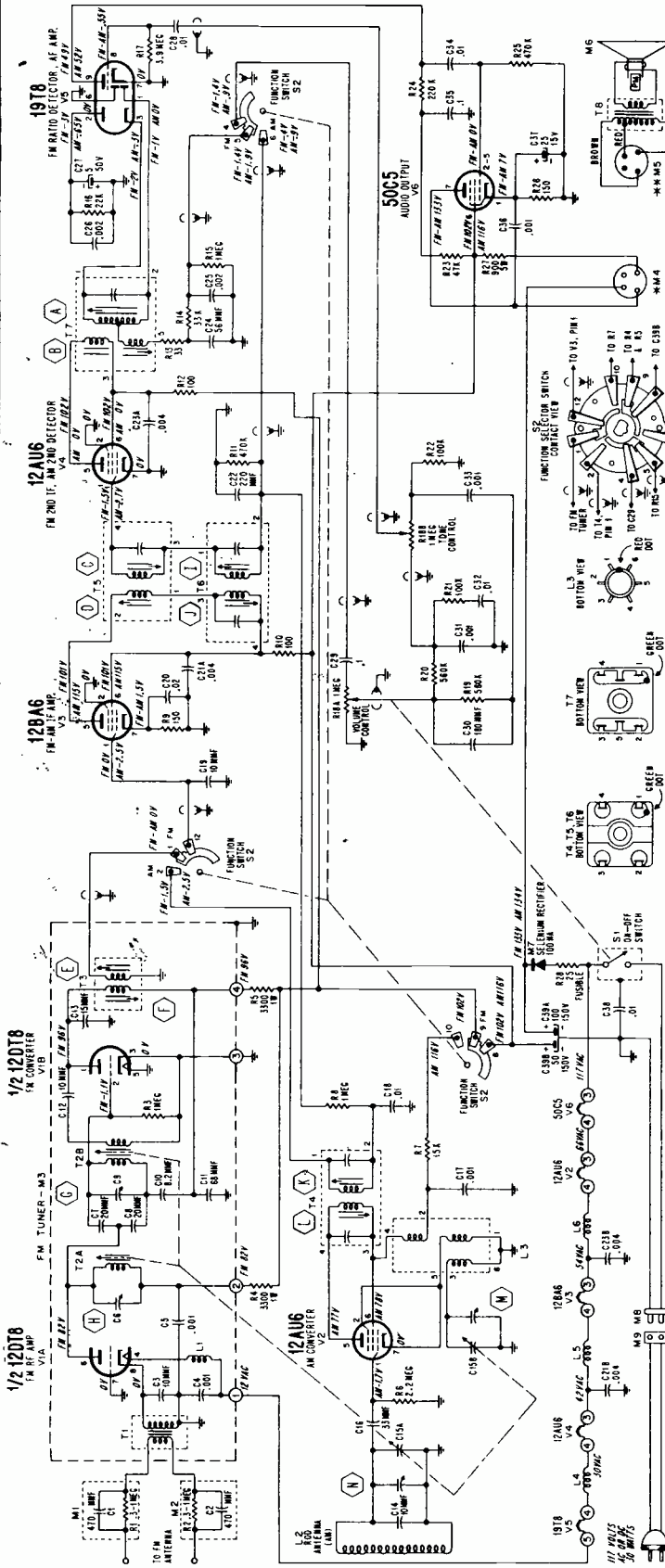


5RP4

NOTE: ALL VOLTAGE READINGS TAKEN WITH A VACUUM TUBE VOLTMETER
* THESE READINGS WILL BE ZERO WHEN S2 IS IN "PHO" POSITION; OTHER DC READINGS MAY BE SLIGHTLY HIGHER.
ALL CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

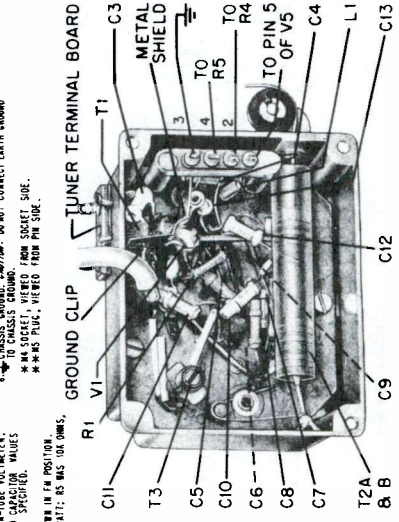


Step	Connection Of Signal Generator	Signal Generator Frequency	Receiver Gang Setting	Adjustment
1	Through a .1 mf capacitor to pin 7 of the 12BE6 (Converter) tube.	455 KC	Gang fully open	"A", "B", "C" and "D" for maximum output
2	Same as "Step 1"	1620 KC	Gang fully open	"E" for maximum output
3	Radiated Signal. Place signal generator lead near enough antenna for adequate signal pickup.	1400 KC	1400 KC	**"F" for maximum output

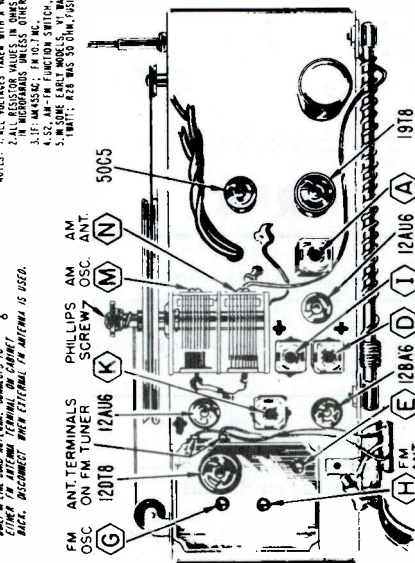


Dial Stringing (present production models).

MODEL	COLOR	CHASSIS
303	Blond	6B3
304	Sierra	



Bottom View of FM RF Tuner (location of components shown).



Top View of Chassis (tube locations and alignment points shown).

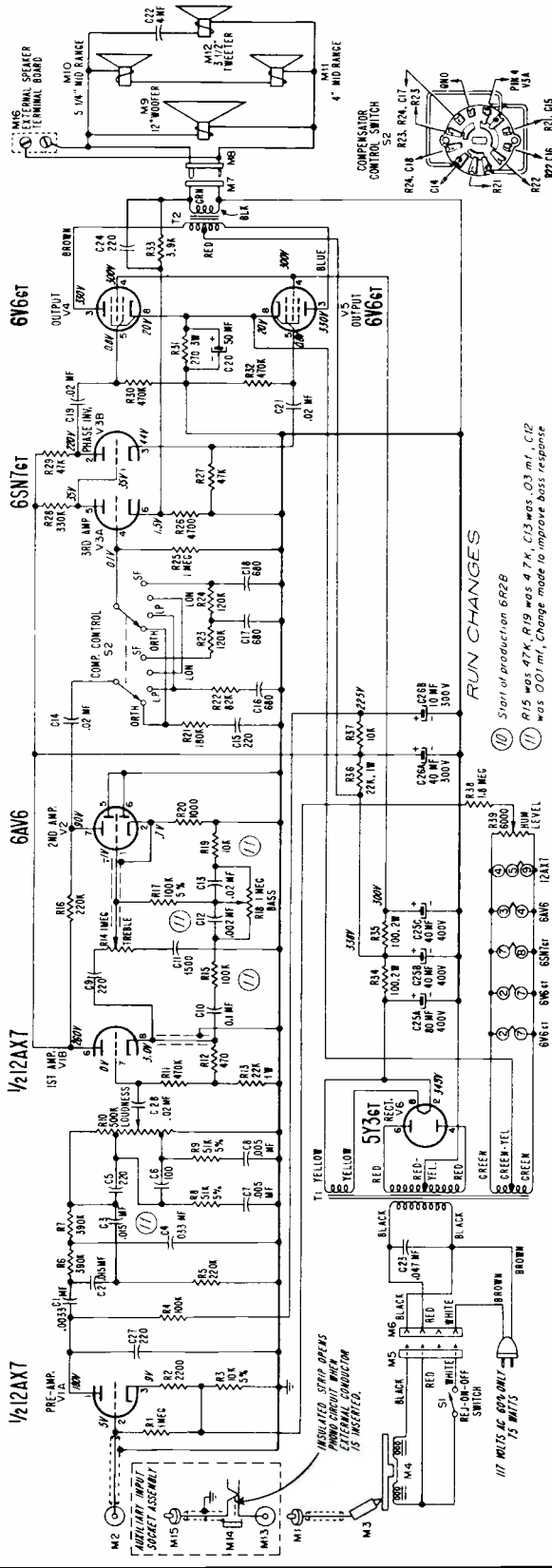
INTERMEDIATE FREQUENCY:

AM, 455 KC.

FM, 10.7 MC.

Admiral

Admiral 6R2B



HI-FI CONSOLE PHONOGRAPH

MODEL	COLOR	CHASSIS	CHANGER
382	Mahogany	6R2B	RC637-2
383	Blonde		
384	Sierra		

HUM LEVEL ADJUSTMENT

The Hum Level control (R39 on schematic) can be set to eliminate any stray 60 cycle hum appearing in the amplifier output. Make the Hum Level adjustment as follows:

1. Turn set on by sliding **Rej-On-Off** pointer to "ON". Set **Compensation** control to "LON"; **Bass, Treble** and **Loudness** controls to "MAX" (fully clockwise).
2. Touch record changer centerpost. If hum level of amplifier output increases, reverse line cord in wall outlet. Touch centerpost again. Leave line cord plug in position that gives least amount of hum when centerpost is touched.
3. Find **Hum Level** control shaft which extends from rear of chassis (see figure 1). Vary control for minimum hum in output. (Setting R39 for minimum hum feeds to control grid of 6V6 an out-of-phase 60 cycle voltage of an amplitude sufficient to cancel out any stray 60 cycle hum picked up by amplifier.)

VOLTAGE DATA

Voltage readings made in reference to chassis ground.

TROUBLE SHOOTING HINTS

If the phonograph sounds weak or distorted, examine the needles for wear. A worn needle will cause excessive needle scratch and a harshness of treble tones. Test the tubes by substitution and then, if possible, try a new cartridge. Check voltage at tube pins against voltage readings shown on schematic.

SERVICE NOTE: The **Rej-On-Off** pointer (S1) on the record changer is used to turn both amplifier and record changer motor on and off. To turn the amplifier on with the record changer disconnected, a short, temporary jumper wire must be connected between the white and red leads on socket "M6". See schematic.

Amplifier voltage readings may also be taken by connecting the record changer motor plug (M5) to the socket (M6) on the chassis. Unclamp the **Tone Arm** from the tone arm rest and slide the **Rej-On-Off** pointer to the "ON" position. Set **Loudness** control for minimum and **Bass** and **Treble** controls to center rotation. Set **Compensation** control to "LON". Do not play a record while taking readings.

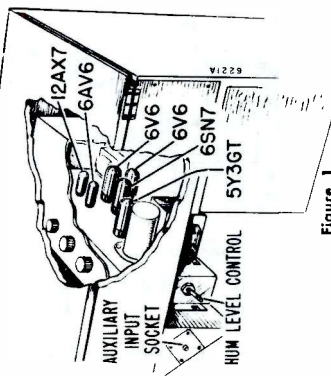


Figure 1.

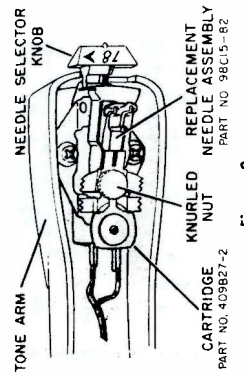
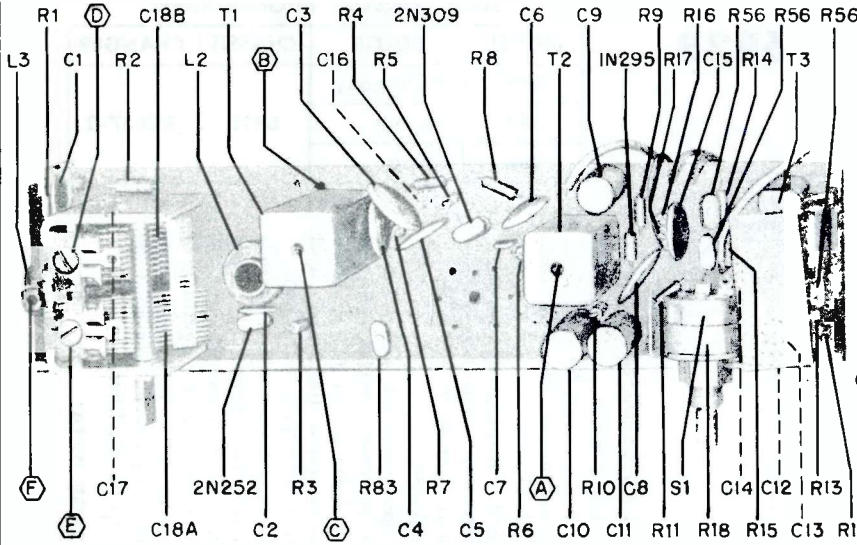
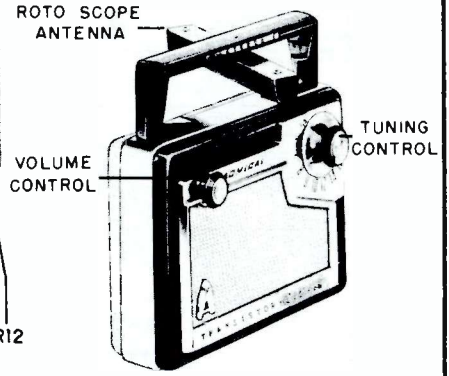


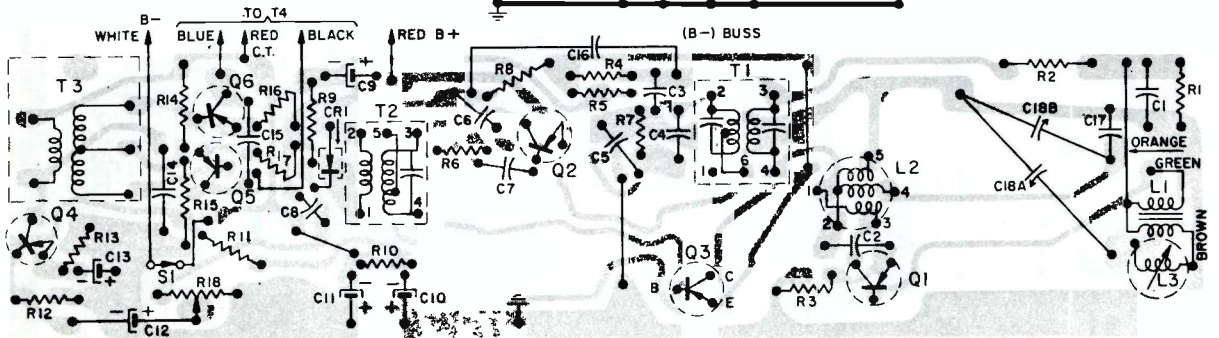
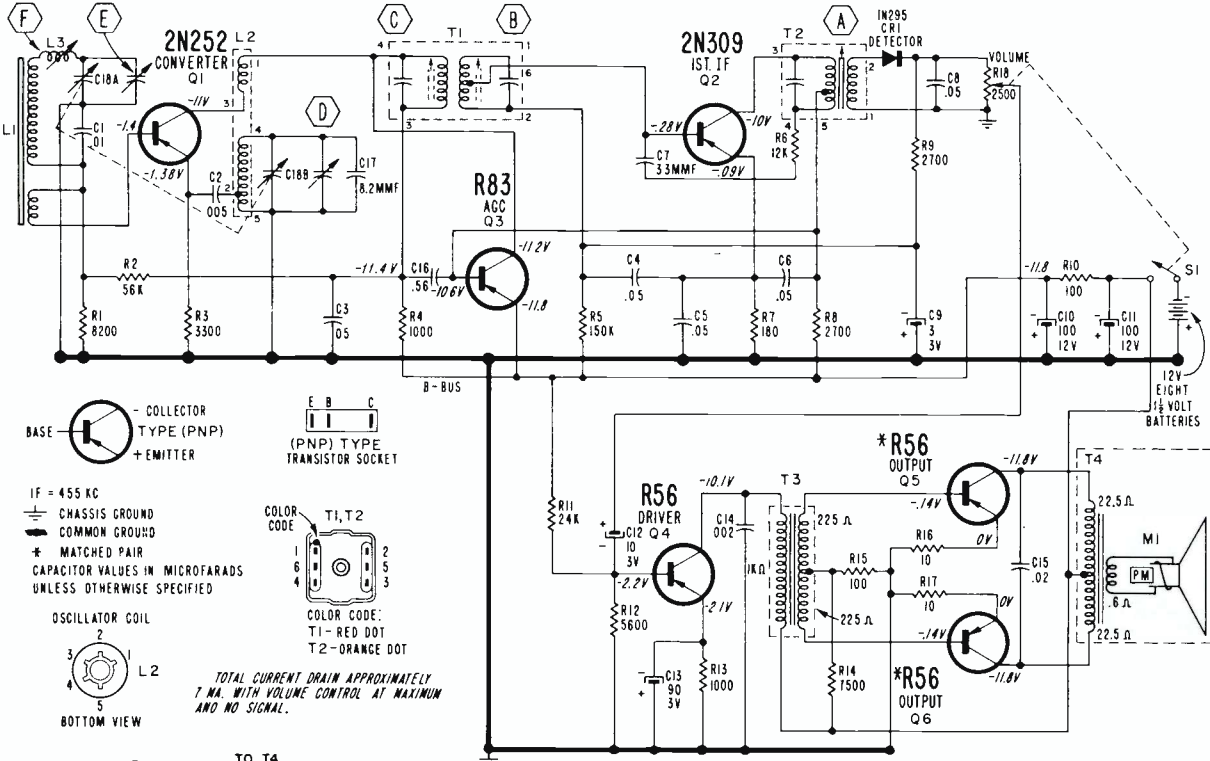
Figure 2.

Admiral 6S2 CHASSIS

Models 221, 227, 228



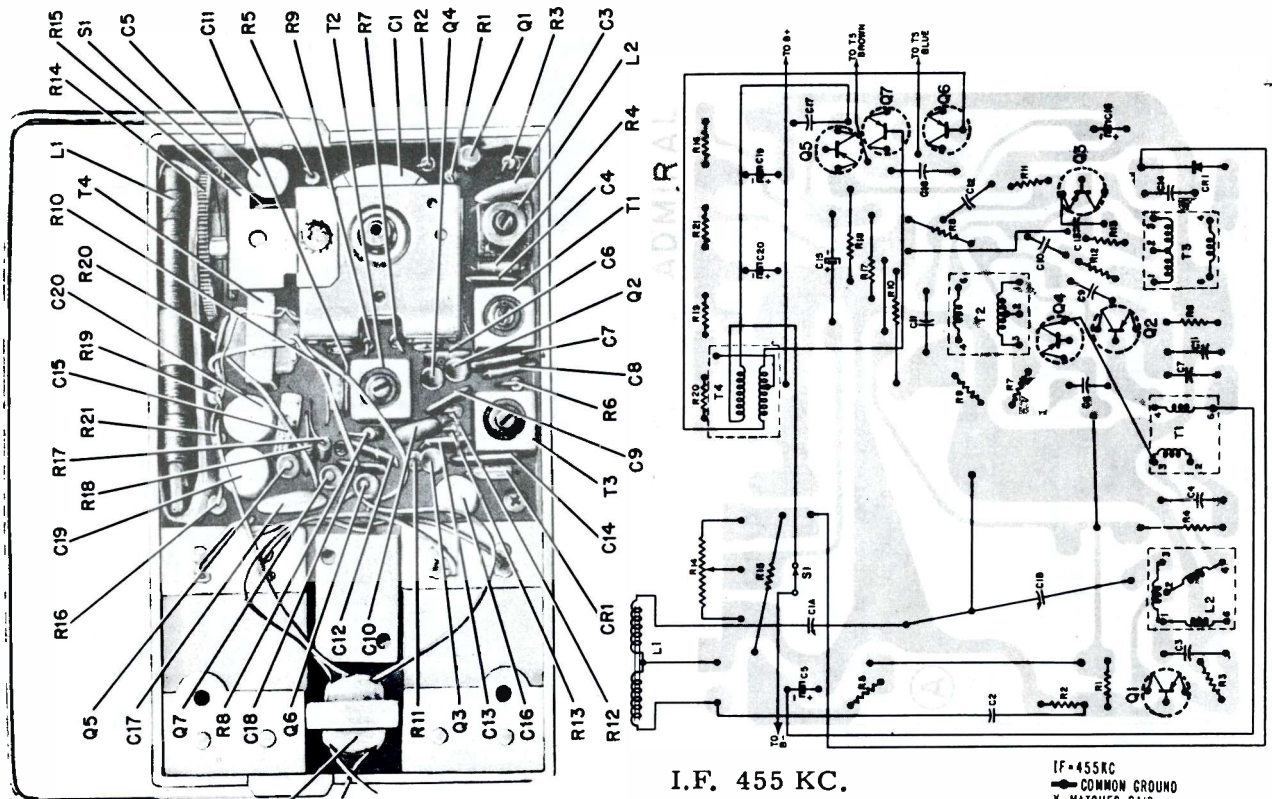
INTERMEDIATE FREQUENCY: 455 KC.



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

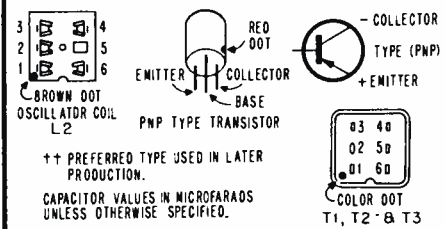
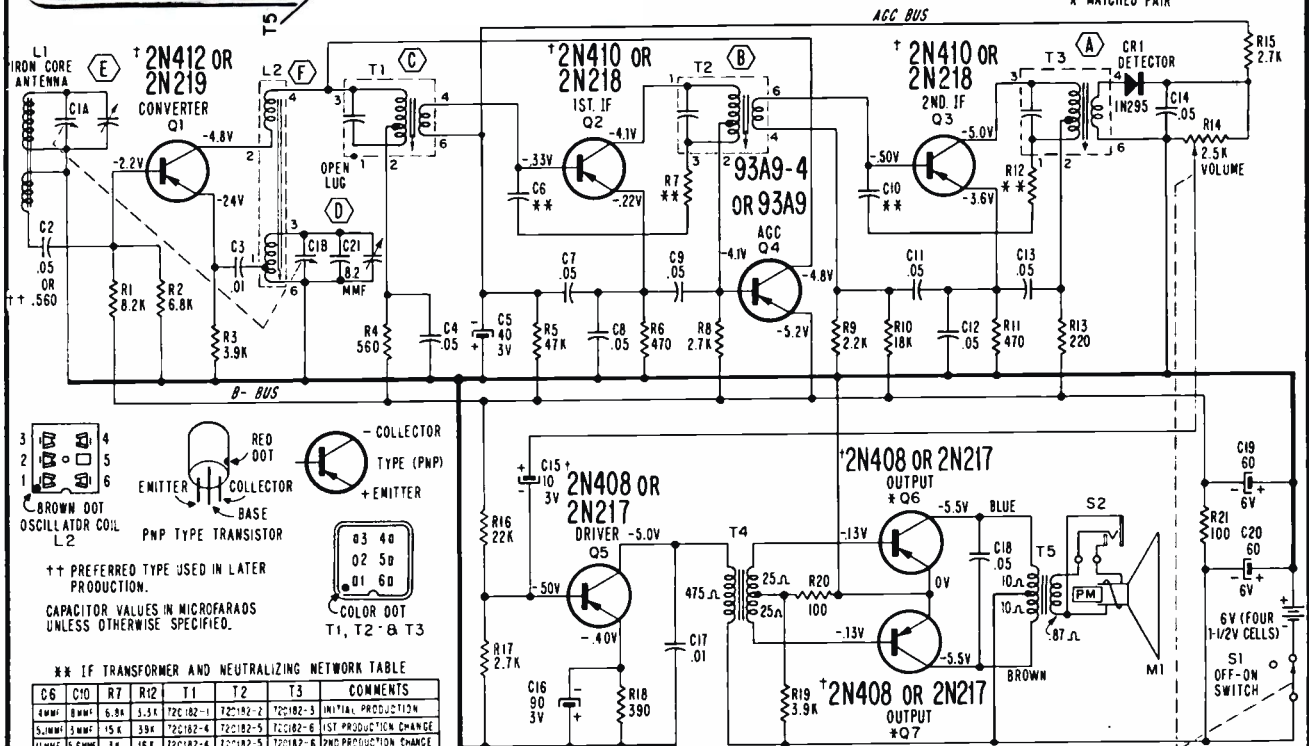
Admiral

CHASSIS 7M1
 MODELS 7M11 · 7M12 · 7M14 · 7M15 · 7M16 · 7M18



I.F. 455 KC.

IF = 455 KC
 — COMMON GROUND
 * MATCHED PAIR



++ PREFERRED TYPE USED IN LATER PRODUCTION.
 CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED.

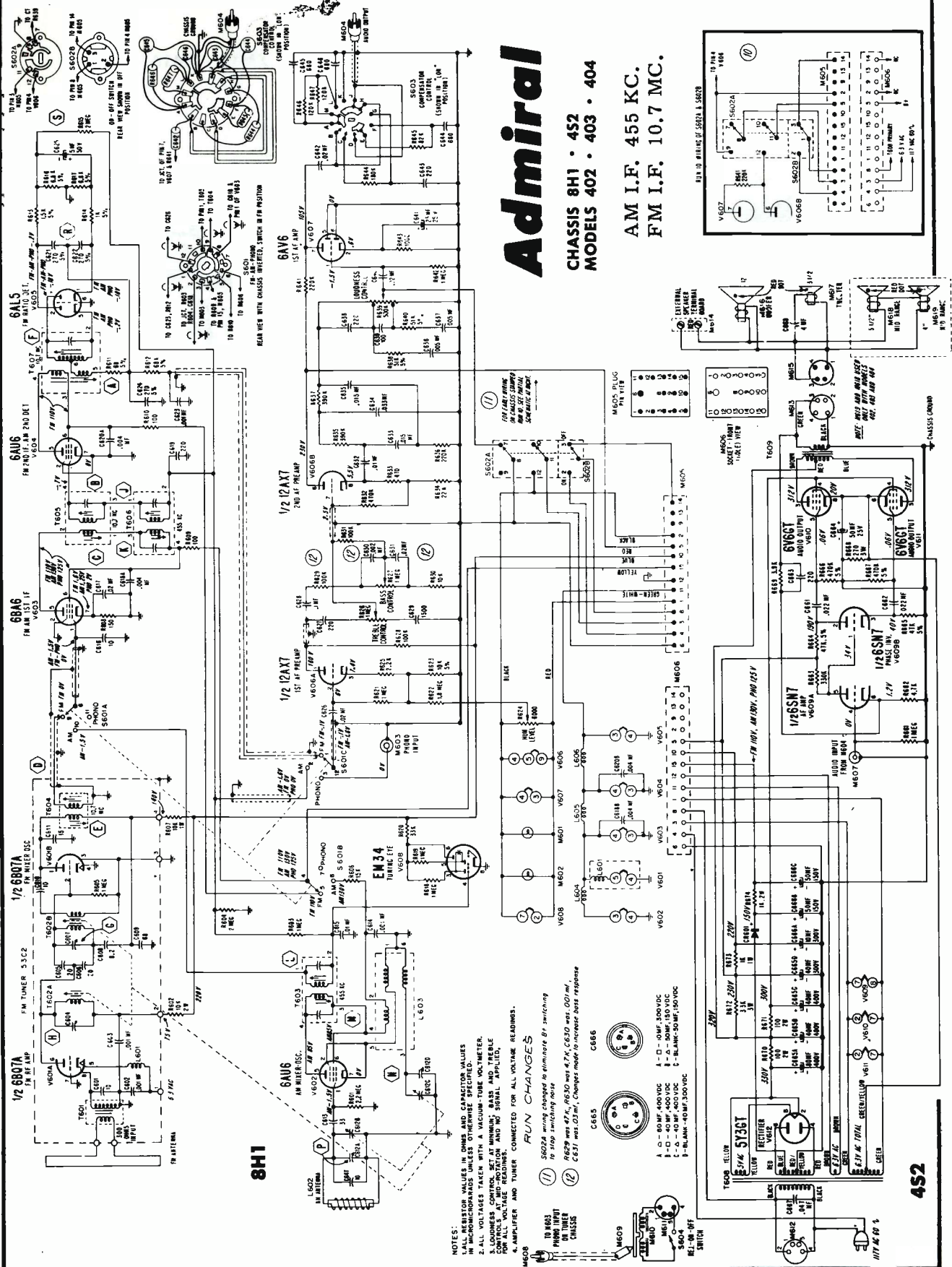
** IF TRANSFORMER AND NEUTRALIZING NETWORK TABLE

Q6	C10	R7	R12	T1	T2	T3	COMMENTS
4MMF	5MMF	6.8K	3.3K	72C182-1	72C182-2	72C182-3	INITIAL PRODUCTION
5MMF	3MMF	15K	39K	72C182-4	72C182-5	72C182-6	1ST PRODUCTION CHANGE
11MMF	5.6MMF	3K	16K	72C182-4	72C182-5	72C182-6	2ND PRODUCTION CHANGE

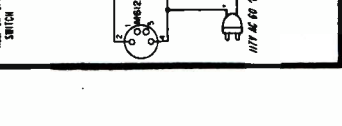
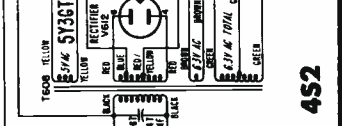
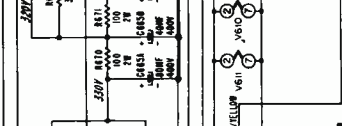
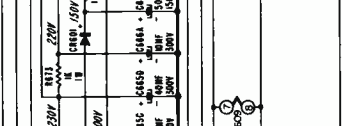
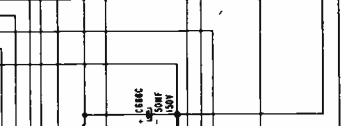
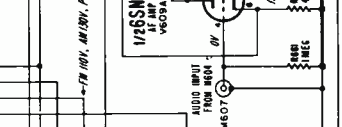
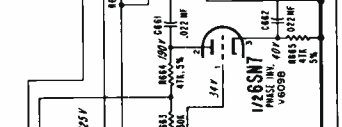
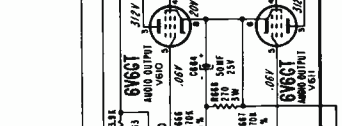
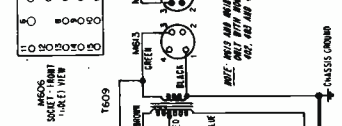
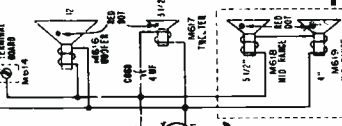
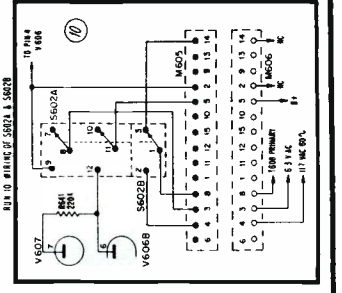
NOTE: WHEN REPLACING INDIVIDUAL COMPONENTS LISTED IN ABOVE TABLE, DO NOT INTERMIX VALUES OR TYPES NOT LISTED ON THE SAME LINE. ALWAYS REPLACE WITH SAME TYPE USED IN SET.

† 400 SERIES TRANSISTORS USED IN LATER PRODUCTION CHASSIS. INTERCHANGEABLE WITH CORRESPONDING 200 SERIES SHOWN

TOTAL CURRENT DRAIN WITH NO SIGNAL & VOLUME CONTROL SET AT MINIMUM, 85MA.

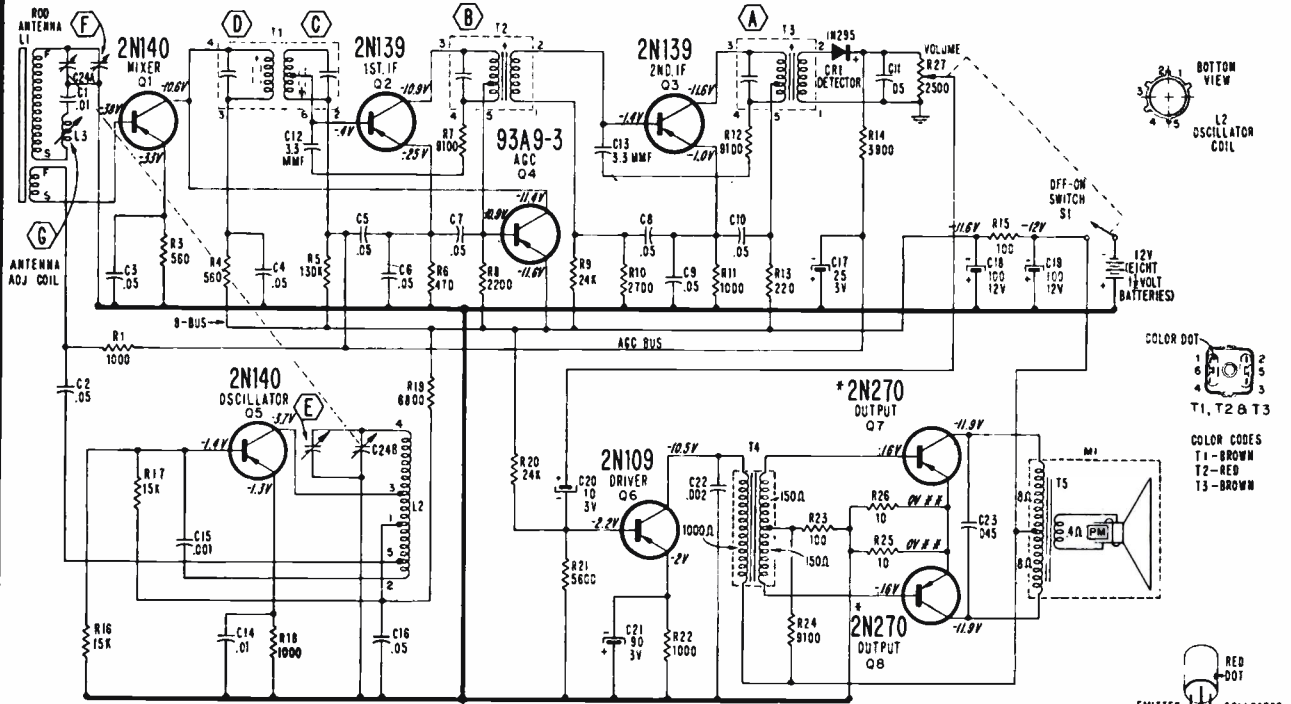


Admiral
 CHASSIS 8H1 • 452
 MODELS 402 • 403 • 404
 AM I.F. 455 KC.
 FM I.F. 10.7 MC.



Admiral 8K1 CHASSIS

Models 231, 237

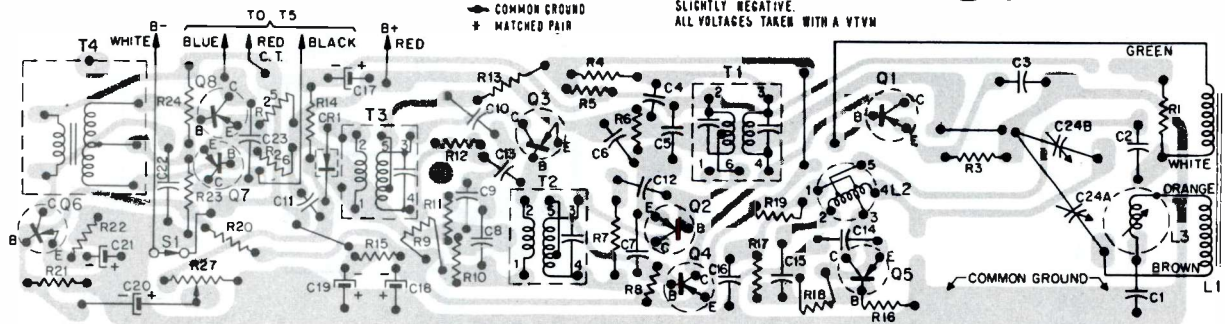


I.F. 455 KC.

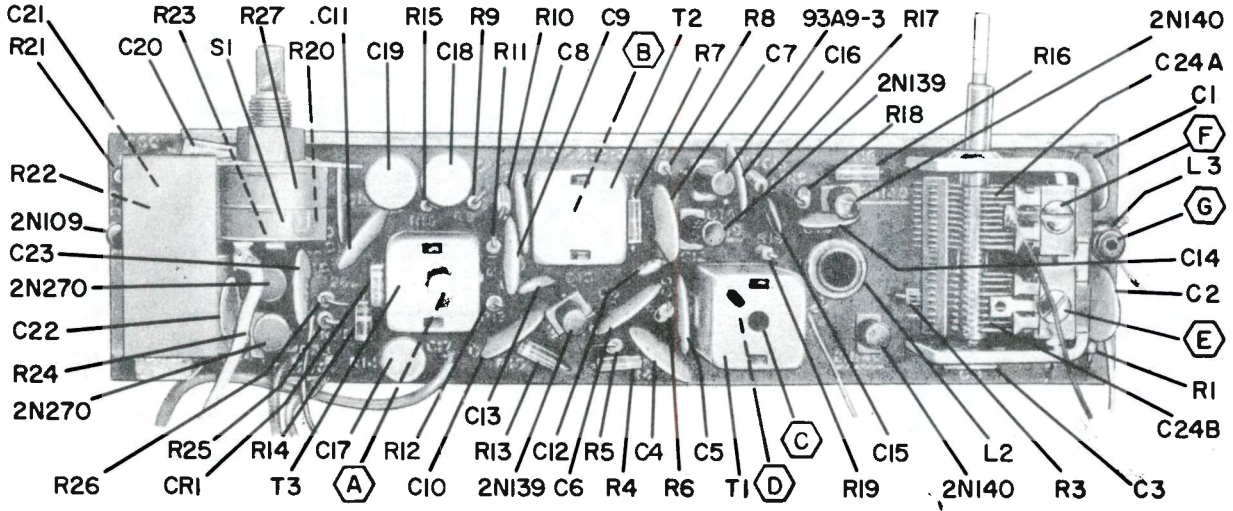
IF - 455 KC
 CHASSIS GROUND
 COMMON GROUND
 MATCHED PAIR

CAPACITOR VALUES IN MICROFARADS UNLESS OTHERWISE SPECIFIED. ## THIS READING MAY BE DV OR SLIGHTLY NEGATIVE. ALL VOLTAGES TAKEN WITH A VTVM

COLLECTOR TYPE (PNP)
 BASE
 EMITTER
 PNP TYPE TRANSISTOR



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



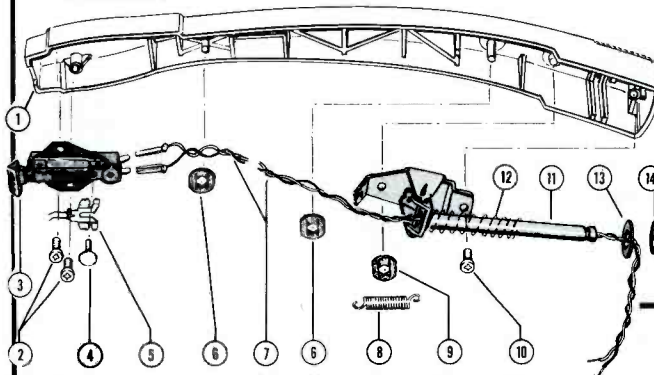
Admiral

CHASSIS 1B1·1C1·1D1

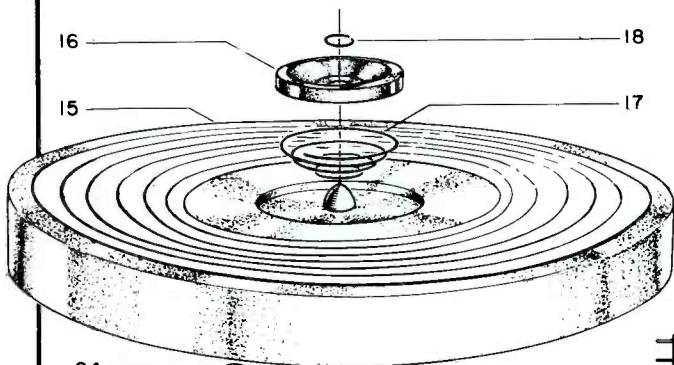
MODELS 1B11·1C12·1C14·1D11·1D12·1E13·1E14

NEEDLE SELECTOR

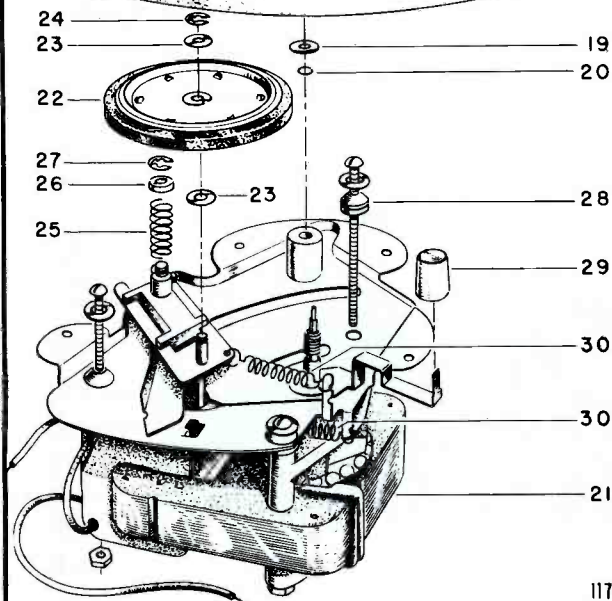
The phonograph in models 1D11, 1D12, 1E13 and 1E14 is equipped with two needles; one for playing 16, 33 and 45 RPM records; the other for playing standard "78" RPM records. The phonograph in models 1B11, 1C12 and 1C14 is equipped with two needles and will play 33, 45, and standard "78" RPM records.



Exploded View of Pickup Arm Assembly.



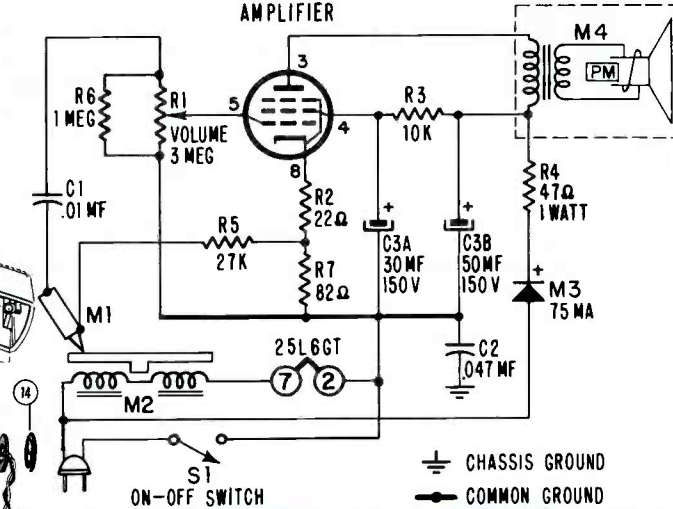
Exploded View of Motor and Turntable.



25L6GT

AMPLIFIER

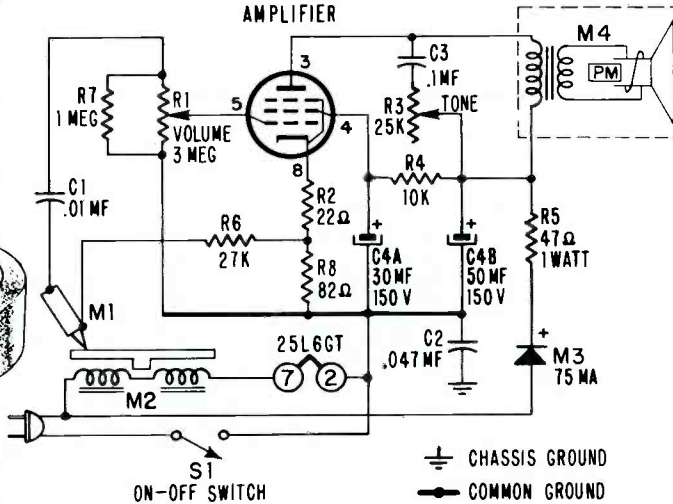
1B1 CHASSIS



25L6GT

AMPLIFIER

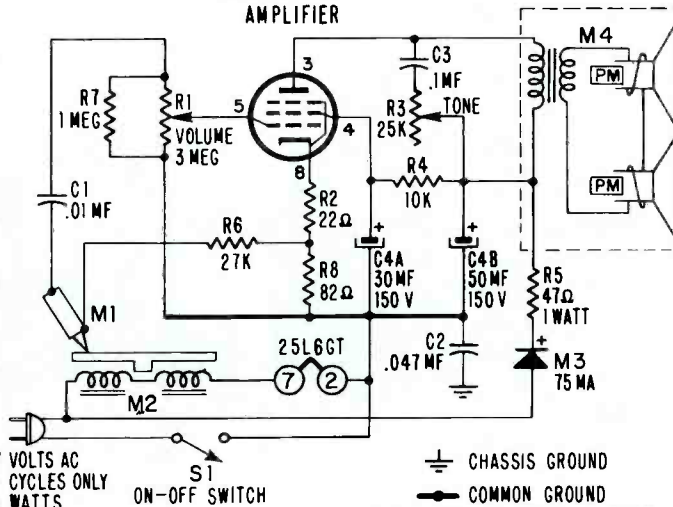
1C1 CHASSIS



25L6GT

AMPLIFIER

1D1 CHASSIS



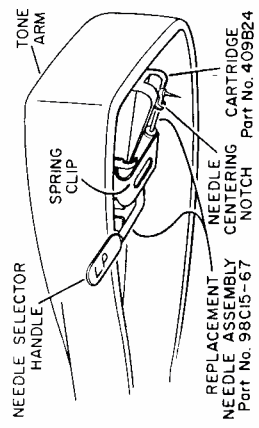
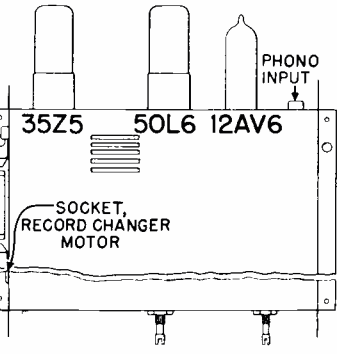
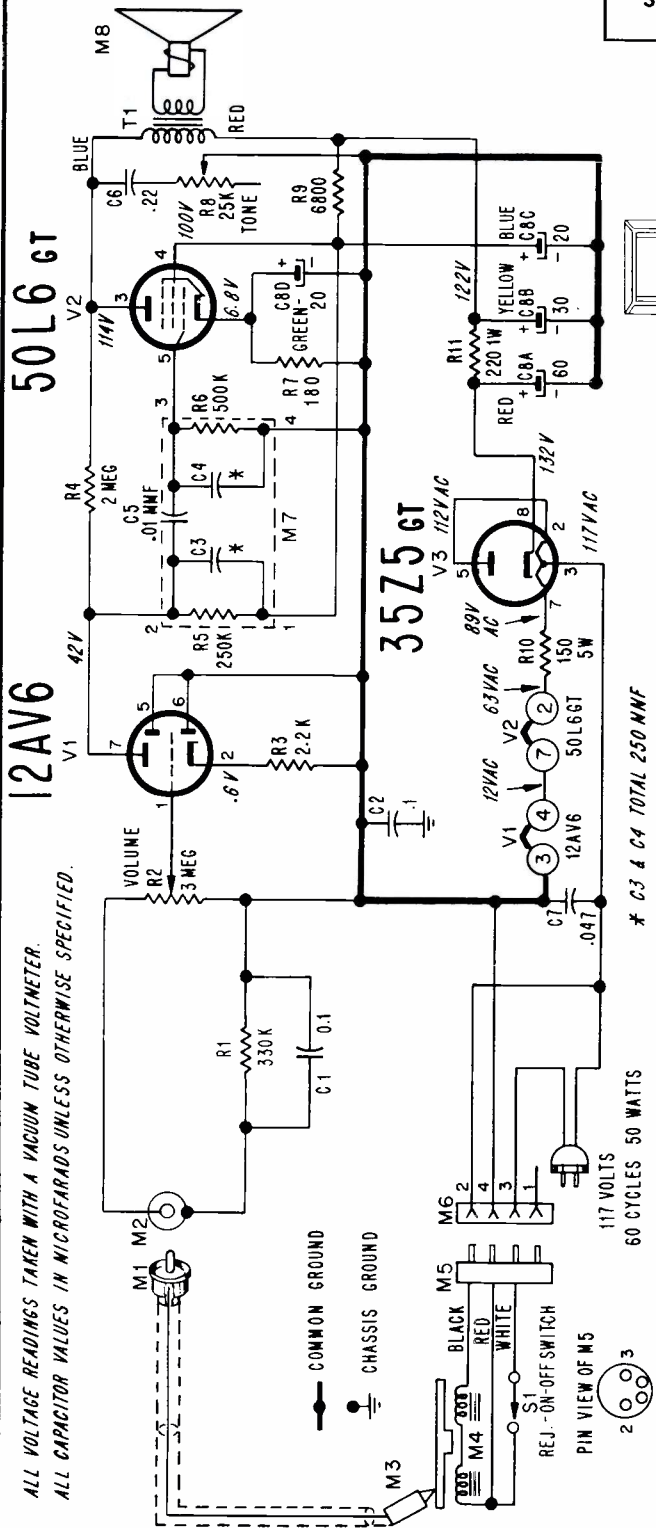
117 VOLTS AC
60 CYCLES ONLY
45 WATTS

Admiral

CHASSIS 3J1A

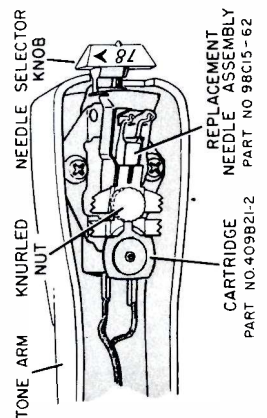
PORTABLE PHONOGRAPH

MODEL	COLOR	CHASSIS
331	Black	
335	Red & Gray	3J1A
338	Blue & White	



Capacitors C3 and C4 (included in printed circuit M7, Couplate) total 250 mmf. If it ever becomes necessary to replace M7 with individual components, use any combination totaling 250 mmf to replace C3 and C4 or else place 250 mmf across R6.

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



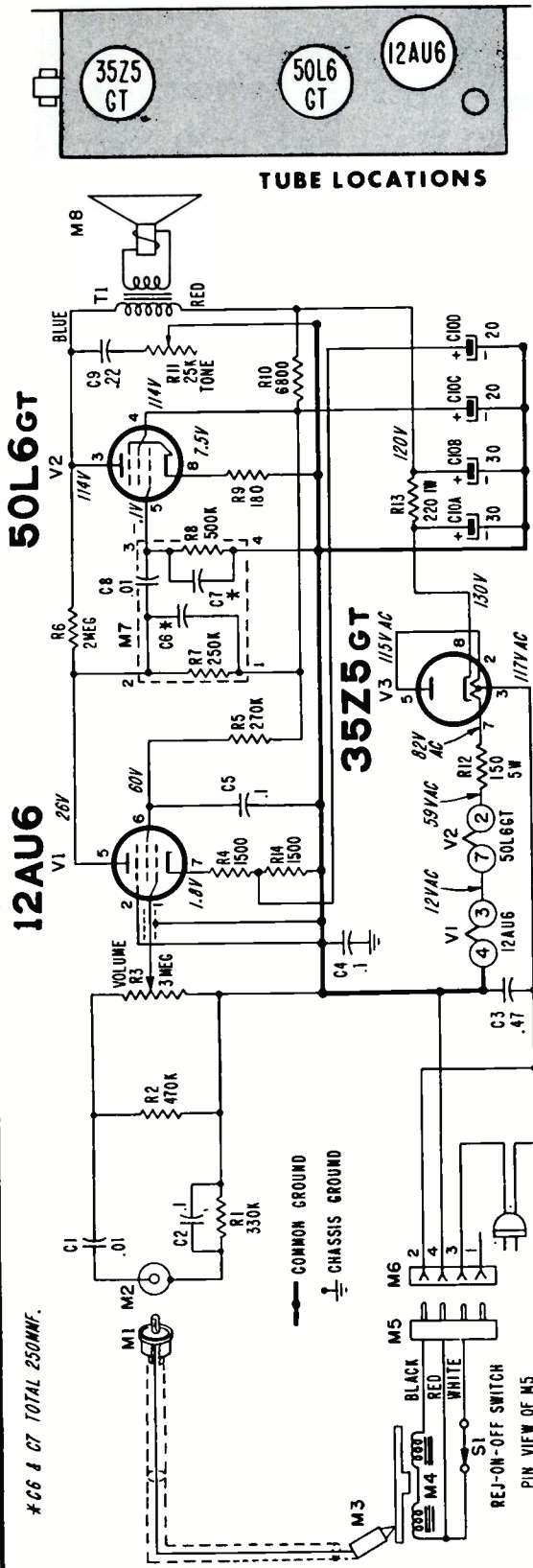
TROUBLE SHOOTING HINTS

If the phonograph sounds weak or distorted, examine the needles for wear. A worn needle will cause excessive needle scratch and a harshness of treble tones. Test the tubes by substitution and then, if possible, try a new cartridge. Check voltage at tube pins against voltage shown on schematic.

SERVICE NOTE: The **Rej-On-Off** pointer (S1) on the record changer is used to turn both amplifier and record changer motor on and off. To turn the amplifier on with the record changer disconnected, a short, temporary jumper wire must be connected from common ground (4) to the single lead from the AC line cord (3) on socket "M6". See schematic.

Amplifier voltage readings may also be taken by connecting the record changer motor plug (M5) to the socket (M6) on the chassis. Unclamp the **Tone Arm** from the tone arm rest and slide the **Rej-On-Off** pointer to the "ON" position. Set volume control for minimum and tone control at the center of its range.

Admiral MODELS 3J14 and 3J16 (3J1 CHASSIS)



ALL VOLTAGE READINGS TAKEN WITH A VACUUM TUBE VOLTMETER.
ALL CAPACITOR VALUES IN MICROFARADS. UNLESS OTHERWISE SPECIFIED.

TUBE AND COMPONENT REPLACEMENT

TO REPLACE TUBES: Disconnect the AC line plug from the wall outlet. Remove the hold down screws on either side of the record changer platform. Carefully lift the record changer from the cabinet. For convenience, the record changer motor plug and audio input plug may be disconnected from the chassis, and the record changer set aside.

The audio amplifier uses the following tubes: one 12AU6 (first audio), one 35Z5GT (rectifier) and one 50L6GT (audio output). See "Tube Locations".

After servicing tubes, reconnect the record changer motor plug and audio output plug, replace both hold down screws and tighten securely.

TO REMOVE THE CHASSIS from the cabinet, follow the procedure outlined under, "To Replace Tubes", then proceed as follows:

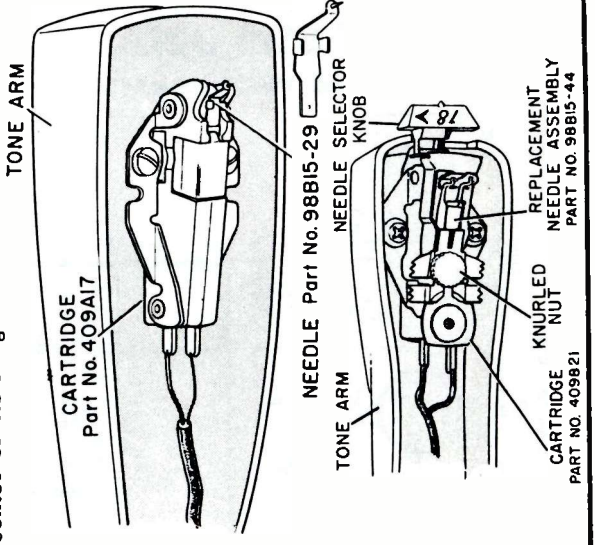
Remove the five speaker compartment cover mounting screws and lift the cover from the cabinet.

Remove the three nuts that hold the chassis to the cabinet. Remove the nuts that hold the speaker to the cabinet. The output transformer leads are soldered to the speaker; speaker and chassis must be removed as a unit.

SERVICE NOTE: The "REJ-ON-OFF" pointer (S1) on the record changer is used to turn both amplifier and record changer motor on and off. To turn the amplifier on with the record changer disconnected, a short, temporary jumper wire must be connected from common ground (4) to the single lead from the AC line cord (3) on socket "M6". See schematic.

Amplifier voltage readings may also be taken by connecting the record changer motor plug (M5) to the socket (M6) on the chassis. Unclamp the TONE ARM from the tone arm rest and slide the "REJ-ON-OFF" pointer to the "ON" position. Set volume

control for minimum and tone control at the center of its range.

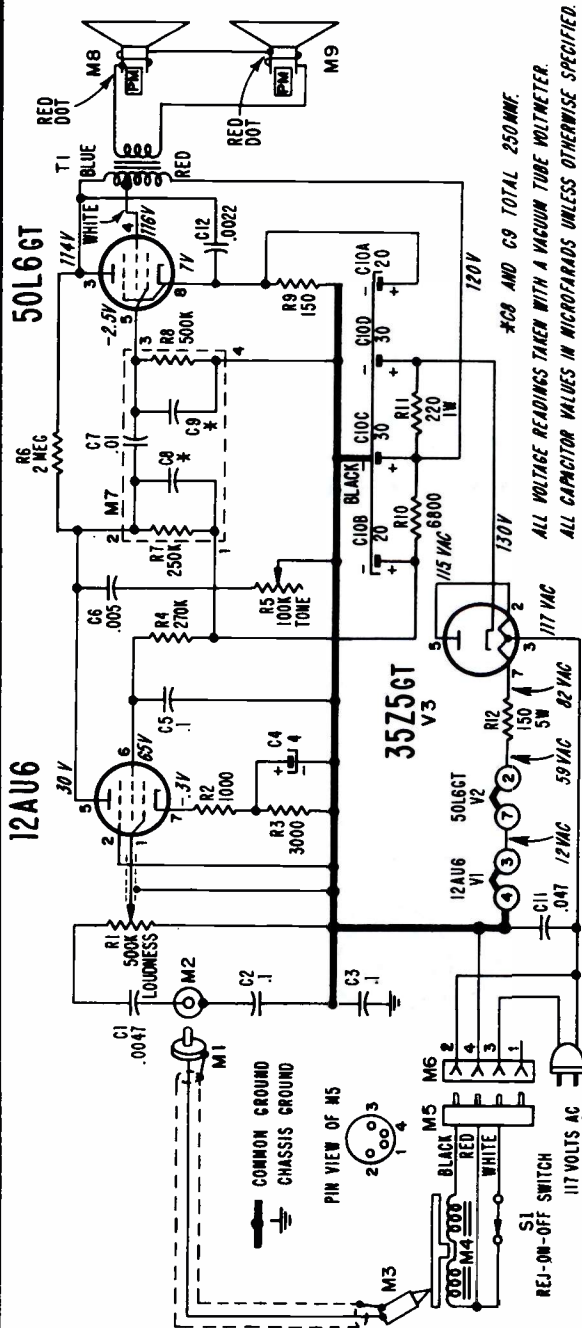


Admiral

Chassis 3K1

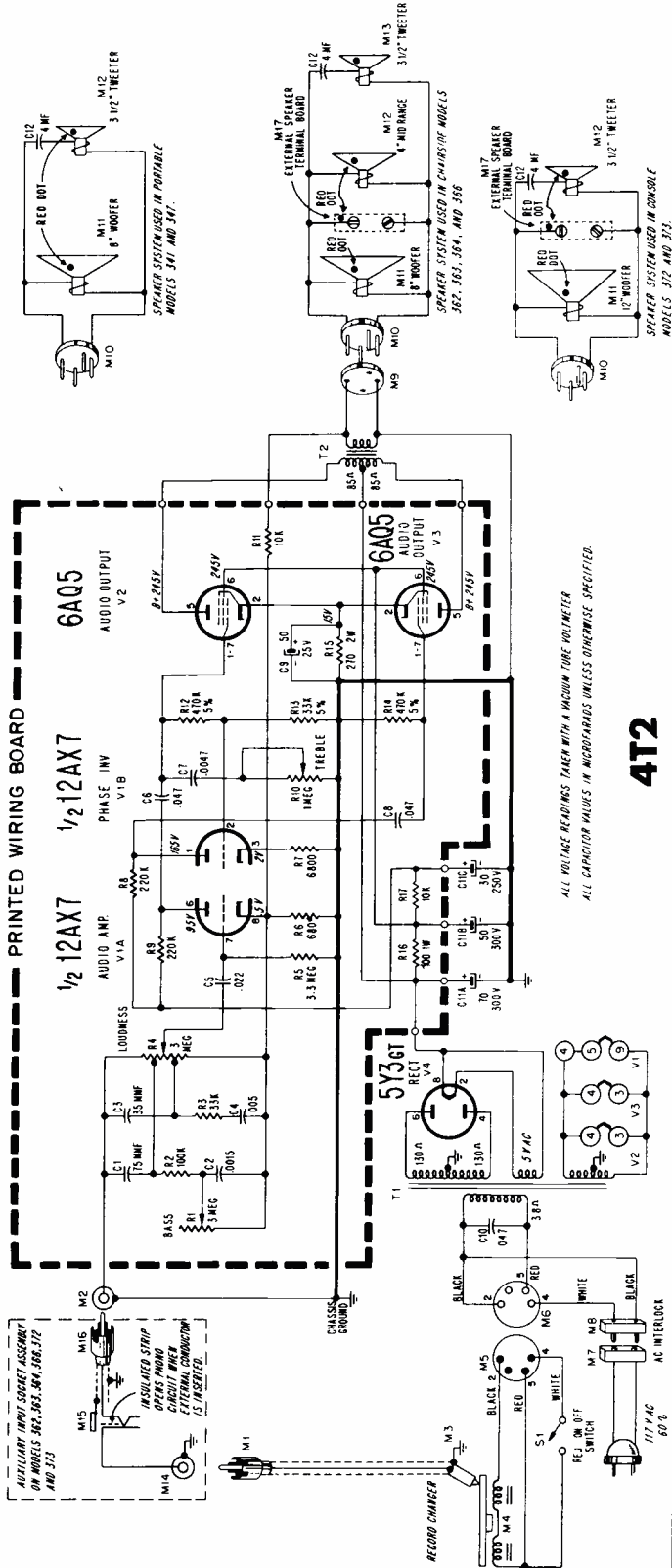
HIGH FIDELITY PHONOGRAPH

MODEL	COLOR	CHASSIS
HT2236	Mahogany	3K1
HT2237	Blond	3K1



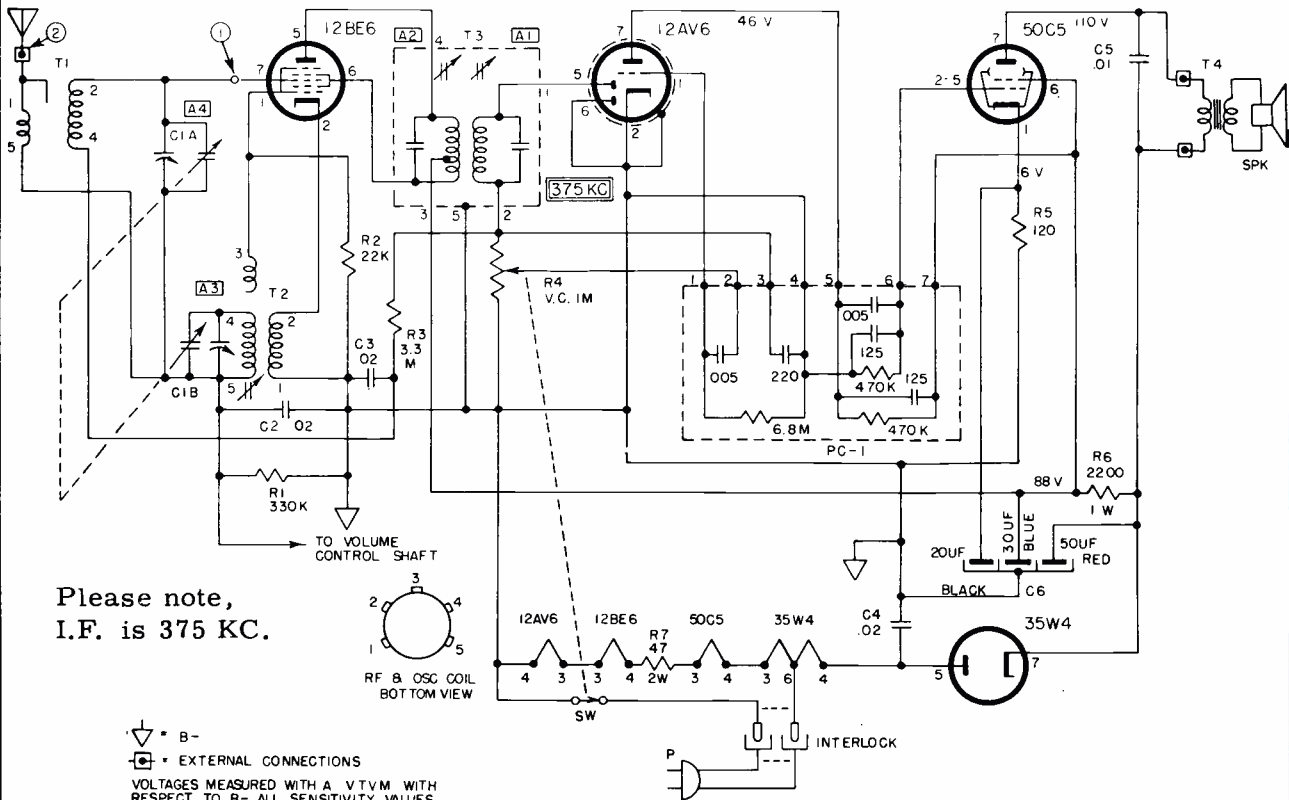
Admiral CHASSIS 4T2

Models 341, 347, 362, 363, 364, 366, 372, 373

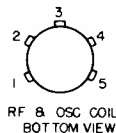




MODEL 1581
CHASSIS 1.44000



Please note,
I.F. is 375 KC.



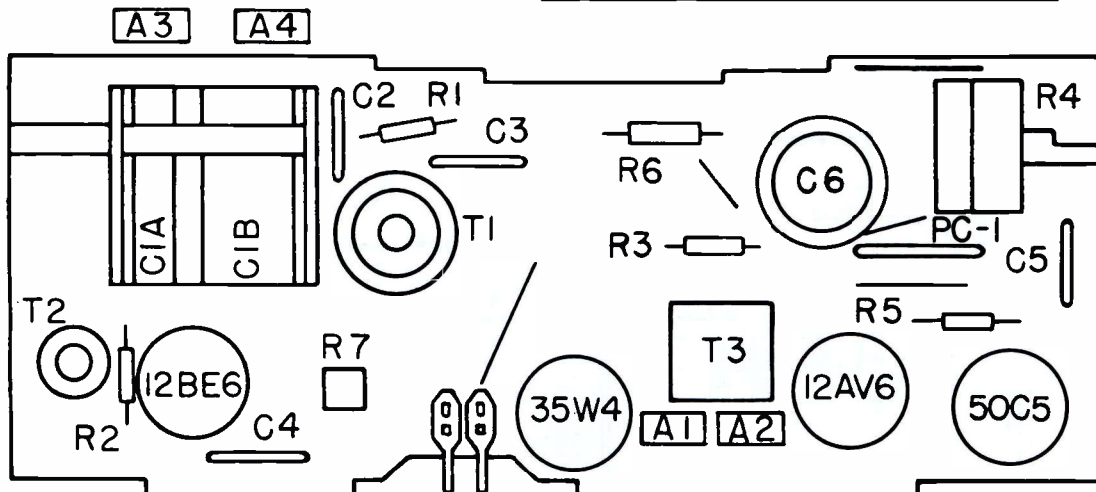
- ▽ * B-
- ⊕ * EXTERNAL CONNECTIONS

VOLTAGES MEASURED WITH A VTVM WITH RESPECT TO B- ALL SENSITIVITY VALUES OBTAINED WITH GENERATOR RETURN TO B- RESISTANCE VALUES ARE IN OHMS K=1000, M=1,000,000

CAPACITANCE VALUES LESS THAN (1) ARE IN MICROFARADS (UF) AND VALUES OF (1) OR GREATER ARE IN MICROMICROFARADS (UUF), UNLESS OTHERWISE INDICATED.

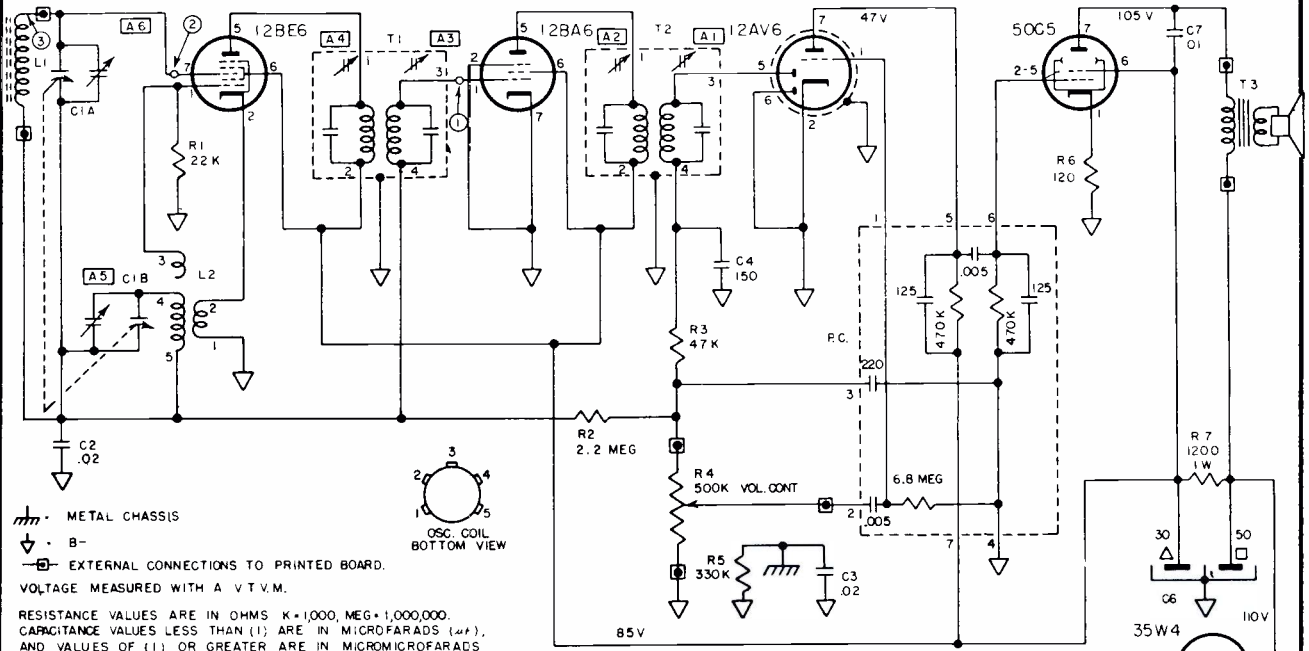
APPROXIMATE SENSITIVITIES

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR 5 WATT OUTPUT (1.26 VOLTS ACROSS V.C.)
1	.05UF AT 375 KC	5000 UV
2	.50UF AT 1000 KC (HANK REMOVED)	350 UV



LOCATION OF PARTS

ARVIN INDUSTRIES RADIO MODEL 5578, CHASSIS 1.43500



M - METAL CHASSIS

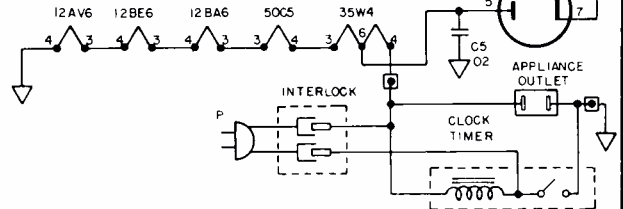
B -

□ - EXTERNAL CONNECTIONS TO PRINTED BOARD.

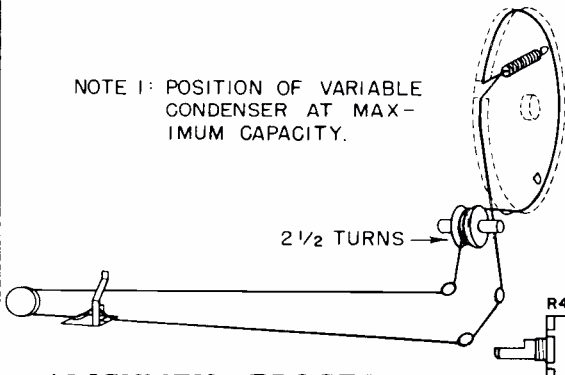
VOLTAGE MEASURED WITH A V.T.V.M.

RESISTANCE VALUES ARE IN OHMS K=1,000, MEG=1,000,000.
CAPACITANCE VALUES LESS THAN (1) ARE IN MICROFARADS (μf),
AND VALUES OF (1) OR GREATER ARE IN MICROMICROFARADS ($\mu\mu f$), UNLESS OTHERWISE INDICATED

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR .05 WATT OUTPUT (0.4 VOLTS ACROSS V.C.)	INPUT FOR .5 WATT OUTPUT (1.26 VOLTS ACROSS V.C.)
1	.05 μf AT 455 KC	2000 μv	5000 μv
2	.05 μf AT 455 KC	60	150
3	STANDARD LOOP AT 1000 KC	200 μv / M	500 μv / M



NOTE 1: POSITION OF VARIABLE CONDENSER AT MAXIMUM CAPACITY.



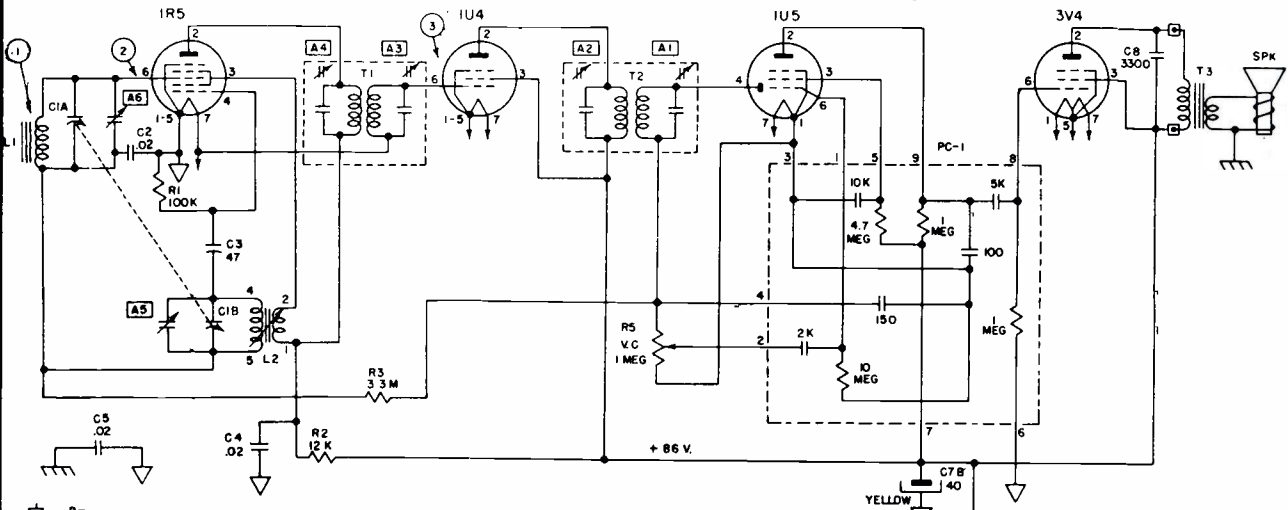
ALIGNMENT PROCEDURE

Position of Variable	Frequency of Generator	Dummy Antenna	Generator Output Connection	Trimmers Adjusted in Order Shown for Maximum Output	Function of Trimmer
Open	455 Kc	.05 μf	Pin 7 12BE6	A1, A2, A3, A4	I.F.
Open	1670 Kc		* Test Loop	A5	Oscillator
1400	1400 Kc		* Test Loop	A6	Antenna
1000	1000 Kc		* Test Loop	Fan C1A Plates	
600	600 Kc		* Test Loop	Fan C1B Plates	

* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.
The alignment procedure should be repeated for greatest accuracy.

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

ARVIN INDUSTRIES, Models 8571, 8573, Chassis 1.41100,
Model 8572, Chassis 1.41300, is similar.

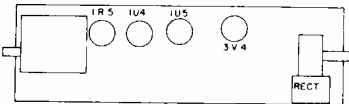
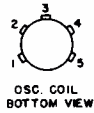
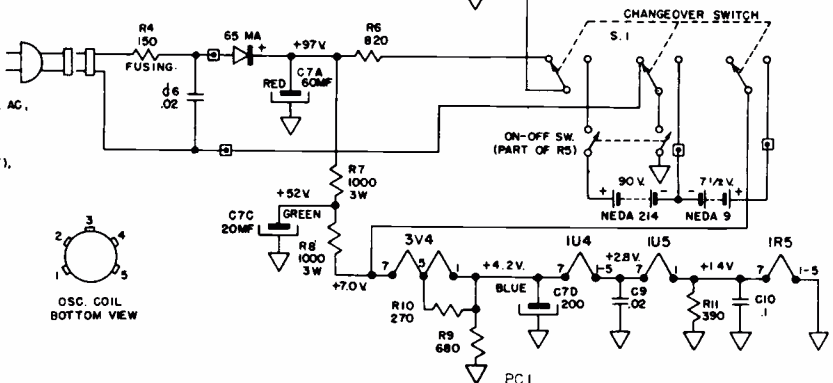


- ▽ - B-
- ⏏ - CHASSIS OR CABINET
- S.1 - SHOWN IN A.C POSITION
- ⊠ - EXTERNAL CONNECTIONS TO BOARD.

VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO B- AND ARE TAKEN WITH NO SIGNAL. LINE VOLTAGE AT 117 V. AC, MEASURED WITH VACUUM TUBE VOLTMETER.

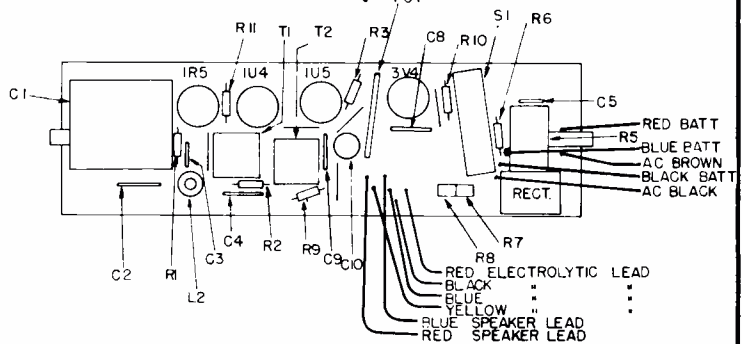
RESISTANCE VALUES ARE IN OHMS $\times 1,000$, MEG $\times 1,000,000$. CAPACITANCE VALUES LESS THAN (1) ARE IN MICROFARADS (μ), AND VALUES OF (1) OR GREATER ARE IN MICROMICROFARADS ($\mu\mu$), UNLESS OTHERWISE INDICATED.

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR .05 WATT OUTPUT (0.4 VOLTS ACROSS V.C.)
1	.05 μ AT 455 KC	2000 UV
2	.05 μ AT 455 KC	60
3	STANDARD LOOP AT 1000 KC	200 UV / M



SPEAKER

Type: Permanent magnet
Size: 4 inch
Voice: Coil Impedance 3.2 Ohms



ALIGNMENT PROCEDURE

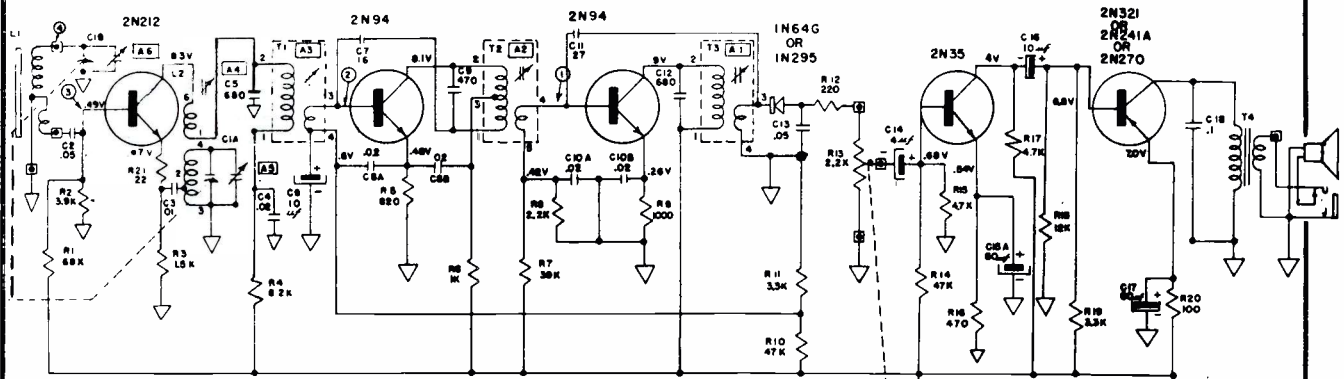
Output meter reading to indicate .05 watt across voice coil ... 0.4V
Generator ground lead connected floating ground

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Adjust Trimmers (In order shown)	Function of Trimmer
Open	455 Kc	.05 μ f	Mixer Grid	A1, A2, A3, A4	I. F.
Open	1670 Kc		* Test Loop	A5	Oscillator
1400 Kc	1400 Kc		* Test Loop	A6	Antenna
600 Kc	600 Kc		* Test Loop	Check Point	

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

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

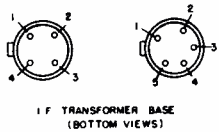
ARVIN INDUSTRIES RADIO MODEL 8576, CHASSIS 1.41400



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

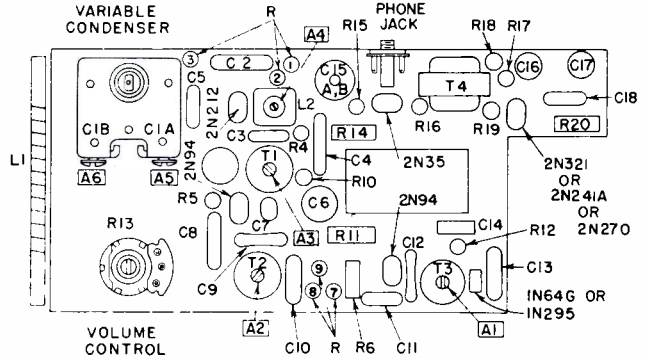
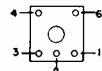
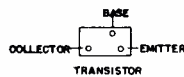
▽ - COMMON GROUND SYMBOL

□ - EXTERNAL CONNECTION TO PRINTED CIRCUIT



I.F. TRANSFORMER BASE (BOTTOM VIEWS)

SIGNAL TEST POINT	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR	INPUT FOR 0.2 WATT OUTPUT (0.5 V ACROSS VCI)
①	455 KC	.05 μf	4 μ
②	455 KC	.05 μf	70 μV
③	455 KC	.05 μf	2000 μV
④	1000 KC	STANDARD LOOP	300 μV



ALIGNMENT PROCEDURE

PRELIMINARY

- Output meter reading to indicate 20 milliwatts 0.5V
- Output meter connection Across speaker voice coil
- Connection of generator ground lead Common Ground
- Generator Modulation 30% 40 Cycles
- Position of Volume Control Fully Clockwise

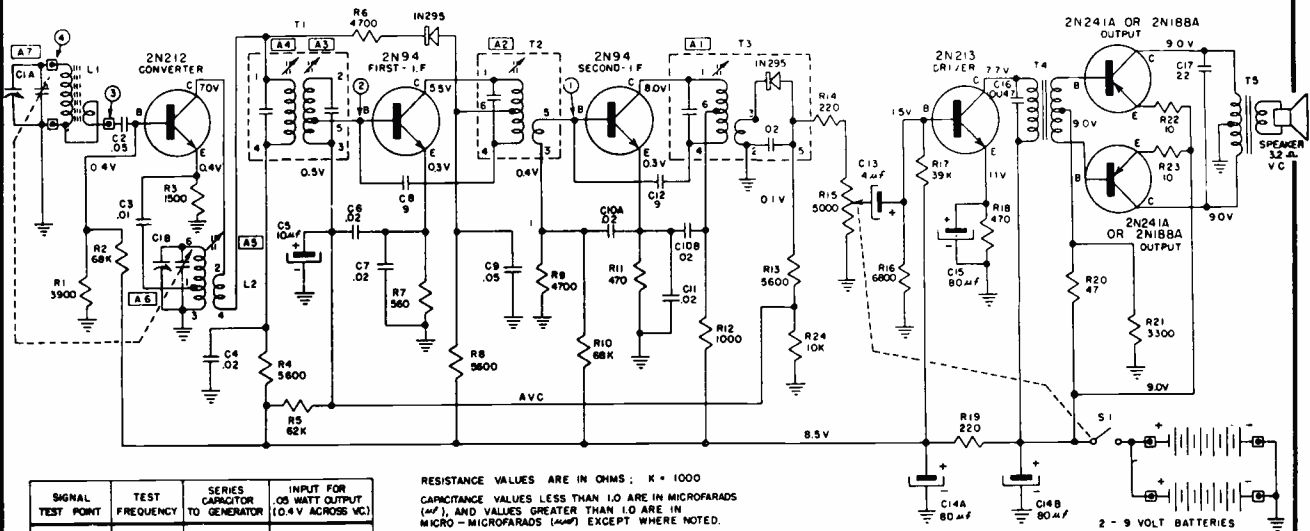
Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 μf	C1B	A1, 2, 3, 4	I. F.
Open	1670 Kc		*Test Loop	A5	Oscillator
1400 Kc	1400 Kc		*Test Loop	A6	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

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

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

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

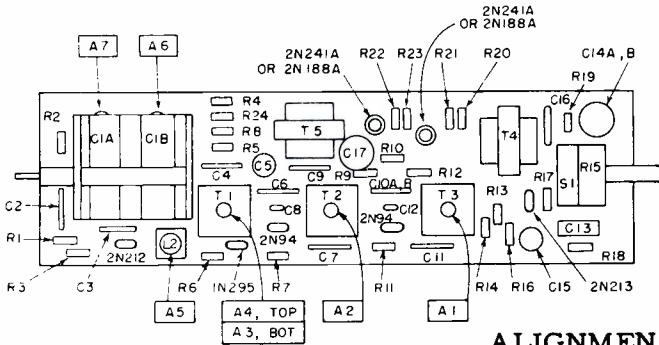
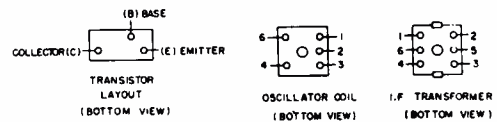
ARVIN INDUSTRIES RADIO MODEL 9574, CHASSIS 1.43000



SIGNAL TEST POINT	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR	INPUT FOR .05 WATT OUTPUT (0.4 V ACROSS VC)
①	455 KC	.05 UF	1000 UV
②	455 KC	.05 UF	35 UV
③	455 KC	.05 UF	3 UV
④	1000 KC	STANDARD LOOP	125 UV / M

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

⊕ - COMMON GROUND SYMBOL.
 □ - EXTERNAL CONNECTION TO PRINTED CIRCUIT



ALIGNMENT PROCEDURE

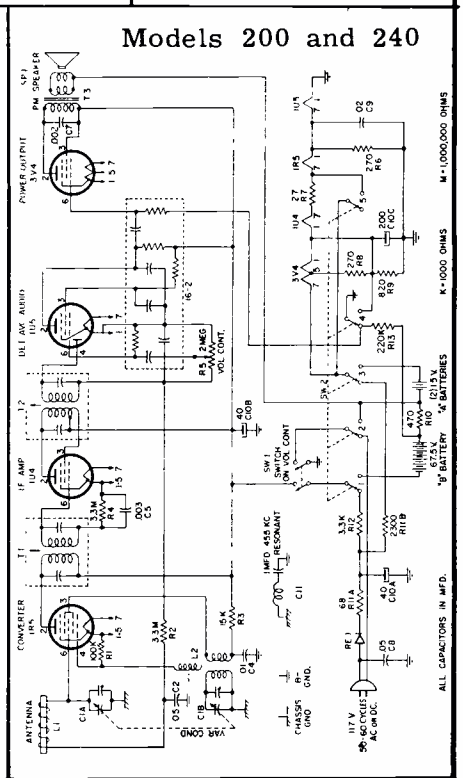
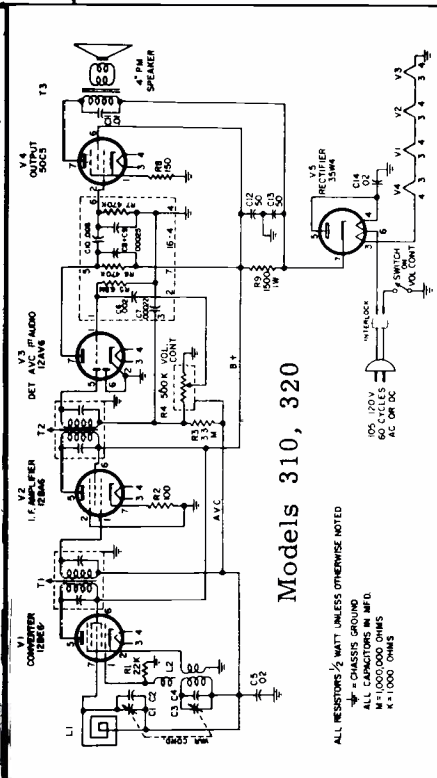
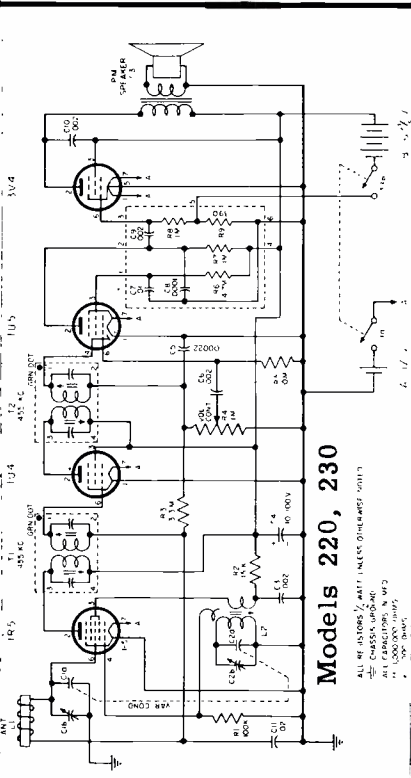
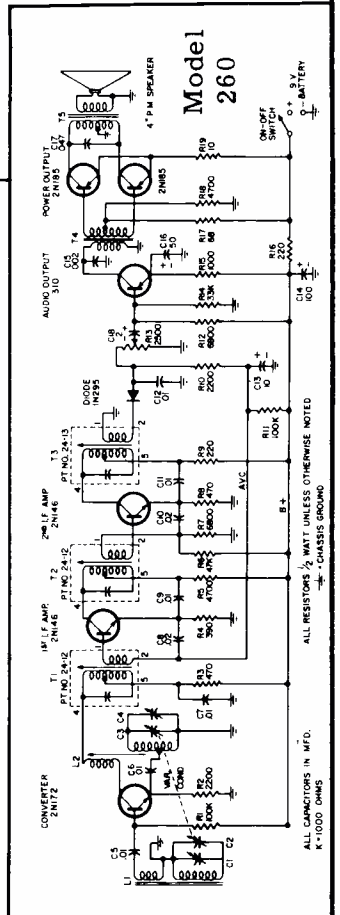
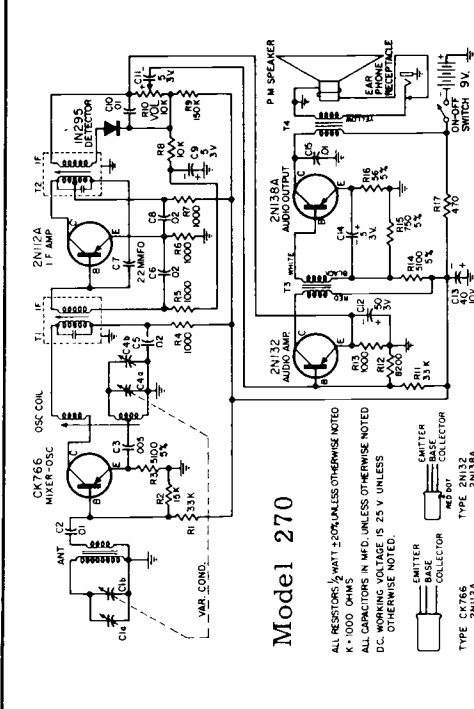
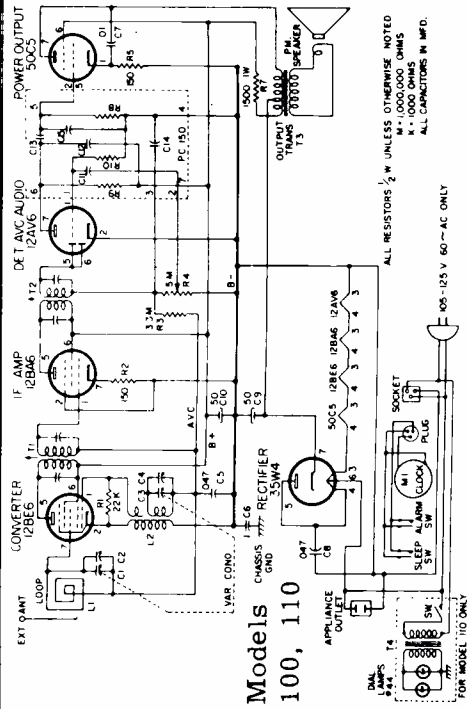
- Output meter reading to indicate 50 milliwatts 0.4V
- Output meter connection Across speaker voice coil
- Connection of generator ground lead Common Ground
- Generator Modulation 30% 400 cycles
- Position of volume control Fully Clockwise

Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 μf	C1A	A1 (Top of T3) A2 (Top of T2) A3 (Bottom of T1) A4 (Top of T1)	I.F. I.F. I.F. I.F.
Open	1670 Kc		*Test Loop	A6	Oscillator
1400 Kc	1400 Kc		*Test Loop	A7	Antenna
600 Kc	600 Kc		*Test Loop	Check Point	

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

BULOVA

Circuit diagrams of various sets manufactured by Bulova Watch Co. The IF is 455 KC. for these sets.

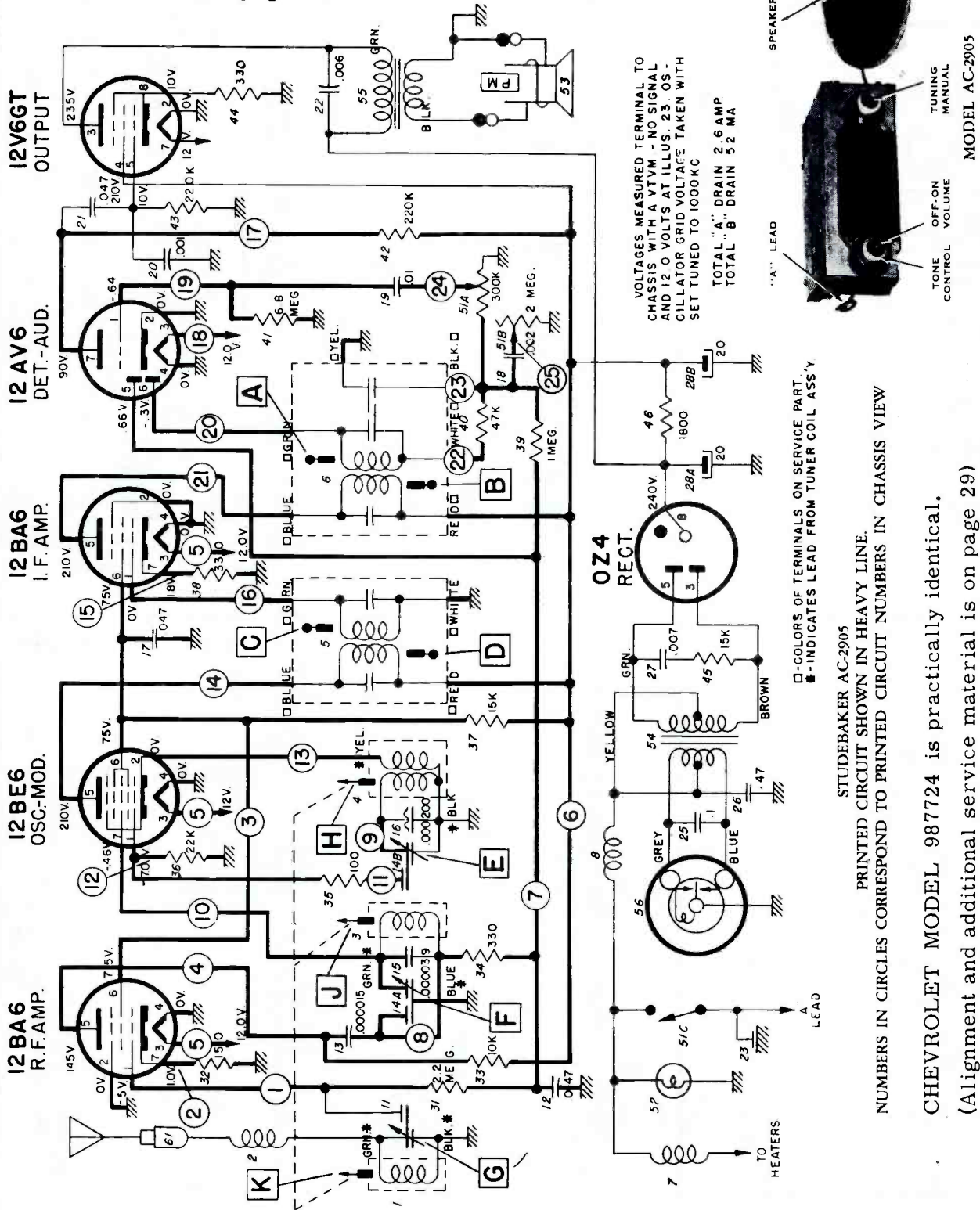


DELCO

STUDEBAKER
MODEL AC-2905

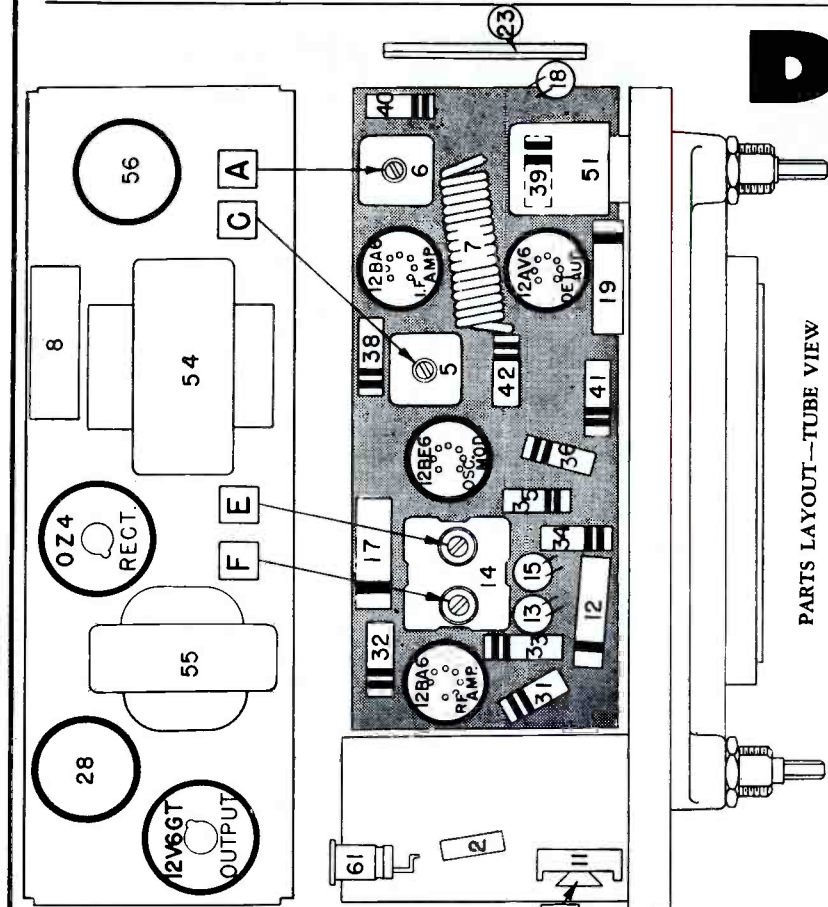
CHEVROLET MODEL 987724 is practically identical.

(Continued on page 29)

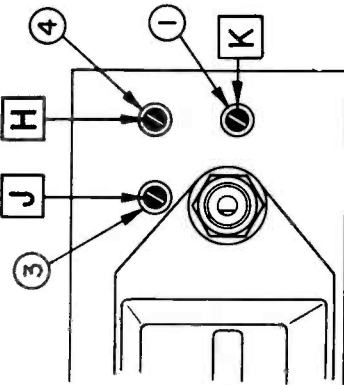


DELCO

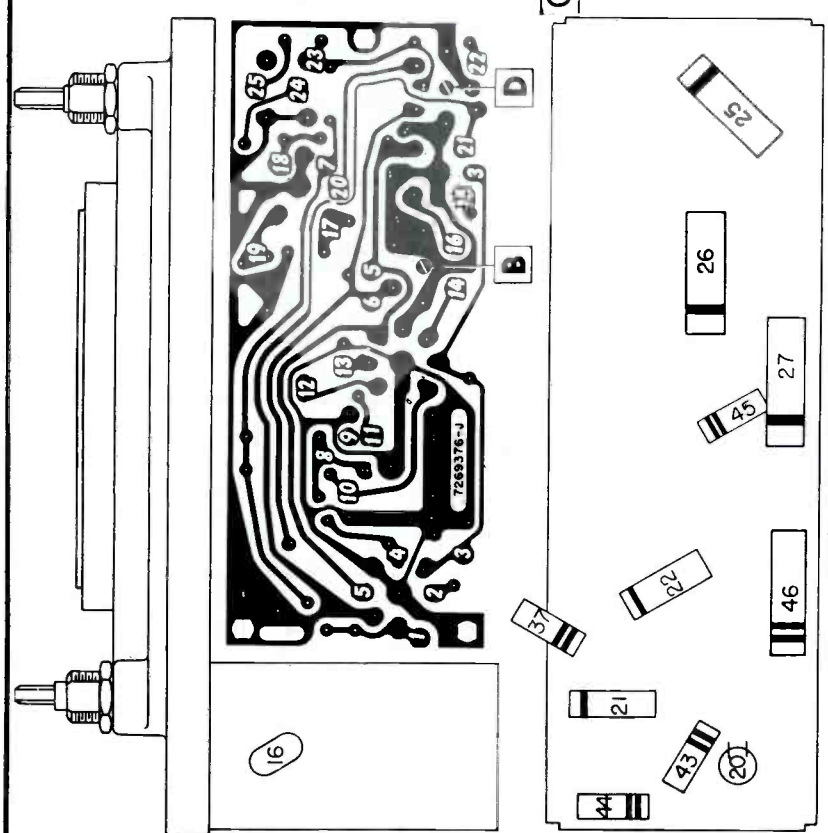
STUDEBAKER Model AC-2905
 CHEVROLET Model 987724
 (Continued from page 28)



PARTS LAYOUT—TUBE VIEW



IRON CORE ALIGNMENT



PARTS LAYOUT—CHASSIS VIEW

STEPS	SERIES CAPACITOR OR DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	TUNE RECEIVER TO	ADJUST IN SEQUENCE FOR MAX. OUTPUT
1	0.1 Mfd.	12BE6 Grid (Pin # 7)	262 KC.	High Frequency Stop	A, B, C, D,
2	0.000068 Mfd.	Antenna Connector	1615 KC.	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC.	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC.	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1100 KC.	Signal Generator Signal	**

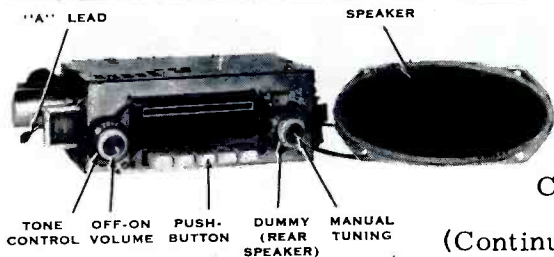
*Before making this adjustment check mechanical setting of oscillator core "H". The rear of the core should be 1 1/2" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screw driver.

**Tune in 1100 KC signal and adjust pointer on the dial cord so that the pointer is on the 1100 KC mark of the dial. This setting is to give the correct relationship between the pointer and dial when the radio is installed in a car. With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)

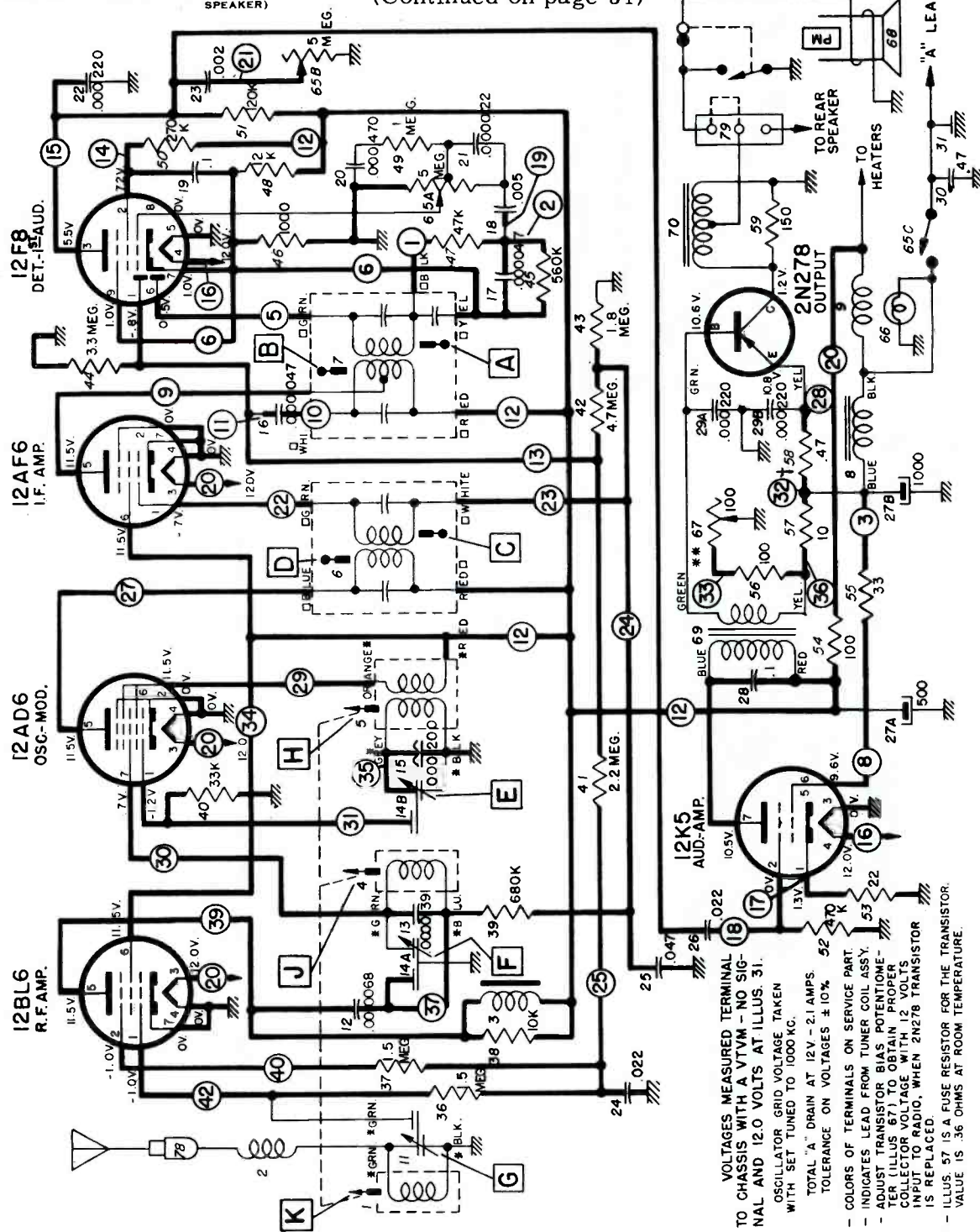
DELCO

STUDEBAKER-PACKARD MODEL AC-2906

CHEVROLET Model 987727 practically identical.



(Continued on page 31)



VOLTAGES MEASURED TERMINAL TO CHASSIS WITH A VTVM - NO SIGNAL AND 12.0 VOLTS AT ILLUS. 31.

OSCILLATOR GRID VOLTAGE TAKEN WITH SET TUNED TO 1000 KC.

TOTAL "A" DRAIN AT 12V - 2.1 AMPS.

TOLERANCE ON VOLTAGES ±10%.

— COLORS OF TERMINALS ON SERVICE PART.

* — INDICATES LEAD FROM TUNER COIL ASSY.

** — ADJUST TRANSISTOR BIAS POTENTIOMETER (ILLUS. 67) TO OBTAIN PROPER COLLECTOR VOLTAGE WITH 12 VOLTS INPUT TO RADIO, WHEN 2N278 TRANSISTOR IS REPLACED.

† — ILLUS. 57 IS A FUSE RESISTOR FOR THE TRANSISTOR. — VALUE IS .36 OHMS AT ROOM TEMPERATURE.

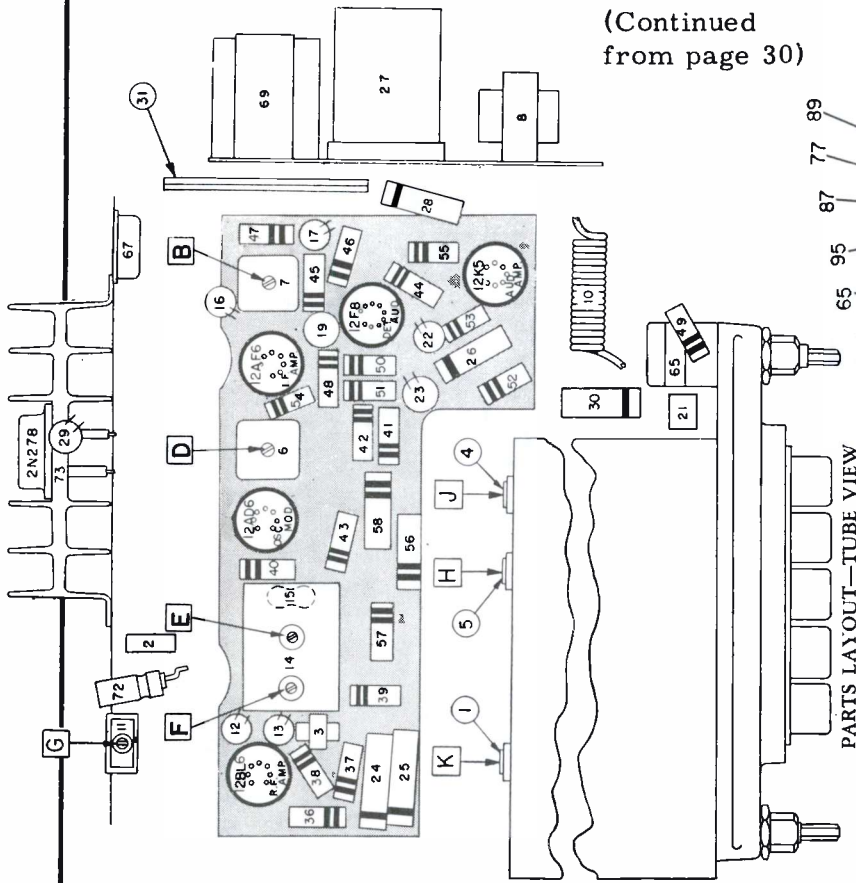
STUDEBAKER-PACKARD AC-2906—PRINTED CIRCUIT SHOWN IN HEAVY LINES.

(Alignment and additional service information is on page 31)

DELCO RADIO

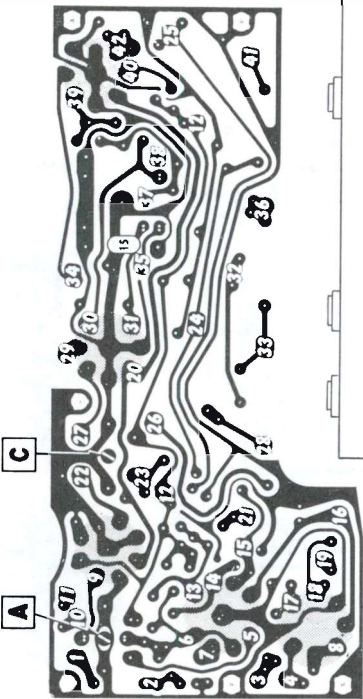
Studebaker-Packard Model AC-2906,
Chevrolet 987727 practically identical.

(Continued
from page 30)

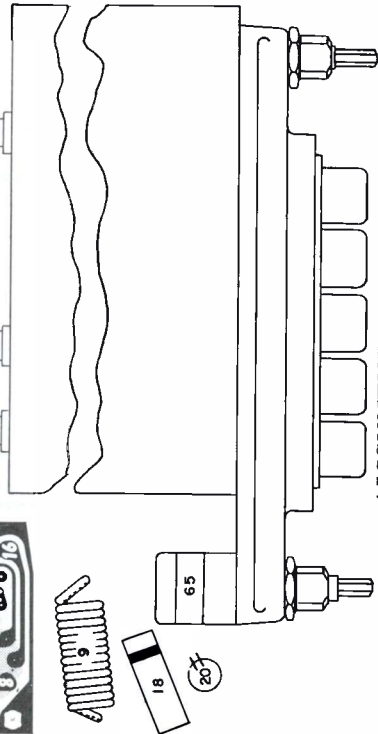


NUMBERS ON PRINTED CIRCUIT BOARD CORRESPOND WITH NUMBERS IN CIRCLES ON SCHEMATIC DIAGRAM.

PARTS LAYOUT—CHASSIS VIEW



PARTS LAYOUT—TUBE VIEW

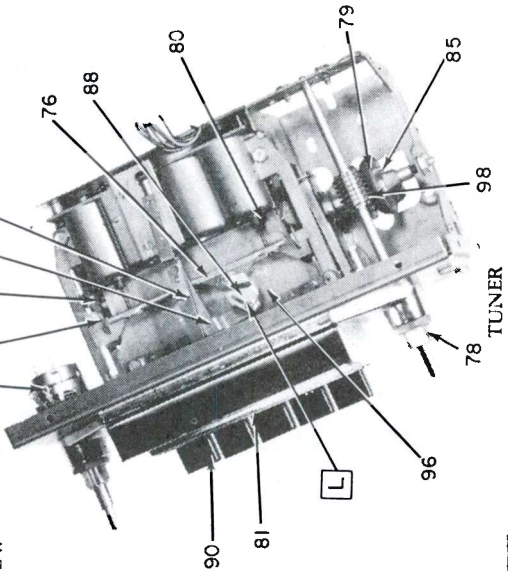


ALIGNMENT PROCEDURE

STEPS	SERIES CAPACITOR OR DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO	SIGNAL GENERATOR FREQUENCY	TUNE RECEIVER TO	ADJUST IN SEQUENCE FOR MAX. OUTPUT
1	0.1 Mfd.	12AD6 Grid (Pin #7)	262 KC.	High Frequency Stop	A, B, C, D,
2	0.000068 Mfd.	Antenna Connector	1615 KC.	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC.	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC.	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1100 KC.	Signal Generator Signal	L**

*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screw driver.

**L is the pointer adjustment which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.). It should be adjusted so that when looking directly at the dial the pointer is on the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car. With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)

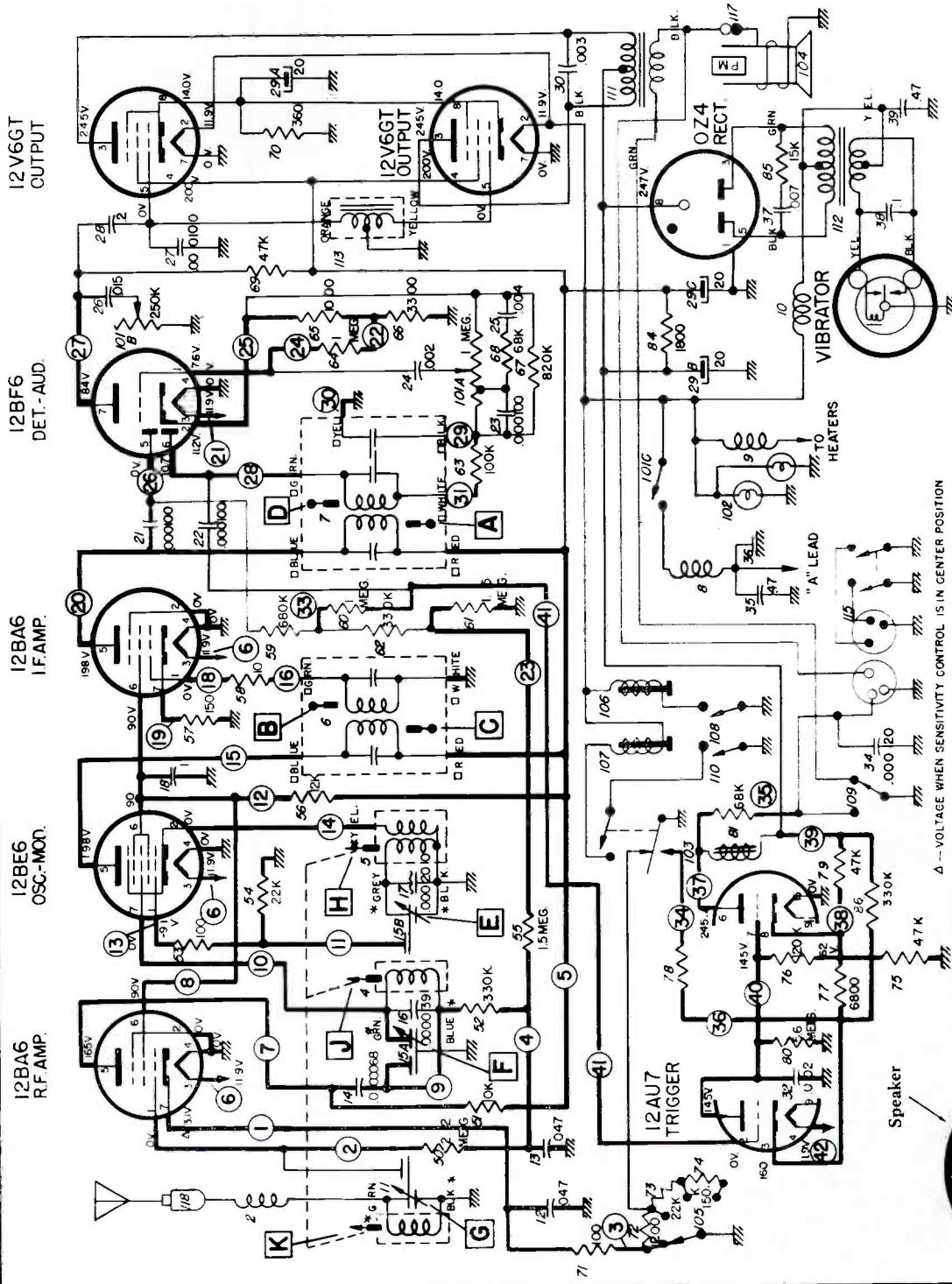


CONNECT VACUUM TUBE VOLTMETER ACROSS SPEAKER VOICE COIL DURING ALIGNMENT.

DELCO

BUICK SELECTRONIC MODEL 981813

(Alignment and other service material is on page 33)



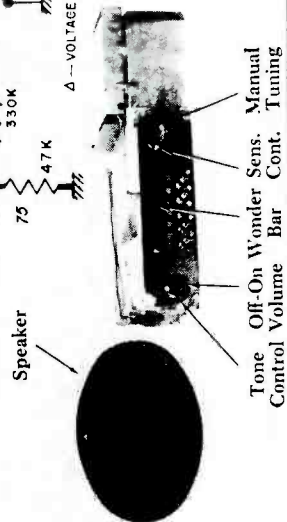
VOLTAGE MEASURED TERMINAL TO CHASSIS WITH A VTVM - NO SIGNAL AND 12.0 VOLTS AT ILLUS. 36 - TUNER STOPPED - OSCILLATOR GRID VOLTAGE TAKEN WITH SET TUNED TO 1000 KC
 TOTAL "A" DRAIN 2.3 AMPS
 TOLERANCE ON VOLTAGES ± 10%
 COLORS OF TERMINAL ON SERVICE PARTS.
 □ - INDICATES LEAD FROM TUNER COIL ASS'Y.

BUICK 981813
PRINTED CIRCUIT SHOWN IN HEAVY LINES

PUSH BUTTON SETUP PROCEDURE

Pull Push Button to the left and out. Tune in desired station manually. Push button all the way in.

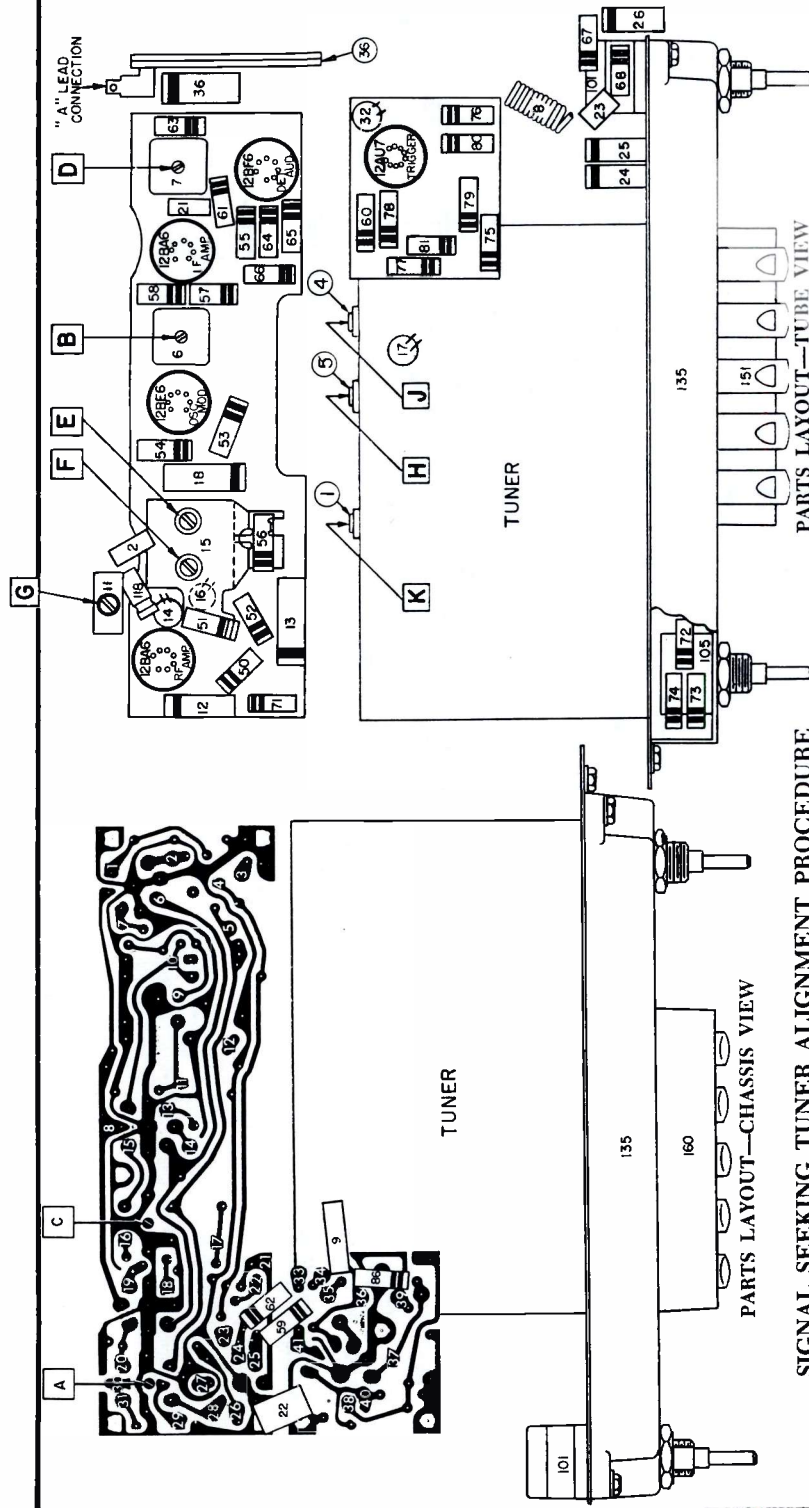
A - VOLTAGE WHEN SENSITIVITY CONTROL IS IN CENTER POSITION



DELCO

BUICK SELECTRONIC MODEL 981813

(Continued from page 32)



SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE

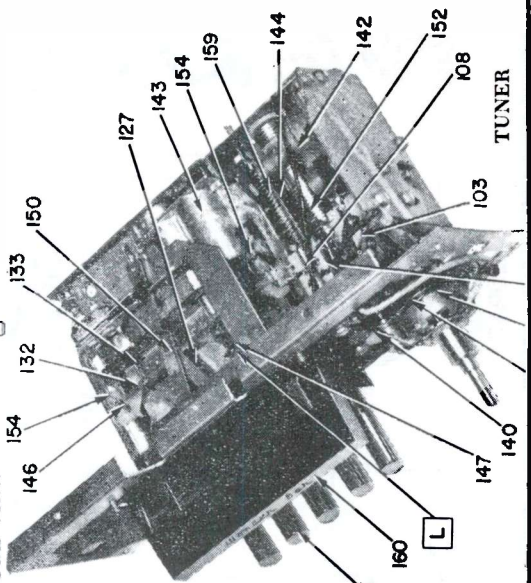
Step	Dummy Antenna	Connect Signal Generator To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Output Indicated
1	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	*High Frequency Stop	A, B, C (Max.)
2	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	High Frequency Stop	D (Min.)
3	.000082 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G (Max.)
4	.000082 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K (Max.)
5	.000082 Mfd.	Antenna Connector	1615 KC	Signal Generator Signal	F, G (Max.)
6	.000082 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	***L

*To tune to high frequency, put a 0.012" feeler gauge (or bare #28 wire) in slot against the high frequency stop. Depress station selector bar and allow the treadle bar arm to run against the feeler gauge. Turn the radio off and then back on.

**Before making this adjustment, check the setting of oscillator core "H". The rear of the core should be 1 1/2" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with a non-metallic screwdriver. If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1100 KC. With the radio installed and the antenna plugged in, adjust the antenna trimmer "C" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC. (see sticker on case.)

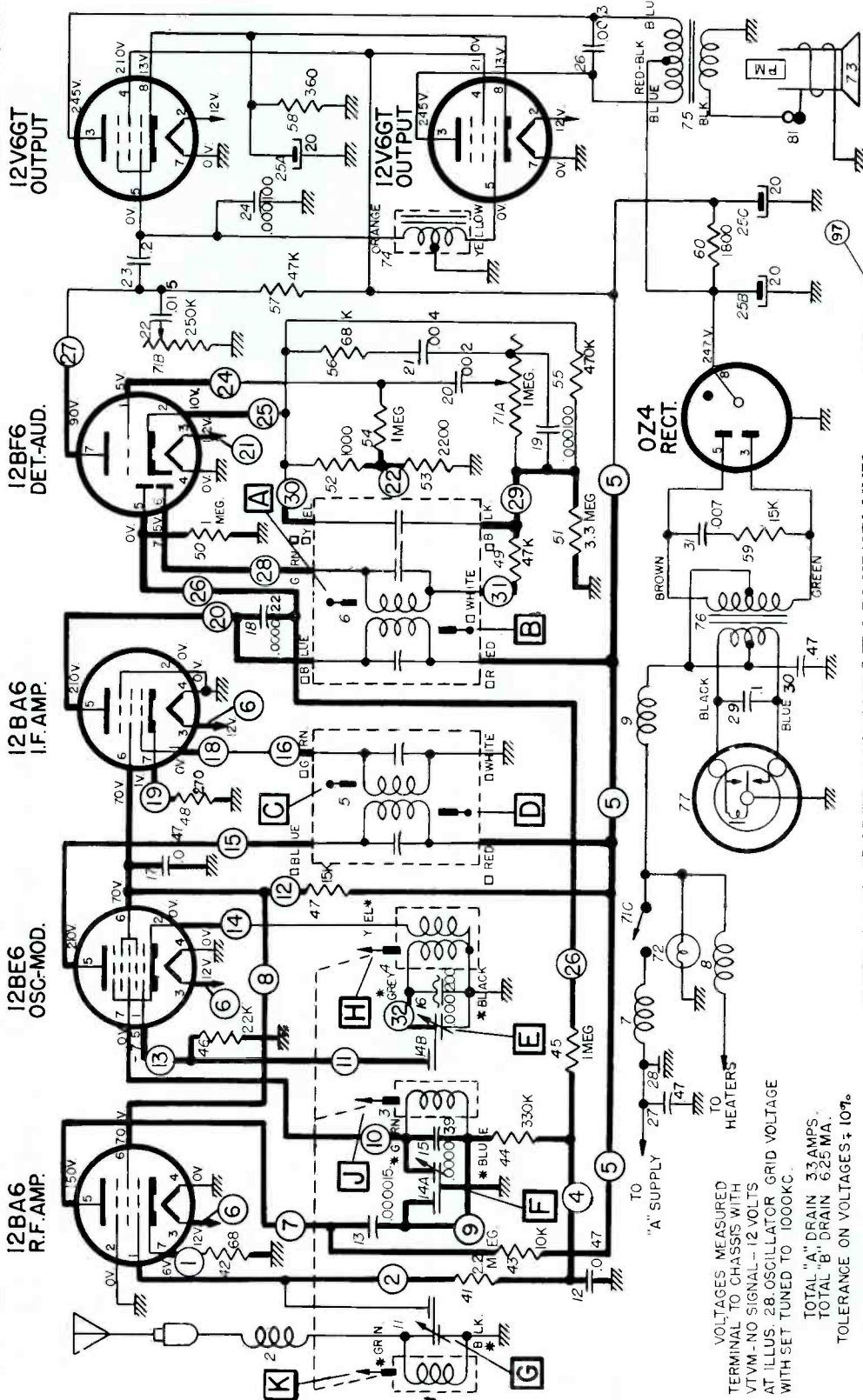
CONNECT A VIVM FROM AVC LINE (#4 ISLAND ON CIRCUIT BOARD) TO GROUND FOR OUTPUT INDICATIONS DURING ALIGNMENT.



DELCO

BUICK MODEL 981814

BUICK Model 981902 practically identical.
(Continued on page 35)

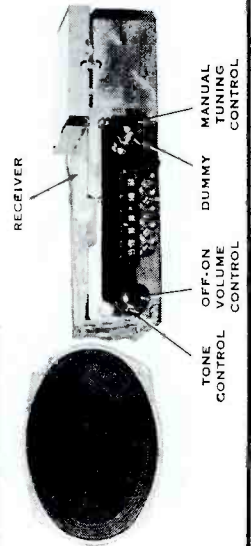


BUICK 981814—PRINTED CIRCUIT SHOWN IN HEAVY LINES

VOLTAGES MEASURED
TERMINAL TO CHASSIS WITH
VTVM. NO SIGNAL—12 VOLTS
AT ILLUS. 28 OSCILLATOR GRID VOLTAGE
WITH SET TUNED TO 1000KC.

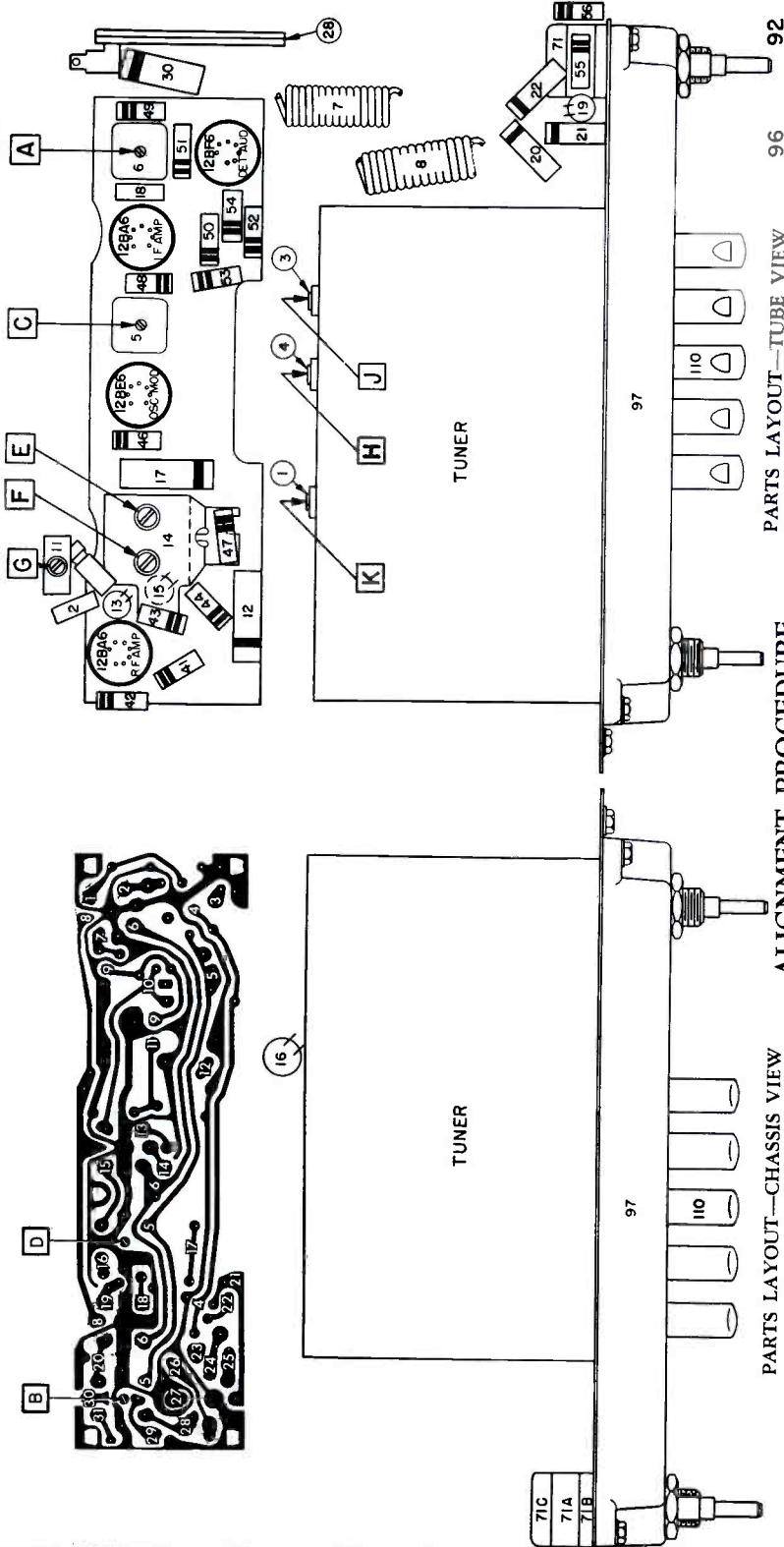
TOTAL "A" DRAIN 3.3 AMPS.
TOTAL "B" DRAIN 6.25 MA.
TOLERANCE ON VOLTAGES ± 10%

□ COLORS OF TERMINAL ON SERVICE PARTS.
* COLOR OF TUNER LEADS.



DELCO

BUICK Model 981814 (Continued from page 34)
 BUICK Model 981902 is practically identical.



ALIGNMENT PROCEDURE

Step	Series Condenser or Dummy Antenna	Connect Signal Generator To	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12BE6 Grid (Pin #7)	262 KC	High Frequency Stop	A, B, C, D
2	.000082 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	.000082 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	.000082 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	.000082 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	L**

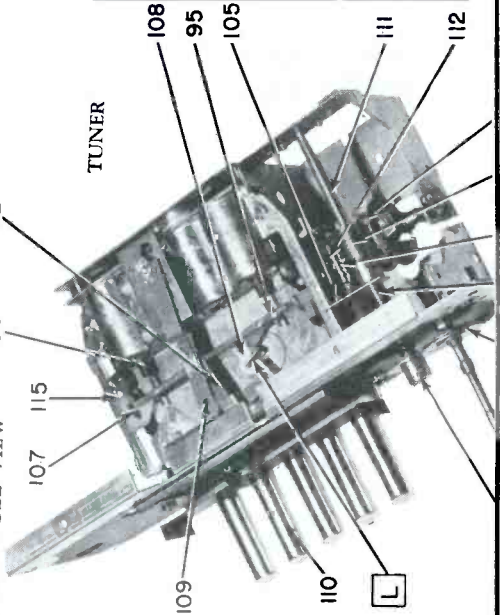
*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screwdriver, and core studs should be cemented in place with glyptal or household cement after alignment.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and the parallel guide bar. It should be adjusted so that the dial pointer corresponds with the 600 KC mark on the dial.

With the radio installed and the car antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 - 1000 KC (see sticker on case.)

PARTS LAYOUT—CHASSIS VIEW

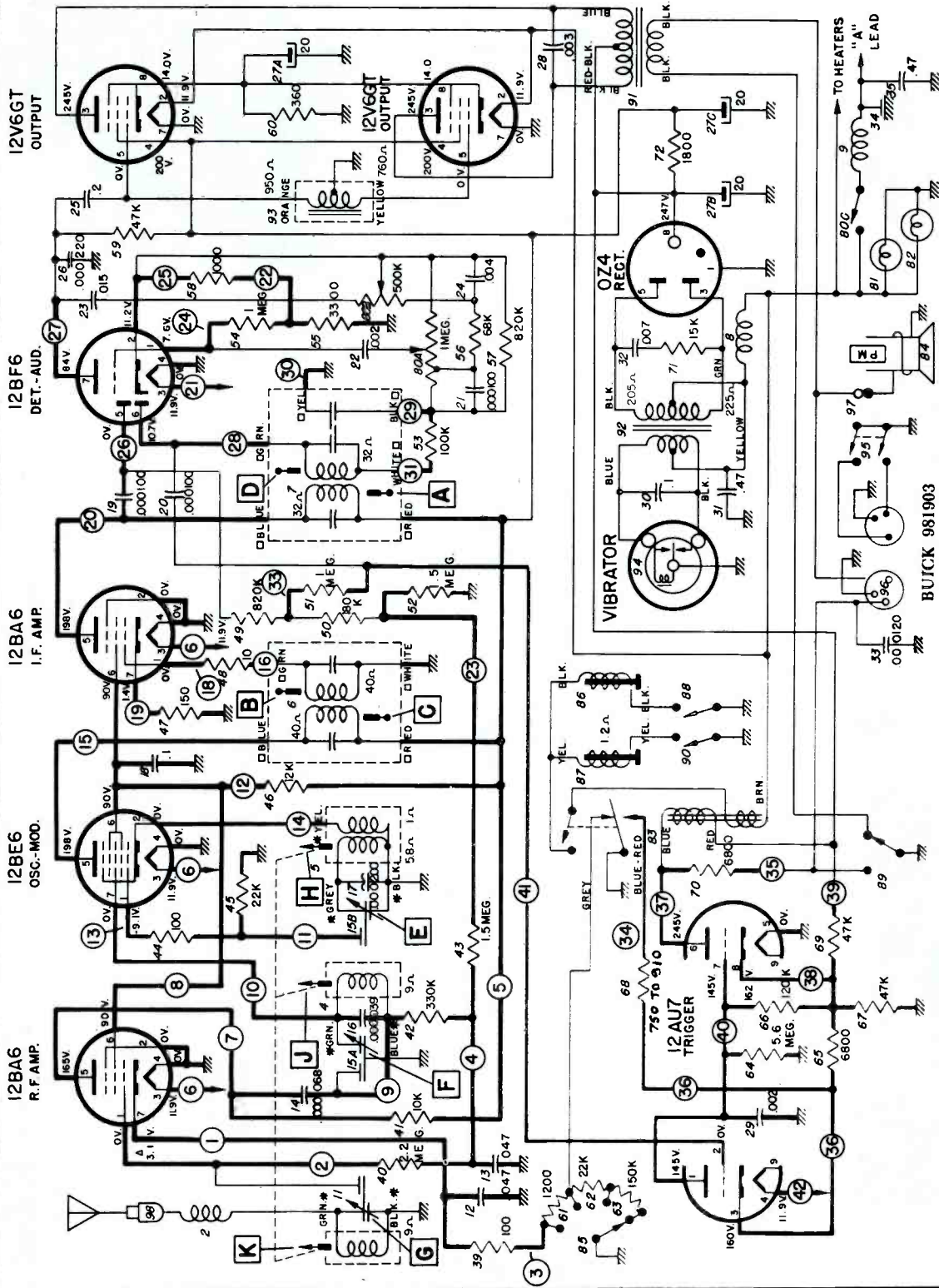
PARTS LAYOUT—TUBE VIEW





BUICK WONDER BAR MODEL 981903

(Alignment is on page 37, adjacent at right)



SCHEMATIC DATA

Volts measured terminal to chassis with a VTVM - no signal and 12.0 volts at illus. 34 - tuner stopped. Oscillator grid voltage taken with set tuned to 1000 kc.
 Total "A" drain 3.3 Amps.
 Total "B" drain 67 MA.
 Tolerance on voltages ±10%

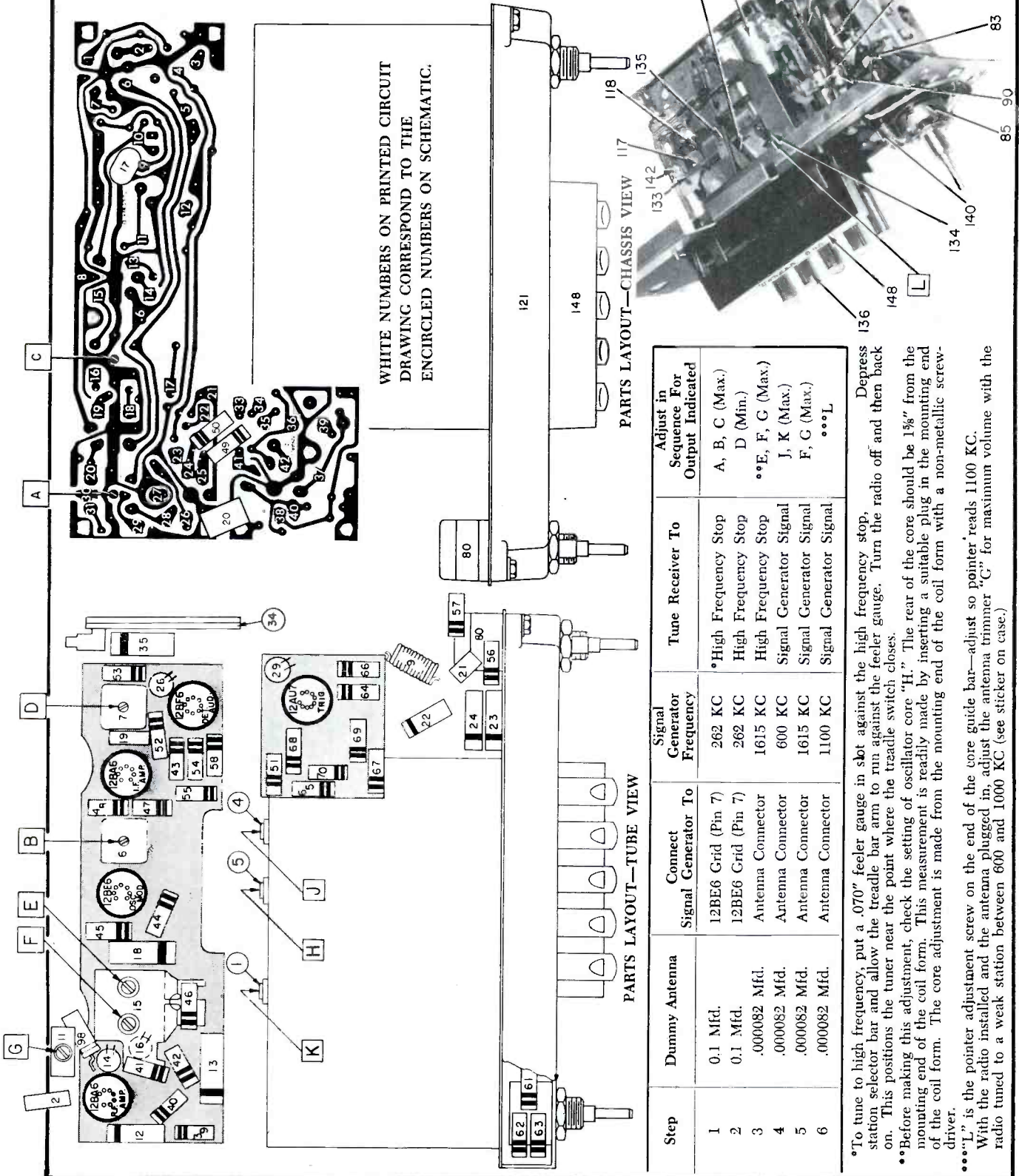
PRINTED CIRCUIT SHOWN IN HEAVY LINES

□—Colors of terminal on service parts.
 ---Indicates lead from tuner coil assembly.
 Δ—Voltage with sensitivity control in center position.
 Resistances are ±20%. Values under 1 ohm are not shown.

BUICK 981903

DELCO

BUICK Model 981903 Alignment, Continued



WHITE NUMBERS ON PRINTED CIRCUIT DRAWING CORRESPOND TO THE ENCIRCLED NUMBERS ON SCHEMATIC.

PARTS LAYOUT—CHASSIS VIEW 117

PARTS LAYOUT—TUBE VIEW

Step	Dummy Antenna	Signal Generator	Connect Generator To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Output Indicated
1	0.1 Mfd.	12BE6 Grid (Pin 7)	12BE6 Grid (Pin 7)	262 KC	*High Frequency Stop	A, B, C (Max.)
2	0.1 Mfd.	12BE6 Grid (Pin 7)	Antenna Connector	262 KC	High Frequency Stop	D (Min.)
3	.000082 Mfd.	Antenna Connector	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G (Max.)
4	.000082 Mfd.	Antenna Connector	Antenna Connector	600 KC	Signal Generator Signal	J, K (Max.)
5	.000082 Mfd.	Antenna Connector	Antenna Connector	1615 KC	Signal Generator Signal	F, G (Max.)
6	.000082 Mfd.	Antenna Connector	Antenna Connector	1100 KC	Signal Generator Signal	***L

*To tune to high frequency, put a .070" feeler gauge in slot against the high frequency stop, station selector bar and allow the treadle bar arm to run against the feeler gauge. Turn the radio off and then back on. This positions the tuner near the point where the treadle switch closes.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1/8" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with a non-metallic screw-driver.

***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1100 KC. With the radio installed and the antenna plugged in, adjust the antenna trimmer "C" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)

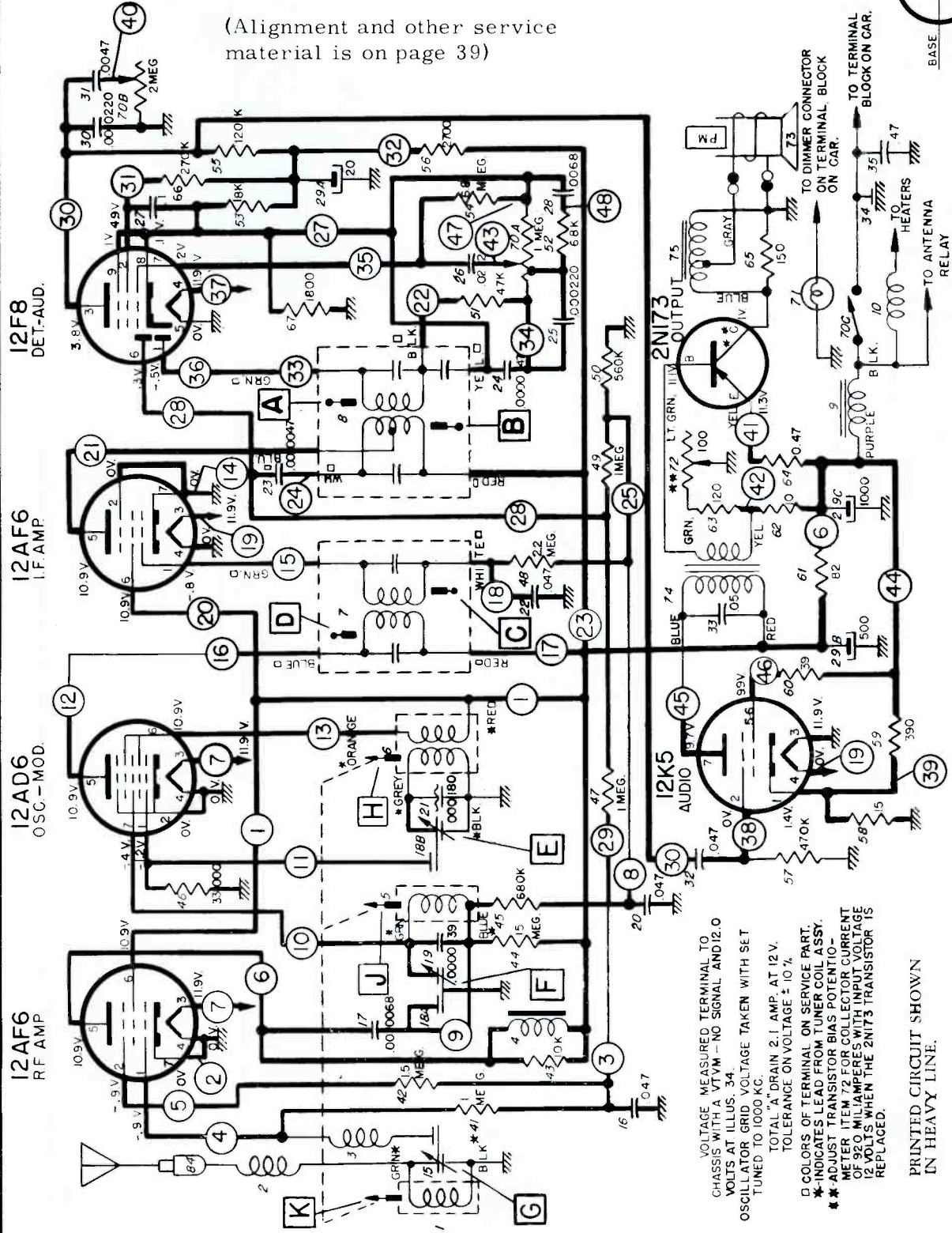
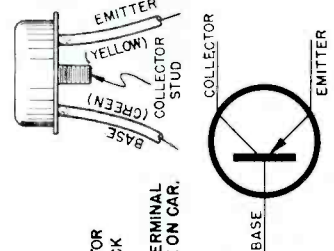
Depress 136

CONNECT A VTVM FROM AVC LINE (#4 ISLAND ON CIRCUIT BOARD) TO GROUND FOR OUTPUT INDICATIONS DURING ALIGNMENT.

DELCO

PONTIAC MODEL 988671

(Alignment and other service material is on page 39)



VOLTAGE MEASURED TERMINAL TO CHASSIS WITH A VTVM - NO SIGNAL AND 12.0 VOLTS AT ILLUS. 34.
 OSCILLATOR GRID VOLTAGE TAKEN WITH SET TUNED TO 1000 KC.
 TOTAL "A" DRAIN 2.1 AMP. AT 12 V.
 TOLERANCE ON VOLTAGE ± 10 %
 D COLORS OF TERMINAL ON SERVICE PART.
 * INDICATES LEAD FROM TUNER COIL ASSY.
 ** ADJUST TRANSISTOR BIAS POTENTIAL - METER ITEM 72 FOR COLLECTOR CURRENT OF 920 MILLIAMPERES WITH INPUT VOLTAGE 12 VOLTS WHEN THE 2N173 TRANSISTOR IS REPLACED.

PRINTED CIRCUIT SHOWN IN HEAVY LINE.

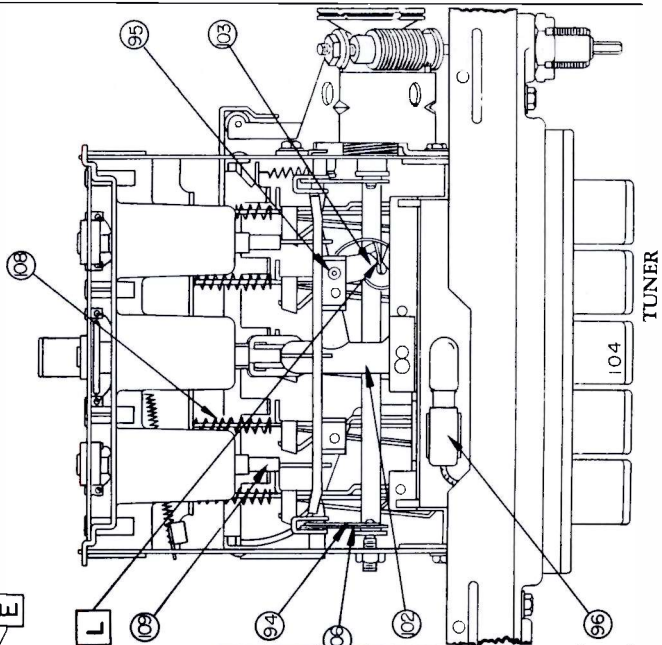
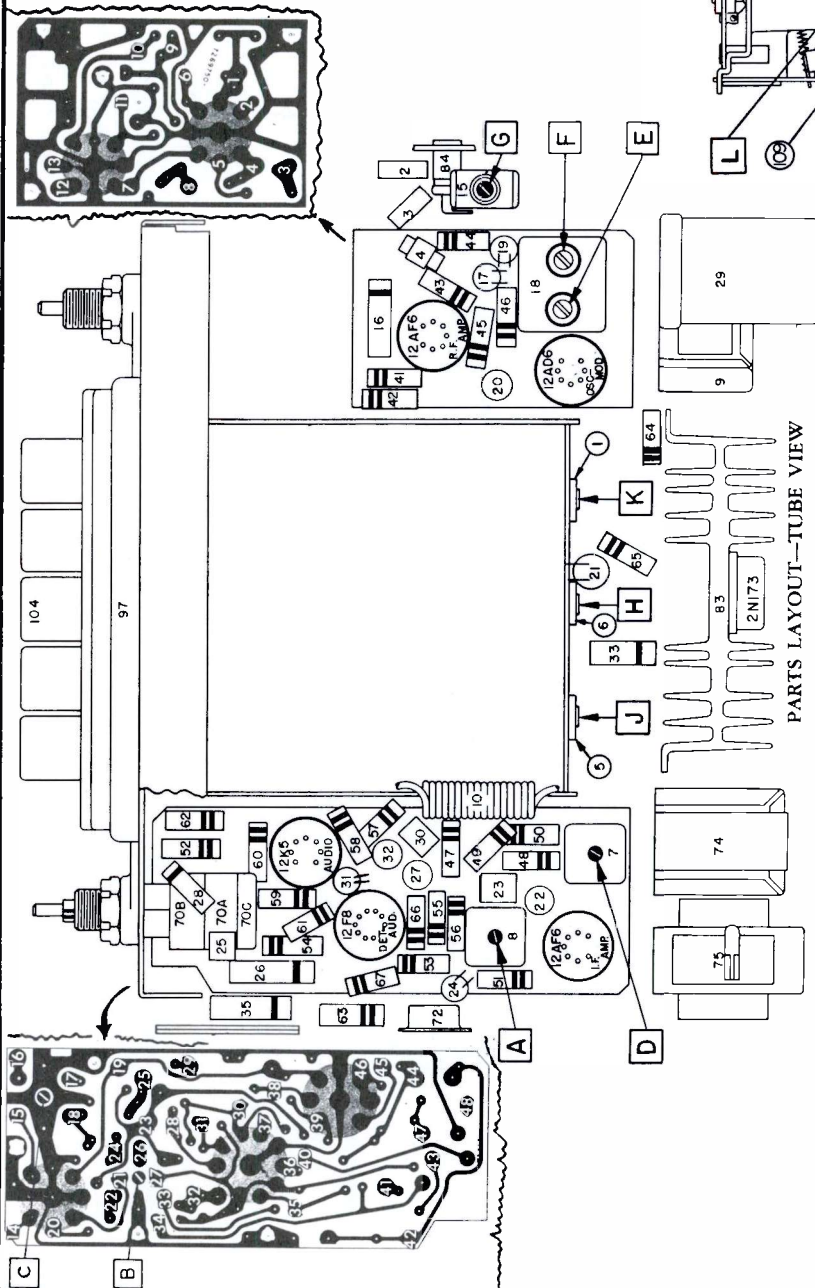
DELCO

PONTIAC MODEL 988671

(Continued from page 38)

TROUBLE SHOOTING THE OUTPUT STAGE

A quick way to determine that the 2N173 is conducting can be made by checking the collector voltage, from transistor case to the radio case. If no voltage is present the transistor is not conducting or the transistor heat radiator is grounded to the radio case. If the voltage at the collector is higher than listed the transistor is conducting too heavily (check with milliammeter) or the output transformer is open. The amount of current the transistor conducts is determined by the voltages at each element, the resistor in the base and emitter circuits, the input transformer secondary resistance, and the transistor itself.



ALIGNMENT PROCEDURE:

Steps	Series Capacitor or Dummy Antenna	Connect to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12BE6 Grid (Pin #7)	262 KC	High Frequency Stop	A, B, C, D
2	0.000047 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000047 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000047 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000047 Mfd.	Antenna Connector	1000 KC	Signal Generator Signal	**L

*Before making this adjustment check the mechanical setting of the oscillator core "H." The slotted end of core should be 1 5/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screwdriver.

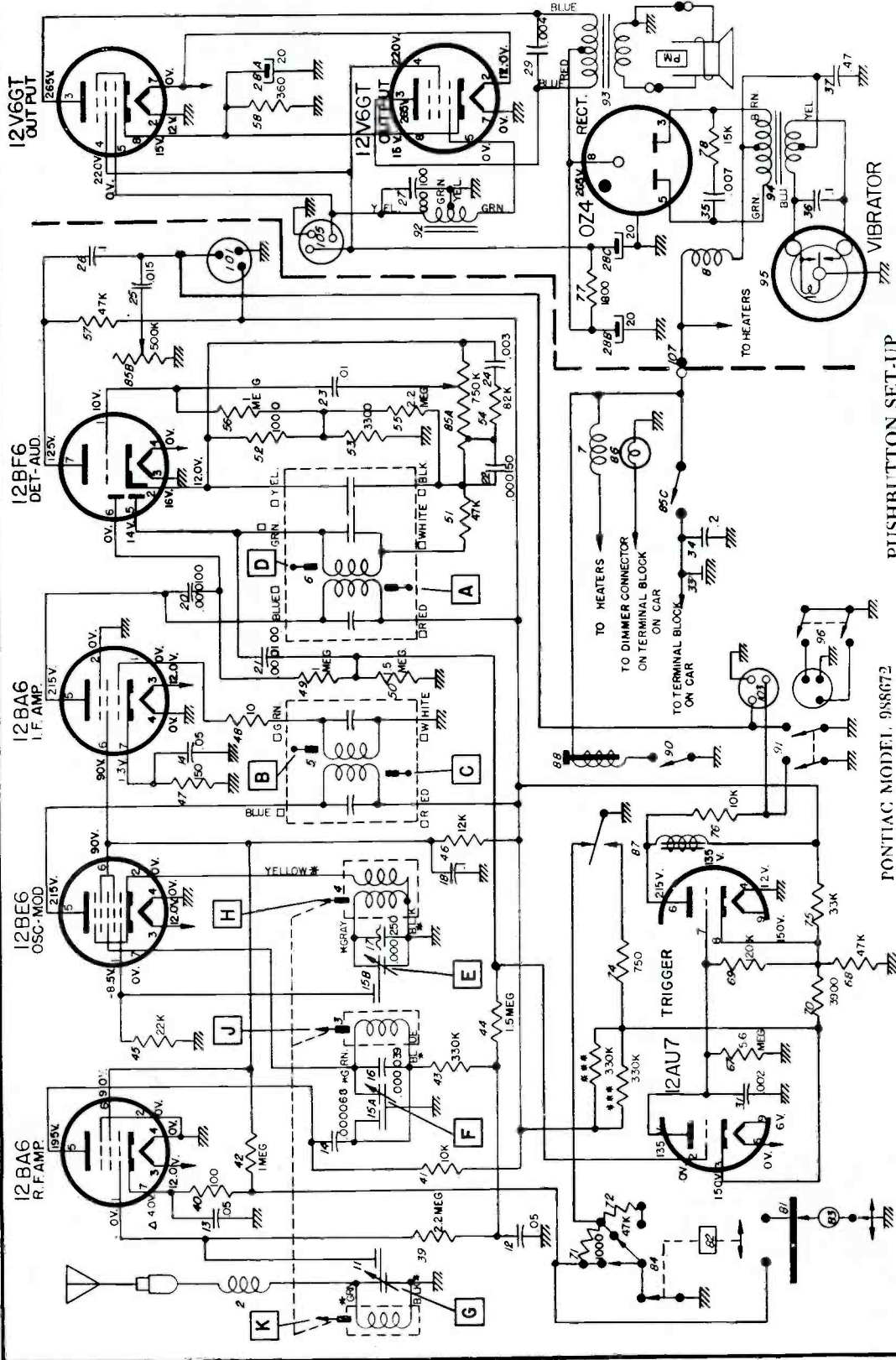
**L is the pointer adjustment screw which is on the pointer connecting link (see tuner drawing) and should be adjusted so the pointer reads 1000 KC.

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC. (See sticker on case.)

DELCO

12V PONTIAC MODEL 988672

(Alignment and other material on page 41)



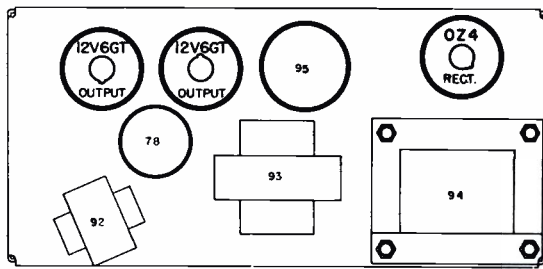
PUSHBUTTON SET-UP

1. Open the hinged door below the dial exposing the selector tabs.
2. Tune in the desired signal nearest the left end of the dial.
3. Move the first selector tab (one farthest left) until it lines up with the pointer tip.
4. Repeat set-up steps 2 and 3 for the remaining selector tabs, choosing stations from left to right on the dial.

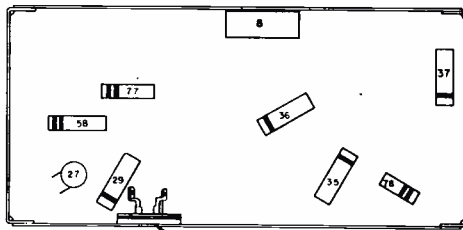
PONTIAC MODEL 988672

Voltages measured terminal to chassis with a VTVM — No signal and 12.0 volts at illus. 53.
 — Tuner stopped. Oscillator grid voltage taken with set tuned to 1000 KC.
 Total "A" Drain 3.3 Amps. Total "B" Drain 67 MA.
 * — Indicates Lead from Tuner Coil Ass'y.
 Δ — Sensitivity Control in Position #2.
 □ — Colors of Terminals on Service Part. *** — Either or Both Resistors May Not Be Found on All Sets.

AUDIO—POWER SUPPLY UNIT

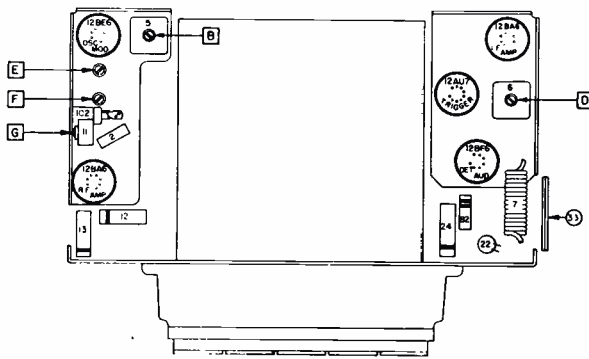


PARTS LAYOUT — TUBE VIEW



PARTS LAYOUT — CHASSIS VIEW

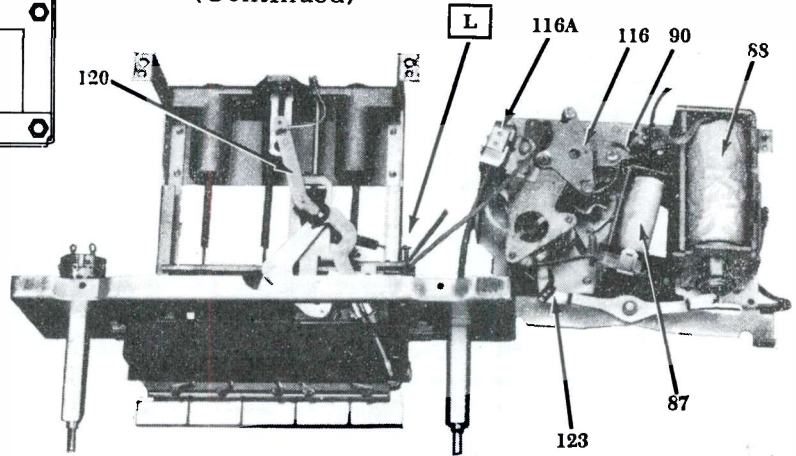
RF—UNIT



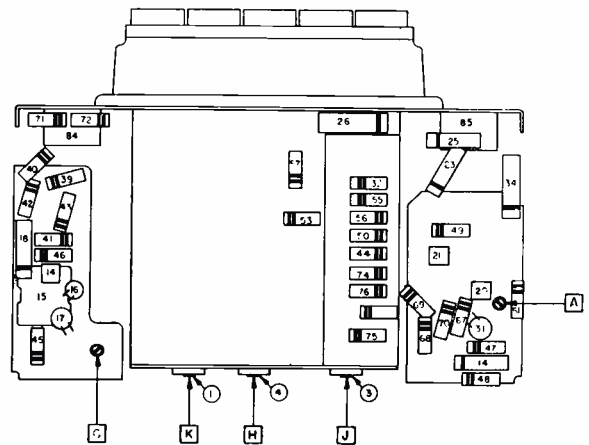
PARTS LAYOUT — TUBE VIEW

DELCO

PONTIAC Model 988672
(Continued)



TUNER UNFOLDED



PARTS LAYOUT — CHASSIS VIEW

SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE:

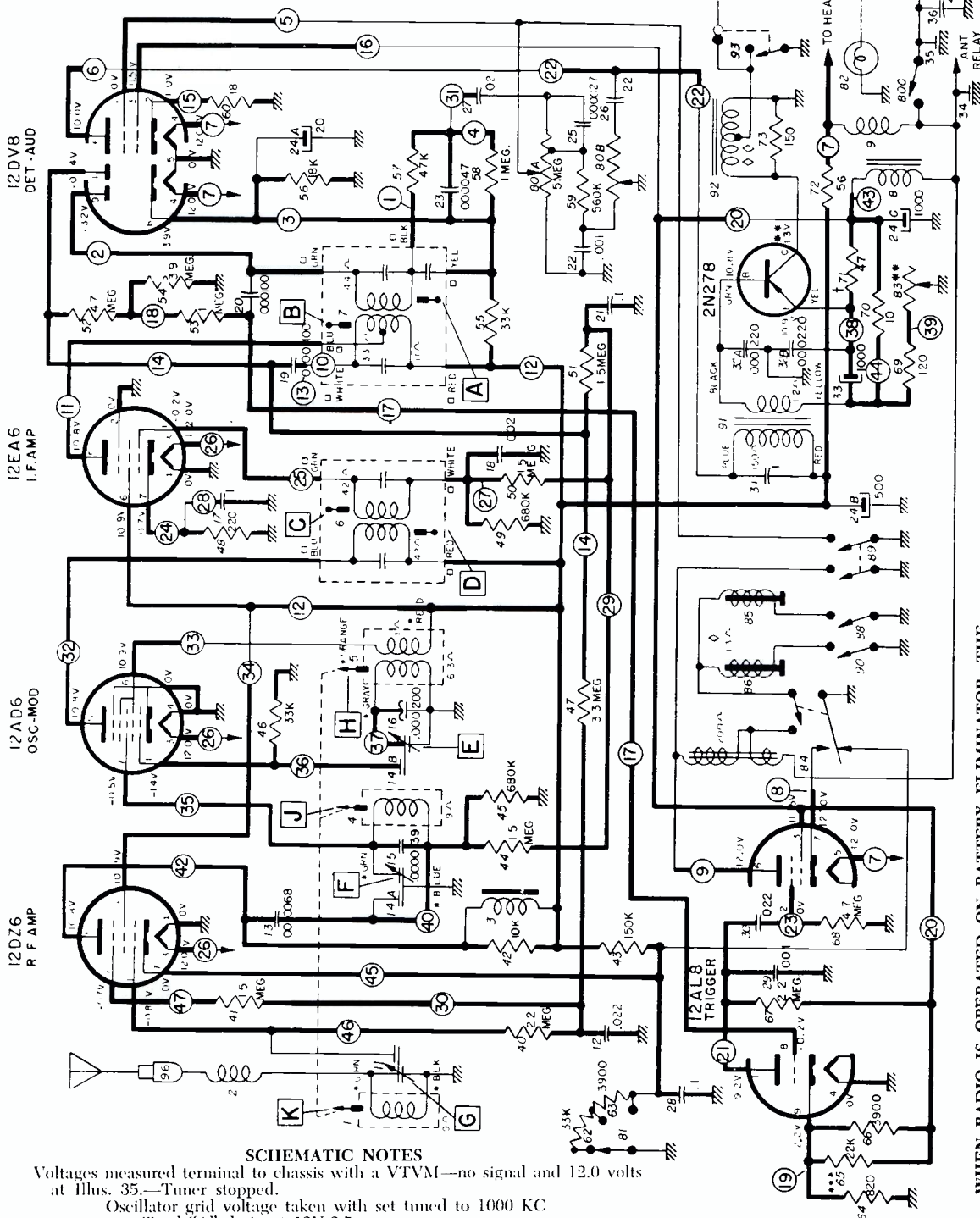
Output Meter Connection VTVM From AVC Line To Chassis (see Parts layout)
Generator Return.....Receiver Chassis

Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence
1	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	*High Frequency Stop	A, B, C (Max.)
2	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	High Frequency Stop	D (Min.)
3	.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G (Max.)
4	.000068 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K (Max.)
5	.000068 Mfd.	Antenna Connector	1615 KC	Signal Generator Signal	F, G (Max.)
6	.000068 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	***L

*To tune to high frequency, put a 0.070" feeler gauge (or bare #13 wire) in slot against the high frequency stop. (See tuner pictures). Turn manual control to allow the planetary arm to run against the feeler gauge.
**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 3/8" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with an insulated screw driver. (It will be necessary to steady the core guide bar by applying a downward pressure at the antenna core end of the bar while making these adjustments.) If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to reseal after making the adjustment.
***"L" is the pointer adjustment screw on the end of the core guide bar—adjust so pointer reads 1100 KC.
With the radio installed and the antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case).

DELCO

PONTIAC Model 988823 (Continued on page 43)
 CHEVROLET Model 987730, CORVETTE #3748611,
 OLDSMOBILE 989129 are similar.



SCHEMATIC NOTES

Volts measured terminal to chassis with a VTVM—no signal and 12.0 volts at illus. 35.—Tuner stopped.

Oscillator grid voltage taken with set tuned to 1000 KC
 Total "A" drain at 12V-2.5 amperes
 Tolerance on all voltage ± 10%

- Colors of terminals on service part.
- Indicates lead from tuner coil assembly.
- Before measuring transistor voltages, the shorting-type speaker socket must be opened and a 4 ohm speaker connected. If transistor is replaced, adjust bias potentiometer (illus. 83) to obtain proper collector voltage with 12 volts input to radio.
- Does not appear on all radios.

PONTIAC MODEL 988823
 PRINTED CIRCUIT SHOWN IN HEAVY LINES

†—illus. 71 is a fuse resistor for the transistor. Value is .36 ohms at room temperature.

WHEN RADIO IS OPERATED ON BATTERY ELIMINATOR, THE TUNER MAY STOP SEEKING EVERY TIME A SOLENOID ENERGIZES, DUE TO VOLTAGE REGULATION.

Speaker socket, illus. 93, is a shorting type to prevent transistor damage if speaker is disconnected. If not opened, radio will be very weak or dead.

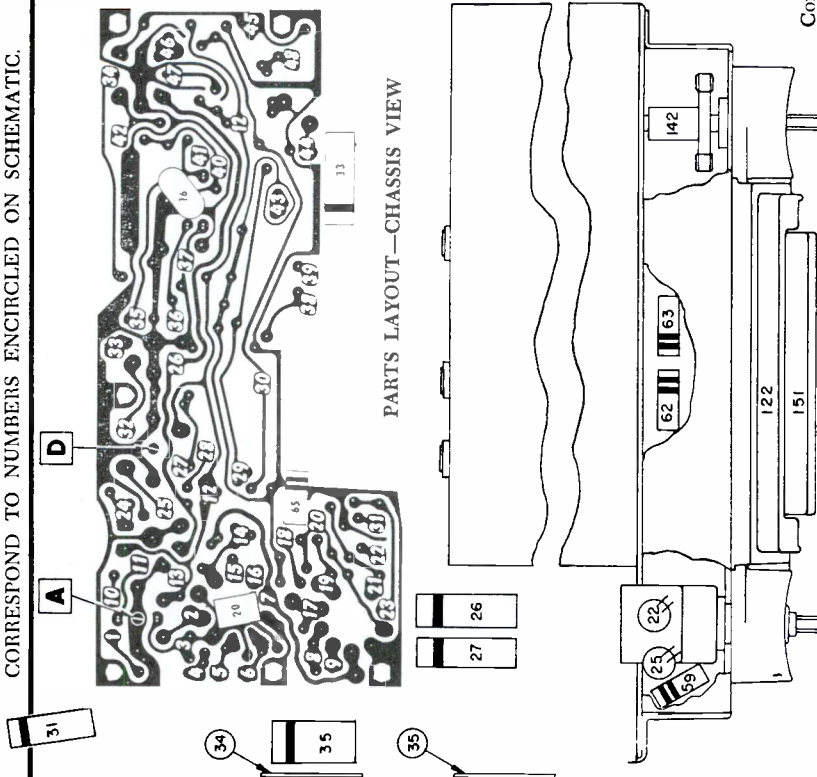
PUSHBUTTON SETUP PROCEDURE

1. Pull button to the left and out.
2. Tune in desired station manually.
3. Push button all the way in.

DELCO

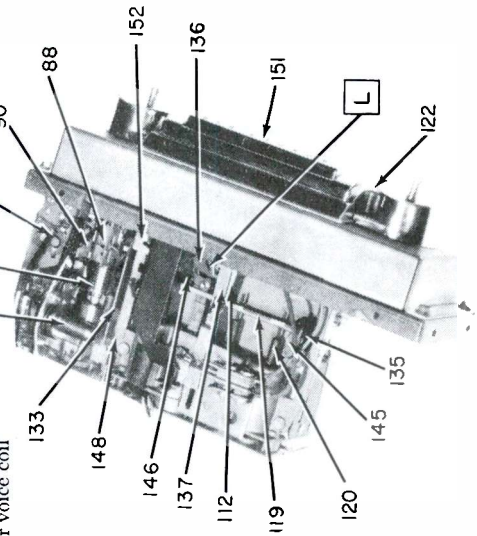
PONTIAC Model 98823 (Continued)
 CHEVROLET 987730, CORVETTE 3748611,
 and OLDSMOBILE Model 989129
 are similar.

WHITE NUMBERS ON PRINTED CIRCUIT BOARD DRAWING
 CORRESPOND TO NUMBERS ENCIRCLED ON SCHEMATIC.



PARTS LAYOUT—TUBE VIEW

Connect vacuum tube voltmeter across speaker voice coil during alignment.



TUNER

Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence
1	0.1 Mfd.	12AD6 Grid (Pin 7)	262 KC	• High Frequency Stop	A, D, B, C (Max.)
2	.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	•• E, F, G (Max.)
3	.000068 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K (Max.)
4	.000068 Mfd.	Antenna Connector	1400 KC	Signal Generator Signal	F, G (Max.)
5	.000068 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	••• L

• To tune to high frequency, put a .070" feeler gauge in slot against the high frequency stop. Turn manual control to allow the treadle bar arm to run against the feeler gauge. This sets the dial near the point where the treadle solenoid switch closes.

•• Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 1/2" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with a non-metallic screw driver.

••• "L" is the pointer adjustment which is on the connecting link, between the pointer assembly and core guide bar—adjust so pointer reads 1100 KC.

With the radio installed and the antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case).



PONTIAC DELUXE MODEL 988822
(Continued on page 45 adjacent at right)

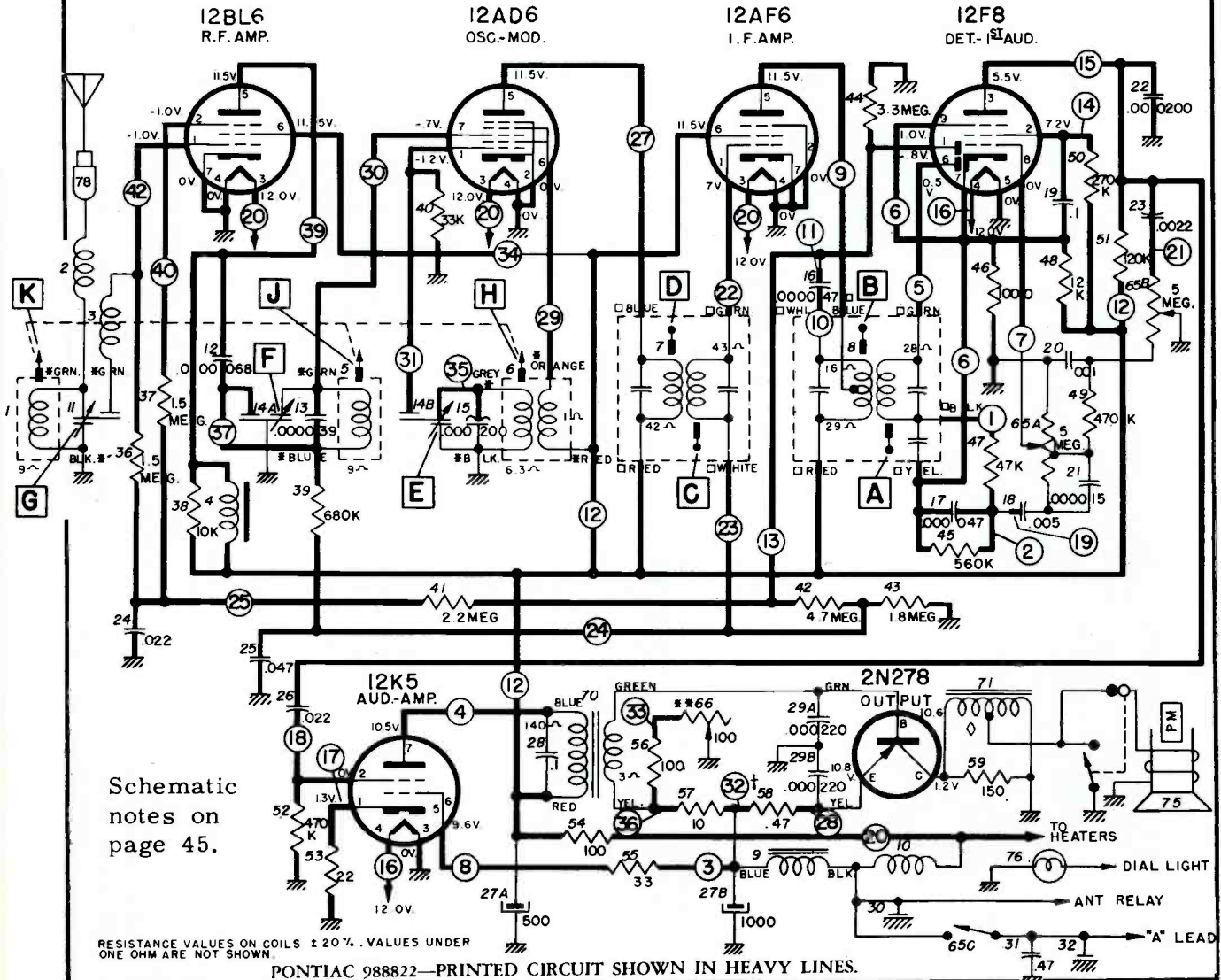
ALIGNMENT PROCEDURE

Steps	Series Capacitor or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12AD6 Grid (Pin # 7)	262 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	L**

*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1/16" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screw driver.

**L is the pointer adjustment which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.). It should be adjusted so that when looking directly at the dial the pointer is on the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)

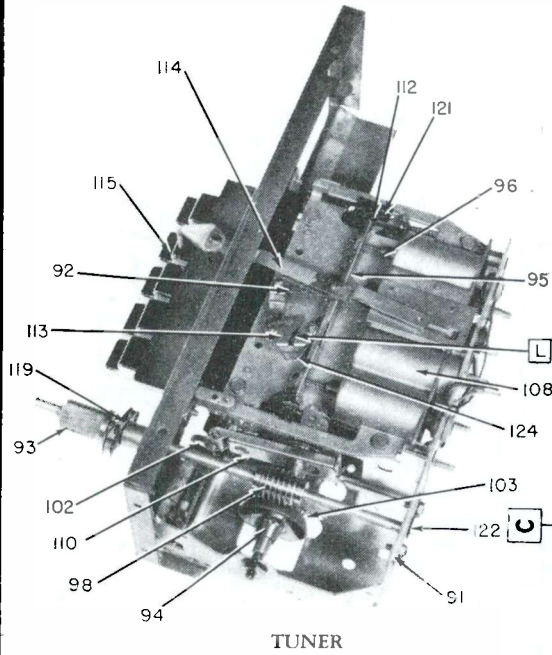


Schematic notes on page 45.

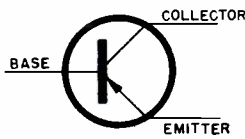
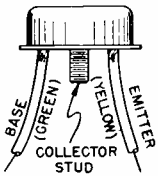
RESISTANCE VALUES ON COILS ± 20%. VALUES UNDER ONE OHM ARE NOT SHOWN

PONTIAC 988822-PRINTED CIRCUIT SHOWN IN HEAVY LINES.

DELCO PONTIAC Model 988822, Continued from page 44



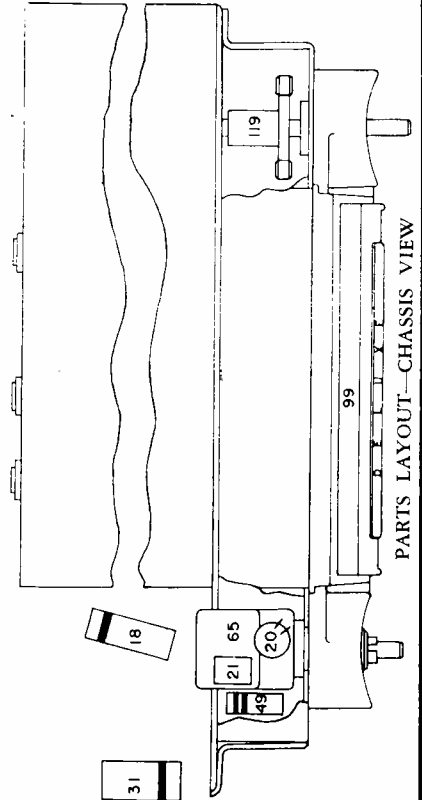
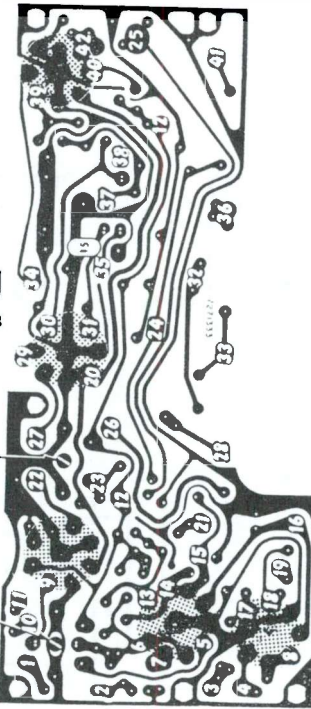
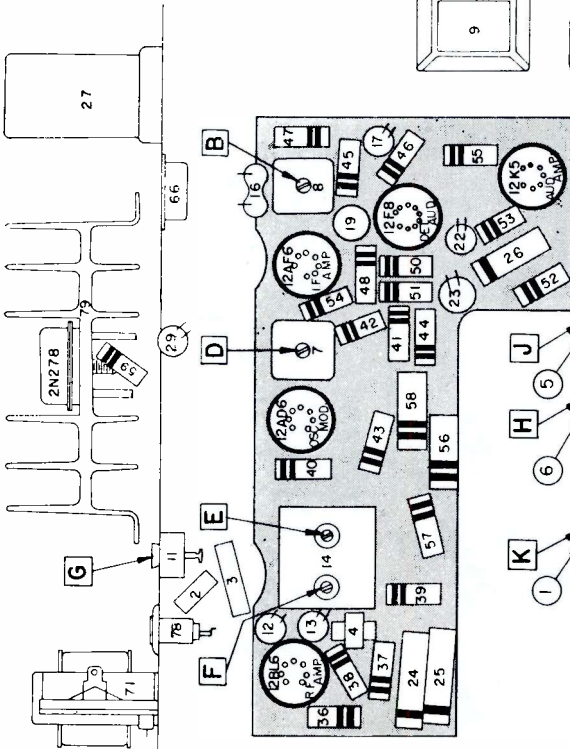
TUNER



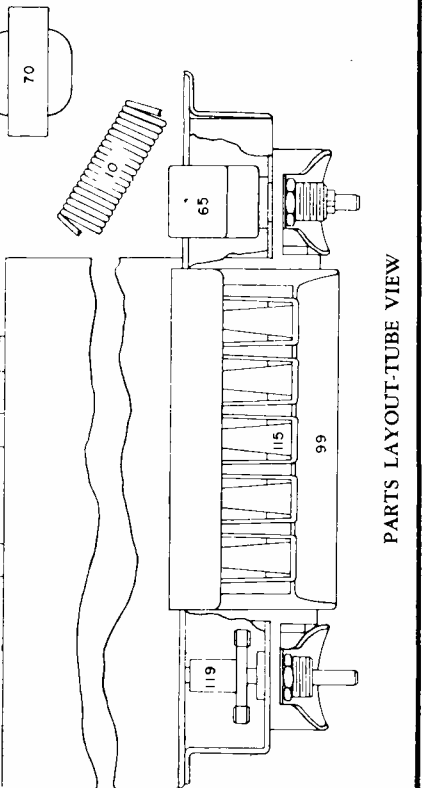
- *** - ADJUST TRANSISTOR BIAS. POTENTIOMETER ITEM 66 FOR COLLECTOR CURRENT OF 10500 MILLIAMPERES WITH INPUT VOLTAGE 12 VOLTS WHEN THE 2N278 TRANSISTOR IS REPLACED.
- † - 58 IS A FUSE RESISTOR FOR THE TUNER. IT SHALL BE 36 OHMS AT ROOM TEMPERATURE. SEE PAGE 2 AND 4 FOR INSTRUCTIONS.
- ◇ - OUTPUT TRANSFORMER MAY APPEAR TO BE SHORTED IF SHORTING-TYPE SPEAKER SOCKET IS NOT HELD OPEN. NORMAL RESISTANCE IS 1-2 OHMS.

- VOLTAGES MEASURED TERMINAL TO CHASSIS WITH A VTVM - NO SIGNAL AND 120 VOLTS AT 115. 32
- OSCILLATOR GRID VOLTAGE TAKEN WITH SET TUNED TO 1000 KC
- TOTAL A DRAIN AT 12V - 22 AMPS. TOLERANCE ON VOLTAGES ± 10%.
- - COLORS OF TERMINAL ON SERVICE PARTS SOCKET LEAD FROM TUNER COIL ASSY
- * - INDICATES LEAD FROM TUNER COIL ASSY

CONNECT VACUUM TUBE VOLTMETER ACROSS SPEAKER VOICE COIL DURING ALIGNMENT.
NUMBERS ON PRINTED CIRCUIT BOARD CORRESPOND WITH NUMBERS IN CIRCLES ON SCHEMATIC DIAGRAM.



PARTS LAYOUT - CHASSIS VIEW



PARTS LAYOUT - TUBE VIEW

DELCO

PONTIAC RADIO MODEL 988837

OLDSMOBILE Model 989131 is similar.

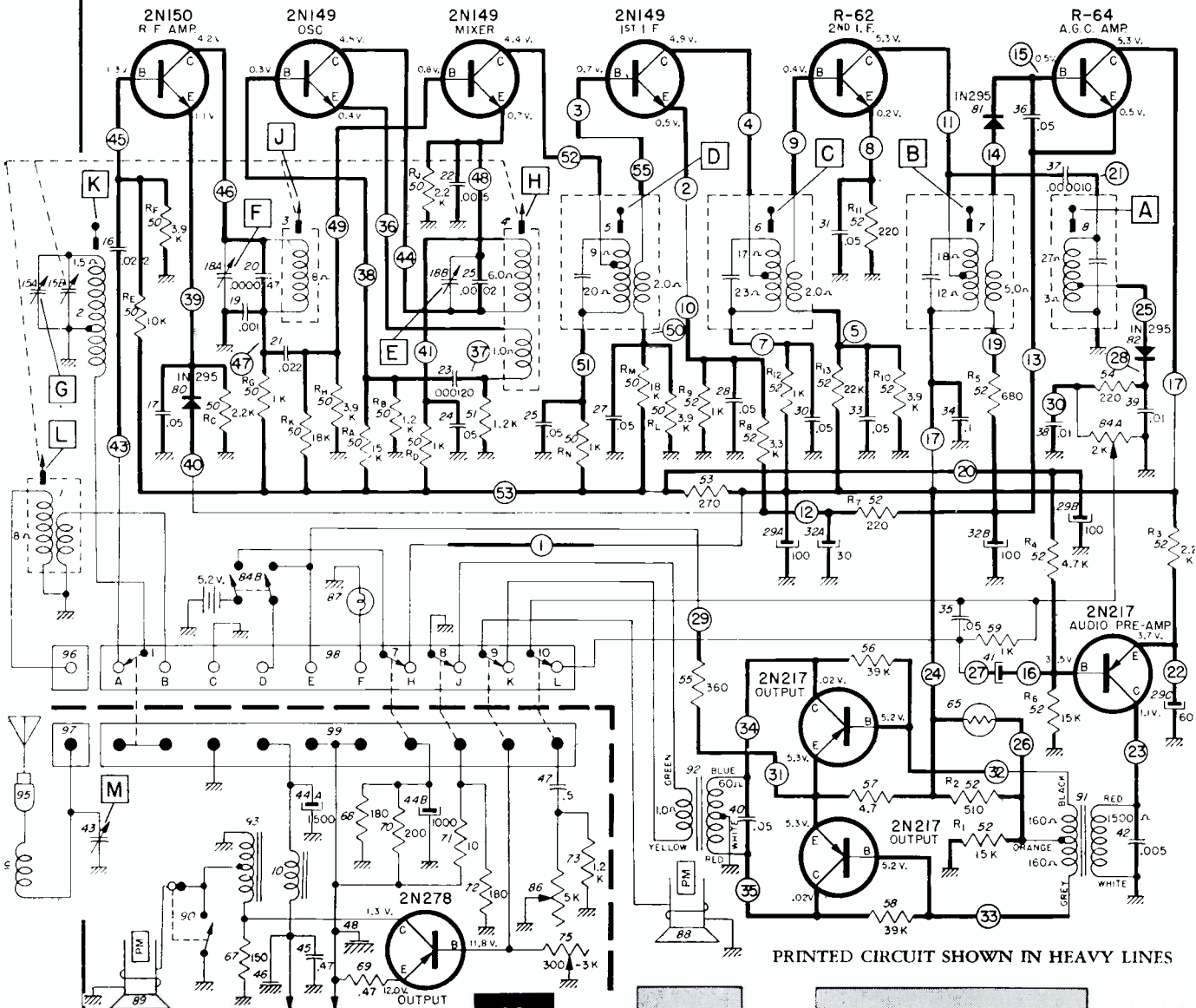
(Continued on page 47, at right)

SCHEMATIC DATA

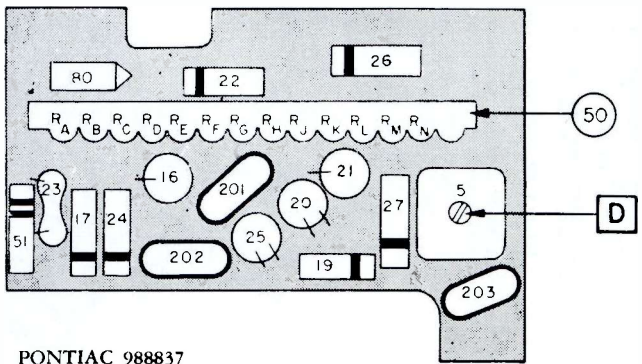
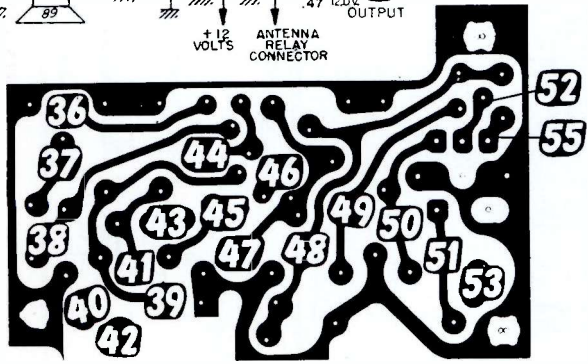
Voltages measured terminal to chassis with a VTVM—no signal. The portable unit voltages are taken with a battery voltage of 5.3 volts. Rack unit voltages taken with 12 volts at Illus. 46. Oscillator Base voltage taken with set tuned to 1000 Kc.

Total "A" Drain in Car 1.3 amps.
 Total "A" Drain of Portable 7.6 ma.

Resistances are $\pm 20\%$. Ohmmeter reading in transistor circuits are affected by meter battery polarity. Check in both directions and use highest reading.



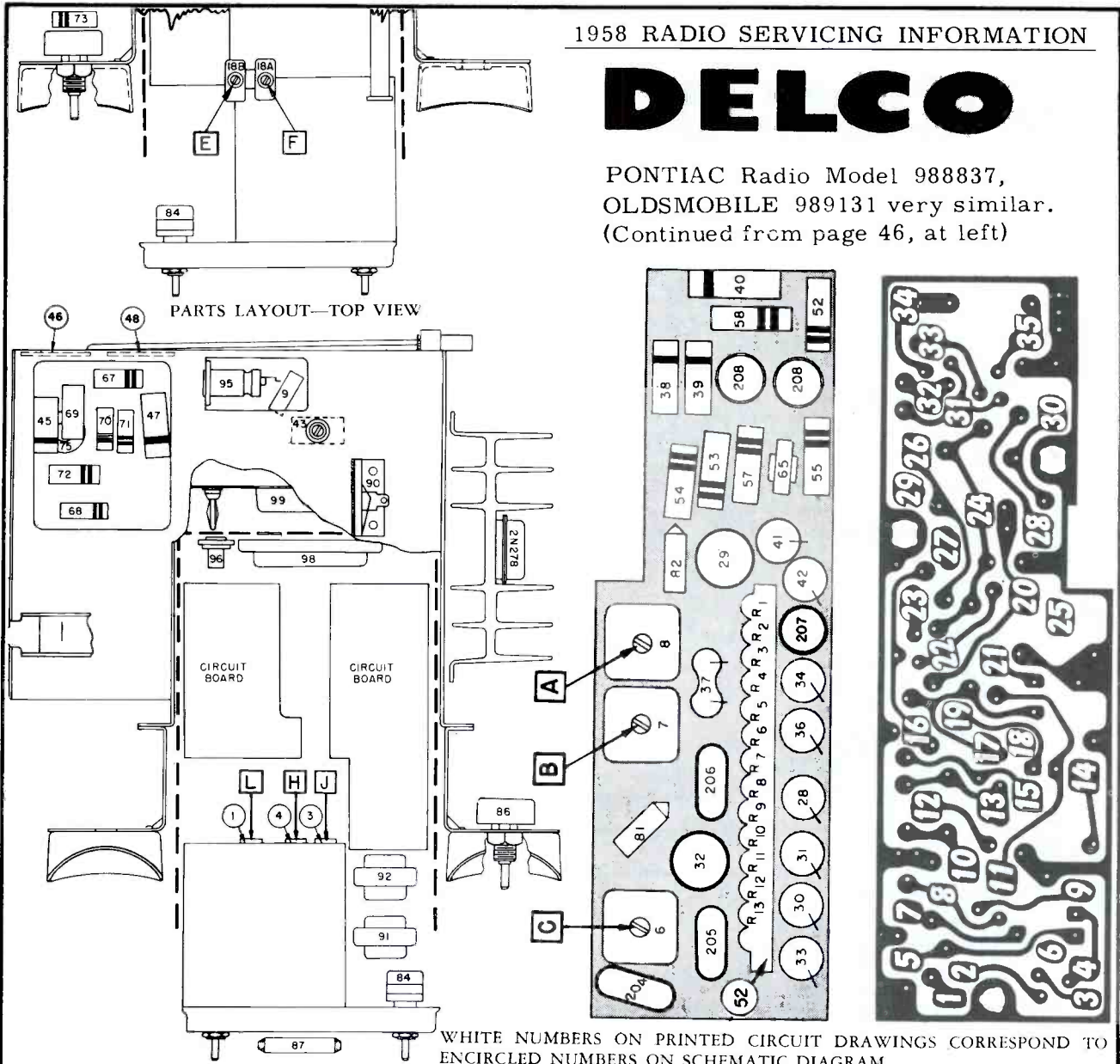
PRINTED CIRCUIT SHOWN IN HEAVY LINES



PONTIAC 988837

DELCO

PONTIAC Radio Model 988837,
OLDSMOBILE 989131 very similar.
(Continued from page 46, at left)



WHITE NUMBERS ON PRINTED CIRCUIT DRAWINGS CORRESPOND TO ENCIRCLED NUMBERS ON SCHEMATIC DIAGRAM.

PARTS LAYOUT—BOTTOM VIEW

ALIGNMENT PROCEDURE:

STEP	DUMMY ANTENNA (METHOD OF CONNECTING GENERATOR)	CONNECT GENERATOR TO	SIGNAL FREQUENCY	TUNE RECEIVER TO	ADJUST IN SEQUENCE FOR MAX. OUTPUT
1	0.1 Mfd. Cap.	Mixer 2N149 Base (Island #49)	262 KC.	High Frequency Stop	A, B, C, D*
2	Pick Up Loop	By Induction to Antenna	1615 KC.	High Frequency Stop	E, F, G**
3	Pick Up Loop	By Induction to Antenna	1000 KC.	Signal Generator Frequency	J
4	Pick Up Loop	By Induction to Antenna	1615 KC.	High Frequency Stop	F
5	Pick Up Loop	By Induction to Antenna	600 KC.	Signal Generator Frequency	K***
6	Pick Up Loop	By Induction to Antenna	1400 KC.	Signal Generator Frequency	G††
7	Pick Up Loop	By Induction to Antenna	1100 KC.	Signal Generator Frequency	P‡
8	.000068 Mfd.	Antenna Connector	1000 KC.	Signal Generator Frequency	L†††
9	With portable unit plug into the car unit, adjust the antenna trimmer M in the rack for maximum volume with the radio tuned to a weak station between 600 and 1000 KC.				

*I, F, cores originally in radio are cemented in position and cannot be aligned. Replacement parts should be aligned with a non-metallic tool.

**Before making these adjustments, check mechanical setting of three tuner cores H, J, and L. The rear of the cores should be 1-11/32" from the back of the coil form.

***Adjustment is made by changing antenna coil position on core.

†Adjust pointer to read 11 on dial.

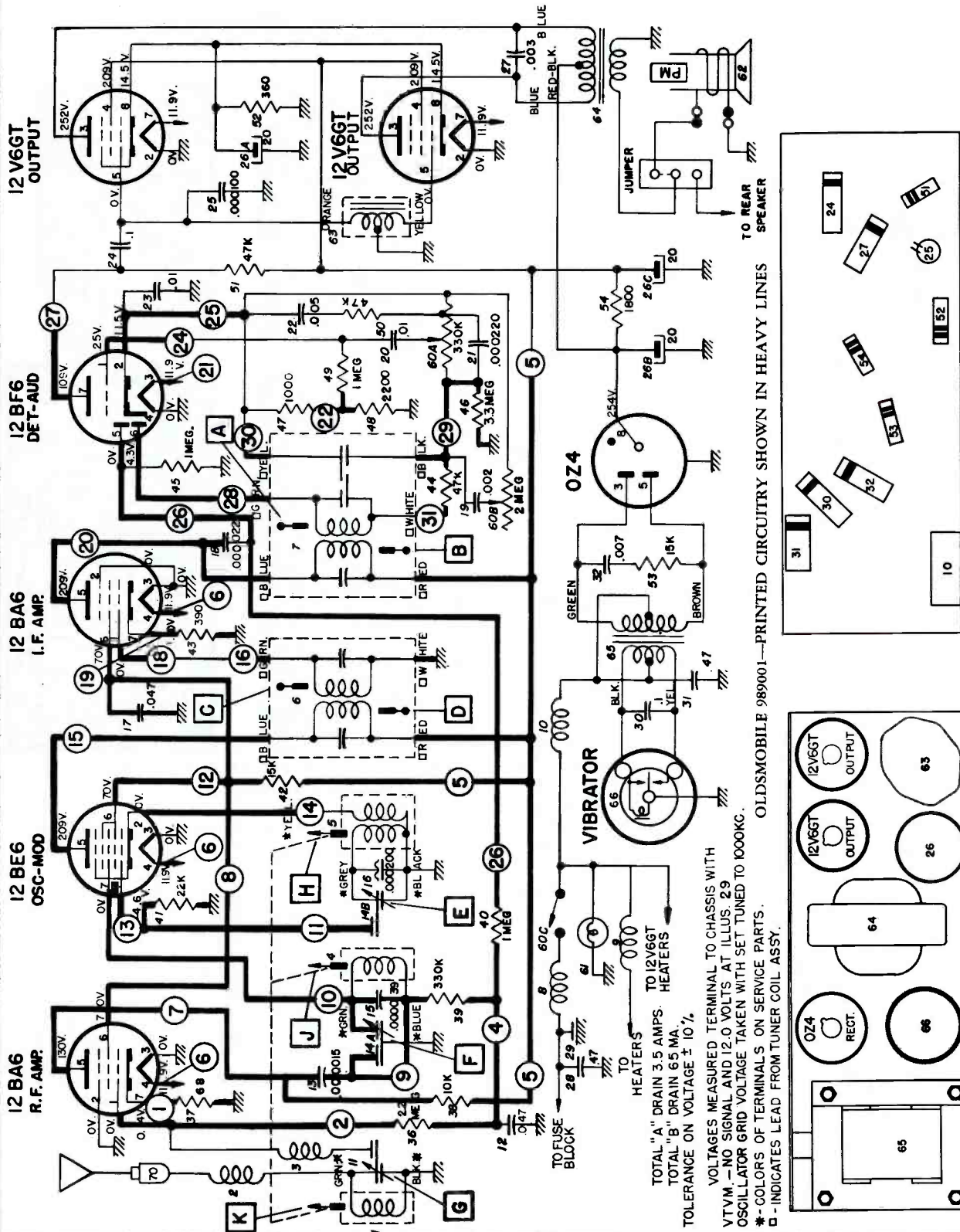
††Trimmer on gang capacitor.

†††This step is needed only when antenna coil or core is replaced. The portable unit must be in the rack and the cover on portable and cover on rack must be removed to make this adjustment.

DELCO

OLDSMOBILE DELUXE MODEL 989001

(Continued on page 49 adjacent at right)



OLDSMOBILE 989001—PRINTED CIRCUITRY SHOWN IN HEAVY LINES

PARTS LAYOUT—CHASSIS VIEW (POWER SUPPLY)

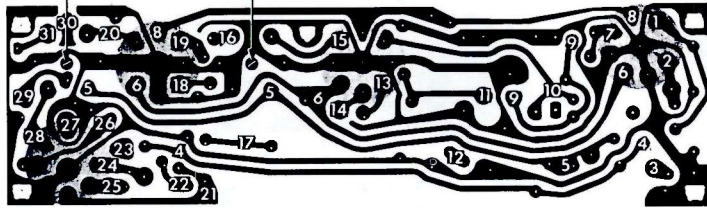
PARTS LAYOUT—TUBE VIEW (POWER SUPPLY)

TO FUSE BLOCK
 TO HEATERS
 TOTAL "A" DRAIN 3.5 AMPS.
 TOTAL "B" DRAIN 65 MA.
 TOLERANCE ON VOLTAGE $\pm 10\%$.

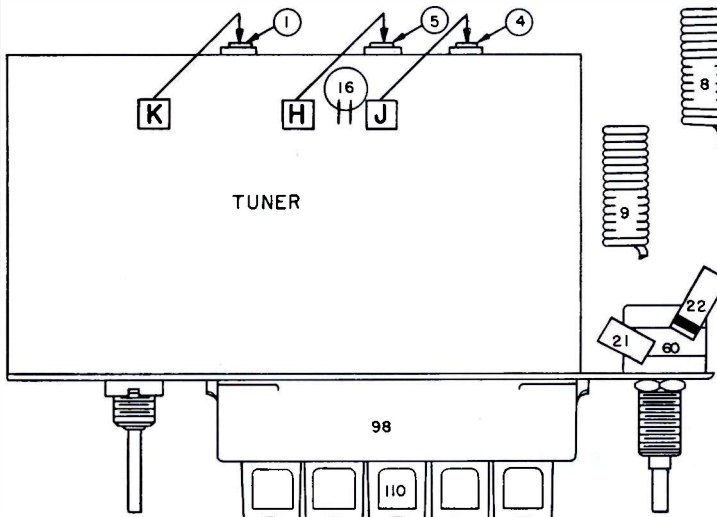
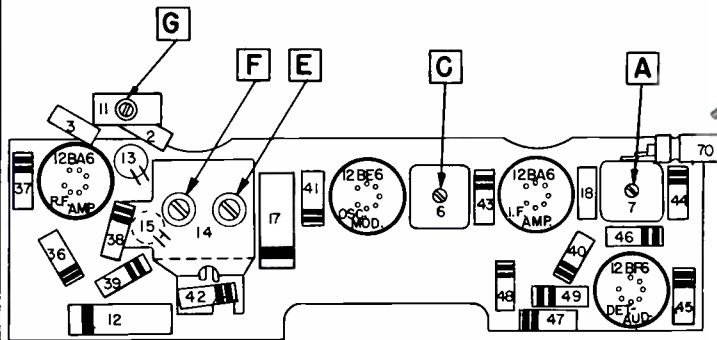
VOLTAGES MEASURED TERMINAL TO CHASSIS WITH VTVM. NO SIGNAL AND 12.0 VOLTS AT ILLUS. 29
 OSCILLATOR GRID VOLTAGE TAKEN WITH SET TUNED TO 1000K.
 *- COLORS OF TERMINALS ON SERVICE PARTS.
 □ - INDICATES LEAD FROM TUNER COIL ASSY.

DELCO

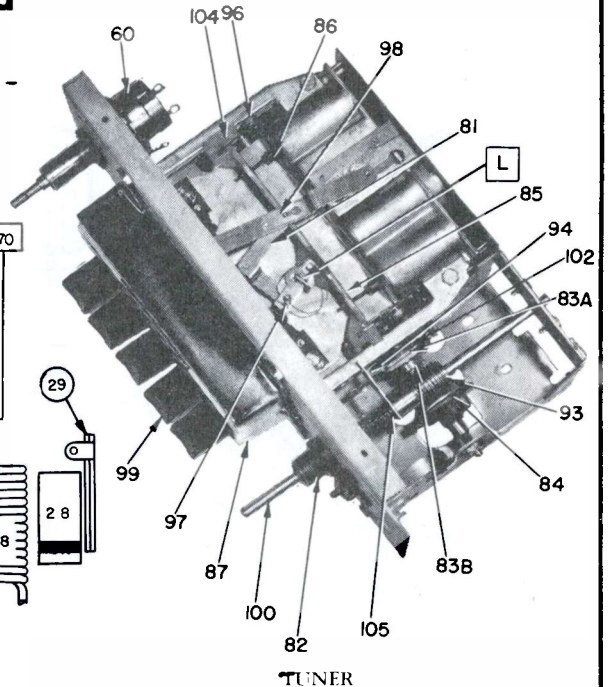
OLDSMOBILE Model 989001
(Continued from page 48)



WHITE NUMBERS ON PRINTED CIRCUIT BOARD DRAWING CORRESPOND TO NUMBERS ENCIRCLED ON SCHEMATIC.



PARTS LAYOUT—TUBE VIEW



PUSH BUTTON SETUP PROCEDURE

Pull Push Button to the left and out. Tune in desired station manually. Push button all the way in.

ALIGNMENT PROCEDURE

- Output Meter Connections.....Across Voice Coil
- Generator Return.....To Receiver Chassis
- Dummy Antenna.....In Series With Generator
- Volume Control Position.....Maximum Volume
- Tone Control Position.....Treble Position
- Generator Output.....Minimum for Readable Indication

Steps	Series Capacitor or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12BE6 Grid (Pin #7)	262 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	L**

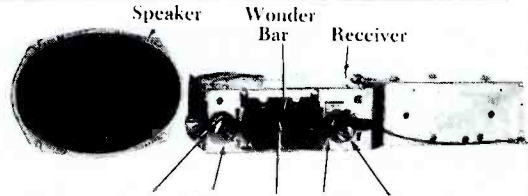
*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screw driver.

**L is the pointer adjustment screw which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.). It should be adjusted so that when looking directly at the dial the pointer is on the 1100-KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car. With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)

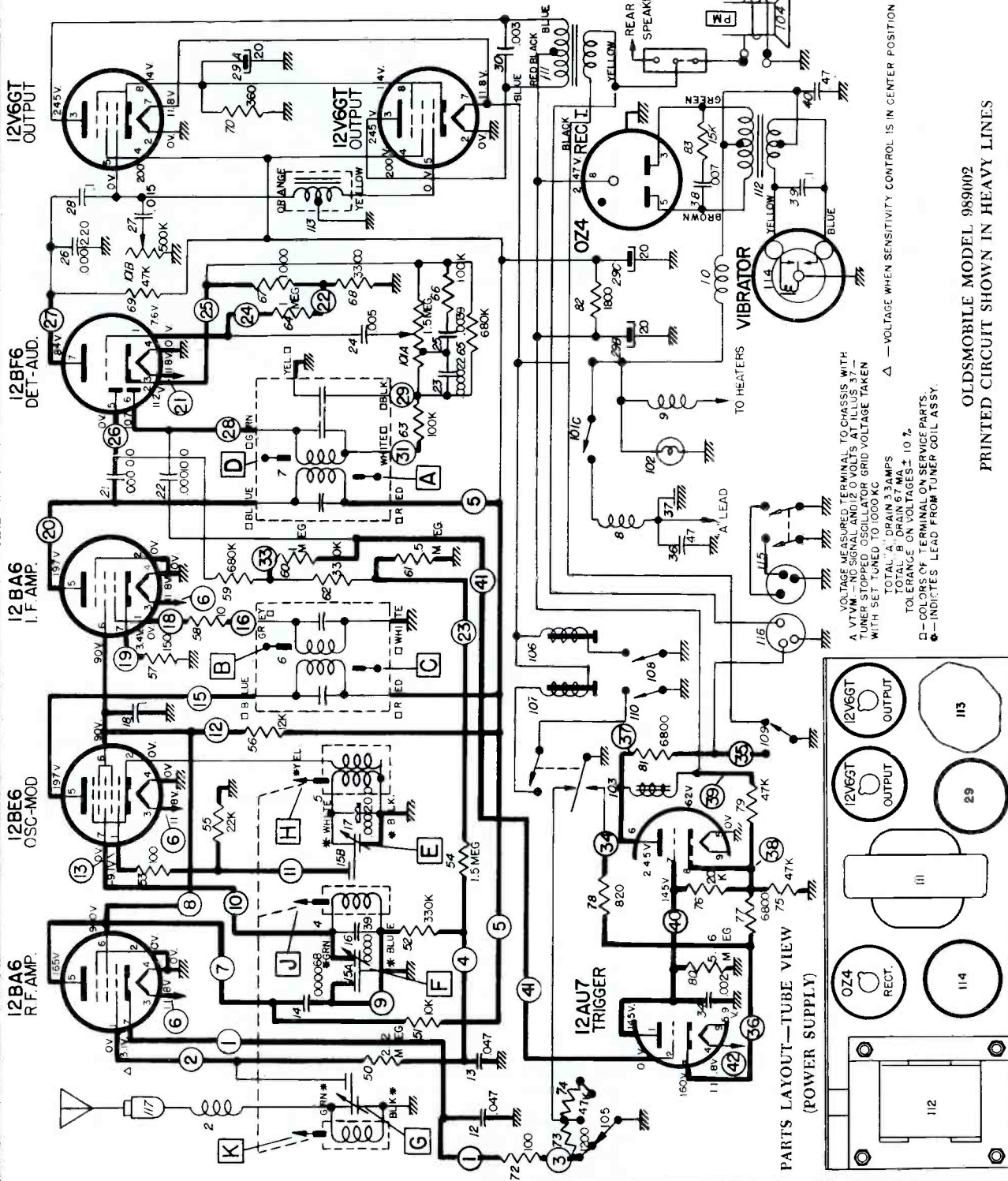
DELCO

OLDSMOBILE SUPER DELUXE MODEL 989002

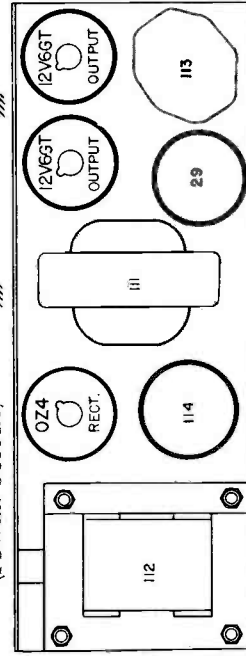
(Alignment and other service material on page 51, adjacent at right.)



Tone Off-On Sens. Speaker Manual Control Volume Cont. Control



VOLTAGE MEASURED TERMINAL TO CHASSIS WITH A V.T. SIGNAL AND FOR VOLTS AT ILLUS. 3. TUNER STOPPED AT 1000 KC GRID VOLTAGE TAKEN WITH SET TUNED TO 1000 KC
 TOTAL 'A' DRAIN 3.3 AMPS
 TOTAL 'B' DRAIN 67 MA
 TOLERANCE ON VOLTAGES ± 10 %
 □—COLORS OF TERMINAL ON SERVICE PARTS.
 ●—INDICATES LEAD FROM TUNER COIL ASSY.

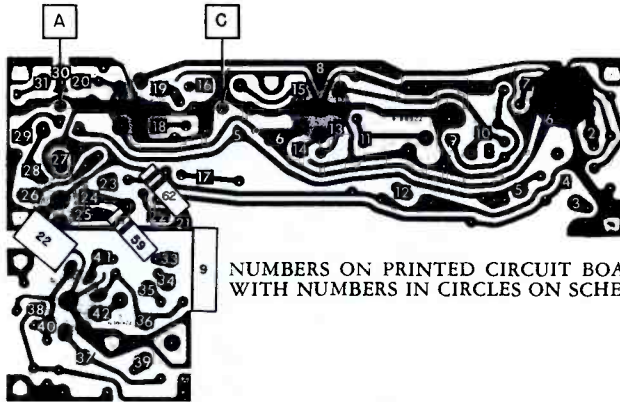


OLDSMOBILE MODEL 989002
 PRINTED CIRCUIT SHOWN IN HEAVY LINES

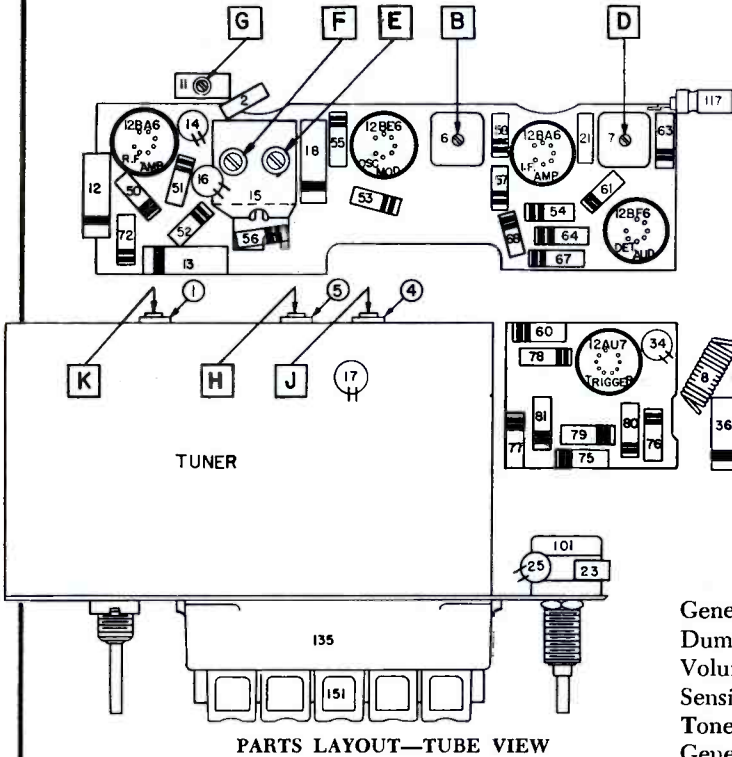
DELCO

OLDSMOBILE MODEL 989002

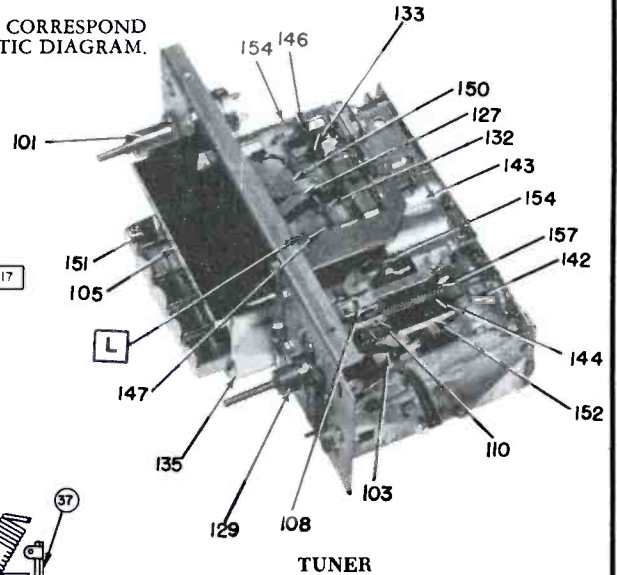
(Continued from page 50)



NUMBERS ON PRINTED CIRCUIT BOARD CORRESPOND WITH NUMBERS IN CIRCLES ON SCHEMATIC DIAGRAM.



PARTS LAYOUT—TUBE VIEW



TUNER

PUSHBUTTON SET-UP

1. Pull button to the left and out.
2. Tune in desired station manually.
3. Push button all the way in.

ALIGNMENT PROCEDURE:

Generator Return Receiver Chassis
 Dummy Antenna In Series With Generator
 Volume Control Maximum Volume
 Sensitivity Control...Position 1. (Position 1 is Maximum)
 Tone ControlTreble (max. clockwise)
 Generator OutputNot to Exceed 2 Volts at VTVM

Connect vacuum tube voltmeter between AVC line (island #4 on printed circuit board) and ground during alignment.

Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence
1	0.1 mfd.	12BE6 Grid (Pin 7)	262 KC	*High Frequency Stop	A, B, C (Max.)
2	0.1 mfd.	12BE6 Grid (Pin 7)	262 KC	High Frequency Stop	D (Min.)
3	0.000068 mfd.	Antenna Connector	1615 KC	High Frequency Stop	**E, F, G (Max.)
4	0.000068 mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K (Max.)
5	0.000068 mfd.	Antenna Connector	1615 KC	Signal Generator Signal	F, G (Max.)
6	0.000068 mfd.	Antenna Connector	1100 KC	Signal Generator Signal	***L

*To tune to high frequency, put a 0.012" feeler gauge (or bare #28 wire) in slot against the high frequency stop. (See tuner pictures). Turn manual control to allow the treadle bar arm to run against the feeler gauge.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1 $\frac{5}{8}$ " from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the mounting end of the coil form with a non-metallic screw driver. If this adjustment is necessary, first dissolve the glyptal seal on the core stud and be sure to re-seal after making the adjustment.

***"L" is the pointer adjustment screw on the end of the core guide bar — adjust so pointer reads 1100 KC. With the radio installed and the antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case).

DELCO

OLDSMOBILE MODEL 989127

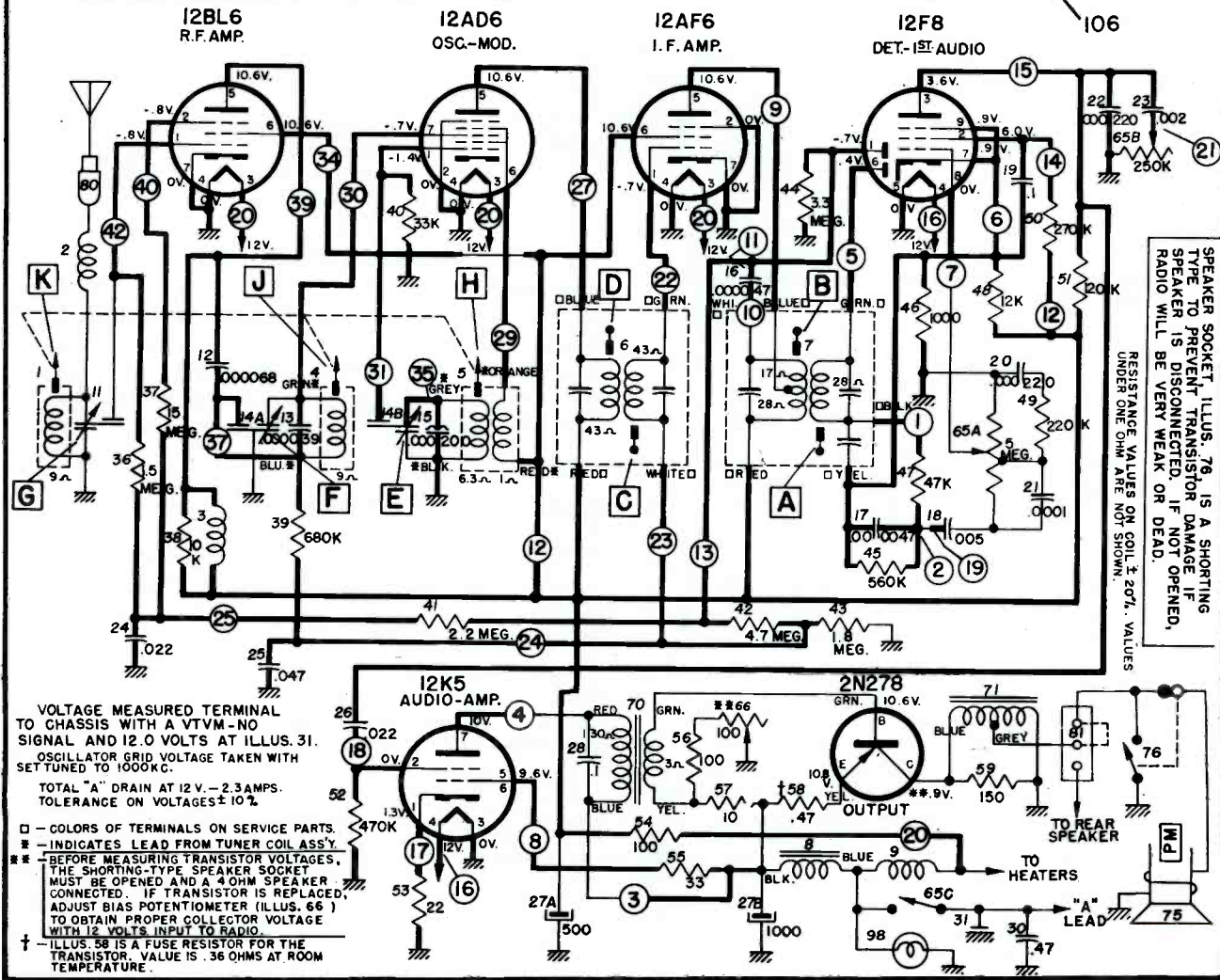
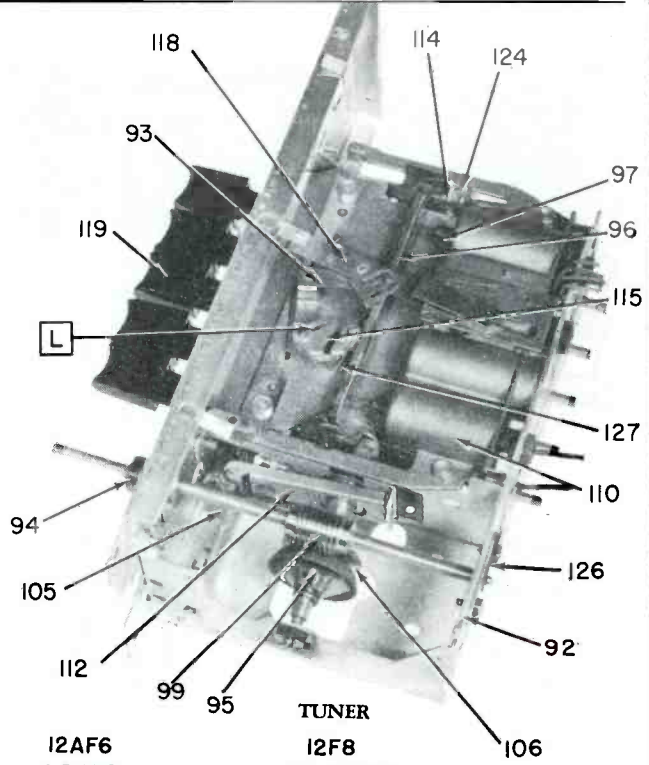
(Continued on page 53)

TROUBLE SHOOTING THE OUTPUT STAGE

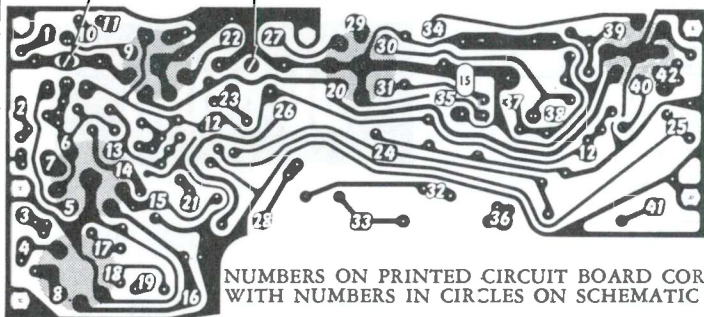
A quick way to determine that the 2N278 is conducting can be made by checking the collector voltage, from transistor case to the radio case. If no voltage is present, the transistor is not conducting or the transistor heat radiator is grounded to the radio case. If the voltage at the collector is higher than listed, the transistor is conducting too heavily (check with milliammeter) or the output transformer is open. The amount of current the transistor conducts is determined by the voltages at each element, the resistor in the base and emitter circuits, the input transformer secondary resistance, and the transistor itself. The most common defect in the transistor is an internal short between emitter and collector. To check for this, use the following procedure.

1. Unsolder base and emitter leads from the circuit.
2. Set ohmmeter on the "R x 1" scale (no other scale should be used.)
3. Place negative lead of ohmmeter (polarity refers to internal ohmmeter battery) on collector, and positive lead on the emitter.
4. The transistor is shorted if reading is "0".

PRINTED CIRCUIT SHOWN IN HEAVY LINES.

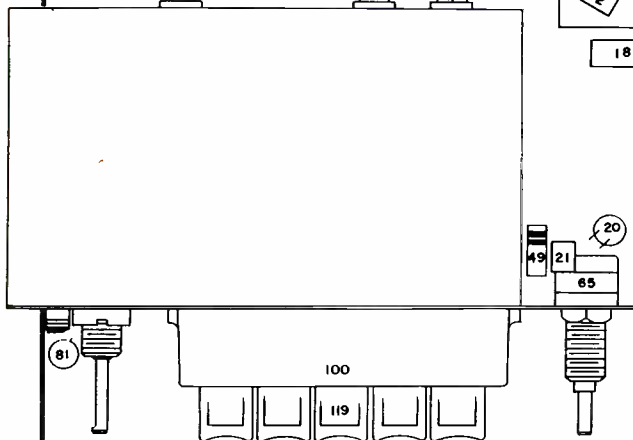
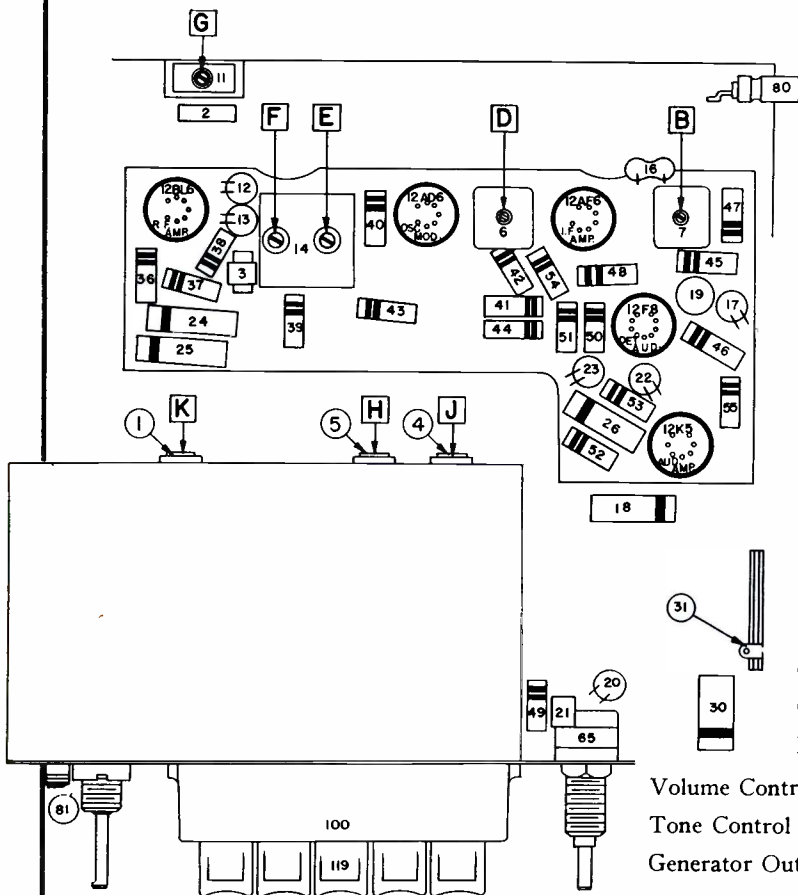


C MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

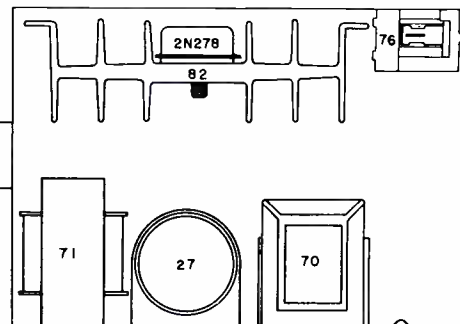


NUMBERS ON PRINTED CIRCUIT BOARD CORRESPOND WITH NUMBERS IN CIRCLES ON SCHEMATIC DIAGRAM.

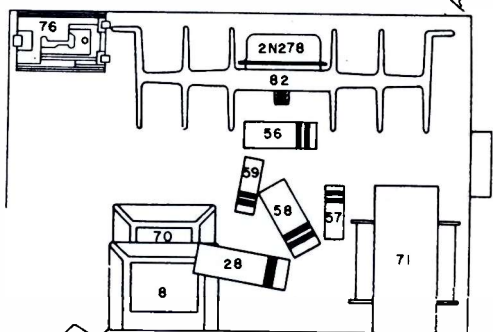
DELCO
OLDSMOBILE Model 989127
 (Continued from page 52)



PARTS LAYOUT—TUBE VIEW



PART LAYOUT—BOTTOM VIEW



PARTS LAYOUT—TOP VIEW
AUDIO POWER SUPPLY UNIT

ALIGNMENT PROCEDURE

- Output Meter Connections.....Across Voice Coil
- Generator Return.....To Receiver Chassis
- Dummy Antenna.....In Series With Generator
- Volume Control Position.....Maximum Volume
- Tone Control Position.....Treble Position
- Generator Output.....Minimum for Readable Indication

CONNECT VACUUM TUBE VOLTMETER ACROSS SPEAKER VOICE COIL DURING ALIGNMENT.

Steps	Series Capacitor or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12AD6 Grid (Pin #7)	262 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	Antenna Connector	600 KC	Signal Generator Signal	J, K
4	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	F, G
5	0.000068 Mfd.	Antenna Connector	1100 KC	Signal Generator Signal	L**

*Before making this adjustment check mechanical setting of oscillator core "H." The rear of the core should be 1 5/8" from the mounting end of the coil form. (This measurement is readily made by inserting a suitable plug in the mounting end of the coil form.) Core adjustment should be made with a non-metallic screw driver.

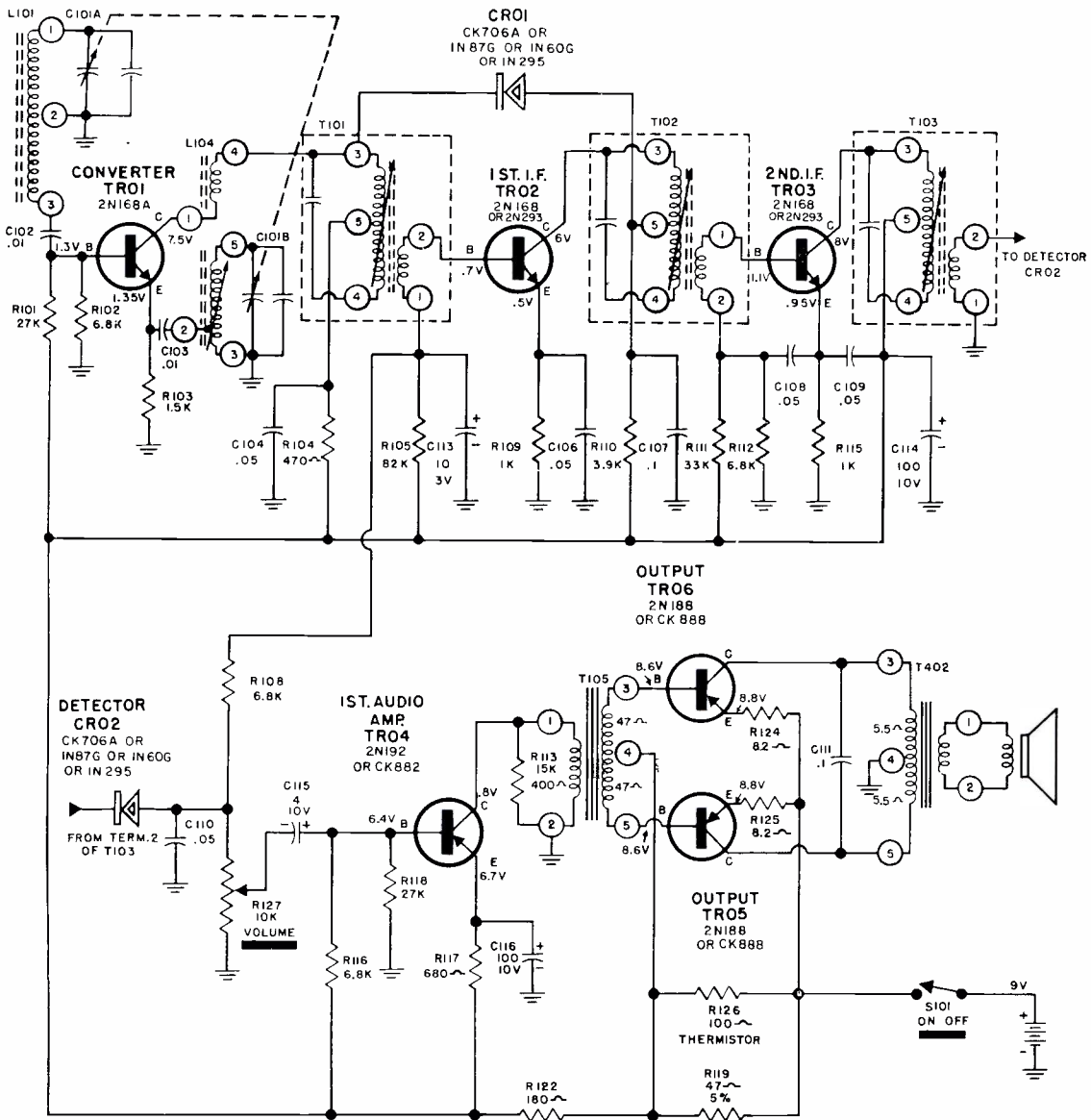
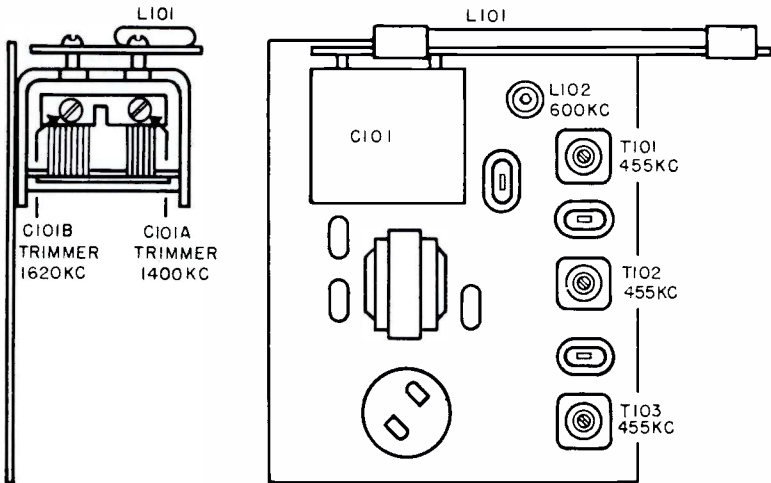
**L is the pointer adjustment which is on the connecting link, between the pointer assembly and core guide bar (See tuner Dwg.). It should be adjusted so that when looking directly at the dial the pointer is on the 1100 KC mark. This setting is to give the correct relationship between the pointer and the dial when the radio is installed in a car.

With the radio installed and the car antenna plugged in adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)



Model 1210 (RA-902)

(Continued on page 55, adjacent at right.)




DU MONT

MODEL 1210 (RA-902)

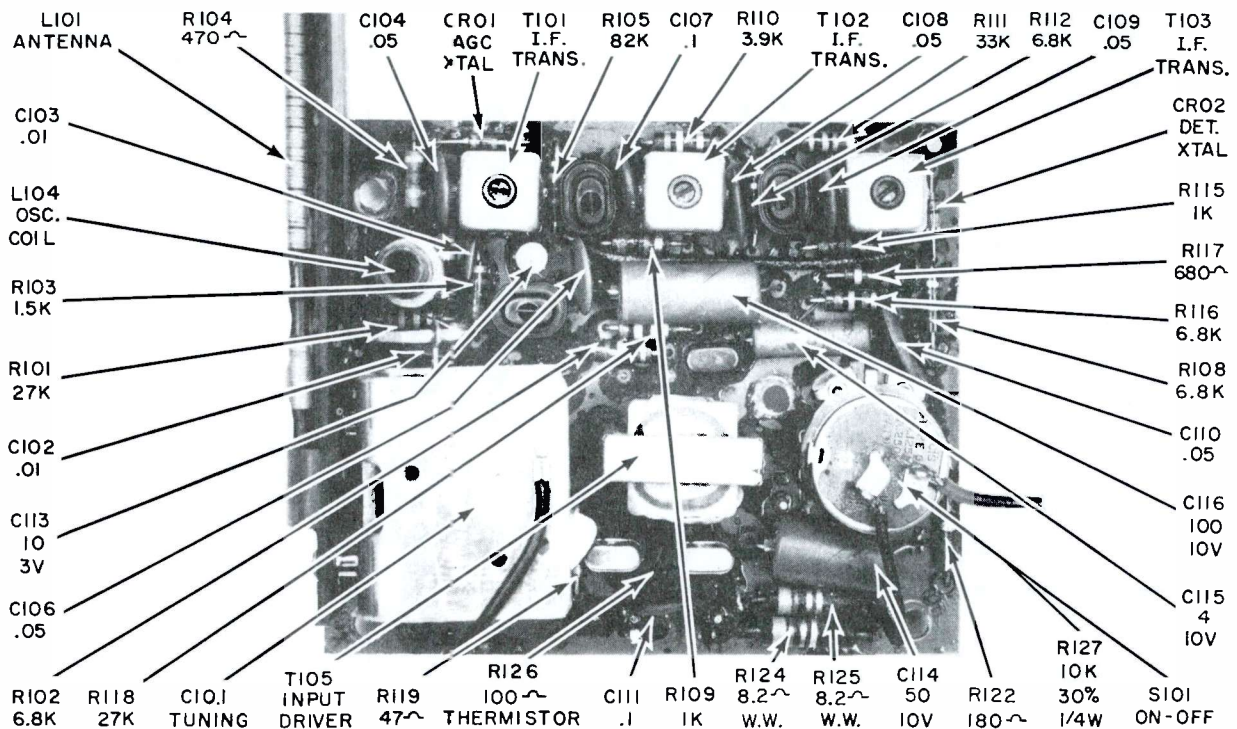
(Continued from page 54, adjacent at left)

ALIGNMENT INSTRUCTIONS

Turn volume control fully clockwise. Adjust the generator for the lowest signal necessary to obtain an output reading (no more than .5 volts across speaker voice coil). Make all adjustments with an insulated alignment tool. Caution: Do not remove or insert transistors while power is on.

Step	Signal Generator		Tuning Capacitor Setting	Output Meter Connection	Adjust
	Frequency	Connect to			
1	455 KC 400 cps AM Mod.	Loop, of several turns of wire placed near AM antenna	Maximum Capacity		I. F. Transformers T103, T102 and T101 in this order for maximum output indication. Repeat once.
2	1620 KC 400 cps AM Mod.	As Above	Minimum Capacity		Oscillator trimmer capacitor of C101B until signal is heard, but don't attempt to tune for peak output. Note: If signal cannot be heard adjust antenna trimmer capacitor of C101A.
3	As Above	As Above, except move loop several feet away for very weak signal.	As Above		Antenna trimmer capacitor of C101A for maximum signal output. Retouch oscillator trimmer for maximum output.
4	600 KC 400 cps AM Mod.	As Above	Set tuning dial for strongest 600 KC signal		Oscillator coil, L102, rocking tuning capacitor back and forth until signal reaches maximum.
5	1400 KC 400 cps AM Mod.	As Above	Set tuning dial for strongest 1400 KC signal		Antenna trimmer capacitor of C101A, and at the same time rocking tuning capacitor back and forth until signal reaches maximum. Note: Repeat steps 4 and 5 if necessary.

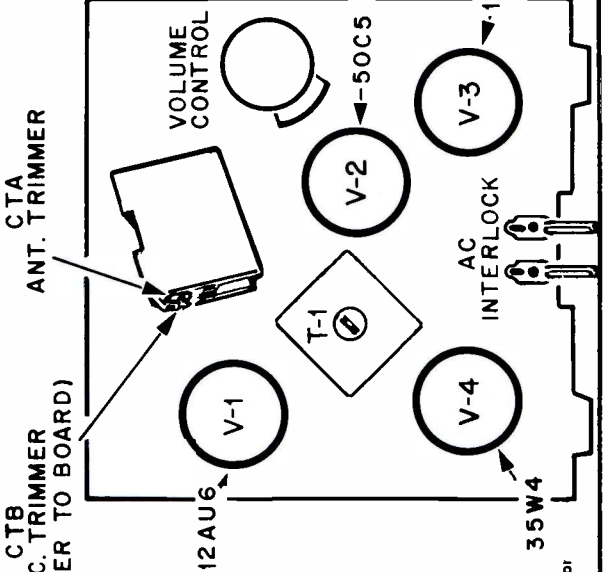
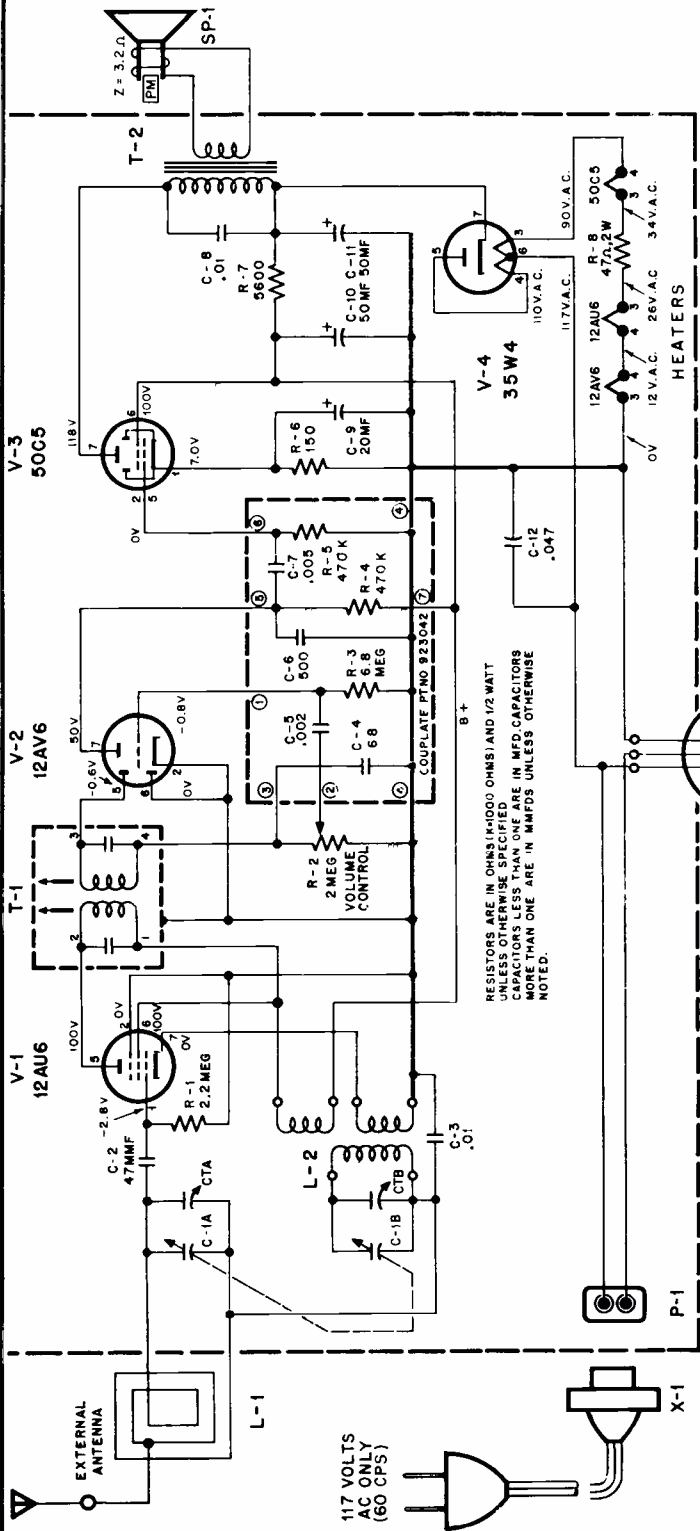
NOTE: When the chassis and/or battery compartment are reinstalled in the case, tune the radio to a weak AM station above 1400 KC, and retouch the antenna trimmer capacitor, C101A, for peak performance.



Component location view of the Model 1210 "Transistor" portable radio.

EMERSON RADIO

CHASSIS 120355B, MODEL 871B



ALIGNMENT INSTRUCTIONS

STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.005 mfd.	High side to grid (pin 1) Low side to B - neutral.	455 KC	**Variable condenser fully open.	Across voice coil.	T1 Top and bottom.	Adjust for maximum output.
2		Form loop of several turns and radiate signal into receiver	1620 KC	Variable condenser fully open.	Across voice coil.	Trimmer (Osc.) CTB	Adjust for maximum output.
3		Form loop of several turns and radiate signal	1400 KC	Tune for maximum output.	Across voice coil.	Trimmer (Ant.) CTA (Repeat steps 2 and 3 for optimum results.)	Adjust for maximum output.

** In the event spurious oscillation is present, adjust variable condenser (towards fully-biased position) until oscillation is eliminated and proceed with alignment of T-1.

Emerson Radio

MODELS 851B, 870B,
874B

CHASSIS 120363A

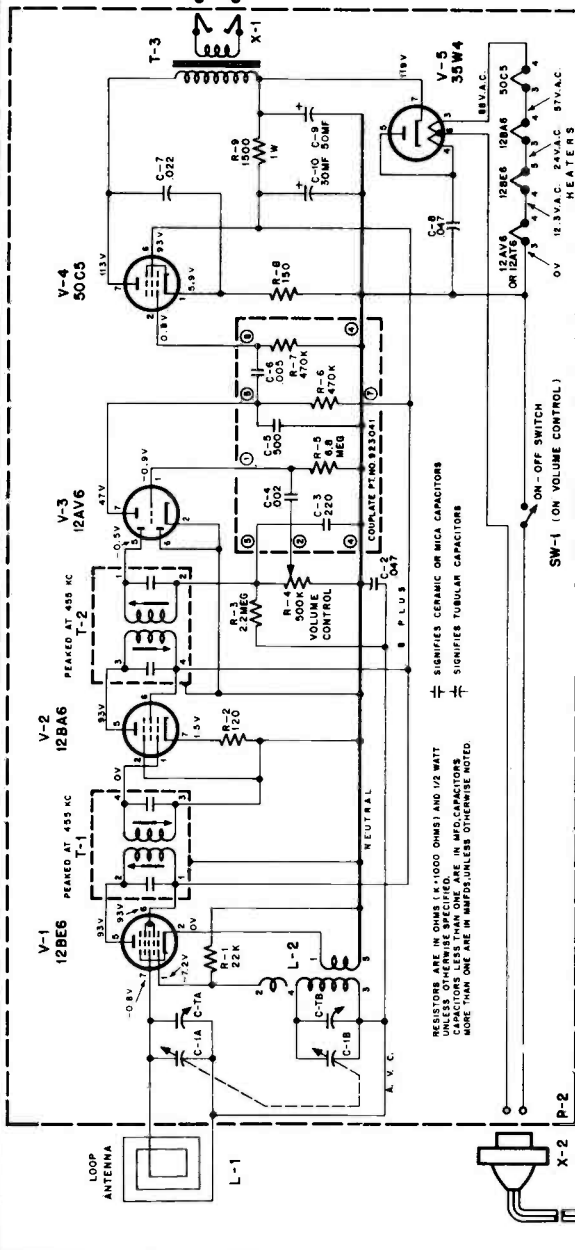
REPAIR OF COUPLATES

Whenever possible couplates should be repaired instead of replaced. This practice could readily become a time saving factor.

Example #1
Shorted .005 mfd condenser C-6.
Clip off pin 6 of couplate from printed board. This removes C-6 and R-7 from the circuit.

Insert a regular 470K ohm ½ watt resistor from B-neutral (Pin 4 of Couplate) to pin 2 of V-4 and a regular .005 mfd 400V condenser from pin 2 of V-4 to pin 5 of Couplate.

Example #2
Open R-7 470K ohm resistor. Insert regular 470K ohm ½ watt resistor across pins 4 and 6 of Couplate.

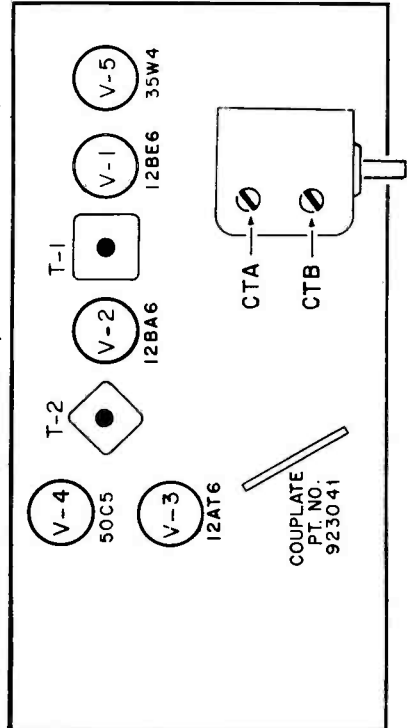


SYM.	PART NO.	DESCRIPTION
C-10	Pt. of C-9	150V 30 MF Electrolytic
R-1	340812	22,000 OHM - Carbon ± 10% 1/2W
R-2	340272	120 OHM - Carbon ± 10% 1/2W
R-3	351292	2.2 MEGOHM - Carbon ± 20% 1/2W
R-4	390448	500,000 OHM - Volume Control
R-8	340292	150 OHM - Carbon ± 10% 1/2W
R-9	380532	1,500 OHM - Carbon ± 20% 1 W
L-1	700118	Loop Antenna & Back Assembly
T-1	716108	Oscillator Coil
T-2	720294	1st I.F. Transformer
T-3	734138	Audio Output Transformer

SYM.	PART NO.	DESCRIPTION
C-1A	900153	Variable Capacitor, R. F. Section
C-1B	Pt. of C-1A	Trimmer, R. F. Section
C-2	Pt. of C-1A	Variable Capacitor, OSC. Section
C-3	923554	Trimmer, OSC. Section ± 20%
C-4	923554	.047 MF Paper 400 V
C-5	Pt. of Couplate	
C-6	923524	.022 MF Paper ± 20% 400V
C-7	923554	.047 MF Paper ± 20% 400V
C-8	923402 or 923372	50 MF Electrolytic 150V

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
V-1	12BE6	22K	1.0Ω	32Ω	22Ω	*1500Ω	*1500Ω	3 MEG
V-2	12BA6	15Ω	0	32Ω	42Ω	*1500Ω	*1500Ω	120Ω
V-3	12AT6 or 12AV6	6.8 MEG	0	0	22Ω	500K	0	*470K
V-4	50C5	150Ω	470K	42Ω	93Ω	500K	*1500	*140Ω
V-5	35W4	N.C.	N.C.	85Ω	120Ω	125Ω	115Ω	†1 MEG

† Wait for meter to settle (about 30 seconds).
* Resistances measured to Pin 7 of 35W4 (Bt).



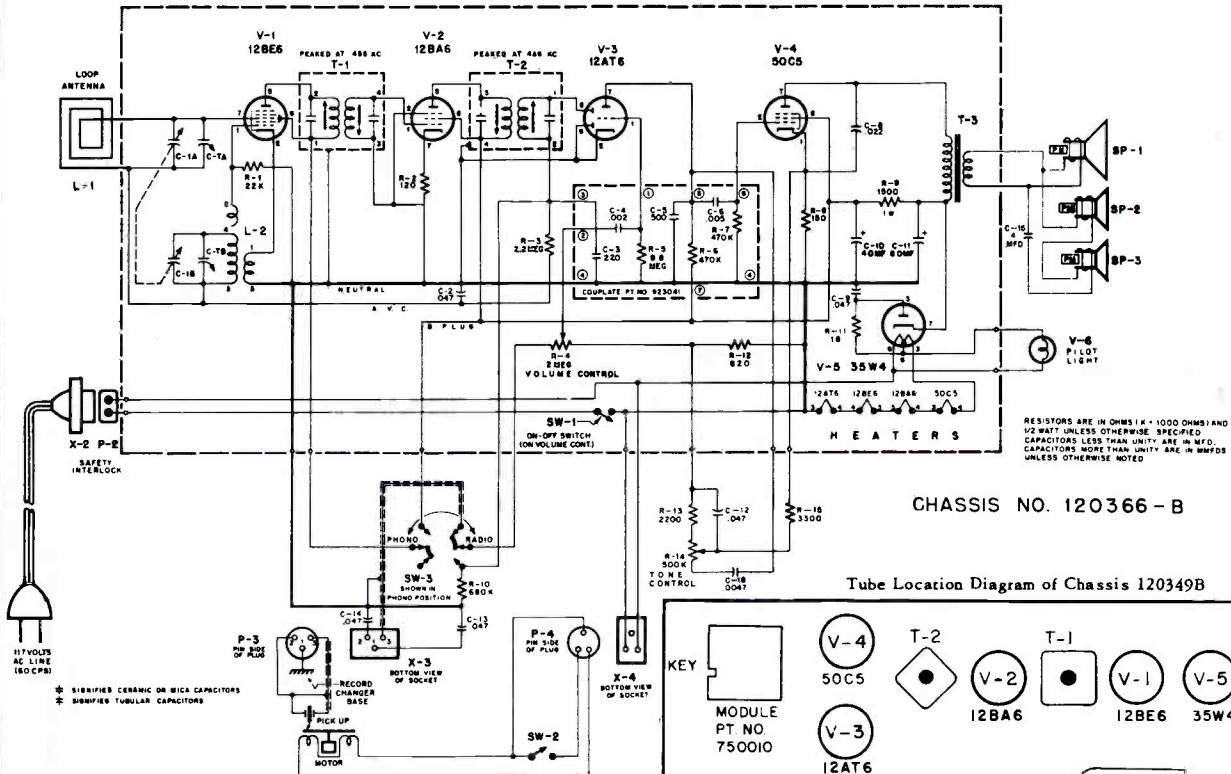
TUBE AND TRIMMER LOCATION

RESISTANCE READINGS

Emerson Radio

MODEL - 867B
CHASSIS - 120366B

This model is identical to the model 867B using chassis 120349B except for the substitution of a couplate (Emerson Pt. No. 923041) and individual components on chassis 120366B for the two modules used on chassis 120349B.



DISASSEMBLY INFORMATION

1. Remove all knobs and remove masonite back.
2. Remove 2 "C" and 2 standard washers securing changer hold down bolts to mounting board (which is part of cabinet), remove 2 three-prong plugs and remove changer (unstaple fish paper wire holders.)
3. To remove radio:
 - a) Remove AC interlock, slide off pilot light assembly.
 - b) Unsolder 2 speaker leads at SP-1 (Woofer), remove antenna assembly from bracket.
 - c) Remove Phillips head screws securing radio to cabinet (on top).
 - d) Remove 45 r.p.m. spindle holder.
4. To reassemble, reverse procedures #1 through #3.

ALIGNMENT INSTRUCTIONS

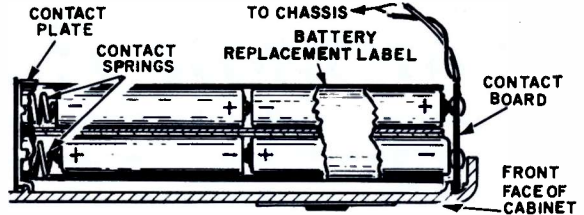
STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.005 mfd.	High side to grid (pin 7) of V1 (12BE6). Low side to B-neutral (See item 2 under alignment instructions).	455 KC	Variable condenser fully open.	Across voice coil.	T2, T1	Adjust for maximum output.
2		Form loop of several turns and radiate signal into receiver	1620 KC	"	Across voice coil.	Trimmer C-TB (Osc.)	Adjust for maximum output.
3			1400 KC	Tune for maximum output.	Across voice coil.	Trimmer C-TA (Ant.)	Adjust for maximum output.

Emerson

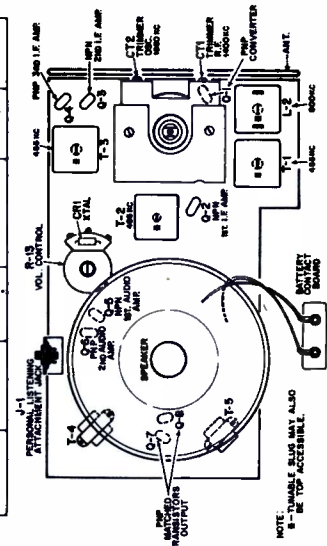
Chassis 120374, Model 888

ALIGNMENT INSTRUCTIONS

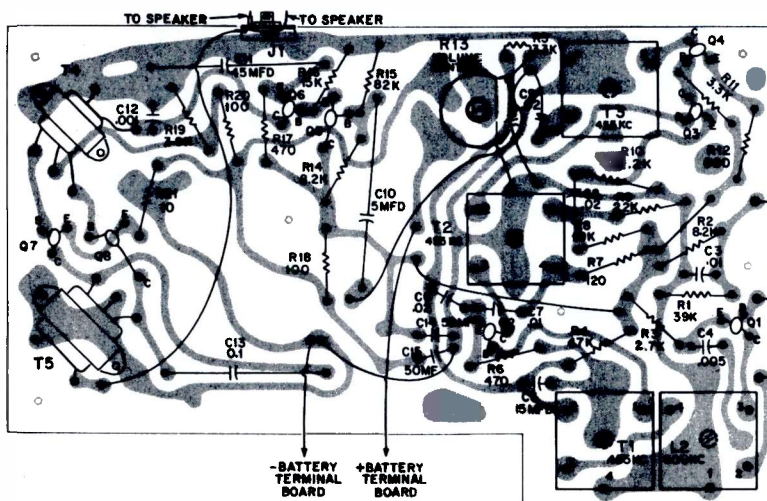
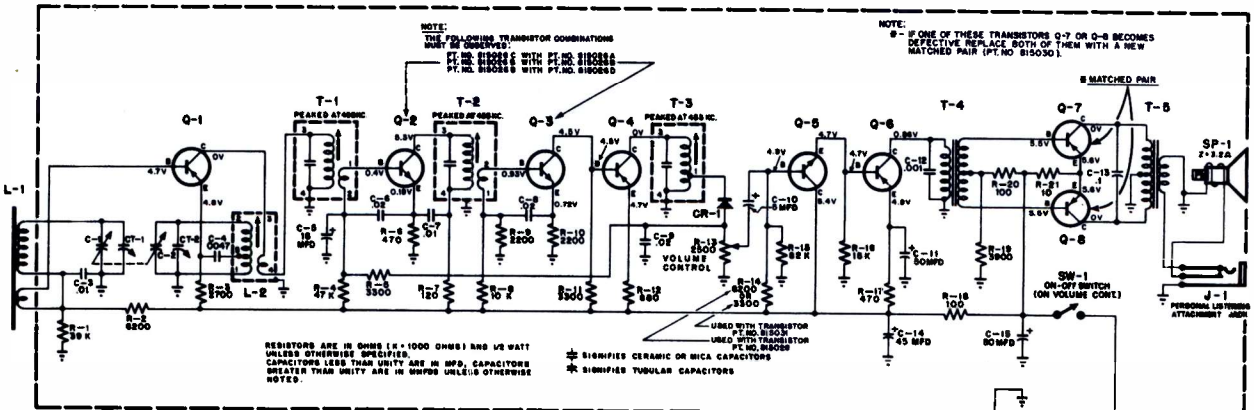
Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.



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



NOTE: For optimum results, repeat entire alignment procedure.

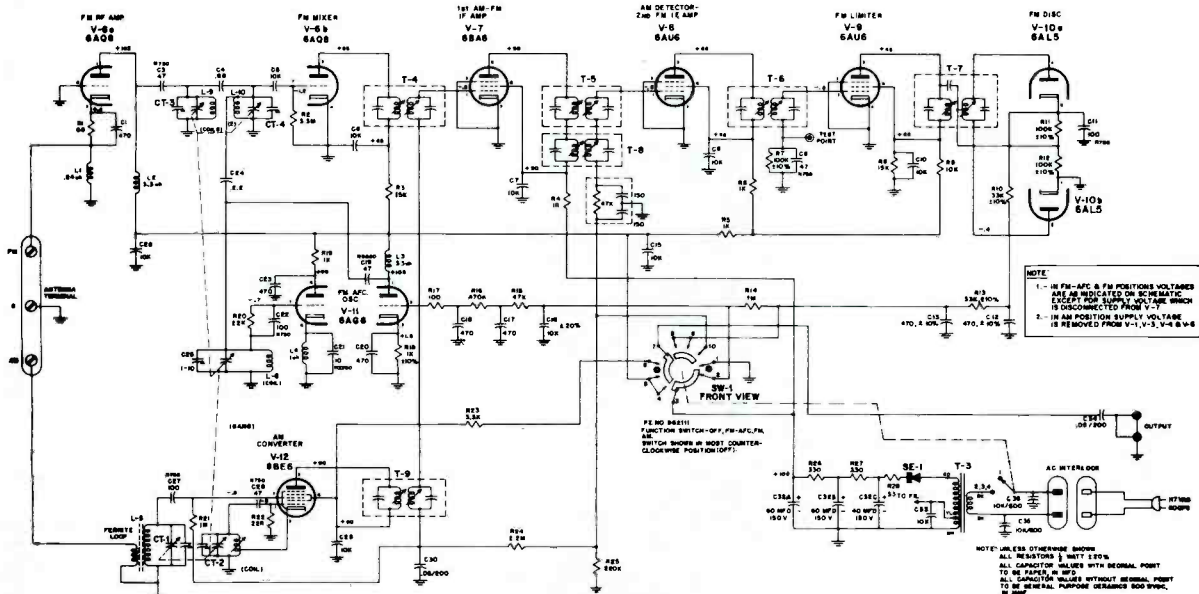
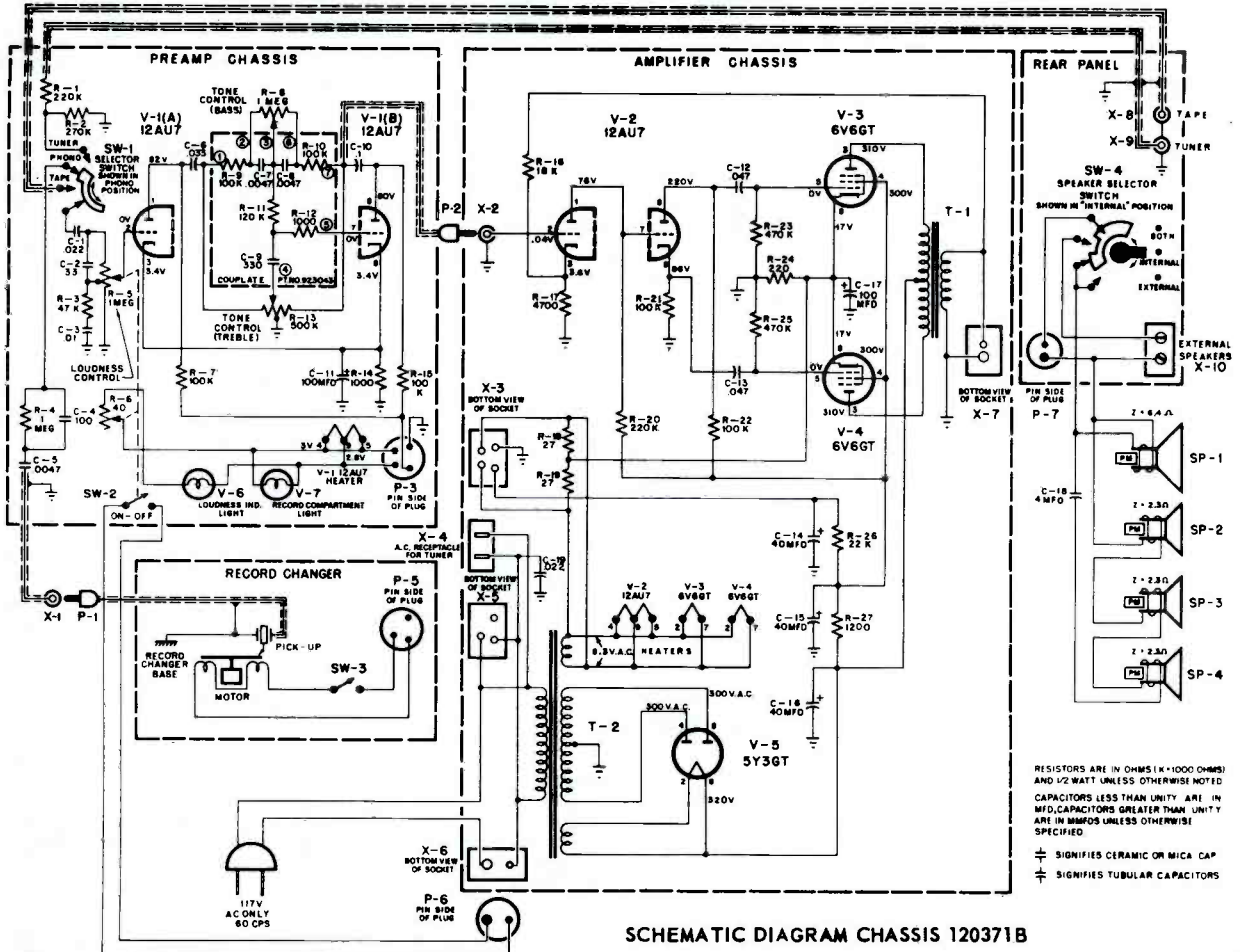


- ### CONDITIONS FOR VOLTAGE READINGS
1. Voltages indicated are positive D.C.
 2. Measurements taken with V.T.V.M.
 3. All Measurements taken between points and chassis.
 4. Voltage measurements taken with:
 - (a) Fresh 6 Volt battery supply. Four 1½ Vpvt conventional penlight cells.
Note: Should Mercury or Nickel-Cadmium batteries be used, an approx. 15% lower voltage reading will be obtained from the battery supply which is considered to be perfectly normal.
 - (b) Volume control set for maximum volume.
 - (c) Variable capacitor fully closed and no signal applied.
 5. Nominal tolerances in component values make possible a variation of ± 15% in readings.
- Caution** - When taking voltage checks, avoid accidental shorting across transistor leads as they may cause transistor damage. Do not use a non-vacuum tube-type voltmeter as the relatively low shunt resistance of this type of voltmeter can easily disrupt the transistor bias and result in erroneous readings as well as damage to the transistor.

Emerson Radio

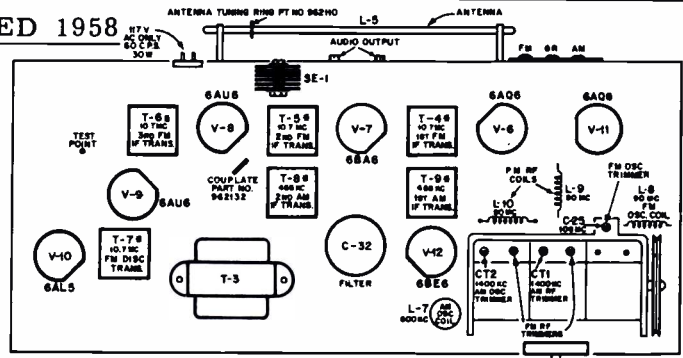
(Material continued on the next page adjacent at right)

MODEL - 885B
 CHASSIS - 120371B
 MODEL - 886B
 CHASSIS - 120371B

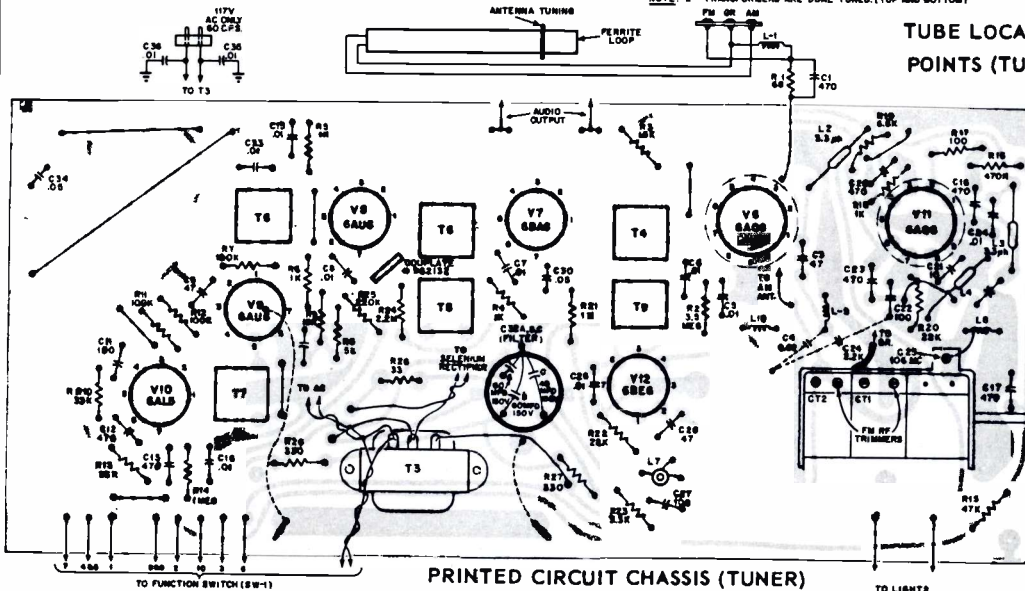


Emerson

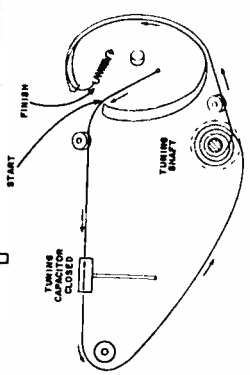
CHASSIS 120371B
 Models 885B and 886B
 (Continued from preceding page adjacent at left.)



TUBE LOCATION AND ALIGNMENT POINTS (TUNER)



PRINTED CIRCUIT CHASSIS (TUNER)



DIAL CORD STRINGING DIAGRAM (TUNER)

ALIGNMENT INSTRUCTIONS (AM)

Selector Switch set to AM position; output of signal generator should be no higher than necessary to obtain an output reading with a 40% modulated R.F. Use an insulated alignment screw driver for adjustments.

STEPS	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER VTVM OR SCOPE	ADJUST	REMARKS
1	High side to junction L-5 and C-27. Low side to chassis ground.	455 kc	Tuning condenser fully open	Across tuner output	T-8 T-9 Top & Bot.	Adjust for maximum output
2	High side to AM ant. terminol. Low side to chassis ground.	1400 kc	1400 kc	Across tuner output	CT-1 CT-2	Adjust for maximum output
3	High side to AM ant. terminol. Low side to chassis ground.	600 kc	600 kc	Across tuner output	L-5 L-7	Adjust for maximum output (L-7 adjusted by sliding tuning ring on loopstick)
4	1400 kc	REPEAT STEP NO. 2				

FM ALIGNMENT INSTRUCTIONS

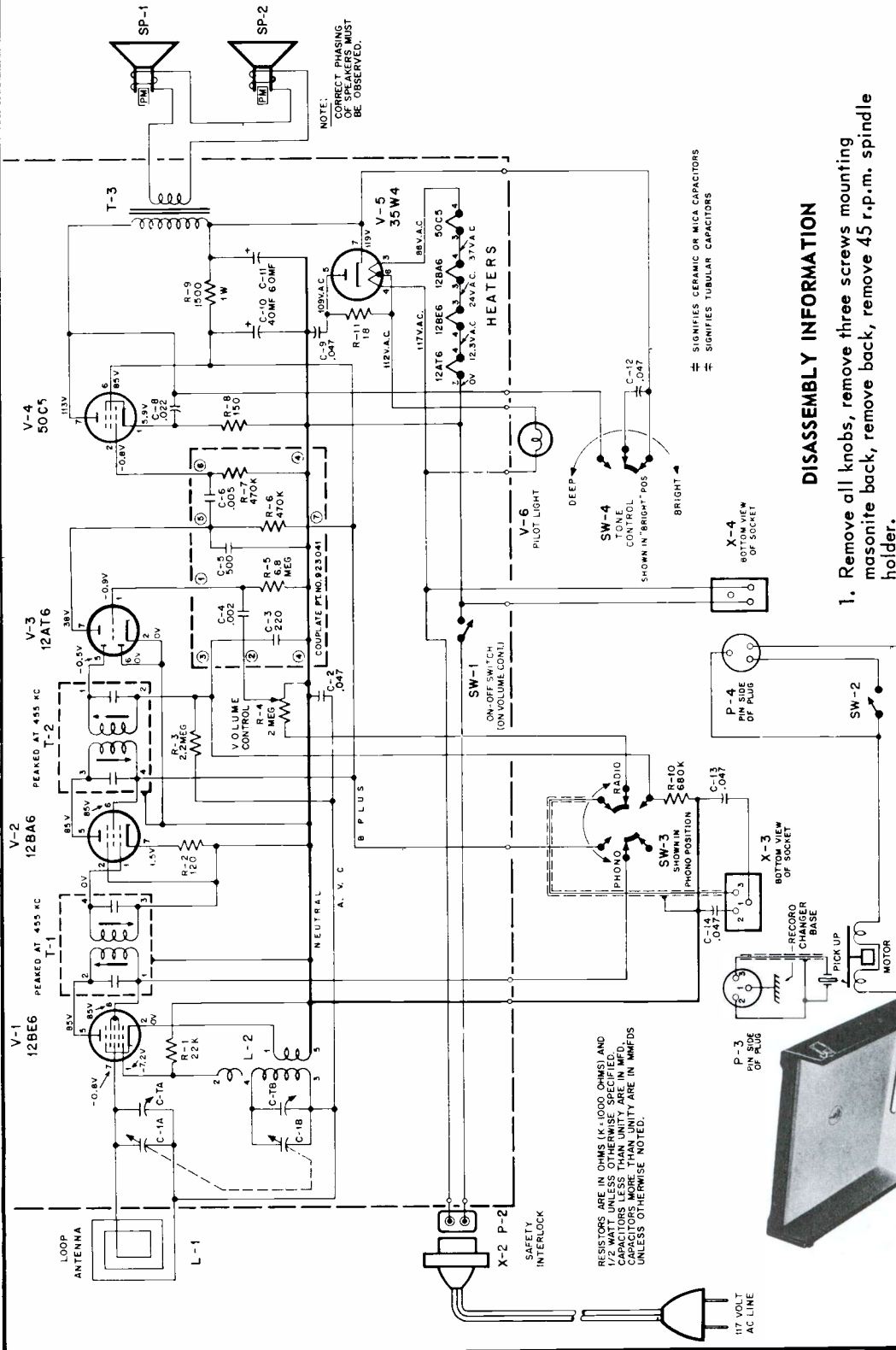
Selector Switch to FM position; sweep generator ± 300 KC. Marker generator as indicated.

1	High side to junction of L-10 & CT-4. Low side to chassis ground.	10.7 mc	Tuning condenser fully open	Test point and chassis	Top & Bot. T-6, T-5, T-3	Adjust for maximum gain & symmetry.
2	High side to junction of L-10 & CT-4. Low side to chas. ground.	10.7 mc	Tuning condenser fully open	Across tuner output	T-7 top & bot.	Adjust for maximum gain & symmetry. (S pattern) See Fig. 7.
3	High side to FM ant. term. Low side to chassis ground.	106 mc	106 mc	Test point and chassis	C-25 CT3 CT4	Adjust for maximum output
4	High side to FM ant. term. Low side to chassis ground.	90 mc	90 mc	Test point and chassis	L8, L9, L10	Adjust (by spreading and/or compressing coils with non-metallic screw driver) for maximum output.

Emerson Radio

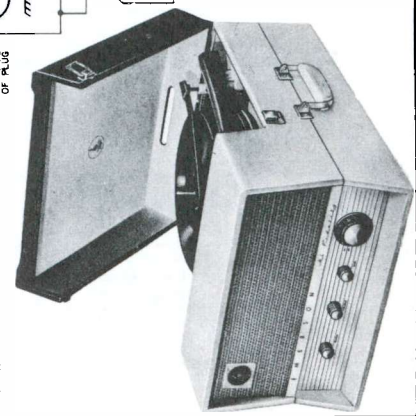
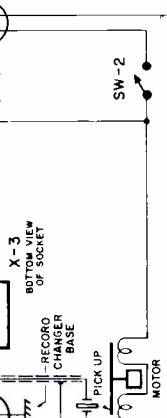
MODEL - 875-B

CHASSIS - 120365B



DISASSEMBLY INFORMATION

1. Remove all knobs, remove three screws mounting masonite back, remove back, remove 45 r.p.m. spindle holder.
2. Loosen four screws securing changer mounting board to cabinet. Tilt changer mounting board up and back while disconnecting two 3-prong plugs.
3. Remove two screws securing chassis mounting board to cabinet, unclip pilot light. Chassis may be moved back. To remove chassis completely from cabinet, speaker leads must be unsoldered.
4. To reassemble, reverse procedure #1 through #3.



EMERSON RADIO

MODEL - 876B
CHASSIS - 120398B

MODEL - 881B
CHASSIS - 120373B

MODEL - 882B, 883B,
884B

CHASSIS - 120372B

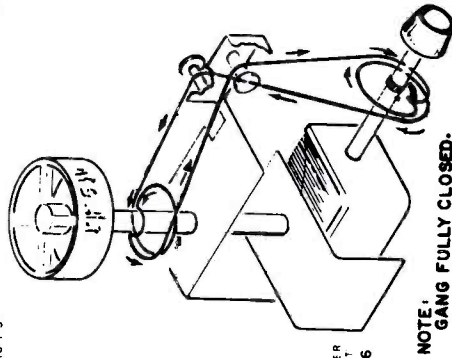
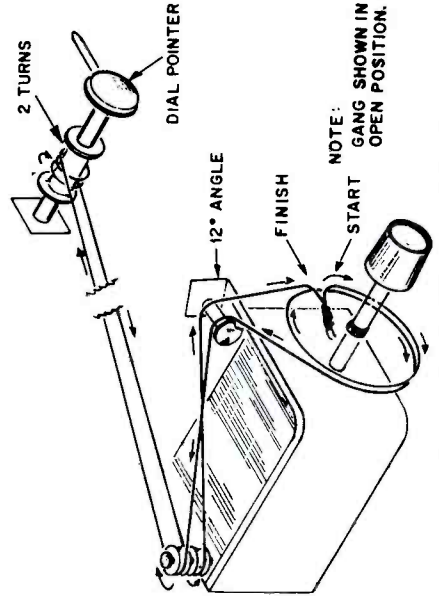
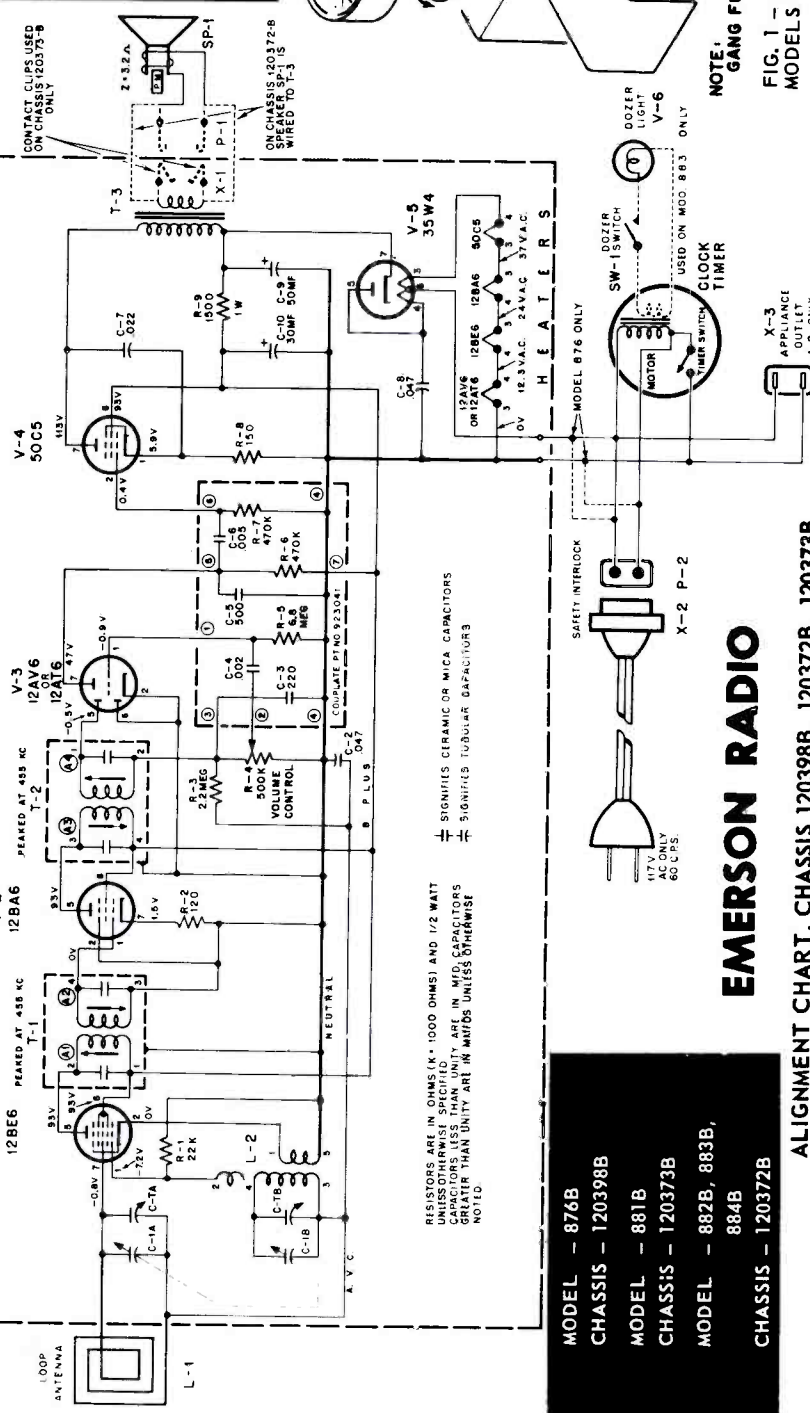


FIG. 1 - DIAL CORD STRINGING,
MODELS 882B, 883B, 884B



DIAL CORD STRINGING, MODEL 876B



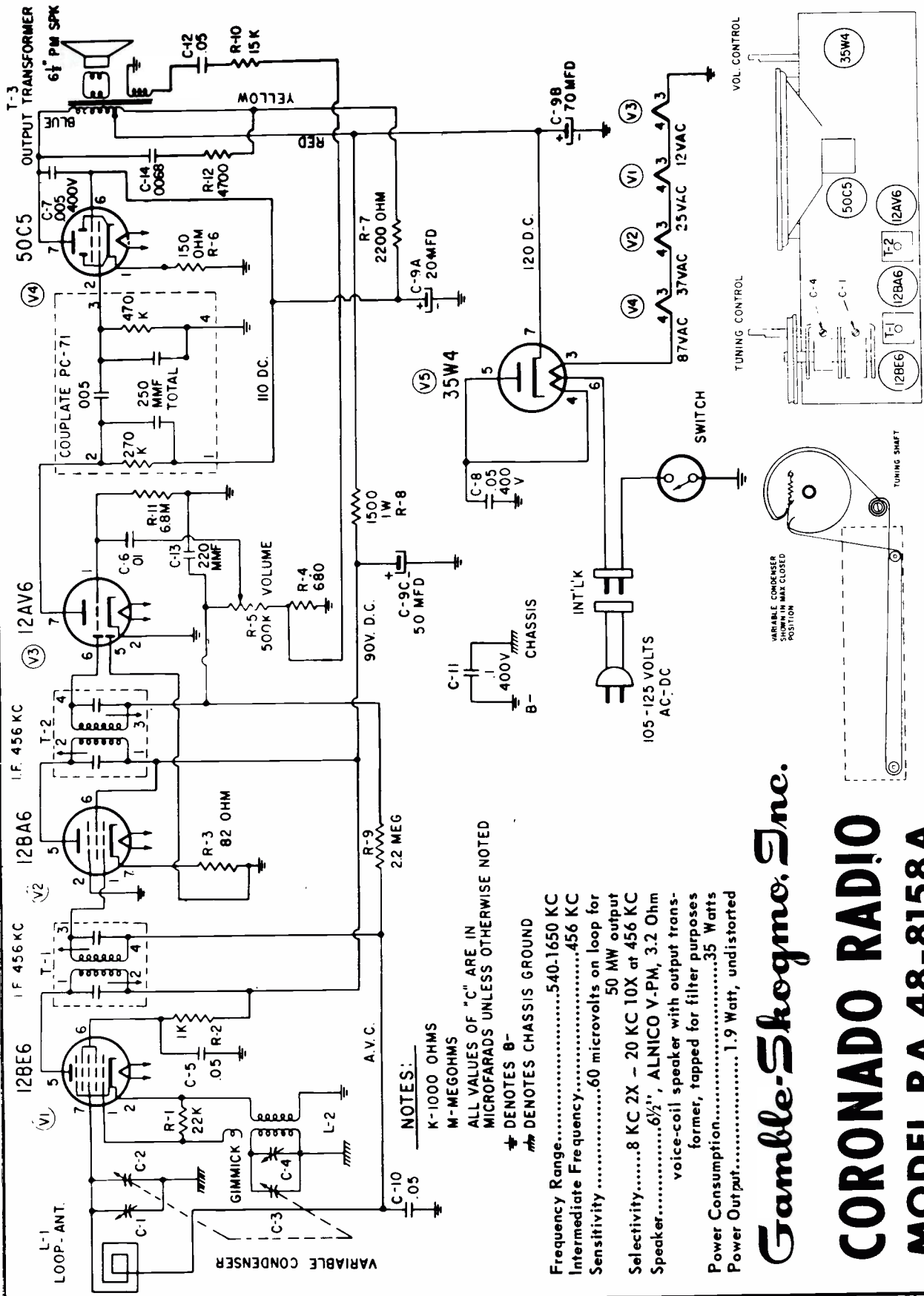
RESISTORS ARE IN OHMS (* 1000 OHMS) AND 1/2 WATT UNLESS OTHERWISE SPECIFIED. CAPACITORS LESS THAN 100 P.F. ARE IN P.F. UNLESS OTHERWISE NOTED.

MODEL - 876B
CHASSIS - 120398B
MODEL - 881B
CHASSIS - 120373B
MODEL - 882B, 883B,
884B
CHASSIS - 120372B

EMERSON RADIO

ALIGNMENT CHART, CHASSIS 120398B, 120372B, 120373B

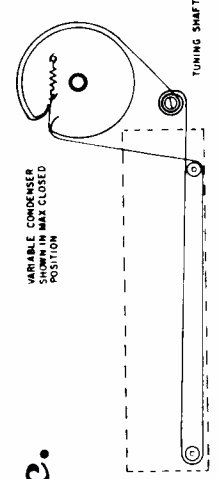
STEP	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.005 mfd.	High side to grid (pin 7) of V1 (12BE6). Low side to B-neutral (See Alignment Note).	455 KC	Variable condenser fully open.	Across voice coil.	T2, T1 (A3, A4, A1, A2)	Adjust for maximum output.
2		Form loop of several turns and radiate signal into receiver	1620 KC	Variable condenser fully open.	Across voice coil.	Trimmer C-TB (Osc.)	Adjust for maximum output.
3		Form loop of several turns and radiate signal into receiver	1400 KC	Tune for maximum output.	Across voice coil.	Trimmer CTA (Ant.)	Adjust for maximum output.



NOTES:
 K-1000 OHMS
 M-MEGOHMS
 ALL VALUES OF "C" ARE IN MICROFARADS UNLESS OTHERWISE NOTED
 ⚡ DENOTES ⚡ CHASSIS GROUND
 ⚡ DENOTES CHASSIS GROUND

Frequency Range.....540-1650 KC
 Intermediate Frequency.....456 KC
 Selectivity.....8 KC 2X - 20 KC 10X at 456 KC
 Speaker.....6 1/2", ALNICO V.P.M., 3.2 Ohm voice-coil speaker with output transformer, tapped for filter purposes
 Power Consumption.....35 Watts
 Power Output.....1.9 Watt, undistorted

Gamble-Skogmo, Inc.
CORONADO RADIO
MODEL RA 48-8158A



DIAL STRINGING GUIDE

TUBE LAYOUT

GENERAL ELECTRIC

Models T105 and T106

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.

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.

TO REPLACE A TUBE SOCKET

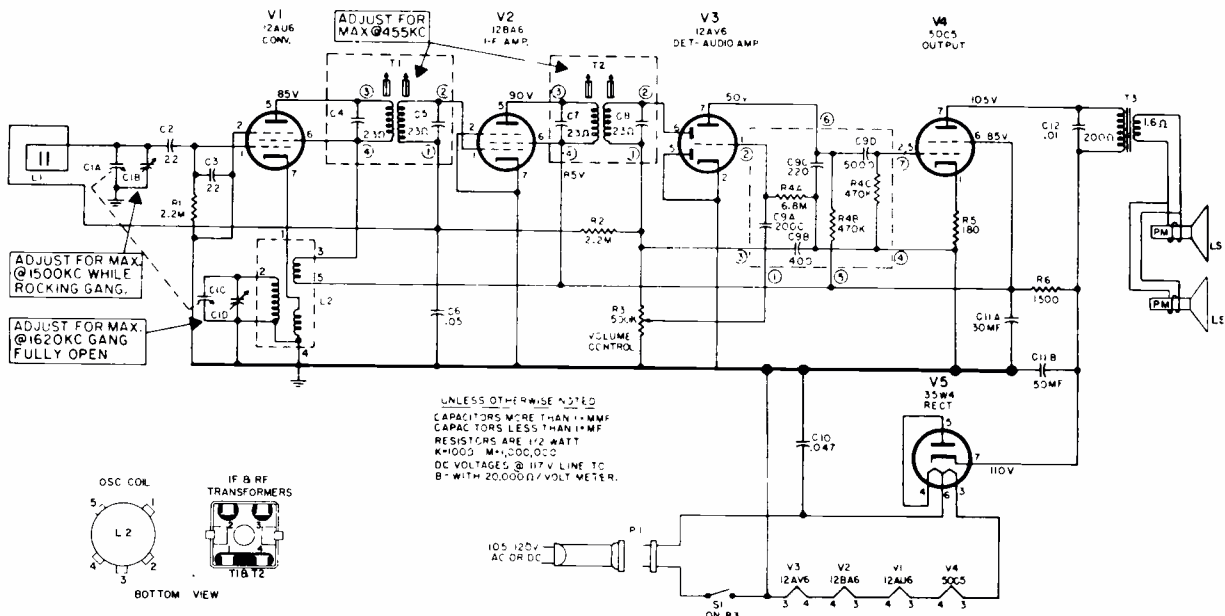
Cut the socket free by cutting all of the socket terminals at the chassis and unsolder the center terminal. Now, heat each terminal only enough to push it out. The new socket can now be inserted into place.

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.

NOTE: The shield cans on T1 and T2 can be removed by unfastening the two spring clips and lifting the cans off the transformers, thereby leaving the coils open for inspection or repair.

ALIGNMENT CHART				
STEP	CONNECT TEST OSCILLATOR TO	TEST OSC. SETTING	TUNING GANG SETTING	ADJUST FOR MAX. OUTPUT
I. F. ALIGNMENT				
1	V2, 12BA6 grid (pin 1) in series with .05mf.	455KC		Cores of 2nd. IF xformer T2
2	V1, 12AU6 grid (pin 1) in series with .05mf.	455KC		Cores of 1st I.F. xformer T1
3	Same	455KC		recheck adjustment of T1 and T2
R. F. ALIGNMENT				
4	Inductively coupled to radio loop	1620 KC	Tuning gang open completely	C1D
5		1500 KC	For Maximum Output	C1B



GENERAL ELECTRIC

Models T115 and T116

TO REMOVE CHASSIS FROM CABINET

1. Remove the cabinet back by unscrewing the 5 screws.
2. Pull off the three knobs.
3. Remove tone control from bracket.
4. Unsolder the 2 leads which connect the speaker to the chassis.
5. Remove cabinet front by unscrewing the 2 screws on the bottom rail; also the screws on the tone control and volume control brackets.

TO REMOVE SPEAKERS

1. Remove grille by unscrewing the 4 corner screws on the inside of the cabinet front.
2. Remove the speakers by removing the screws on the front of the speaker.

Label the speaker leads before unsoldering them from the speakers; incorrectly connecting the leads will cause distorted audio.

NOTE: The radio-phonograph switch on the rear of the cabinet should be in the "radio" position before starting alignment procedures.

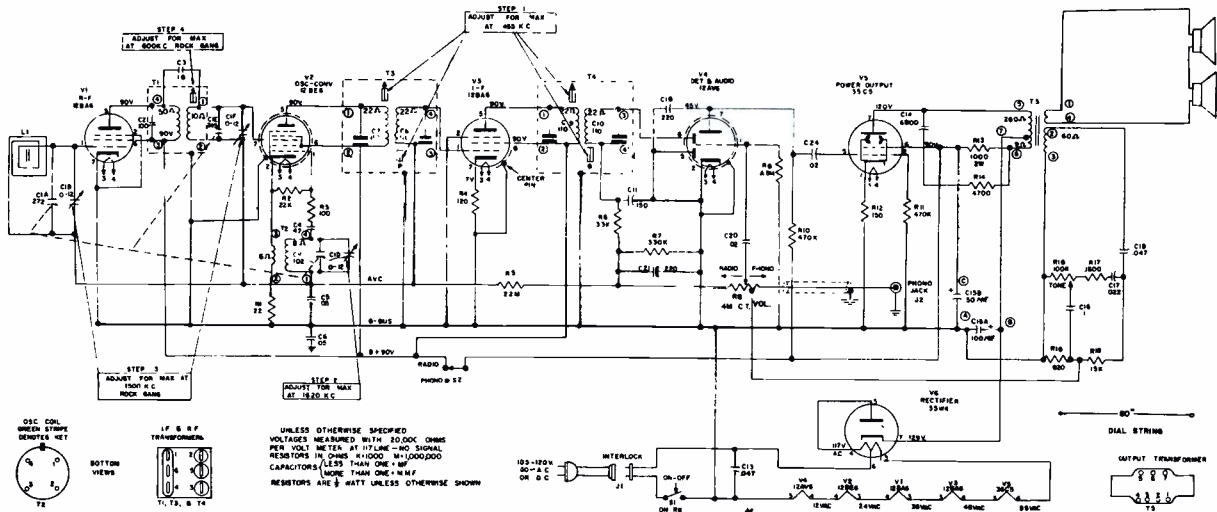
Always have Volume Control set for maximum, and reduce signal input so AVC will not affect output.

SPECIFICATIONS

CABINET:	T115, Brown; T116, Ivory	
ELECTRICAL RATING:	Voltage 105-120 Volts AC or DC, 30 Watts	
POWER OUTPUT:	Undistorted Maximum	.75 Watts 1.25 Watts
SPEAKERS:	(2) 6 1/2" and 4"; 3.2 ohms @ 400 cps.	
TUBE COMPLEMENT:	V1 R. F. Amplifier V2 Oscillator-Converter V3 I. F. Amplifier V4 Det. & Audio amplifier V5 Power Output V6 Rectifier	12BA6 12BE6 12BA6 12AV6 35C5 35W4

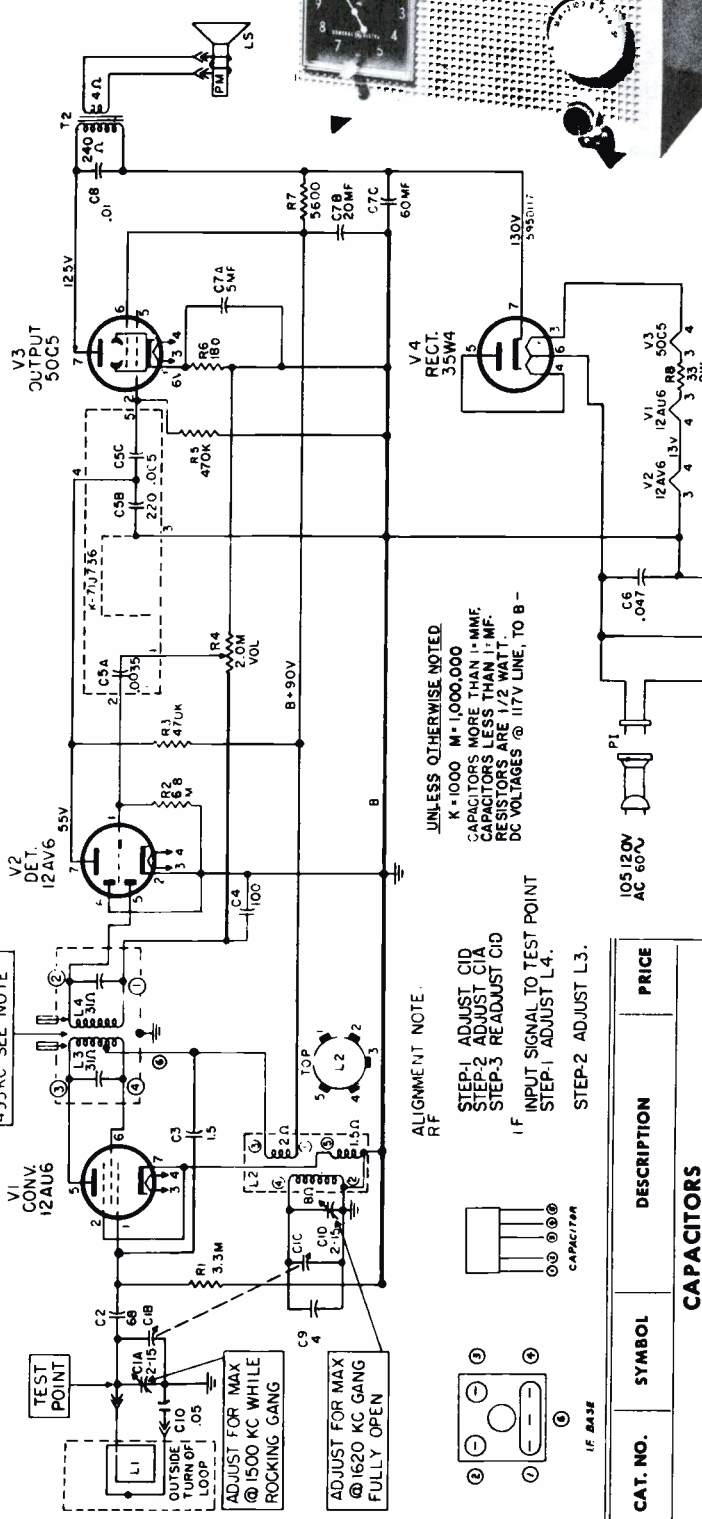
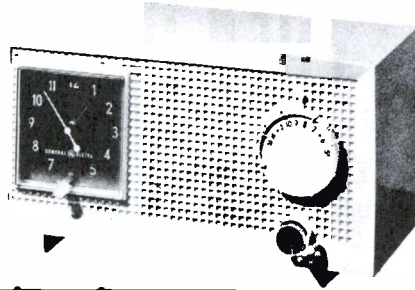
ALIGNMENT CHART

Step	Connect Test Oscillator To	Test Oscillator Setting	Receiver Tuning	Adjust for Maximum Output
1	12BA6, V3 grid (pin 1) in series with .05 mf.	455 KC	Minimum capacity	Cores of 2nd i-f transformer T4
2	12BE6, V2 grid (pin 7) in series with .05 mf.			Cores of 1st i-f transformer, T3
3		Recheck adjustment of T4 and T3		
4	Inductively coupled to radio loop, L1	1620 KC	Minimum capacity	CIF, oscillator trimmer
5		1500 KC	For Maximum Signal	CIF, r-f trimmer
6				CIB, antenna trimmer
7		Approximately 600 KC	Rock in with core of T1	Core of r-f transformer, T1. Rock in with receiver tuning.
8	Repeat steps 4, 5, 6 and 7.			



GENERAL ELECTRIC

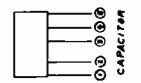
MODEL C399



UNLESS OTHERWISE NOTED
K = 1000 M = 1,000,000
CAPACITORS MORE THAN 1-MF.
CAPACITORS LESS THAN 1-MF.
RESISTORS ARE 1/2 WATT.
DC VOLTAGES @ 117V LINE, TO B -

ALIGNMENT NOTE.
RF

- STEP-1 ADJUST CID
 - STEP-2 ADJUST CIA
 - STEP-3 READJUST CID
- (IF INPUT SIGNAL TO TEST POINT
STEP-1 ADJUST L4.
STEP-2 ADJUST L3.



TO REMOVE CHASSIS FROM CABINET:

Remove cabinet back and interlock. 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 attached 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, first close the tuning capacitor, grasp the capacitor with the thumb and forefinger of one hand and the tuning knob with the other hand and pull.

TO REPLACE A TUBE SOCKET:

Cut the socket free by cutting all of the socket terminals at the chassis. Now heat each terminal only enough so that the socket may be pushed out. The new socket can now be inserted into the holes left by the old one and soldered into place.

TO REPLACE THE VOLUME CONTROL:

Remove the shaft nut, then cut the center and lower terminals. Apply only enough heat to the upper terminal to enable you to pull out the control. Apply heat to the center and lower terminals, so they may be pushed out as the new control is inserted into place and soldered.

COILS AND TRANSFORMERS

RLC-135	L2	Oscillator Coil	1.00
RS-1027	T1	I-F Transformer	1.90
RTO-176	T2	Output Transformer	2.05

CABINET AND APPEARANCE ITEMS

RB-1000	Cabinet (Yellow)	4.10
RS-1000	Second Hand (Clock)	.05
RS-1005	Knob Clock	.05
RDK-516	Knob, Tuning, Brown	1.25
RDK-425	Knob, Volume, Clear and Gold	.35
RZW-025	Crystal, Clock, Clear	.75
RAB-305	Back and Loop	1.60

CAPACITORS

CAT. NO.	SYMBOL	DESCRIPTION	PRICE
RCE-217	C7A, B, C	5 mf., @ 25 v., 20 mf., & 60 mf. @ 150 v., electro.	\$2.00
RCN-048	C3	1.5 mmf., 20%, 500 v., ceramic	.20
RCN-053	C6	.047 mf., +40 -10%, 600 v., molded	.35
RCT-097	C1A, B, C, D	Tuning capacitor—two gang	3.40
RCW-3036	C5A, B, C	Bullplate—.0035 mf., 220 mmf., .005 mf.	.80
RCW-3079	C4	100 mmf., 20%, 500 v., ceramic	.25
RCW-3186	C8	.01 mf., +40 -10%, 400 v.	.30
RCW-3209	C9	4 mmf., ±20%, 500 v., ceramic	.25
UCG-1024	C2	68 mmf., 10%, 500 v.	.35
	C10	.05 mf., 200 v.	

POTENTIOMETER

RS-1028	R4	Volume Control—2 meg.	1.15
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RESISTORS

All resistors used in this receiver are common carbon type and are readily obtainable at any Radio Parts Jobber. For values and symbol numbers, refer to the schematic diagram.

GENERAL ELECTRIC

Models C415, -A, -B, C416, -A, -B, and C417

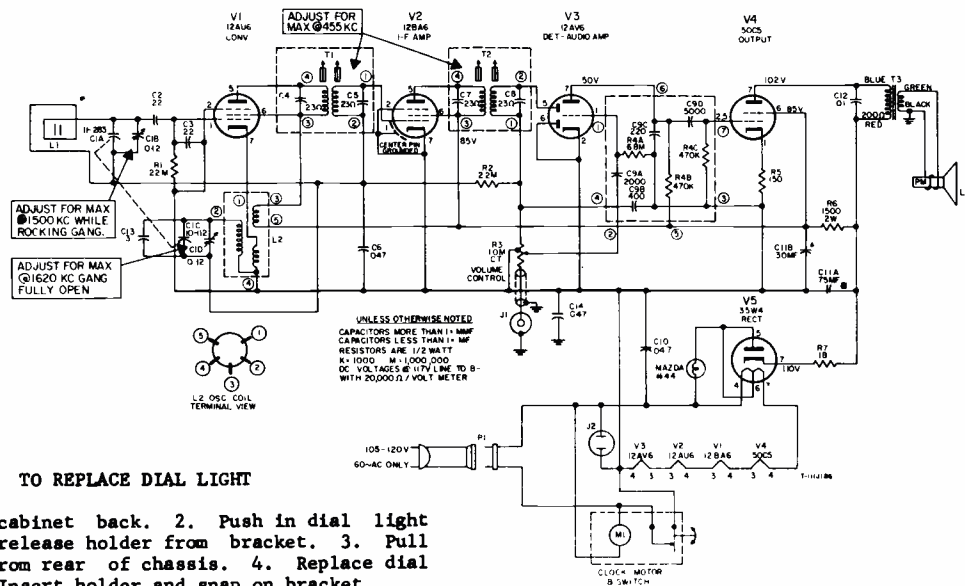
TO REMOVE CHASSIS FROM CABINET

1. Remove tuning, volume and timer knobs.
2. Remove time set knob from shaft at back of cabinet. Hold shaft and turn knob counter clockwise.
3. Remove five hex-head screws on cabinet back.
4. Remove four hex-head screws on bottom of cabinet.
5. Remove Snooz-Alarm knob.
6. Remove timer by unscrewing four Phillips head screws.
7. Unsolder speaker leads from speaker.
8. Pull chassis out slowly. Leads from chassis to timer remain attached for A. C. while testing.

CAUTION

The chassis uses the dip solder copper-plated printed circuit to eliminate most of the inter-connecting wiring. When soldering, keep the heat to a minimum to prevent the printed wiring from becoming unbonded. A 35 to 50 watt soldering iron is recommended.

Always use an isolation transformer when servicing this receiver. To protect the test equipment being used when aligning, connect the output lead of the signal generator to the grid of an I. F. tube through a .05 capacitor. This will prevent the output impedance of the generator from having a loading effect on the circuit.



TO REPLACE DIAL LIGHT

1. Remove cabinet back.
2. Push in dial light holder and release holder from bracket.
3. Pull holder out from rear of chassis.
4. Replace dial light.
5. Insert holder and snap on bracket.

STEP	CONNECT TEST OSCILLATOR TO	TEST OSCILLATOR SETTING	TUNING GANG SETTING	ADJUST FOR MAXIMUM OUTPUT
I. F. ALIGNMENT				
1	V2, 12BA6 grid (pin 1) in series with .05 mfd.			Cores of 2nd I.F. Transformer T2
2	V1, 12AU6 grid (pin 1) in series with .05 mfd.			Cores of 1st I. F. Transformer T1
3				Recheck adjustment of T1 and T2
R. F. ALIGNMENT				
4	Inductively coupled to radio loop	1620 kc	Tuning gang Open	C1D
5		1500 kc	For Maximum Output	C1B*

* Rock Tuning for maximum while adjusting C1B.

GENERAL ELECTRIC

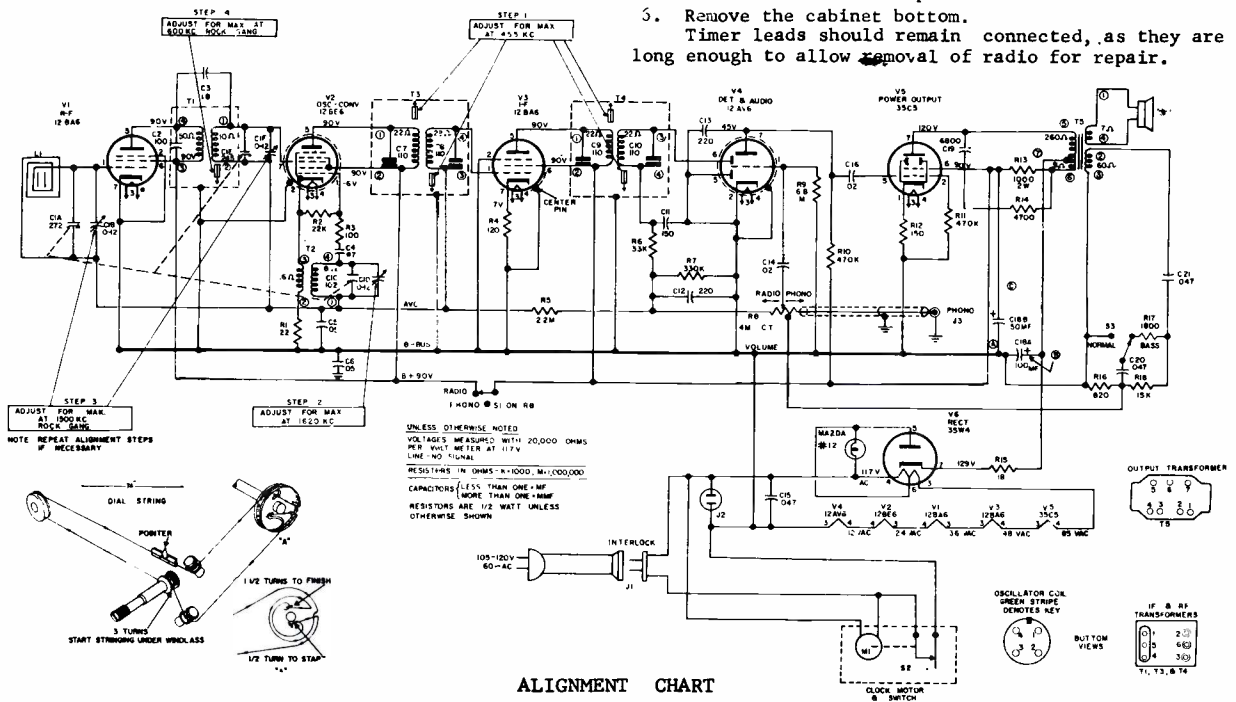
Models C420 and C421

TO REMOVE SPEAKER

1. Follow steps 1 through 5 as above.
2. Remove the 4 hexhead screws from around speaker. This will remove the speaker and speaker grille.

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.
5. Remove the cabinet bottom. Timer leads should remain connected, as they are long enough to allow removal of radio for repair.



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.				Recheck adjustment of T3 and T4
4.	Inductively Coupled to Antenna L1	1620 KC	Tuning gang open	C1D Oscillator trimmer
5.		1500 KC	Tune for max. signal	C1F, R.F. Trimmer
6.			C1B, Antenna trimmer	
7.		Approximately 600 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			

GENERAL ELECTRIC

Models P710A, -B, -C, -C₁, and P711A, -B, -C, -C₁ (Continued on the next page at right)

TO REMOVE CHASSIS FROM THE CABINET

Pry off the cabinet back by using a small coin in the slots provided on the bottom of the case. Pull off the volume control knob. Remove the tuning knob by unscrewing the thumb screw in its center in a counterclockwise direction; then pull off the large knob. Remove the Phillips flat head screw located under the tuning dial. Also remove the two Phillips head screws located on the speaker end of the chassis. This will enable the chassis to come free from the cabinet front.

This receiver is of dual chassis design. The speaker, loop antenna, volume control, and tuning condenser are mounted on the upper metal chassis. All transistors, transformers, and components are soldered on the etched circuit board.

To separate the metal chassis from circuit board unsolder the two tabs that hold the volume control to the metal chassis; unsolder the lead from the loud-speaker; unsolder the lead from the top lug of the tuning gang oscillator section and two loop leads to the chassis board; carefully bend the two mounting lugs on the speaker end of the circuit board and on the tuning condenser end; also unsolder the lug near the phone jack; then gently pull off the circuit board. The tuning condenser, loop antenna, and speaker will remain on the metal chassis.

COMPONENT REMOVAL

To remove the speaker from the radio, unsolder one speaker lead and carefully bend over condenser C13 and remove speaker mounting screw.

Remove the tuning condenser by unscrewing the two mounting screws located on the face of the metal chassis.

To replace the volume control, unsolder the three volume control leads at the control and the two switch leads on the back of the control.

ALIGNMENT

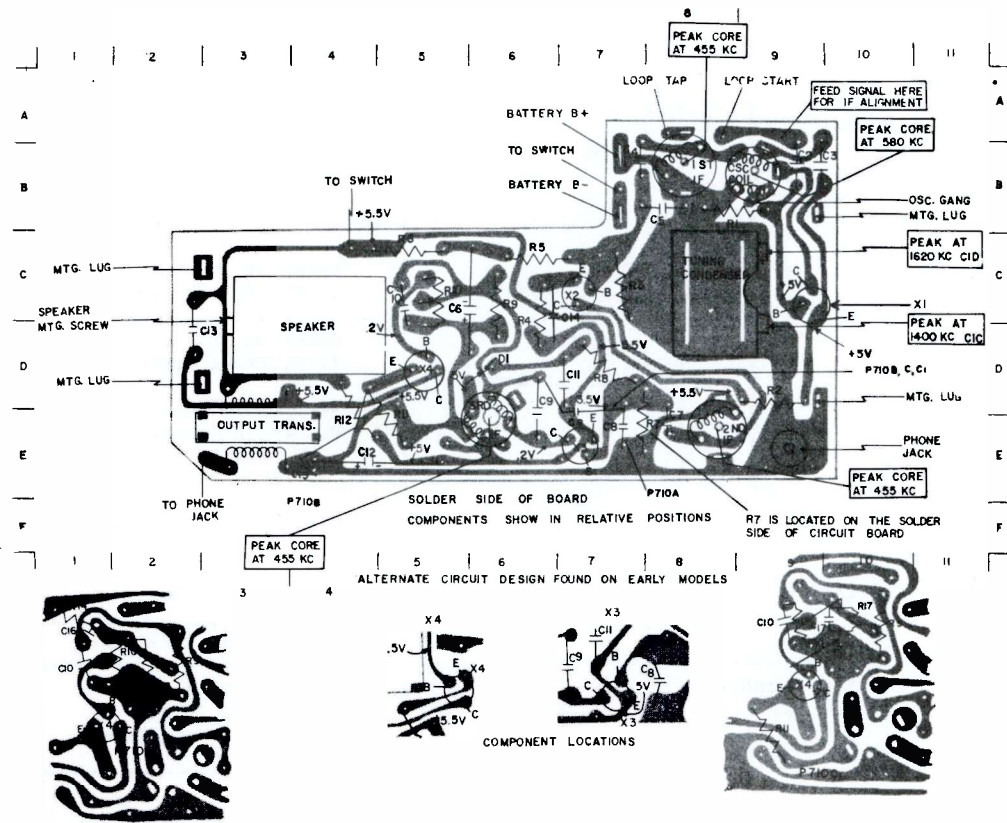
Feed the output from the signal generator to the junction of C2 and the loop antenna for IF alignment. For oscillator and antenna peaking, radiate a signal to the receiver by connecting a ferrite-rod antenna to the signal generator output leads.

All alignment points can be adjusted with the cabinet back off. The I.F. and oscillator cores can be peaked by using the holes provided in the circuit board.

Keep RF from signal generator low.

It is advisable to check battery voltage before alignment to insure a proper operating voltage. Always align the receiver with the batteries in place, as their close proximity to the loop antenna maintains the inductance constant for maximum operating efficiency.

1. Align all IF cores in T1, T2 and T3.
 2. With gang fully open align oscillator trimmer CID to peak at 1620 KC.
 3. Peak antenna trimmer C1C to maximum output at 1400 KC.
 4. Rock oscillator core and gang to peak at 580 KC.
- Repeat steps 2, 3 and 4 as necessary.

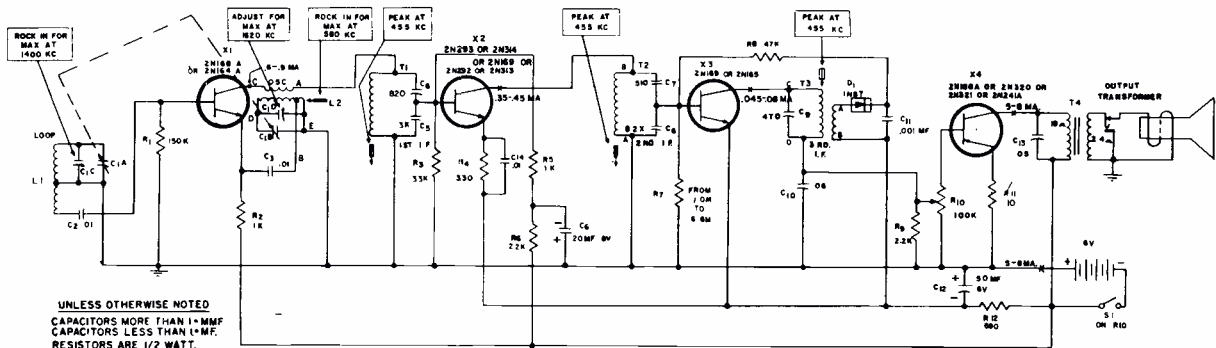


TRANSISTOR REPLACEMENT

To replace X4, remove the speaker as described above. To remove X2, use needle nose pliers through the hole near the volume control.

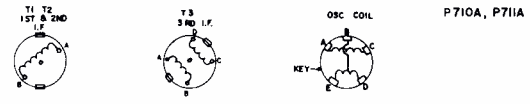
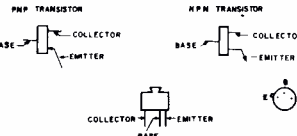
GENERAL ELECTRIC

Models P710A, -B, -C, -C,, and P711A, -B, -C, -C, (Continued from the preceding page)



UNLESS OTHERWISE NOTED
CAPACITORS MORE THAN 1 μMMF
CAPACITORS LESS THAN 1 μMF.
RESISTORS ARE 1/2 WATT.
K=1000. M=1,000,000.

CHECK COLLECTOR CURRENT WITH
A MILLIAMMETER INSERTED IN
SERIES WITH THE CIRCUITS SHOWN
AT POINTS MARKED "X" IN
COLLECTOR CIRCUITS AND CHECK
BATTERY CURRENT AT POINT
MARKED "X" IN BATTERY CIRCUIT



Production Changes

P710B

- C8-- 300mmf., connected to junction of C9 and C10.
- C15-- 50mf., 6V, connected across R11
- R8-- 22K
- R12-- 390 ohms
- See Fig. A for X3 and X4 stages.

P710C

- C8-- 300mmf., connected to junction of C9 and C10.
- C16-- 3mf.
- R4-- 120 ohms
- R7-- 1.5 meg
- R8-- 22K
- R12-- 390 ohms
- R13-- 3.3K
- R14-- 18K
- See Fig. B for X3 and X4 stages.

P710C1

- C8-- 3000 mmf., connected to junction of C9 and C10.
- C17-- 3mf.
- R8-- 22K
- R17-- 4.7K
- R17 and C17 mounted to solder side of component board.
- See Fig. C for X3 and X4 stages.

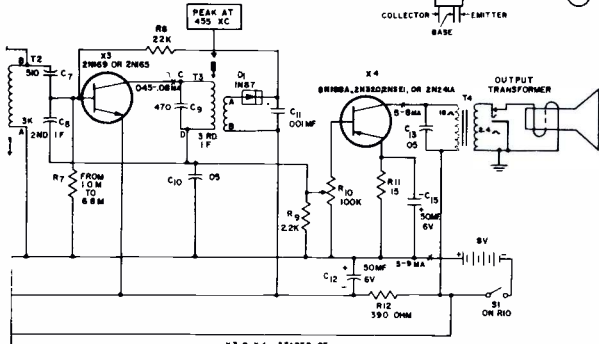


FIG. A

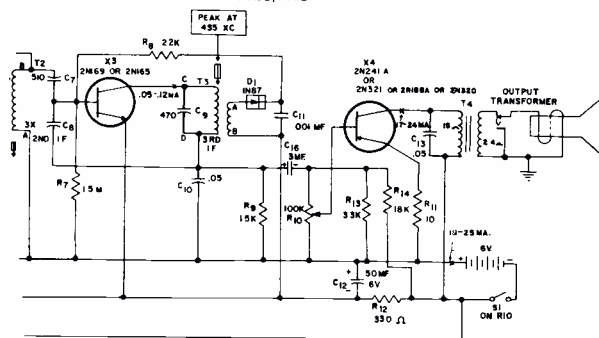


FIG. B

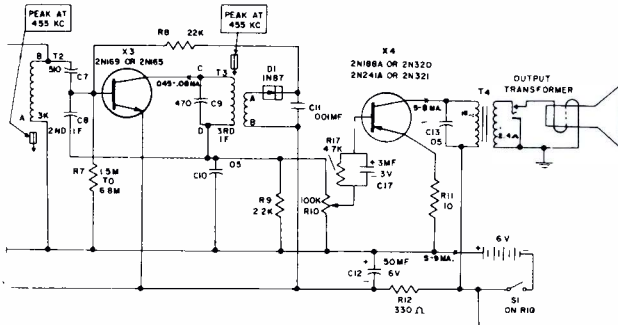
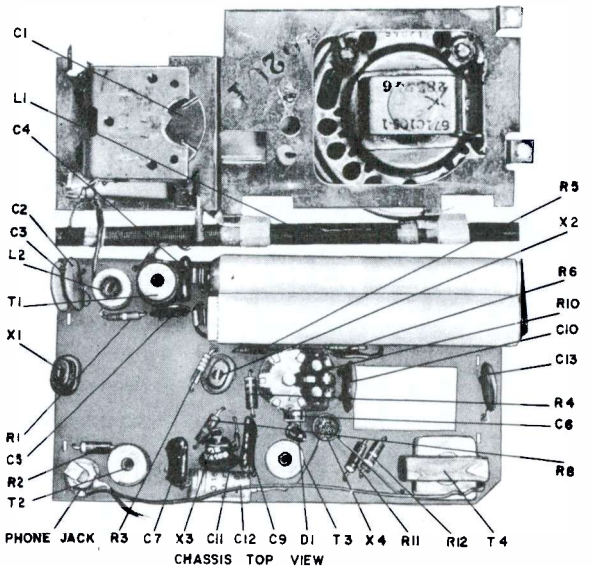


FIG. C

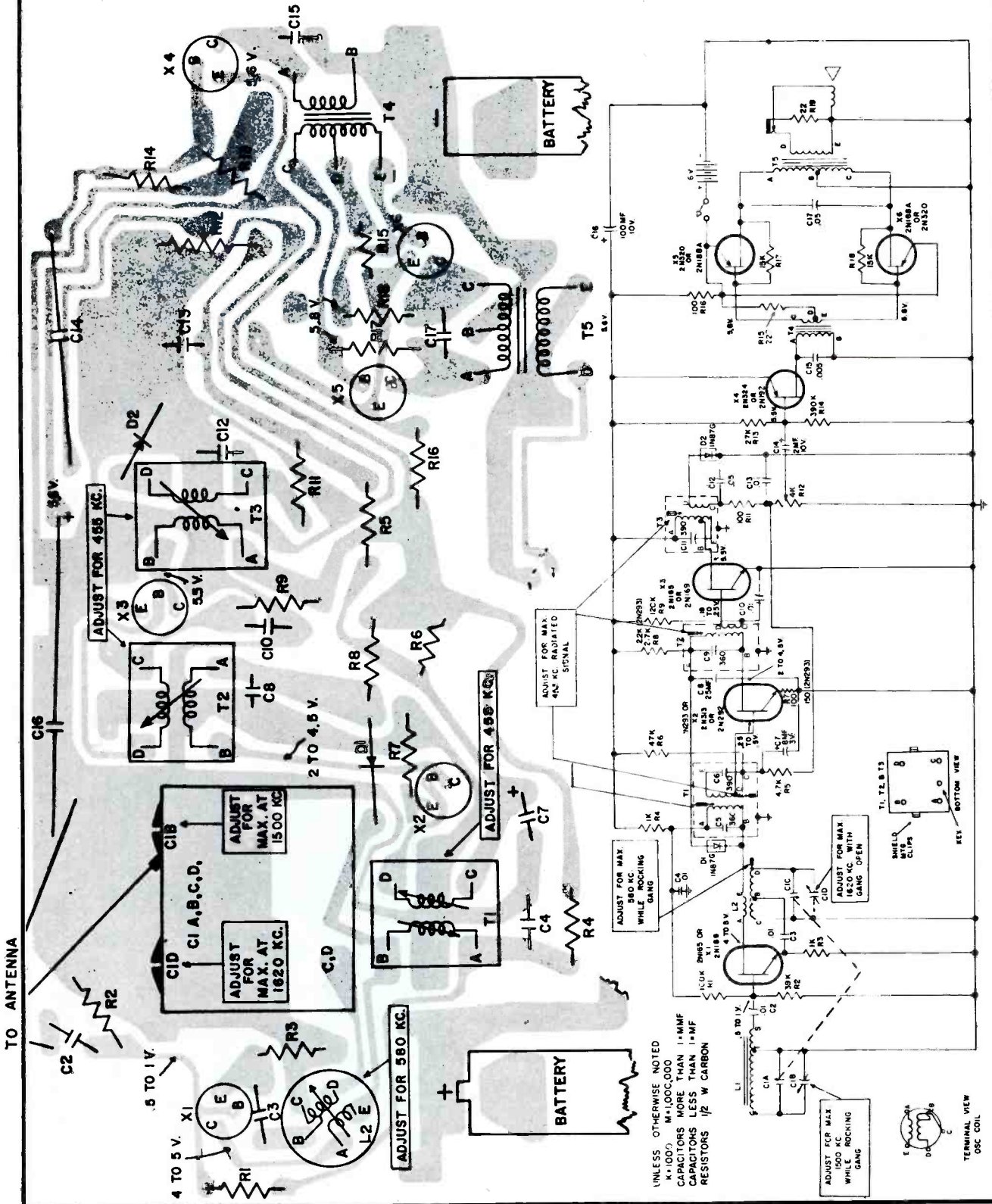


GENERAL ELECTRIC

Models P725 and P726

CHASSIS REMOVAL

Remove both knobs. Remove the 4 batteries. Unsolder the two leads on the speaker; unscrew the 5 screws holding chassis to cabinet.



GENERAL ELECTRIC

Models P745A, P746A

TO REMOVE CIRCUIT BOARD

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

TO REMOVE TUNING CAPACITOR

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

TO REMOVE VOLUME CONTROL

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

TROUBLESHOOTING

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

CAPACITORS

RS-1378	CA, B, C, D	Tuning Capacitor.....
RS-1022	C1, 3	.01mf., 450V.....
	C2, 7	.01mf., 50V.....
	C4	150mmf., 300V.....
RS-1462	C5	8mf., 6V.....
	C6, 9	390mmf., 300V.....
RS-1024	C10, 17, 19	.05mf., 50V.....
	C18	.003mf., 100V.....
RS-1463	C16	32mf., 6V.....
RS-1460	C11, 12, 14, 15	3mf., 6V.....

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.

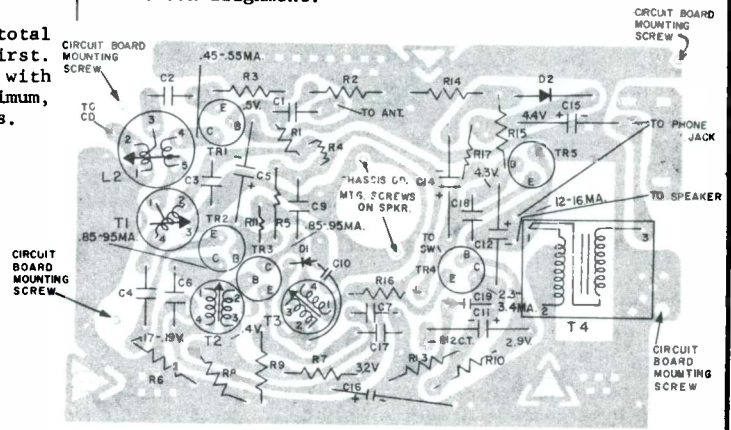
A single-edge razor blade is a satisfactory tool for cutting the copper circuit wiring, so that a milliammeter can be inserted in series with the break to measure the current flow. After each current check is completed, solder the cut carefully to complete the circuit again.

NO RECEPTION:

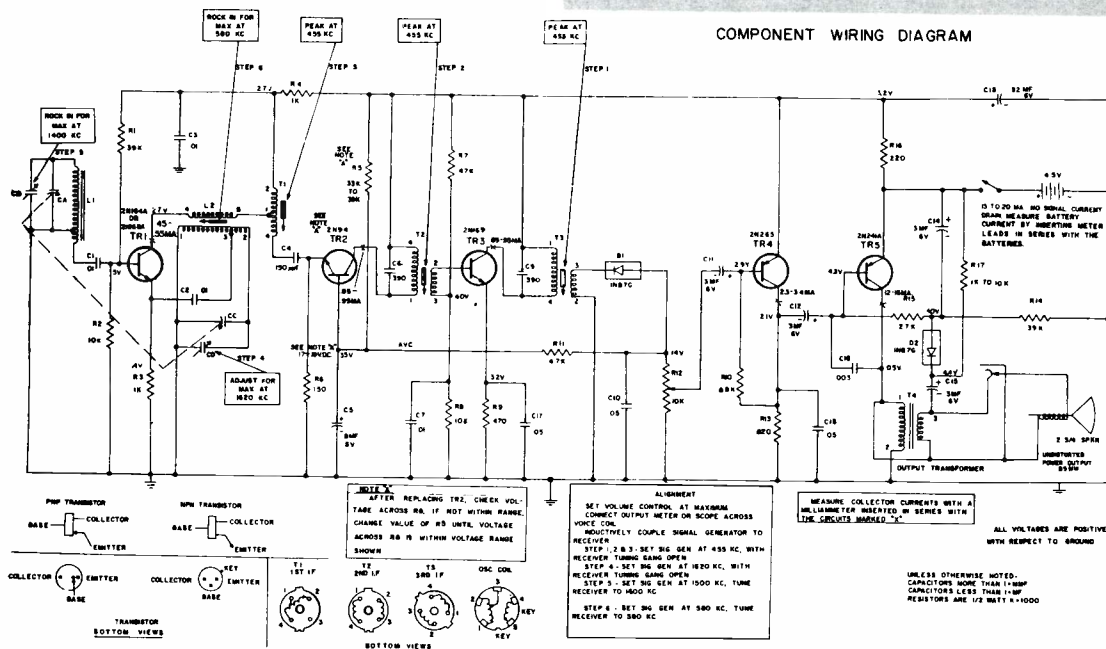
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:

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

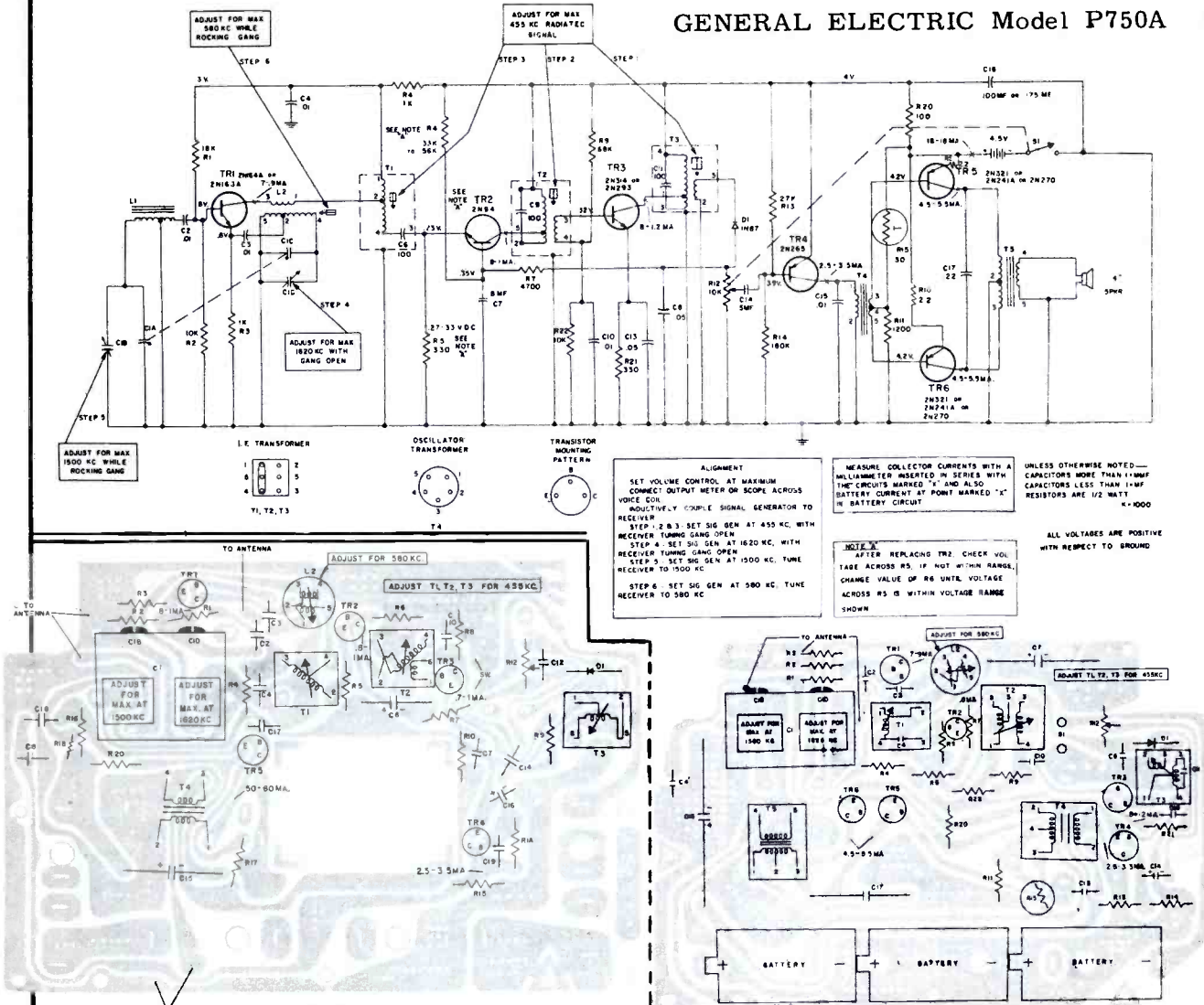


COMPONENT WIRING DIAGRAM



VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

GENERAL ELECTRIC Model P750A



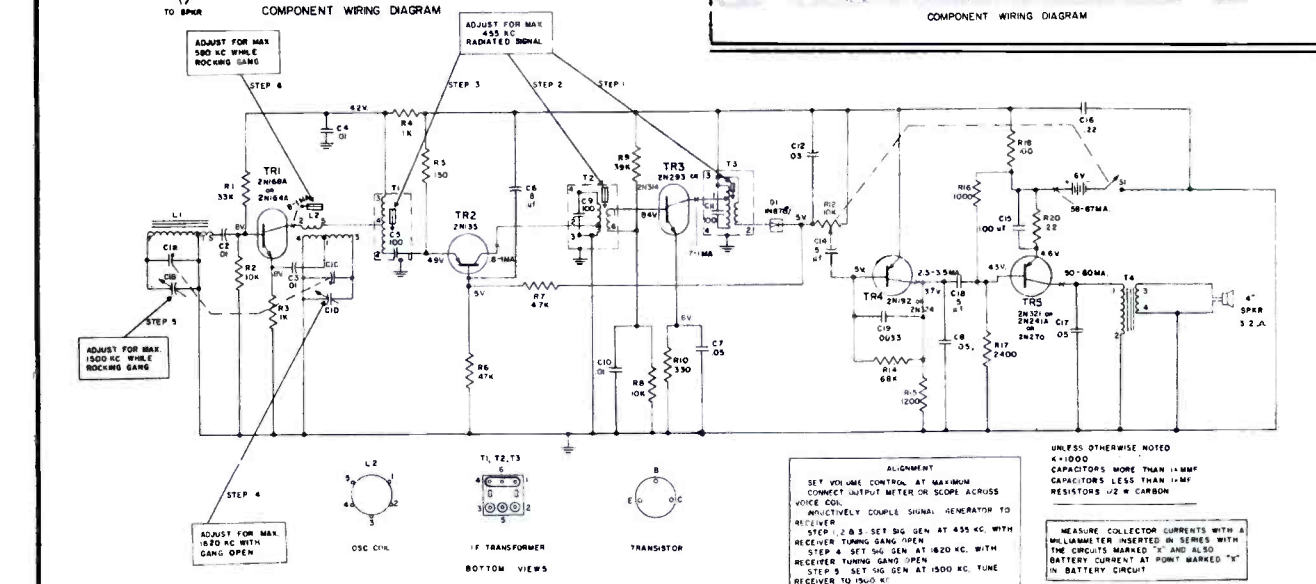
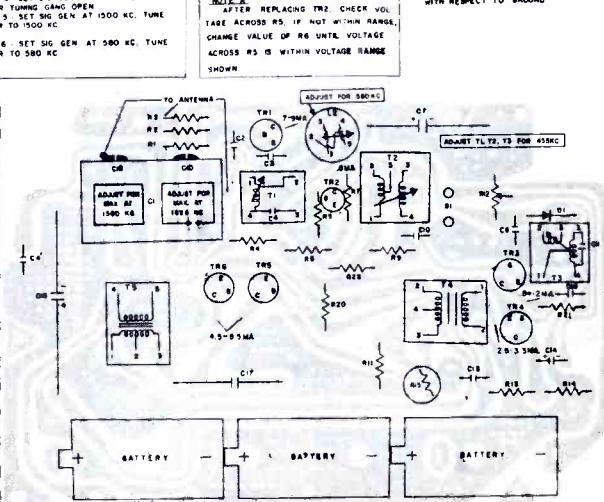
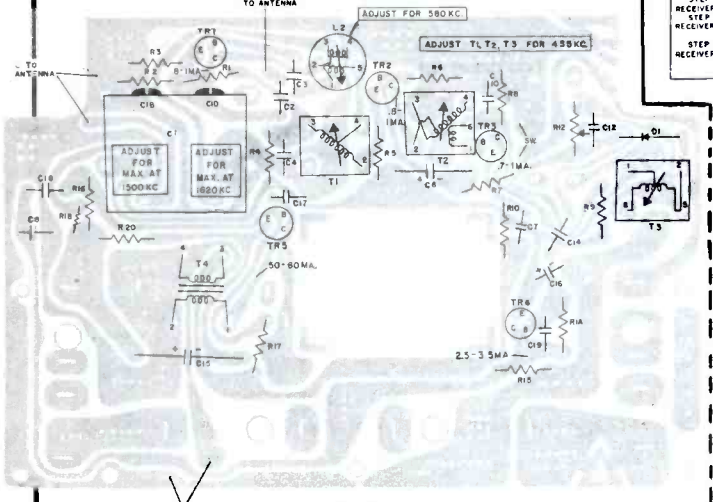
ALIGNMENT
 SET VOLUME CONTROL AT MAXIMUM
 CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL
 INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER
 STEP 1 2 & 3 SET SIG GEN AT 455 KC. WITH RECEIVER TUNING GANG OPEN
 STEP 4 SET SIG GEN AT 1820 KC. WITH RECEIVER TUNING GANG OPEN
 STEP 5 SET SIG GEN AT 1500 KC. TUNE RECEIVER TO 1500 KC
 STEP 6 SET SIG GEN AT 580 KC. TUNE RECEIVER TO 580 KC

MEASURE COLLECTOR CURRENTS WITH A MILLIAMMETER INSERTED IN SERIES WITH THE CIRCUITS MARKED "I" AND ALSO BATTERY CURRENT AT POINT MARKED "X" IN BATTERY CIRCUIT

UNLESS OTHERWISE NOTED—
 CAPACITORS MORE THAN 1 μMF
 CAPACITORS LESS THAN 1 μMF
 RESISTORS ARE 1/2 WATT
 R-1000

NOTE
 AFTER REPLACING TR2 CHECK VOLTAGE ACROSS R5. IF NOT WITHIN RANGE, CHANGE VALUE OF R6 UNTIL VOLTAGE ACROSS R5 IS WITHIN VOLTAGE RANGE SHOWN

ALL VOLTAGES ARE POSITIVE WITH RESPECT TO GROUND



ALIGNMENT
 SET VOLUME CONTROL AT MAXIMUM
 CONNECT OUTPUT METER OR SCOPE ACROSS VOICE COIL
 INDUCTIVELY COUPLE SIGNAL GENERATOR TO RECEIVER
 STEP 1 2 & 3 SET SIG GEN AT 455 KC. WITH RECEIVER TUNING GANG OPEN
 STEP 4 SET SIG GEN AT 1820 KC. WITH RECEIVER TUNING GANG OPEN
 STEP 5 SET SIG GEN AT 1500 KC. TUNE RECEIVER TO 1500 KC
 STEP 6 SET SIG GEN AT 580 KC. TUNE RECEIVER TO 580 KC

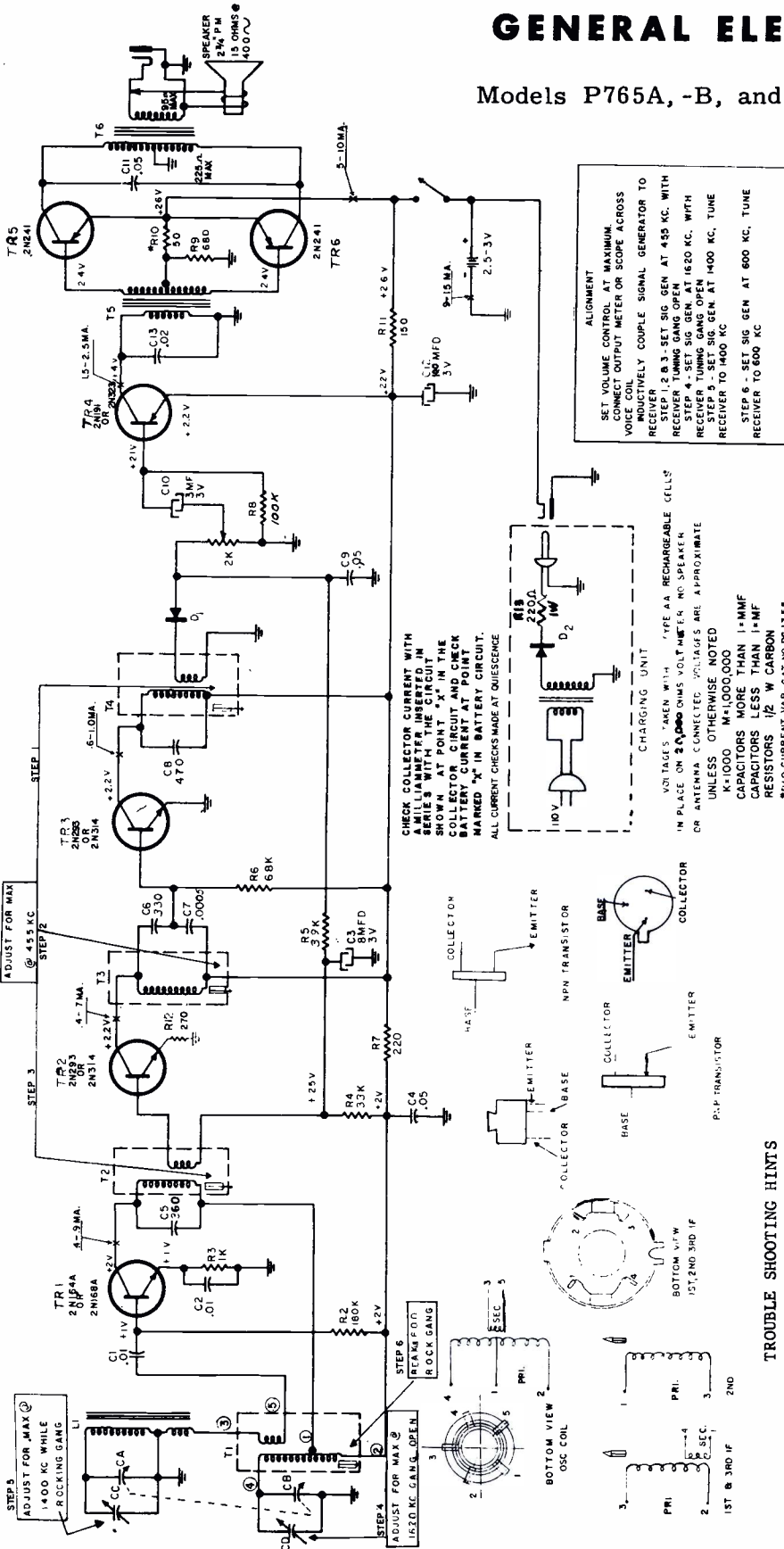
MEASURE COLLECTOR CURRENTS WITH A MILLIAMMETER INSERTED IN SERIES WITH THE CIRCUITS MARKED "I" AND ALSO BATTERY CURRENT AT POINT MARKED "X" IN BATTERY CIRCUIT

UNLESS OTHERWISE NOTED—
 CAPACITORS MORE THAN 1 μMF
 CAPACITORS LESS THAN 1 μMF
 RESISTORS 1/2 W. CARBON

GENERAL ELECTRIC Models P760A, P761A

GENERAL ELECTRIC

Models P765A, -B, and P766A, -B



- TO REMOVE CHASSIS FROM CASE**
1. 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.
 2. With a pair of longnose pliers, straighten the metal tab holding the speaker grille in place.
 3. Remove the speaker grille by folding it up and toward the opposite end of the case.
 4. Using care, pull out the speaker and unsolder the two leads.
 5. Remove the volume knob by pulling it off. Turn the screw in the center of the tuning dial in a counterclockwise direction to remove it, then pull off the tuning knob.
 6. Take out the screw near the tuning shaft hole, also the screw on the end cap tuning dial end.

TROUBLE SHOOTING HINTS

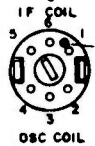
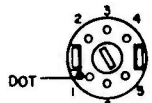
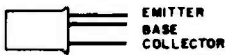
Total battery drain used by the receiver will give an indication of whether the transistors are operating normally. This current check is made at quiescence. This means the volume control should be all the way open, the tuning gang all the way closed, and with no signal or noise being picked up.

With the radio controls set accordingly, a current flow check between the battery end cap and the negative end of the battery should indicate properly operating transistors. If excessive total current is noted when this check is made, individual current checks should be made at the collector section of the suspected transistors.

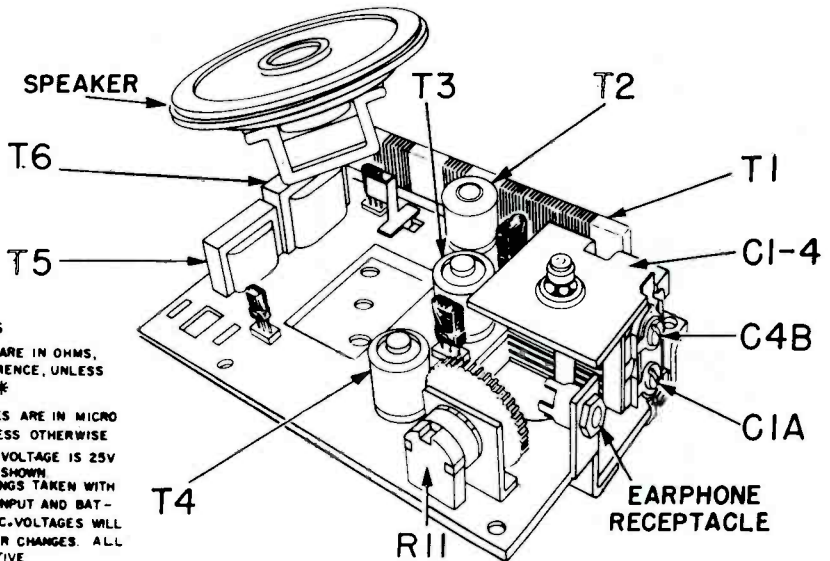
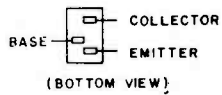
We are including in the schematic of this radio the proper current ranges found at the various check points. A properly operating stage should not vary from these readings. An excessive current reading will likely mean a shorted transistor.

MONTGOMERY WARD Transistor Radio Model BR-1102A

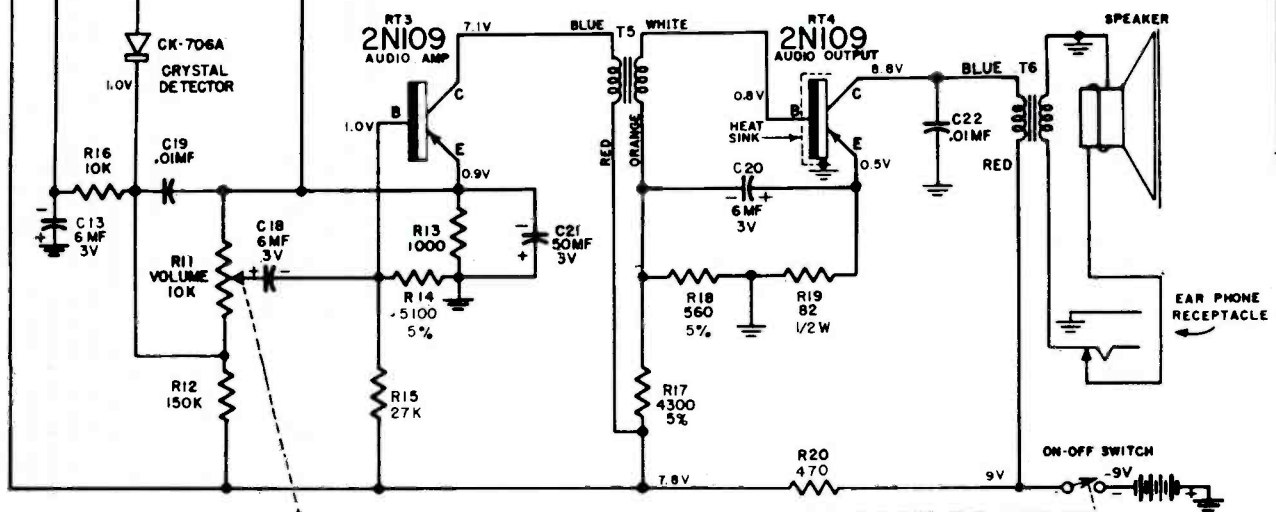
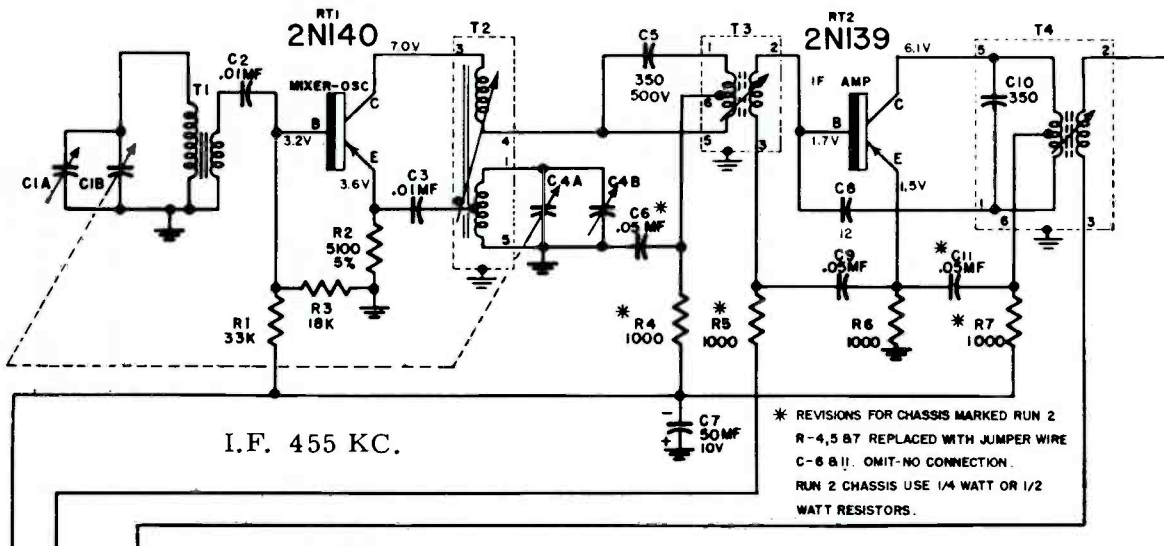
TYPE 2N109, 2N139 AND 2N140



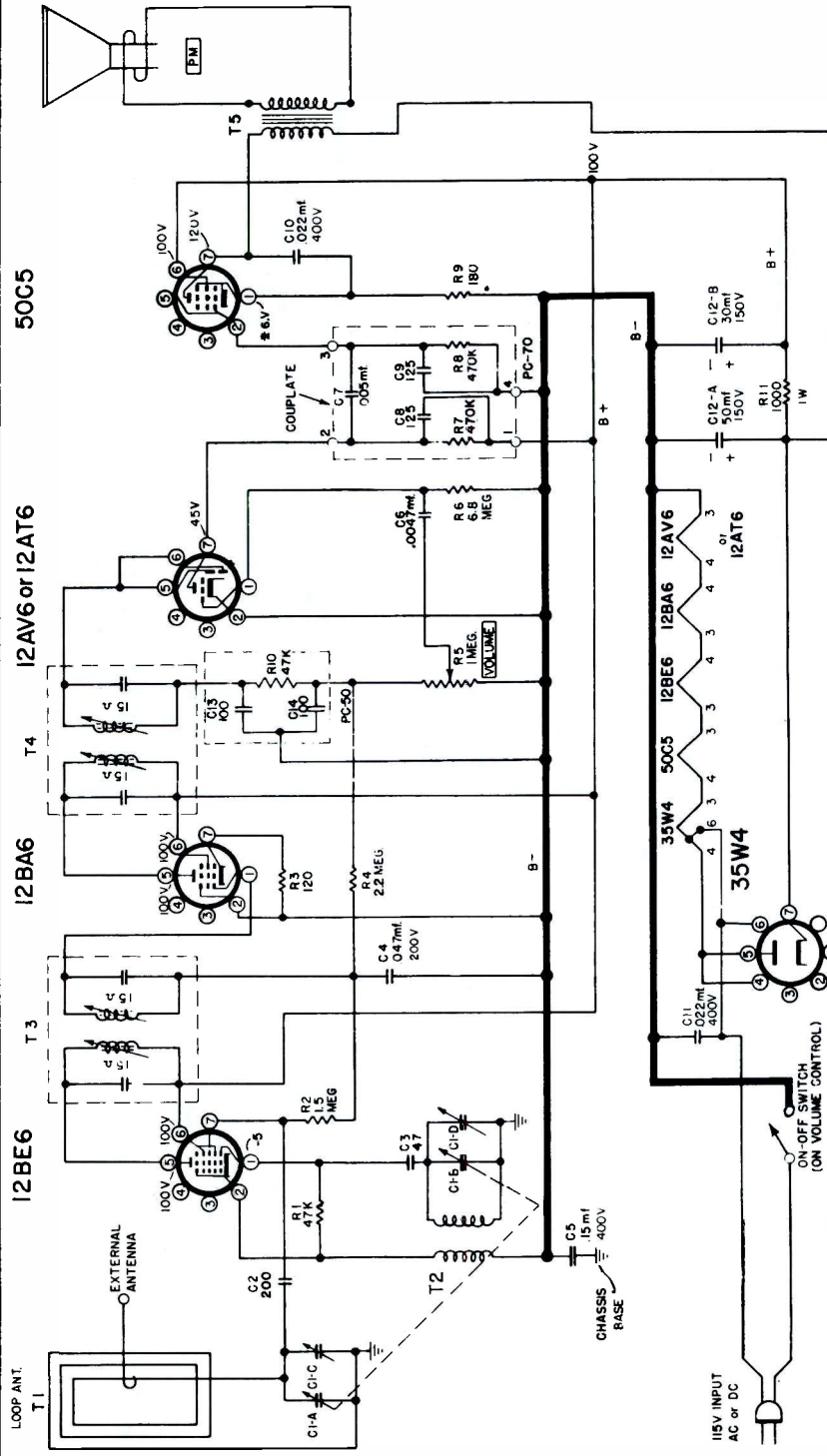
TRANSISTOR SOCKET



NOTES
 RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 10% TOLERANCE, UNLESS OTHERWISE SHOWN. *
 CAPACITOR VALUES ARE IN MICRO-MICROFARADS UNLESS OTHERWISE SHOWN. DC WORKING VOLTAGE IS 25V UNLESS OTHERWISE SHOWN. DC VOLTAGE READINGS TAKEN WITH VTVM, NO SIGNAL IN INPUT AND BATTERY VOLTAGE - 9VDC. VOLTAGES WILL VARY WITH TRANSISTOR CHANGES. ALL VOLTAGES ARE NEGATIVE.



MONTGOMERY WARD
Models BR-1557B, BR-1558B

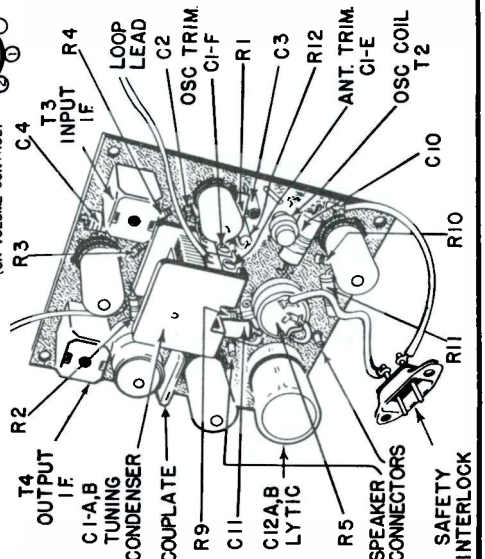


NOTES:
VOLTAGE READINGS TAKEN WITH A 1000-OHM-PER-VOLT
VOLTMETER ON THE 250 VOLT SCALE
* READ ON THE 10 VOLT SCALE OF THE VOLTMETER
LINE VOLTAGE 115V. A.C.
UNLESS OTHERWISE SHOWN, RESISTOR VALUES ARE IN OHMS
AND ARE 1/2 WATT
CAPACITOR VALUES ARE IN MICRO-MICROFARADS

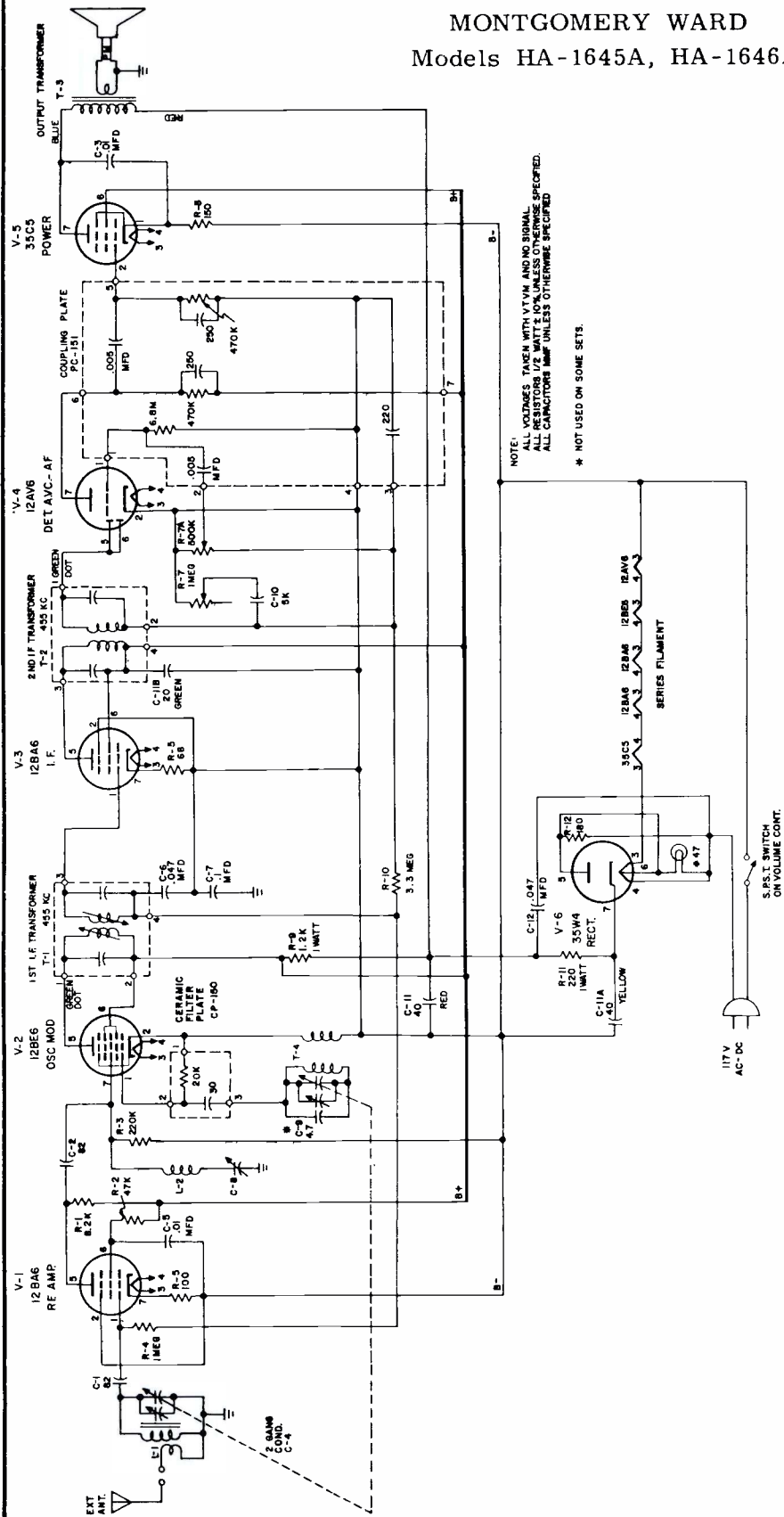
ALIGNMENT PROCEDURE

SIGNAL GENERATOR		GROUND SIDE	TUNER SETTING	ADJUST FOR
FREQUENCY	COUPLING CAPACITY	CONNECTION TO RADIO	GANG OPEN (plates out of mesh)	MAXIMUM OUTPUT
I.F. 455 KC	.1 mfd.	GREEN LOOP LEAD	GANG OPEN (plates out of mesh)	Top and Bottom cores T4 and T3
Osc. 1620 KC	.1 mfd.	FRONT TRIMMER ON GANG	GANG OPEN (plates out of mesh)	C1F Osc. trimmer on gang
Ant. 1400 KC		Connect 3 turn loop generator place near loop on receiver	TUNE TO (1400 KC signal)	C1E Antenna trimmer on gang

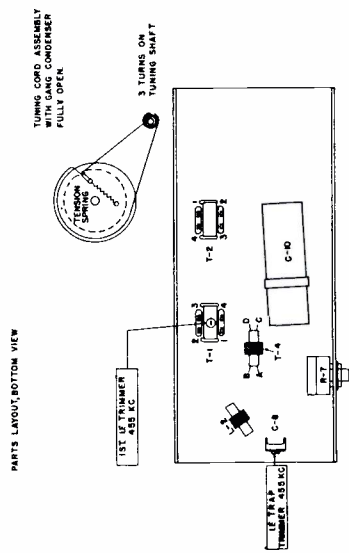
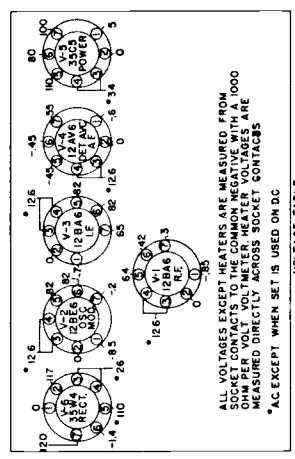
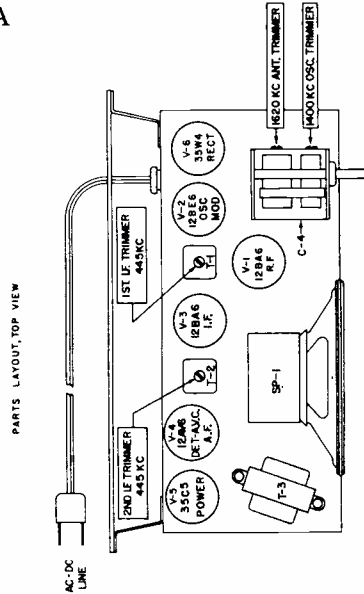
CHECK FOR ALIGNMENT AND DIAL CALIBRATION AT 1000 AND 600 KC.



MONTGOMERY WARD
Models HA-1645A, HA-1646A

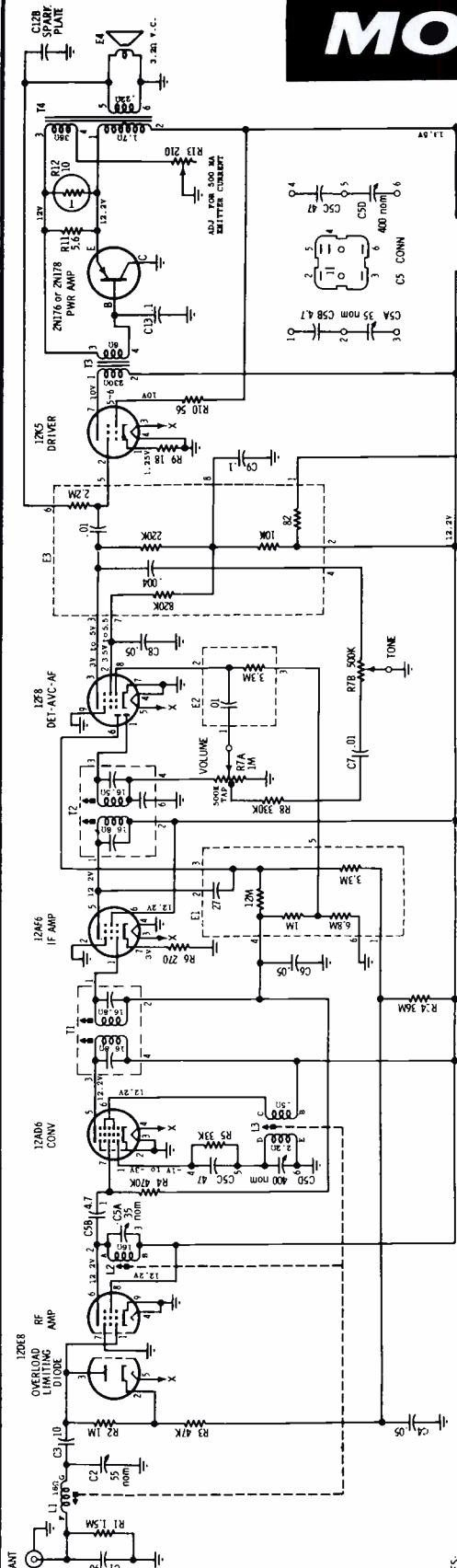


NOTE: VOLTAGES TAKEN WITH V.T.M. AND NO SIGNAL.
ALL RESISTORS 1/2 WATT 5% UNLESS OTHERWISE SPECIFIED.
ALL CAPACITORS 50MFD UNLESS OTHERWISE SPECIFIED.
* NOT USED ON SOME SETS.



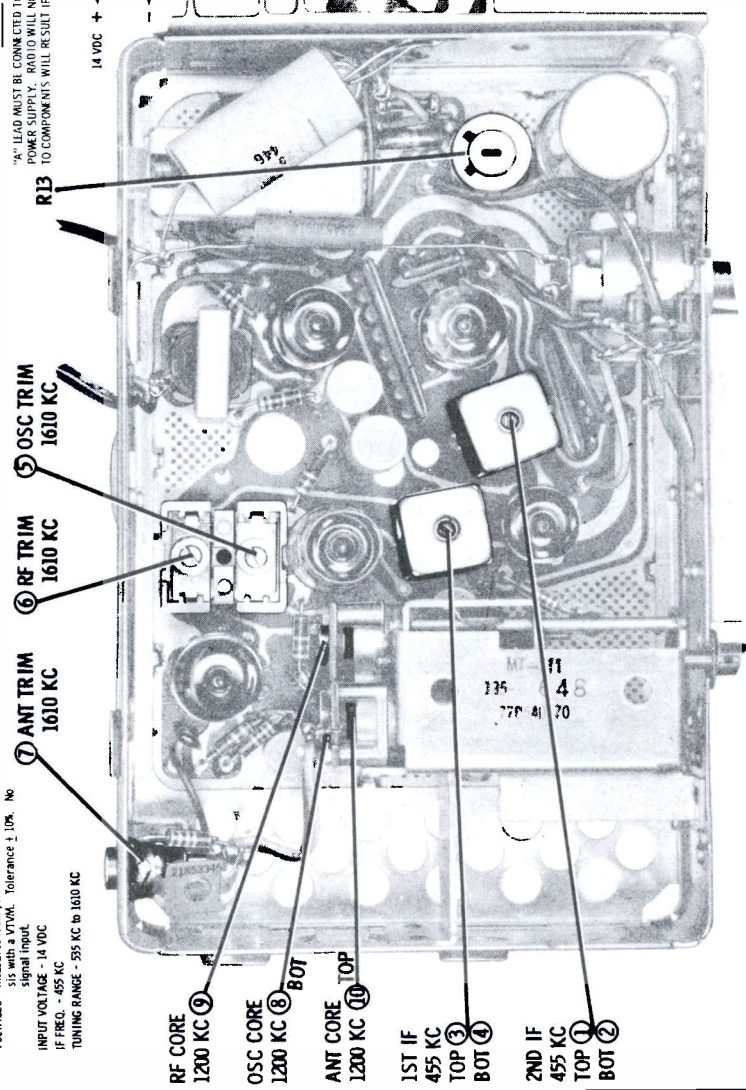
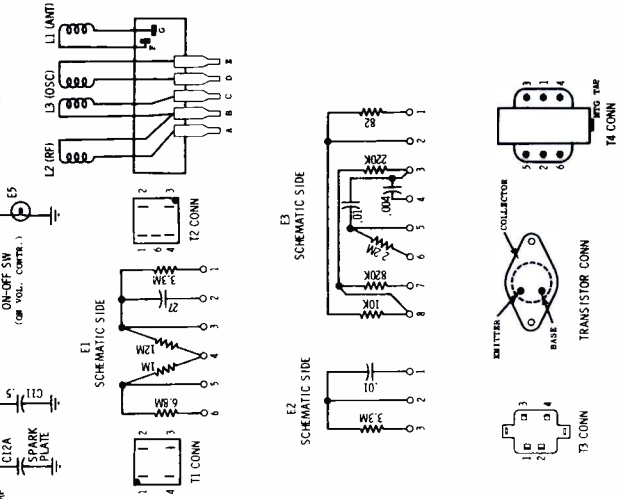
MOTOROLA

**AUTO RADIO
MODEL
7MX**



CAUTION
"X" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance ± 10%. No signal input.
INPUT VOLTAGE - 14 VDC IF FREQ. - 455 KC
TUNING RANGE - 535 KC to 1610 KC

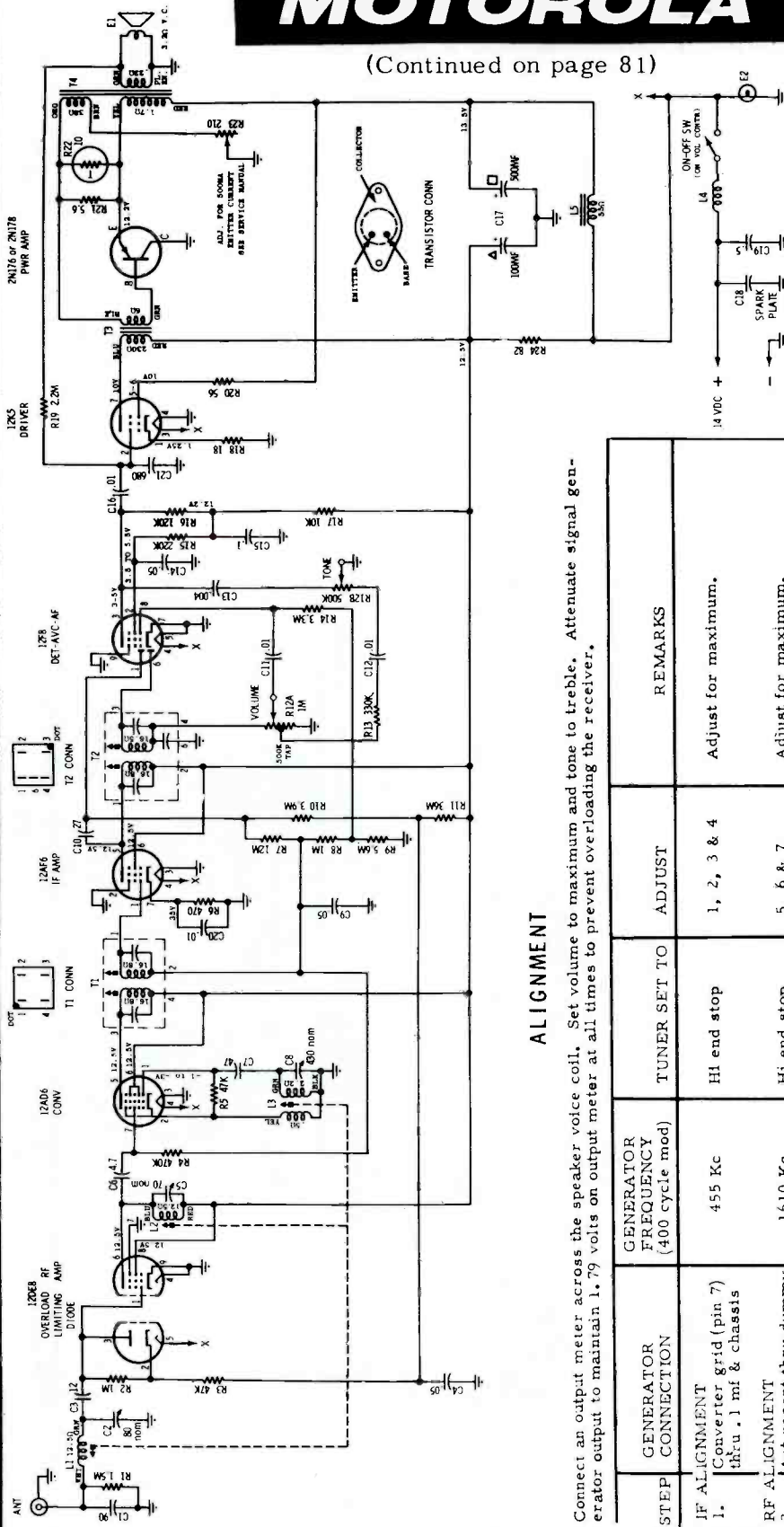


- 1 ANT TRIM 1610 KC
- 2 RF TRIM 1610 KC
- 3 OSC TRIM 1610 KC
- 4 RF CORE 1200 KC
- 5 OSC CORE 1200 KC
- 6 ANT CORE 1200 KC
- 7 1ST IF 455 KC TOP
- 8 1ST IF 455 KC BOT
- 9 2ND IF 455 KC TOP
- 10 2ND IF 455 KC BOT

MOTOROLA

(Continued on page 81)

AUTO RADIO
MODEL
CTM7X



CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - Decimal values in MF, others in MUF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance $\pm 10\%$. No signal input.
INPUT VOLTAGE - 14 VDC.
TUNING RANGE - 595 KC to 1695 KC.
IF FREQ. - 455 KC.

ALIGNMENT

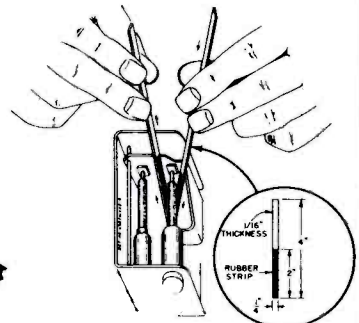
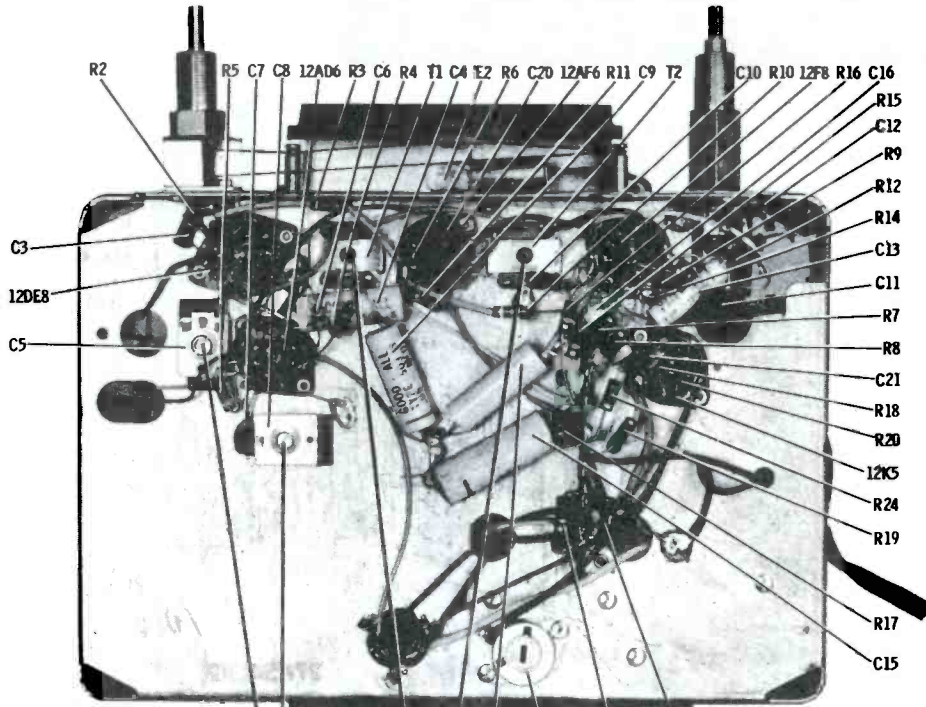
Connect an output meter across the speaker voice coil. Set volume to maximum and tone to treble. Attenuate signal generator output to maintain 1.79 volts on output meter at all times to prevent overloading the receiver.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	TUNER SET TO	ADJUST	REMARKS
1.	IF ALIGNMENT Converter grid (pin 7) thru .1 mf & chassis	455 Kc	Hi end stop	1, 2, 3 & 4	Adjust for maximum.
2.	RF ALIGNMENT Ant receipt thru dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
3.	Ant receipt thru dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
4.	"	1400 Kc	Tuner carriage 13/64" from hi end stop	8, 9 & 10	Adjust for maximum.
5.	"	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
6.	Repeat steps 4 & 5 until no further increase, then cement tuning cores in place; step 5 should be last adjustment.				
7.	ANTENNA TRIMMER	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, adjust antenna trimmer for maximum.

(See page 81 for views of locations of adjustments and parts)

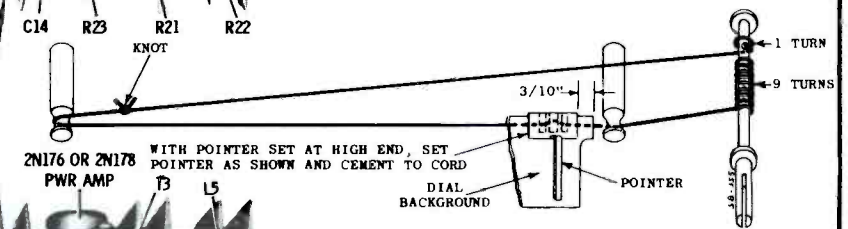
MOTOROLA

Model CTM7X
(Continued from page 80)

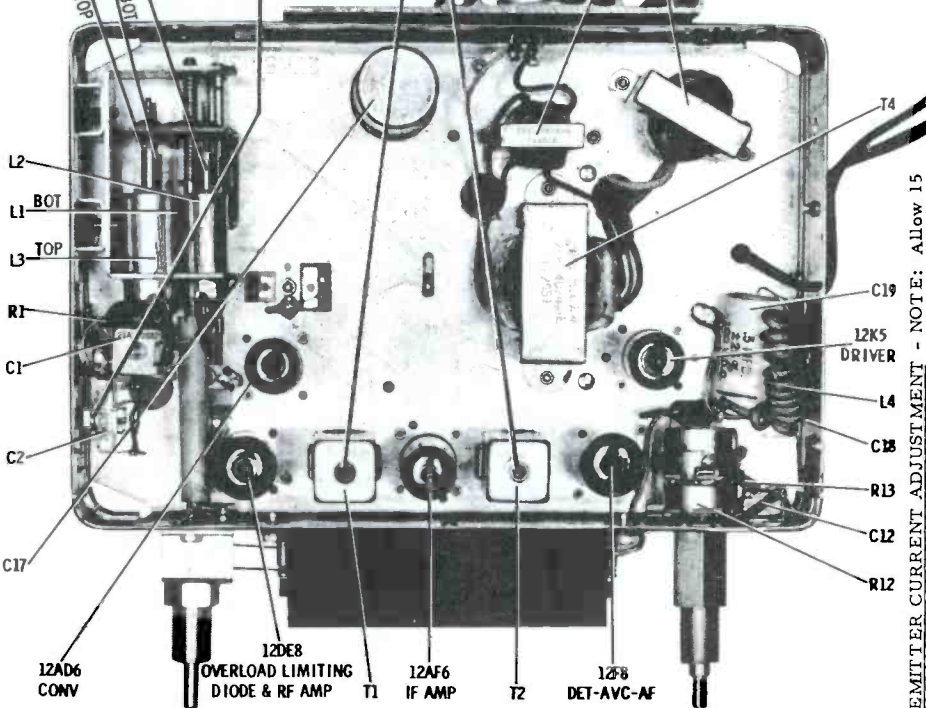


CORE ALIGNMENT TOOL DETAIL

- RF CORE 1400 KC (9)
- RF TRIM 1610 KC (6)
- ANT CORE 1400 KC (10)
- OSC TRIM 1610 KC (5)
- OSC CORE 1400 KC (8)
- ANT TRIM 1610 KC (7)
- 1ST IF 455 KC (4)
- 2ND IF 455 KC (2)
- 2ND IF 455 KC (1)
- 1ST IF 455 KC (3)

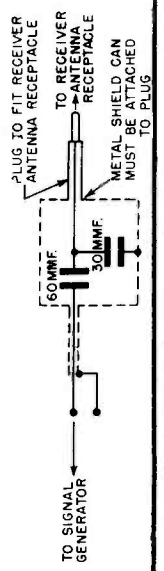


DIAL RESTRINGING DETAIL



ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS

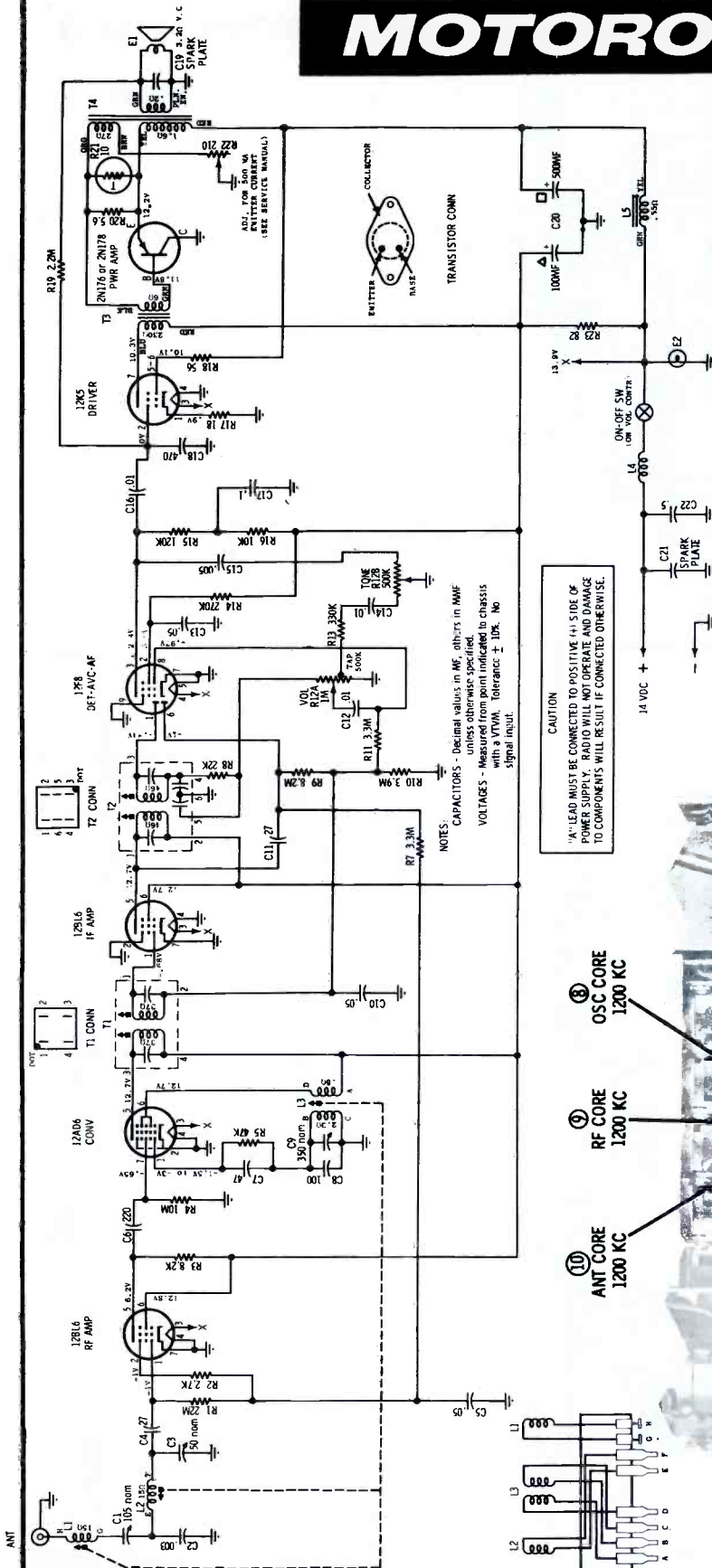
EMITTER CURRENT ADJUSTMENT - NOTE: Allow 15 minutes warm-up time before making any adjustments. The emitter current is adjusted by variable resistor R-23 for a 500 Ma flow through the transistor with 14 volts at the receiver's "A" lead. Disconnect yellow lead which goes to the emitter contact of the transistor socket; connect this lead to the positive side of a milliammeter; connect negative side of meter to emitter contact of the transistor socket. Adjust variable resistor R-23 for a 500 Ma current flow through the meter. NOTE: INTERNAL RESISTANCE OF MILLIAMMETER SHOULD NOT EXCEED .5 OHM.



DUMMY ANTENNA

MOTOROLA

**AUTO RADIO
MODEL
OEA7X**

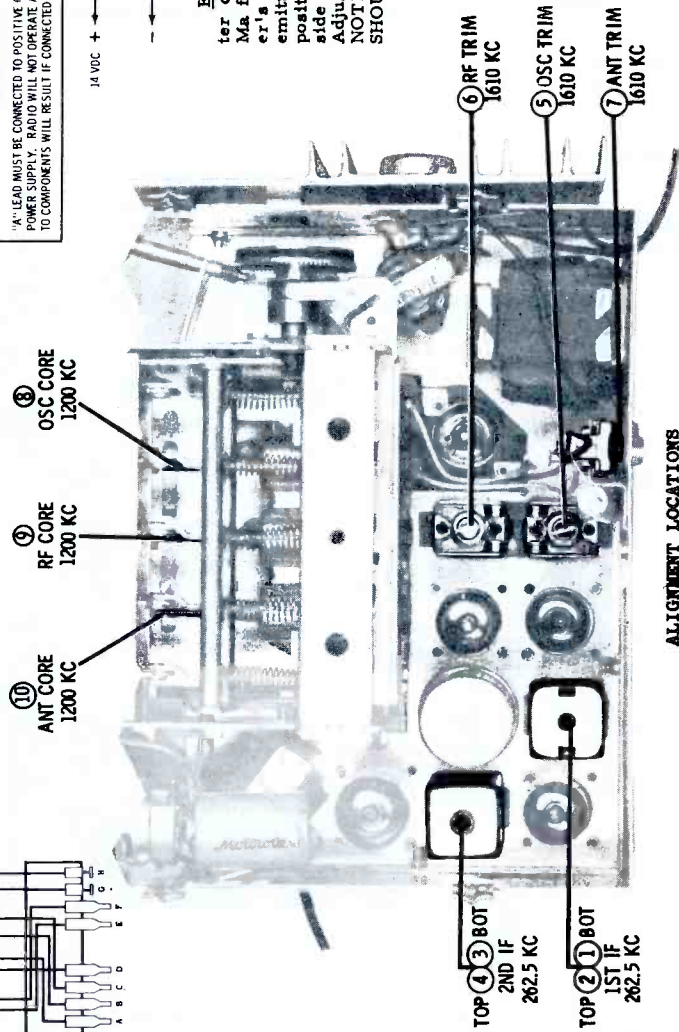


EMITTER CURRENT ADJUSTMENT - NOTE: The emitter current is adjusted by variable resistor R-22 for a 500 Ma flow through the transistor with 14 volts at the receiver's "A" lead. Disconnect yellow lead which goes to the emitter contact of the transistor socket; connect it to the positive (+) side of a milliammeter; connect negative (-) side of meter to emitter contact of the transistor socket. Adjust R-22 for a 900 Ma current flow through the meter. NOTE: INTERNAL RESISTANCE OF MILLIAMMETER SHOULD NOT EXCEED .5 OHM.

TO SET PUSHBUTTONS

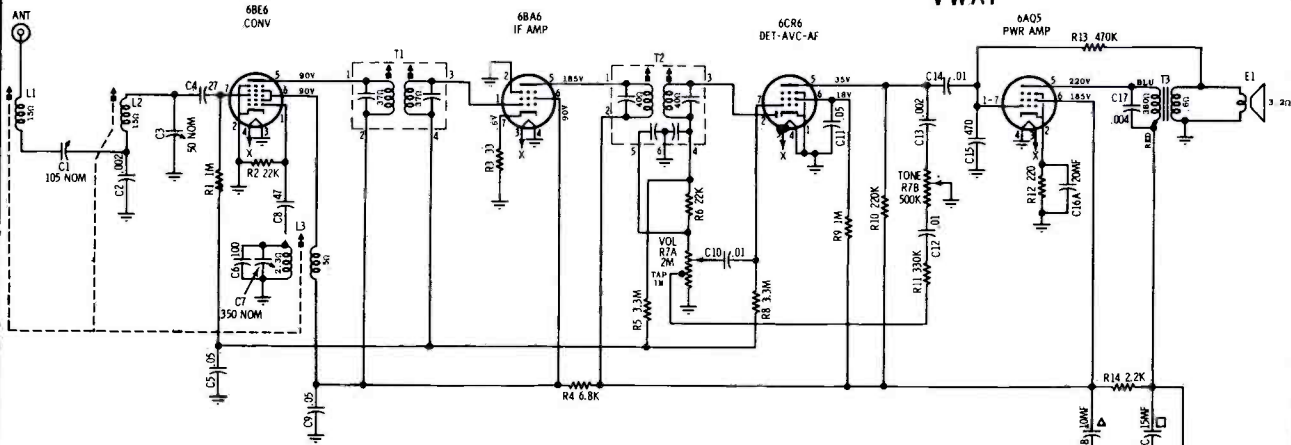
To set the pushbuttons for automatic tuning, proceed as follows:

1. Tune in the desired station with the manual tuning knob. Tune carefully until you are exactly on the station.
2. Pull out the first pushbutton to be set, to unlock the button for station set-up, and then push button in firmly to set and lock the pushbutton.
3. Follow the above procedure for the remaining four pushbuttons.



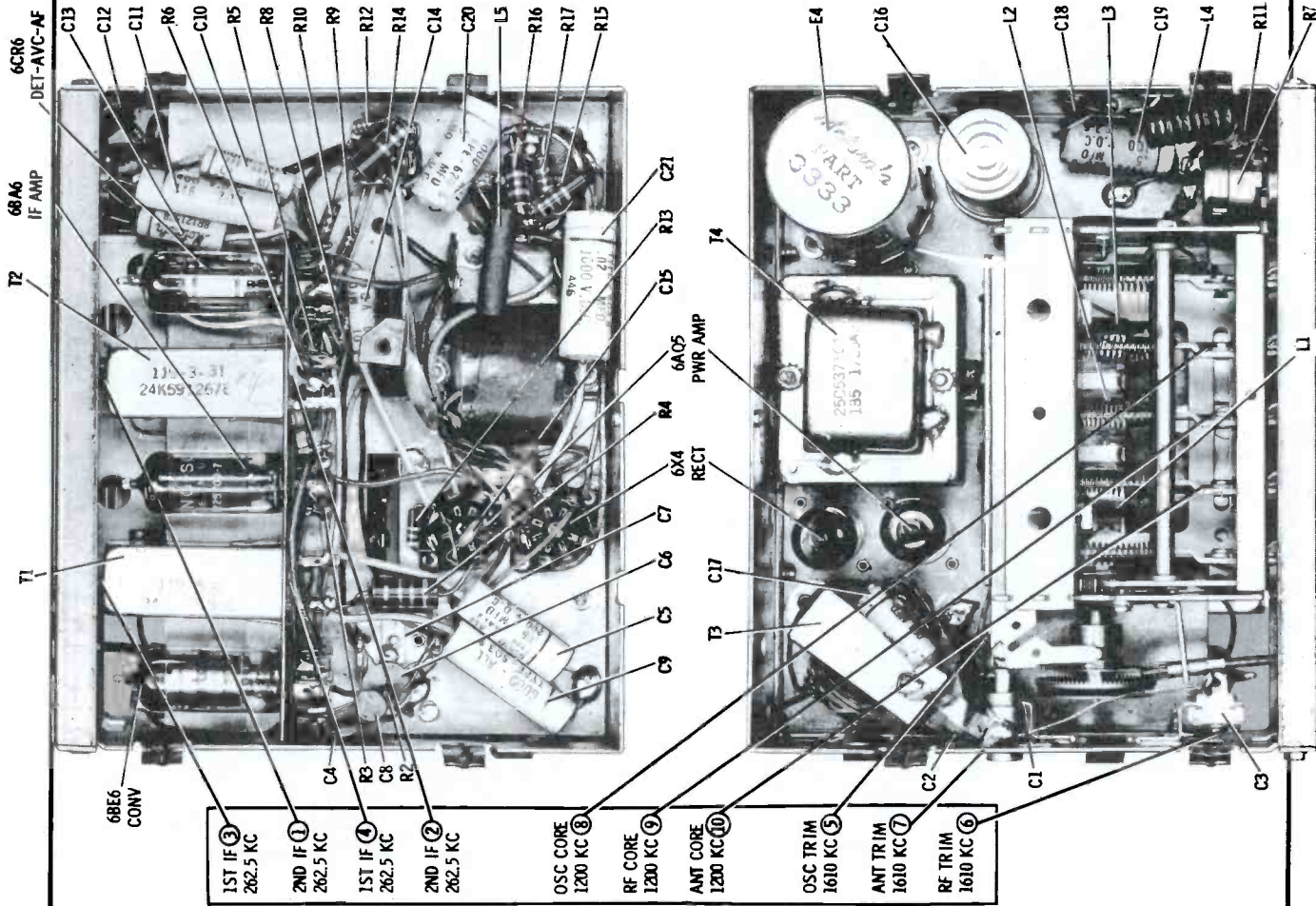
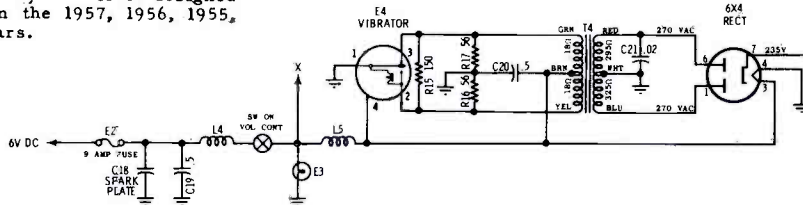
MOTOROLA

AUTO RADIO MODEL VWA7



TYPE - Automotive type superheterodyne receiver designed for custom installation in the 1957, 1956, 1955, 1954 & 1953 Volkswagen cars.

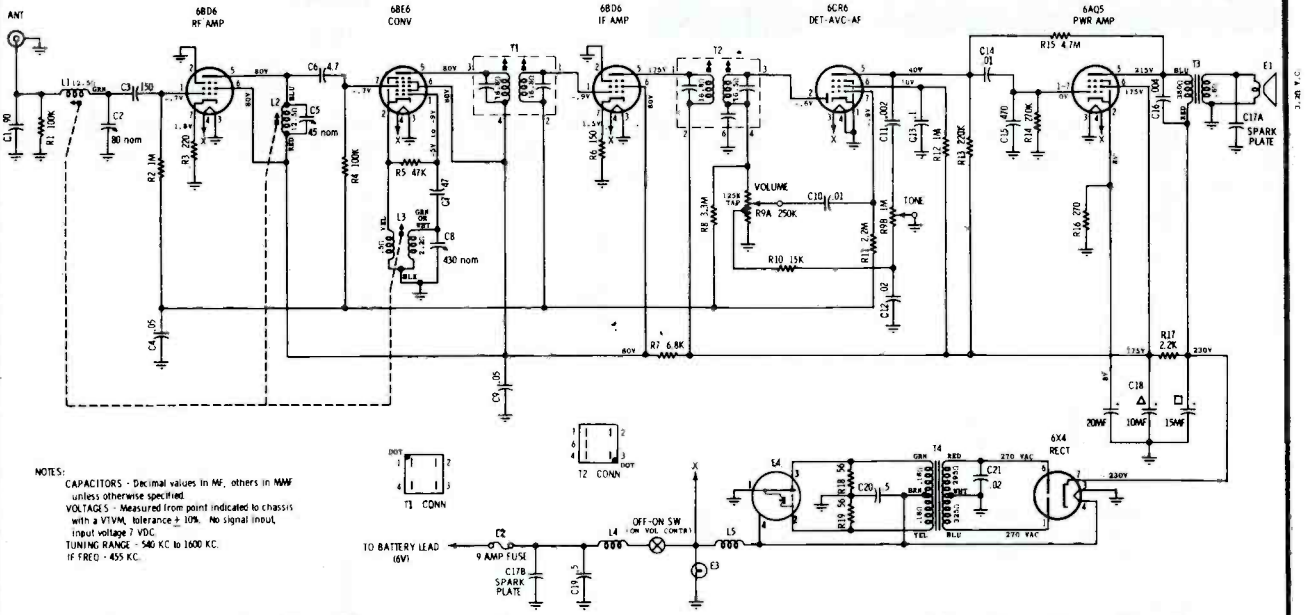
NOTES:
CAPACITORS: Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES: Measured from point indicated to chassis with a VTVM. No signal input. Tolerance $\pm 10\%$.
INPUT VOLTAGE: 7V
TUNING RANGE: 535 KC to 1605 KC.
IF: 262.5 KC.



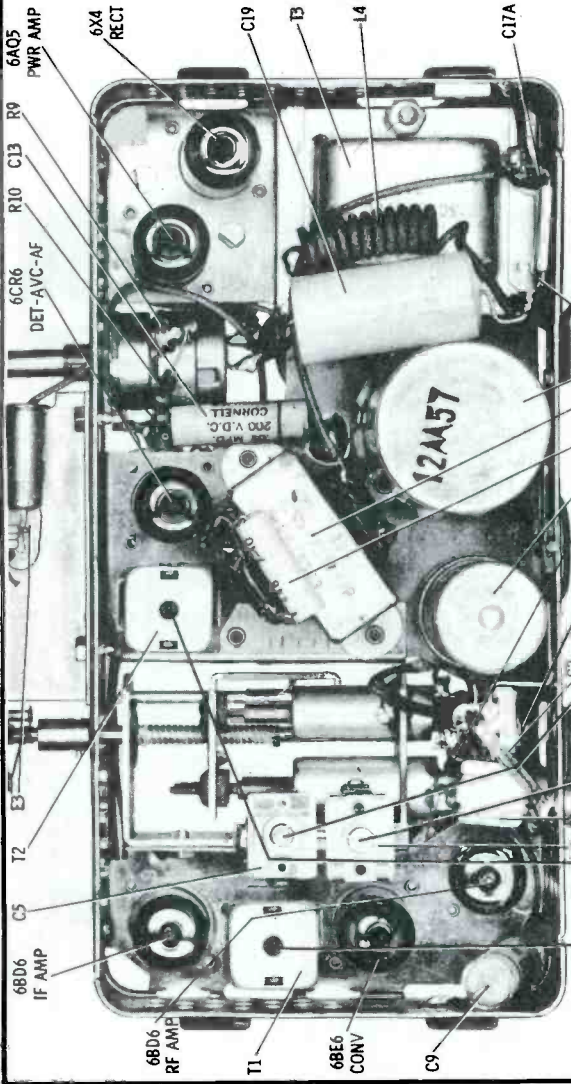
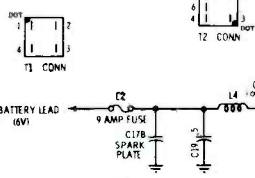
ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

MOTOROLA

Auto Radio Model 8M

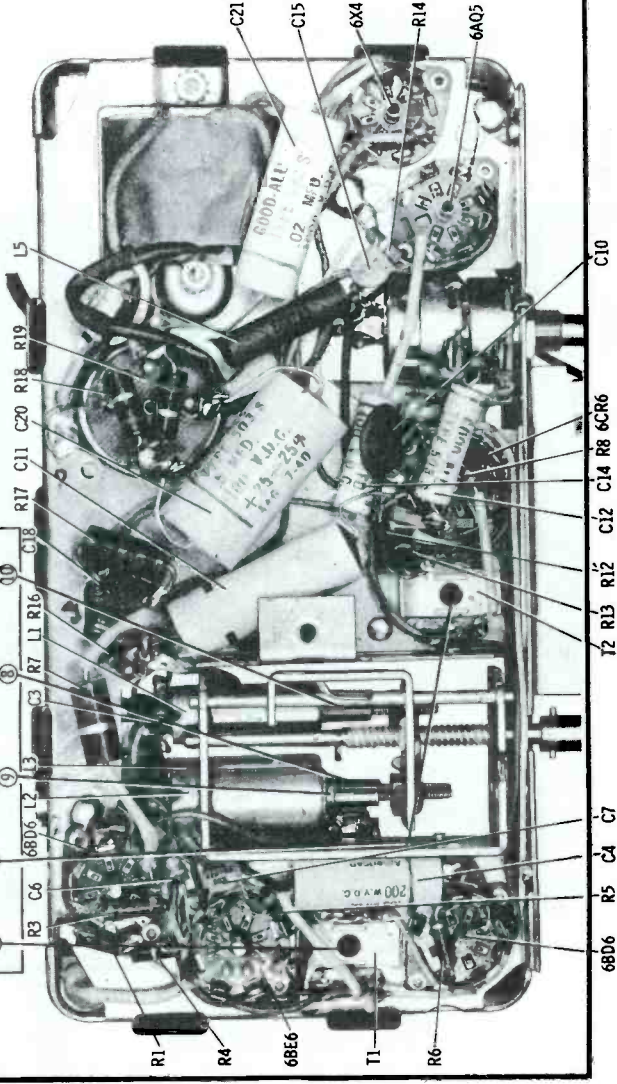


NOTES:
 CAPACITORS - Decimal values in MF, others in MM unless otherwise specified.
 VOLTAGE - Measured from point indicated to chassis with a VTVM, tolerance $\pm 10\%$. No signal input. Input voltage 7 VDC.
 TUNING RANGE - 540 KC to 1600 KC.
 IF FREQ - 455 KC.



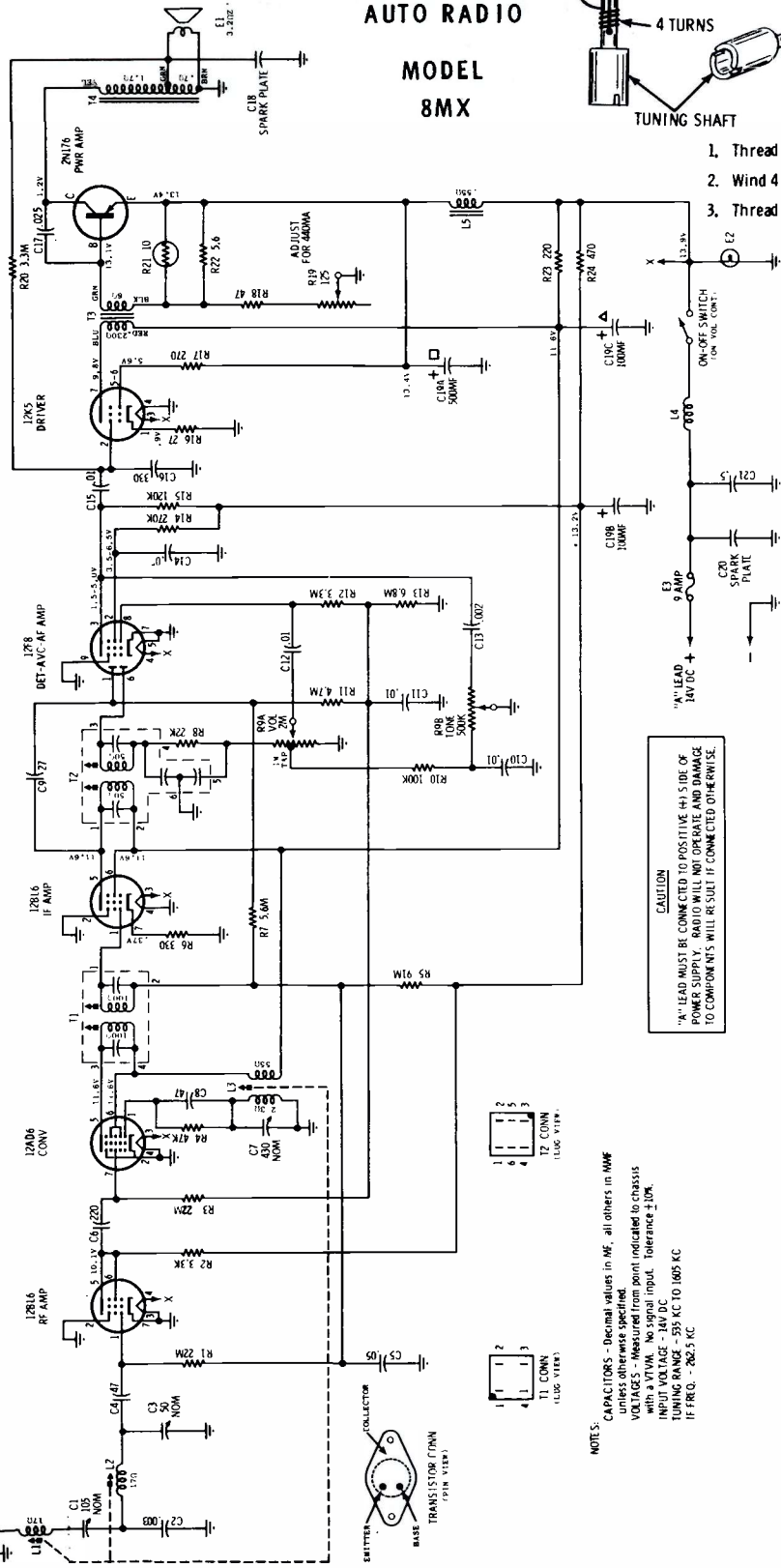
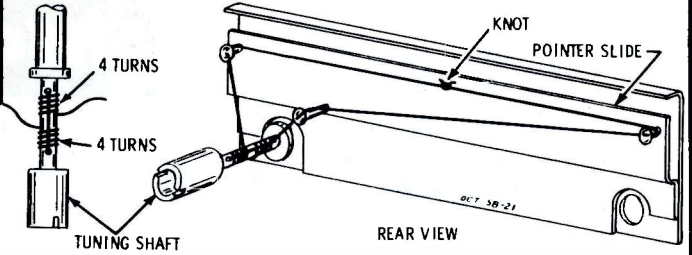
ALIGNMENT ADJUSTMENT & PARTS LOCATIONS

- ① 1ST IF 455 KC
- ② RF CORE 1400 KC
- ③ OSC TRIM 1610 KC
- ④ 2ND IF 455 KC
- ⑤ RF CORE 1400 KC
- ⑥ OSC CORE 1400 KC
- ⑦ ANT TRIM 1610 KC
- ⑧ ANT CORE 1400 KC



MOTOROLA

AUTO RADIO MODEL 8MX



1. Thread a sufficient length of dial cord through two holes in shaft,
2. Wind 4 turns from each hole toward center of shaft as shown in detail.
3. Thread over guides and tie knot as shown.

c. Adjust R-19 for a collector current reading of 360 ma with 12.6 volts input to radio "A" lead.
NOTE: Two values of radio input voltage are given as a convenience to service personnel to accommodate different power sources. The schematic collector current value of 440 ma. is stated with 14 volts DC input to receiver "A" lead.

TRANSISTOR INSULATOR - When replacing a transistor or transistor insulator, be sure to coat both sides of insulator with DC-4 grease (Motorola Part No. 11M490487) to insure proper heat dissipation.

TRANSISTOR CHECK - Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors. **NOTE:** When checking, be sure transistor insulator is in place (see SERVICE NOTE 6).

TUBE CHECK - Substituting a known good tube for a suspected one is the best and only check recommended at this time.

SERVICE NOTES

TRANSISTOR REPLACEMENT - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and set will not operate. If mounting screws are not tight, the transistor will be damaged due to lack of proper heat dissipation.

TRANSISTOR CURRENT ADJUSTMENT - After the transistor has been replaced, the collector current should be checked and adjusted for proper operation.

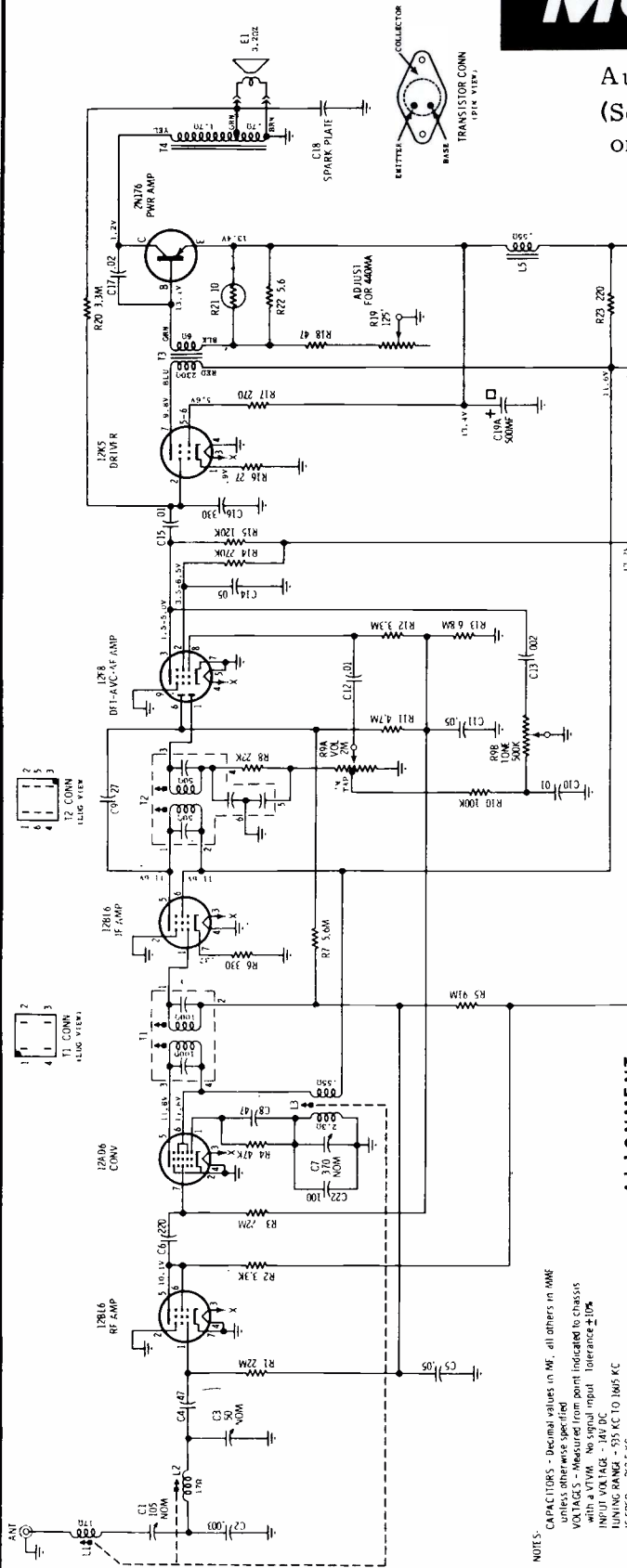
- Set R-19 on back of receiver to its maximum resistance position (fully clockwise) to avoid excessive collector current, then allow radio to warm-up for 15 minutes.
- Open the output transformer T4 (speaker connected) by disconnecting the collector lead (Yel.) from the center lug of transistor socket, and insert a 0-1 amp DC Ammeter whose internal resistance is .05 ohms or less: (+) side of meter to lug of transistor socket and (-) side to yellow lead of transformer.

NOTE:
 CAPACITORS - Decimal values in μ F, all others in μ MFD unless otherwise specified.
 VOLTAGES - Measured from point indicated to chassis with a VTVM. No signal input. Tolerance $\pm 10\%$.
 INPUT VOLTAGE - 14V DC
 TUNING RANGE - 535 KC TO 1605 KC
 IF FREQ. - 262.5 KC



MOTOROLA

Auto Radio Model CTA8X
(Service material continued on page 87, adjacent at right)



ALIGNMENT

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	TUNER SET TO	ADJUST	REMARKS
1.	IF ALIGNMENT Converter grid (pin 7) through .1 mf & chassis.	262.5 Kc	Hi end stop	1, 2, 3 & 4	Adjust for maximum.
2.	RF ALIGNMENT Ant receipt through dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
3.	Ant receipt through dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
4.	"	1200 Kc	Tuner carriage 9/32" from hi end stop	8, 9 & 10	Adjust for maximum, using alignment tool, Motorola Part No. 66A76278.
5.	"	1610 Kc	Hi end stop	5, 6 & 7	"
6.	Repeat steps 4 and 5 until no further increase,		then cement tuning cores in place.		Step 5 should be last adjustment.
7.	ANTENNA TRIMMER	-	Weak station Around 1400 Kc	7	With radio installed in car and antenna fully extended, adjust antenna trimmer for maximum.

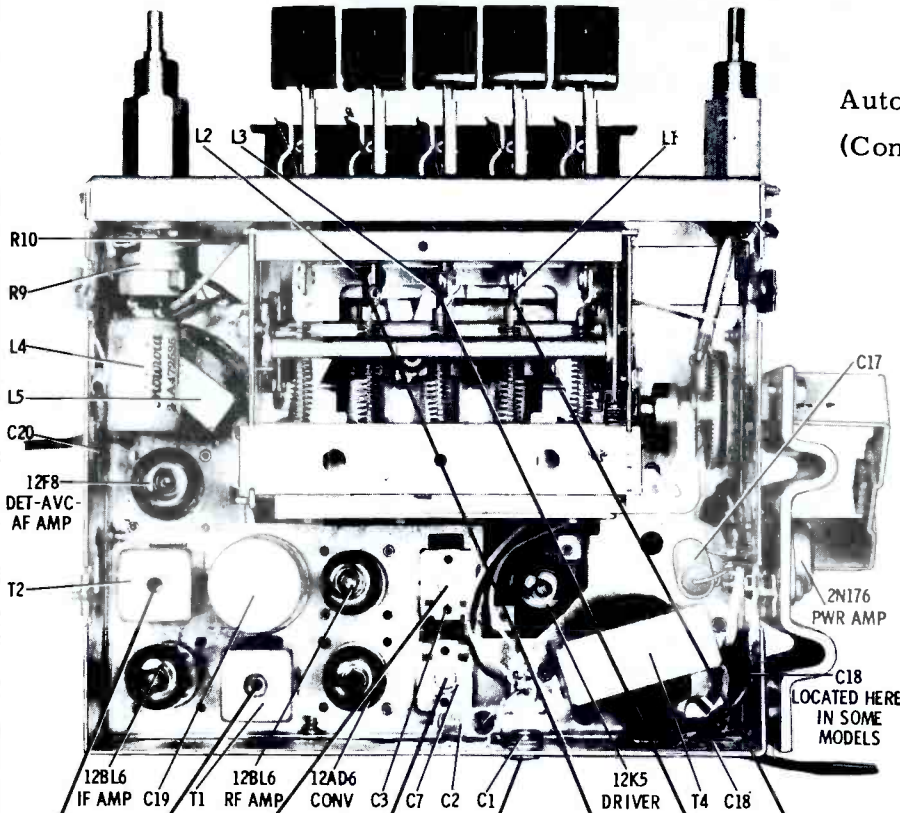
NOTES: CAPACITORS - Decimal values in MF, all others in MME unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. No signal input. Tolerance ±10%.
INPUT VOLTAGE - 14V DC
TUNING RANGE - 555 KC TO 1865 KC
IF FREQ - 262.5 KC

CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL BE DONE IF CONNECTED OTHERWISE.

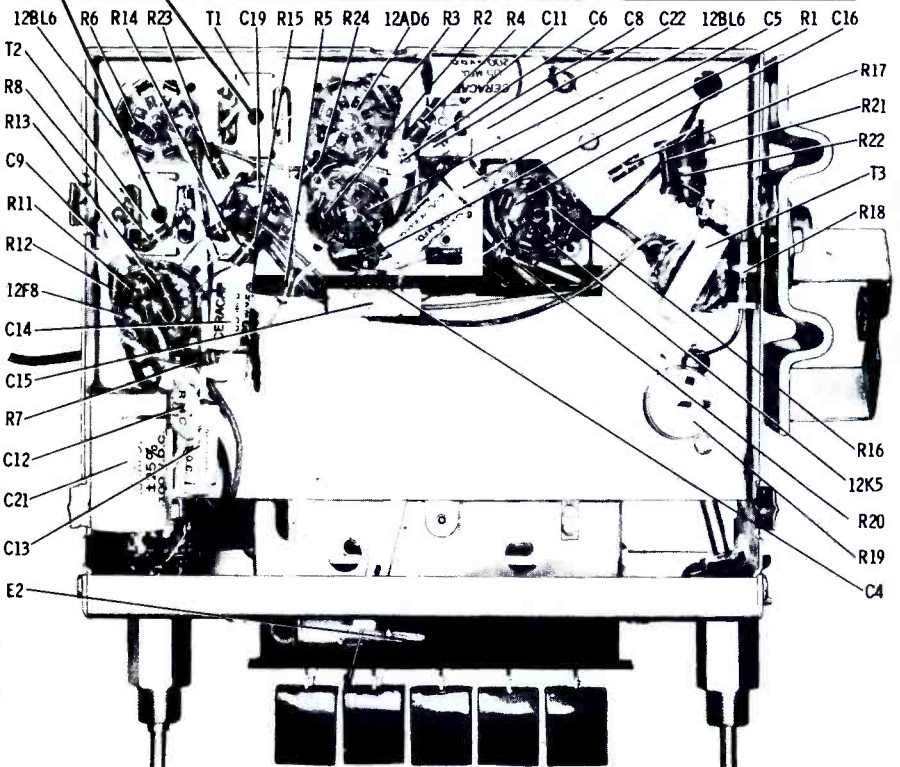
MOTOROLA

Auto Radio Model CTA8X

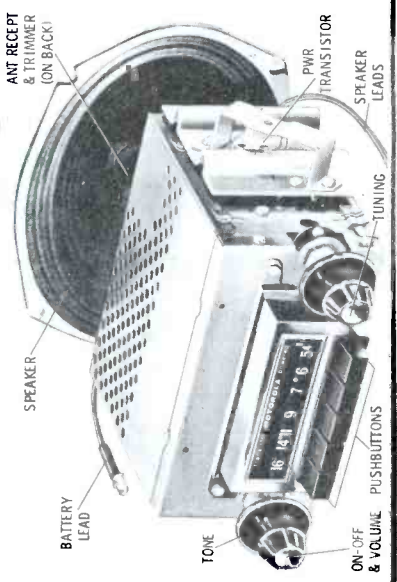
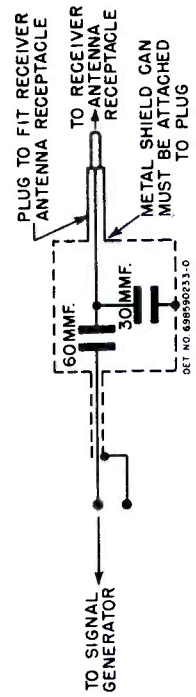
(Continued from page 86)



①	③	⑥	⑤	⑦	⑨	⑧	⑩
2ND IF 262.5 KC	1ST IF 262.5 KC	RF TRIM 1610 KC	OSC TRIM 1610 KC	ANT TRIM 1610 KC	RF CORE 1200 KC	OSC CORE 1200 KC	ANT CORE 1200 KC
②	④	ALIGNMENT POINTS					



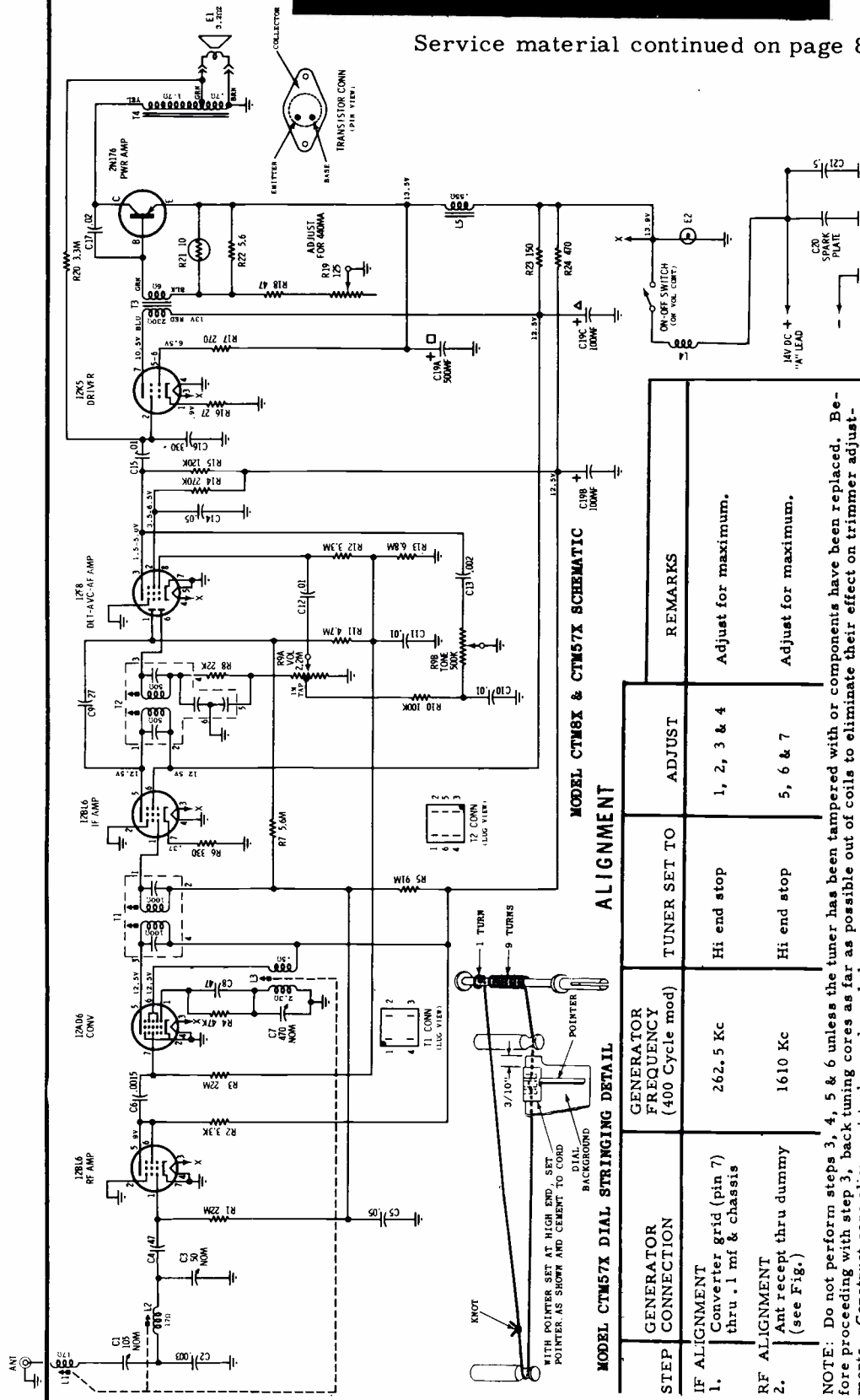
ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



MOTOROLA

MODELS
CTM8X
CTM57X

Service material continued on page 89.



CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGE MEASURED FROM POINT INDICATED BY CHASSIS SYMBOL.
INPUT VOLTAGE - 14V DC
TUNING RANGE - 540 KC TO 1610 KC
IF FREQ. - 262.5 KC

MODEL CTM8X & CTM57X SCHEMATIC

ALIGNMENT

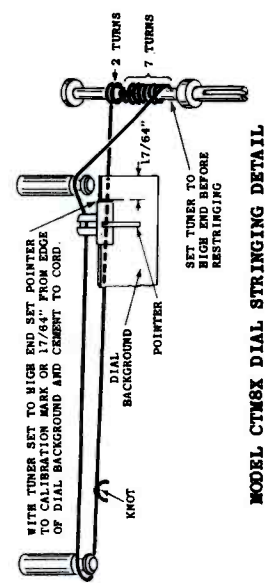
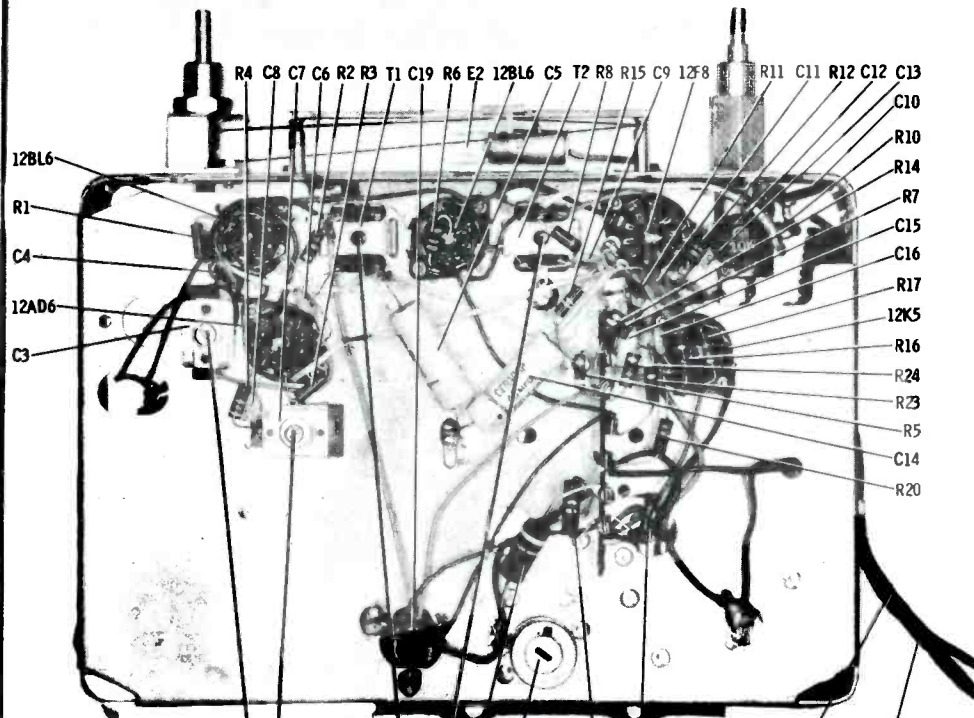
STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 Cycle mod)	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT					
1.	Converter grid (pin 7) thru .1 mf & chassis	262.5 Kc	Hi end stop	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Ant receipt thru dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
NOTE: Do not perform steps 3, 4, 5 & 6 unless the tuner has been tampered with or components have been replaced. Before proceeding with step 3, back tuning cores as far as possible out of coils to eliminate their effect on trimmer adjustments. Construct core alignment tools as shown below.					
3.	Ant receipt thru dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
4.	"	1400 Kc	Tuner carriage 13/64" from hi end stop	8, 9 & 10	Adjust for maximum.
5.	"	1610 Kc	Hi end stop	5, 6 & 7	Adjust for maximum.
6.	Repeat steps 4 & 5 until no further increase, then cement tuning cores in place; step 5 should be last adjustment.				
ANTENNA TRIMMER					
7.	-	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, adjust antenna trimmer for maximum.

(For location of alignment adjustments, see illustrations on page 89)

MOTOROLA

Models CTM8X and CTM57X (Continued)

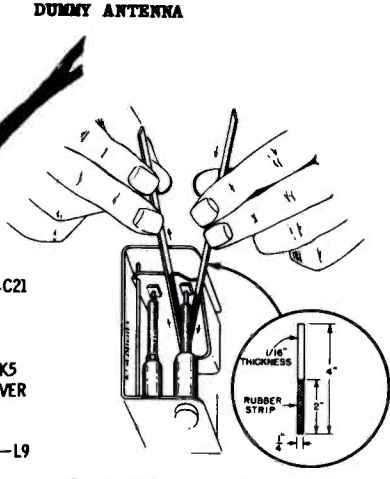
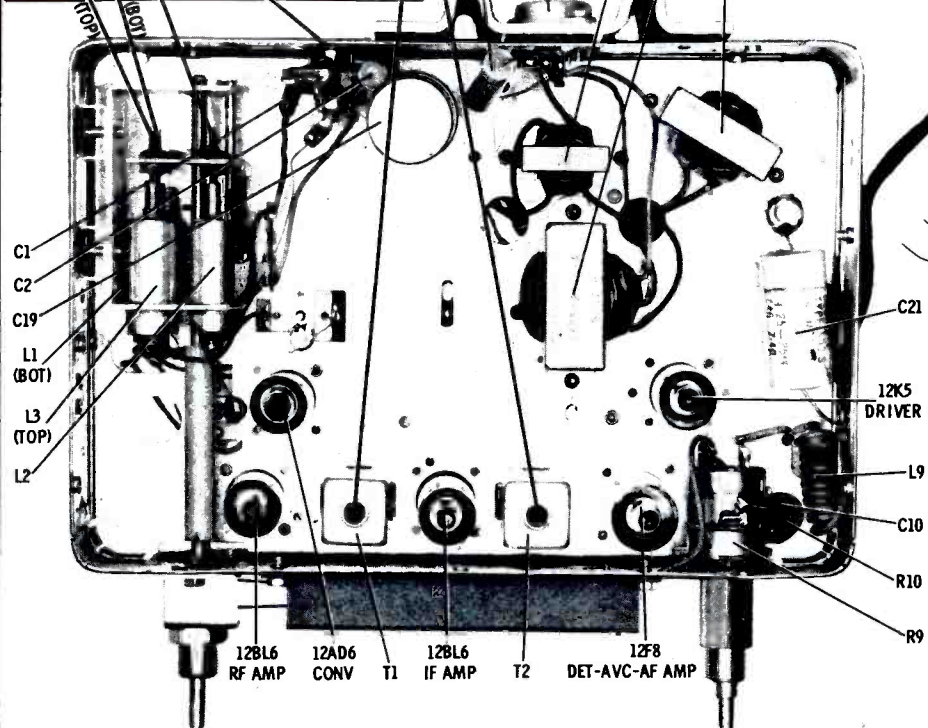
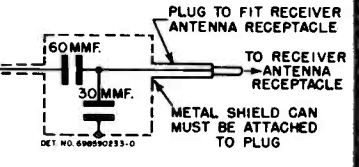
(See page 88 for circuit diagram and additional service material)



- RF CORE 1400 KC (9)
- RF TRIM 1610 KC (6)
- 1ST IF 262.5 KC (4)
- 2ND IF 262.5 KC (2)
- 2ND IF 262.5 KC (1)
- 1ST IF 262.5 KC (3)
- ANT CORE 1400 KC (10)
- OSC TRIM 1610 KC (5)
- OSC CORE 1400 KC (8)
- ANT TRIM 1610 KC (7)

BATTERY "A" LEAD SPEAKER LEADS

TO SIGNAL GENERATOR



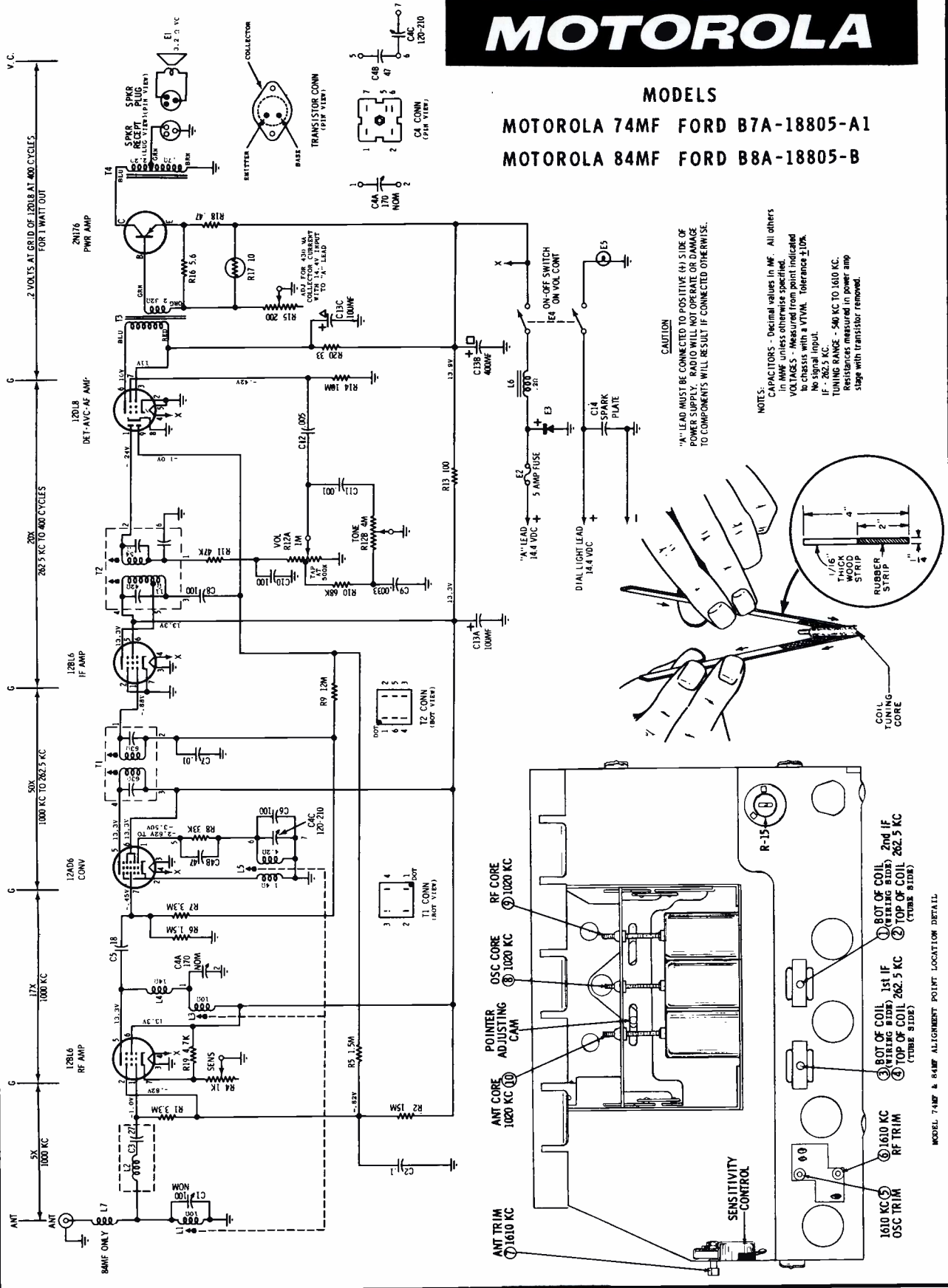
Model CTM8X Alignment adjustments and parts locations. CTM57X is similar.

MOTOROLA

MODELS

MOTOROLA 74MF FORD B7A-18805-A1

MOTOROLA 84MF FORD B8A-18805-B

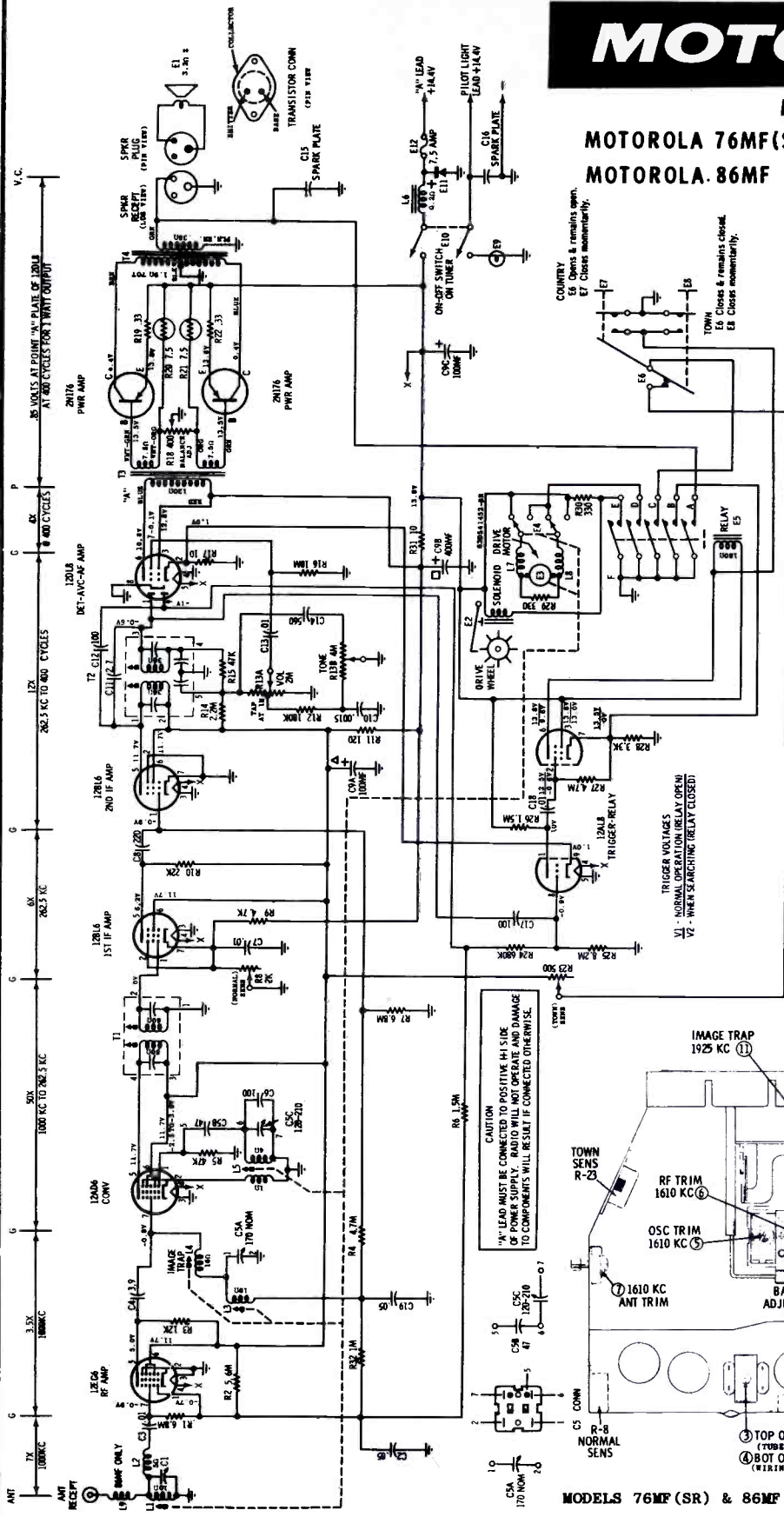


MOTOROLA

MODELS

MOTOROLA 76MF(SR) FORD B7A-18805-B1

MOTOROLA 86MF FORD B8A-18805-A

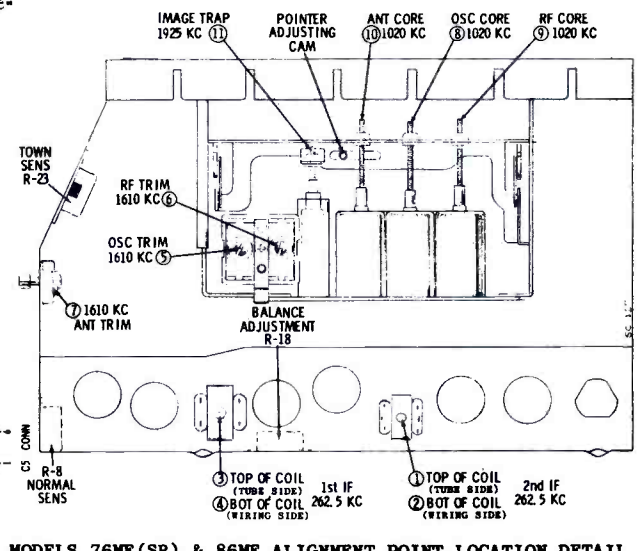


TRANSISTOR CURRENT ADJUSTMENT - After replacing transistor and before connecting radio to power supply, set the transistor balance control (R-18) to the mid-position to prevent excessive current from damaging the transistors. Allow about 15 minutes warm-up time before proceeding with the following:

- Connect a VTVM from collector to collector. Be sure VTVM is accurately zeroed and set to a low voltage scale. NOTE: If VTVM has a center zero scale, use this scale.
- Adjust R-18 for zero DC reading on VTVM.

TRANSISTOR INSULATOR - When replacing a transistor or transistor insulator, be sure to coat both sides of insulator with DC-4 grease (Motorola Part No. 11M490487) to insure proper heat dissipation.

NOTES:
 CAPACITORS - decimal values in MF. All others in MMF unless otherwise specified.
 VOLTAGES - measure from point indicated to chassis unless otherwise specified.
 INPUT VOLTAGE - 14.0DC.
 TUNING RANGE - 540-1610KC.
 IF - 262.5KC.
 Resistances in power amp stage made with transistors removed.

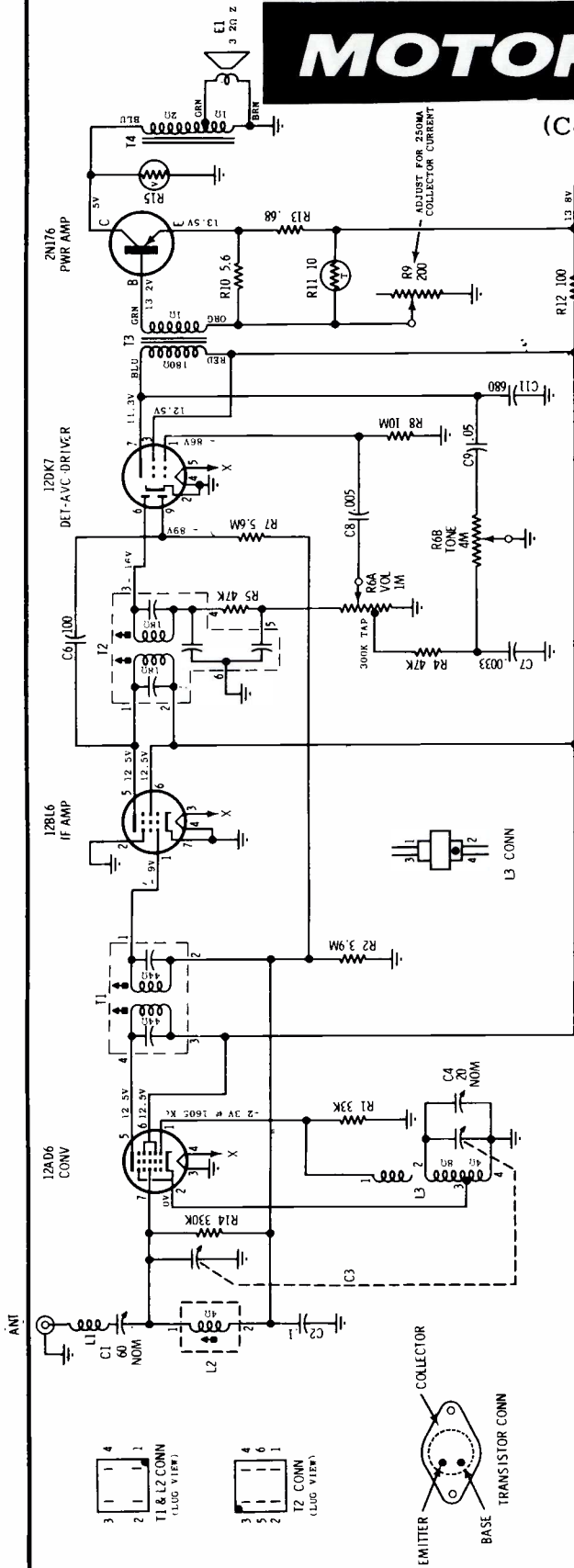


MODELS 76MF(SR) & 86MF ALIGNMENT POINT LOCATION DETAIL

MOTOROLA

MODEL
AMERICAN MOTORS 8990543
MOTOROLA 83MR

(Continued on page 93)



ALIGNMENT

Connect an output meter across the speaker voice coil. Set tone control to high and volume to maximum. Attenuate signal generator output to maintain 1.3 volts on output meter to prevent overloading the receiver.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	GANG SETTING	ADJUST	REMARKS	
IF ALIGNMENT	Grid of conv (pin 7 12AD6) through .1 mf capacitor & chassis	1.	455 Kc	Fully open	1, 2, 3 & 4	Peak for maximum.
		2.	1605 Kc	Fully open	5	Peak for maximum.
		3.	1400 Kc	Tune for max	6	Peak for maximum.
		4.	600 Kc	Tune for max	7	Peak for maximum while rocking gang.
5.	Repeat steps 3 & 4 until no further increase. The last adjustment should be the trimmer (6).					
ANTENNA TRIMMER	—	—	Tune to a weak station around 1400 Kc	6	With radio installed in car and antenna fully extended, peak antenna trimmer for max.	

(For location of alignment adjustments see illustration on page 93)

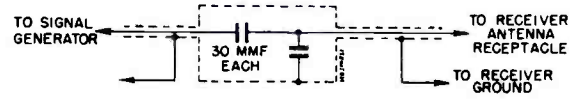
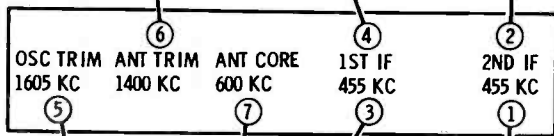
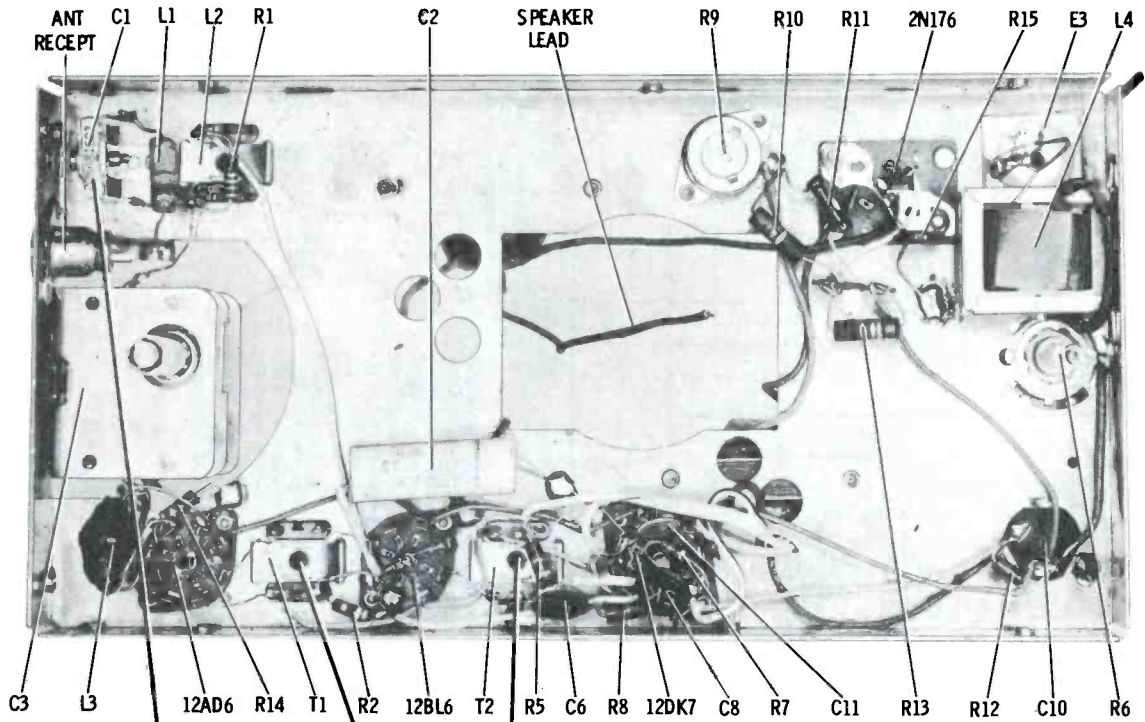
CAUTION

"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

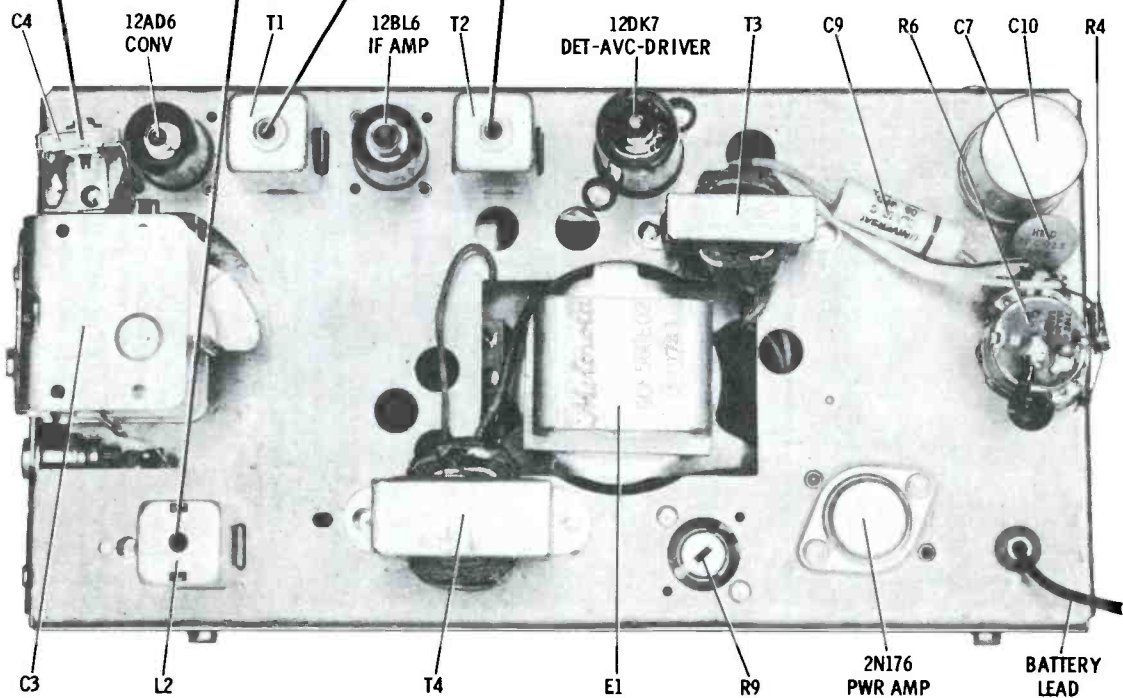
NOTES: CAPACITORS - Decimal values in MF. All others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis. +10%. No signal input.
INPUT VOLTAGE - 14V DC.
TUNING RANGE - 540 KC to 1605 KC
IF - 455 KC

MOTOROLA

Model 83MR, American Motors 8990543
(Continued from page 92)



DUMMY ANTENNA

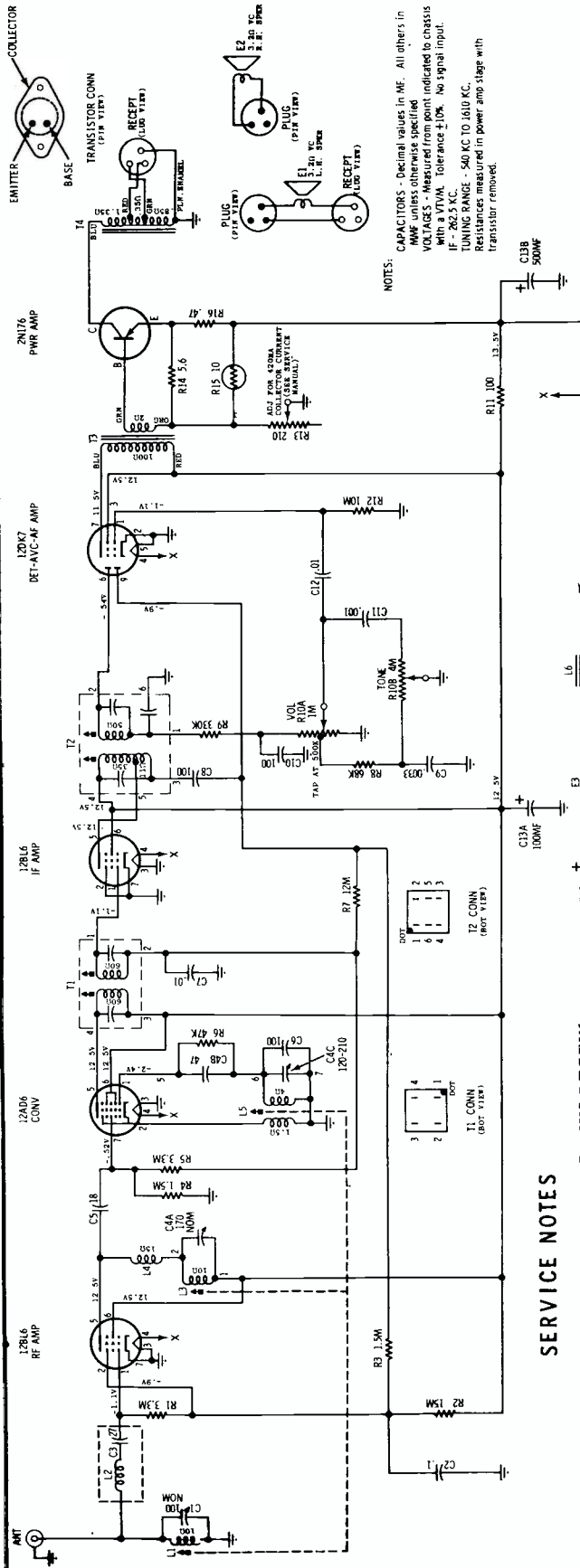


ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

MOTOROLA

MODEL
AMERICAN MOTORS 8990494
MOTOROLA 84MA

(Continued on page 95)



CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE HI SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - Decimal values in MF. All others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance $\pm 10\%$. No signal input.
TUNING RANGE - 540 KC TO 1610 KC.
Resistance measured in power amp stage with transistor removed.

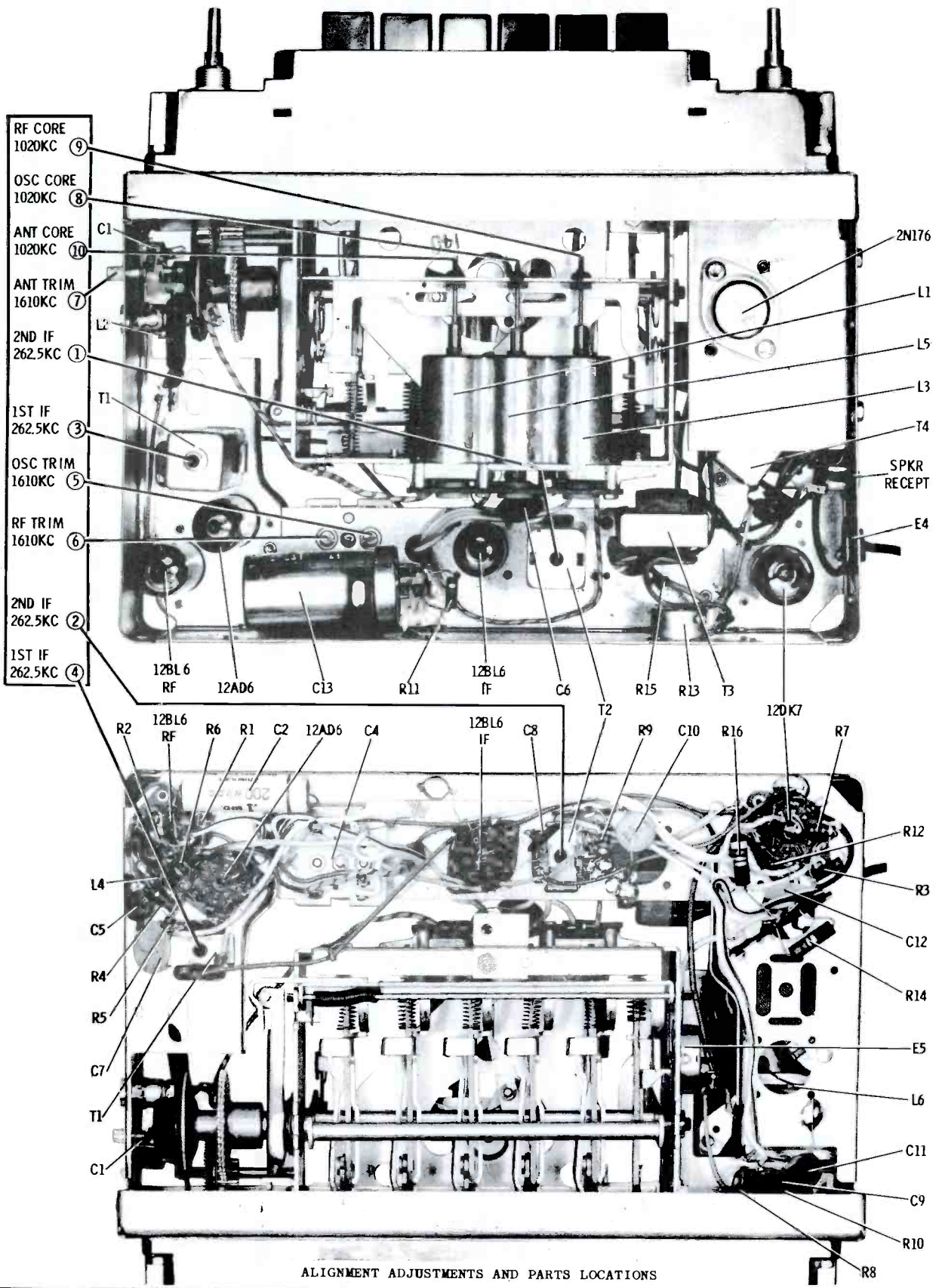
5. TRANSISTOR CURRENT ADJUSTMENT - After replacing transistor and before connecting radio to power supply, set the transistor bias control (R-13) to the maximum (fully counterclockwise) position to prevent excessive current from damaging the transistor. Allow about 15 minutes warm-up time before proceeding with the following:
a. Connect a VTVM from transistor collector electrode (external shell) to chassis.
b. Adjust R-13 for .98 volts on VTVM. (This corresponds to a collector current of 420 MA).
c. Repeat Step b after a half hour.

6. TRANSISTOR INSULATOR - When replacing a transistor or transistor insulator, be sure to coat both sides of insulator with DC-4 Grease (Motorola Part No. 11M490487) to insure proper heat dissipation.

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

SERVICE NOTES

- RADIO POLARITY** - WHEN SERVICING THIS RECEIVER ON THE SERVICE BENCH, BE SURE THAT THE RECEIVER "A" LEAD IS CONNECTED TO THE POSITIVE SIDE OF THE POWER SOURCE AND THAT THE RECEIVER HOUSING IS CONNECTED TO THE NEGATIVE SIDE. IF CONNECTED OTHERWISE, THE RECEIVER WILL NOT OPERATE AND DAMAGE TO COMPONENTS MAY RESULT.
- POWER SUPPLY REQUIREMENTS** - It is preferable to use a storage battery (without a battery charger) in place of a battery eliminator when servicing this receiver, because the average eliminator has an extremely high AC ripple content which may damage the transistor and other low voltage components. The average output of the eliminator may be read as 14 volts, but the peak ripple may actually be 15 to 25 volts or higher. Only a well filtered and regulated eliminator type power supply should be used to service this receiver in place of the storage battery recommended.
- SERVICING PRECAUTION** - When servicing this receiver, probing with a screwdriver (checking for spark to ground from various points) must be avoided, because the plate power is obtained directly from the storage battery and high currents can flow through the components causing permanent damage. The transistor stage is especially 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 removed allowing excessive current to flow through the transistor causing permanent damage by melting the indium junctions in the transistor.
- TRANSISTOR REPLACEMENT** - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and set will not operate. If mounting screws are not tight, the transistor will be damaged due to a lack of proper heat dissipation. NOTE: When a transistor is replaced the current should be checked (see SERVICE NOTE 5 and 6).



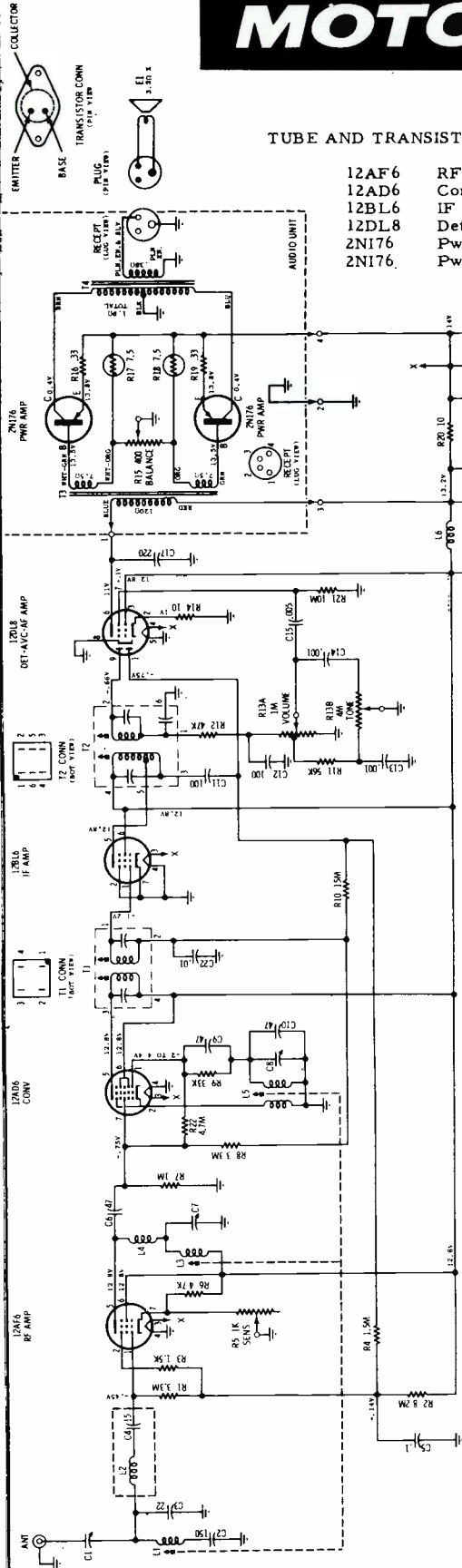
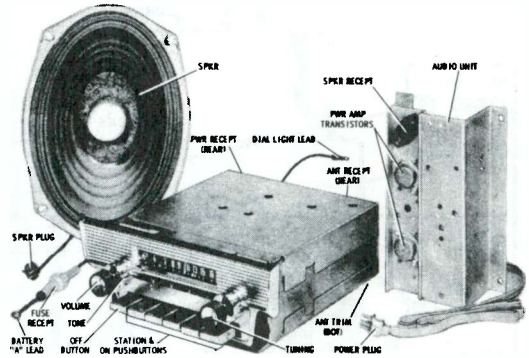
ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

MOTOROLA

MOTOROLA 84MS
FORD FEV-18805-F

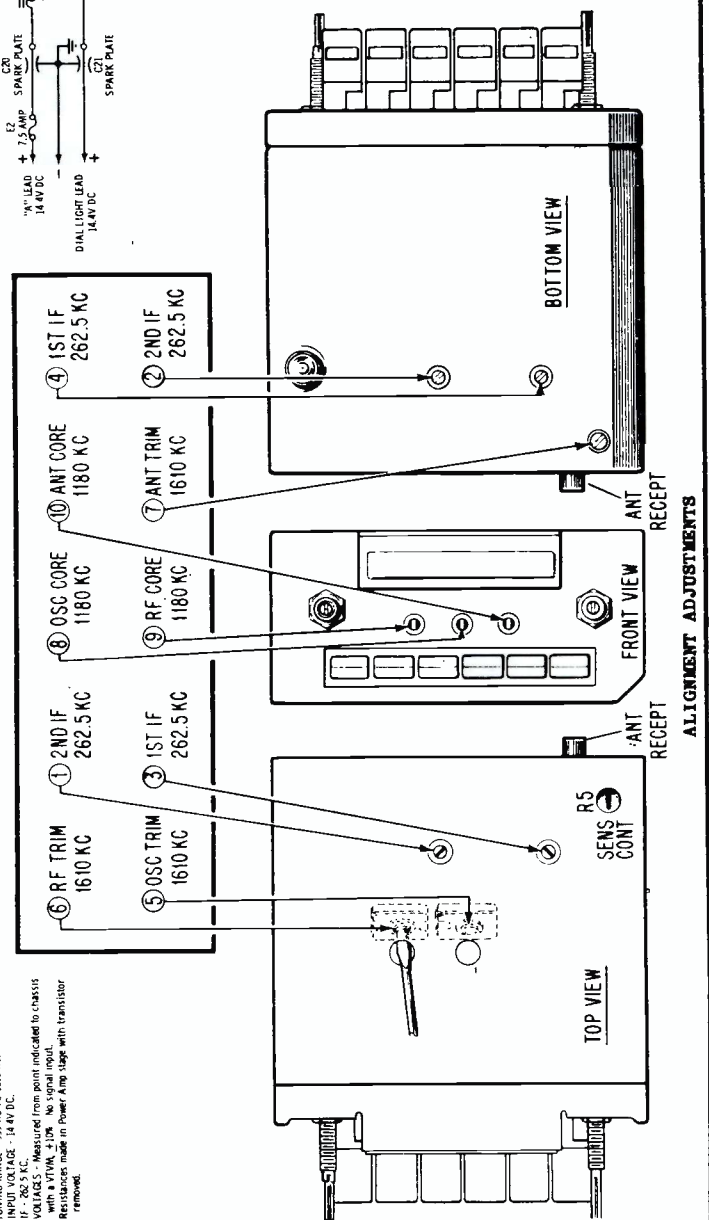
TUBE AND TRANSISTOR COMPLEMENT

- | | |
|-------|----------------|
| 12AF6 | RF amp |
| 12AD6 | Converter |
| 12BL6 | IF amp |
| 12DL8 | Det-AVC-AF amp |
| 2N176 | Pwr amp |
| 2N176 | Pwr amp |



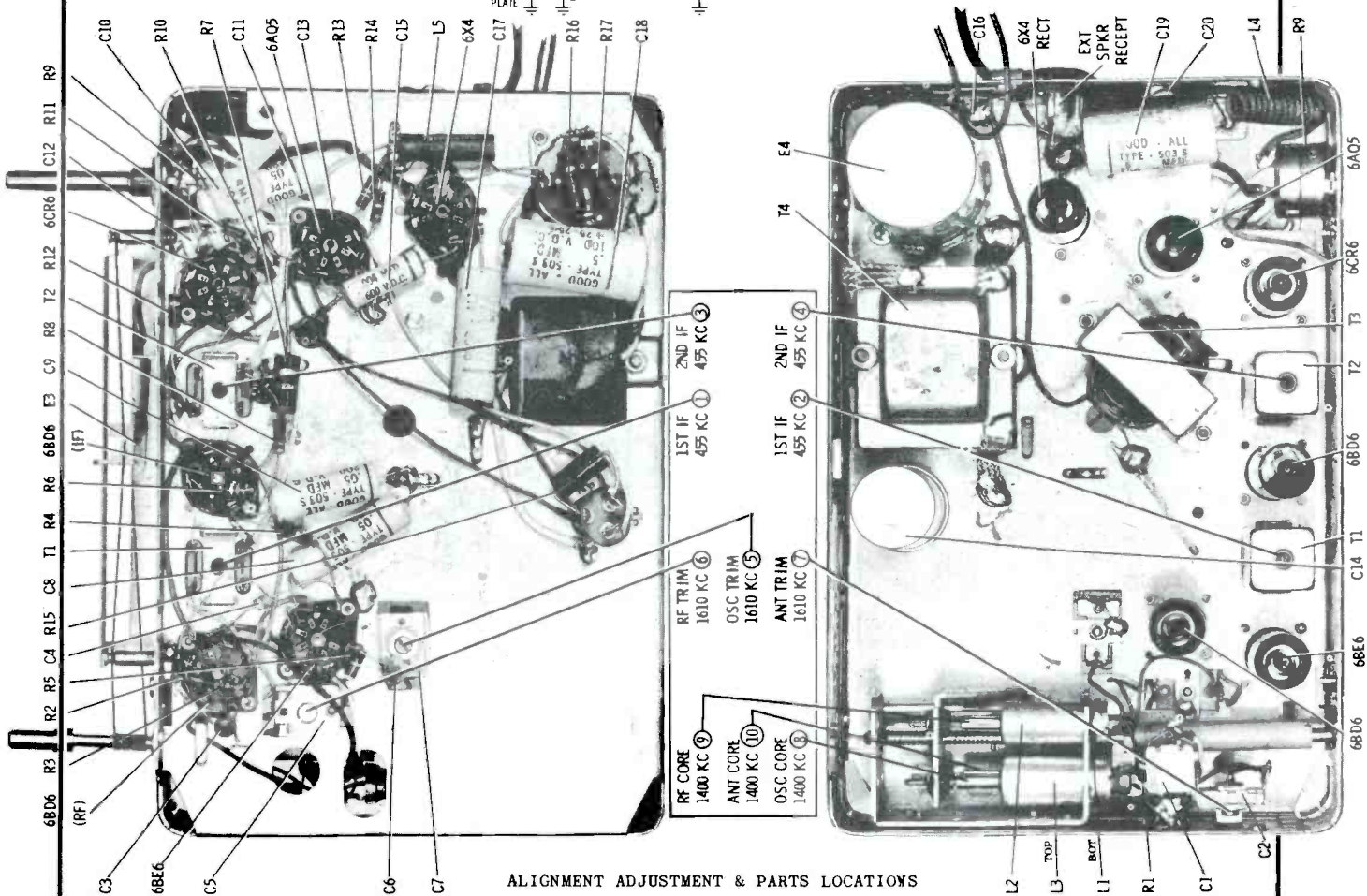
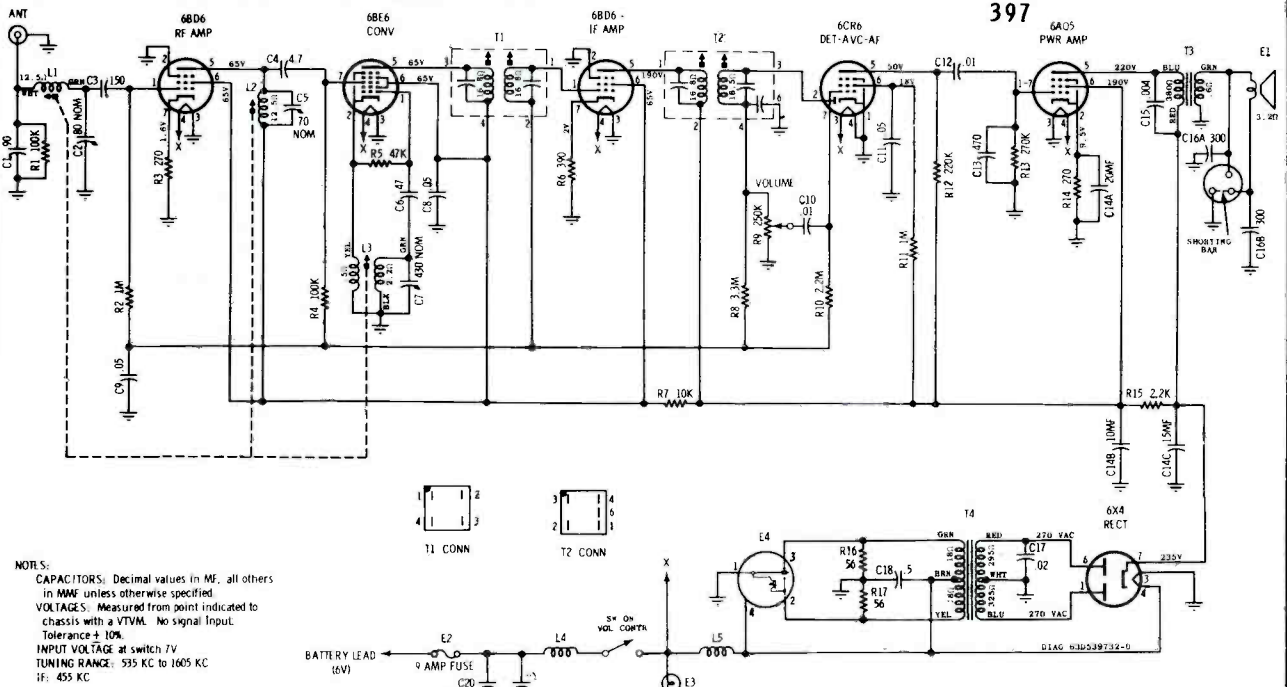
CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - Decimal values in μ F, all others in MUF unless otherwise specified.
TUNING RANGE - 535 KC TO 1630 KC.
INPUT VOLTAGE - 14.4V DC.
VOLTAGES - Measured from point indicated to chassis with a VTVM, $\pm 10\%$. No signal input.
RESISTANCES - Resistor in Power Amp stage with transistor removed.



MOTOROLA

AUTO RADIO MODEL 397

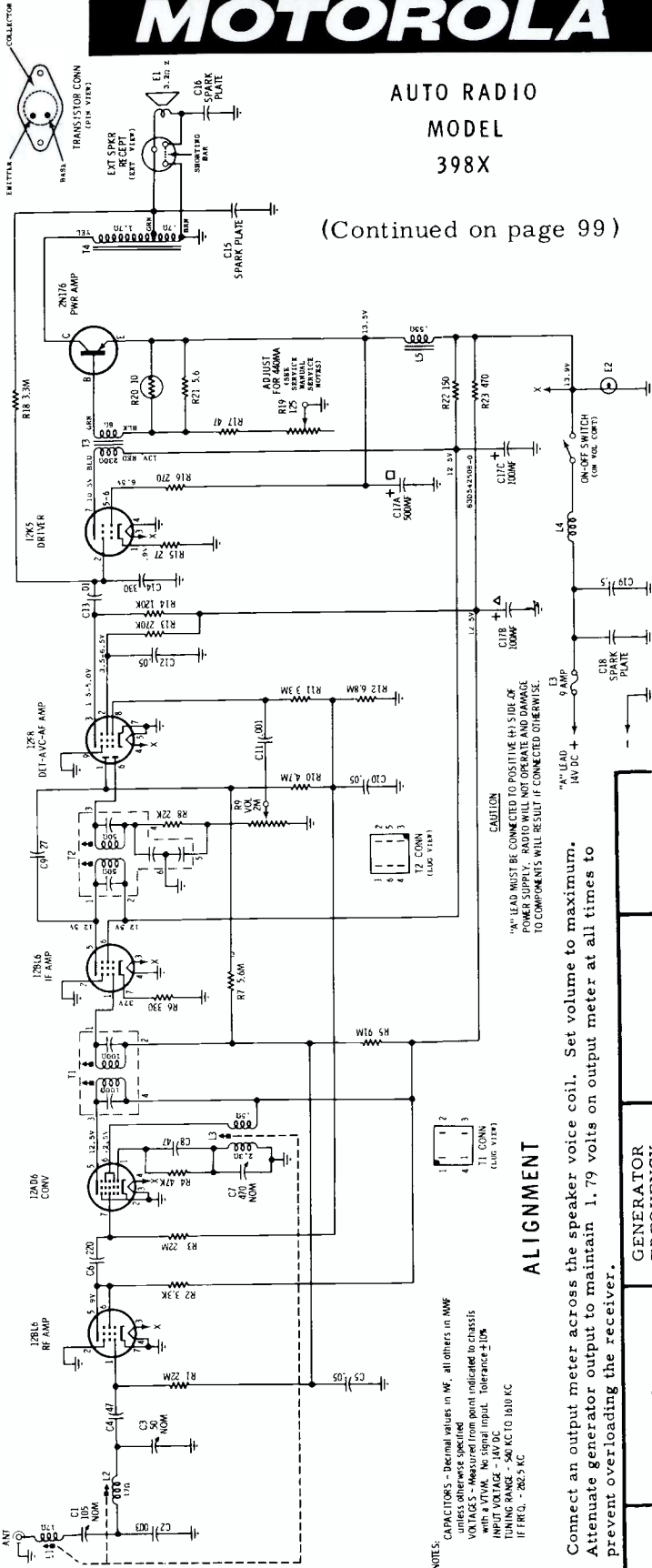


ALIGNMENT ADJUSTMENT & PARTS LOCATIONS

MOTOROLA

AUTO RADIO MODEL 398X

(Continued on page 99)



TRANSISTOR REPLACEMENT - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and set will not operate. If mounting screws are not tight, the transistor will be damaged due to lack of proper heat dissipation. NOTE: When a transistor is replaced the current should be checked (see SERVICE NOTE 5 and 6).

TRANSISTOR CURRENT ADJUSTMENT - After a transistor has been replaced, the collector current should be checked and adjusted for proper operation.

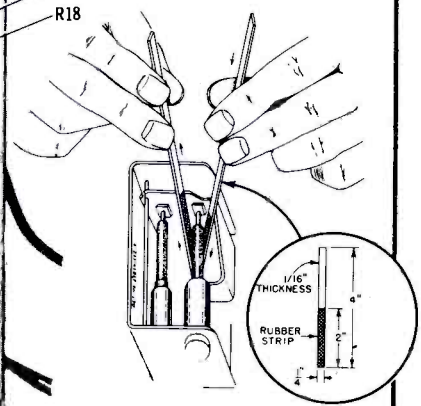
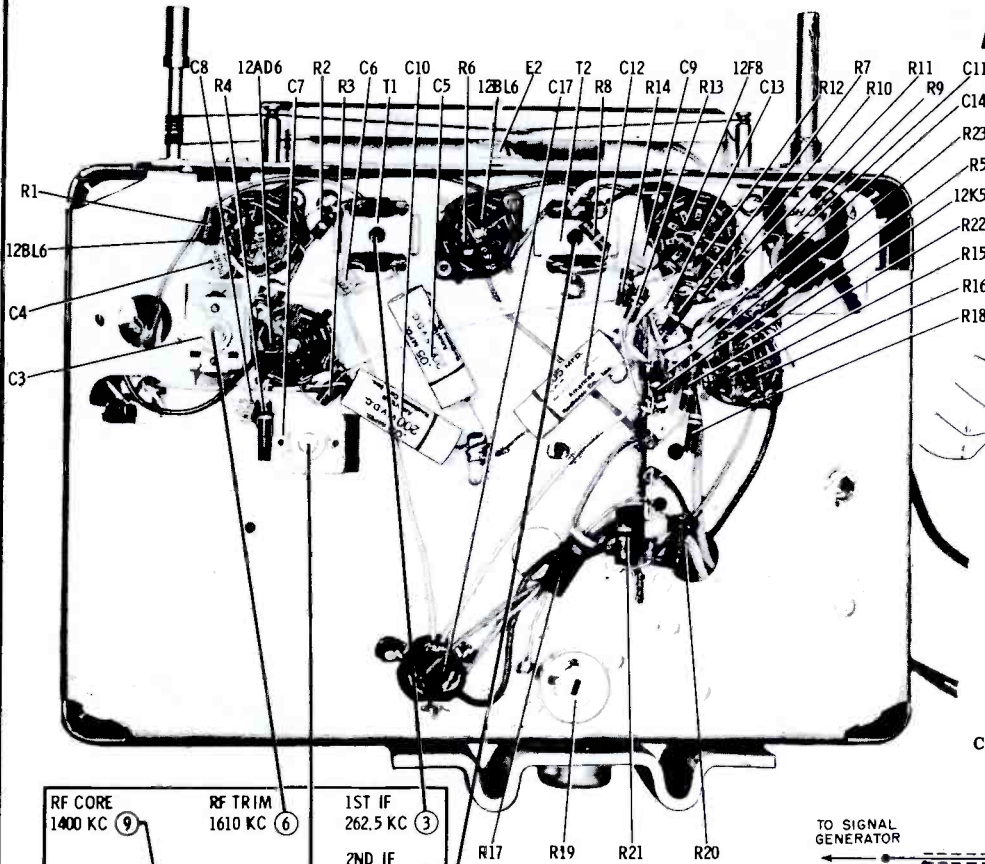
- Set R-19 to its maximum resistance position (fully counter-clockwise from wiring side) to avoid excessive collector current, then allow radio to warm-up for 15 minutes.
- Open the output transformer T4 (speaker connected) by disconnecting the collector lead (Yel) from the center lug of transistor socket and insert an 0-1 amp DC Ammeter (.05 ohms internal resistance or less): (+) side of meter to lug of transistor socket and (-) to yellow lead of transformer.
- Adjust R-19 for a collector current reading of 360 ma with 12.6 volts input to radio "A" lead.

NOTE: Two values of radio input voltage are given as a convenience to service personnel to accommodate different power sources. The schematic collector current value of 440 ma. is stated with 14 volts DC input to receiver "A" lead.

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	TUNER SET TO	ADJUST	REMARKS
1.	IF ALIGNMENT Conv grid (pin 7) thru .1 mf capacitor and chassis	262.5 Kc	Hi end stop	1, 2, 3 & 4	Peak for maximum.
2.	RF ALIGNMENT Ant receipt through dummy (see Fig. 1)	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
3.	Ant receipt through dummy (see Fig. 1)	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
4.	"	1400 Kc	13/64" from hi end stop	8, 9 & 10	Peak for maximum.
5.	"	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
6.	Repeat steps 4 and 5 until no further increase, then cement tuning cores in place.				
7.	ANTENNA TRIMMER	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, peak antenna trimmer for maximum.

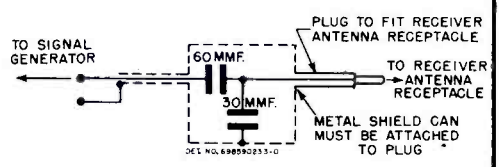
MOTOROLA

Model 398X
(Continued from page 98)

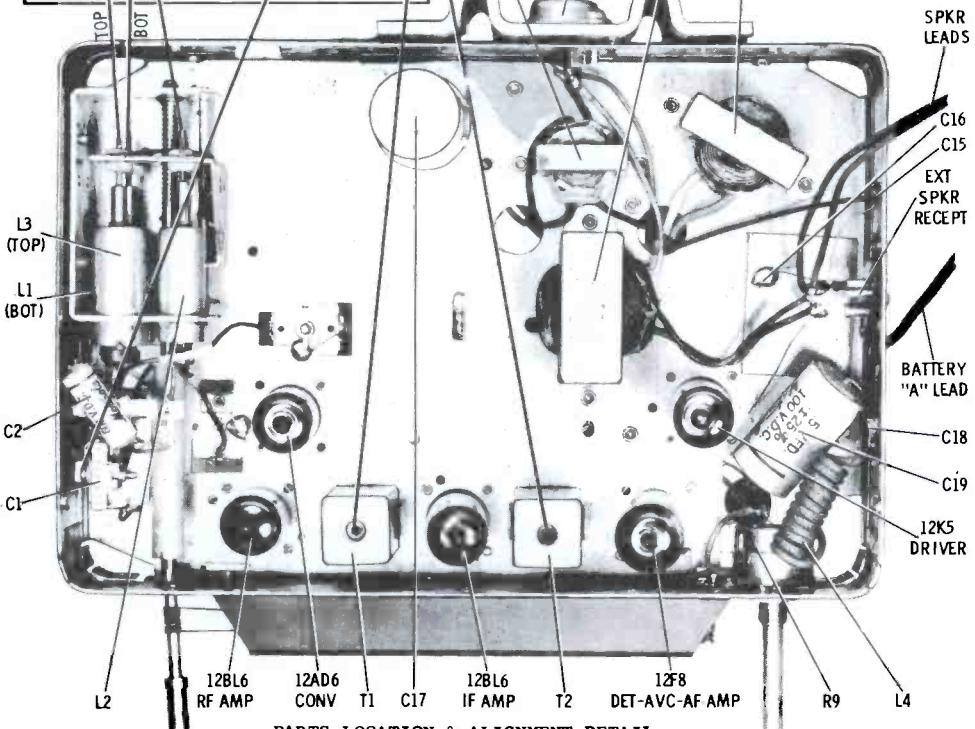


CORE ALIGNMENT TOOL DETAIL

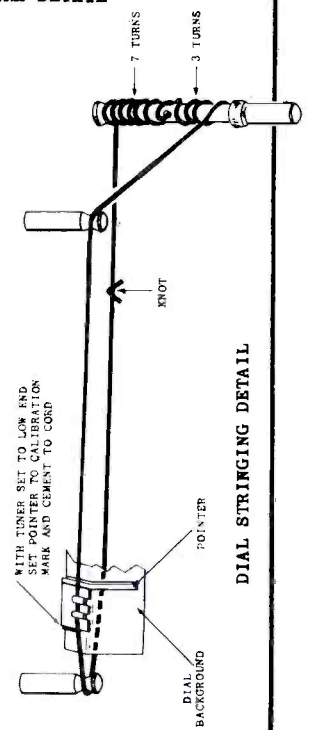
- | | | |
|--------------------------|-------------------------|------------------------|
| RF CORE
1400 KC (9) | RF TRIM
1610 KC (6) | 1ST IF
262.5 KC (3) |
| ANT CORE
1400 KC (10) | OSC TRIM
1610 KC (5) | 2ND IF
262.5 KC (2) |
| OSC CORE
1400 KC (8) | ANT TRIM
1610 KC (7) | 2ND IF
262.5 KC (1) |
| | | 1ST IF
262.5 KC (4) |



DUMMY ANTENNA DETAIL



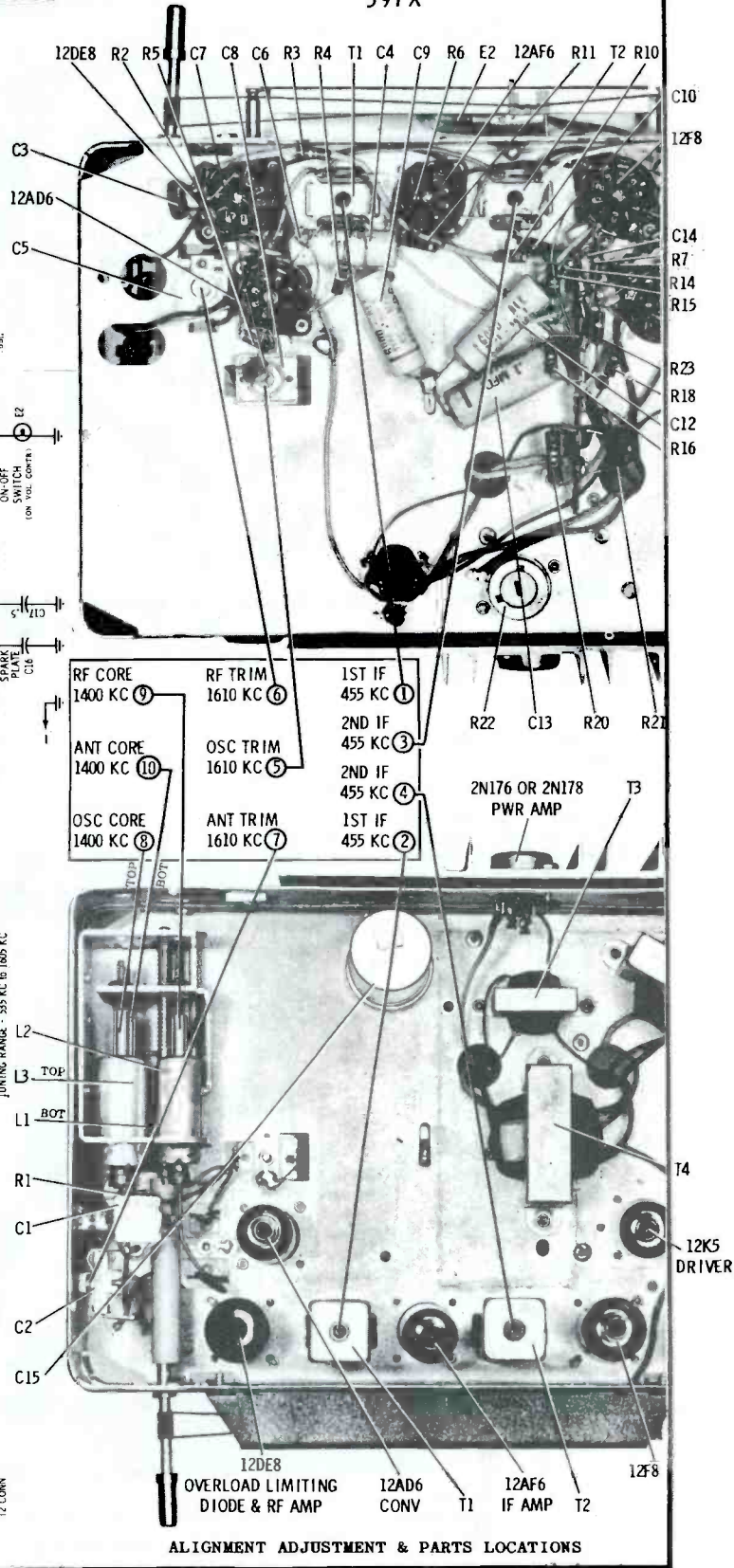
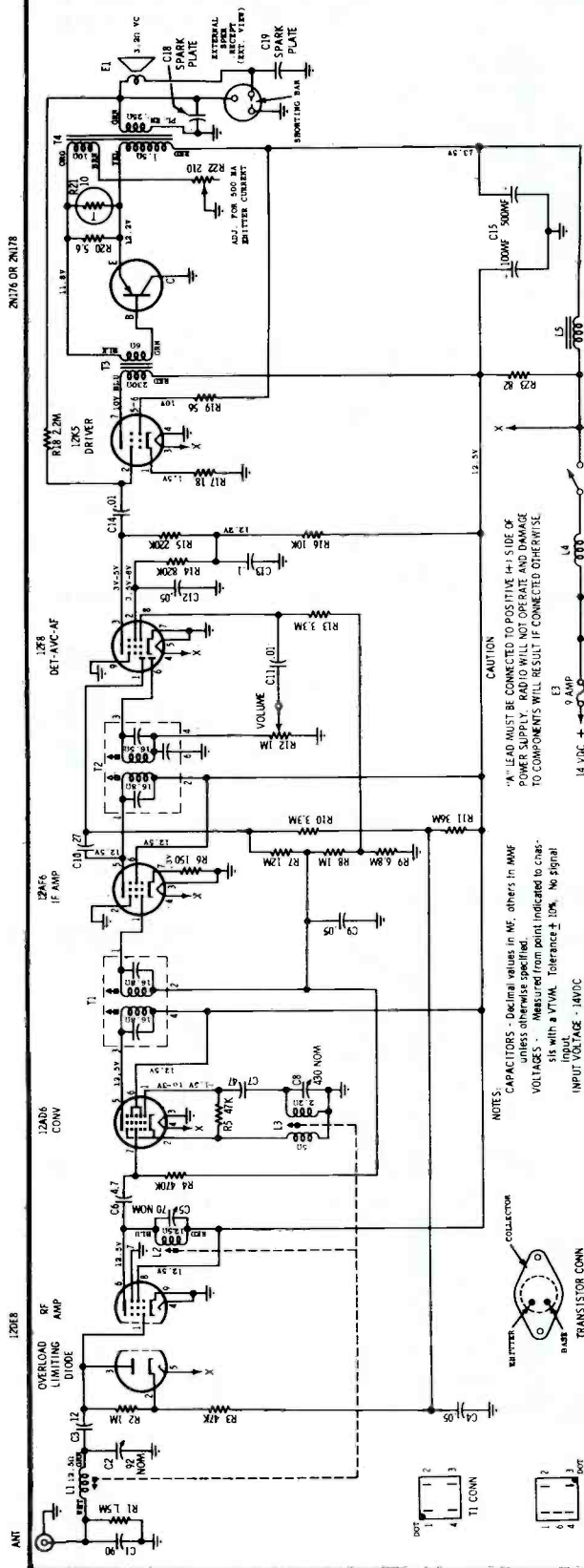
PARTS LOCATION & ALIGNMENT DETAIL



DIAL STRINGING DETAIL

MOTOROLA

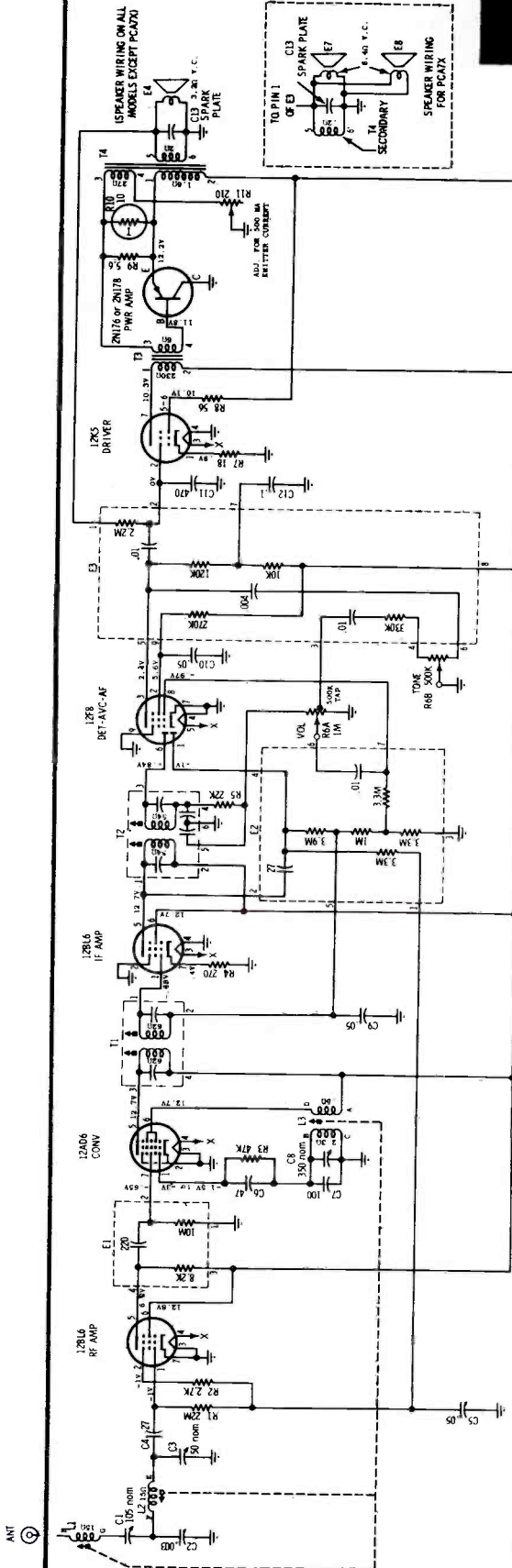
AUTO RADIO
MODEL
397X



ALIGNMENT ADJUSTMENT & PARTS LOCATIONS

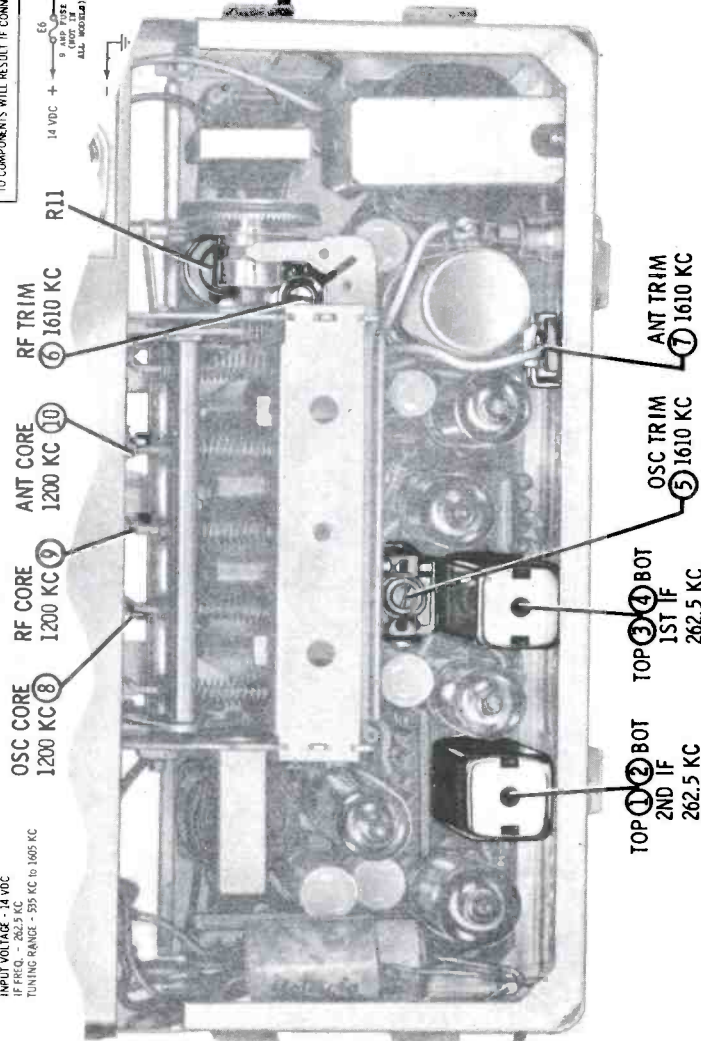
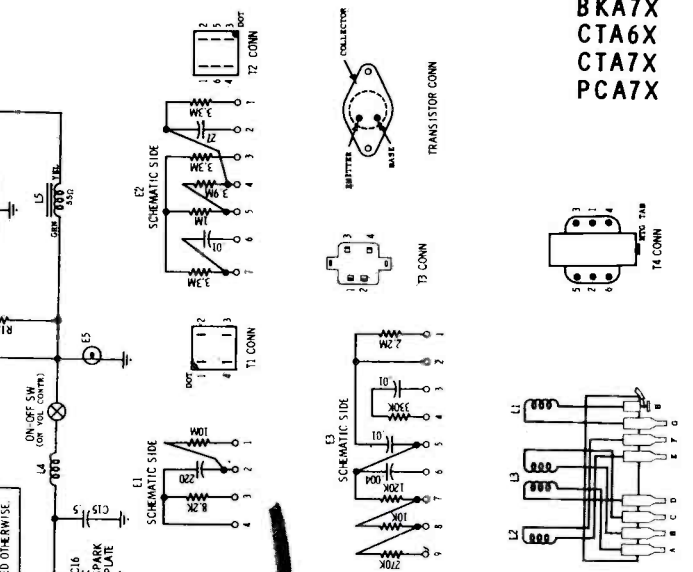
MOTOROLA

MODELS
597X
BKA6X
BKA7X
CTA6X
CTA7X
PCA7X



CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE (+) SIDE OF POWER SUPPLY - RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

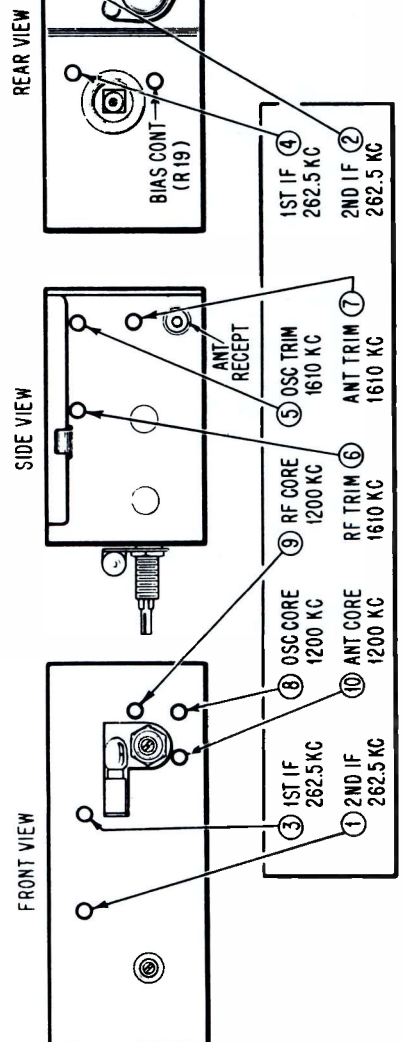
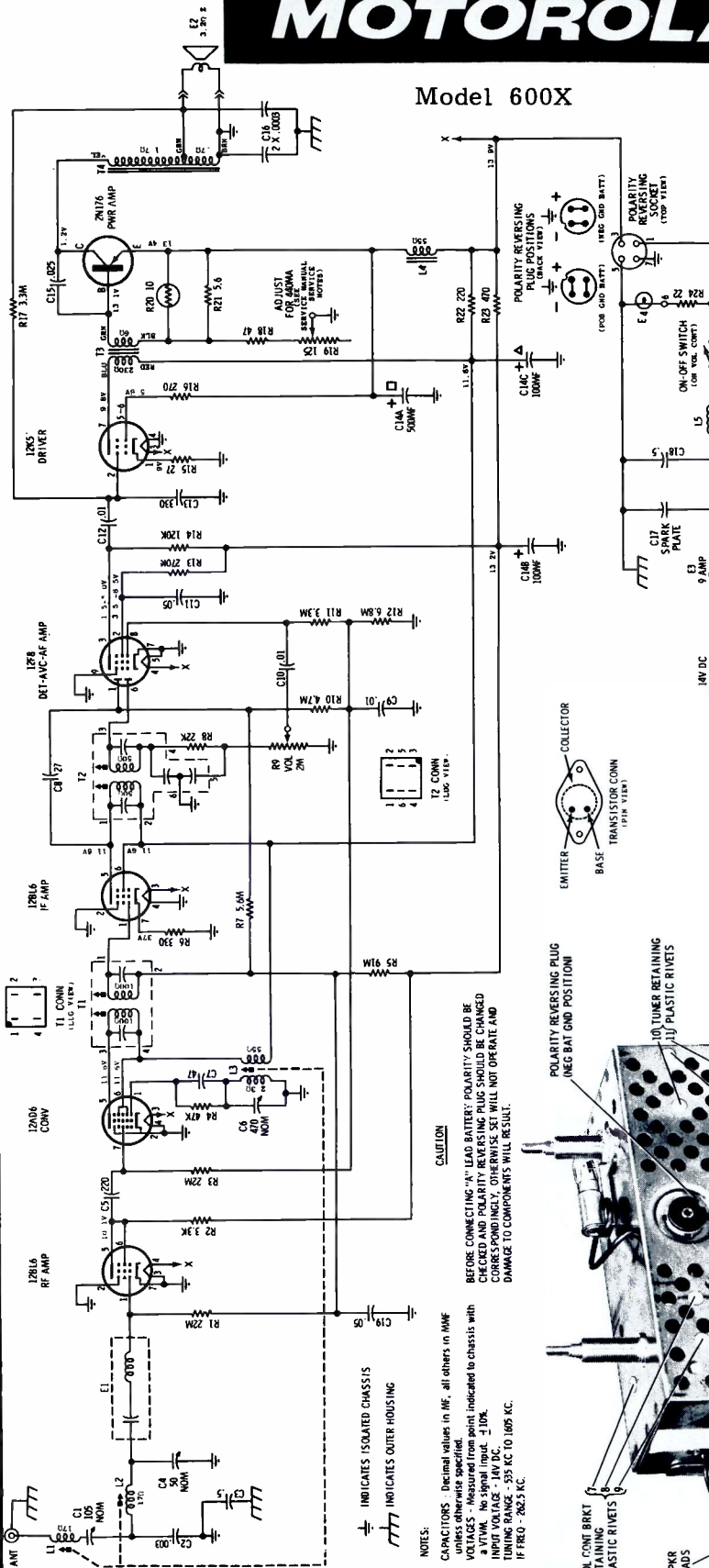
NOTES:
CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance $\pm 10\%$. No input voltage - 14 VDC
IF FREQ. - 262.5 KC
TUNING RANGE - 535 KC to 1605 KC



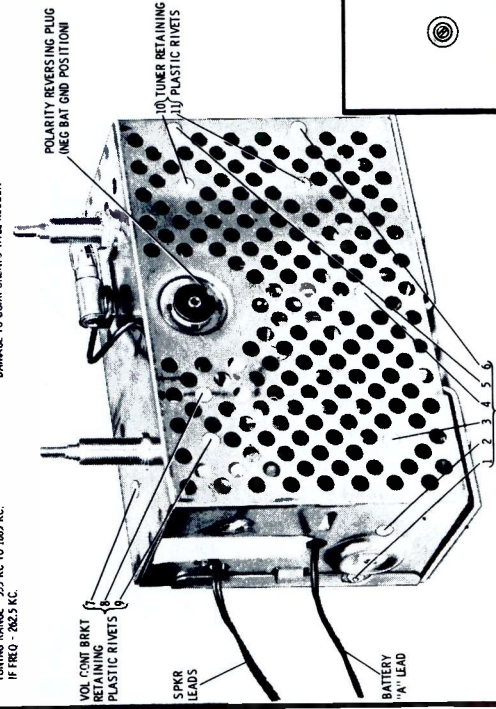
ALIGNMENT POINTS

MOTOROLA

Model 600X



ALIGNMENT ADJUSTMENTS

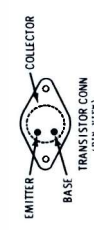


- CHASSIS REMOVAL:**
- Remove cover and back plate.
 - Remove chassis retainer plastic rivets 1, 2, 3, 4, 5 and 6 (see photo) by carefully pushing out center pin and then remove plastic rivet.
 - Unsoldier chassis leads to Polarity Reversing Socket.
 - Unsoldier chassis leads to mica capacitor (C16).
 - Unsoldier chassis leads going to antenna receptacle and volume control.
 - Unsoldier chassis leads to tuner.
 - Remove chassis.

CAUTION
BEFORE CONNECTING "A" LEAD BATTERY: POLARITY SHOULD BE CHECKED AND POLARITY REVERSING PLUG SHOULD BE CHANGED CORRESPONDINGLY. OTHERWISE SET WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT.

NOTES:
CAPACITORS - Decimal values in MF, all others in MAF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. No signal input. $\pm 10\%$.
INPUT VOLTAGE - 14V D.C.
TUNING RANGE - 535 KC TO 1605 KC.
IF FREQ. - 455.5 KC.

⊥ INDICATES ISOLATED CHASSIS
⊥ INDICATES OUTER HOUSING

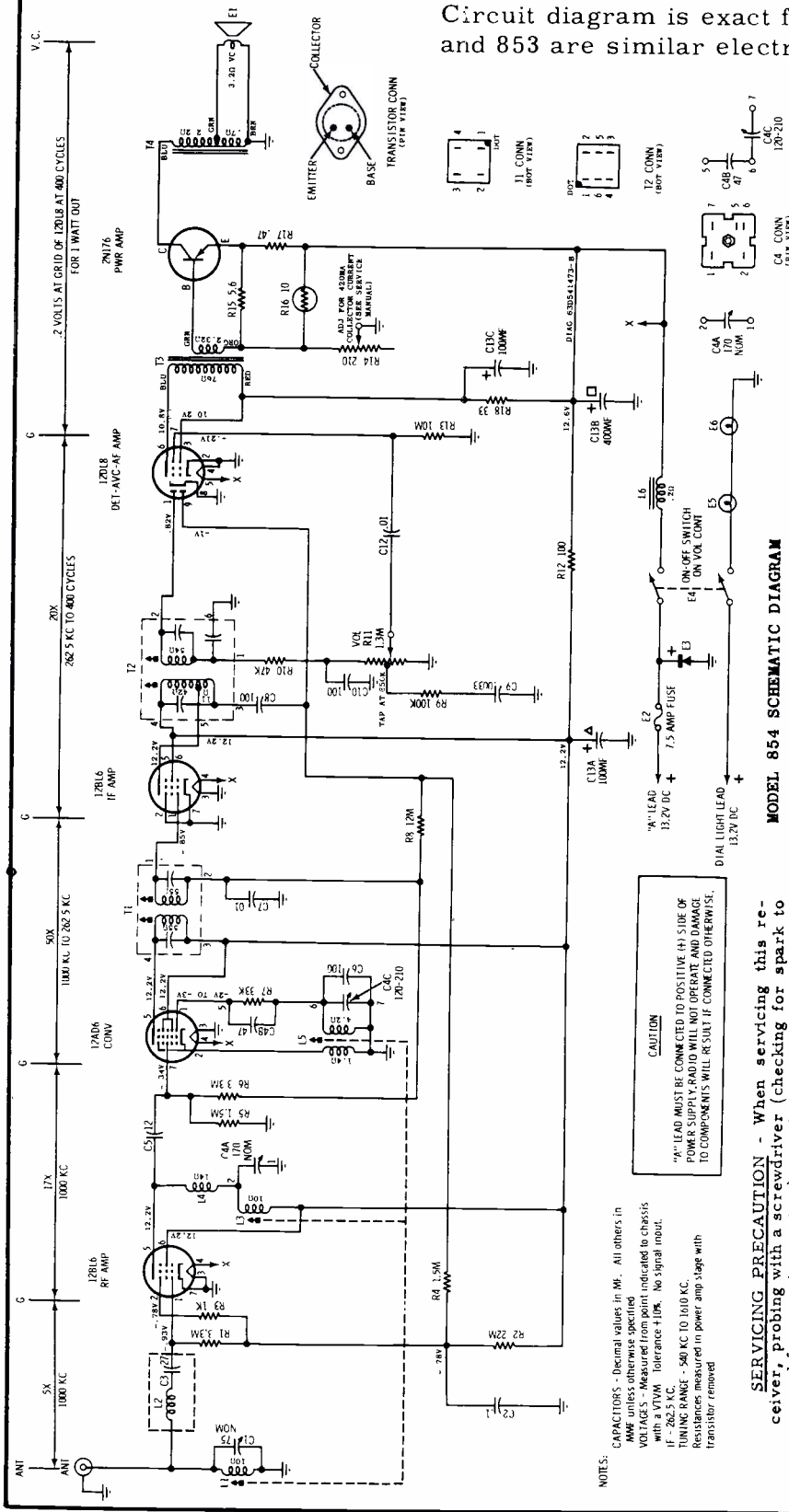


MOTOROLA

Model 852, used in Dodge cars
 Model 853, used in DeSoto cars
 Model 854, used in Plymouth cars

Circuit diagram is exact for Model 854. Models 852 and 853 are similar electrically to Model 854.

Model 852	Dodge	LD1, LD2, LD3
Model 853	DeSoto	LS1, LS2, LS3
Model 854	Plymouth	LPI, LP2



MODEL 854 SCHEMATIC DIAGRAM

- Connect a VTVM from collector electrode (transistor shell) to chassis.
- Adjust R-14 for .85 volts on VTVM. (this corresponds to a collector current of 425 Ma.)
- Repeat step b after a half-hour.

TRANSISTOR INSULATOR - When replacing a transistor or transistor insulator, be sure to coat both sides of insulator with DC-4 grease (Motorola Part No. 11M490487) to insure proper heat dissipation.

TRANSISTOR CHECK - Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors. NOTE: When checking, be sure transistor insulator is in place (see SERVICE NOTE 6).

TUBE CHECK - Substituting a known good tube for a suspected one is the best and only check recommended at this time.

SERVICING PRECAUTION - When servicing this receiver, probing with a screwdriver (checking for spark to ground from various points) must be avoided, because the plate power is obtained directly from the storage battery and high currents can flow through the components causing permanent damage. The transistor stage is especially 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 removed allowing excessive current to flow through the transistor causing permanent damage.

TRANSISTOR REPLACEMENT - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and set will not operate. If mounting screws are not tight, the transistor will be damaged due to a lack of proper heat dissipation.

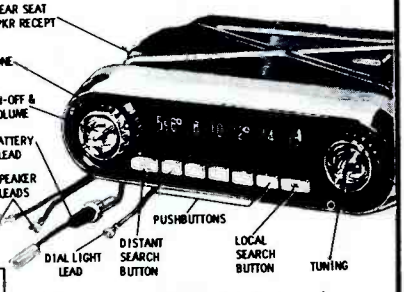
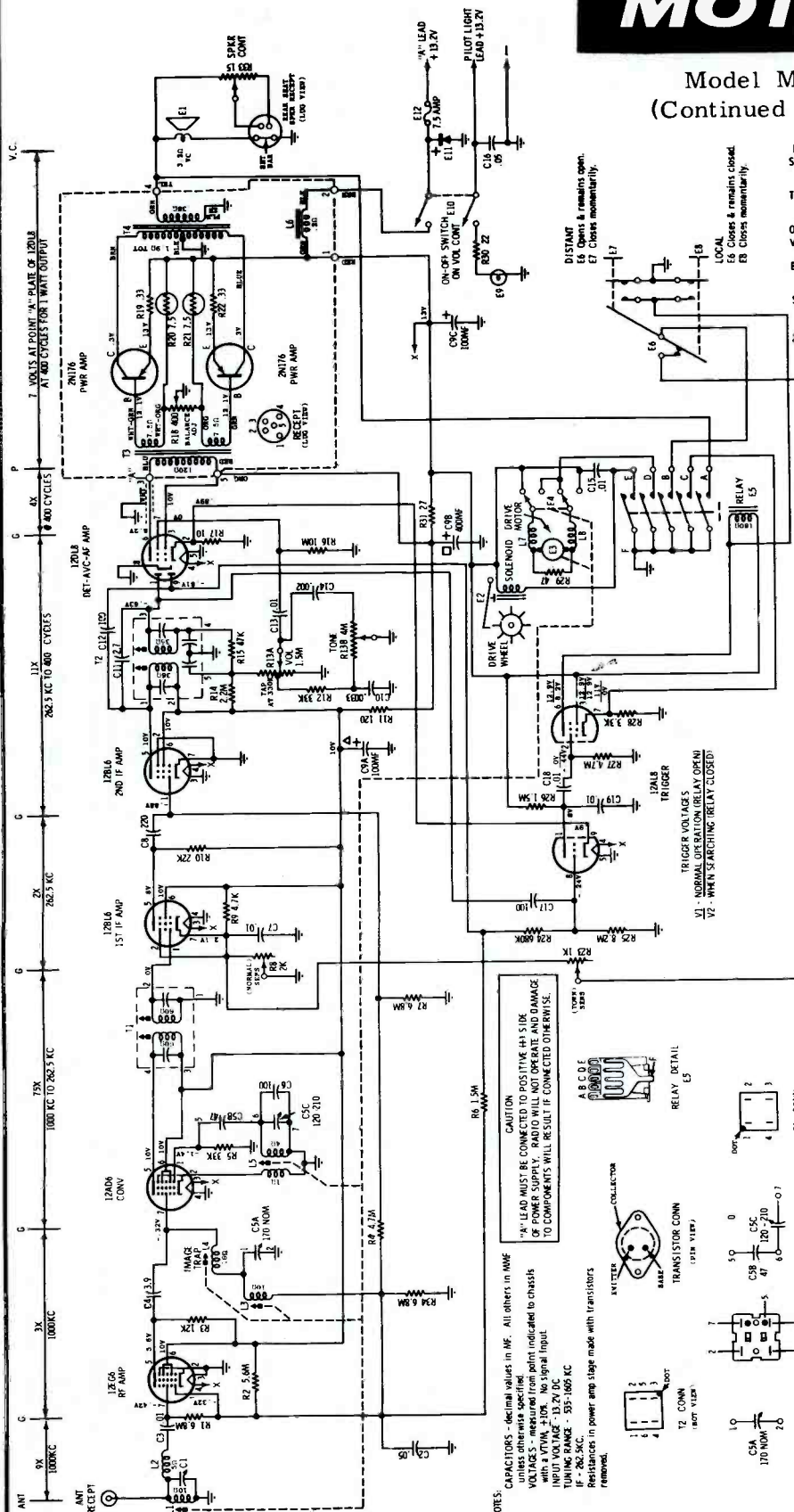
TRANSISTOR CURRENT ADJUSTMENT - After replacing transistor and before connecting radio to power supply, set the transistor bias control (R-14) to the maximum (fully counterclockwise) position to prevent excessive current from damaging the transistor. Allow about 15 minutes warm-up time before proceeding with the following:

CAUTION
 1/4" LEAD MUST BE CONNECTED TO POSITIVE HI SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
 CAPACITORS - Decimal values in μ F. All others in μ MF unless otherwise specified.
 VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance $\pm 10\%$. No signal input.
 IF - 262.5 KC.
 TUNING RANGE - 540 KC TO 1610 KC.
 Resistances measured in power amp. stage with transistor removed.

MOTOROLA

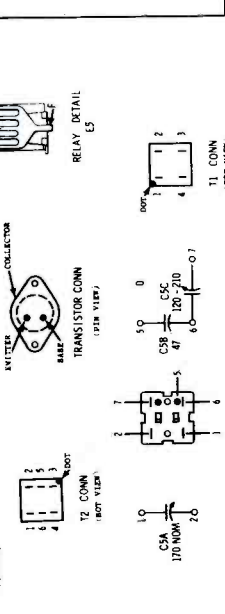
Model MoPar 923
(Continued on page 105)



- SERVICE NOTES**
- TRANSISTOR REPLACEMENT** - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and will not operate. If mounting screws are not tight, the transistor will be damaged due to lack of proper heat dissipation. NOTE: When a transistor is replaced the current should be checked (see SERVICE NOTE 6 and 7).
 - TRANSISTOR CURRENT ADJUSTMENT** - After replacing transistor and before connecting radio to power supply, set the transistor balance control R-18 to the mid-position to prevent excessive current from damaging the transistors. Allow about 15 minutes warm-up time before proceeding with the following:
 - Connect a VTVM across the two ends of balance adjustment control R-18; be sure VTVM is accurately zeroed
 - TRANSISTOR INSULATOR** - When replacing a transistor or transistor insulator, be sure to coat both sides of insulator with DC-4 grease (Motorola Part No. 11M490487) to insure proper heat dissipation.
 - TRANSISTOR CHECK** - Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors. NOTE: When checking, be sure transistor insulator is in place (see SERVICE NOTE 7).
 - TUBE CHECK** - Substituting a known good tube for a suspected one is the best and only check recommended at this time.
- NOTE:** If VTVM has a center zero scale, use center zero scale.
Adjust R-18 for zero reading on VTVM.

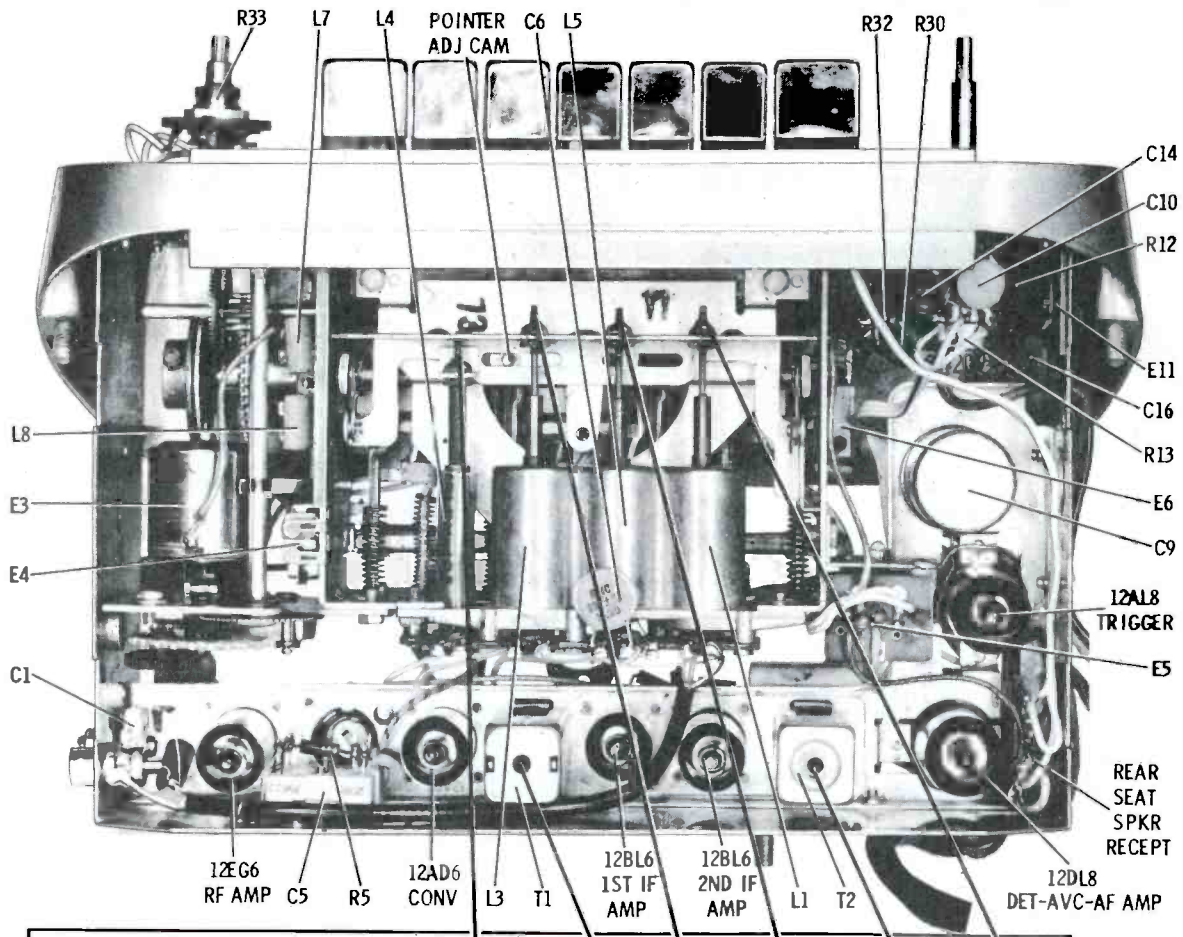
CAUTION
"A" LEAD MUST BE CONNECTED TO POSITIVE H-H SIDE OF POWER SUPPLY. RADIO WILL NOT OPERATE AND DAMAGE TO COMPONENTS WILL RESULT IF CONNECTED OTHERWISE.

NOTES:
CAPACITORS - decimal values in MF. All others in MMF unless otherwise specified.
VOLTAGES - measured from point indicated to chassis unless otherwise specified.
INPUT VOLTAGE - 12.7V DC.
TUNING RANGE - 535-1605 KC
IF - 262.5 KC.
Resistances in power amp stage made with transistors removed.

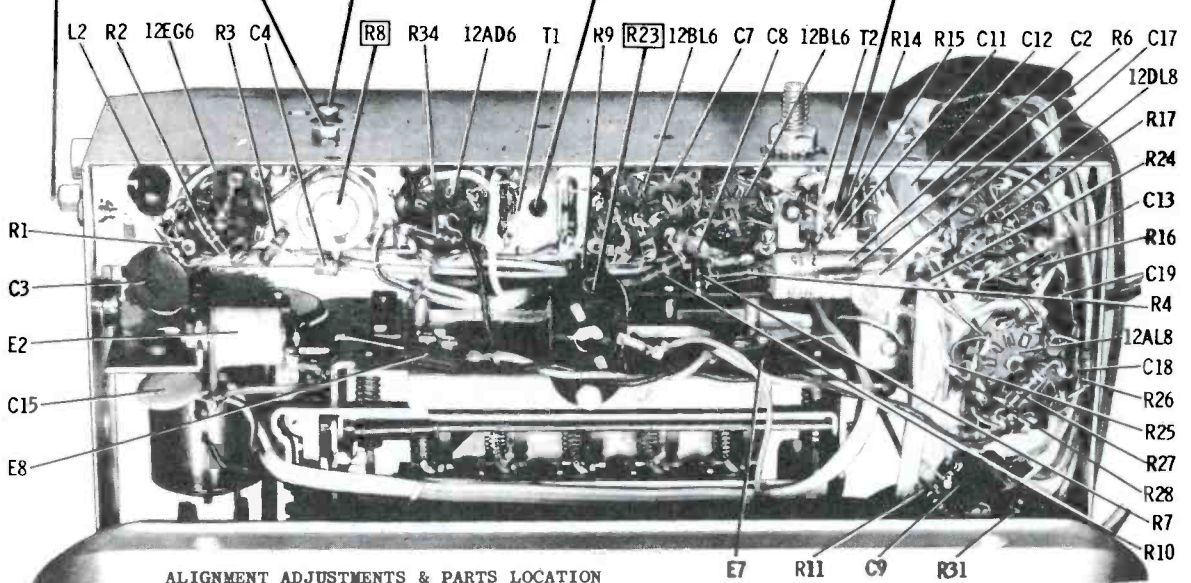


VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

MOTOROLA Model MoPar 923 (Continued from page 104)

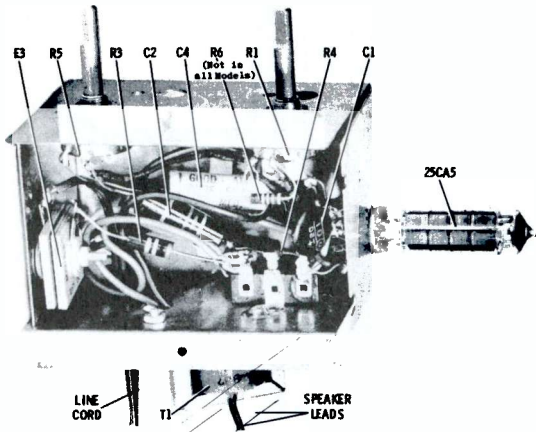


7	ANT TRIM 1610 KC	OSC TRIM 1610 KC	RF TRIM 1610 KC	11	IMAGE CORE 1925 KC	3	1ST IF 262.5 KC	9	RF CORE 1020 KC	8	OSC CORE 1020 KC	1	2ND IF 262.5 KC	10	ANT CORE 1020 KC
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ALIGNMENT ADJUSTMENTS & PARTS LOCATION

MOTOROLA



PARTS LOCATION

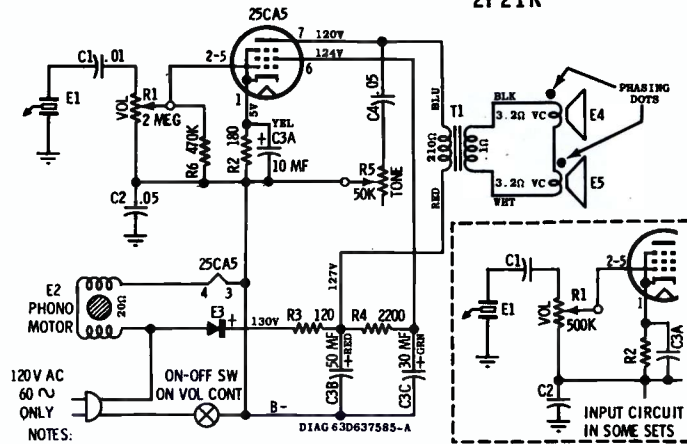
SPEAKER PHASING

NOTE: THE SPEAKERS MUST BE PHASED OR A LOSS OF THE LOW FREQUENCIES WILL RESULT

Phasing can be checked by momentarily connecting a 1-1/2 volt flashlight cell in parallel with the output transformer secondary and noting that the cones of all speakers move in the same direction. If they do not, reverse the connections of one speaker.

CHASSIS
HS-598

MODELS
2F21B
2F21R



NOTES:
Capacitors - decimal values in MF all others in MMF unless otherwise specified.
Voltages - measured from point indicated to B- with a VTVM.

DISASSEMBLY INSTRUCTIONS

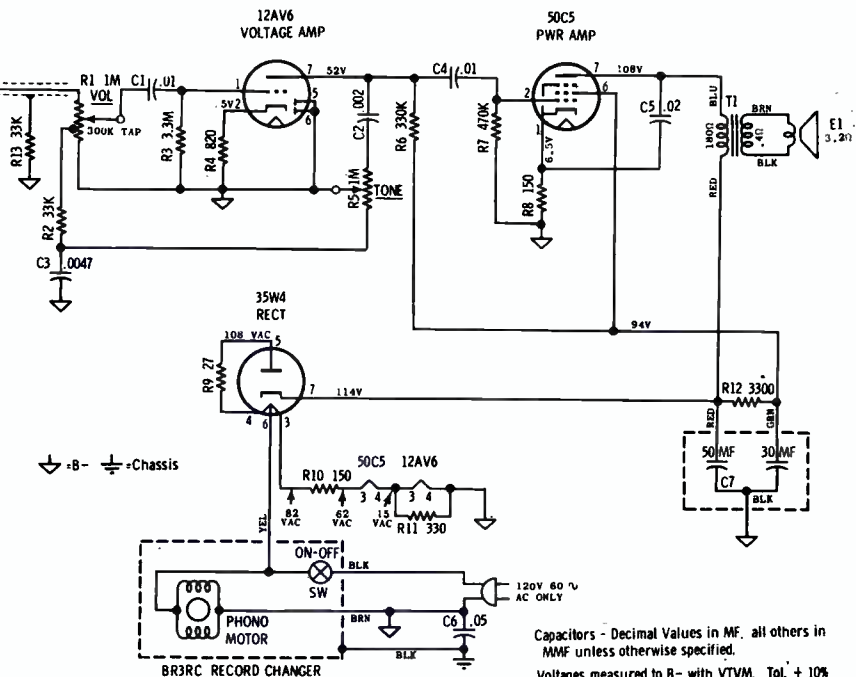
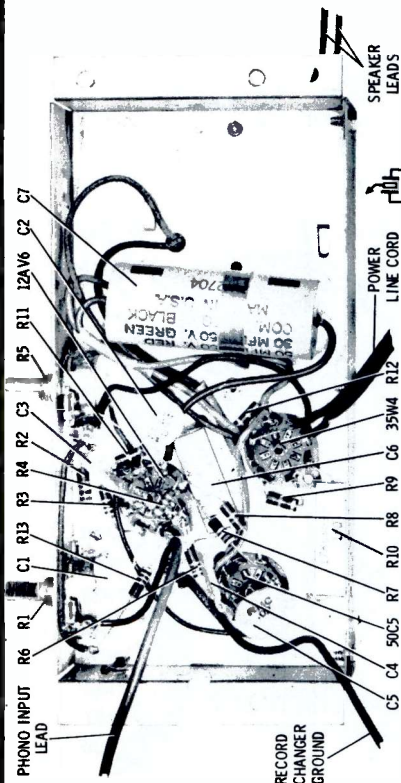
To Remove Chassis from Cabinet

1. Pull off two knobs from front of cabinet.
2. Remove four (4) phono mounting board and two (2) baffle retainer screws.
3. Lift rear of phono mounting board slightly and slide out.
4. Remove two screws which hold chassis to mounting board and remove chassis.

To Remove Turntable

1. Remove "C" washer from spindle.
2. Remove turntable by pulling up - off of spindle.

MOTOROLA Chassis HS-599, Model 3F22

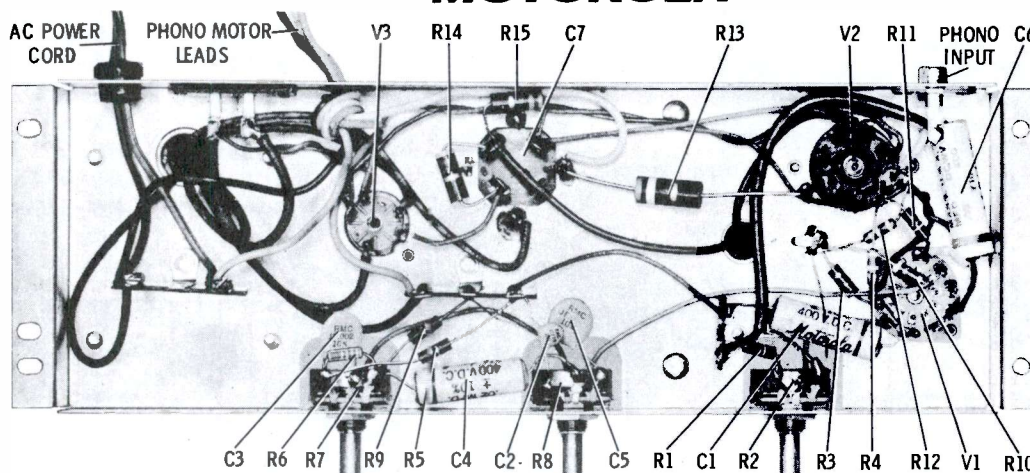


Capacitors - Decimal Values in MF, all others in MMF unless otherwise specified.
Voltages measured to B- with VTVM. Tol. ± 10%

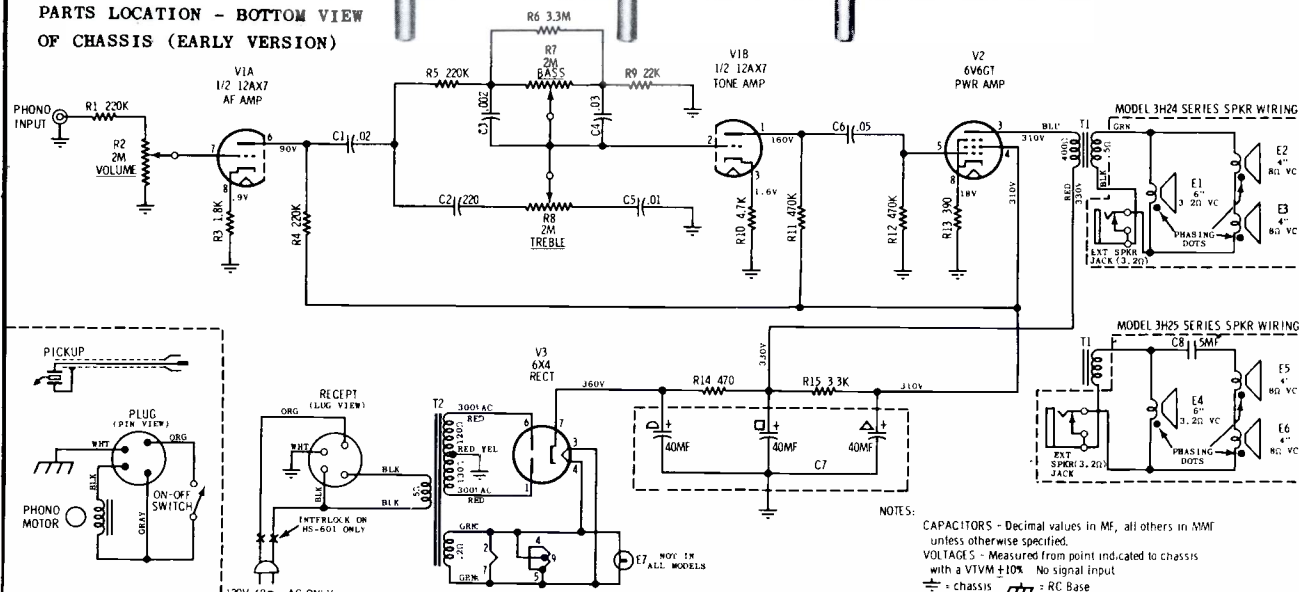
MOTOROLA

CHASSIS
HS-601
HS-602

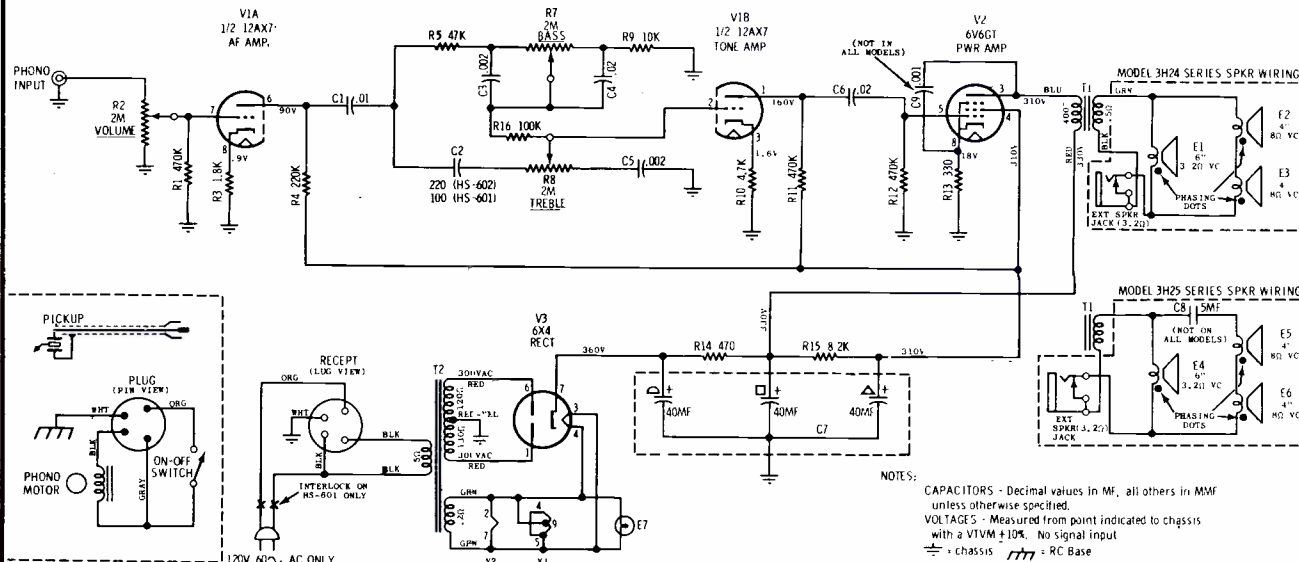
MODELS
3H24B-1
3H24B-2
3H24S-1
3H24S-2
3H25B
3H25B-1
3H25M
3H25M-1



PARTS LOCATION - BOTTOM VIEW OF CHASSIS (EARLY VERSION)



SCHMATIC DIAGRAM (EARLY VERSION)



SCHMATIC DIAGRAM (LATE VERSION)

B3R3C RECORD CHANGER (3H24-1, 3H25)
VM15RC RECORD CHANGER (3H24-2) (3H25-1)

B3R3C RECORD CHANGER (3H24-1, 3H25)
VM15RC RECORD CHANGER (3H24-2) (3H25-1)

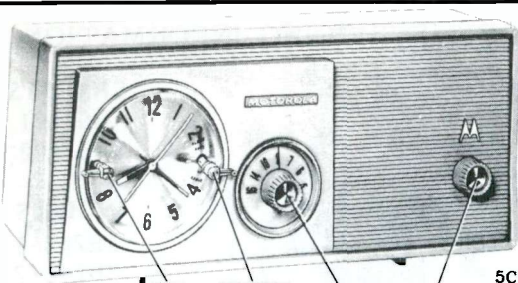
NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM $\pm 10\%$. No signal input
- chassis - RC Base

NOTES:
CAPACITORS - Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM $\pm 10\%$. No signal input
- chassis - RC Base

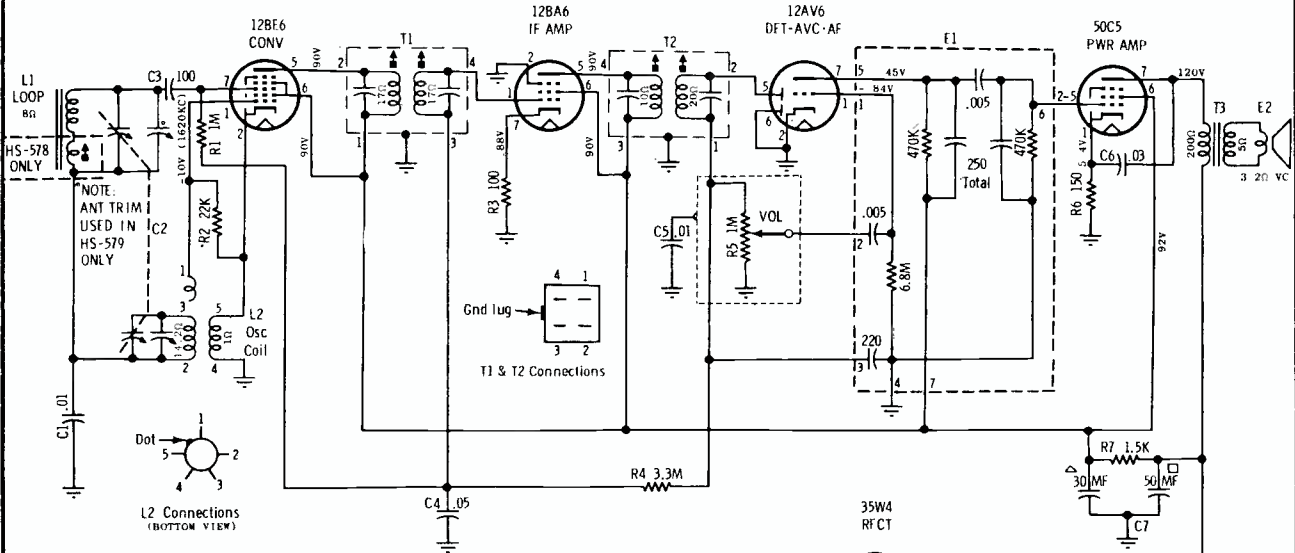
1958 RADIO SERVICING INFORMATION

MOTOROLA

MODELS	CHASSIS
5C22M	HS-578
5C22N	HS-578
5C22P	HS-578
5C22W	HS-578
5C22Y	HS-578
5C23CW	HS-579
5C23GW	HS-579
5C23PW	HS-579

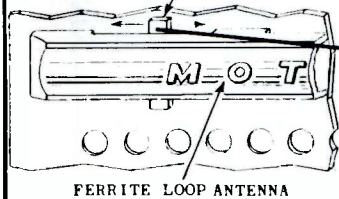
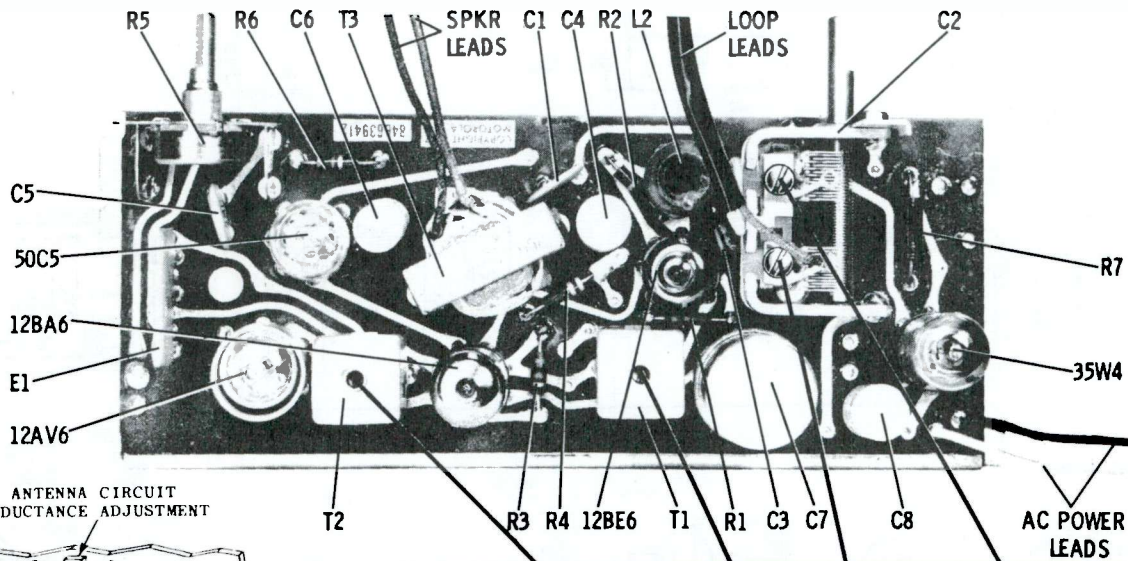


5C23 SERIES
 SLEEP CONTROL OPERATION SELECTOR TUNING VOLUME



NOTES

- Capacitors - Decimal values in MF, all others in MMF unless otherwise specified.
- Voltages - Measured from point indicated to ground with a VTVM. No signal input.
- Input Voltage - 120V AC \pm 10%.
- Tuning Range - 535 to 1620 KC.
IF - 455 KC.

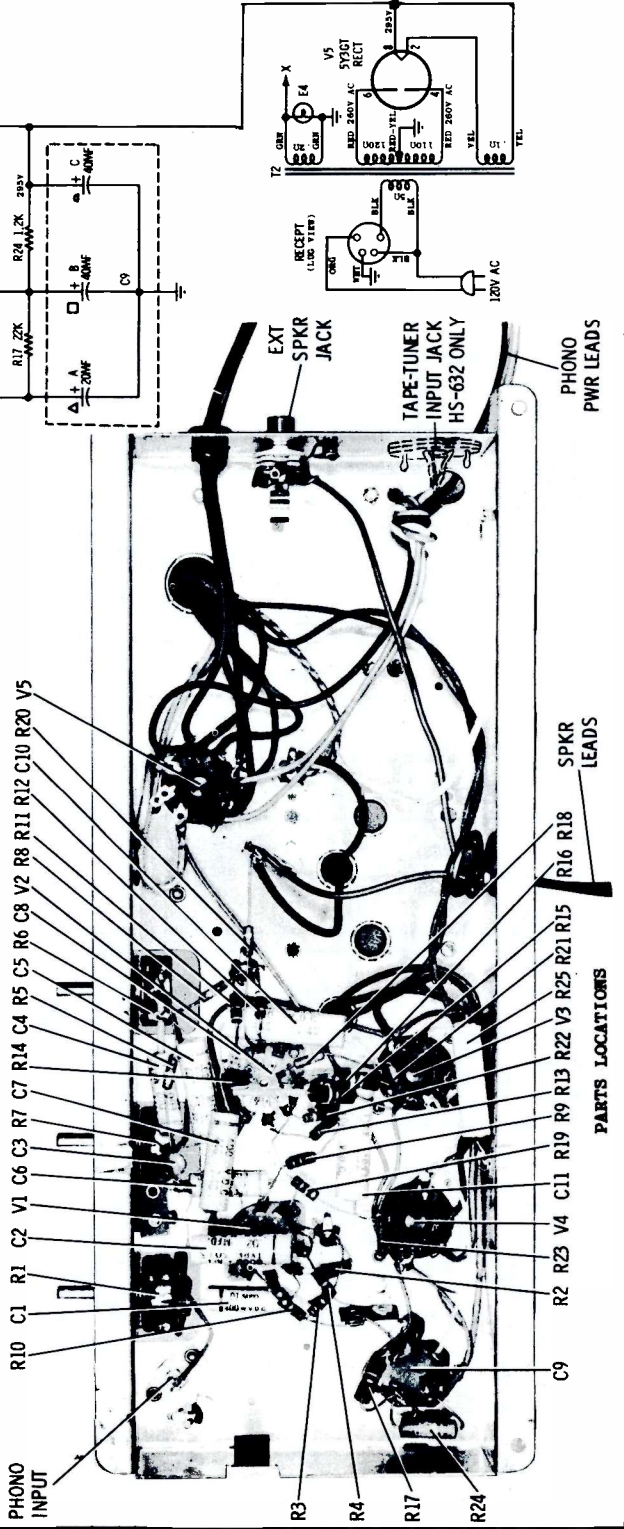
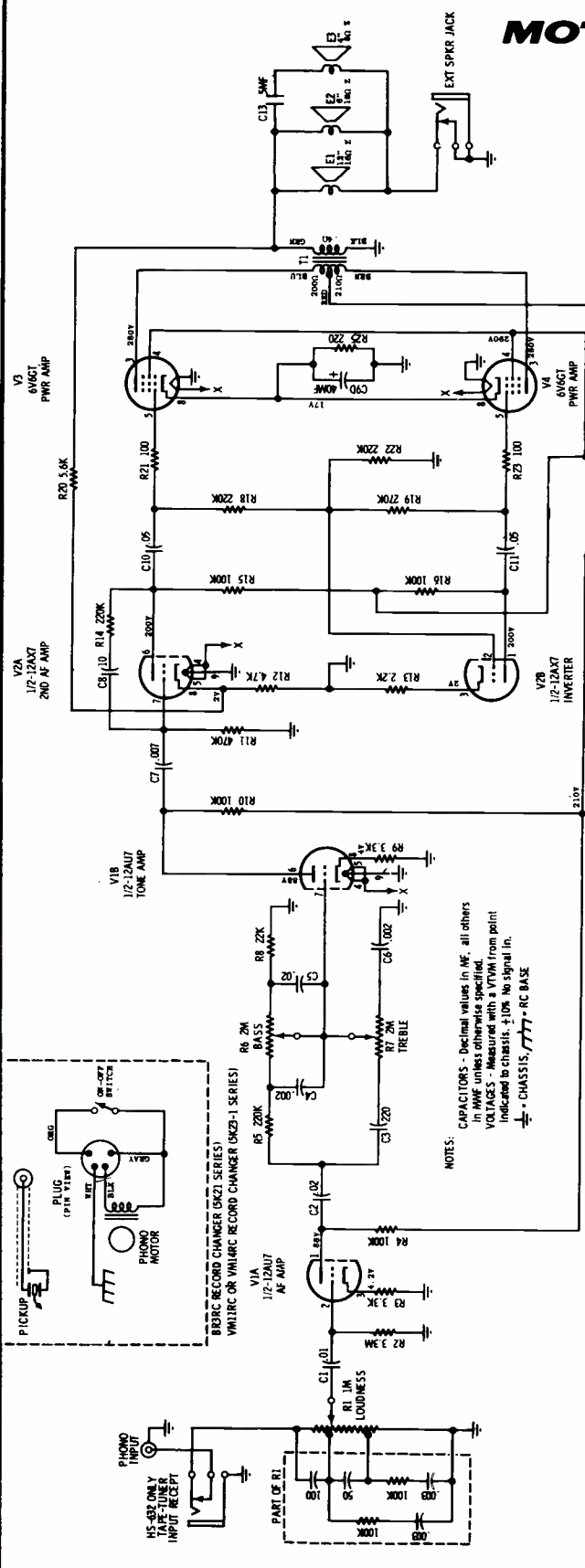


⑥ ANT CORE 600KC (5C22 ONLY)	TOP ①	BOT ②	TOP ③	BOT ④	⑦ ANT TRIM 1400KC (5C23 ONLY)	⑤ OSC 1620KC
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ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

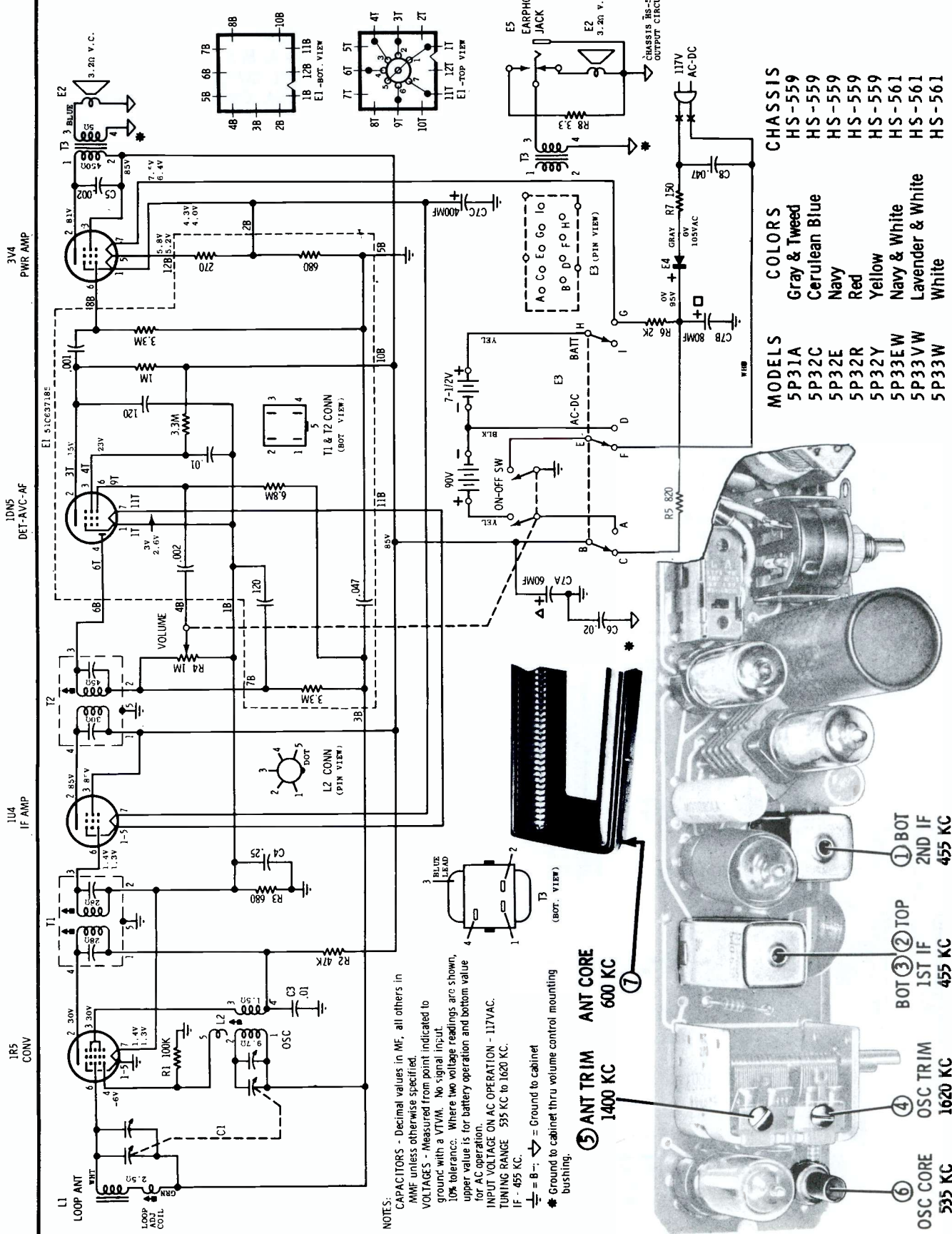
MOTOROLA

MODELS	CHASSIS
5K21B, M	HS-608
5K21B-A, M-A	HS-632
5K23B-1, CW-1, M-1	HS-608
5K23B-1A, CW-1A, M-1A	HS-632



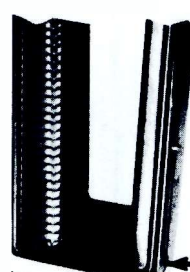
NOTES:
 CAPACITORS - Decimal values in μF all others in MMF unless otherwise specified.
 VOLTAGES - Measured with a VTVM from point indicated to chassis. $\pm 10\%$ No signal in.
 ⊕ - CHASSIS, ⊕ - RC BASE

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

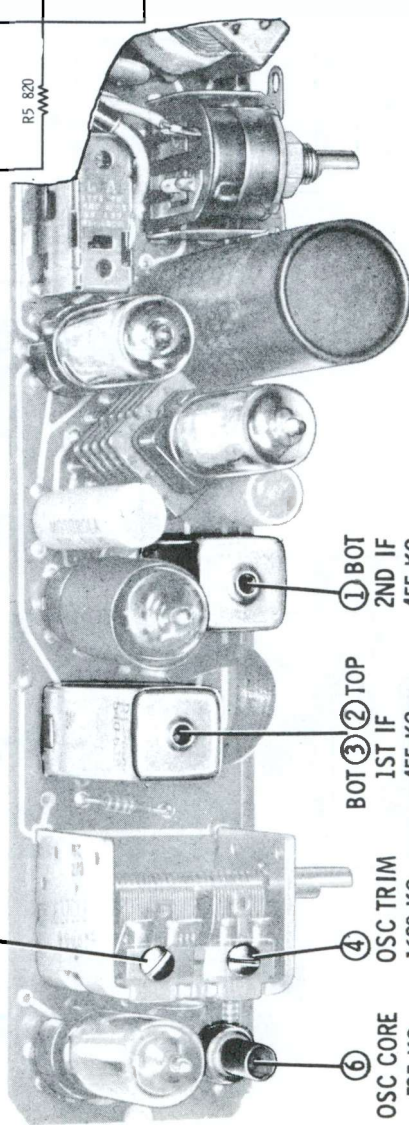


MODELS	COLORS	CHASSIS
5P31A	Gray & Tweed	HS-559
5P32C	Cerulean Blue	HS-559
5P32E	Navy	HS-559
5P32R	Red	HS-559
5P32Y	Yellow	HS-559
5P33EW	Navy & White	HS-561
5P33VW	Lavender & White	HS-561
5P33W	White	HS-561

NOTES:
 CAPACITORS - Decimal values in MF, all others in MUF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM. No signal input.
 10% tolerance. Where two voltage readings are shown, upper value is for battery operation and bottom value for AC operation.
 INPUT VOLTAGE ON AC OPERATION - 117VAC.
 TUNING RANGE - 535 KC to 1620 KC.
 IF - 495 KC.
 ⊕ = B - ⊕ = Ground to cabinet
 * Ground to cabinet thru volume control mounting bushing.



⑤ ANT TRIM 1400 KC
 ANT CORE 600 KC



ALIGNMENT LOCATIONS

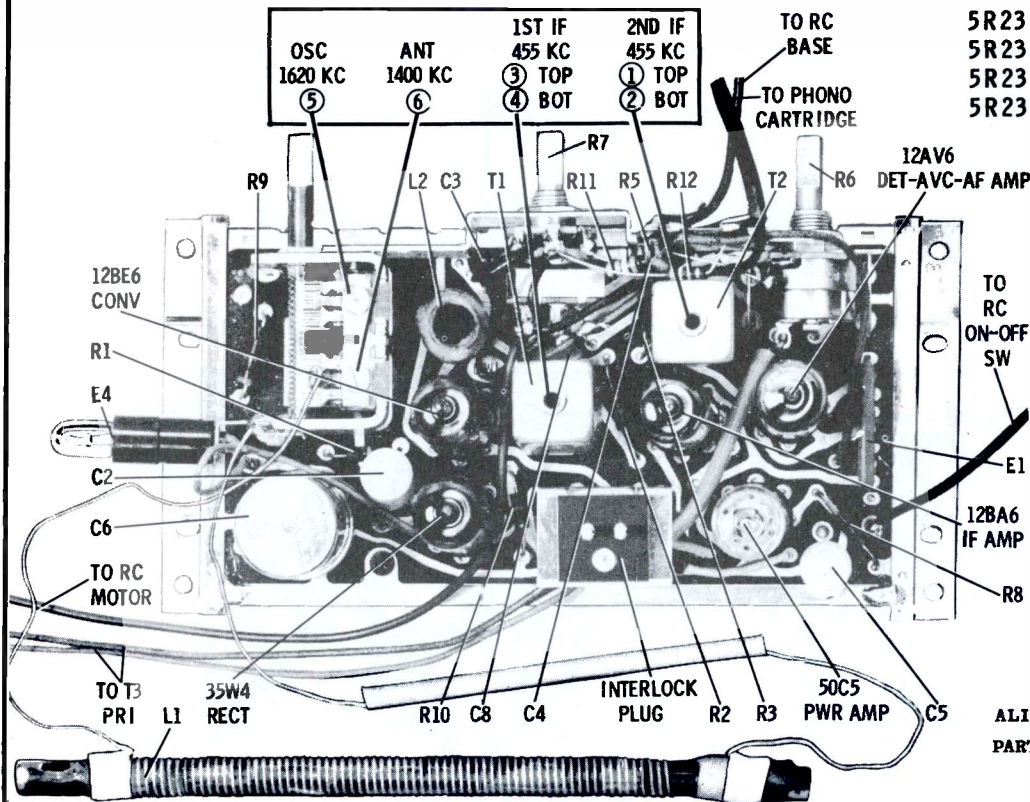
①	BOT	455 KC
②	TOP	455 KC
③	1ST IF	455 KC
④	OSC TRIM	1620 KC
⑥	OSC CORE	535 KC

MOTOROLA

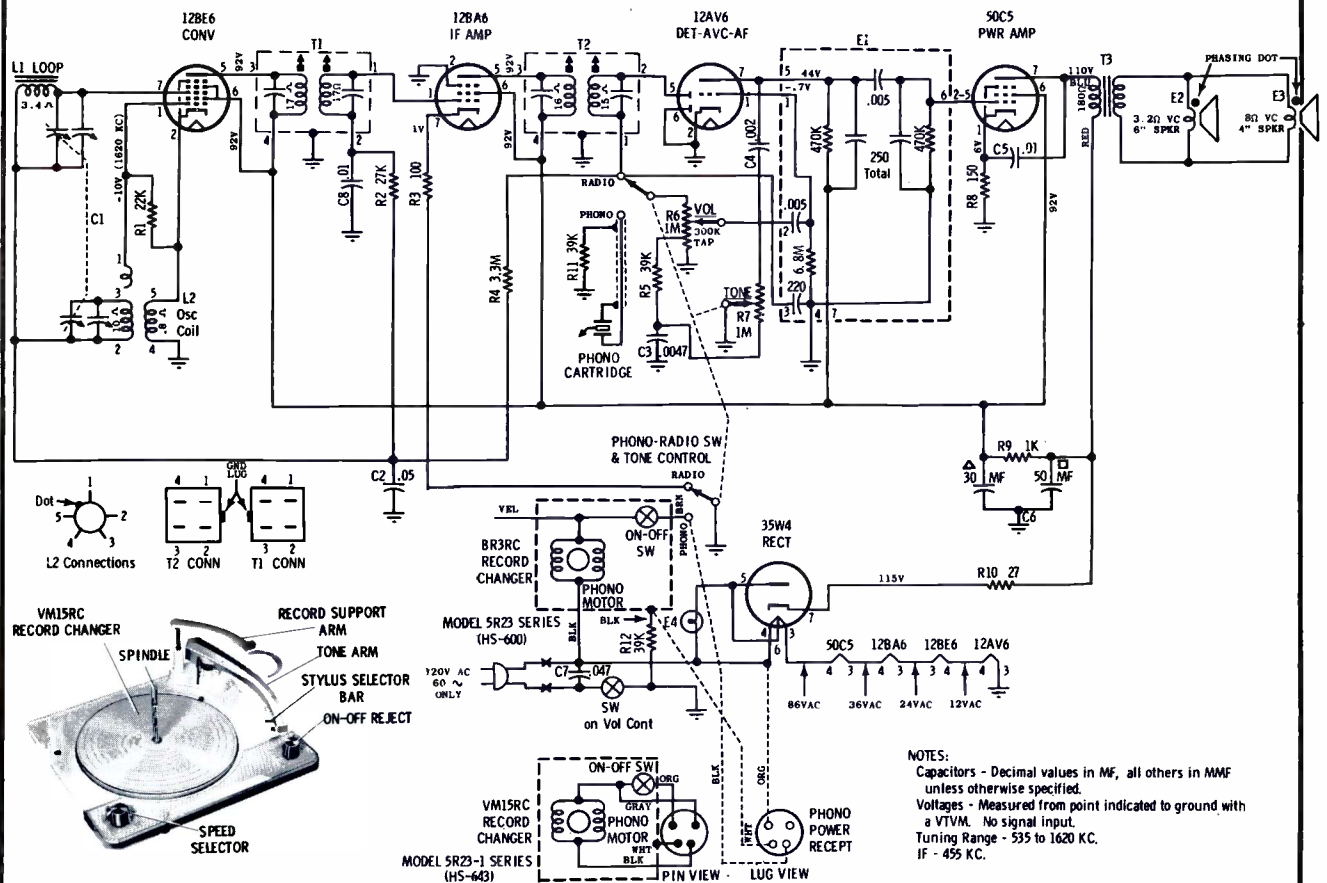
MOTOROLA

MODELS CHASSIS

5R23G	HS-600
5R23G-1	HS-643
5R23N	HS-600
5R23N-1	HS-643



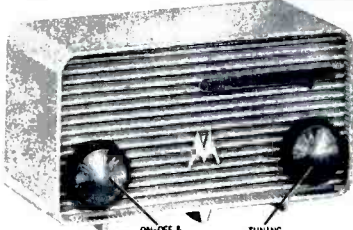
ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



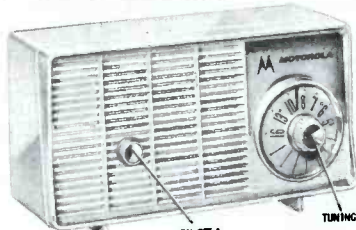
NOTES:
 Capacitors - Decimal values in MF, all others in MMF unless otherwise specified.
 Voltages - Measured from point indicated to ground with a VTVM. No signal input.
 Tuning Range - 535 to 1620 KC.
 IF - 455 KC.

MOTOROLA

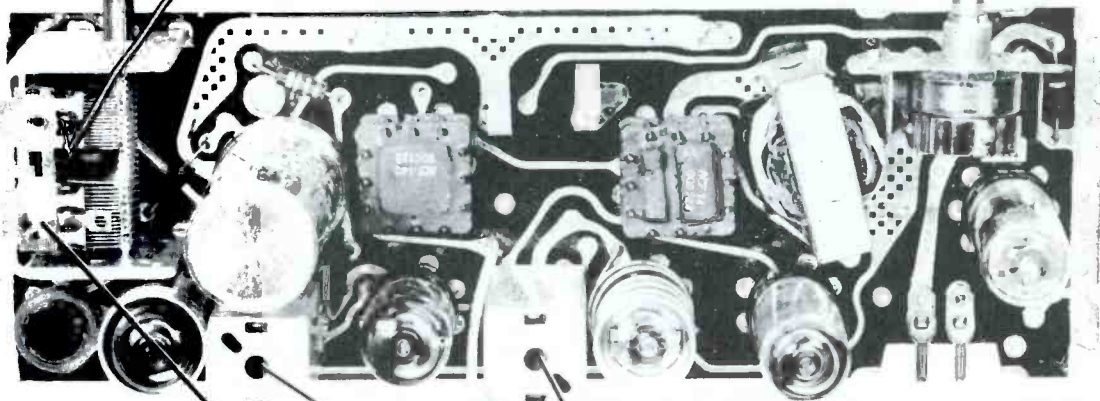
MODELS	CHASSIS
5T21W-1	HS-625
5T22M-1	HS-625
5T22R-1	HS-625
5T22W-1	HS-625
5T22Y-1	HS-627
5T23N-1	HS-627
5T23P-1	HS-627
5T23W-1	HS-627
5T23Y-1	HS-627



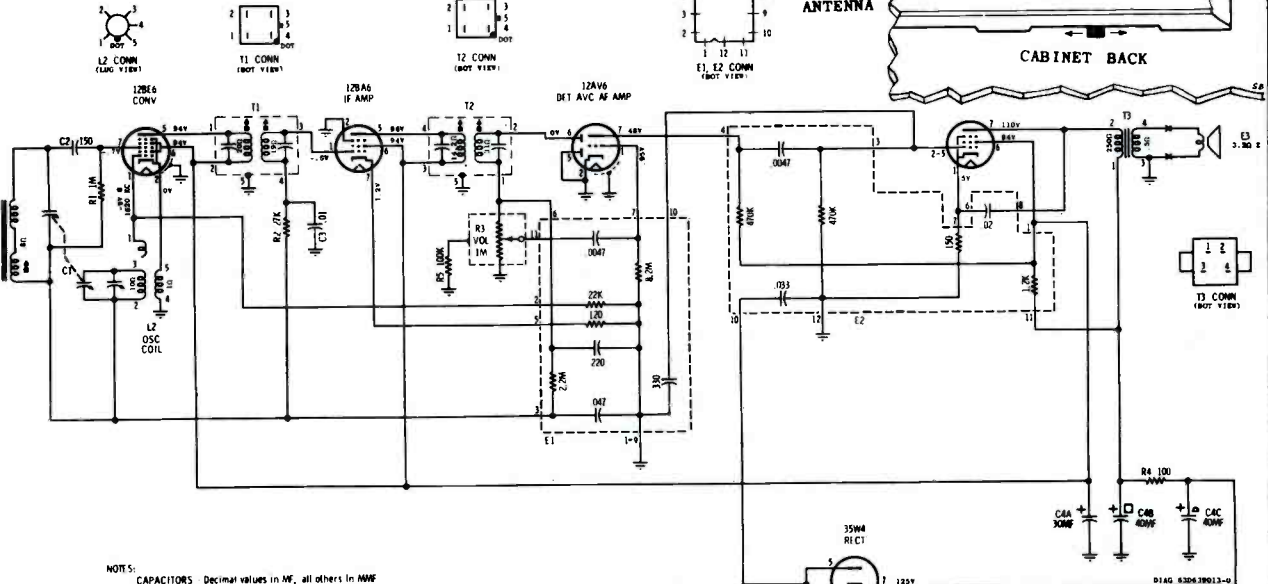
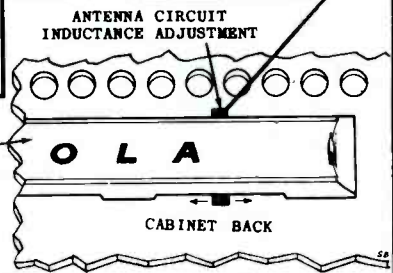
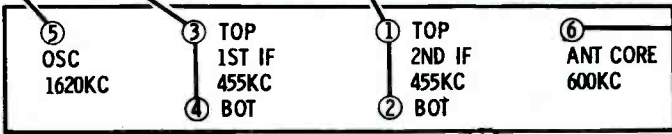
5T21-1 SERIES



5T23-1 SERIES



ALIGNMENT LOCATIONS



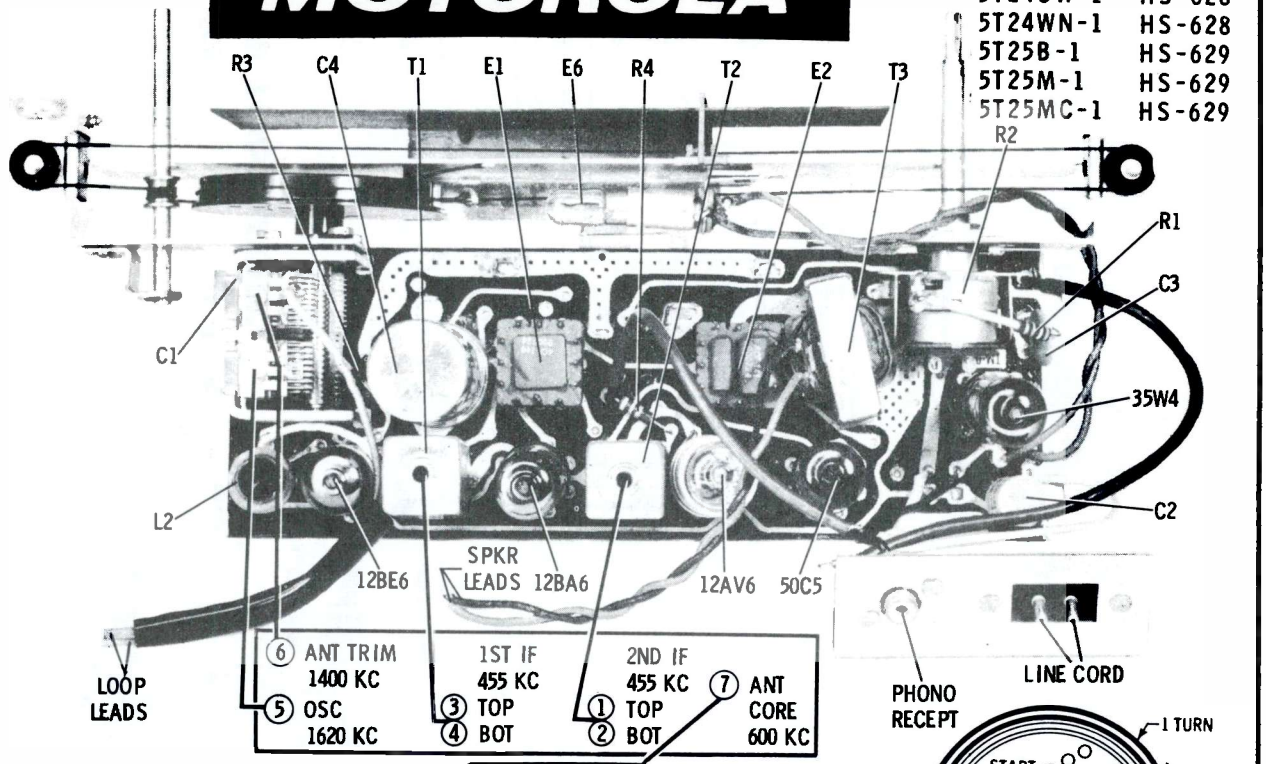
NOTES:
 CAPACITORS - Decimal values in μF , all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated to chassis with a VTVM, $\pm 10\%$. No signal input.
 INPUT VOLTAGE - 120V AC/DC
 TUNING RANGE - 535KC TO 1620KC
 IF - 455KC

MOTOROLA

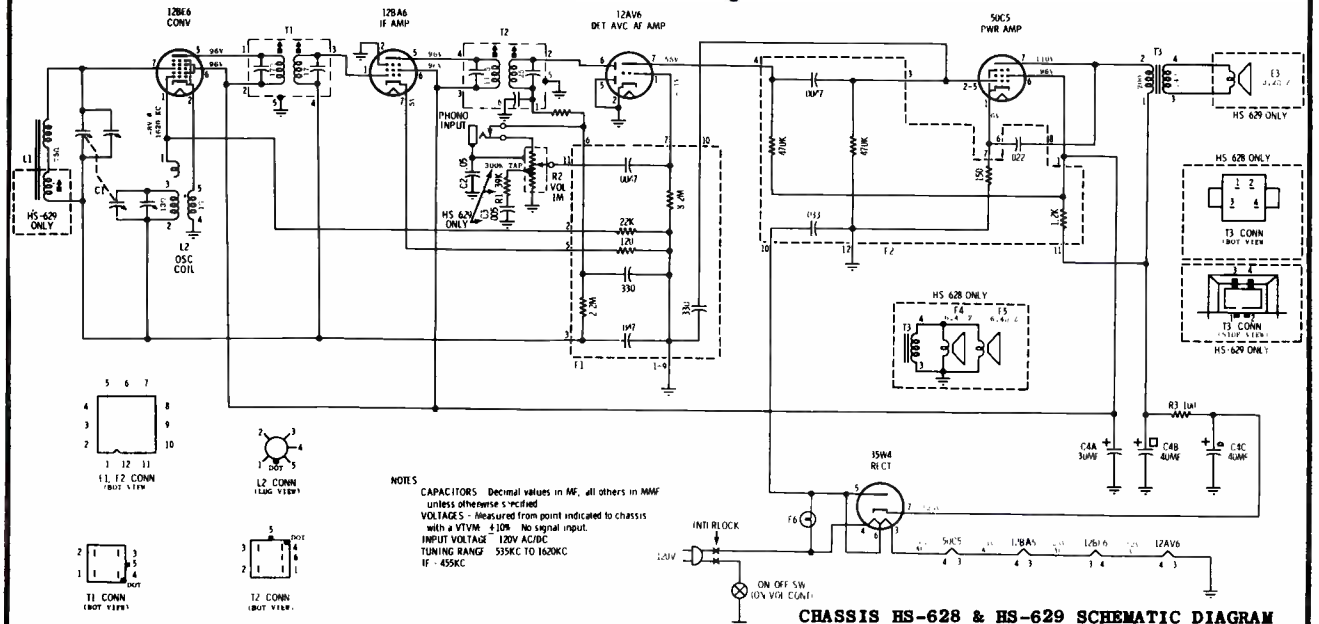
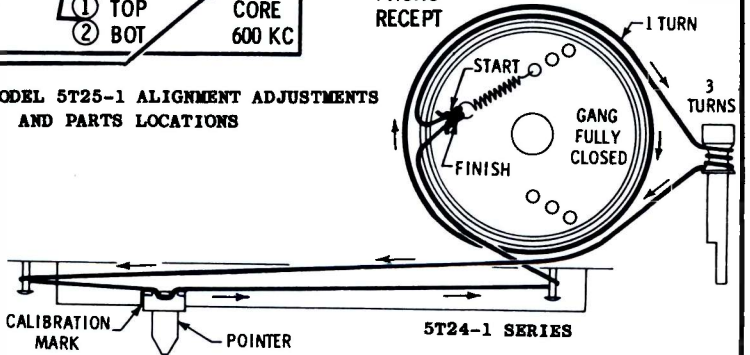
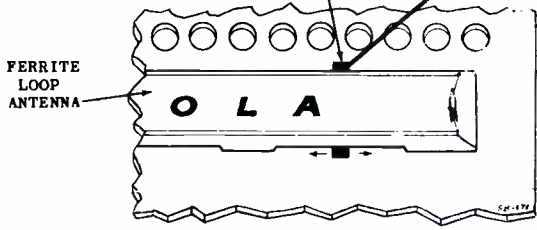
SCHEMATIC DIAGRAM

MOTOROLA

MODELS	CHASSIS
5T24GW-1	HS-628
5T24WN-1	HS-628
5T25B-1	HS-629
5T25M-1	HS-629
5T25MC-1	HS-629



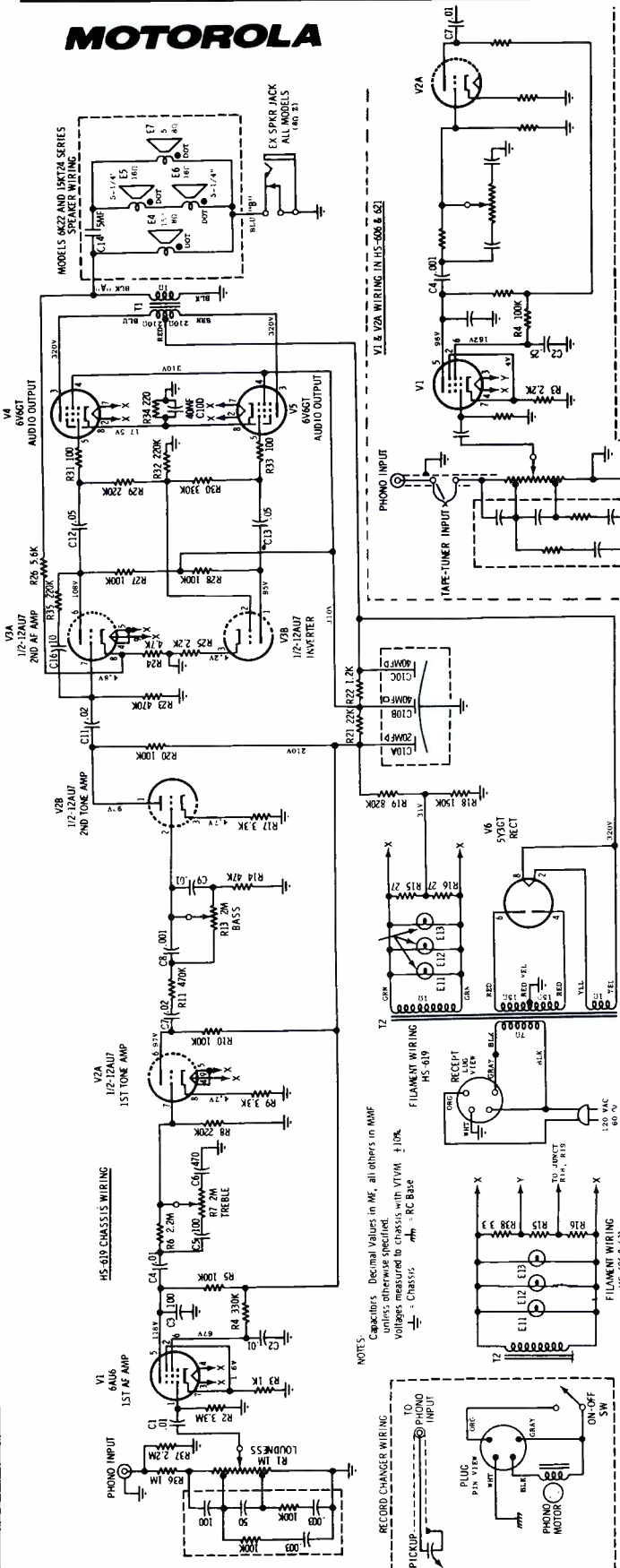
MODEL 5T25-1 ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS



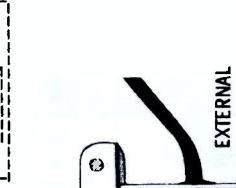
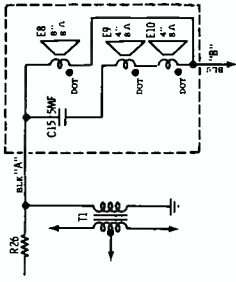
NOTES
 CAPACITORS - Decimal values in MF, all others in MUF unless otherwise specified.
 VOLTAGES - Measured from point indicated to chassis with a VTVM - $\pm 10\%$. No signal input.
 INPUT VOLTAGE - 120V AC/DC
 TUNING RANGE - 535KC TO 1620KC
 IF - 455KC

CHASSIS HS-628 & HS-629 SCHEMATIC DIAGRAM

MOTOROLA

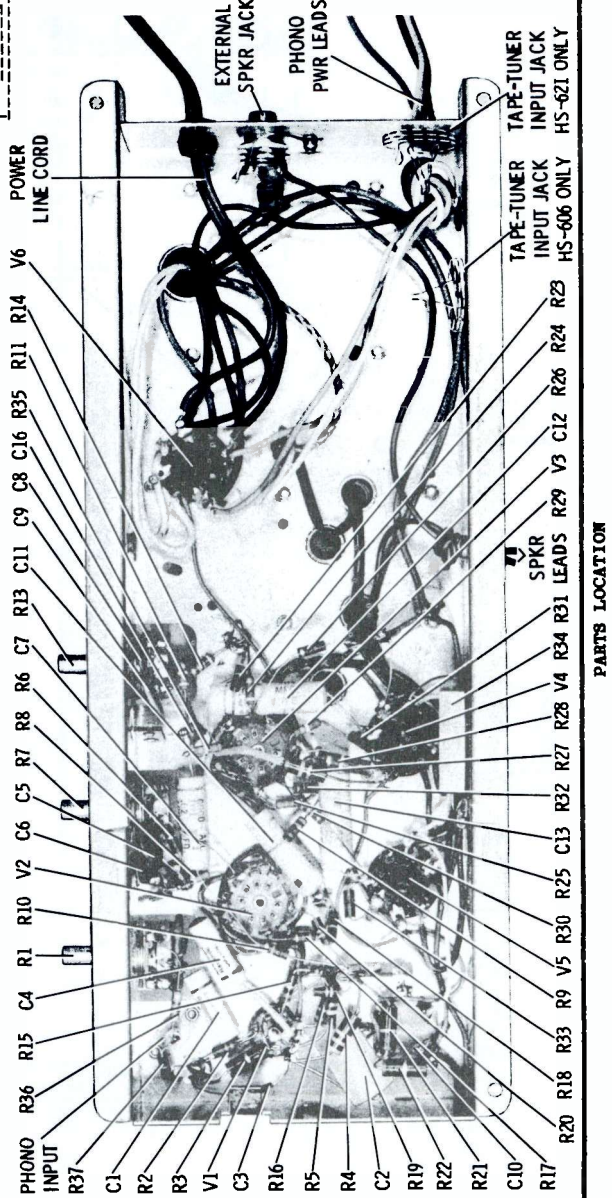


NOTES: Capacitors - Decimal values in μ F, all others in M μ F unless otherwise specified. Voltages measured to chassis, with VT/VIN \pm 10%.
 - C: Chassis; - R: RC Base



MOTOROLA

- MODELS**
 6H26S-1
 6H26S-1A
 6H27B-1, W-1
 6H27B-1A, W-1A
 6K22B-1, M-1, MC-1, W-1
 6K22B-1A, M-1A, MC-1A, W-1A
 15KT24B-1, CW-1, M-1
 15KT24B-1A, CW-1A, M-1A
- CHASSIS**
 HS-619
 HS-621
 HS-619
 HS-621
 HS-619
 HS-621
 HS-619, HS-590
 HS-606, HS-590

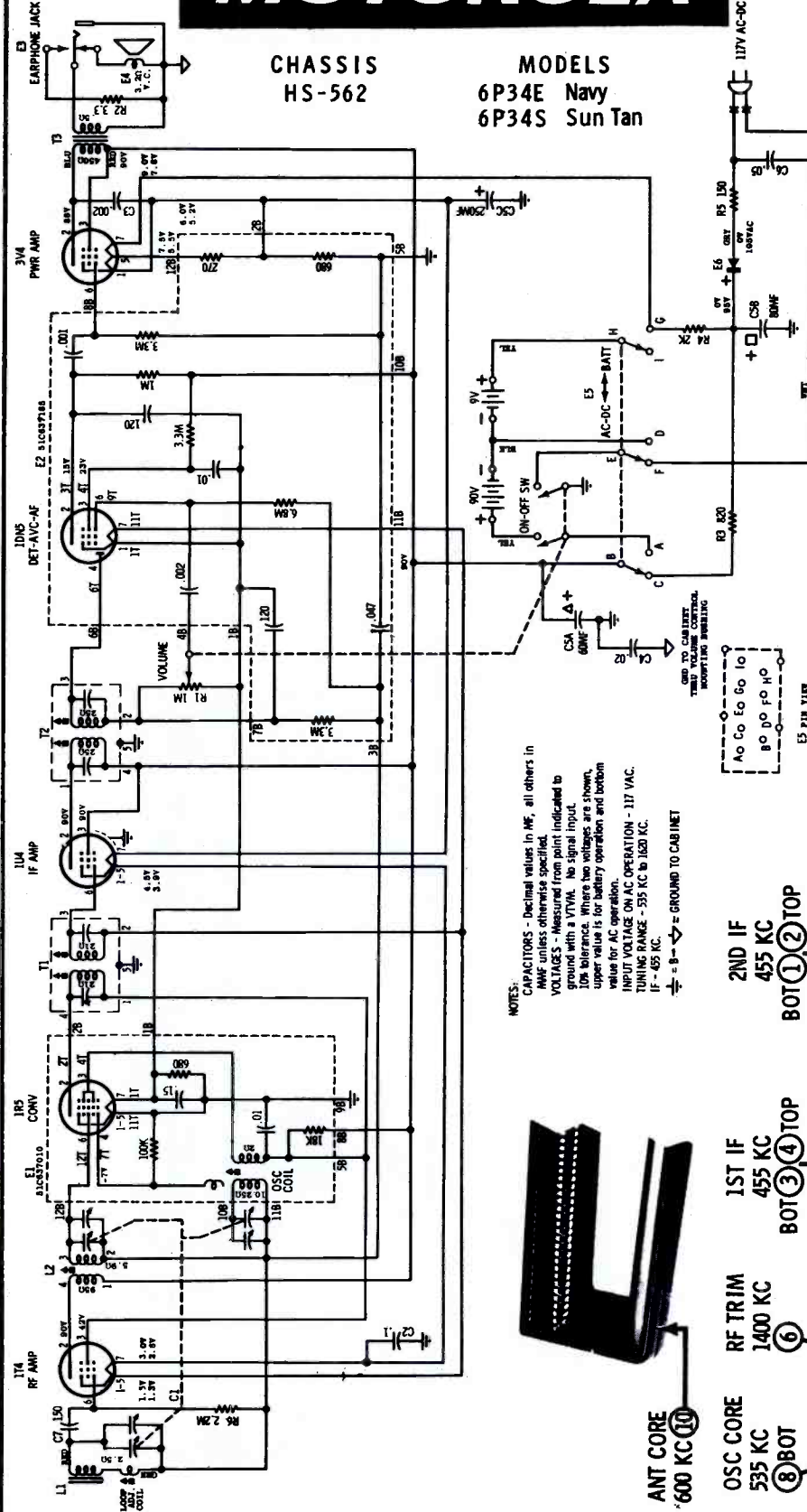


PARTS LOCATION

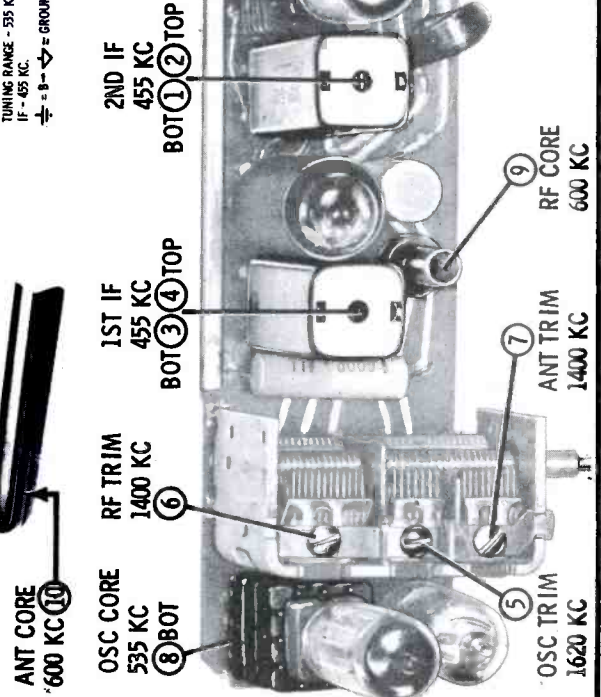
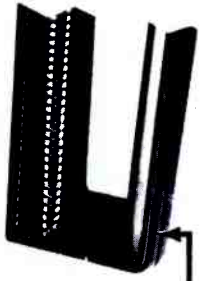
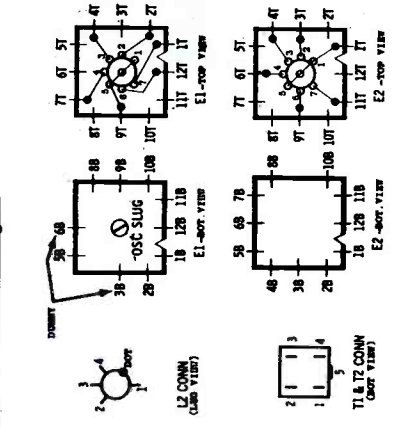
MOTOROLA

CHASSIS
HS-562

MODELS
6P34E Navy
6P34S Sun Tan



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



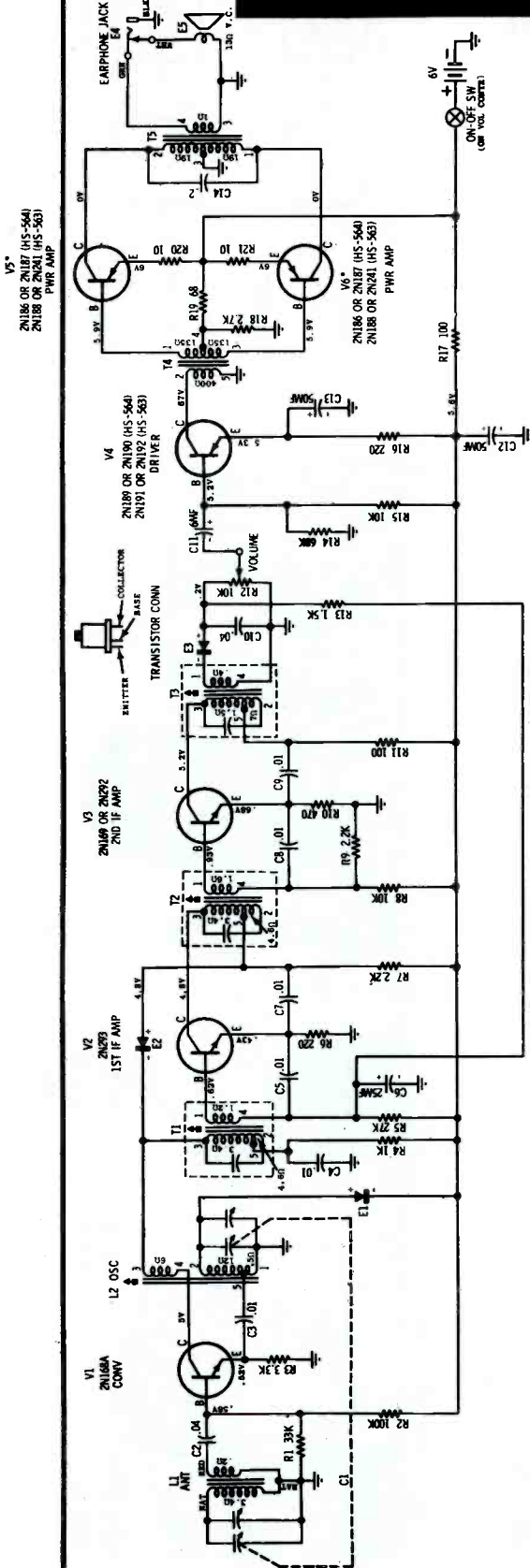
ALIGNMENT LOCATIONS

MOTOROLA

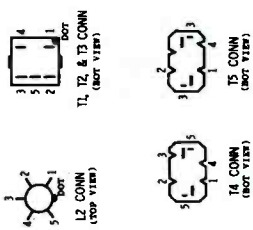
MODELS

CHASSIS

6X31C	Blue & Beige	HS-564
6X31N	Beige	HS-564
6X31R	Red & Beige	HS-564
6X32E	Navy Blue	HS-563

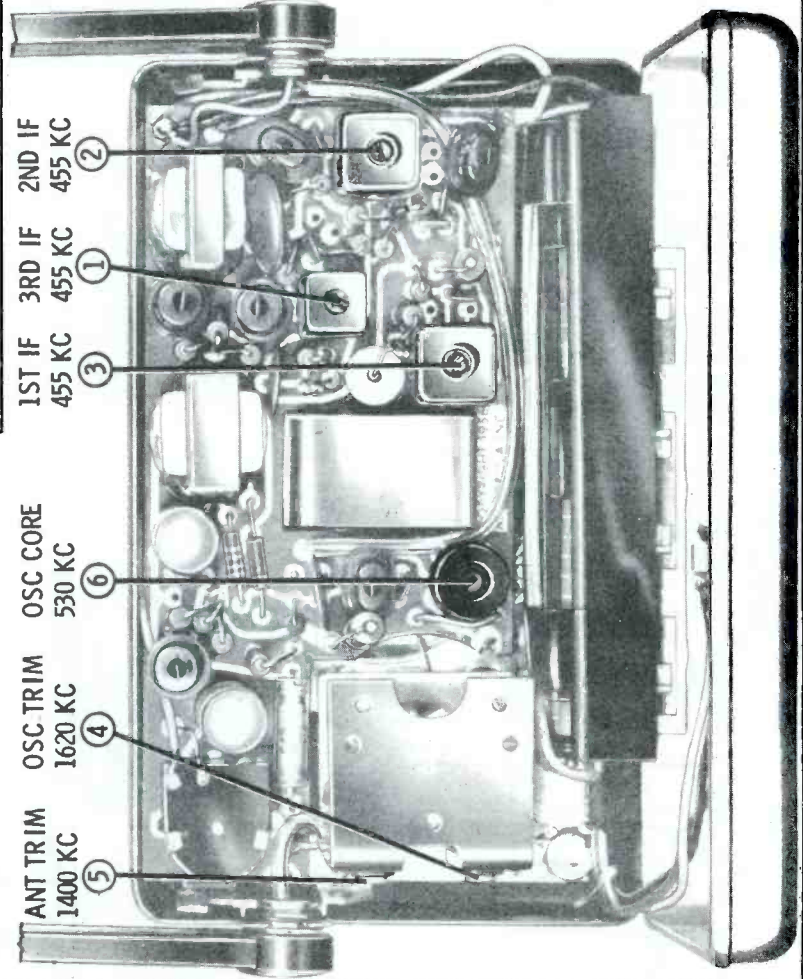


NOTES:
 CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM $\pm 10\%$. No signal input, volume at maximum.
 TUNING RANGE - 530 KC to 1620 KC.
 *Do not interchange power amplifier types, use two of the same type transistors in the output stage.
 DIMENSIONS - Measured with the transistors out of associated circuits.



CHASSIS REMOVAL

1. Pull the volume control knob from front of radio.
2. Remove tuning knob retaining screw from the tuning knob and remove the tuning knob (see cover photo).
3. Remove chassis mounting screw from under tuning knob (see cover photo).
4. Open rear cover and turn handle perpendicular to the plated chassis.
5. Grasp handle near one of its two mounting bushings and pull out from side of cabinet until the round portion of the mounting bushing clears hole in side of cabinet, then lift this side of handle and chassis slightly out of cabinet. Perform the same procedure on the other mounting bushing, then lift handle, chassis and speaker plate out of cabinet.
6. The plated chassis is separated from the speaker mounting plate as follows: unsolder the wire that connects from the gang to the plated chassis. Remove speaker, earphone jack, antenna & battery leads from plated chassis. Then unsolder one at a time the four chassis mounting support lugs.



ALIGNMENT LOCATIONS

MOTOROLA

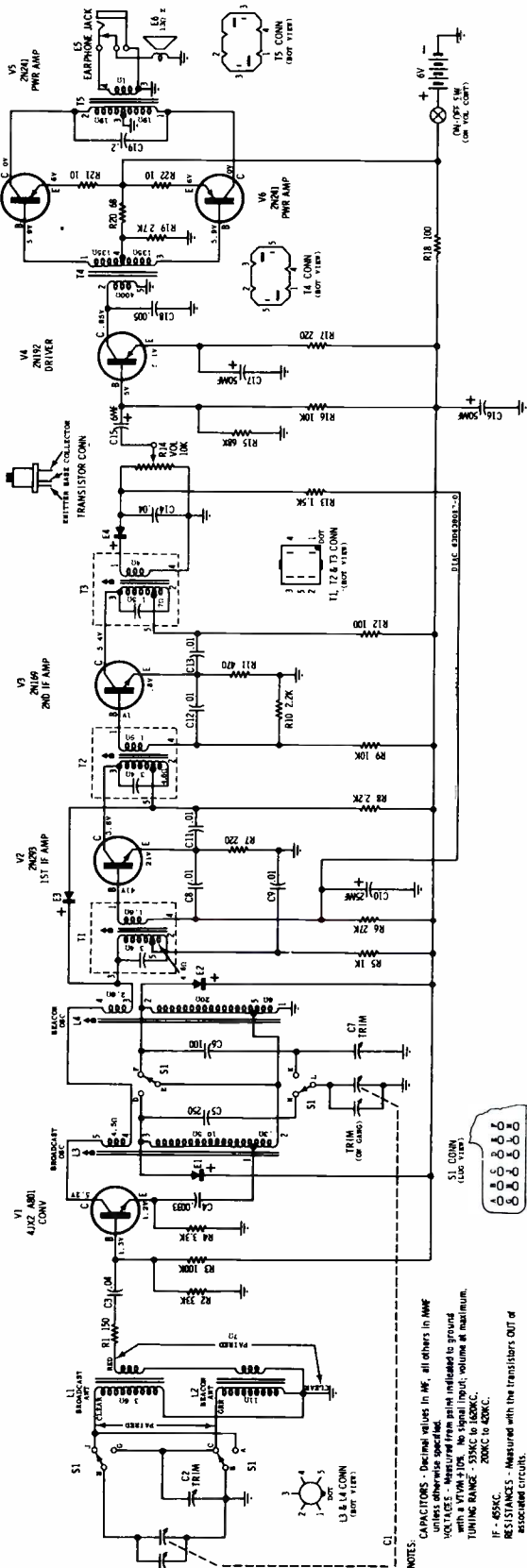
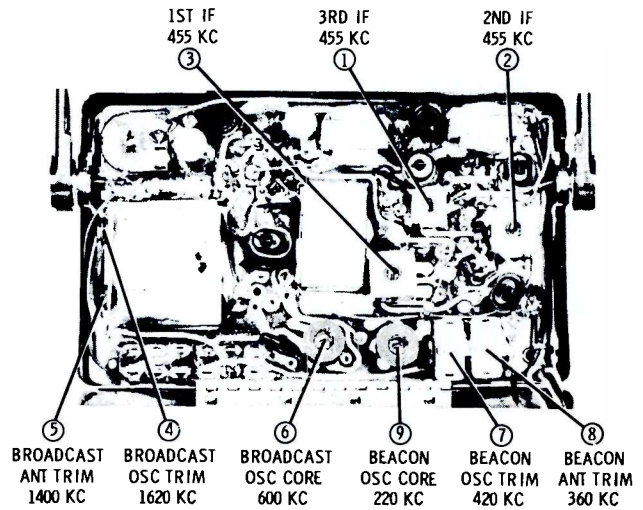
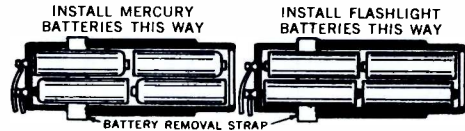
MODEL	CHASSIS
6X39A	HS-630
6X39A-1	HS-683
6X39A-2	HS-684

CHASSIS REMOVAL

1. Pull the volume control knob from front of radio.
2. Remove tuning knob retaining screw from the tuning knob and remove the tuning knob.
3. Remove chassis mounting screw from under tuning knob.
4. Open rear cover and turn handle perpendicular to the plated chassis.
5. Grasp handle near one of its two mounting bushings and pull out from side of cabinet until the round portion of the mounting bushing clears hole in side of cabinet, then lift this side of handle and chassis slightly out of cabinet. Perform the same procedure on the other mounting bushing, then lift handle, chassis and speaker plate out of cabinet.
6. The plated chassis is separated from the speaker mounting plate as follows: unsolder the wire that connects from the gang to the plated chassis. Remove speaker, earphone jack, antenna & battery leads from plated chassis. Then unsolder one at a time the three chassis mounting support lugs.

HANDLE REPLACEMENT

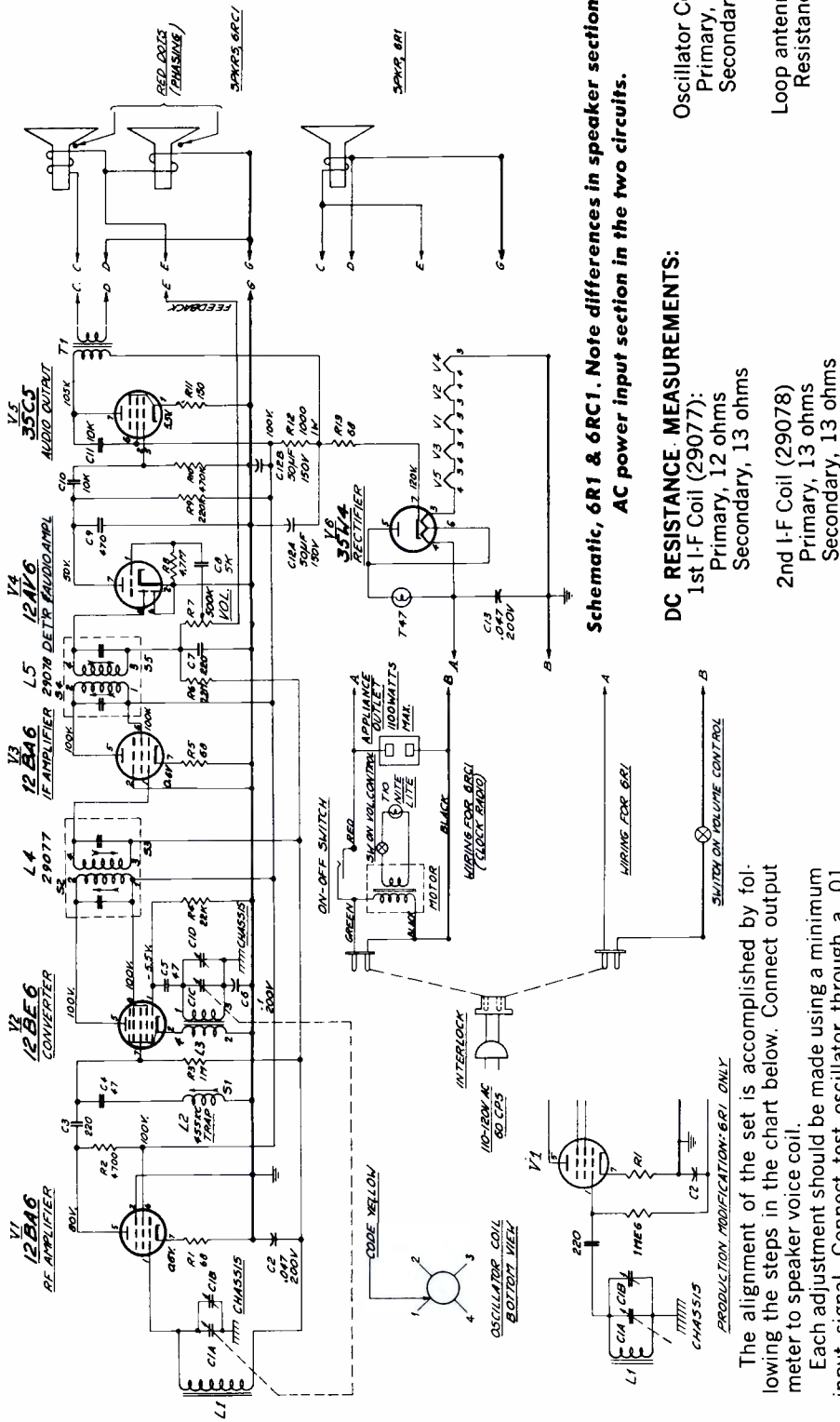
1. Remove chassis and speaker mounting plate from cabinet as described under CHASSIS REMOVAL.
2. Unsolder antenna leads from chassis.
3. Turn handle perpendicular to chassis and slide out of handle clips.



NOTES: CAPACITORS - Original values in MF, all others in MMF unless otherwise specified.
 VOLTAGES - Measured from point indicated to ground with a VTVM 2.0K. No signal input; volume at maximum.
 TUNING RANGE - 530KC to 1600KC.
 IF - 455KC.
 RESISTANCES - Measured with the transistors OUT or associated circuits.
 S1 - 4-POST SWITCH - Shown in Broadcast band position.

Packard Bell

TABLE MODEL RADIO 6R1 CLOCK RADIO MODEL 6RC1



Schematic, 6R1 & 6RC1. Note differences in speaker section and AC power input section in the two circuits.

DC RESISTANCE MEASUREMENTS:

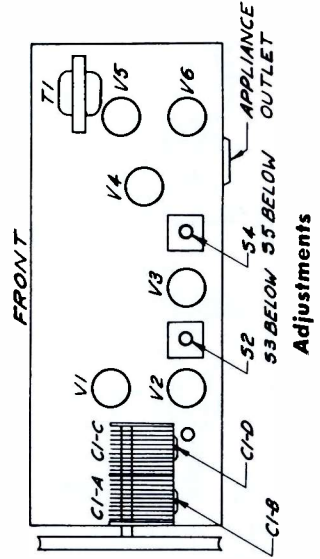
- 1st I-F Coil (29077): Primary, 12 ohms; Secondary, 13 ohms
- 2nd I-F Coil (29078): Primary, 13 ohms; Secondary, 13 ohms

- Oscillator Coil (29229B): Primary, 1 ohm; Secondary, 5.5 ohms

Loop antenna:
Resistance, 0.3 ohms

ALIGNMENT PROCEDURE:

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

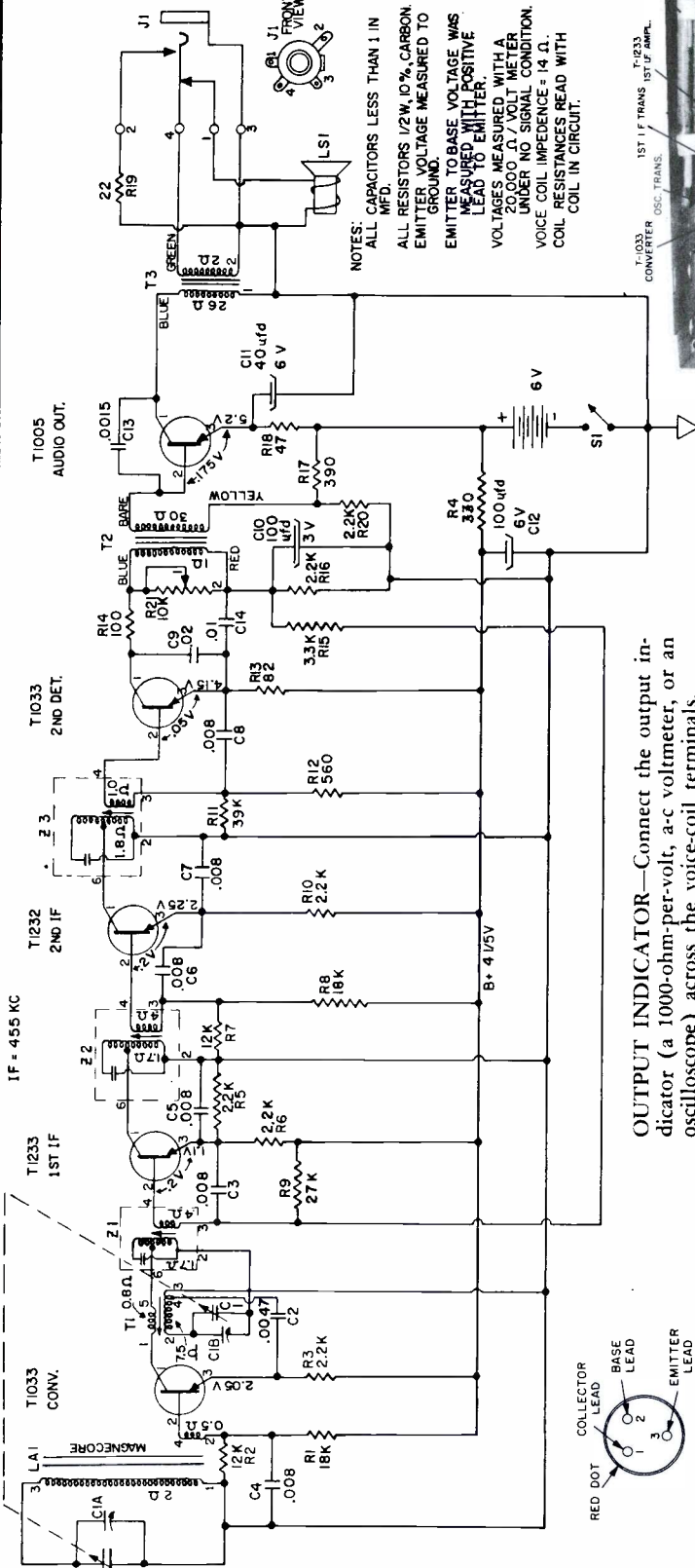


The alignment of the set is accomplished by following the steps in the chart below. Connect output meter to speaker voice coil.

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.

PHILCO TRANSISTOR RADIO

MODEL T-500 - CODE 124



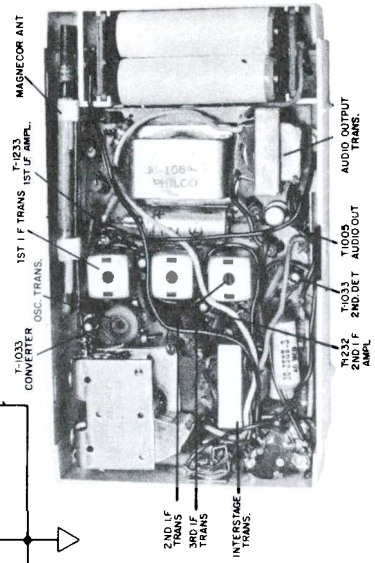
NOTES:
 ALL CAPACITORS LESS THAN 1 IN MFD.
 ALL RESISTORS 1/2W, 10% CARBON.
 EMITTER VOLTAGE MEASURED TO GROUND.
 EMITTER TO BASE VOLTAGE WAS MEASURED WITH POSITIVE LEAD TO EMITTER.
 VOLTAGES MEASURED WITH A 20,000 Ω/V VOLT METER UNDER NO SIGNAL CONDITION.
 VOICE COIL IMPEDANCE = 14 Ω.
 COIL RESISTANCES READ WITH COIL IN CIRCUIT.

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

ALIGNMENT CHART

STEP	RADIO			ADJUST
	SIGNAL GENERATOR CONNECTION TO RADIO	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Panel must be removed from cabinet. Connect signal generator through a .1 μf condenser to antenna section of gang. Use the least generator signal necessary to give an output indication.	455 KC	Tuning gang fully open. Adjust for maximum output.	Z3—3rd IF Z2—2nd IF Z1—1st IF
2	Use radiating loop (See note 1 below).	1620 KC	1620 KC (gang fully open)	C1B—osc. trimmer
3	Same as step 2.	1400 KC	1400 KC	C1A—ant. trimmer
4	Same as step 2. Panel MUST be re-mounted in cabinet.	600 KC	600 KC	T1—osc. core
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 2.			

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



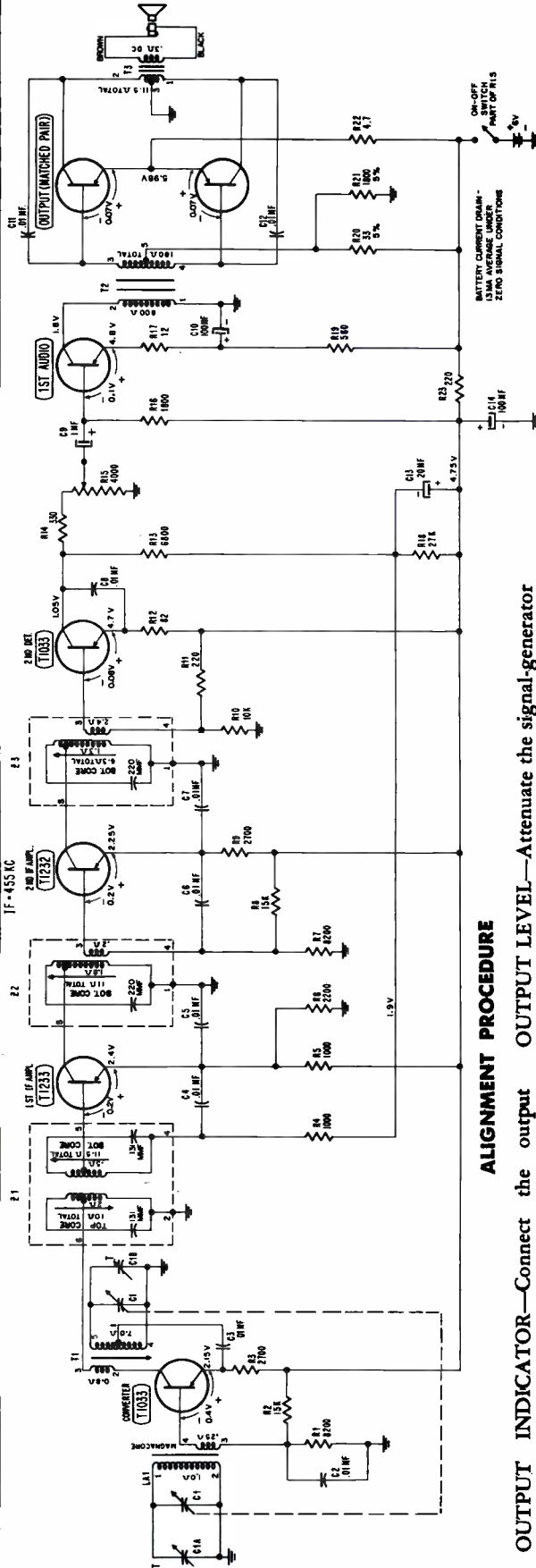
TERMINAL LUG IDENTIFICATION

- L1 Orange jumper to L4, 5 volt B+.
- L2 Yellow lead to T2.
- L3 To short antenna lead no. 4.
- L4 Orange jumper to L1, 4.5 volt B+.
- L5 Black jumper to ground lug L10.
- L6 Black lead to positive battery terminal (6 volts).
- L7 Green lead to end (No. 2) of R21.
- L8 Orange lead to end (No. 2) of R21.
- L9 Blue lead of T3.

PHILCO TRANSISTOR RADIOS

MODELS T-700 and T-800
CODES 124 and 126

(Continued on page 121, at right)



ALIGNMENT PROCEDURE

OUTPUT INDICATOR—Connect the output indicator (a 1000-ohm-per-ohm, a-c voltmeter, or an oscilloscope) across the voice-coil terminals. **OUTPUT LEVEL**—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .4 volt.

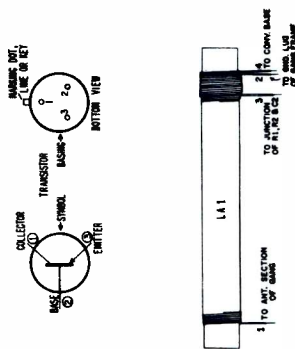
SIGNAL GENERATOR—Use an AM r-f signal generator. Connect the ground lead to chassis, and connect the output lead as indicated in the alignment chart.

ALIGNMENT CHART

STEP	R A D I O			ADJUST
	SIGNAL GENERATOR CONNECTION TO RADIO	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Connect signal generator through a .1-uf. condenser to ant. section of gang.	455 kc.	Tuning gang fully open.	Z3—3rd i-f pri. Z2—2nd i-f pri. Z1—1st i-f sec. (Bottom Core) Z1—1st i-f pri. (Top Core)
2	Use radiating loop. (See NOTE 1 below).	600 kc.	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core trimmer
3	Same as step 2.	1620 kc. (Tuning gang fully open)	Adjust for maximum output.	C1B—osc. trimmer
4	Same as step 2.	1400 kc.	Adjust for maximum output.	C1A—antenna trimmer
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 4.			

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

* VOLTAGES READ UNDER NO SIGNAL CONDITIONS WITH A 20,000 PER VOLT METER. COIL RESISTANCES READ WITH COIL CONNECTED IN THE CIRCUIT.



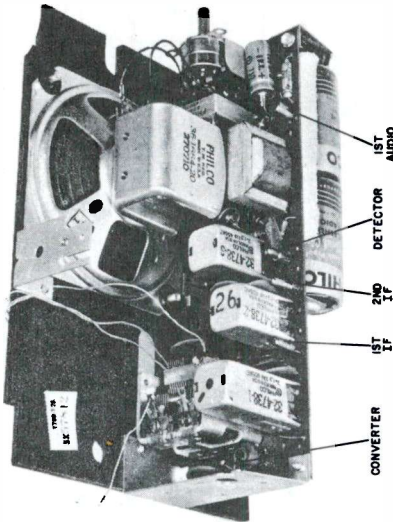
MODEL	CODE	TRANSISTORS			
		1ST AUDIO	OUTPUT	OSC.	ANTENNA
T-700	124	T-1001	T-1007	T-1000	T-1008
T-800	126	T-1001	T-1000	T-1000	T-1008

PHILCO Models T-700 and T-800

(Continued from page 120)

REPLACEMENT PARTS LIST

T1	Transformer, oscillator	32-4689-2
T2	Transformer, audio driver	32-8813
T3	Transformer, audio output	32-8812
T1033	Transformer, converter and 2nd detector, 2 used	34-6000-3
T1233	Transistor, 1st I-F amplifier	34-6000-12
T1232	Transistor, 2nd I-F amplifier	34-6000-11
	Transistor, 1st audio, code 124, T1001	34-6001-18
	Transistor, 1st audio, code 126, T1000	34-6001-15
	Transistors, output, matched pair, code 124, T1007	34-6008
	Transistors, output, matched pair, code 126, T1008	34-6008
Z1	Transformer, 1st I-F	32-4738-1
Z2	Transformer, 2nd I-F	32-4738-2
Z3	Transformer, 3rd I-F	32-4738-3
	Printed wiring panel	64-6487
	Battery bracket and spring contact Assy., end of panel	76-10141
	Battery bracket and contact Assy., center	76-10142

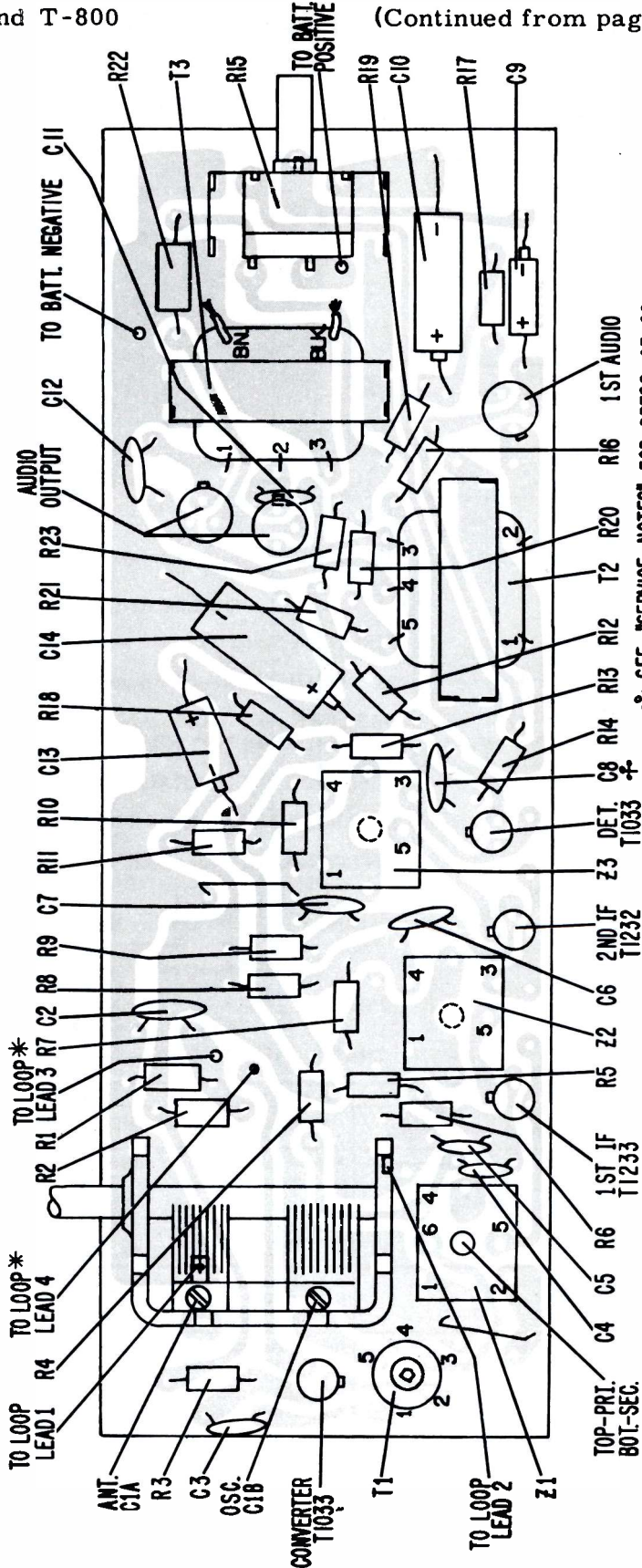


SERVICE NOTES

When signal tracing, inject signal at transistor collector and limit input to keep signal across speaker below 0.4 volts.

Normally, the transistors should be the last item suspected.

The dress (position) of condenser C8 may be helpful in reducing harmonic whistle when encountered. C8 may be bent over toward R14 and the detector transistor. In sets where C8 is in this bent position, do not disturb.



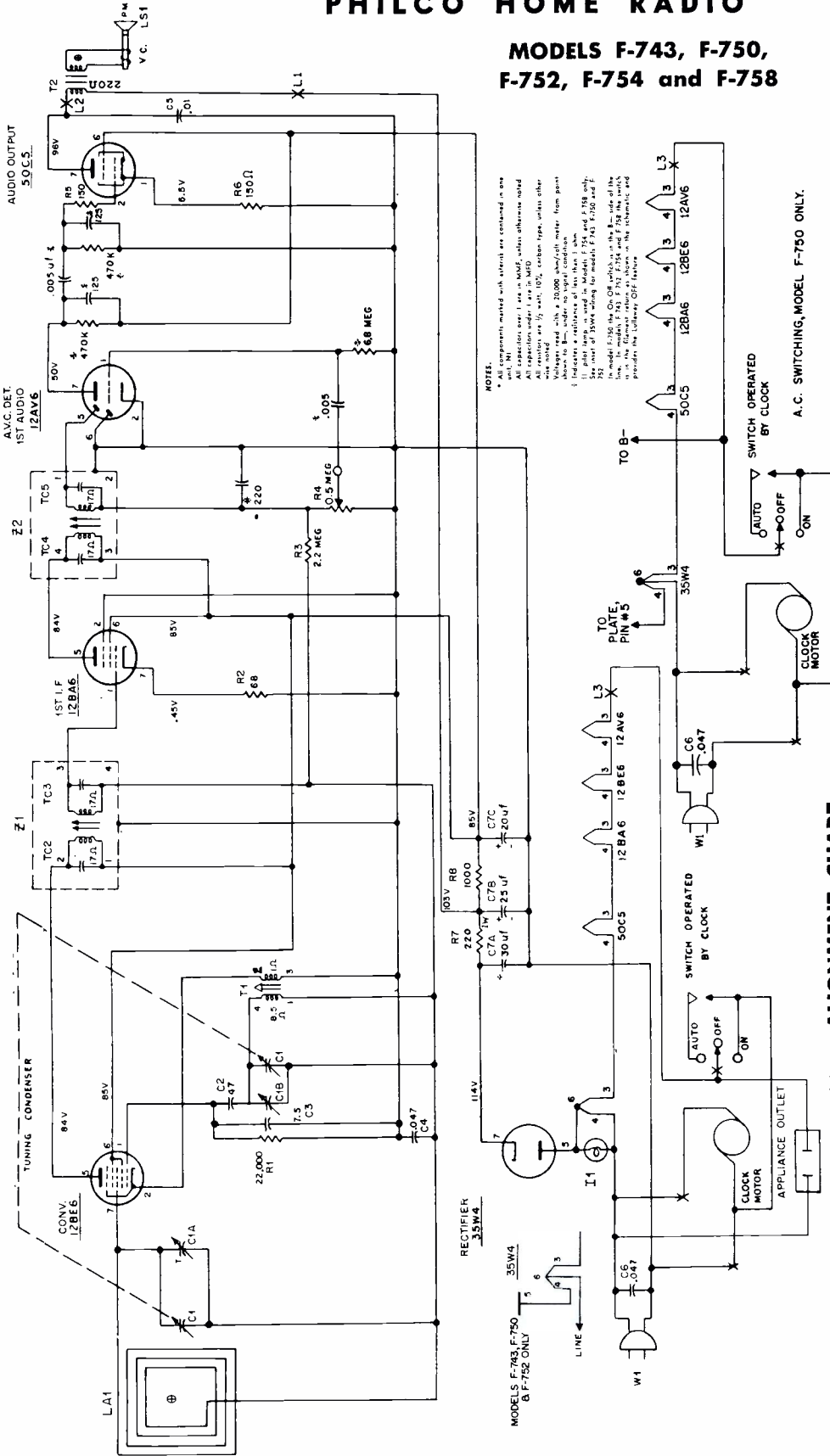
* LOOP LEADS 3 & 4 DRESS BETWEEN EDGE OF PRINTED PANEL & MASONITE FRONT PLATE & CONNECT TO TIE LUGS INDICATED ON FOIL SIDE OF PANEL.

* SEE "SERVICE NOTES" FOR DRESS OF C8.

Composite Panel View — Showing Parts Replacement and Tuning Adjustments

PHILCO HOME RADIO

**MODELS F-743, F-750,
F-752, F-754 and F-758**



NOTES:

- * All components marked with asterisk are contained in one All-Season unit. See in MAF, unless otherwise noted.
- All capacitors over 1 µf are in MFD, unless otherwise noted.
- All resistors are 1/2 watt, 10% carbon type, unless other.
- Volts per inch with a 20,000 ohm/volt meter from point to point, under no signal condition.
- 1. Pilot lamp is used in Models F-754 and F-758 only.
- 2. See note of 35w4 for wiring for models F-743, F-750 and F-752.
- 3. In model F-750 the On-Off switch is in the back side of the chassis. In models F-752, F-754 and F-758 the On-Off switch is in the front panel. In models F-743 and F-758 the On-Off switch is in the bottom panel. The On-Off switch provides the Lullaby Off feature.

CHASSIS REMOVAL

- (1) Remove Back: In models F-750, F-752, F-754 and F-758 there are two screws holding the back to the cabinet. In model F-743 spring the cabinet top to allow the back top to come back and out. Then lift (or slide upwards) the back to free back from bottom slots. Disengage interlock.
- (2) Remove the drive screw which holds the volume control frame to a boss on inside of cabinet.
- (3) It may be desirable or necessary to unsolder the speaker and clock leads.

ALIGNMENT CHART

SIGNAL GENERATOR			RADIO		
STEP	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1.	Ground lead to B-; output lead through a .1 mf condenser to grid (pin 7) of 12BE6 or top of r-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-B—osc.
3.	Same as step 2.	1500 kc.	1500 kc.	Adjust for maximum output.	C1-A—aerial

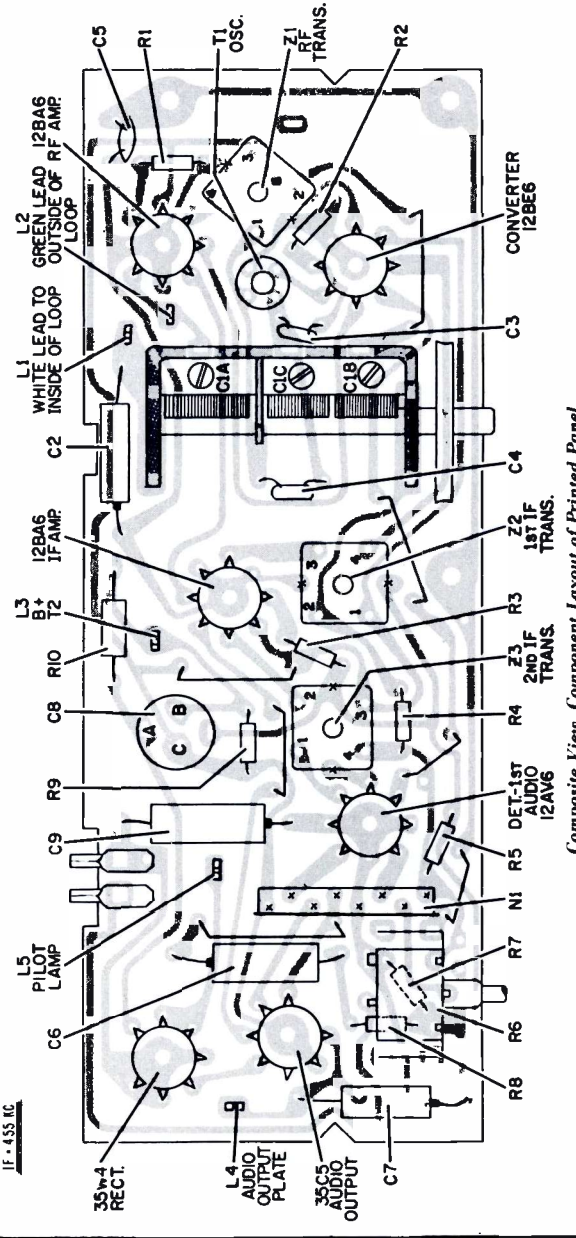
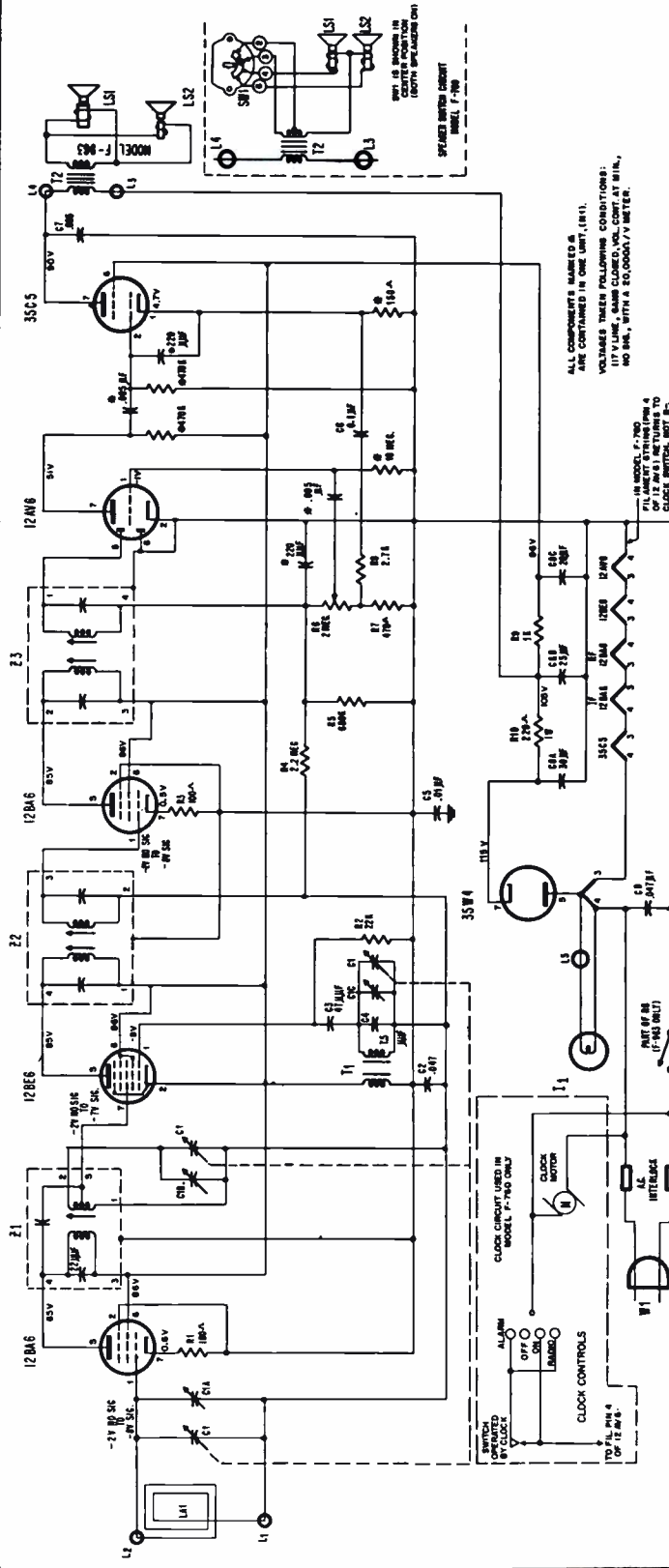
NOTE: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads, and place near radio loop.

PHILCO

MODELS F-760 and F-963

SPECIFICATIONS

Cabinet: Plastic, table model; Model F-963 has a rotary dial scale with a 5:1 drive ratio. Model F-760 has a slide rule dial with a 6:1 drive ratio.
 Frequency Coverage: 535KC to 1620KC.
 Intermediate Frequency: 455 KC.
 Audio Output: 0.9 watts.
 Operating Voltage: Model F-963—105 to 120 volts, AC-DC; Model F-760—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: F-760 only—A fully automatic Telechron (type C-103) internal timer and clock. Includes Sleep-Switch, Buzzer Alarm, and "Lullaway" Slow Shut-off.

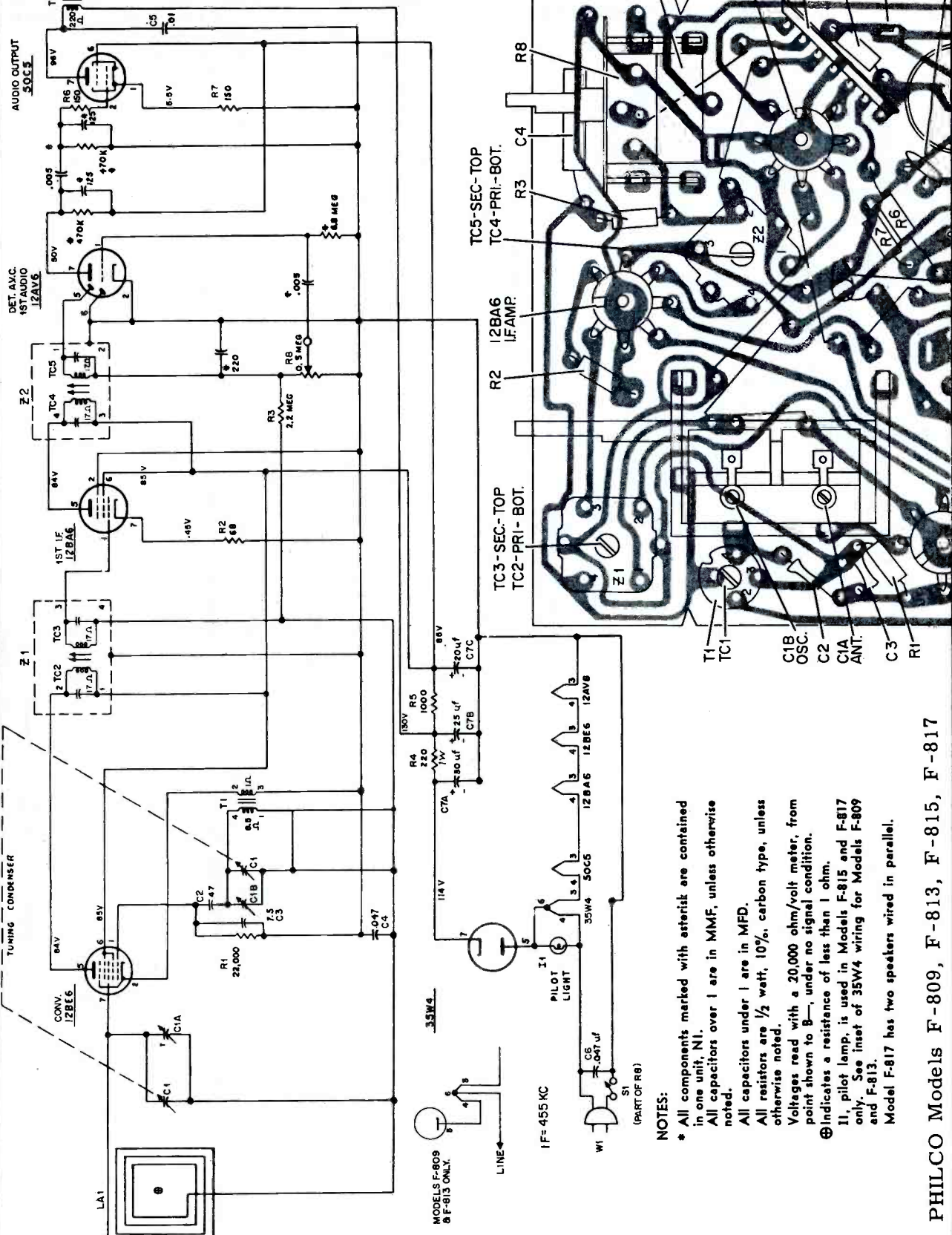


Composite View, Component Layout of Printed Panel

ALL COMPONENTS SHOWN ARE CONTAINED IN ONE UNIT (R1). VOLTAGE TAPES FOLLOWING CONDITIONS: 117V LINE, MAIN CLOSED, NO CONTROL WINDING, NO SW, WITH A 50,000Ω/V METER.

IN MODEL F-760 OF 12 BA 6 RETURNS TO CLOCK INITIAL POSITION.

**PHILCO MODELS F-809, F-813
F-815 and F-817**



NOTES:

- * All components marked with asterisk are contained in one unit, N1.
- All capacitors over 1 are in MMF, unless otherwise noted.
- All capacitors under 1 are in MFD.
- All resistors are 1/2 watt, 10%, carbon type, unless otherwise noted.
- Voltages read with a 20,000 ohm/volt meter, from point shown to B—, under no signal condition.
- ⊕ Indicates a resistance of less than 1 ohm.
- Ⓜ, pilot lamp, is used in Models F-815 and F-817 only. See inset of 35W4 wiring for Models F-809 and F-813.
- Model F-817 has two speakers wired in parallel.

PHILCO Models F-809, F-813, F-815, F-817

PHILCO HOME RADIO

AM/FM MODEL F-974

Frequency Ranges — Tuning drive ratio 12:1
 Broadcast — 540-1620 KC
 FM — 88-108 MC

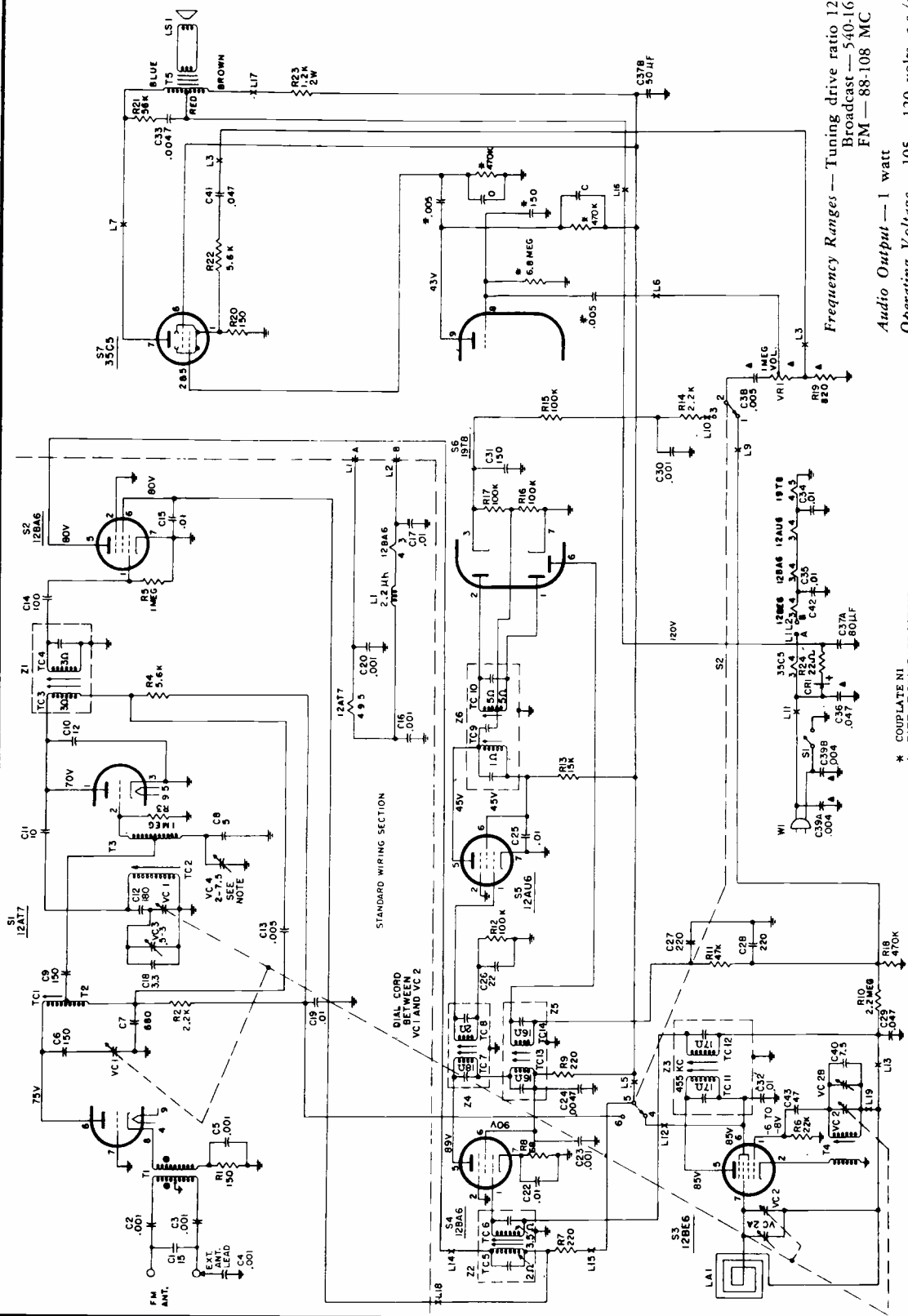
Audio Output — 1 watt

Operating Voltage — 105 - 120 volts, a.c./d.c.

Power Consumption — 40 watts

Antennas — 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

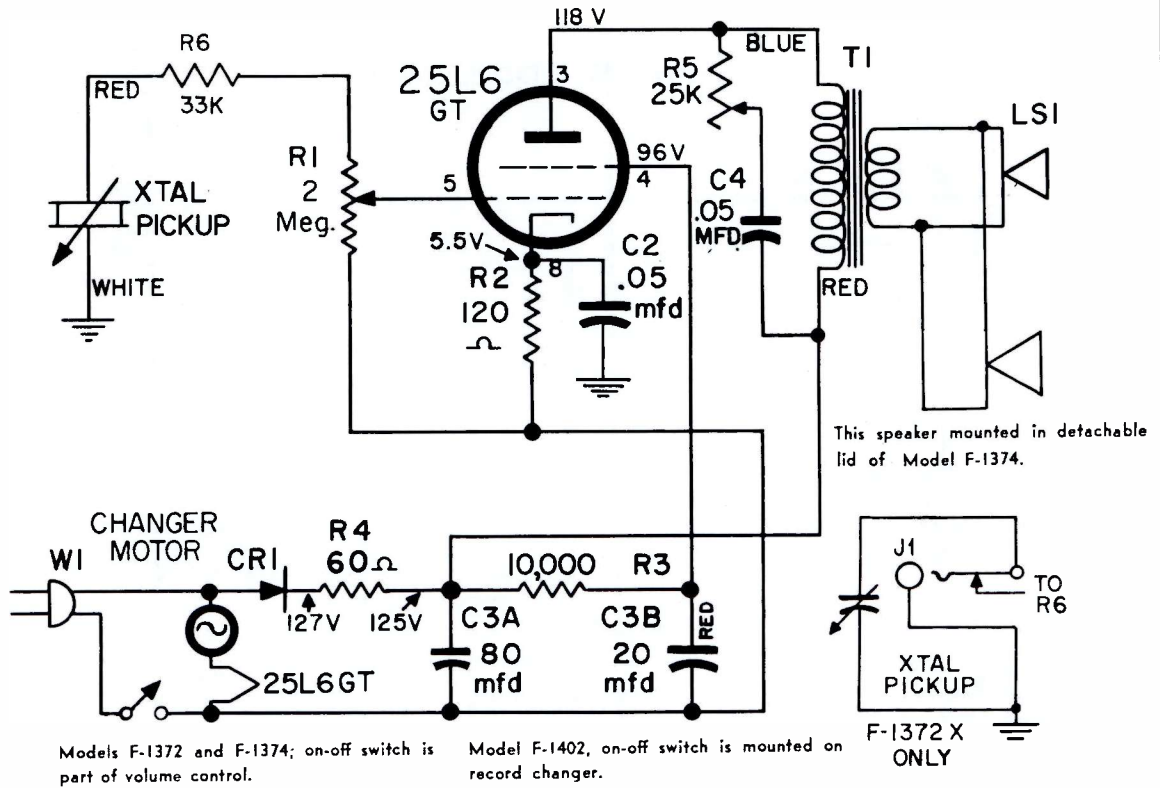


* COUPLATE NI
 ▲ PART OF STANDARD WIRING
 ● INDICATES LESS THAN 1 OHM
 CONDENSERS C - D = 250 μF

ALL RESISTORS ARE 1/2 WATT, 10% UNLESS OTHERWISE NOTED.
 ALL CAPACITORS ABOVE 1 ARE IN μF UNLESS OTHERWISE NOTED, ALL CAPACITORS BELOW 1 ARE pF.

VC4 IS A FACTORY ADJUSTMENT AND SHOULD NOT REQUIRE FUTURE ADJUSTMENT UNLESS RE-PLACED. IT MINIMIZES OSCILLATOR RADIATION. TO ADJUST, TUNE RADIO TO 100 MC AND TUNING RANGE TO 100 MC. TURN ON POWER. FIELD STRENGTH METER TUNED TO THE OSC FREQ.

PHILCO MODELS F-1372, F-1372X, F-1374 and F-1402



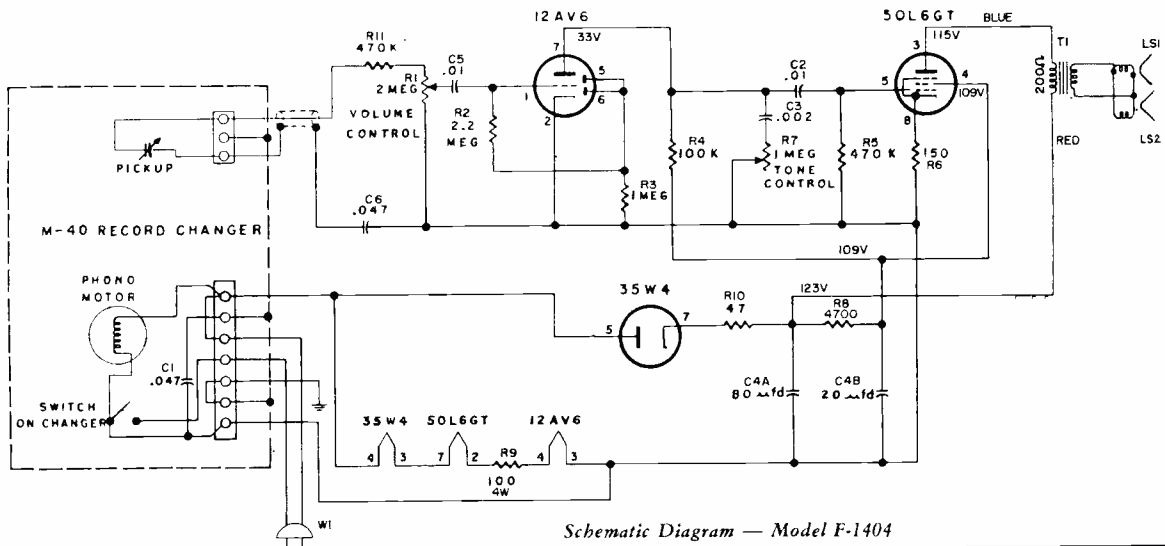
LEAD DRESS

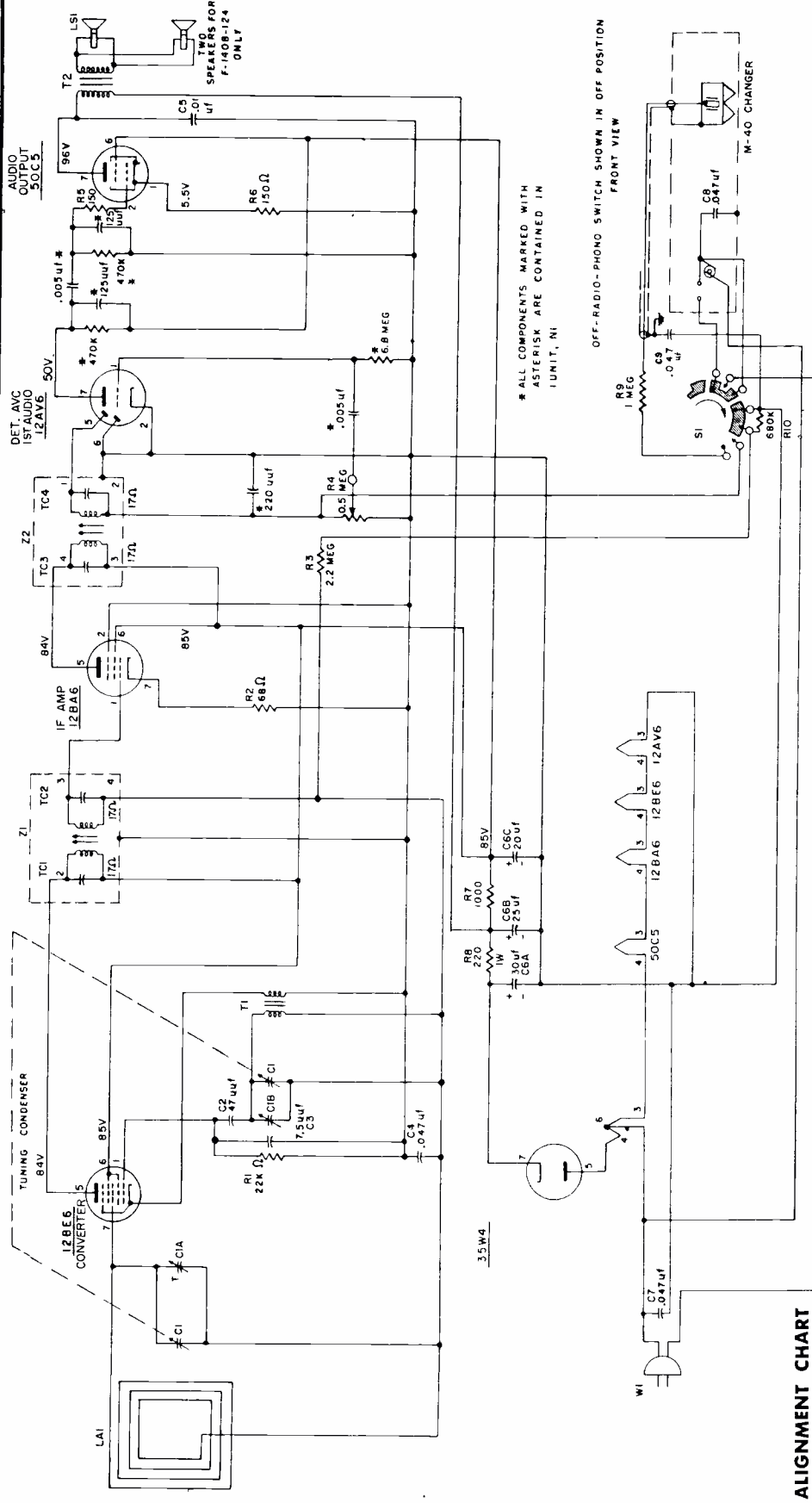
R4, the surge limiting resistor, should be dressed up in the air and all leads and components kept away. This resistor operates at a high temperature that could damage lead insulation or cause value changes in components in contact with it.

RECORD PLAYER (F-1372 and F-1374 Only)

Tone Arm Assy.	35-2780
Cartridge and needle assy.	325-8012
Knob, cartridge flip-over	54-6333
Needle, 78 RPM	325-8013
Needle, LP	325-8013-1
Needle pressure spring	28-11728
Retaining ring, tone arm	1W42296FA3
Screw, knob	28-11729
Shaft and support assy., tone arm	78-11359
Spring, tone arm	28-10376-3
Washer, tone arm	28-10377
Bushing, tone arm	28-10374

PHILCO PHONOGRAPH MODEL F-1404





* ALL COMPONENTS MARKED WITH ASTERISK ARE CONTAINED IN UNIT, NI

OFF-RADIO-PHONO SWITCH SHOWN IN OFF POSITION FRONT VIEW

PHILCO

MODELS F-1406 AND F-1408 CODE 124

Frequency Range—540 KC to 1620 KC.
 Intermediate Frequency—455 KC.
 Audio Output—9 watts.
 Power Consumption—30 watts.
 Operating Voltage—105 to 120 volts, 60 cycle.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO SPECIAL INSTRUCTIONS	ADJUST
	CONNECTION TO RADIO	DIAL SETTING		
1.	Ground lead to B-; output lead through a .1 mf condenser to grid (pin 7) of 12BE6.	455 kc.	Adjust tuning cores, in order given, for max. output. TC2 and TC4 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.	Adjust for maximum output.	C1-B—osc.
3.	Same as Step 2.	1500 kc.	Adjust for maximum output.	C1-A—aerial.

* 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.

NOTE: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads, and place near radio loop.

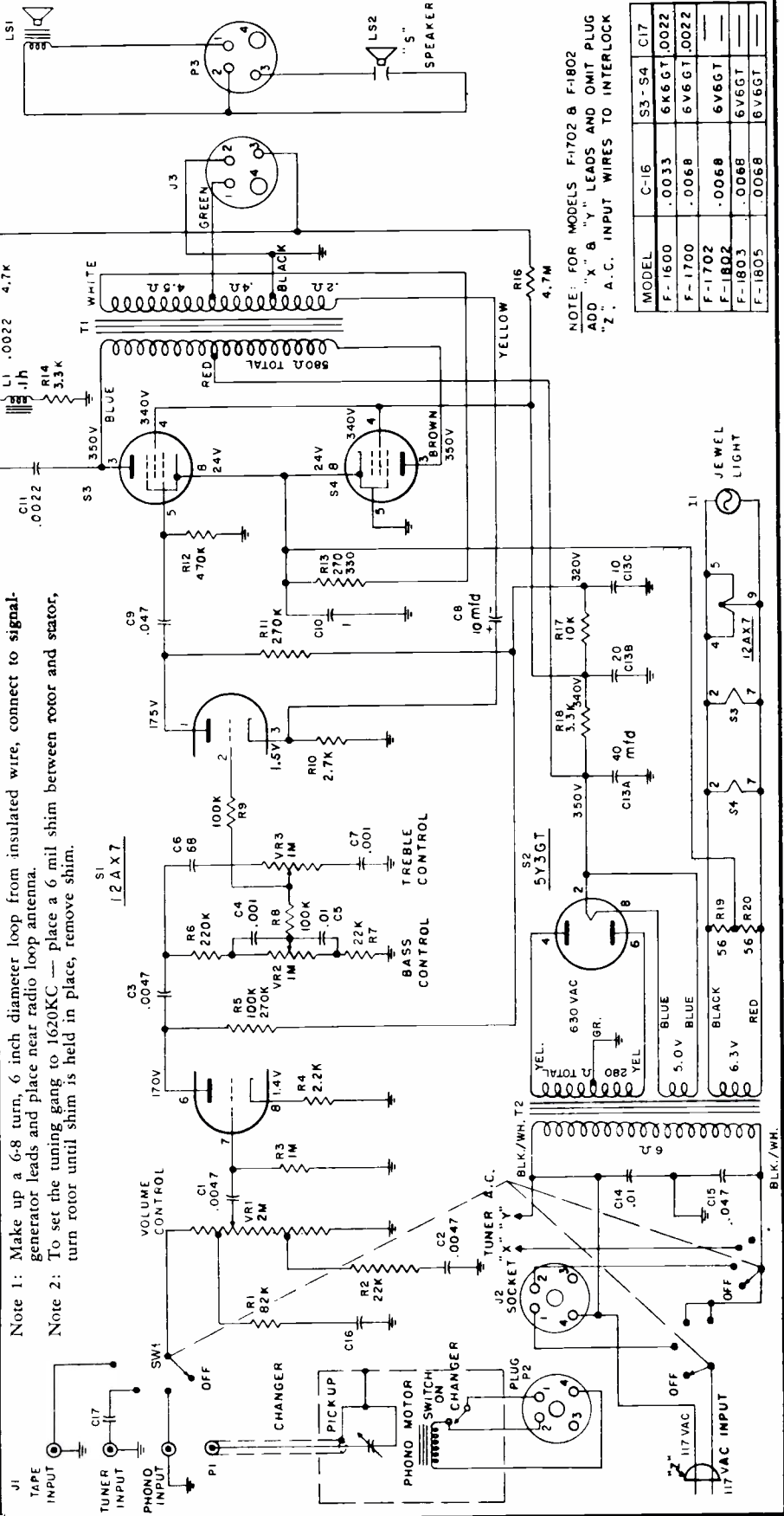
PHILCO PHONOGRAPHS
MODELS F-1600, F-1700, F-1702, F-1802, F-1803, and F-1805

(Continued on page 129, adjacent at right)

ALIGNMENT CHART

Step	Signal Generator	Freq.	Dial Setting	Special Instruct. 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	1620KC. See Note 2 below	C1C, osc. trimmer
3	Same as step 2	1520KC	Tune radio to gen. signal	C1B, mixer grid trimmer C1A, ant. trimmer
4	Same as step 2	580KC	Tune radio to gen. signal	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.



NOTE: FOR MODELS F-1702 & F-1802 ADD "X" & "Y" LEADS AND OMIT PLUG "Z". A.C. INPUT WIRES TO INTERLOCK

MODEL	C-16	S3-S4	C17
F-1600	.0033	6K6GT	.0022
F-1700	.0068	6V6GT	.0022
F-1702	.0068	6V6GT	—
F-1802	.0068	6V6GT	—
F-1803	.0068	6V6GT	—
F-1805	.0068	6V6GT	—

Amplifier Schematic Diagram for Models F-1600, F-1700, F-1702, F-1802, F-1803 and F-1805

PHILCO PHONOGRAPH MODELS — F-1600, F-1700, F-1702, F-1802, F-1803 and F-1805

(Service material continued from page 128, at left)

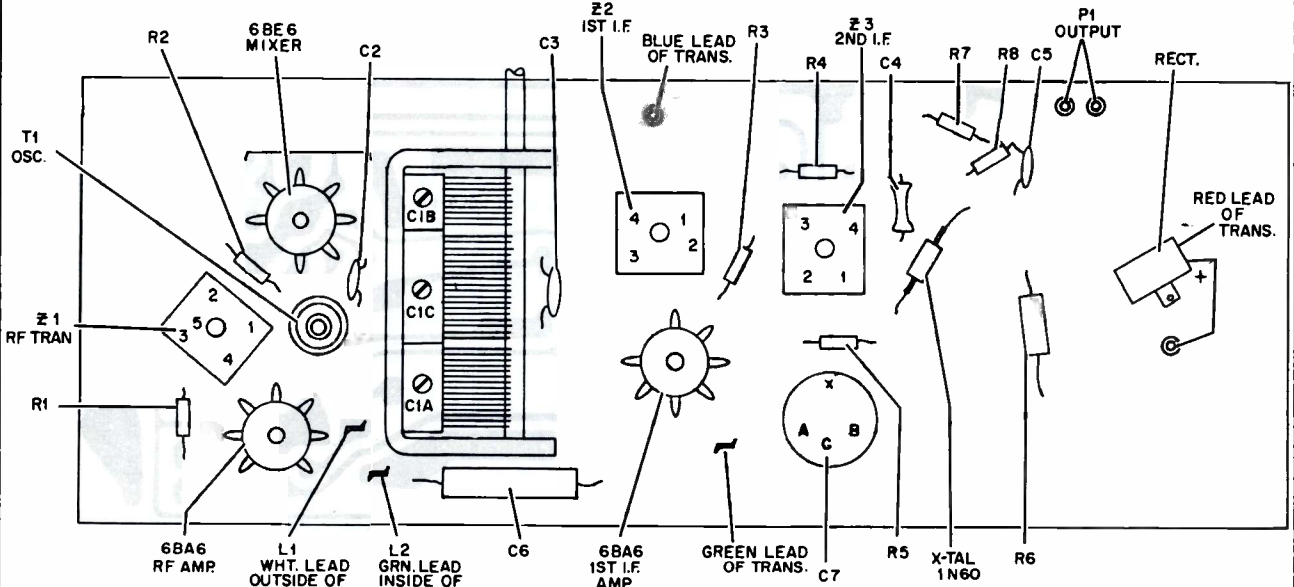
Circuit — Amplifier—Three tube amplifier plus rectifier. Includes base, treble and volume controls and a selector switch. Inputs provided for external tuner and tape recorder.

Tuner—Model F-1702 employs the RT-100 AM tuner. Tuner includes three tubes, separate power supply and crystal detector. Models F-1802, F-1803 and F-1805 employ the RT-201 AM-FM tuner.

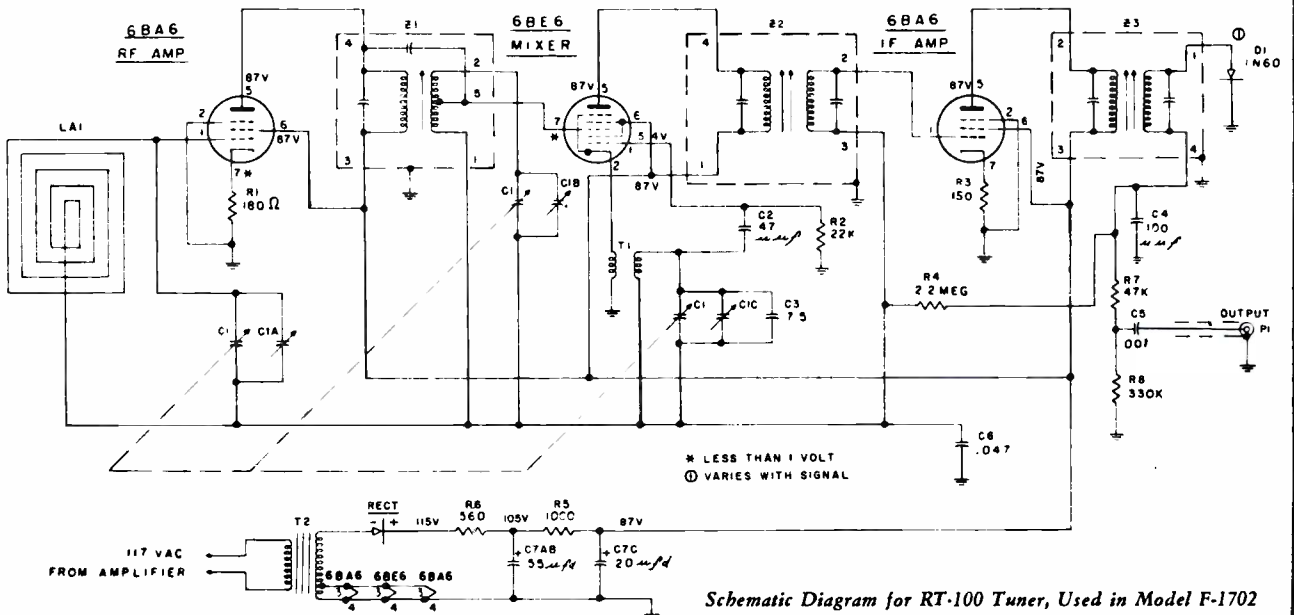
Audio Output — Model F-1600 — 6 watts. Models F-1700, F-1702, F-1802, F-1803 and F-1805 — 10 watts.

Operating Voltage — 105 to 120 volts, 60 cycles, a-c.

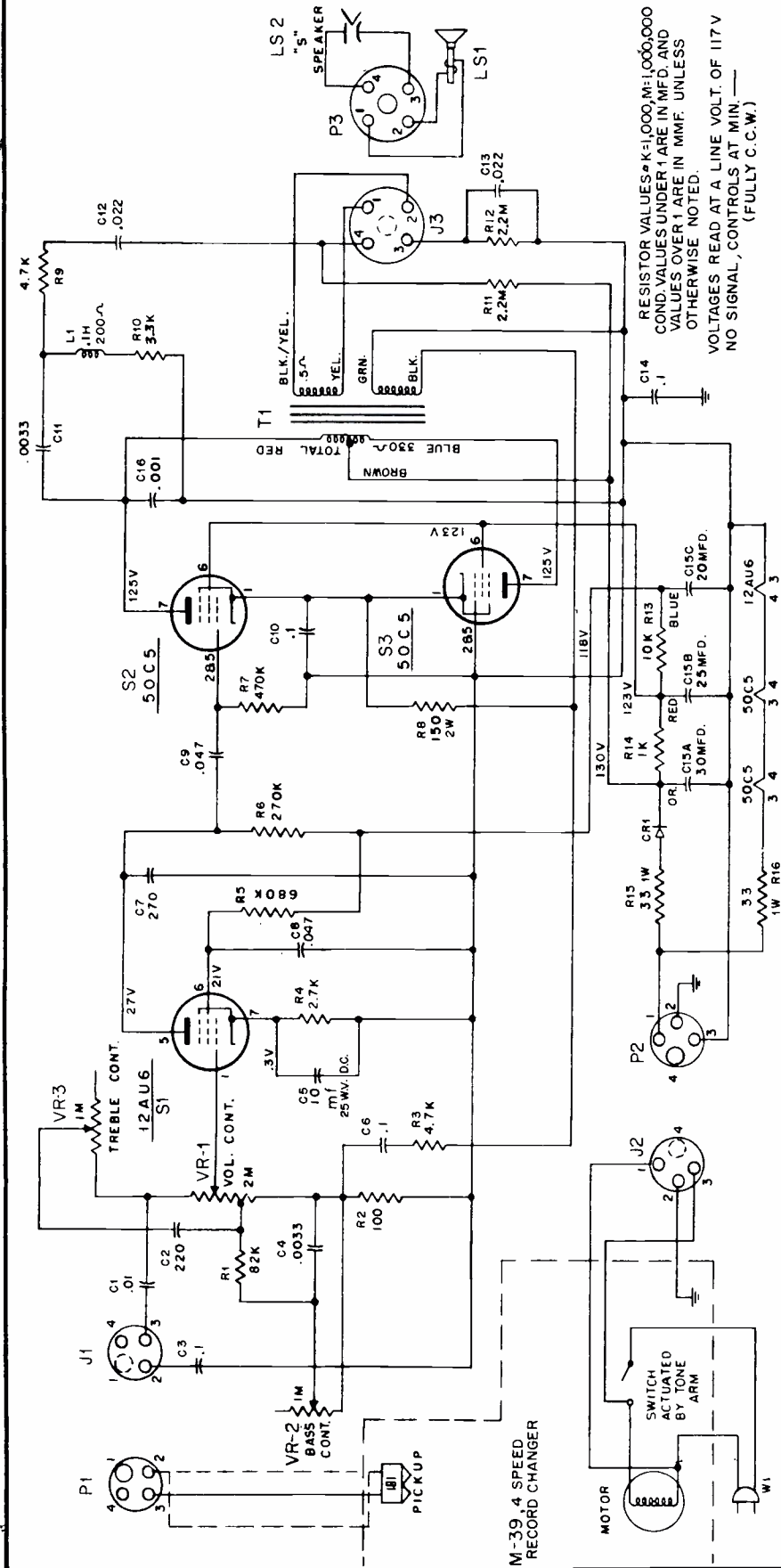
Power Consumption — Models F-1600 and F-1700 — 60 watts. Models F-1702, F-1802, F-1803 and F-1805 — 100 watts.



RT-100 Tuner Composite View, Component Layout of Printed Panel



Schematic Diagram for RT-100 Tuner, Used in Model F-1702

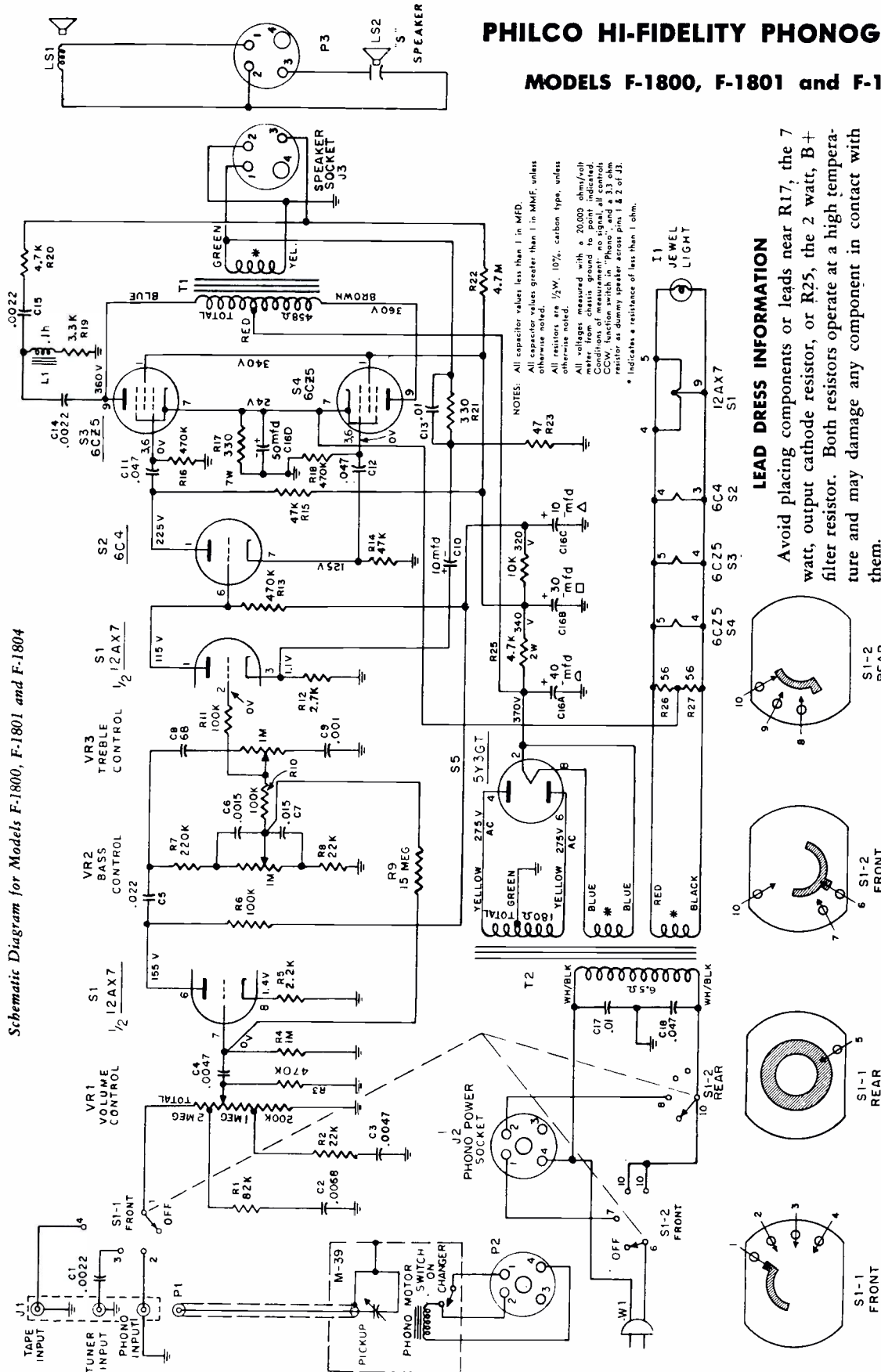


PHILCO PHONOGRAPH
MODEL F-1500

- REMOVAL INSTRUCTIONS**
- AMPLIFIER**
- (1) Pull the three control knobs from the right-hand side of the phonograph.
 - (2) Remove metal grill from inside of phonograph.
 - (3) Pull the three plugs from the amplifier.
 - (4) Loosen right-hand amplifier mounting nut, about half way.
 - (5) Remove left-hand amplifier mounting nut. Raise the left-hand side of the amplifier while sliding the amplifier from the right-hand mounting screw.
- CHANGER**
- (1) Remove amplifier.
 - (2) Check that the "hold-down" bolts are in "play" position (Head of bolt flush with changer base plate).
 - (3) Reach under the motor board and flip the toggle on the bottom of the right-hand "hold-down" bolt. It will be easier to operate the toggle if the right-hand side of the changer is pressed downward.
 - (4) Raise the right-hand side of the changer until the "hold-down" bolt is free and then slide the changer to the right. The left-hand "hold-down" bolt is mounted in a slot of the motor board. The bolt will slide free as the changer is moved to the right.

PHILCO HI-FIDELITY PHONOGRAPHS

MODELS F-1800, F-1801 and F-1804



Schematic Diagram for Models F-1800, F-1801 and F-1804

LEAD DRESS INFORMATION

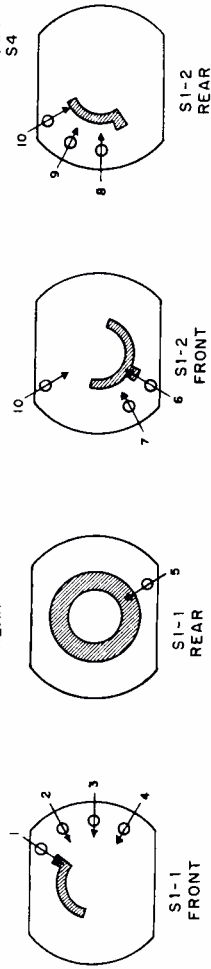
Avoid placing components or leads near R17, the 7 watt, output cathode resistor, or R25, the 2 watt, B+ filter resistor. Both resistors operate at a high temperature and may damage any component in contact with them.

The AC leads should be dressed along the sides and down against the subbase.

Care should be taken not to break the wax seal covering L1, the tweeter cross-over choke.

RECORD CHANGER—Philco 4-speed automatic record changer, model M-39.

7-in., 10-in. and 12-in. intermix. Automatic shut-off of entire instrument at end of last record.



SWITCH SHOWN IN MAX. COUNTER CLOCKWISE POSITION "OFF"

SWITCH VIEWED FROM KNOB END

S1-1 IS A SHIELD SECTION, CONTACT 5 IS GROUNDED.

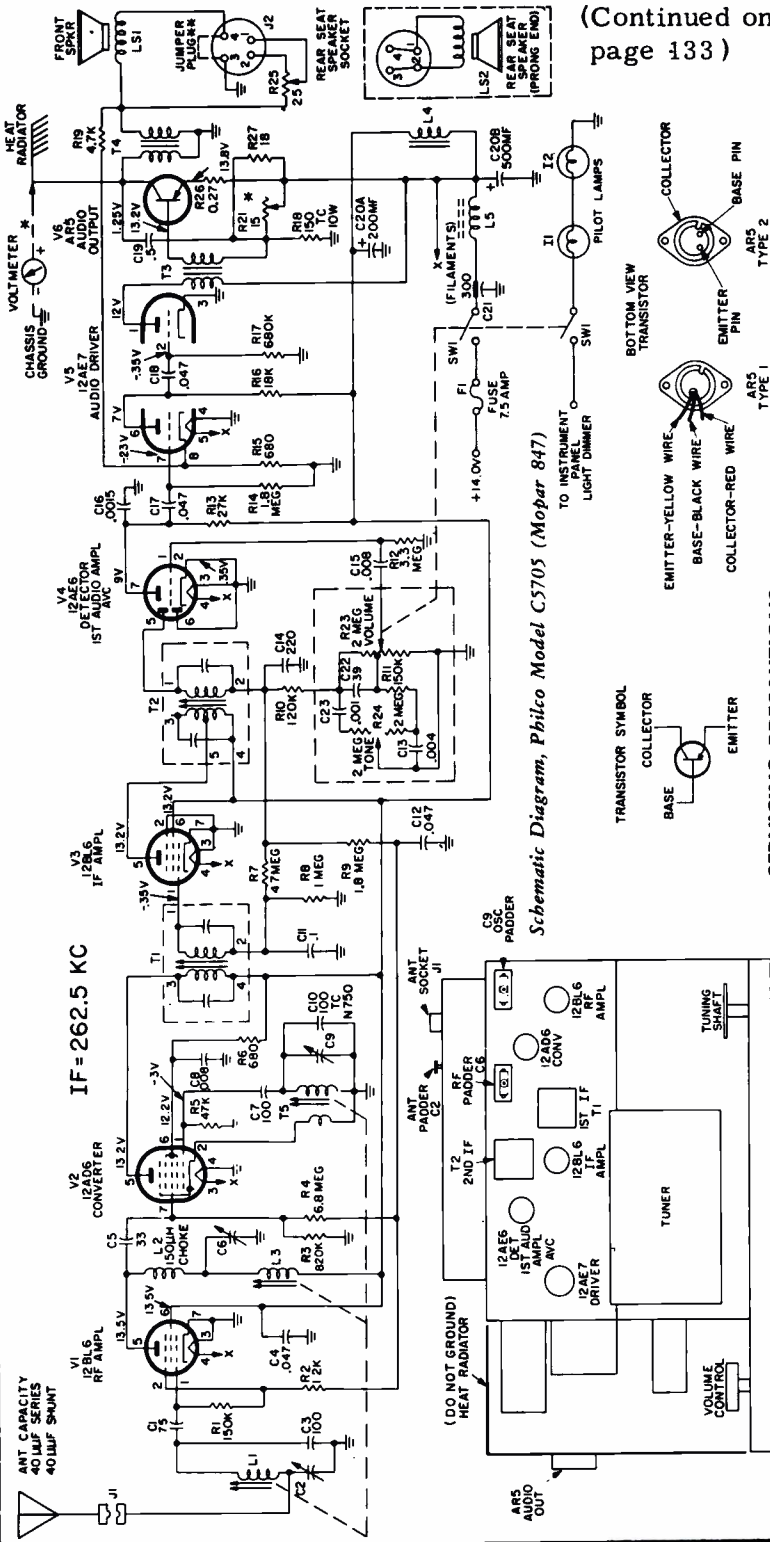
NOTES: All capacitor values less than 1 in MFD. All capacitor values greater than 1 in MMF, unless otherwise noted. All resistors are 1/2W, 10% carbon type, unless otherwise noted. All tube sockets are 20000 ohm/volt meter frame chassis ground. No signal, all controls CCW, function switch in "Phono", and a 3.3 ohm resistor as dummy speaker across pins 1 & 2 of J1. * Indicates a resistance of less than 1 ohm.

PHILCO AUTO RADIO

MODEL - C-5705-P-5701

Models P5701 (Mopar 848) and C5705 (Mopar 847) are electrically identical except that Model C5705 has two pilot lamps, a rear seat speaker socket, a fader control, and a tone control (with C22 & C23).

(Continued on page 133)



SERVICING PRECAUTIONS

A-C leakage from measuring instruments or soldering irons may damage the transistor. All transistor measurements should be made with a battery-operated instrument. When soldering is necessary, disconnect set from power source.

Do not operate these receivers with the speaker disconnected, as transient voltages across an unloaded output transformer may damage the transistor.

When installing a new transistor, a good physical and electrical contact must be established between the collector and the heat radiator; care must be exercised when soldering, since excessive heat may melt the internal junctions. To adjust the bias, first make sure that the bias control, R21, is set at the center of its range. Then adjust the bias control for 500 ma. collector current, or for 1.25 volts, d.c., across the output transformer primary, with no input signal. (This bias control is "HOT" to ground — use insulated adjustment tool!)

- NOTES**
- 1 ALL RESISTANCE VALUES ARE IN OHMS ± 10%, 1/2 WATT, UNLESS OTHERWISE INDICATED.
 - 2 ALL CAPACITANCE VALUES OF 1.0 AND ABOVE ARE IN MMF ± 20%; AND ALL VALUES BELOW 1.0 ARE IN MF ± 20%, UNLESS OTHERWISE INDICATED.
 - * ADJUST FOR 500MA COLLECTOR CURRENT OR 1.25V DC ACROSS OUTPUT TRANSFORMER PRIMARY (NO SIGNAL INPUT) DO NOT USE A VACUUM TUBE VOLTMETER FOR THIS MEASUREMENT.
 - ** REMOVE JUMPER PLUG FOR REAR SEAT SPEAKER INSTALLATION.

VOLTAGE MEASUREMENTS WERE MADE WITH SET OPERATING FROM 1400-1500 MC. ALL SIGNAL INPUTS WERE AT LOW-FREQUENCY (400 CYCLES). NO SIGNAL INPUT ALL MEASUREMENTS ARE FROM POINT INDICATED TO CHASSIS UNLESS OTHERWISE SPECIFIED. OSCILLATOR GRID VOLTAGE WAS MEASURED WITH AN ELECTRONIC VOLTMETER HAVING A ONE-MEGOHM PROBE ISOLATING RESISTOR. ALL OTHER MEASUREMENTS WERE TAKEN WITH A 20,000-OHMS PER-VOLT METER.

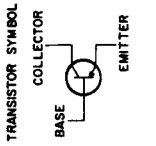
DC RESISTANCES	
L1	11 OHMS
L2	12 OHMS
L3	7 OHMS
L4	15 OHMS
L5	15 OHMS
L6	15 OHMS
L7	15 OHMS
L8	15 OHMS
L9	15 OHMS
L10	15 OHMS
L11	15 OHMS
L12	15 OHMS
L13	15 OHMS
L14	15 OHMS
L15	15 OHMS

MODEL P-5701 AND C-5705

To correct audio frequency response the 1st audio plate load resistor (R13) has been changed in value to 470,000 ohms, the 2nd audio grid return resistor (R14) has been changed to 4.7 megohms and the .0015 mfd, 1st audio plate bypass condenser, C16, has been removed.

SETTING PUSH BUTTONS

1. Turn radio on and allow it to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock push buttons by pulling them out.
3. Accurately tune in a station with manual tuning knob.
4. Lock one push button to that station by pushing firmly in.
5. Repeat above procedure for remaining push buttons.



PHILCO Models C-5705 and P-5701, Alignment Procedure, Continued

GENERAL—The cover must be removed in order to perform the alignment procedure. Allow the set and the test equipment to warm up for fifteen minutes before starting the alignment procedure. Make sure that all plugs and cables are connected to their proper receptacles.

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

SIGNAL GENERATOR—Use an AM r-f signal generator with 30% modulation. Connect the ground lead to the chassis, and the output lead as indicated in the alignment chart.

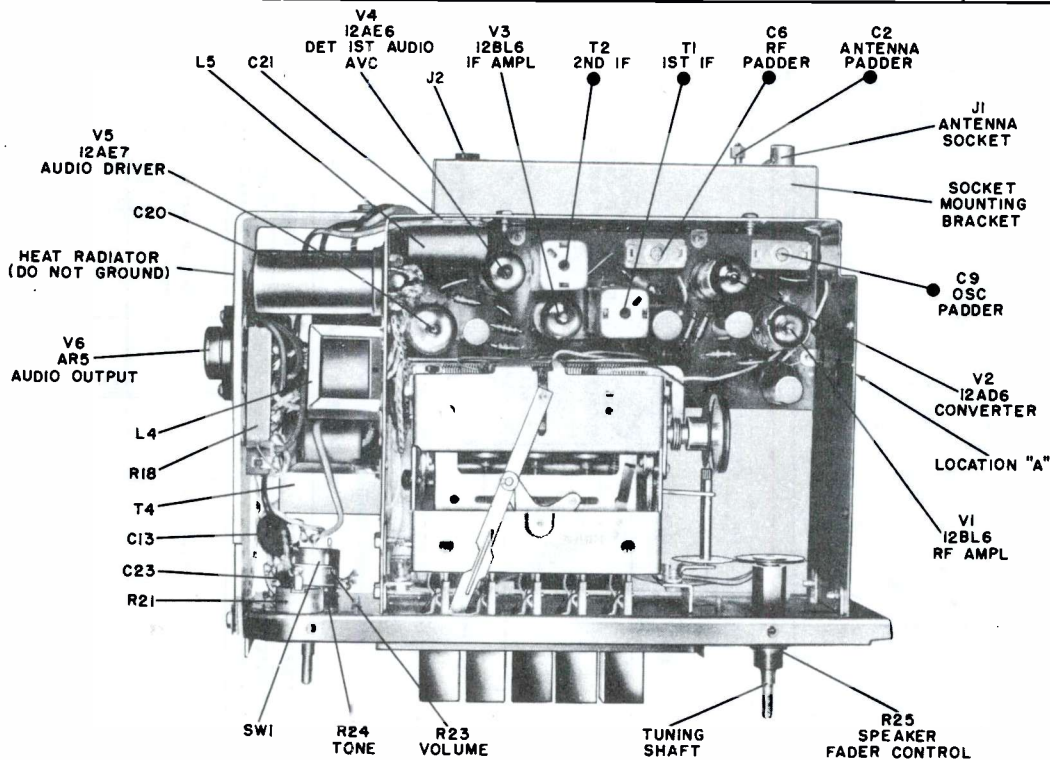
OUTPUT LEVEL—Attenuate the signal-generator output throughout the procedure to hold the output indication below 1 volt.

RADIO CONTROLS—Set the volume control to maximum. Set the tone control to mid-range (in C5705 only). Set the tuning control as indicated in the alignment chart.

DUMMY ANTENNA—When making the r-f and antenna tuning adjustments, connect the signal-generator output lead through a 40- μ f. condenser to the antenna receptacle, and connect another 40- μ f. condenser from the antenna receptacle to the chassis.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1	Through a .05 μ f. condenser to mixer grid, pin 7, of 12AD6.	262.5 kc.	1605 kc.	Adjust in order given for maximum output.	T2 (top) — 2nd i-f secondary T2 (bottom) — 2nd i-f primary
2	Same as step 1.	262.5 kc.	1605 kc.	Same as step 1.	T1 (top) — 1st i-f secondary T1 (bottom) — 1st i-f primary
3	Through dummy antenna to J1 (antenna socket).	1605 kc.	1605 kc.	Adjust for maximum output.	C9—osc. padder C2—ant. padder C6—r-f padder
4				With radio and antenna installed in car, adjust for maximum output, using a weak station near 1200 kc.	C2—ant. padder

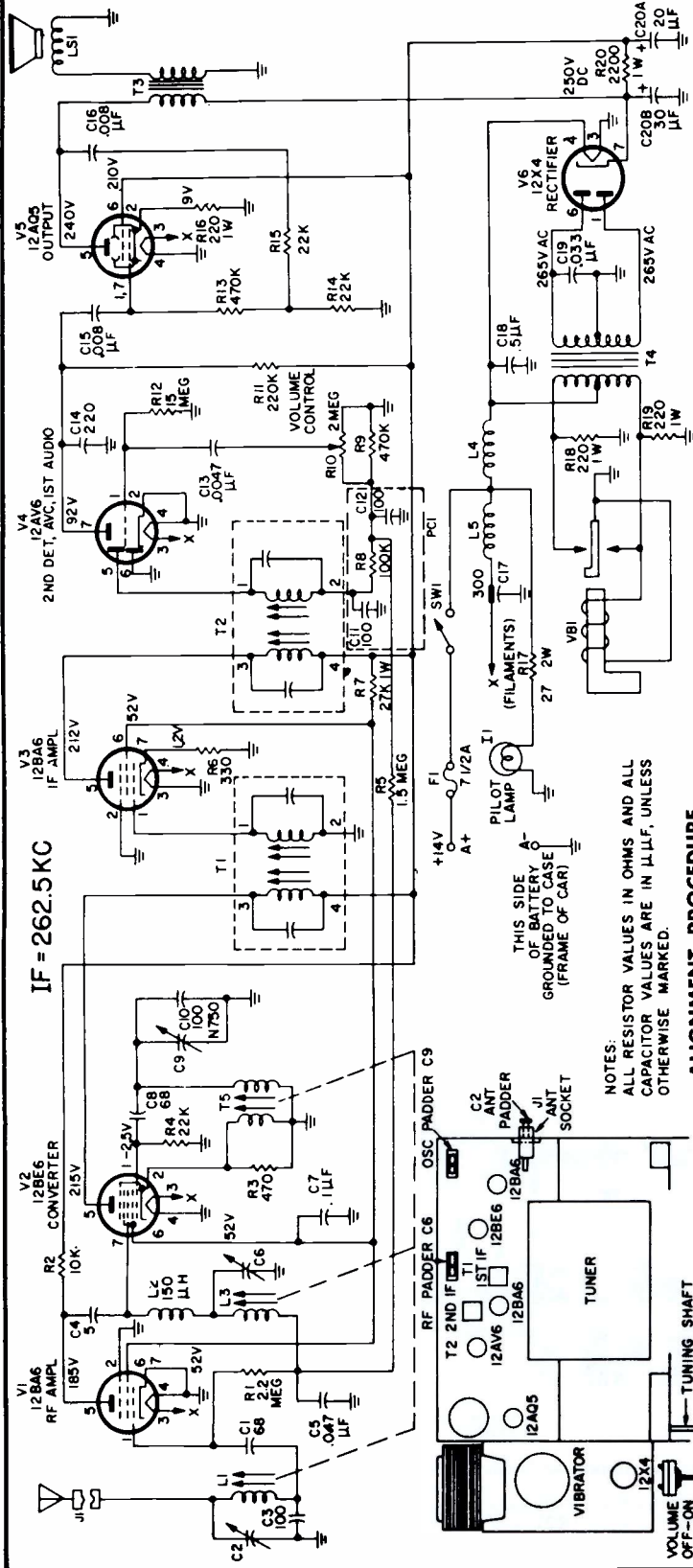


Top View of Philco Model C5705, Showing Alignment Points, Tubes, and Location of Parts

NOTE: Model P5701 is the same as Model C5705 with the following exceptions: the socket mounting bracket, the rear-seat speaker socket (J2), the speaker fader control (R25) and the tone control (R24) (with C22 & C23) are omitted; the antenna socket (J1) and the antenna padder (C2) are placed at location "A".

PHILCO

PHILCO MODEL P-5702
MOPAR MODEL 848



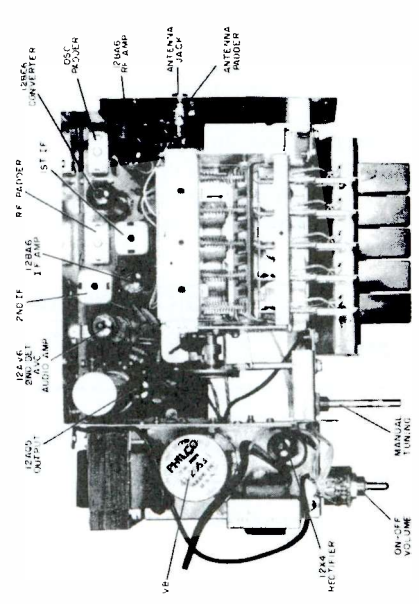
ALIGNMENT PROCEDURE

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

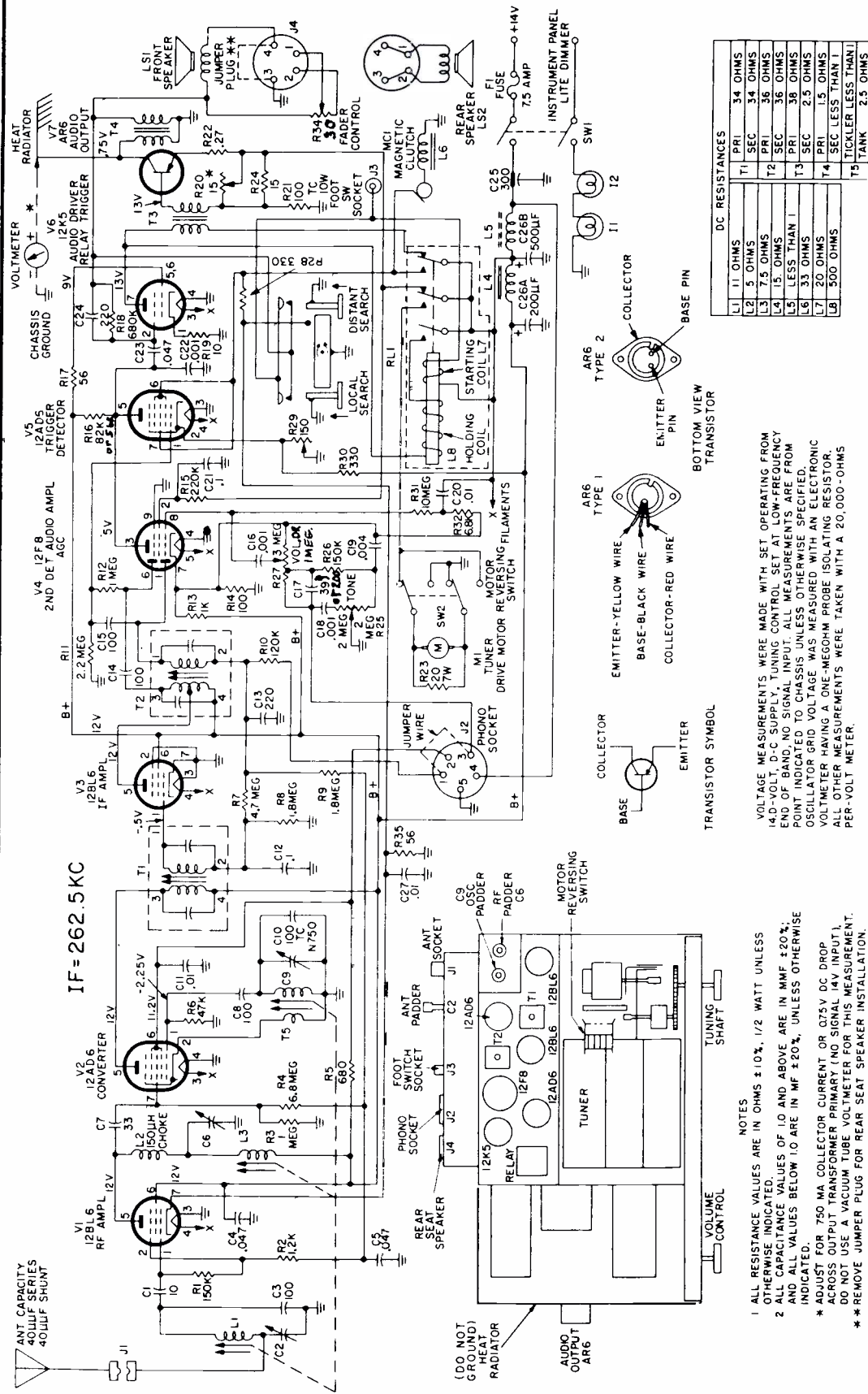
SIGNAL GENERATOR — Use an AM r-f signal generator with 30% modulation. Connect the ground lead to the chassis, and the output lead as indicated in the alignment chart.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR CONNECTION TO RADIO		RADIO SPECIAL INSTRUCTIONS		ADJUST
	DIAL SETTING	DIAL SETTING			
1	Through a .05 μ f. condenser to mixer grid, pin 7, of 12BE6.	262.5 kc.	Adjust in order given for maximum output.		T2 (top) — 2nd i-f secondary T2 (bottom) — 2nd i-f primary
2	Same as step 1.	262.5 kc.	Same as step 1.		T1 (top) — 1st i-f secondary T1 (bottom) — 1st i-f primary
3	Through dummy antenna to J1 (antenna socket).	1605 kc.	Adjust for maximum output.		C9 — osc. padder C2 — ant. padder C6 — r-f padder
4			With radio and antenna installed in car, adjust for maximum output, using a weak station near 1200 kc.		C3 — ant. padder



PHILCO AUTO RADIOS MODELS P-5703, C-5707 AND C-5709



PHILCO AUTO RADIO
MODELS P-5703, C-5707, C-5709

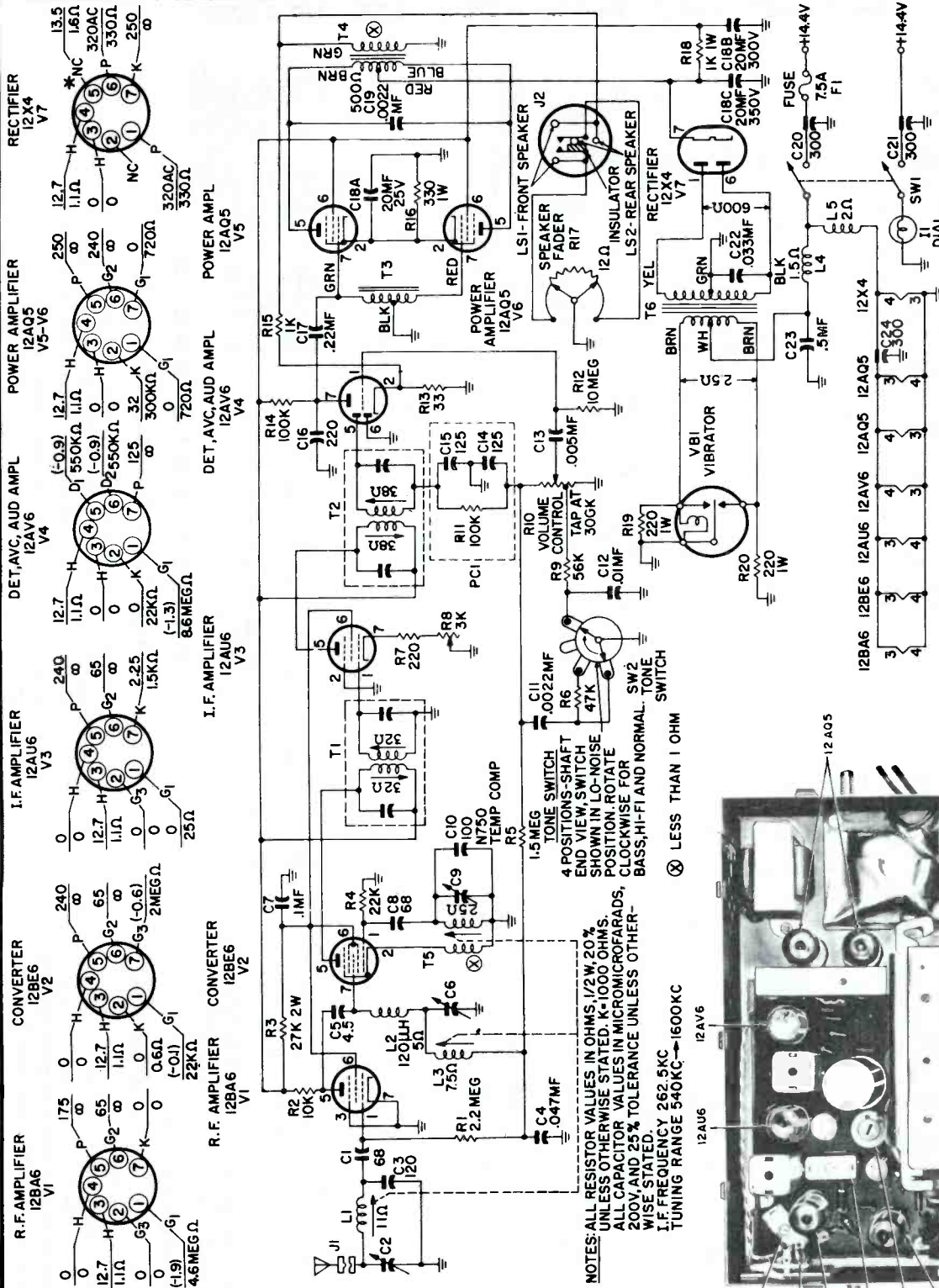
Models P5703 (Mopar 917HR), C5707 (Mopar 920HR), and C5709 (Mopar 921HR) are electrically identical except that Models C5707 and C5709 have two pilot lamps, a rear-seat-speaker socket, a fader control, and a foot switch socket.

SETTING PUSH BUTTONS

1. Turn radio on and allow it to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock push buttons by pulling them out.
3. Accurately tune in a station with manual tuning knob.
4. Lock one push button to that station by pushing firmly in.
5. Repeat above procedure for remaining push buttons.

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

PHILCO MODEL M-5741



TEST CONDITIONS
 SOCKETS AT TOP OF PAGE ARE BOTTOM VIEWS. VOLTAGES TO GROUND ARE SHOWN ABOVE LINES, AND RESISTANCES TO GROUND BELOW LINES.
 * - INDICATES SOCKET LUG USED AS TIE POINT.

VOLTAGE MEASUREMENTS

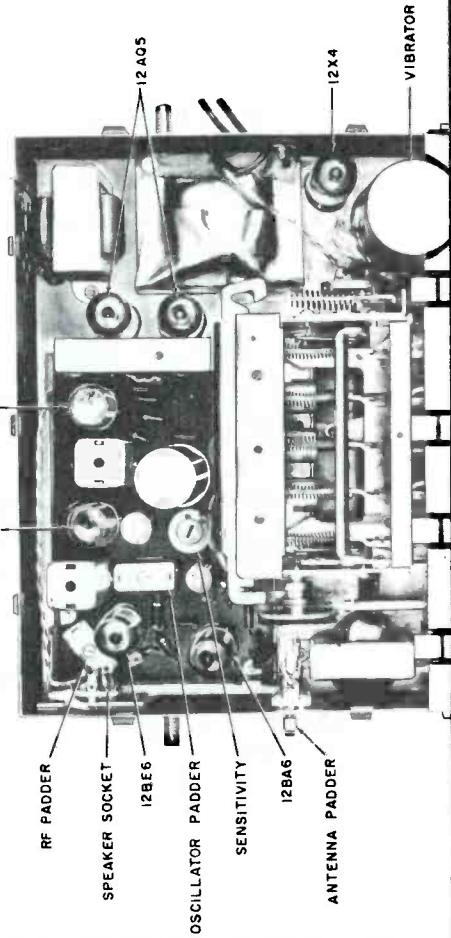
- 1-VOLTAGES IN PARENTHESIS ARE MEASURED WITH VTVM.
- 2-ALL OTHER DC VOLTAGES MEASURED WITH 20,000Ω/VOLT METER.
- 3-ALL AC VOLTAGES MEASURED WITH 1,000Ω/VOLT METER.
- 4-ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS.
- 5-ALL VOLTAGES MEASURED WITH +14.4 VOLTS INPUT WITH NEGATIVE GROUND.

RESISTANCE MEASUREMENTS

- 1-BATTERY LEAD REMOVED FROM SET.
- 2-NEGATIVE OHMMETER LEAD ON CHASSIS GROUND.
- 3-TONE SWITCH AND VOLUME CONTROL IN FULL CLOCKWISE POSITION.
- 4-VALUES SHOULD NOT VARY MORE THAN 20%.

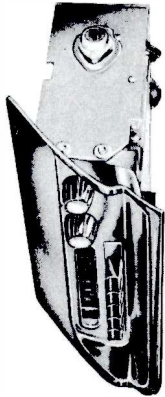
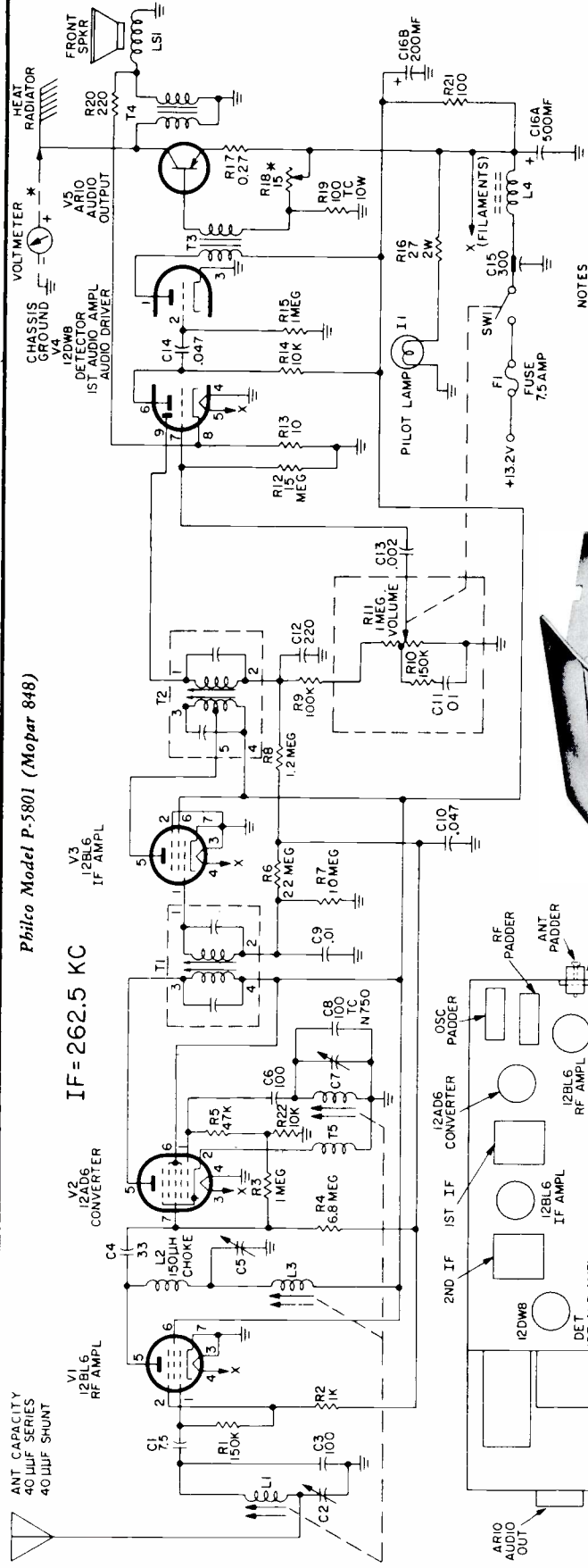
NOTES: ALL RESISTOR VALUES IN OHMS, 1/2W, 20% UNLESS OTHERWISE STATED. K=1000 OHMS.
 ALL CAPACITOR VALUES IN MICROMICROFARADS, 200V, AND 25% TOLERANCE UNLESS OTHERWISE STATED.
 I.F. FREQUENCY 262.5KC
 TUNING RANGE 540KC→1600KC

⊗ LESS THAN 1 OHM



Philco Model P-5801 (Mopar 848)

IF = 262.5 KC



Philco Model P-5801 (Mopar 848)

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .047 μf. condenser to mixer grid, pin 7, of 12AD6.	262.5 kc.	1605 kc.	Adjust in order given for maximum output.	T2 (top) — 2nd i-f secondary T2 (bottom) — 2nd i-f primary
2	Same as step 1.	262.5 kc.	1605 kc.	Same as step 1.	T1 (top) — 1st i-f secondary T1 (bottom) — 1st i-f primary
3	Through dummy antenna to J1 (antenna socket).	1605 kc.	1605 kc.	Adjust for maximum output.	C7—osc. padder C2—ant. padder C5—r-f padder
4				With radio and antenna installed in car, adjust for maximum output, using a weak station near 1200 kc.	C2—ant. padder

- NOTES
1. ALL RESISTANCE VALUES ARE IN OHMS ± 20%, 1/2 WATT, UNLESS OTHERWISE INDICATED.
 2. ALL CAPACITANCE VALUES OF 1.0 AND ABOVE ARE IN MMF ± 20%; AND ALL VALUES BELOW 1.0 ARE IN MF ± 20%, UNLESS OTHERWISE INDICATED.
- * ADJUST FOR 550 MA COLLECTOR CURRENT OR 95VDC DROP ACROSS OUTPUT TRANSFORMER PRIMARY (NO SIGNAL 132V INPUT) DO NOT USE A VACUUM TUBE VOLTMETER FOR THIS MEASUREMENT.

IMPORTANT: When connecting radio to "A" supply, either in car or on test bench, polarity must be observed. "A+" lead is positive, "A—" is chassis ground.

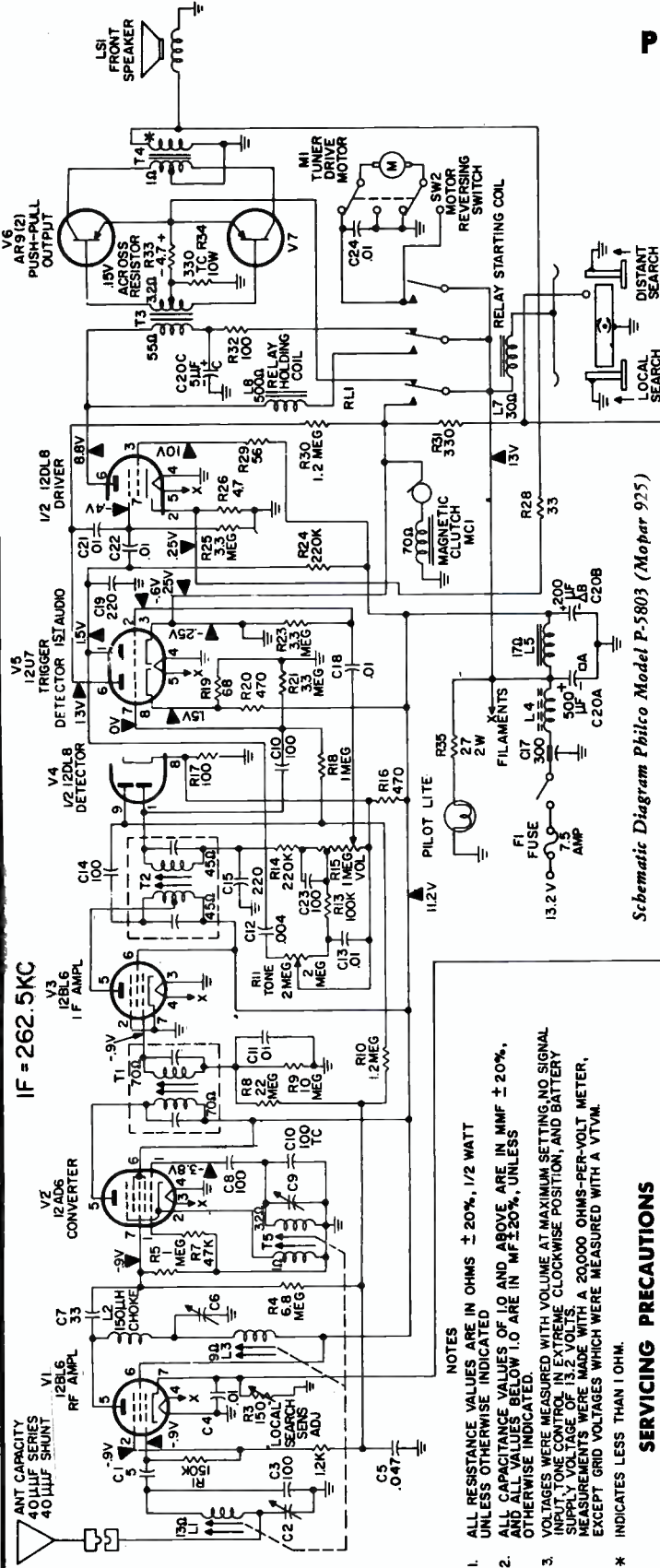
PHILCO AUTO RADIO
MODEL P-5801

PHILCO AUTO RADIO

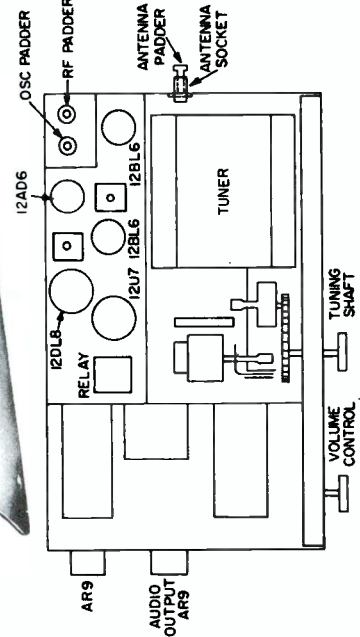
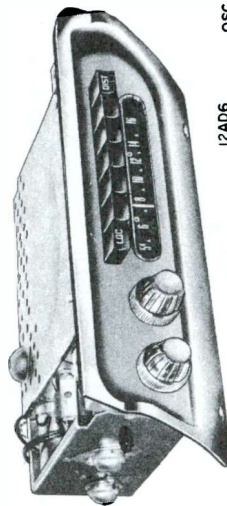
MODEL P-5803 - MOPAR 925

FREQUENCY RANGE 540 kc. to 1610 kc.
 AUDIO OUTPUT 5 watts
 PUSH BUTTONS 5 station selectors plus 2 search buttons
 POWER INPUT 1.5 amp. at 13.2 volts, d.c.
 AERIAL Vertical whip, fender mounting (40 uuf. series, 40 uuf. shunt)

FREQUENCY INTERMEDIATE 262.5 kc.



Schematic Diagram Philco Model P-5803 (Mopar 925)



- NOTES
1. ALL RESISTANCE VALUES ARE IN OHMS $\pm 20\%$, 1/2 WATT UNLESS OTHERWISE INDICATED
 2. ALL CAPACITANCE VALUES OF 1.0 AND ABOVE ARE IN MMF $\pm 20\%$, AND ALL VALUES BELOW 1.0 ARE IN MF $\pm 20\%$, UNLESS OTHERWISE INDICATED.
 3. VOLTAGES WERE MEASURED WITH VOLUME AT MAXIMUM SETTING, NO SIGNAL INPUT, TONE CONTROL IN EXTREME CLOCKWISE POSITION, AND BATTERY SUPPLY VOLTAGE OF 13.2 VOLTS.
- MEASUREMENTS WERE MADE WITH A 20,000 OHMS-PER-VOLT METER, EXCEPT GRID VOLTAGES WHICH WERE MEASURED WITH A VTVM.
- * INDICATES LESS THAN 1 OHM.

SERVICING PRECAUTIONS

A-C leakage from measuring instruments or soldering irons may damage the transistors. All transistor measurements should be made with a battery-operated instrument. When soldering is necessary, disconnect set from power source.

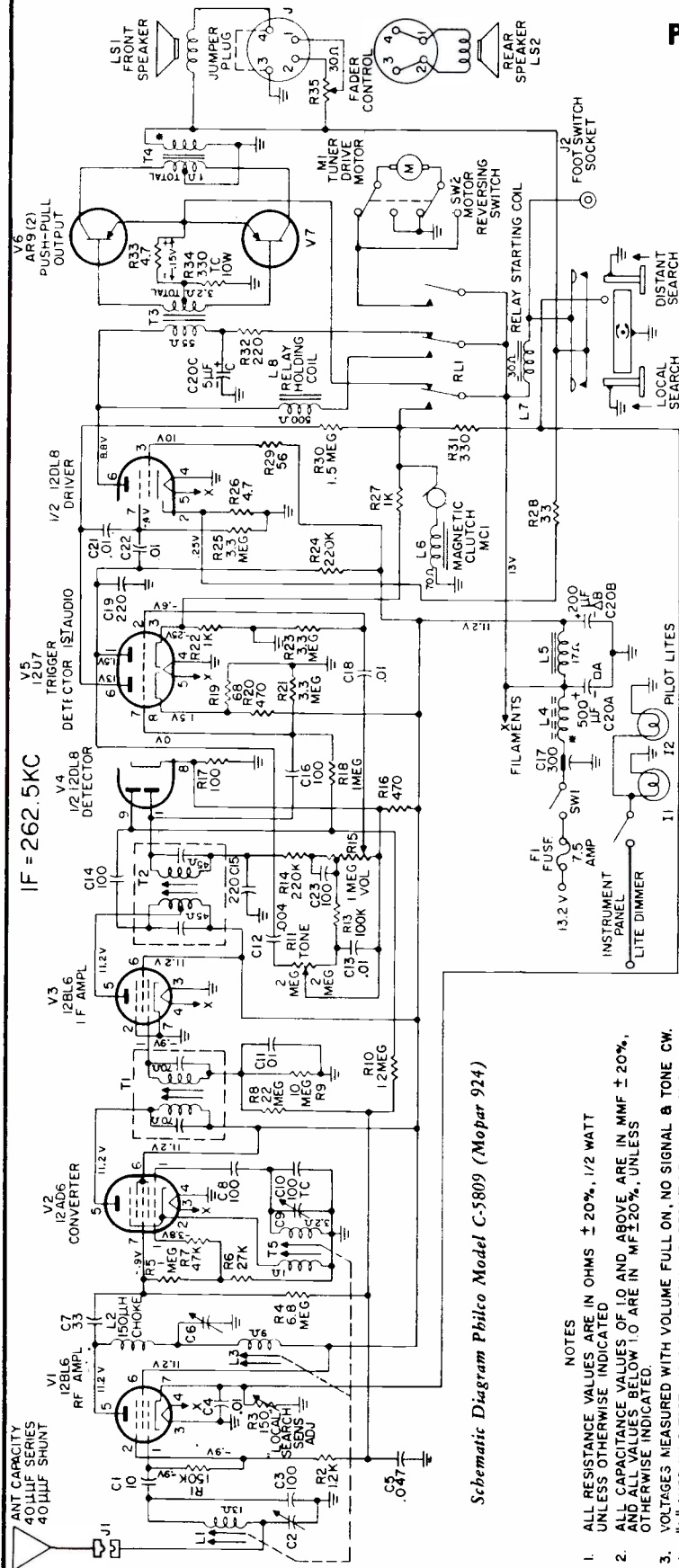
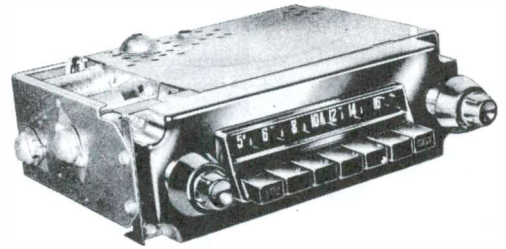
Do not operate these receivers with the speaker disconnected, as transient voltages across an unloaded output transformer may damage the transistors.

When installing a new transistor, a good physical contact must be established between the collector and the heat radiator. The transistor shell (connected to the transistor base) is insulated from the heat radiator by a film of plastic. The transistor must be mounted to give a good physical contact — the plastic film will allow heat conduction to the plate—but **MUST NOT** make electrical contact with the heat radiator plate. Use caution to prevent damage to the plastic film. Care must be exercised when soldering, since excessive heat may melt the internal junctions.

CAUTION: Do not ground the base of any of the transistors or serious damage will result to the transistor.

PHILCO AUTO RADIO

MODEL C-5809



Schematic Diagram Philco Model C-5809 (Mopar 924)

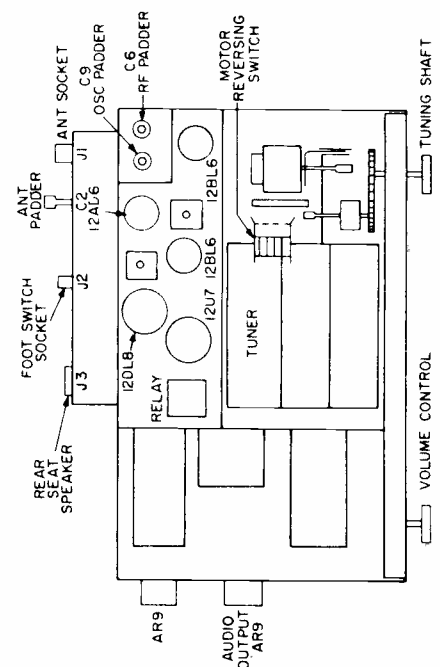
- NOTES
1. ALL RESISTANCE VALUES ARE IN OHMS $\pm 20\%$, 1/2 WATT UNLESS OTHERWISE INDICATED
 2. ALL CAPACITANCE VALUES OF 1.0 AND ABOVE ARE IN MMF $\pm 20\%$, AND ALL VALUES BELOW 1.0 ARE IN MF $\pm 20\%$, UNLESS OTHERWISE INDICATED.
 3. VOLTAGES MEASURED WITH VOLUME FULL ON, NO SIGNAL & TONE CW.
 4. "A" SUPPLY VOLTAGE = 13.2 V; NORMAL CURRENT DRAIN = 1.5 AMP.
 5. MEASUREMENTS TAKEN WITH 20,000 Ω /VOLT METER, GRID VOLT. TAKEN WITH V.T.V.M.
- * INDICATES A RESISTANCE OF LESS THAN 1 OHM.

SETTING PUSH BUTTONS

Stations may be set up in any order. However, for convenience in remembering, it is suggested that stations be set up in frequency sequence.

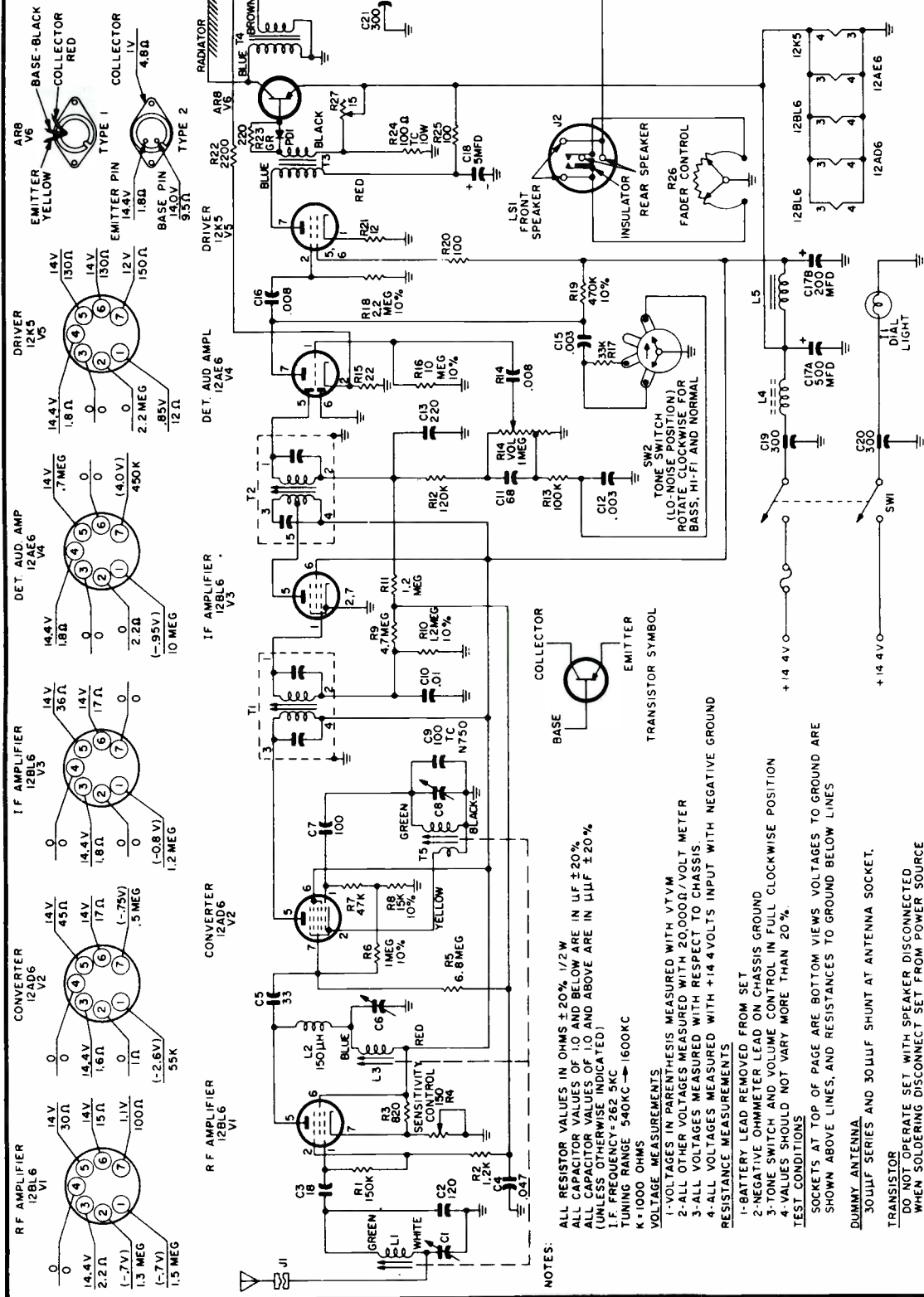
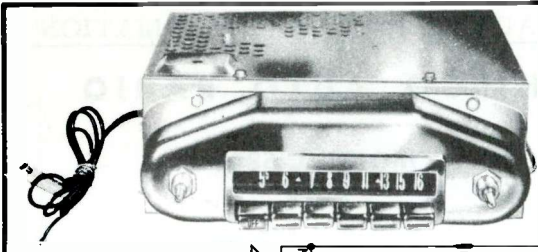
NOTE: In metropolitan areas, it is recommended that the push buttons be set up in a shielded place where signals are weak, such as under a viaduct or in a steel-constructed building. In this way, accuracy of adjustment is assured.

1. Turn radio on and allow it to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock push buttons by pulling them out.
3. Accurately tune in a station with manual tuning knob.
4. Lock one push button to that station by pushing firmly in.
5. Repeat above procedure for remaining push buttons.



PHILCO AUTO RADIO

MODEL M-5841



IMPORTANT: When connecting radio to "A" supply, either in car or on test bench, polarity must be observed. "A+" lead is positive, "A-" is chassis ground.

PHILCO AUTO RADIO MODEL M-5841

NOTES:

- 1- BATTERY LEAD REMOVED FROM SET
 - 2- NEGATIVE OHMMETER LEAD ON CHASSIS GROUND
 - 3- TONE SWITCH AND VOLUME CONTROL IN FULL CLOCKWISE POSITION
 - 4- VALUES SHOULD NOT VARY MORE THAN 20%
- TEST CONDITIONS
 SOCKETS AT TOP OF PAGE ARE BOTTOM VIEWS. VOLTAGES TO GROUND ARE SHOWN ABOVE LINES, AND RESISTANCES TO GROUND BELOW LINES
- DUMMY ANTENNA
 30 μ LF SERIES AND 30 μ LF SHUNT AT ANTENNA SOCKET.
- TRANSISTOR
 DO NOT OPERATE SET WITH SPEAKER DISCONNECTED WHEN SOLDERING. DISCONNECT SET FROM POWER SOURCE USE BATTERY OPERATED INSTRUMENT WHEN MAKING MEASUREMENTS

POWER INPUT 2.2 amp. at 14.4 volts, d.c.

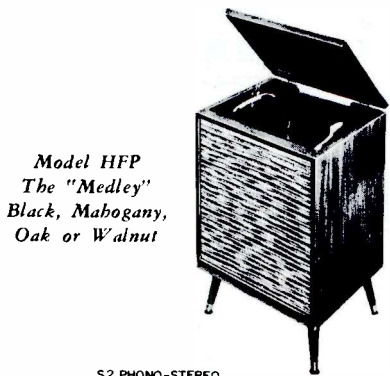
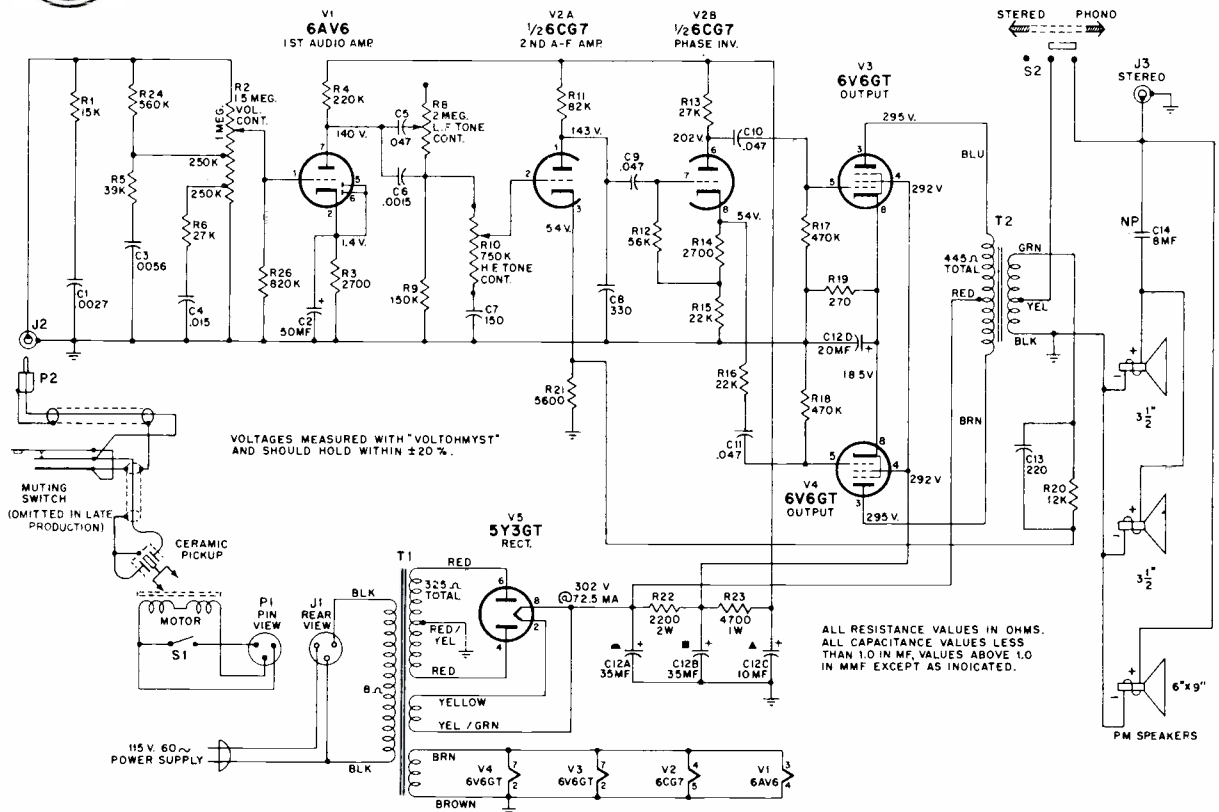
AERIAL Vertical whip, fender mounting (30 μ f. series, 30 μ f. shunt)

INTERMEDIATE FREQUENCY 262.5 kc.

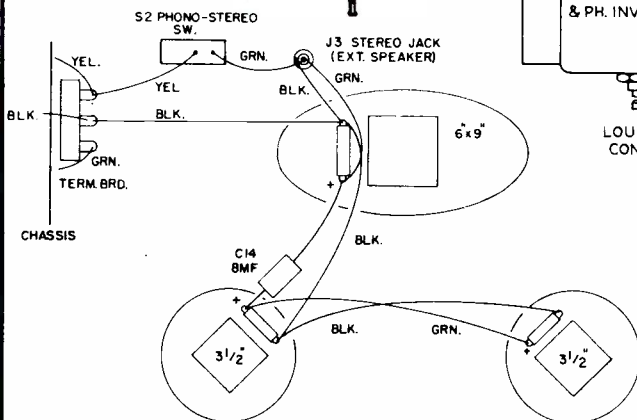
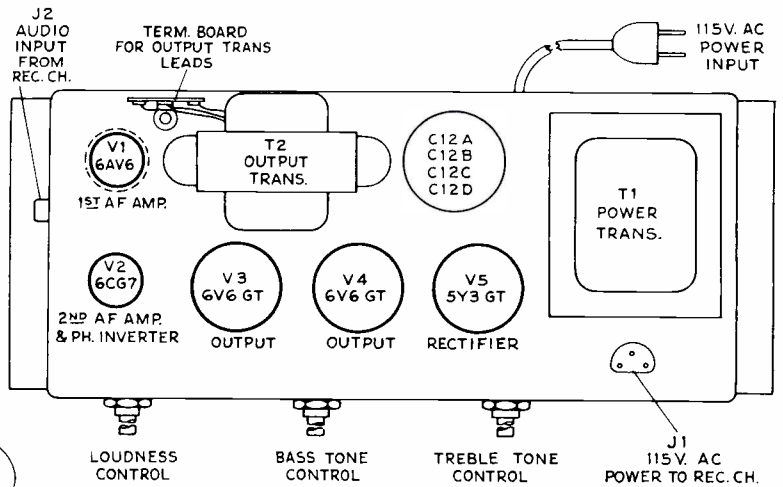


RCA VICTOR

HFP RECORD PLAYER Chassis RS-164B, Rec. Changer RP-205D-2



Model HFP
The "Medley"
Black, Mahogany,
Oak or Walnut



Speaker Connection Diagram—Model HFP

POWER SUPPLY

115 volts, 60 cycles85 watts

POWER OUTPUT . . .10 watts undistorted, 12 watts maximum

FREQUENCY RESPONSE60 to 20,000 cycles

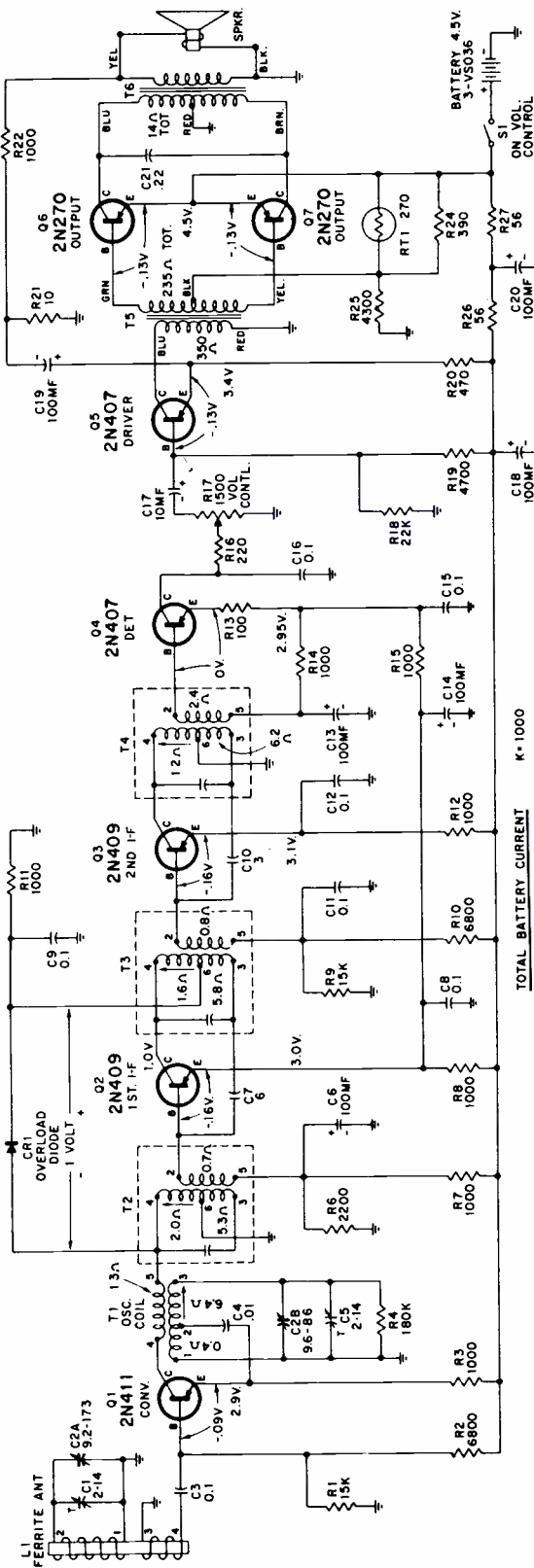
LOUDSPEAKERS

One 6" x 9" PM "woofer"3.2 ohms @ 400 cy.
Two 3 1/2" PM "tweeters"7.6 ohms each @ 6000 cy.



MODEL 1-BT-58

Chassis No. RC-1156B



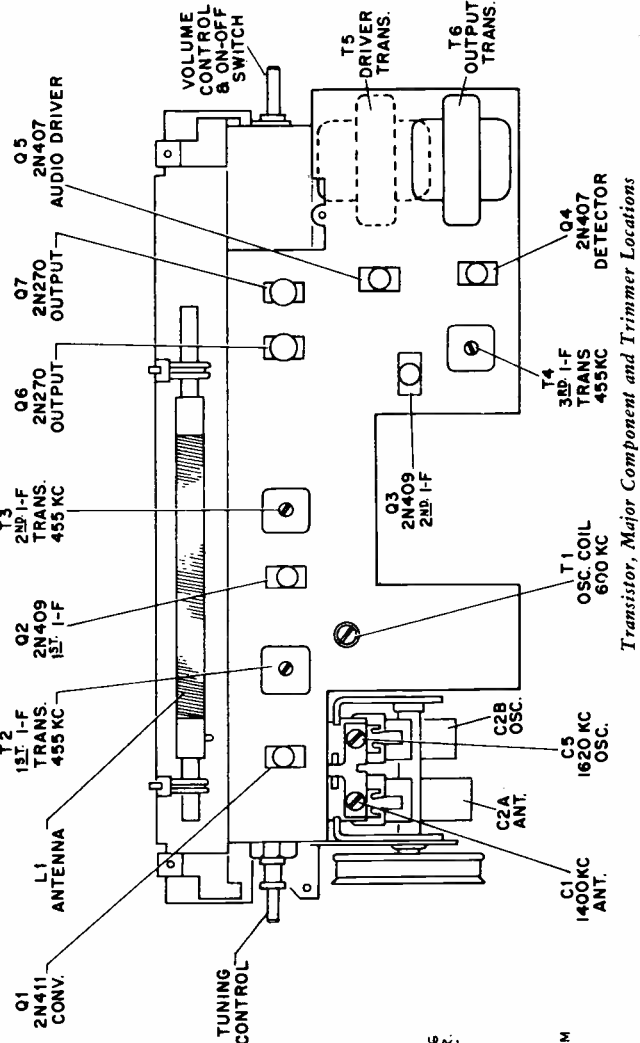
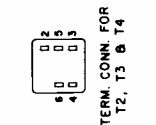
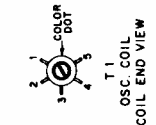
VOLTAGES MEASURED TO CHASSIS GROUND EXCEPT AS INDICATED, AND SHOULD HOLD WITHIN ±20% WITH NEW BATTERIES.

ALL RESISTANCE VALUES IN OHMS
ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF AND 1.0 μ ABOVE IN MMF EXCEPT THOSE INDICATED.

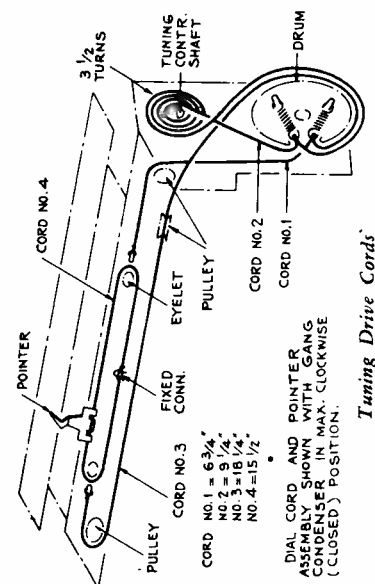
TOTAL BATTERY CURRENT
K = 1000
CURRENT
OUTPUT
0 11.5 MA
25 MILLIWATTS 33 MA
200 MILLIWATTS 82 MA

COLLECTOR CURRENTS WITH NO SIGNAL INPUT

01 0.82 MA
02 0.9 MA
03 0.8 MA
04 0.8 MA
05 0.9 MA
06+07 5.2 MA



Transistor, Major Component and Trimmer Locations



Tuning Drive Cords

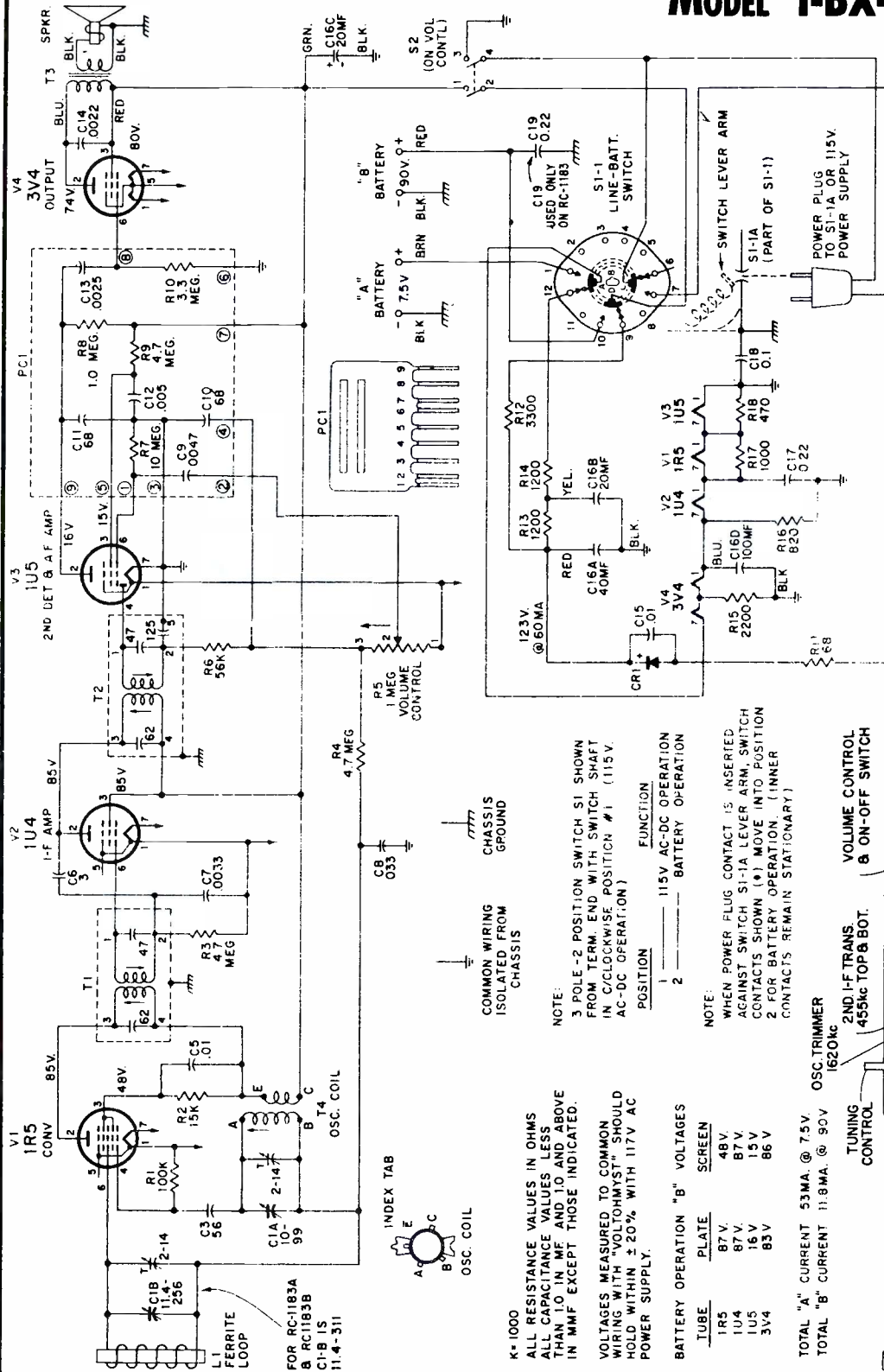
DIAL CORD AND POINTER ASSEMBLY SHOWN WITH GANG CONDENSER IN MAX. CLOCKWISE (CLOSED) POSITION.

CORD NO. 1 = 63/4"
NO. 2 = 9 1/4"
NO. 3 = 16 1/4"
NO. 4 = 15 1/2"

RCA VICTOR

Chassis Nos. RC-1183, RC-1183A, RC-1183B

MODEL 1-BX-5 SERIES MODEL 1-BX-6 SERIES MODEL 1-BX-7 SERIES



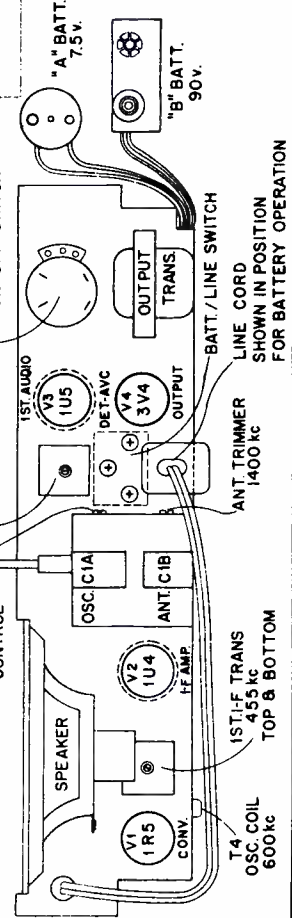
To Remove Cabinet Back

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.

NOTE:
3 POLE-2 POSITION SWITCH S1 SHOWN FROM TERM. END WITH SWITCH SHAFT IN C/CLOCKWISE POSITION #1 (115V. AC-DC OPERATION)

POSITION	FUNCTION
1	115V AC-DC OPERATION
2	BATTERY OPERATION

NOTE:
WHEN POWER PLUG CONTACT IS INSERTED AGAINST SWITCH S1-1A LEVER ARM, SWITCH CONTACTS SHOWN (*) MOVE INTO POSITION 2 FOR BATTERY OPERATION. (INNER CONTACTS REMAIN STATIONARY)



K=1000
ALL RESISTANCE VALUES IN OHMS
ALL CAPACITANCE VALUES LESS THAN 100 P.F. AND 10 AND ABOVE IN M.M.F. EXCEPT THOSE INDICATED.

VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMIST" SHOULD HOLD WITHIN ±20% WITH 117V AC POWER SUPPLY.

TUBE	PLATE	SCREEN	BATTERY OPERATION "B" VOLTAGES
1R5	87V	48V	
1U4	87V	87V	
1U5	16V	15V	
3V4	83V	83V	

TOTAL "A" CURRENT 53MA. @ 75V.
TOTAL "B" CURRENT 11.9MA. @ 90V

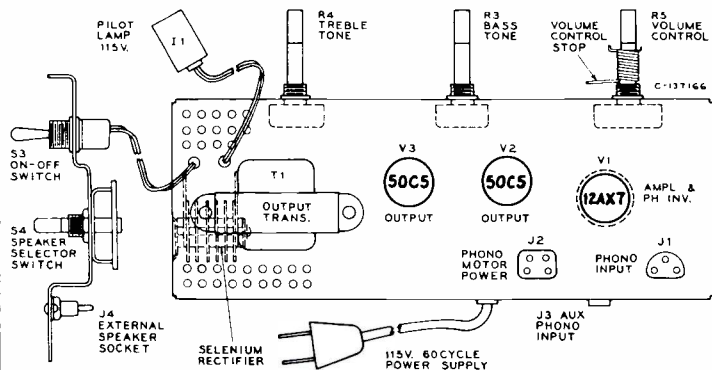
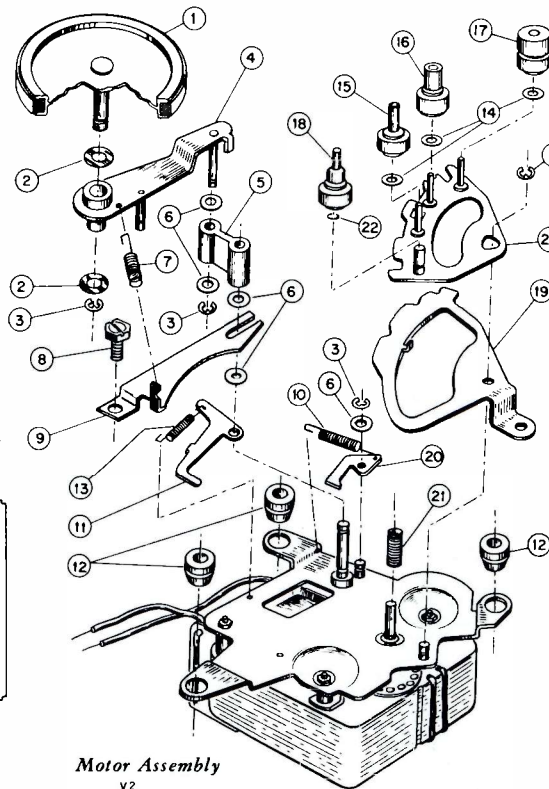
MOTOR ASSEMBLY

ILL. NO.	STOCK NO.	DESCRIPTION
1	102968	Wheel—Idler wheel
2	78509	Washer—Fibre washer (.015" thk. x 31/64" O.D. x 7/32" I.D.)
3	78652	Washer—"C" type retaining washer
4	102969	Plate—Idler plate assembly
5	78517	Link—Idler link
6	78515	Washer—Metal washer
7	78512	Spring—Idler spring
8	...	Screw—Hold down plate mounting screw (#6-32)
9	102970	Plate—Hold down plate
10	78520	Spring—Shifter latch spring
11	78518	Arm—Pulley plate latch arm
12	78514	Grommet—Motor mounting grommet
13	78519	Spring—Pulley latch spring
14	78528	Washer—Speed pulley fibre washer
15	78525	Pulley—33 1/2 RPM pulley assembly
16	78526	Pulley—45 RPM pulley assembly
17	78527	Pulley—78 RPM pulley assembly
18	102972	Pulley—16 1/2 RPM pulley assembly
19	102974	Lever—Speed shift lever
20	78521	Lever—Latch arm lever
21	79967	Sleeve—Sleeve pulley for 50 cycle operation
21	78522	Sleeve—Sleeve pulley for 60 cycle operation
22	102973	Retainer—Pulley retainer "C" ring
23	102971	Plate—Speed pulley mounting plate (less pulleys)
	102541	Motor—4 Speed motor assembly complete,

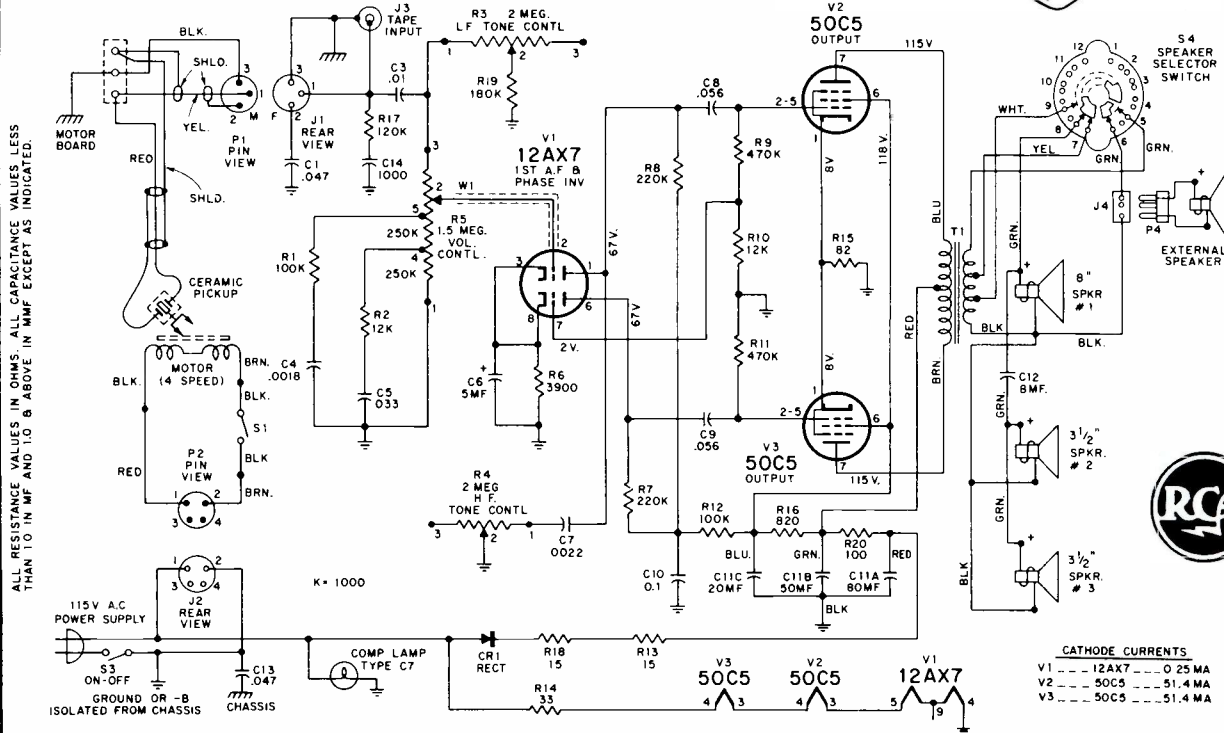
RCA VICTOR

MODEL HRD-2

Chassis No. RS-158J
Record Player Mechanism No. RP-200-2



Motor Assembly



ALL RESISTANCE VALUES IN OHMS. ALL CAPACITANCE VALUES LESS THAN 10 IN MF AND 1.0 μ ABOVE IN MMF EXCEPT AS INDICATED.

CATHODE CURRENTS

V1	12AX7	0.25 MA
V2	50C5	51.4 MA
V3	50C5	51.4 MA

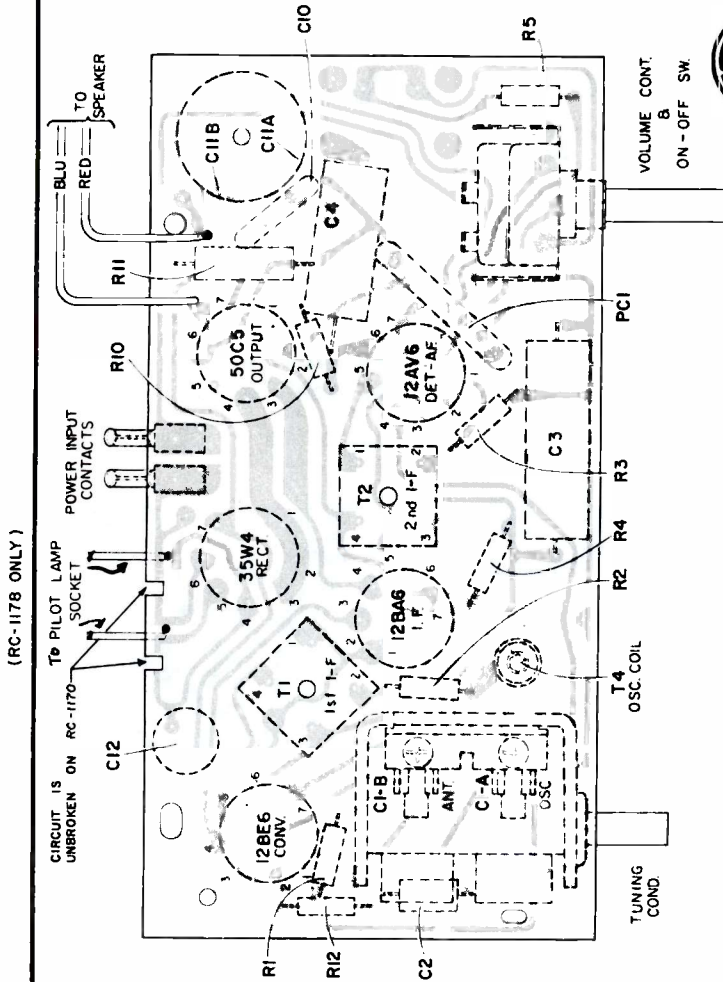


RCA VICTOR

**8-X-5 SERIES, 8-X-6 SERIES
MODEL 8-X-51**

Chassis No. RC-1170, RC-1178

8-C-5 Series and Model 8-C-51, using Chassis RC-1179, are like RC-1170, and 8-C-6 Series, Chassis RC-1179A, are like RC-1178, except of addition of timer with switch.

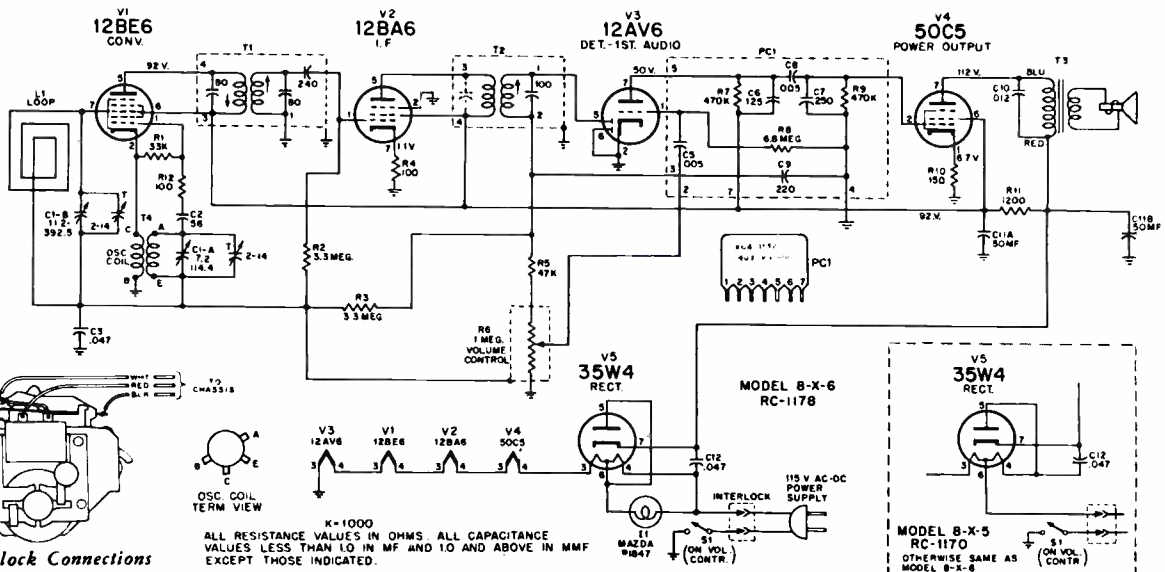


Chassis Wiring and Components — View from Wiring Side

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

Alignment Procedure

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3		1,620 kc	Gang fully open	osc. trimmer C1-A
4	Short wire placed near loop to radiate signal	1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6	Repeat steps 3, 4, and 5			





RCA VICTOR

Battery-Operated Pocket Radio

MODEL 9-BT-9 Series

Chassis No. RC-1164A, RC-1164B

Model 8BT9, RC-1164, is practically identical.

(See pages 147 and 148 for additional service hints and alignment facts.)

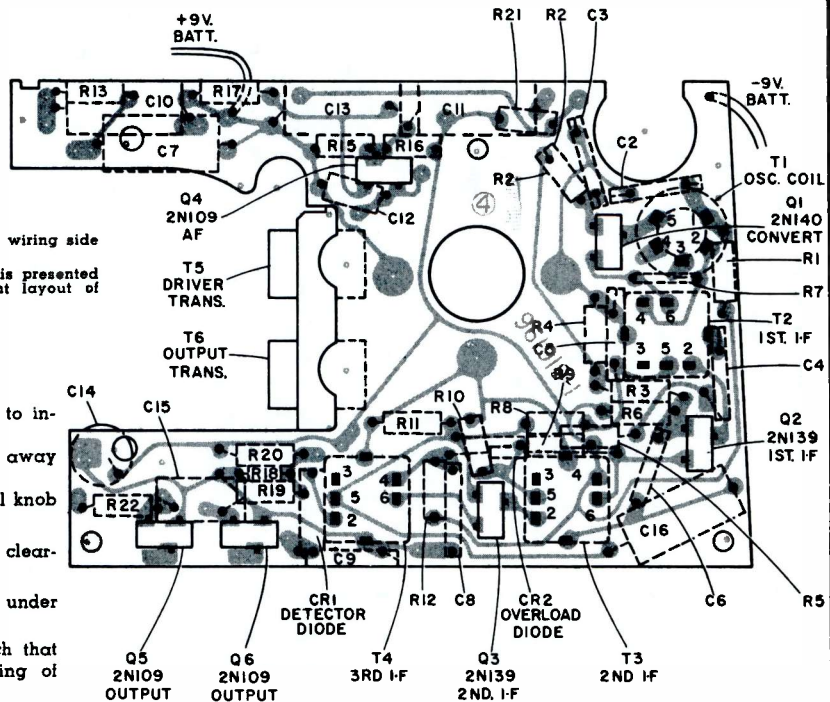
Model 9-BT-9 Series The "Transistor Six"

Printed Circuit Board Wiring and Components
View from Wiring Side

Circuit Board No. 961919-1
Chassis No. RC-1164A

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

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



CRITICAL LEAD DRESS

Dress leads and components at gang so as not to interfere with rotor plates.

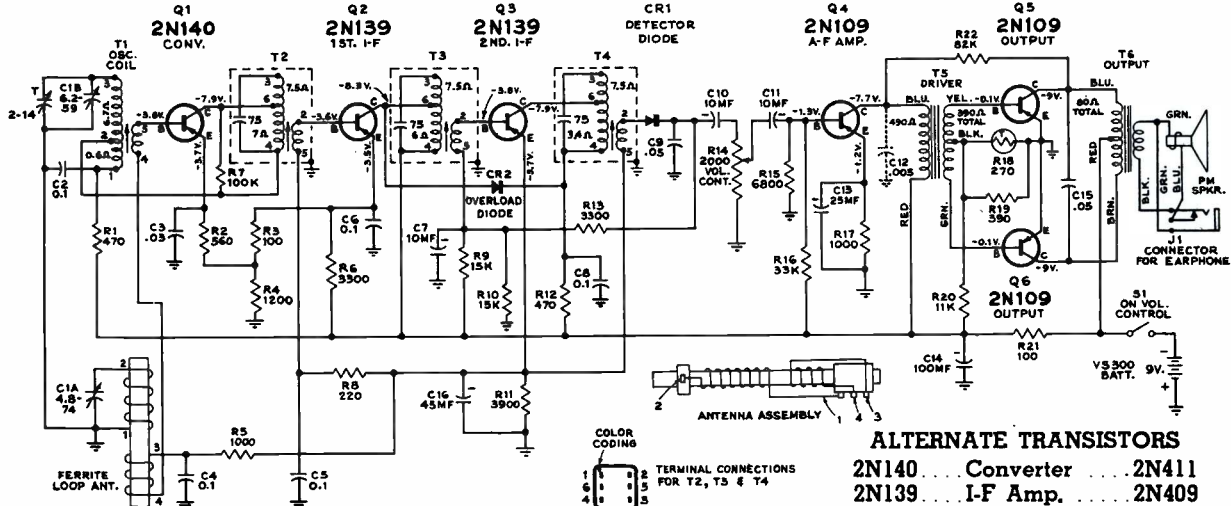
Dress lead from antenna to gang ant. terminal away from metal parts as far as practicable.

Check for possible solder shorts to volume control knob from printed circuit wiring.

Antenna terminal of gang must be bent to insure clearance to output transformer.

Dress "B-" lead from ON-OFF switch to battery under positive (+) lead of C16.

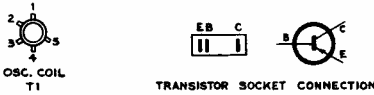
Dress antenna rod to clear end of case and such that antenna terminal does not interfere with closing of case back.



ALTERNATE TRANSISTORS

2N140	Converter	2N411
2N139	I-F Amp.	2N409
2N109	Audio Amp.	2N407

VOLTAGES MEASURED WITH "VOLTHMYST" SHOULD HOLD WITHIN ±20% WITH NEW BATTERY. K=1000. ALL RESISTANCE VALUES IN OHMS. ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF AND 1.0 & ABOVE IN MMF EXCEPT THOSE INDICATED.



BATTERY CURRENT
NO SIGNAL --- 8 MA.
15 MW OUTPUT --- 13 MA.

RCA Victor Model 9-BT-9 Series, Chassis RC-1164A, -B, Continued

SERVICE HINTS

Recommended Test Procedure

Use signal tracing or signal injection as basic test procedure in conjunction with voltage measurements.

Make stage-by-stage check by injecting signal from signal generator and checking with a high-gain oscilloscope (at least .03 volts/inch). Oscillator action must be stopped in order to measure RF signal at converter base since oscillator signal also appears at this point. Oscillator action can be stopped by touching a finger to oscillator section of the tuning condenser.

NOTE. All transformers are step-down type and will show voltage loss from primary to secondary.

Extreme care should be used to avoid accidental shorting of transistor elements to circuit ground. This is especially true of the output transistors; if the junction of R18-R19-R20 should be accidentally grounded for a few seconds, the output transistors would be permanently damaged.

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

1. The first thing to check when the receiver is inoperative, is the battery. With the receiver turned on, a new battery should show 9 volts although the receiver can be expected to operate on any battery which checks between 6 volts and 9 volts.
2. To check for a circuit defect which would cause excessive battery drain, an overall current measurement and supplementary voltage measurements should be made. For reasons explained above, continuity measurements can be misleading.
3. Signal tracing by injection of a signal from a signal generator is done on transistor radios in exactly the same manner as with conventional vacuum tube radios. The signal generator should be connected (as in past practice) in series with a capacitor to avoid shorting out bias voltages. With the transistors used in this receiver, the BASE is the signal input terminal (corresponding to signal grid of tubes), the COLLECTOR is the signal output terminal (corresponding to plate of tubes), and the EMITTER is the common terminal (corresponding to cathode of tubes).
4. The output of this receiver is of the "Class B" type. It should be noted that in "Class B" output the battery

current increases noticeably with increased signal input. Refer to the schematic diagram for current specifications.

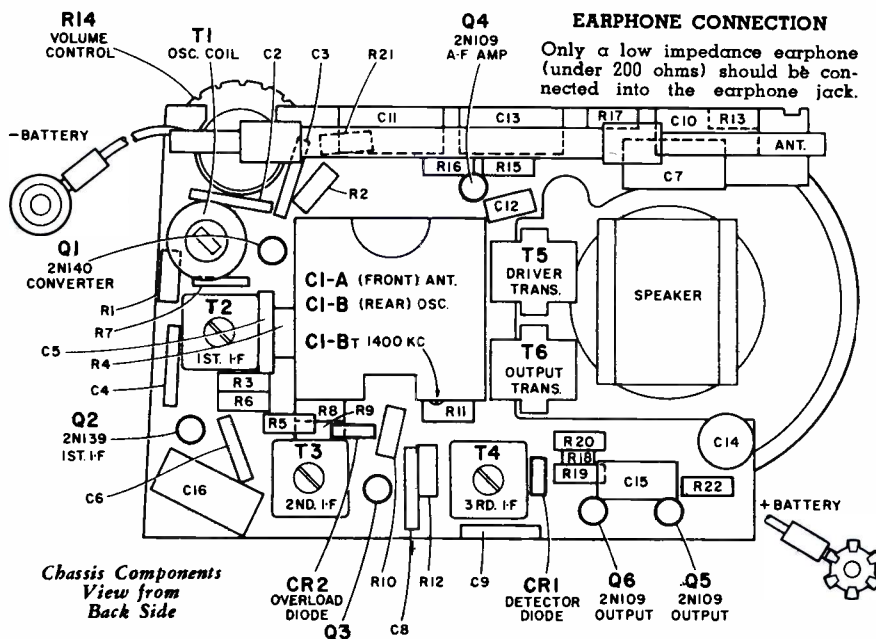
5. Application of a signal from a signal generator to the input (B) of Q1 will stop oscillator action (R-F signal can not be injected at this point although 455 kc I-F signal can be injected).
6. Measurement of oscillator signal strength with an oscilloscope at the input of Q1 (base contact) will give an indication of oscillator performance. Voltage should be 0.20 to 0.70 volts peak-to-peak.
7. D-C measurements should be made only with a sensitive voltmeter, such as an RCA VoltOhmst®.
8. Interchanging transistors in the I-F stages may necessitate realignment.
9. The transistors and the printed wiring board can be readily damaged by excessive heat. When soldering on the printed wiring board, use a soldering iron which is both HOT and CLEAN. The soldering operation can then be completed quickly with a minimum of heat radiation to components.

ALIGNMENT PROCEDURE

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

Step	Connect High Side of Sig. Gen. to —	Sig. Gen. Output	Dial Pointer Setting	Adjust for Max. Output
1	#2 terminal of ant. assembly L1	455 kc	Quiet point near 1600 kc	T4 3rd I-F T3 2nd I-F T2 1st I-F
2	Repeat Step 1			
3	Short wire placed near antenna for radiated signal	1400 kc	1400 kc rock gang	trimmer* C1-B (osc.)
4		600 kc	600 kc rock gang	T1 osc. coil
5	Repeat Steps 3 and 4			

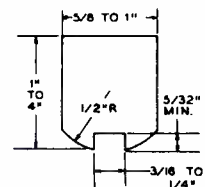
* Oscillator trimmer is located on bottom of gang.



Chassis Components View from Back Side

Production Changes

1. R4 was 1000 ohms. R5 was 220 ohms.
2. C9 was .03 mf. C12 (.005 mf.) removed—it was connected from collector of Q4 to gnd. C16 (45 mf.) was a wire-in type of capacitor in early production. It may be either a wire-in type or upright type in late production.



MATERIAL—STEEL OR BRASS THICKNESS OF 25¢ COIN.

Tool Required for Removal of Chassis Mounting Nut

RCA Victor Model 9-BT-9 Series, Chassis RC-1164A, -B, Continued

SERVICE PROBLEMS AND REMEDIES

Distorted Only On Weak Stations Or Only On Strong Stations

When distortion is present and varies with the strength of the station signals, it indicates an abnormal condition in the circuit of those transistors whose bias is AGC controlled.

Distortion only on weak stations is most often due to unsatisfactory operation of the detector. The diode should have a slight initial forward bias. Check for presence of this bias voltage, check to see that polarity does not reverse with signal and that AGC voltage with signal is of proper polarity (base to emitter voltage should decrease with increase of signal).

Distortion on strong stations indicates that the transistors are being driven to cutoff by a strong AGC voltage. An overload diode is used to reduce the gain of an IF circuit only on strong signals. Check terminal voltages and the overload diode. Transistor radios will not handle large variations of signal as well as vacuum tube radios, and it may be that on excessively strong signals the best solution is to turn the radio so that the antenna will pick up less signal.

Regeneration

An IF transistor having exceptionally high gain may cause regeneration on weak signals. A possible correction for this difficulty is to interchange the two IF transistors—realignment is advisable after any change of transistors in the IF circuit.

If a type 2N140 transistor is used in place of a type 2N139 transistor, regeneration may occur. Check for use of correct type of transistor.

Two specific types of regenerative squeal have been found in the Transistor Six. The first type in which the audible sound can be controlled by the volume control has had several causes which were as follows:

1. High internal battery resistance. A new battery corrects the trouble.
2. High resistance riveted connections at battery leads on printed board. This trouble can be overcome by soldering the rivets to the printed wiring.
3. High resistance connections at chassis mounting spacer. This condition is evidenced by a change in the frequency and intensity of the squeal when the tuning condenser mounting screws are first loosened and then tightened. The spacer and the mounting screws are in the tuning condenser "ground" circuit and electrolytic action between the copper wiring and the die-cast zinc spacer results in corrosion and high resistance joints. A 3-point wire jumper should be soldered between the three copper areas at the tuning condenser mounting screws. The spacers now being used are copper plated and can be soldered to the wiring.
4. Stripped tuning condenser mounting screw. The third tuning condenser mounting screw is also used as part of the tuning condenser "ground" circuit. The screw must be long enough to hold securely in the condenser and yet not long enough to touch the tuning condenser plates.
5. Rosin joint at tuning condenser mounting screw. The third tuning condenser mounting screw mentioned above is soldered to the printed wiring. Some cases of poor soldering have resulted in rosin joints.
6. The mounting lugs of IF transformers T3 and T4 are used for ground interconnections. Loose rivets can result in intermittent regeneration. Solder a jumper wire between the two mounting lugs of each can.

No Signal

In cases of "no signal," the first step is to check battery voltage with set turned on. New batteries are 9 volts, but transistor radios will operate on batteries as low as 6 volts. If the battery is O.K., check terminal voltages. There can be short-circuits in transistor radios just as in any other radio. One significant difference is that in a transistor radio, there is insufficient power to burn a resistor.

Transistors have no filaments to burn out, but lead wires can be broken. Battery leads and phone jack leads are the most likely source of such trouble. Transistors themselves should be the last items suspected.

Weak RF/IF Signal

Transistor life in normal service has no known limit; service deterioration is so negligible as to be dismissed without further thought.

In all cases of RF/IF low sensitivity, first check terminal voltages. Although voltages may vary widely without greatly affecting stage gain, the voltages should all have the same proportion of variation. The bias voltages are the most difficult to measure but must not be neglected. A transistor having a normal "forward" bias of 0.15 volt will have a slight decrease in gain when operating with a bias of 0.12 volt but may have a great decrease in gain when operated with a bias of 0.10 volt. If a large voltage discrepancy is found it will be necessary to remove transistors before making resistance measurements in localizing the trouble.

Where a transistor stage shows low gain, shunt each bypass capacitor in that stage with another capacitor to detect open capacitors.

Alignment should be checked in all cases of low RF/IF sensitivity. There is only one core to each IF transformer but in some cases two peaks may be reached, one peak being higher than the other. If a transformer can not be peaked, it may have to be replaced—first check transformer terminal connections. The following are alignment suggestions:

1. IF transformer will not peak at 455KC—may be either defect in transformer or defective transistor (IF or converter)—try replacing transistor before changing transformer. An open bypass capacitor in the circuit of that transformer could give an unsatisfactory peaking condition.
2. IF transformers may be peaked incorrectly—maximum gain is obtained when cores are peaked at the "farthest in" peak.

Other possibilities of low RF/IF sensitivity are as follows:

1. Incorrect transistor—if type 2N139 is used in place of specified type 2N140, conversion gain will be down and oscillator section may fail to operate when battery voltage is down slightly.
2. Resistor value change in oscillator or converter stage—measure oscillator a.c. voltage at Q1 base (should be 0.20 to 0.70 volts p-p)—measure d.c. voltages—remove transistors and check resistors in converter circuit; if transistors are soldered in, unsolder one end of suspected resistor and measure without removing transistors.
3. Detector diode reversed—output is down slightly. Check by noting polarity of AGC voltage at the diode source. AGC line voltage at the diode will become more positive (or less negative) in respect to circuit ground with signal increase.

Audio Distortion

One type of audio distortion is regeneration due to low capacity filters and/or high resistance joints.

Because the output transistors are in a "Class B" circuit, even a small change in bias may result in distortion. The no-signal emitter or collector current of each of the output transistors should be 1.5 to 2 ma with a new battery. A bias voltage of -0.1 v. is required at that current drain.

Negative feedback is used to reduce distortion, the feedback resistor R22 is 82K. If the resistor is connected to the wrong output collector, the distortion would be increased instead of decreased. This tells us that the YEL. and GRN. leads of the driver transformer must not be interchanged and neither should the BLUE and RED leads be reversed. Some transformers had incorrect color coding.

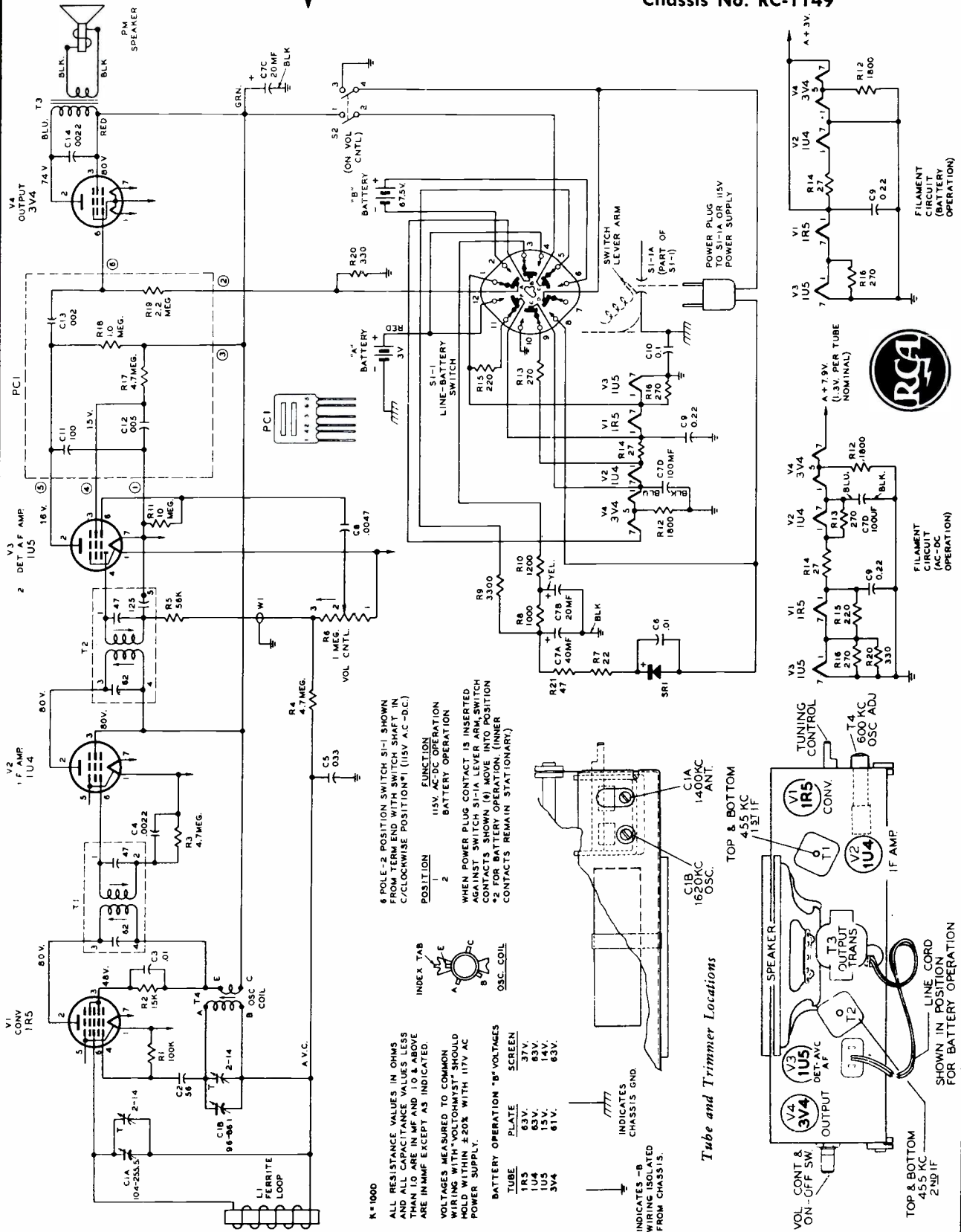
A simple case of low output and distortion has resulted from one pin of one output transistor being bent at right angles and not in its socket; the other two pins held the transistor in place.

In factory production, selected pairs of transistors are used for Class "B" output. Mismatched transistors will result in some distortion, this may or may not be noticeable during listening. Transistors may be matched by injecting an audio signal at the volume control and measuring the audio signal from each output collector to "ground." Matched transistors will give matched output signal.

RCA VICTOR

MODEL 8-BX-5 Series

Chassis No. RC-1149



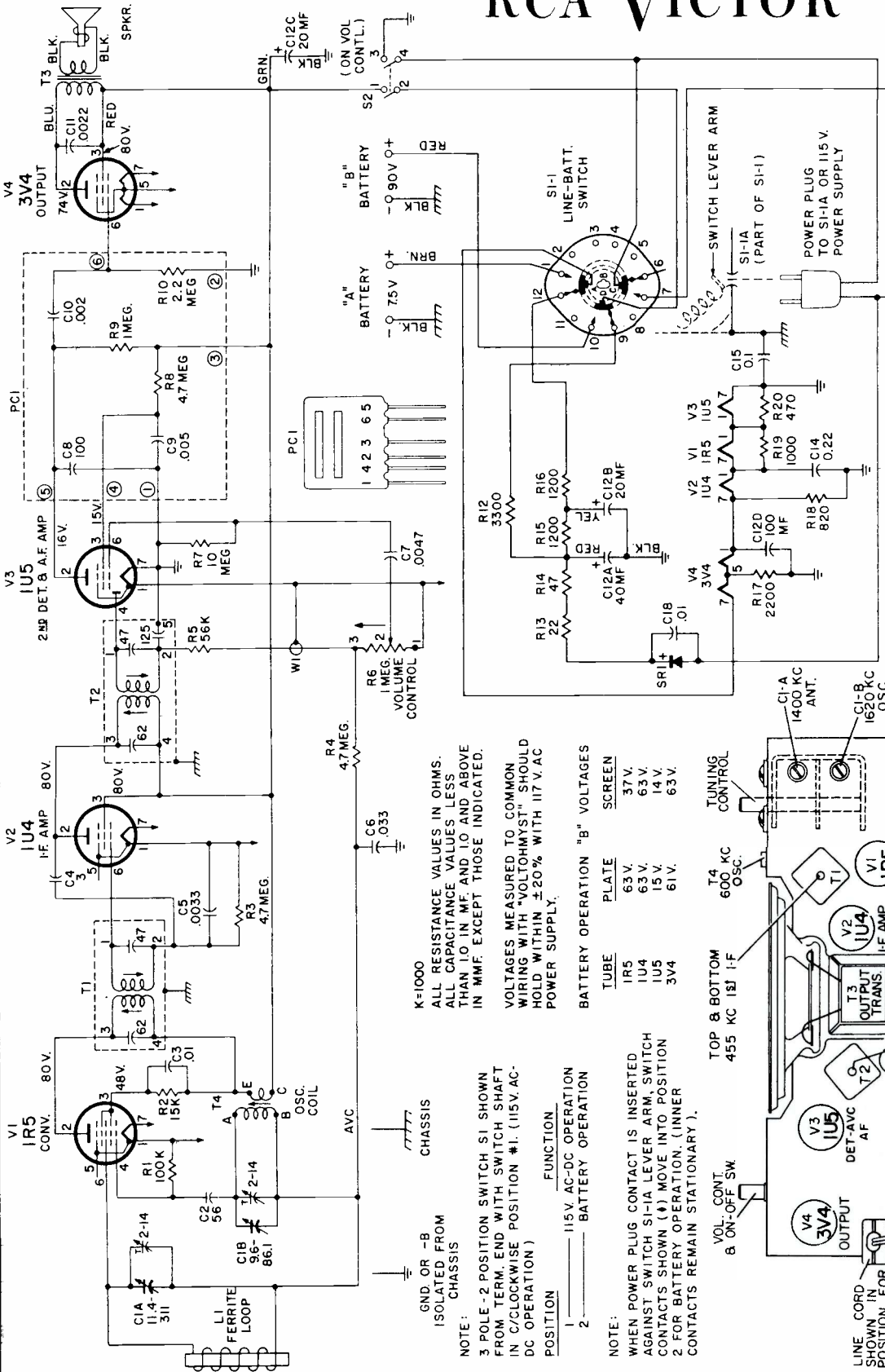
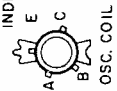
RCA VICTOR

**MODEL 8-BX-6 SERIES,
MODEL 8-BX-7 SERIES**

Chassis Nos. RC-1161, RC-1161A



INDEX TAB



K=1000
ALL RESISTANCE VALUES IN OHMS.
ALL CAPACITANCE VALUES LESS
THAN 1.0 IN MF. AND 1.0 AND ABOVE
IN MMF. EXCEPT THOSE INDICATED.

VOLTAGES MEASURED TO COMMON
HOLD WITHIN ±20% WITH 117 V. AC
POWER SUPPLY.

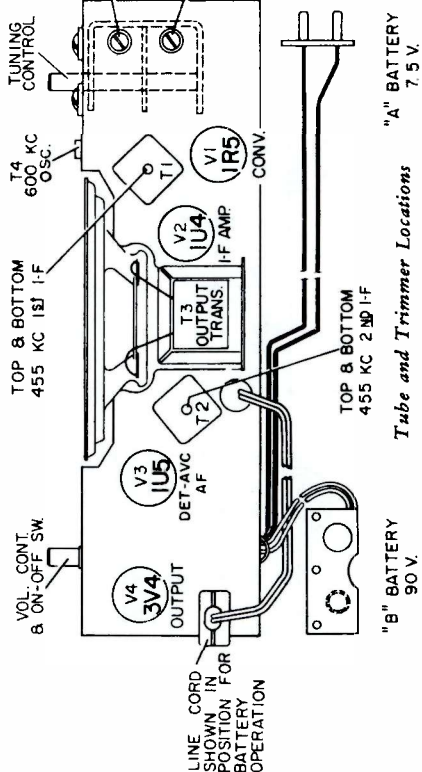
BATTERY OPERATION "B" VOLTAGES

TUBE	PLATE	SCREEN
1R5	63 V.	37 V.
1U4	63 V.	63 V.
1U5	15 V.	14 V.
3V4	63 V.	63 V.

NOTE:
3 POLE-2 POSITION SWITCH S1 SHOWN
FROM TERM. END WITH SWITCH SHAFT
IN C/CLOCKWISE POSITION #1. (115V. AC-
DC OPERATION)

FUNCTION
1 115 V. AC-DC OPERATION
2 BATTERY OPERATION

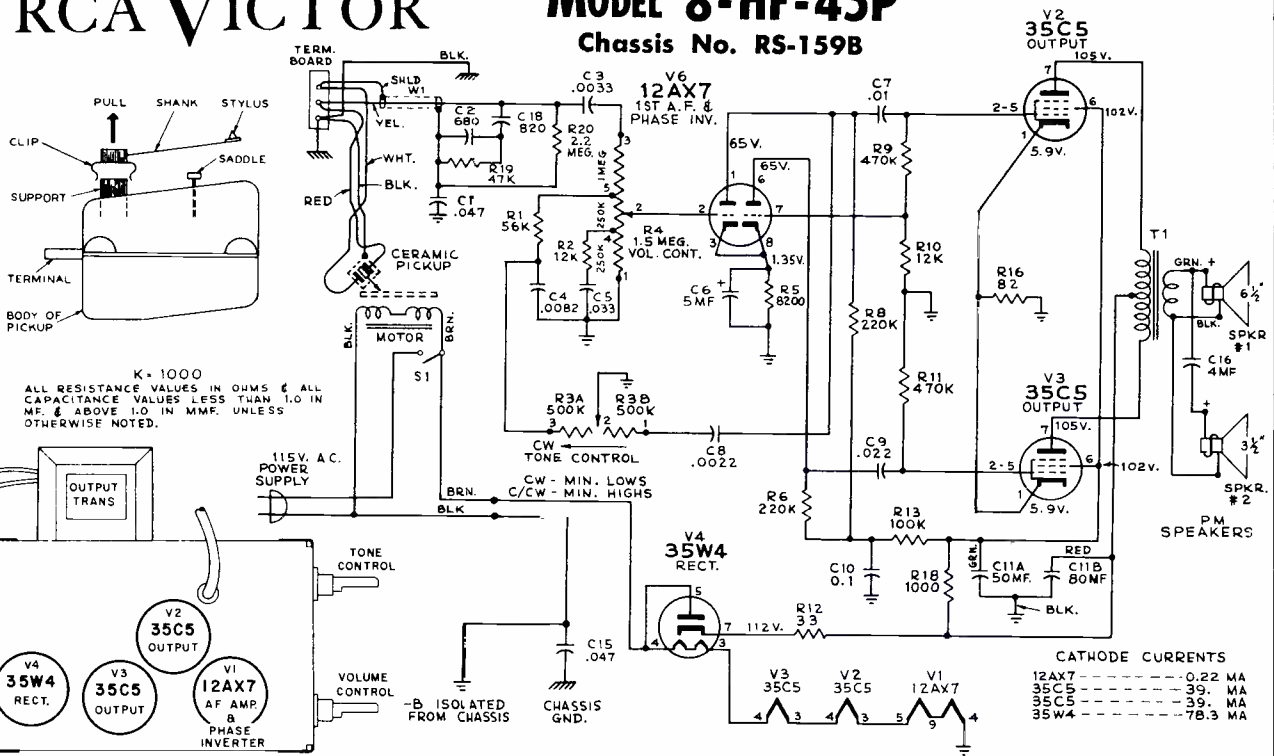
NOTE:
WHEN POWER PLUG CONTACT IS INSERTED
AGAINST SWITCH SI-1A LEVER ARM, SWITCH
CONTACTS SHOWN (#) MOVE INTO POSITION
2 FOR BATTERY OPERATION. (INNER
CONTACTS REMAIN STATIONARY).



RCA VICTOR

MODEL 8-HF-45P

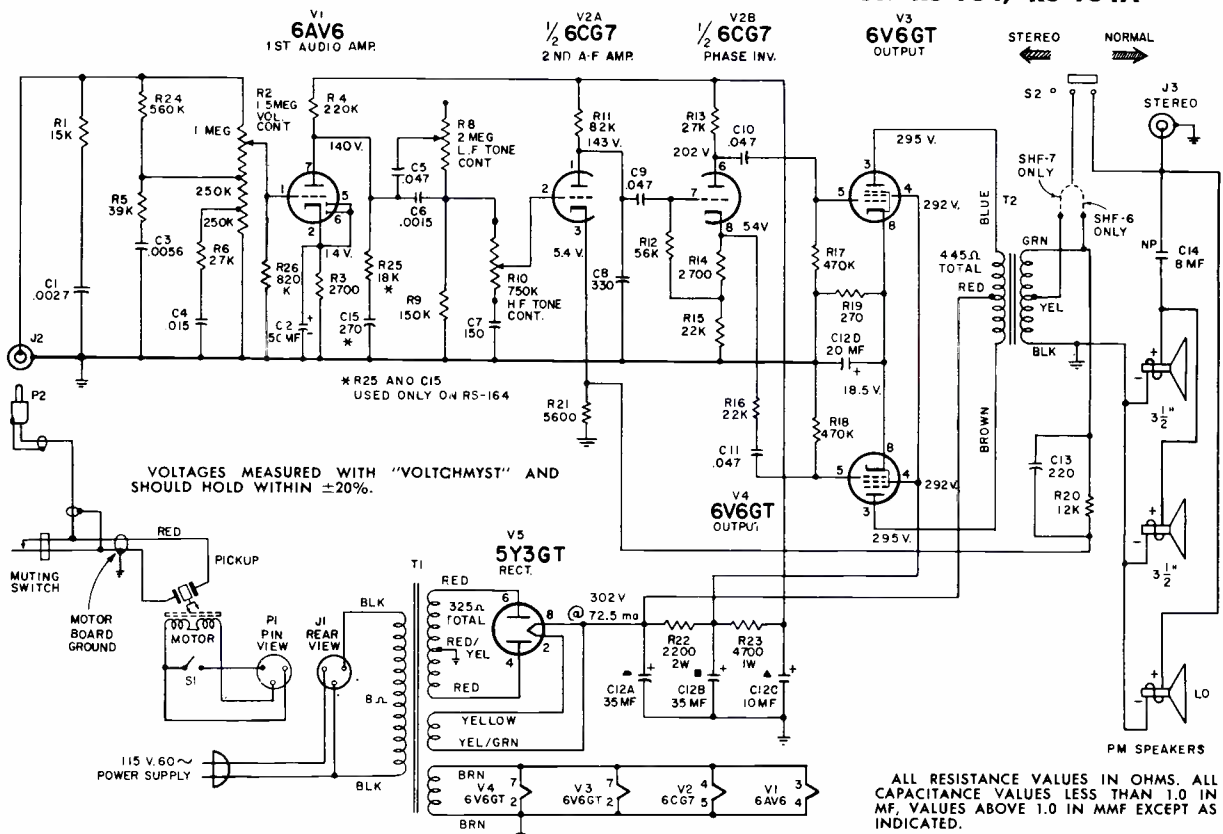
Chassis No. RS-159B



RCA VICTOR

MODELS SHF-6, SHF-7

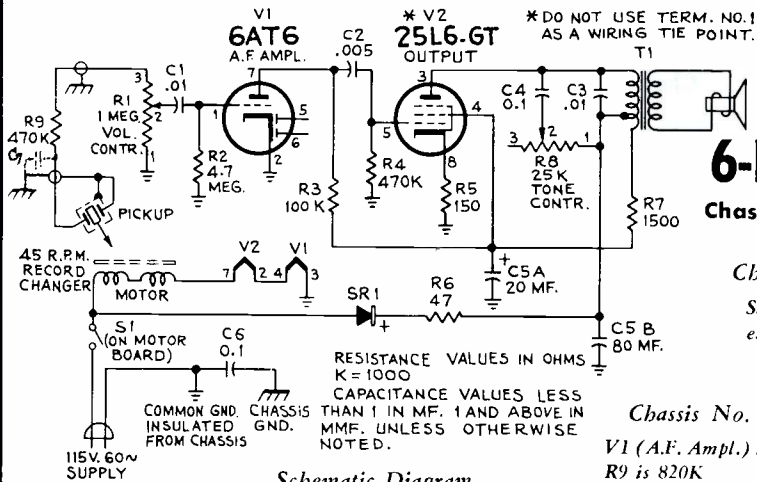
Chassis Nos. RS-164, RS-164A



RCA VICTOR

6-EY-3A, 6-EY-3B, 6-EY-3C

Chassis Nos. RS-152A, RS-152B, RS-152D, RS-152E



Schematic Diagram
Chassis No. RS-152A

Chassis No. RS-152D
V1 (A.F. Ampl.) is type 6AV6
R9 is 820K
C2 is .0047
otherwise same as shown for Chassis No. RS-152A

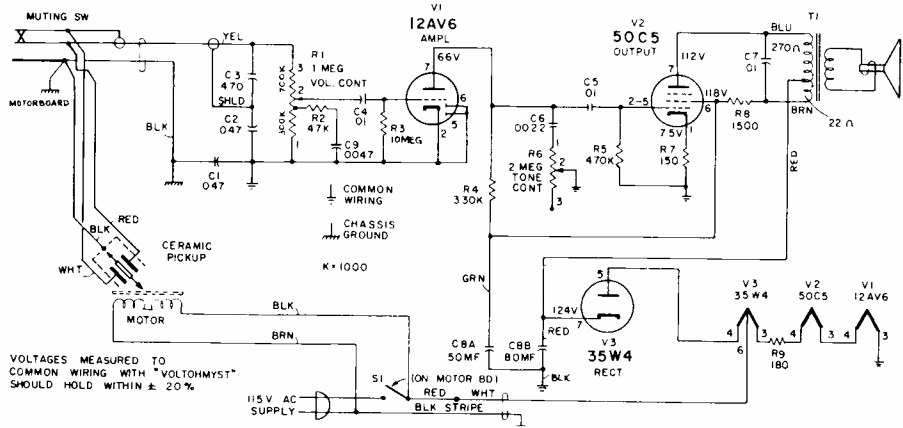
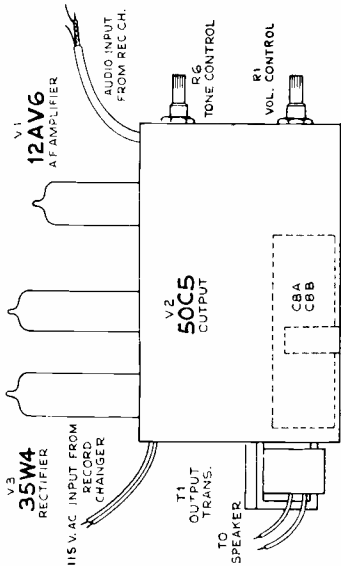
Chassis No. RS-152B
Same as shown for RS-152A
except C2 is .0047 mf

Chassis No. RS-152E
V1 (A.F. Ampl.) is type 6AV6
R2 is 10 megohm
R9 is 390K
C7 (470 mmf) is added
otherwise same as shown
for Chassis No. RS-152A

RESISTANCE VALUES IN OHMS
K = 1000
CAPACITANCE VALUES LESS
THAN 1 IN MF. 1 AND ABOVE IN
MMF. UNLESS OTHERWISE
NOTED.

MODELS 9-ES-5H, 9-ES-5JE

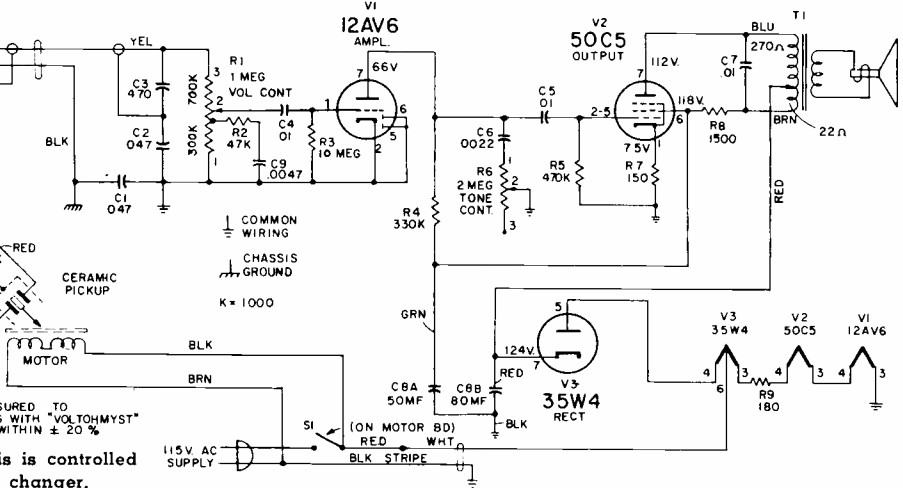
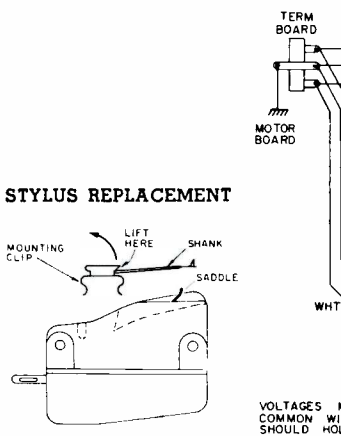
Chassis No. RS-170B

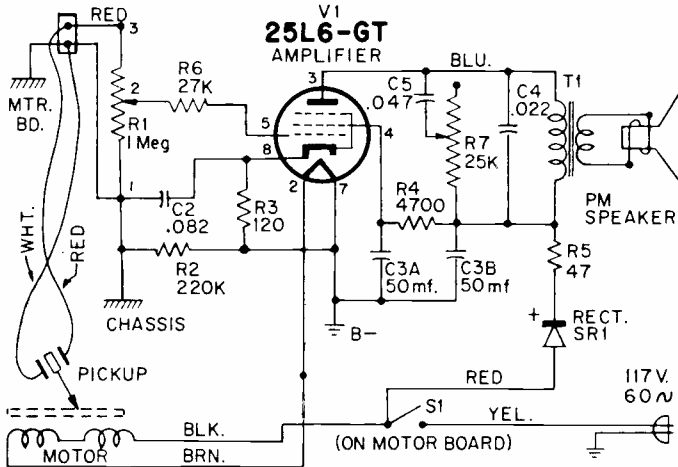


RCA VICTOR

MODELS 9-ED-2LE, 9-ED-2KF

Chassis No. RS-170D





RCA VICTOR

Automatic Record Player MODEL 8-EY-31

Chassis No. RS-153A
Record Changer No. RP-190D-1

Stylus Replacement—Pickup #103238

The stylus assembly is held in position by a pressure fit only. To remove stylus assembly, pull straight outward away from pickup.

Pickup Height Adjustment

Adjust knurled nut "A" until the distance (during change cycle) between the top of the turntable and the stylus point is approximately $1\frac{1}{8}$ ".

Pickup Landing Adjustment

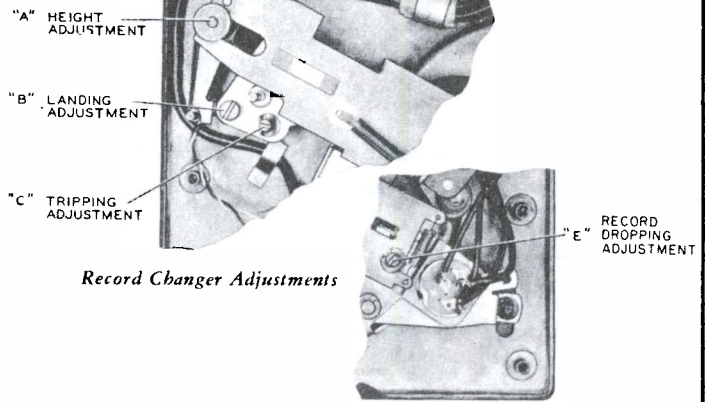
Adjust the screw driver landing adjustment stud "B" so the stylus lands $2\frac{1}{8}$ " $\pm 1/64$ " from the side of the center post.

Tripping Adjustment

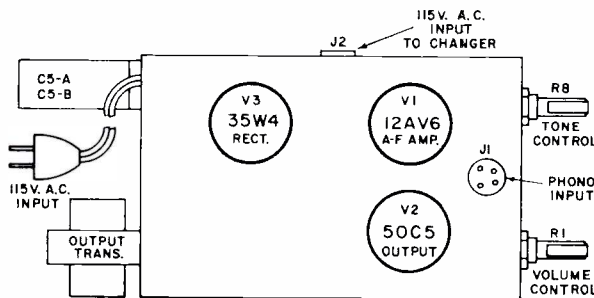
Adjust the eccentric tripping stud "C" until the mechanism trips when the stylus is $1\frac{9}{32}$ " from the side of the center post.

Record Dropping Adjustment

Turn the eccentric screw "E" until the record drops to the turntable without striking the pickup arm.



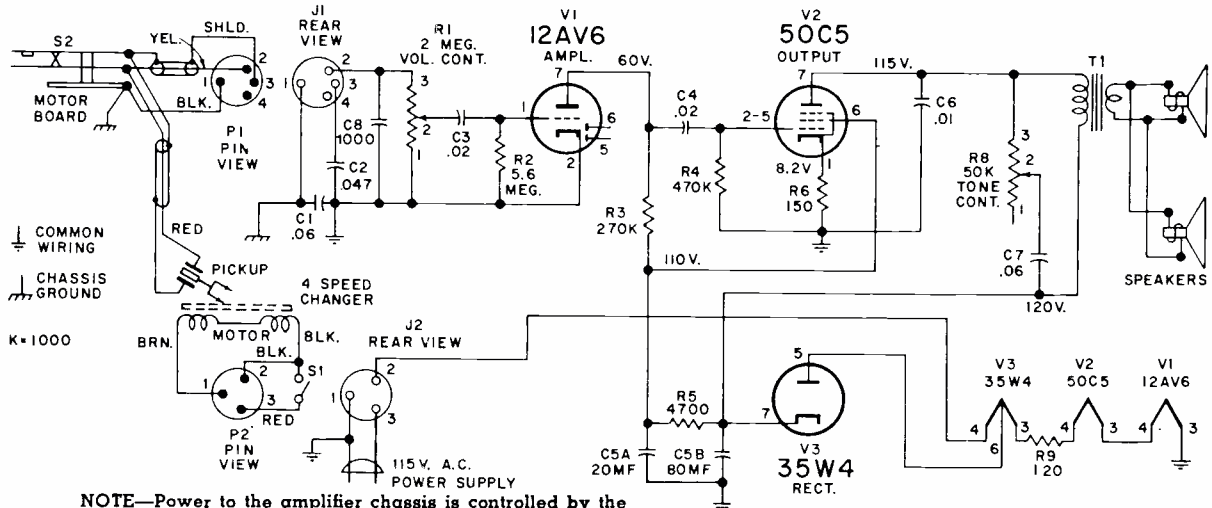
Record Changer Adjustments



RCA VICTOR

MODELS 9-ES-6H, 9-ES-6J

Chassis No. RS-157B
Record Changer RP-205B-4



NOTE—Power to the amplifier chassis is controlled by the power switch on the record changer.

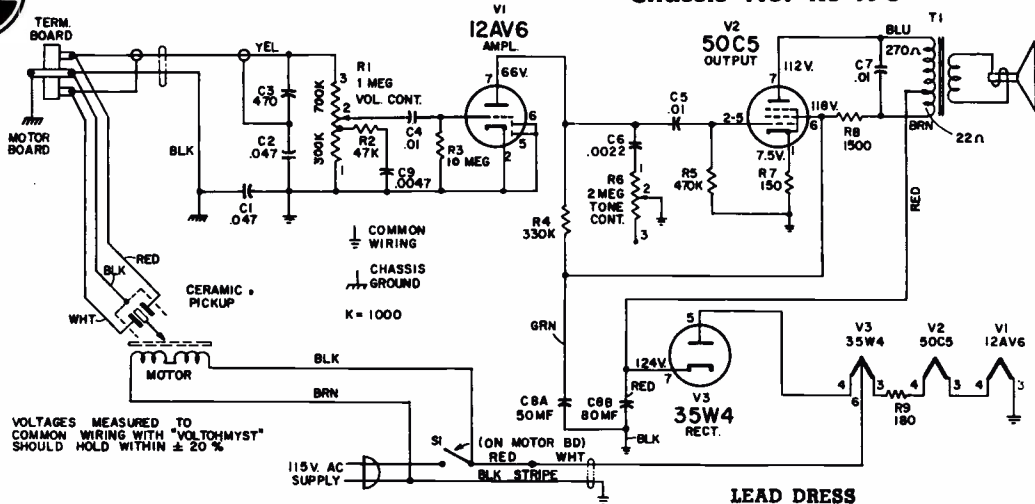
VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN $\pm 20\%$



RCA VICTOR

9-ED-32 Series

Chassis No. RS-170



VOLTAGES MEASURED TO COMMON WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN ± 20 %

LEAD DRESS

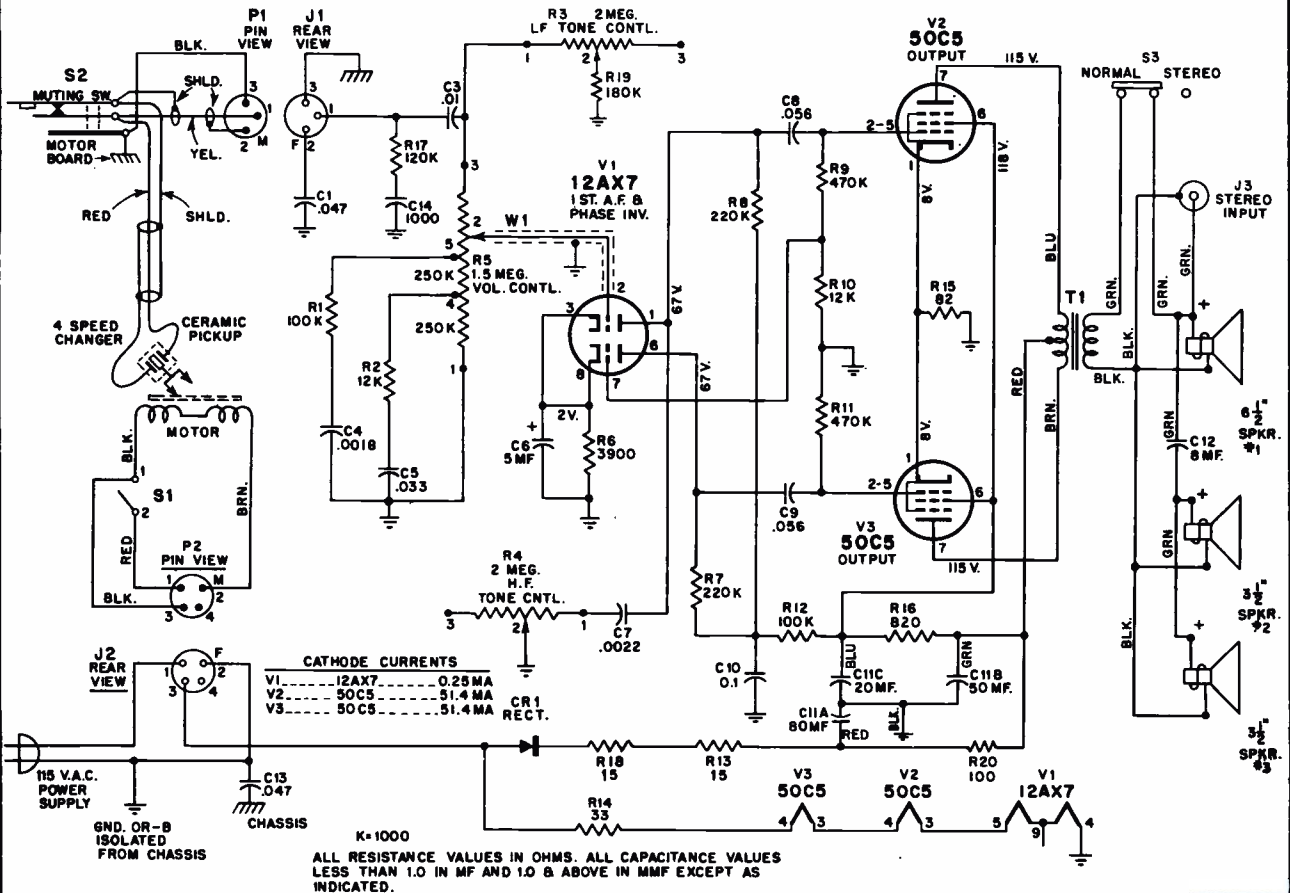
1. Dress R2, R3 and C6 against chassis.
2. Dress all heater and a.c. power leads close to chassis.
3. B- power lead (white with black stripe) should be dressed from knot at entrance to chassis under the lead dress terminal, and then under the electrolytic capacitor and over to its tie point on terminal board.
4. The green electrolytic capacitor lead and the blue output transformer lead should be dressed well into corner of chassis at the V3 tube socket.
5. Dress all components away from R9.

NOTE—Power to the amplifier chassis is controlled by the power switch on the record changer.

RCA VICTOR

MODELS SHF-8, SHF-9

Chassis No. RS-158D, RS-158F



ALL RESISTANCE VALUES IN OHMS. ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF AND 1.0 & ABOVE IN MMF EXCEPT AS INDICATED.

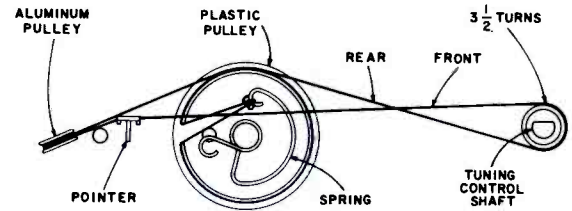
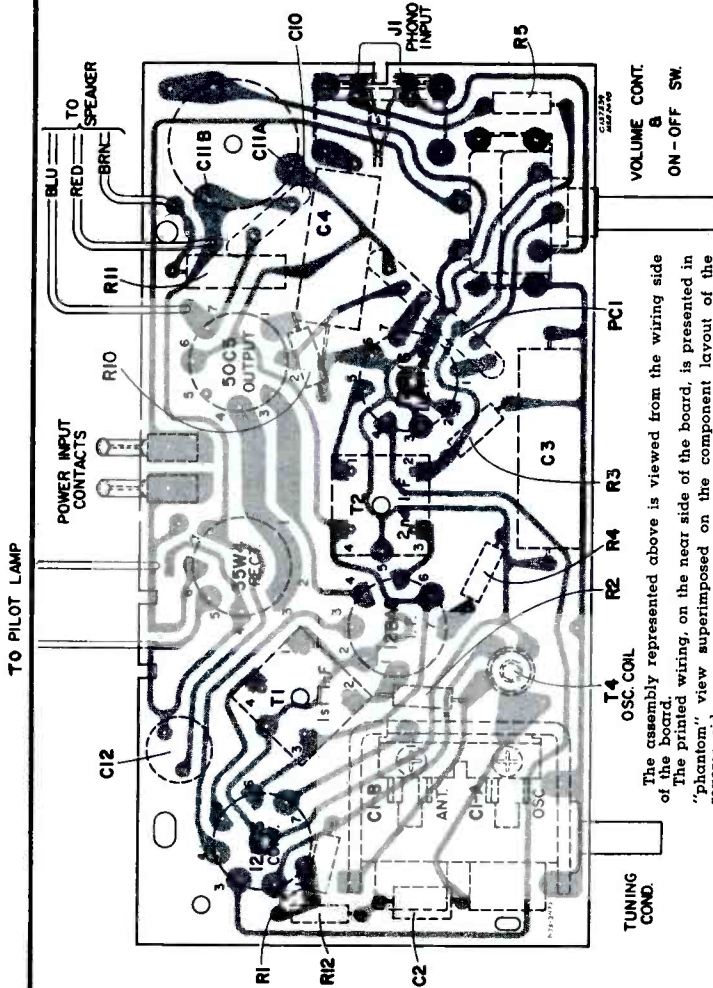
RCA VICTOR

9-C-7, 9-C-8, 9-X-10 SERIES

Chassis No. RC-1166A, No. RC-1166B

REMOVAL OF CHASSIS FROM CRADLE

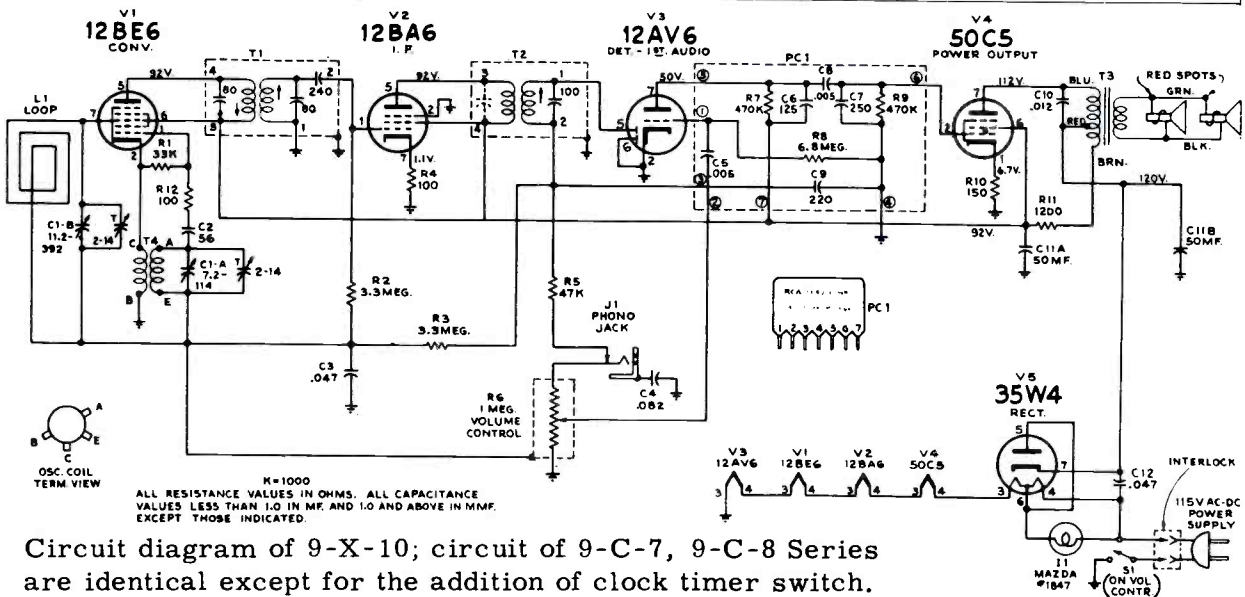
- Remove volume and tuning control knobs.
- Disconnect three speaker leads.
- Remove bottom screw.
- Remove one screw at outside of cradle (close to speaker).
- Swing right end of chassis (as viewed from rear) to the rear of the cradle.
- Disengage chassis from cradle by moving endways.



ASSEMBLY SHOWN WITH TUNING CONDENSER PLATES FULLY MESHED.

ALIGNMENT PROCEDURE

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3	Short wire placed near loop to radiate signal	1,620 kc	Gang fully open	osc. trimmer C1-A
4		1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6	Repeat steps 3, 4, and 5			



Circuit diagram of 9-X-10; circuit of 9-C-7, 9-C-8 Series are identical except for the addition of clock timer switch.



RCA VICTOR

MODELS 9-US-5H, 9-US-5KE

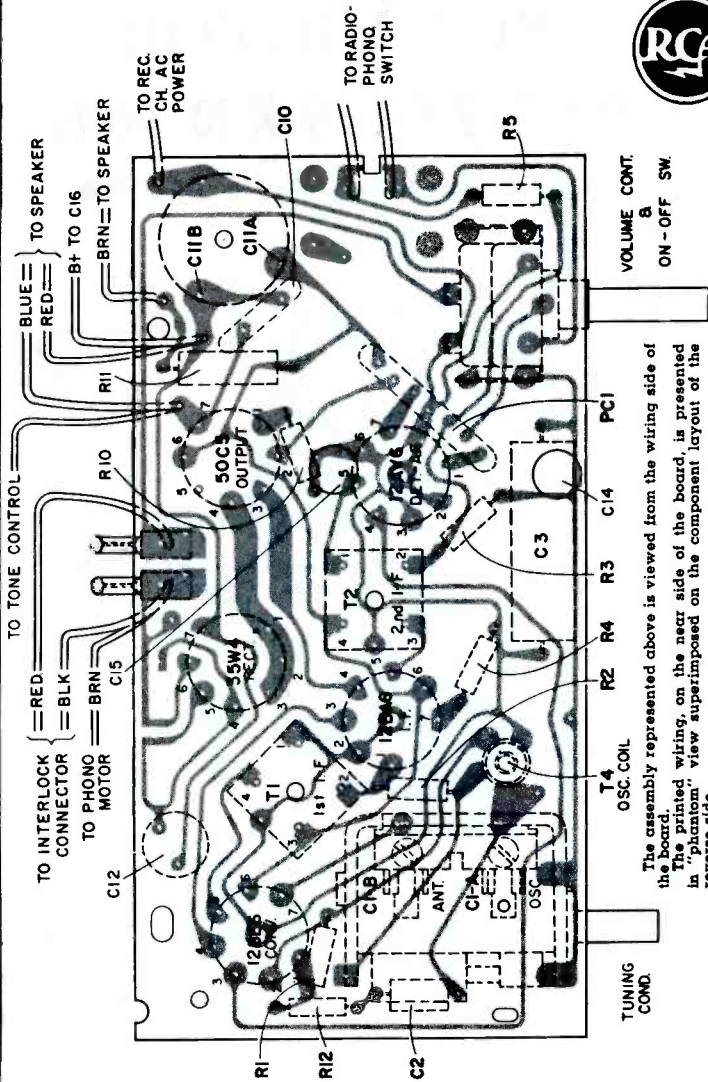
Chassis No. RC-1170A

REMOVAL OF CHASSIS

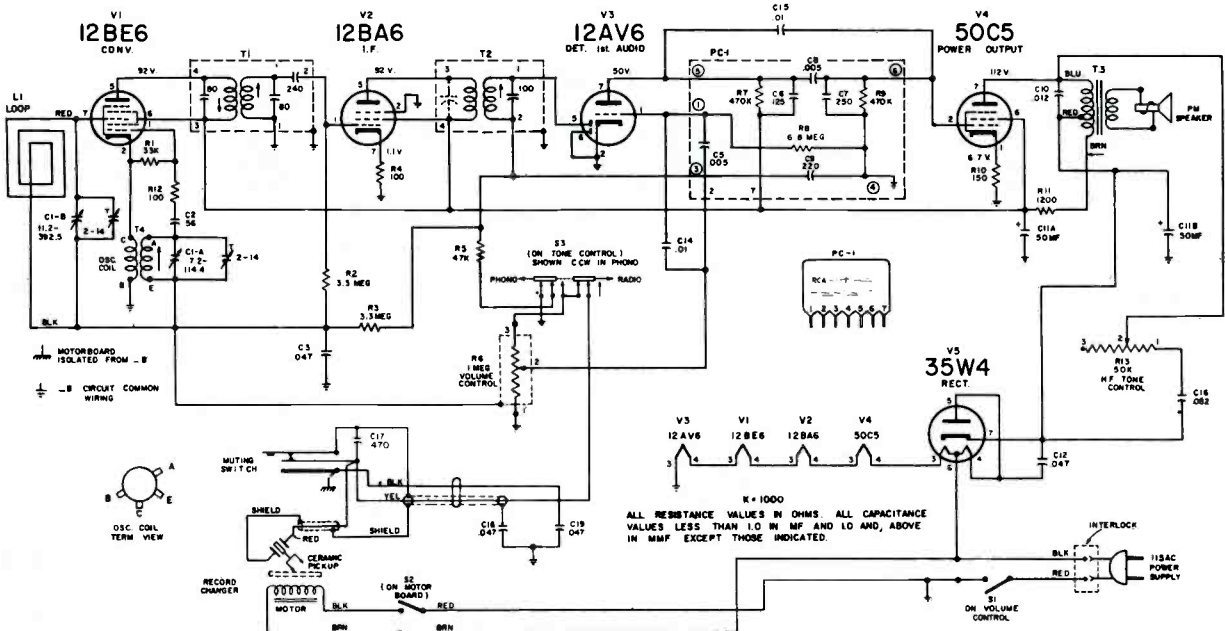
1. Remove two screws at ends of chassis compartment panel.
2. Pull on attachment cord to separate cord from interlock contacts which are attached to the cabinet.
3. Unsolder three speaker leads and two loop antenna leads.
4. Unsolder record changer audio leads (yellow, black and shield).
5. Unsolder two record changer power leads and interlock leads from terminals at rear edge of circuit board.
6. Pull knobs off (volume, tone/switch, tuning).
7. Remove two nuts which hold chassis mounting bracket to front baffle board.
8. Remove two screws at rear edge of circuit board.

Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.		1,400 kc signal	T1 (top and bottom) 1st I-F trans.
3		1,620 kc	Gang fully open	osc. trimmer C1-A
4	Short wire placed near loop to radiate signal	1,400 kc	1,400 kc signal	ant. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6	Repeat steps 3, 4, and 5			

Circuit Board Wiring and Components — View from Wiring Side



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



N = 1000
ALL RESISTANCE VALUES IN OHMS ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF AND 1.0 AND ABOVE IN MMF EXCEPT THOSE INDICATED.



RCA VICTOR

9-XL-1 SERIES

Chassis No. RC-1167A

TO REMOVE BACK COVER

1. Loosen screw at bottom-center of back cover and move slide upward out of slot in cabinet.
2. Tilt outward to free interlock contacts, then drop from top grooves.

Avoid strain on loop connections.

REMOVAL OF CHASSIS

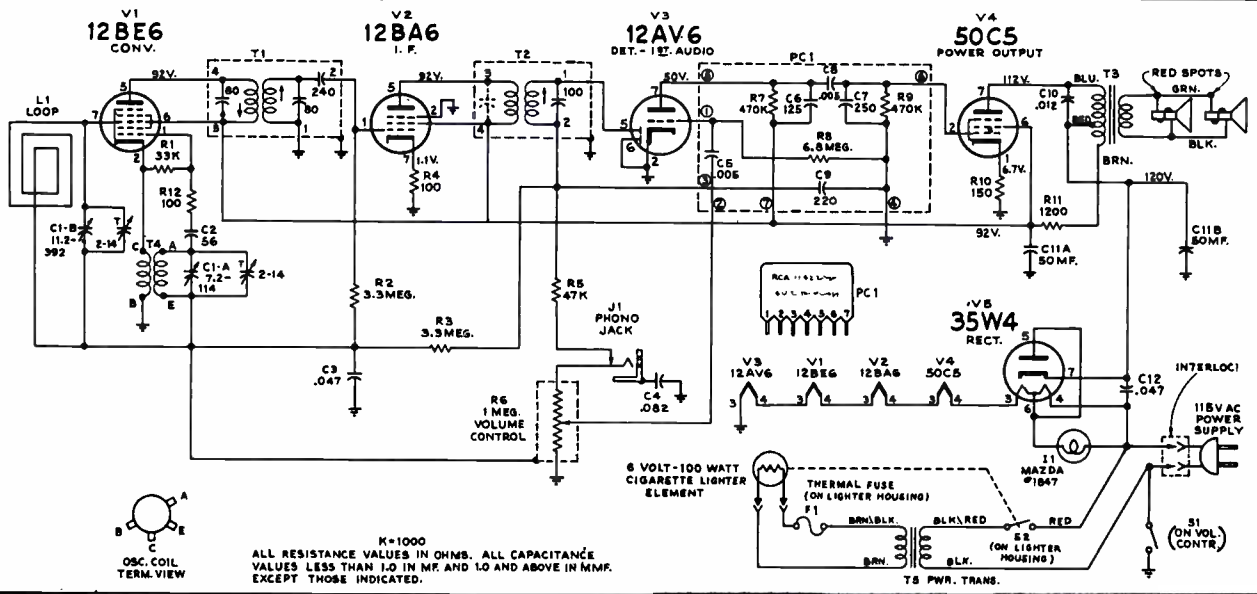
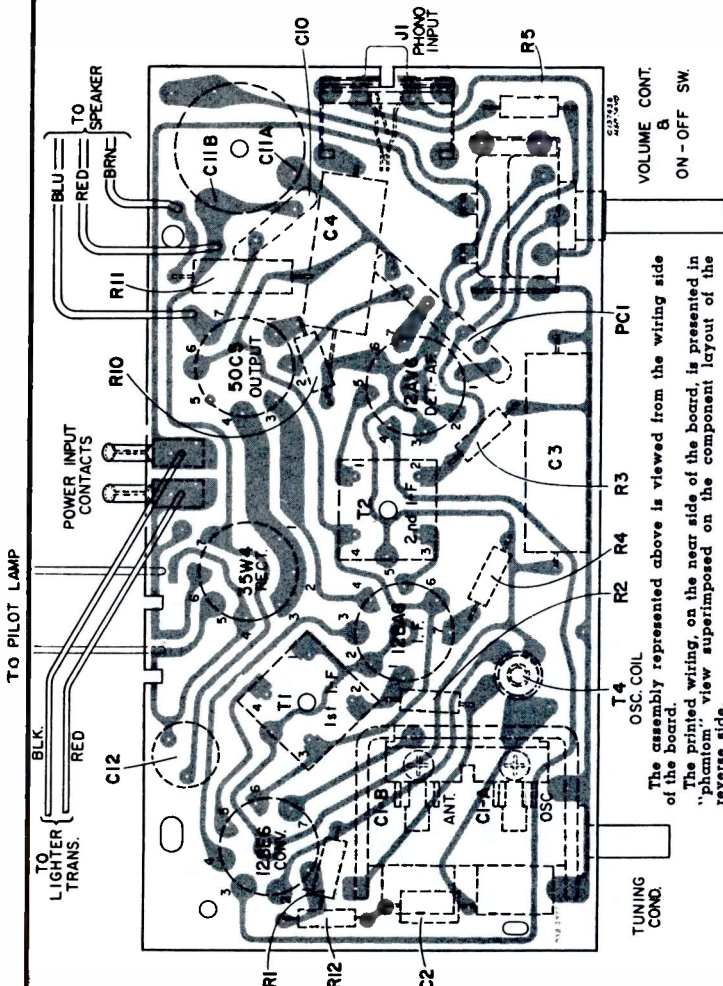
1. Pull off volume control and tuning knobs.
2. Remove back cover.
3. Remove two screws holding dial assembly to cabinet.

LEAD DRESS

1. Leads from the chassis to the speaker should be dressed between the electrolytic capacitor and the left end of the cabinet.

ALIGNMENT PROCEDURE

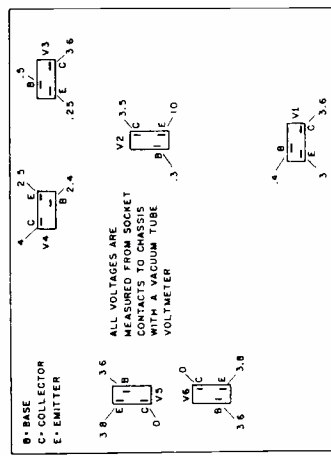
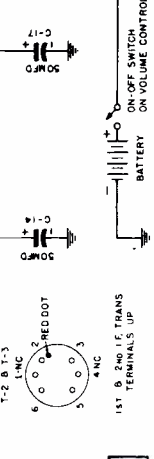
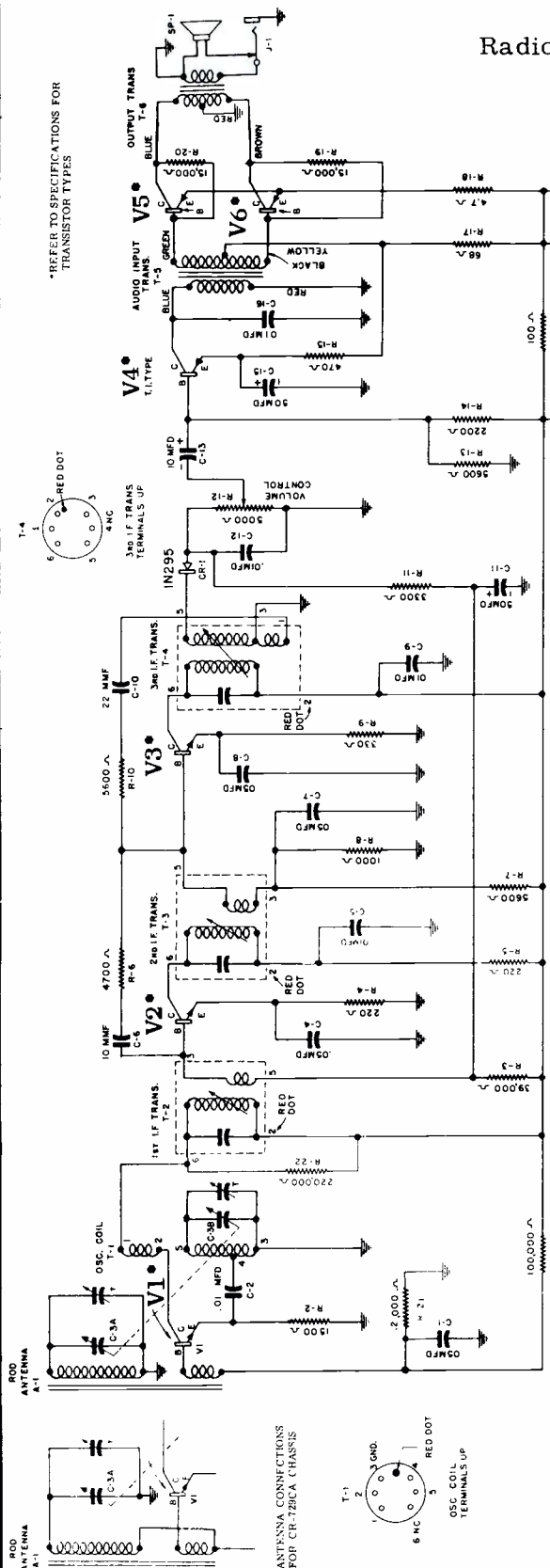
Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3		1,620 kc	Gang fully open	osc. trimmer C1-A
4	Short wire placed near loop to radiate signal	1,400 kc	1,400 kc signal	amt. trimmer C1-B
5		600 kc	600 kc signal	osc. coil T-4 (rock gang)
6	Repeat steps 3, 4, and 5			



K=1000
ALL RESISTANCE VALUES IN OHMS. ALL CAPACITANCE VALUES LESS THAN 1.0 IN MF. AND 10 AND ABOVE IN MMF. EXCEPT THOSE INDICATED.

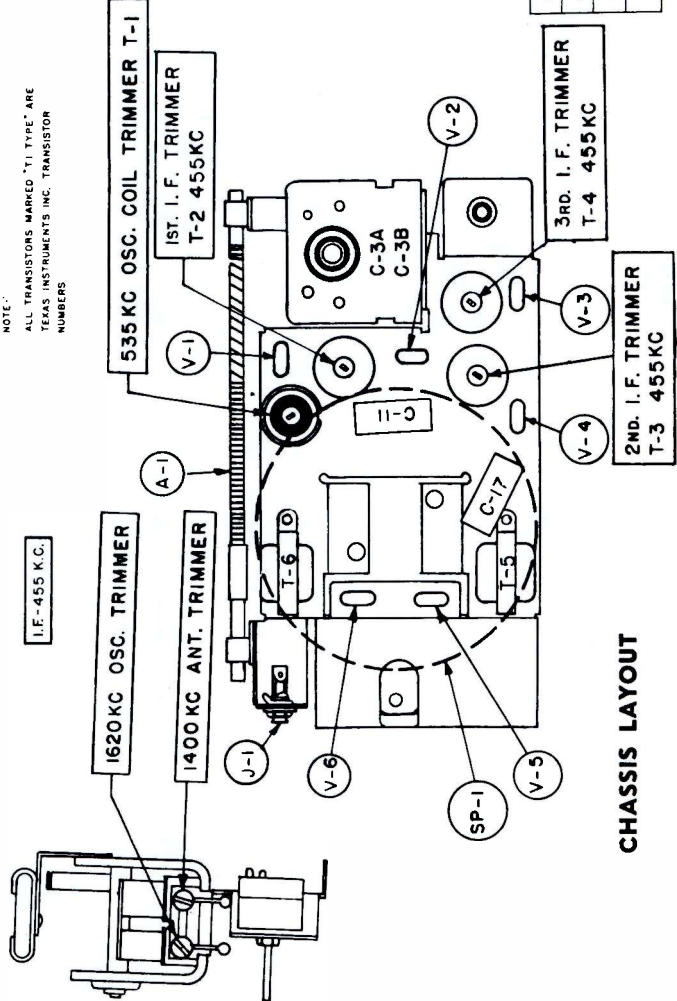
SENTINEL and SPARTAN

Radio Chassis CR-729



VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)

CHASSIS	R-1	R-2	R-5	R-17	R-19	R-20	R-21	R-22	C-1	C-2	C-5	C-10
CR-729AA	100K	1500	220	100	OMIT	OMIT	OMIT	220K	.05	.01	.01	.18
CR-729BA	100K	1500	OMIT*	68	15K	15K	OMIT	OMIT	.05	.01	OMIT	22
CR-729CA	3300	2700	OMIT*	68	15K	15K	12K	OMIT	.01	.005	OMIT	22



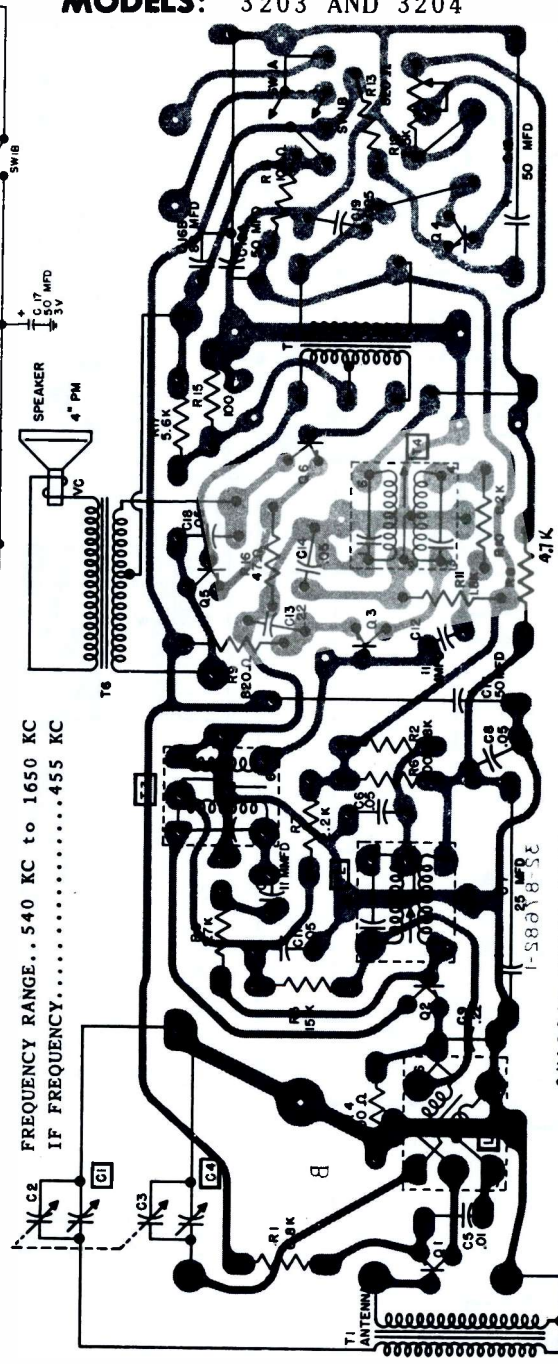
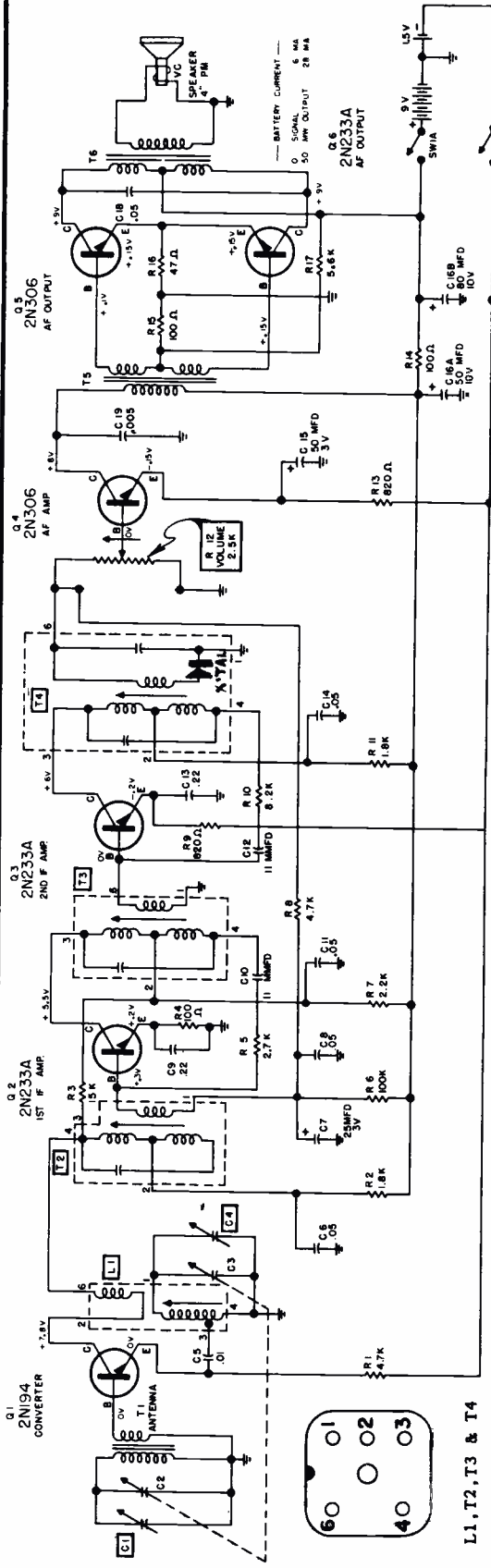
CHASSIS LAYOUT

*Replaced by Buss Wire

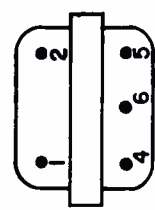
SYLVANIA

CHASSIS: 1-617-1

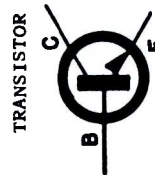
MODELS: 3203 AND 3204



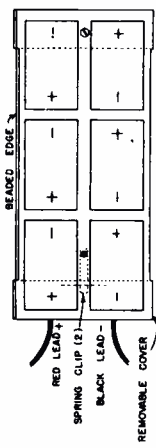
FREQUENCY RANGE... 540 KC to 1650 KC
IF FREQUENCY..... 455 KC



BOTTOM VIEW OF T5



B-BASE
C-COLLECTOR
E-EMITTER

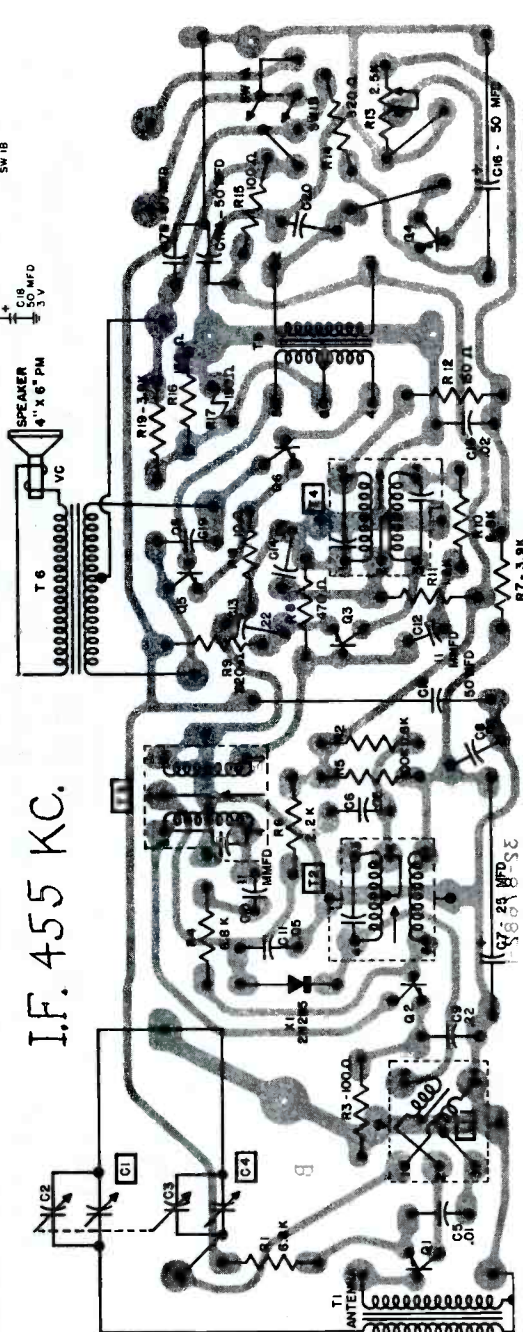
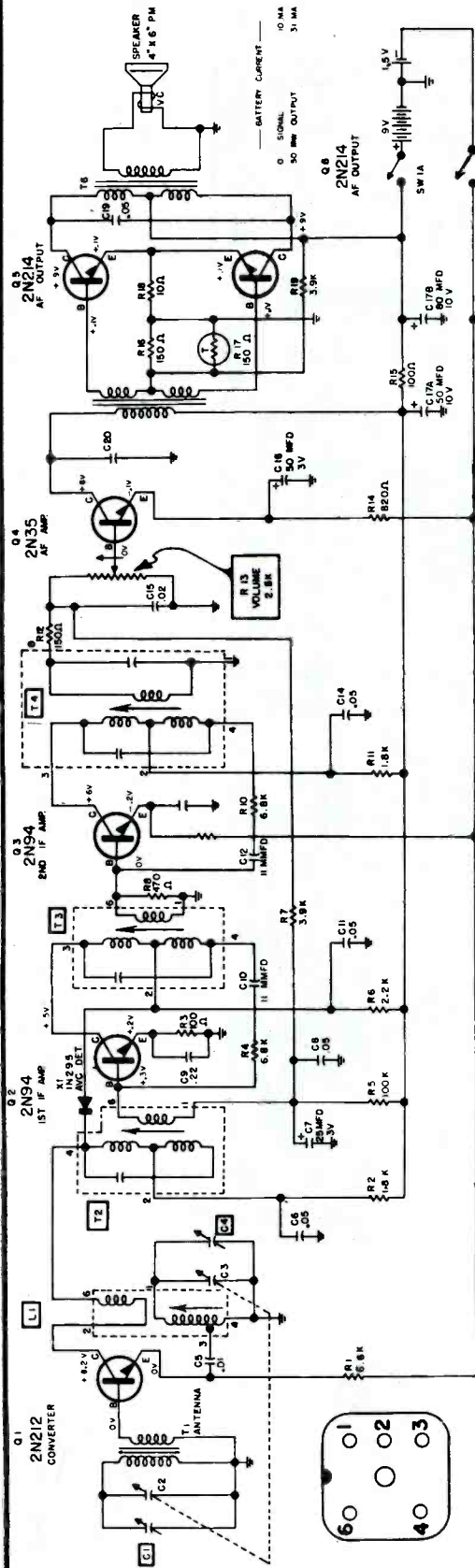


CHASSIS BOARD REMOVAL

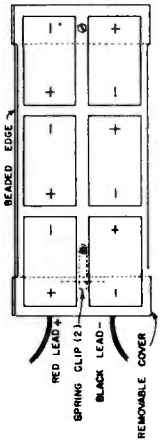
1. Open case by depressing top of front cover near handle ends while pulling top of rear cover backward.
 2. Remove knobs (2) and remove screw (1) behind tuning knob.
 3. Remove screws (2) securing chassis board to mounting brackets. (NOTE: One screw is insulated from chassis by a fiber washer. Replace this washer when installing chassis board.)
- The chassis may now be lifted from case for alignment and maintenance.

SYLVANIA

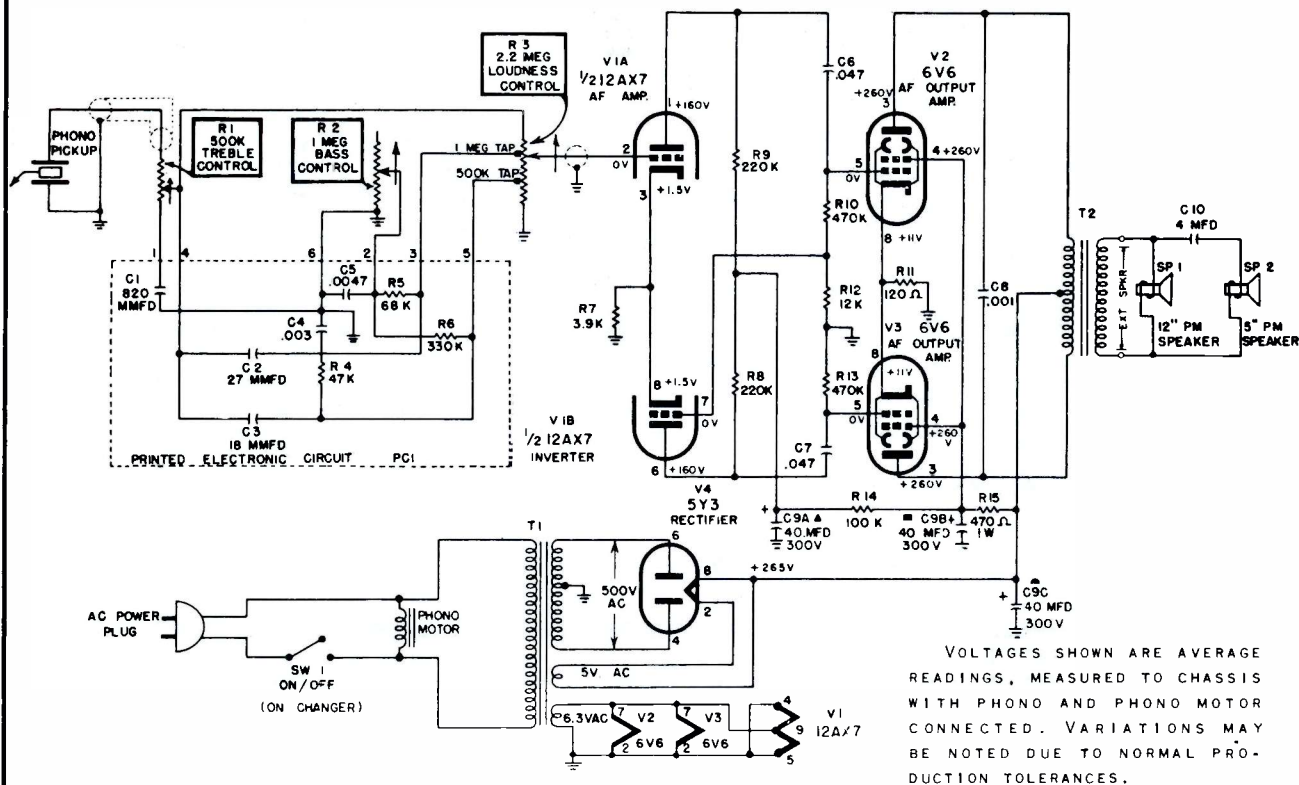
CHASSIS: 1-620-1
MODELS: 3305



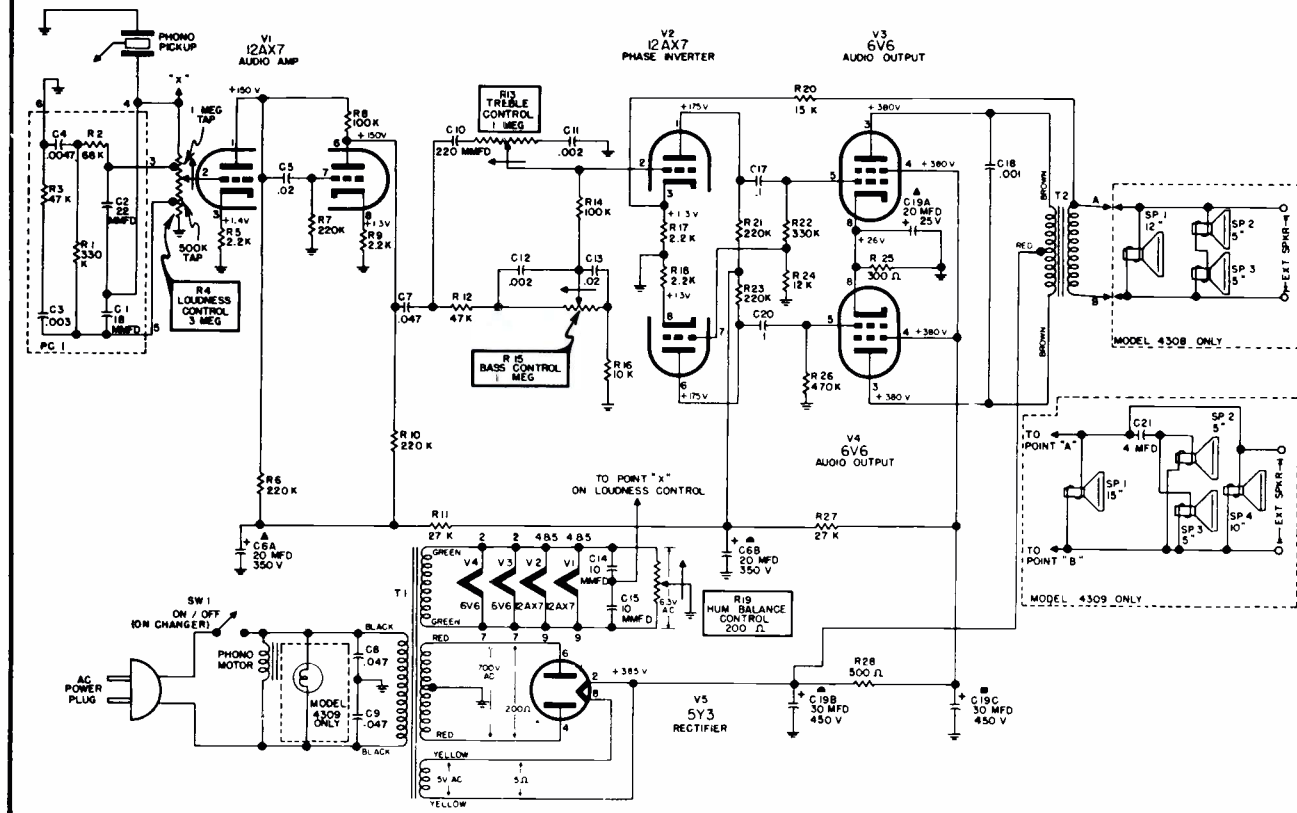
- CHASSIS BOARD REMOVAL**
1. Open case by depressing top of front cover near handle ends while pulling top of rear cover backward.
 2. Remove knobs (2) and remove screw (1) behind tuning knob.
 3. Remove screws (2) securing chassis board to mounting brackets. (NOTE: One screw is insulated from chassis by a fiber washer. Replace this washer when installing chassis board.)
- The chassis may now be lifted from case for alignment and maintenance.



SYLVANIA Amplifier Chassis 1-609-6, Model 4307

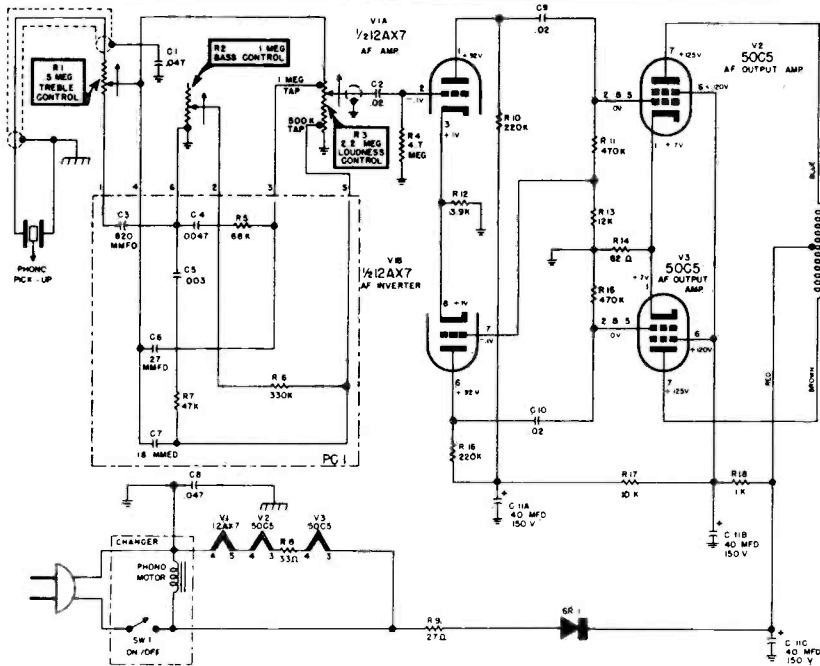


SYLVANIA Amplifier Chassis 1-621-1, 1-621-2, Models 4308, 4309

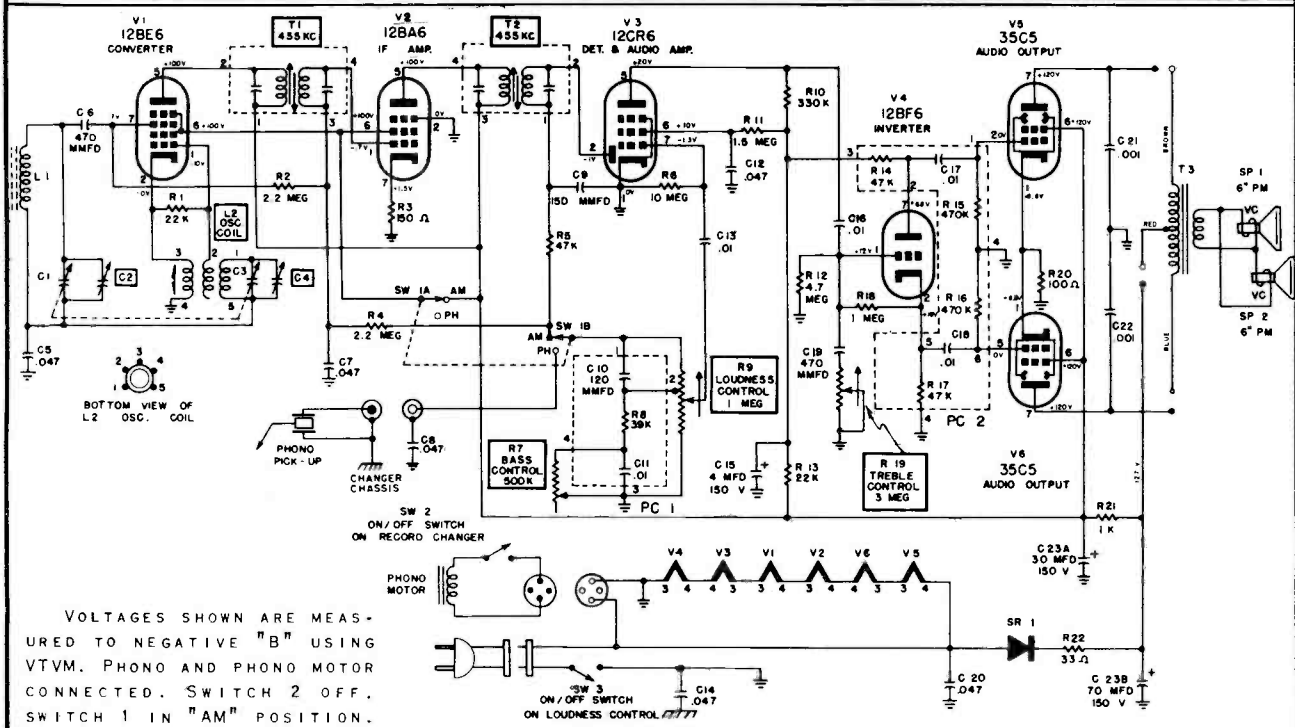


VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

SYLVANIA
Chassis 1-623-1
Model 4406

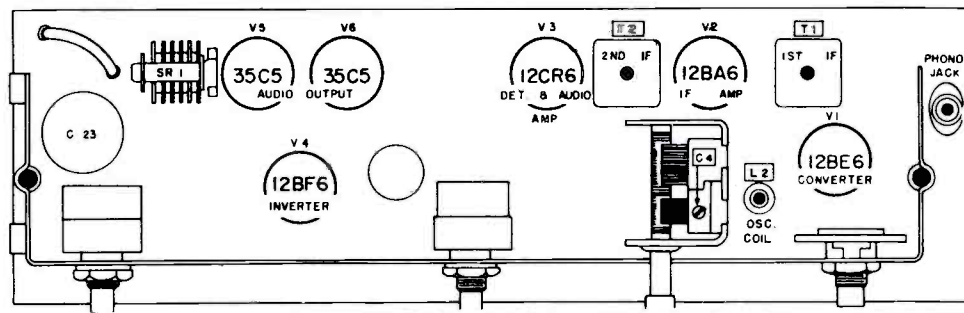


- SCHEMATIC NOTES**
1. VOLTAGES ARE AVERAGE READINGS MEASURED TO NEG. "B" USING VTVM, WITH PHONO AND MOTOR CONNECTED. POWER SOURCE 117V, 60~ "VARIAC" REGULATED. VARIATIONS MAY BE NOTED DUE TO NORMAL PRODUCTION TOLERANCES.
 2. SYMBOL "⊖" DESIGNATES CONNECTION TO NEG. "B". SYMBOL "⏏" DESIGNATES CONNECTION TO CHASSIS METAL.

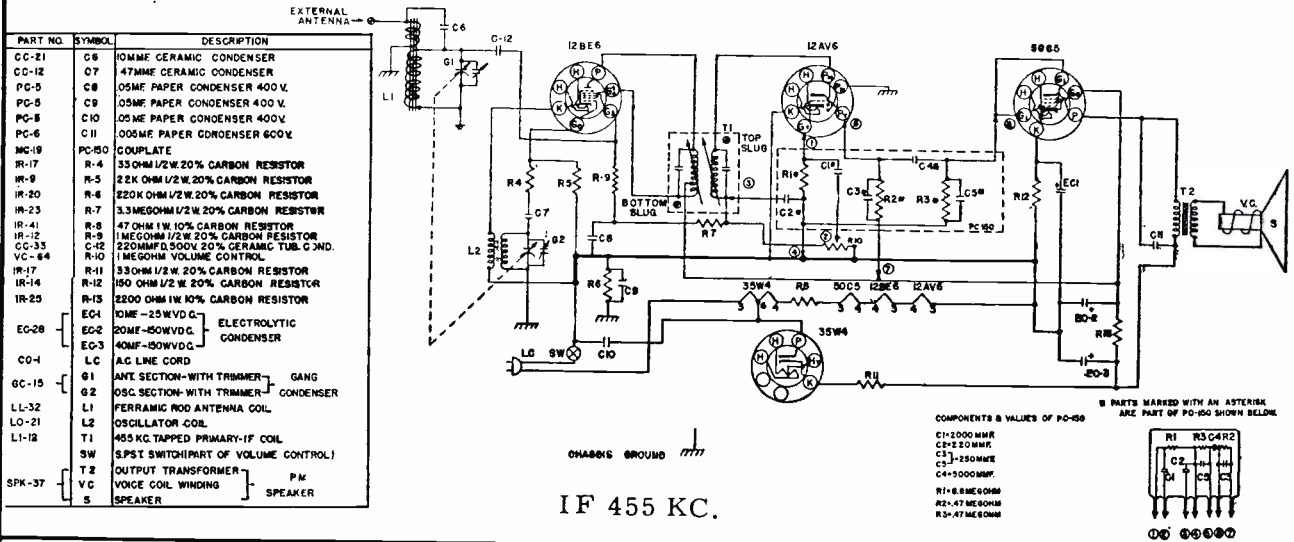


VOLTAGES SHOWN ARE MEASURED TO NEGATIVE "B" USING VTVM. PHONO AND PHONO MOTOR CONNECTED. SWITCH 2 OFF. SWITCH 1 IN "AM" POSITION.

SYLVANIA
Chassis 1-624-1
Model 4501



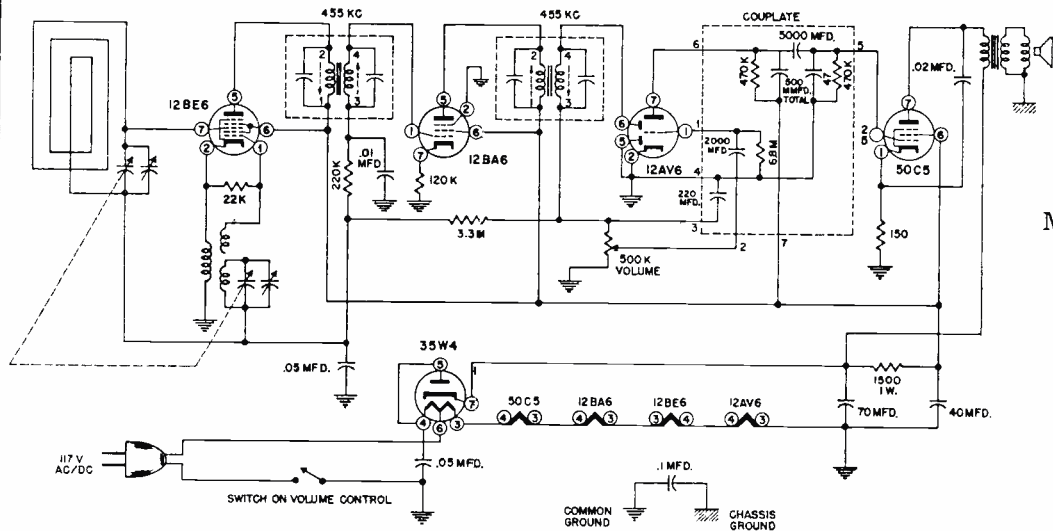
TRAVLER MODEL 46-37



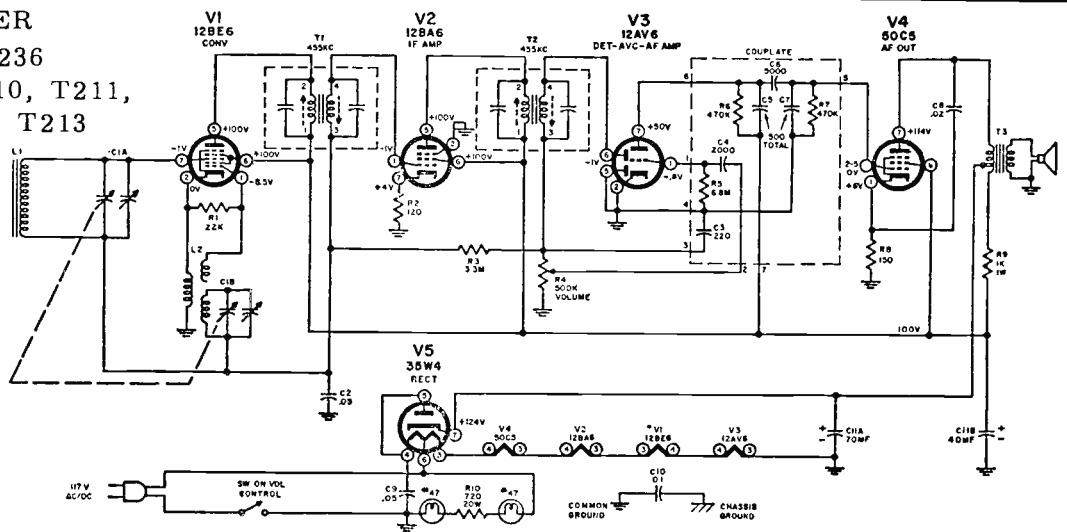
IF 455 KC.

COMPONENTS & VALUES OF PO-50
 C1-2000MMF
 C2-220MMF
 C3-250MMF
 C4-5000MMF
 R1-8.8MEG OHM
 R2-47MEG OHM
 R3-47MEG OHM

TRAV-LER
 Models T200,
 T201, T202,
 T203, T204



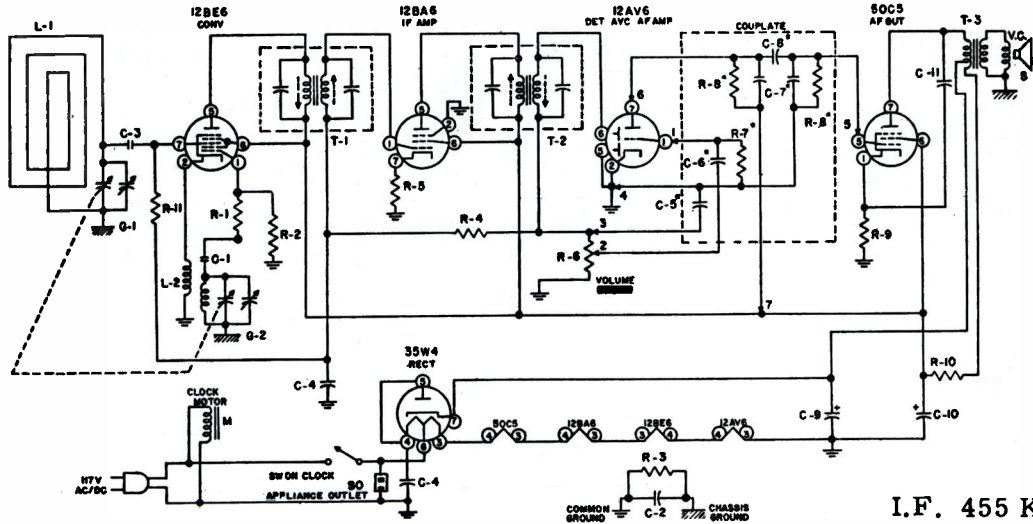
TRAV-LER
 Chassis 236
 Models T210, T211,
 T212 and T213



VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

TRAV-LER RADIO Models 56C220, 56C230, 56C231, 56C232, 56C233

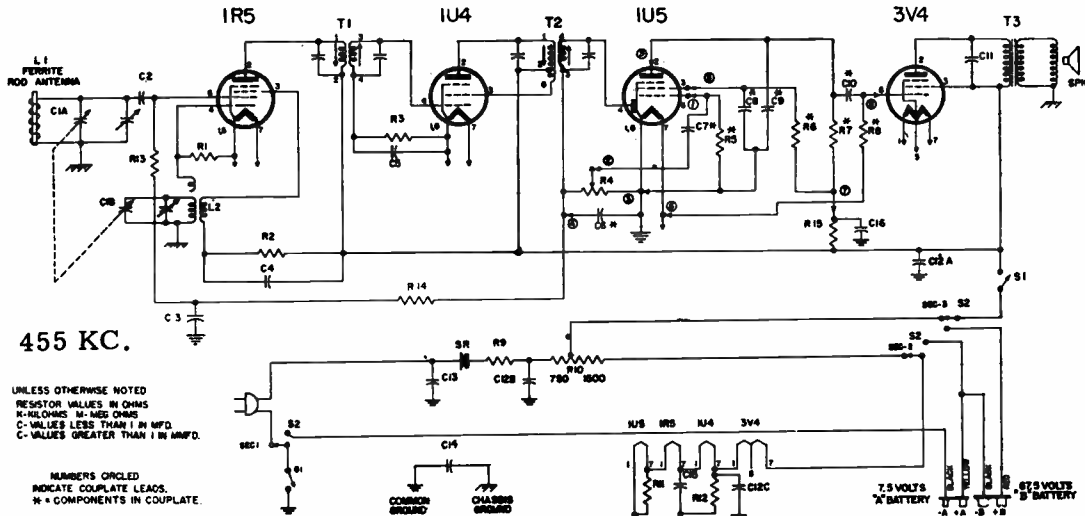
The diagram below is exact for above listed sets. Model 56C240 is very similar but includes pilot light and phono input jack and switch.



I.F. 455 KC.

PART NO.	DESCRIPTION	PART NO.	DESCRIPTION	PART NO.	DESCRIPTION
IR-4	R-1 47Ω. RESISTOR 1/2W. 20%	CC-12	C-1 47 MMFD. CERAMIC CONDENSER	SPK-35	S 4" 6" PM SPEAKER
IR-45	R-2 22MΩ. RESISTOR 1/2W. 10%	PC-8	C-2 .1 MFD. CONDENSER 400 V.	V.C.	V.C. VOICE COIL
IR-20	R-3 220MΩ. RESISTOR 1/2W. 20%	CC-33	C-3 220 MMFD. 500V. 20% GER. COND.	AT-24	T-3 OUTPUT TRANSFORMER
IR-23	R-4 3.3MEG. RESISTOR 1/2W. 20%	PC-5	C-4 .05 MFD. CONDENSER 400 V.	LL-48	L-1 LOOP ANTENNA
IR-105	R-5 20Ω. RESISTOR 1/2W. 10%	MC-19	C-5 220 MMFD.	LO-27	L-2 OSC. COIL
VC-101	R-6 1 MEG. VOLUME CONTROL	MC-19	C-6 250 MMFD.	SO-54	SO APPLIANCE OUTLET SOCKET
MC-19	R-7 8.8 MEG.	MC-19	C-7 .005 MFD.	CK-7	M SW ELECTRIC CLOCK
	R-8 470MΩ.	EC-68	C-9 70 MFD. 150W.V.D.G. ELECTROLYTIC		
IR-89	R-9 180Ω. RESISTOR 1/2W. 10%	PC-47	C-10 40 MFD.		
IR-42	R-10 100Ω. RESISTOR 1W. 10%	GC-24	C-11 .02 MFD. CONDENSER 400 V.		
IR-12	R-11 1MEG. RESISTOR 1/2W. 20%				
LI-19	T-1 INPUT L.F. TRANSFORMER				
	T-2 OUTPUT L.F. TRANSFORMER				

TRAV-LER RADIO MODEL 5220



I.F. 455 KC.

UNLESS OTHERWISE NOTED
RESISTOR VALUES IN OHMS
R-HOLDINGS IN MEG OHMS
C-VALUES LESS THAN 1 IN MFD.
C-VALUES GREATER THAN 1 IN MMFD.

NUMBERS CIRCLED
INDICATE COUPLATE LEADS.
* = COMPONENTS IN COUPLATE.

PART NO.	SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION	PART NO.	SYMBOL	DESCRIPTION
CC-21	C1A	TUNING CAPACITOR	PC-8	C1B	1MFD. PAPER CONDENSER 400 V.	LL-18	T1	L.F. IF COIL
CC-87	C2	280 MMFD. CERAMIC CONDENSER 500V.	IR-43	R1	100Ω. 1/2W. 10% CARBON RESISTOR	LL-19	T2	L.F. IF COIL
PC-2	C3	.047 MFD. PAPER CONDENSER 500V.	IR-48	R2	47KΩ. 1/2W. 10%	AT-21	T3	OUTPUT TRANSFORMER
CC-38	C4	20 MFD. CERAMIC CONDENSER 500V.	IR-10	R3	50 MEGOHM 1/2W. 10% CARBON RESISTOR	SW-33	SS	SWITCH ON VOLUME CONTROL, D.P.S.T.
CC-37	C5	200 MFD. CERAMIC CONDENSER 500V.	VC-19	R4	2MΩ OHM VOLUME CONTROL	SB-2	SS	POWER CHANGEOVER 3 POLE 3 POSITION
MC-6	C6	150 MMFD.	IR-9	R5	10 MEGOHM	SPK-35	SPK	4" 6" SPEAKER
MC-19	C7	200 MFD.	MC-19	R6	RESISTORS IN COUPLATE			
MC-19	C8	20 MFD.	WR-30	R7	3.3 MEGOHM			
MC-6	C9	150 MMFD.	WR-29	R8	75 OHM 2 WATT FLEXIBLE WIREWOUND RESISTOR			
CC-88	C10	100 MFD. CERAMIC CONDENSER 500V.	IR-148	R9	220 OHMS TAPPED AT 750 OHMS - CARBONS			
EC-84	C11	80 MFD. 150V. ELECTROLYTIC CONDENSER	IR-149	R10	500 OHMS 1/2W. 10% CARBON RESISTOR			
EC-84	C12	100 MFD. 150V. ELECTROLYTIC CONDENSER	IR-105	R11	1 MEGOHM 1/2W. 10% CARBON RESISTOR			
PC-31	C13	.047 MFD. PAPER CONDENSER 500V.	IR-106	R12	3.3 MEGOHMS 1/2W. 10% CARBON RESISTOR			
PC-3	C14	1 MFD. PAPER CONDENSER 400V.	IR-107	R13	200K OHM 1/2W. 10% CARBON RESISTOR			
PC-5	C15	1 MFD.	LL-48	L1	100Ω. 1/2W. 10% CARBON RESISTOR			
			LO-27	L2	OSCILLATION COIL			

Westinghouse

MODELS
H-570T4

(Mocha)

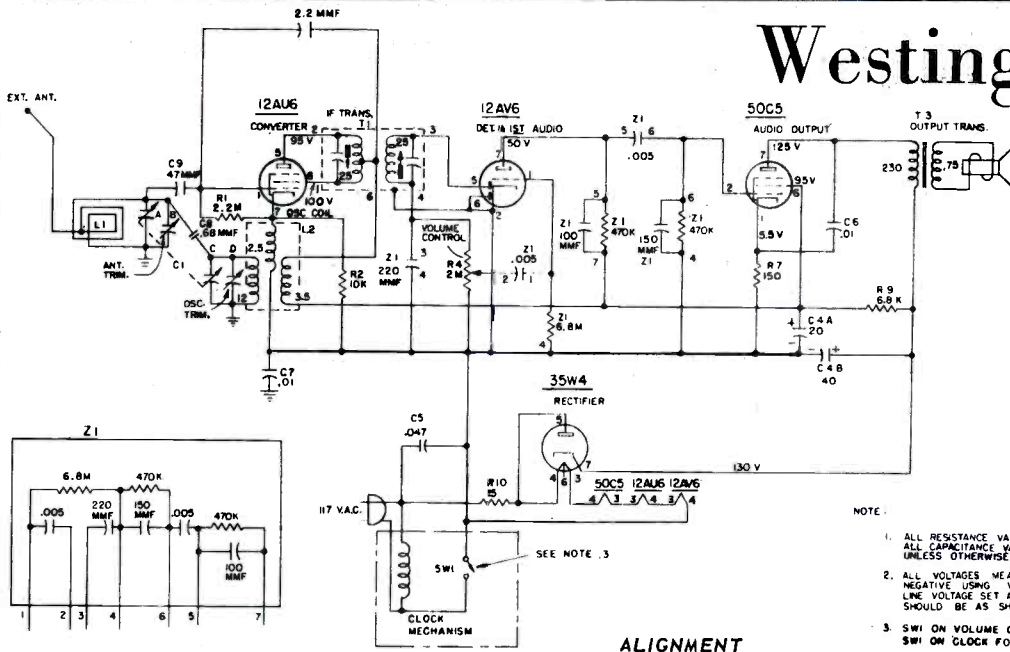
H-571T4

(Ivory)

H-572T4

(Pink)

Chassis V-2239-4

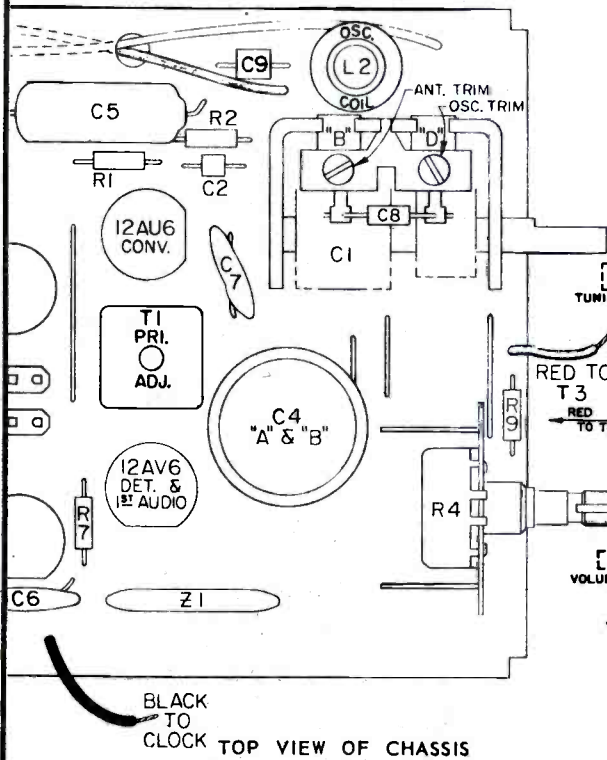


NOTE:

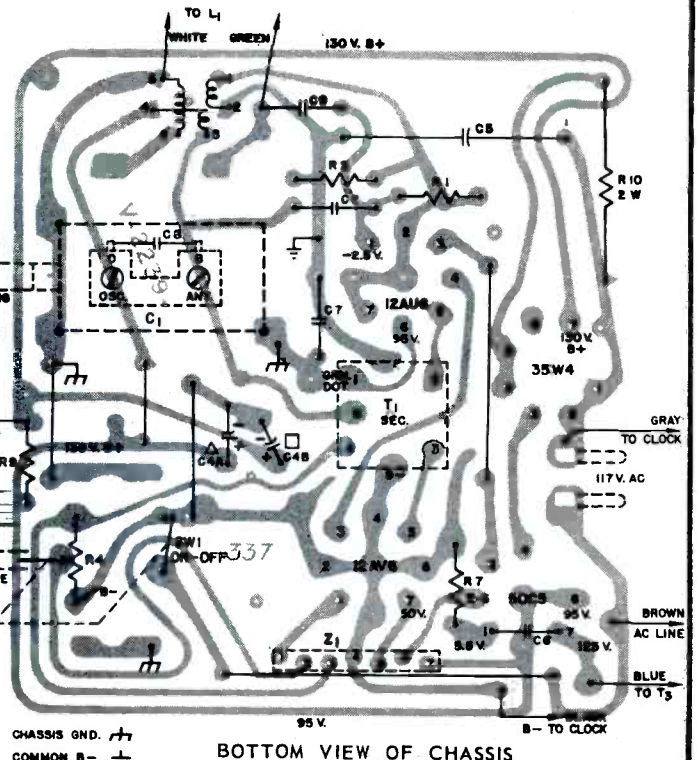
1. ALL RESISTANCE VALUES IN OHMS B UNLESS OTHERWISE SPECIFIED.
2. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING V.T.V.M. LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN $\pm 20\%$.
3. SW1 ON VOLUME CONTROL FOR V2239-1,3 SW1 ON CLOCK FOR V2239-2,4

ALIGNMENT

Step	Connect Signal Generator to -	Signal Generator Frequency	Radio Dial	Connect V.T.V.M. Across Voice Coil and Adjust for Maximum Output -
1	Stator of ant. tuning capacitor (A) through a 200 mmf capacitor	455 kc.	minimum capacity	Top and bottom slugs of T1
2	Radiated signal	1625 kc.	minimum capacity	Oscillator trimmer (D)
3	Radiated signal	1400 kc.	1400 kc.	Antenna trimmer (B)



BLACK TO CLOCK TOP VIEW OF CHASSIS

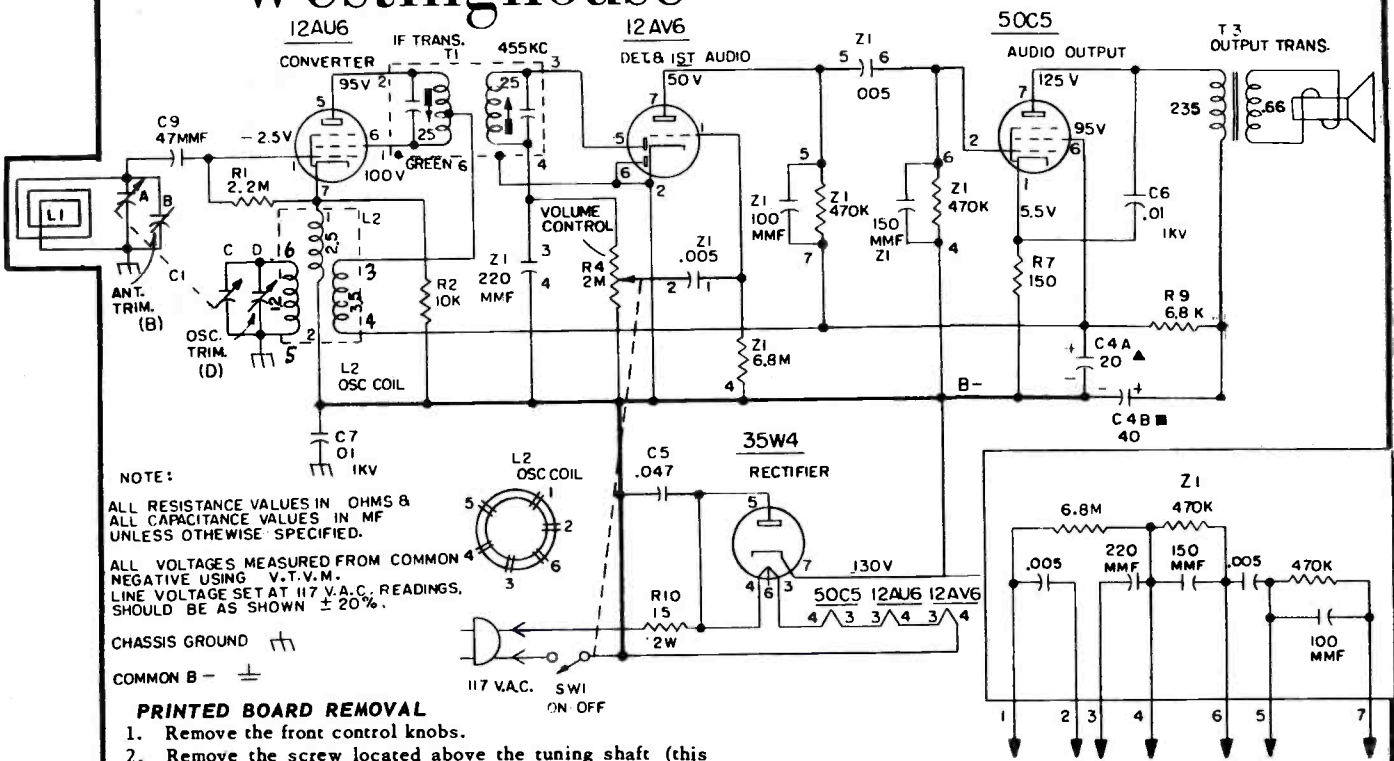


CHASSIS GND. COMMON B-

BOTTOM VIEW OF CHASSIS

Westinghouse

MODEL H-648T4, CHASSIS V-2239-5

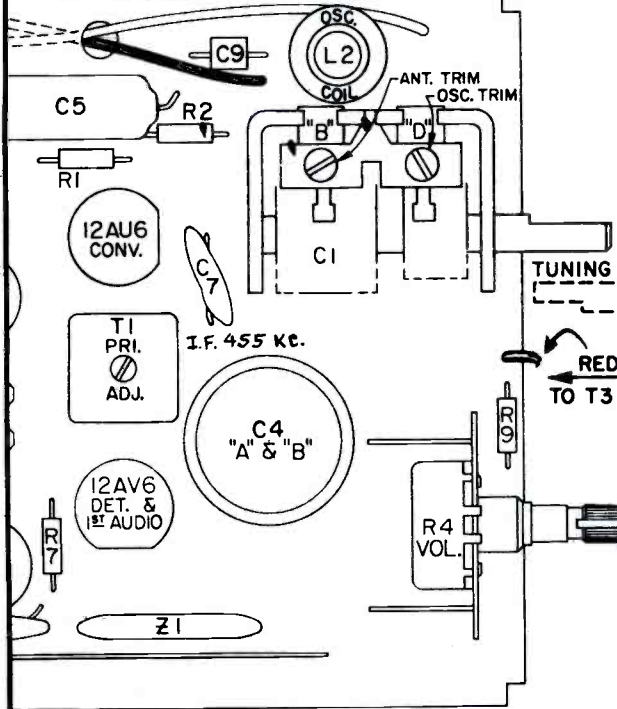


NOTE:
 ALL RESISTANCE VALUES IN OHMS &
 ALL CAPACITANCE VALUES IN MF
 UNLESS OTHERWISE SPECIFIED.
 ALL VOLTAGES MEASURED FROM COMMON
 NEGATIVE USING V.T.V.M.
 LINE VOLTAGE SET AT 117 V.A.C. READINGS
 SHOULD BE AS SHOWN ± 20%.
 CHASSIS GROUND
 COMMON B -

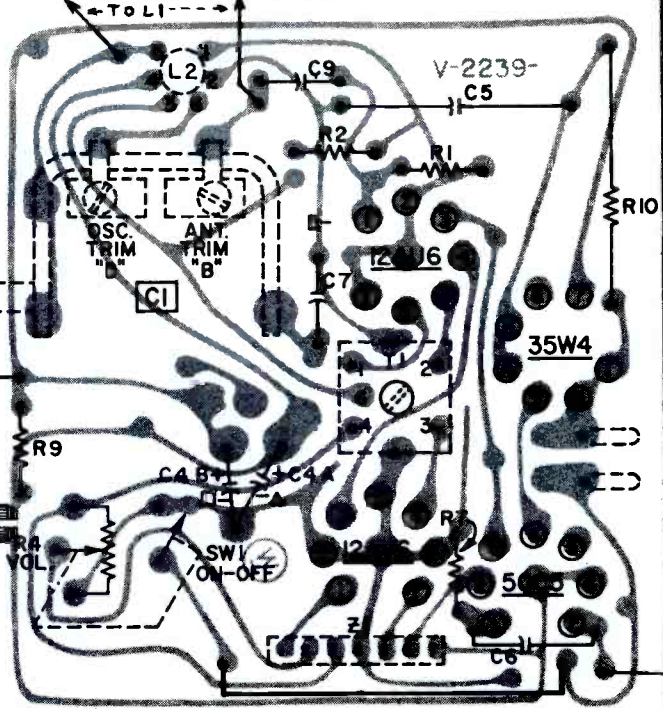
PRINTED BOARD REMOVAL

1. Remove the front control knobs.
2. Remove the screw located above the tuning shaft (this screw mounts the printed circuit board to the front of the cabinet).
3. Remove the two self-tapping screws from the back of the cabinet.
4. Remove the back cover. Be careful not to break the two leads from the antenna loop to the chassis.
5. Loosen the metal band securing the speaker leads to

6. Carefully slide the printed board out from the rear of the cabinet (the printed board is held secure in the cabinet by a top and bottom channel molded into the cabinet).
7. Use a conventional TV AC interlock line cord to power the radio while servicing.



TOP VIEW OF CHASSIS



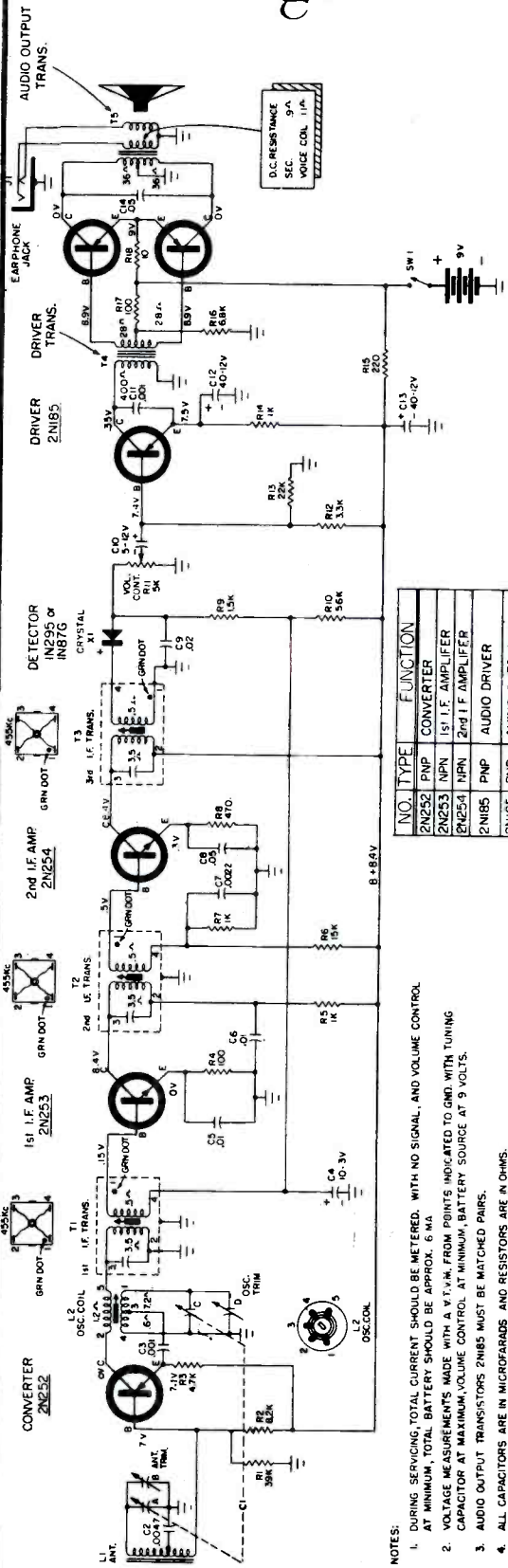
BOTTOM VIEW OF CHASSIS

Westinghouse

Chassis V-2278-4 used in Models H-651P6, H-652P6, H-653P6

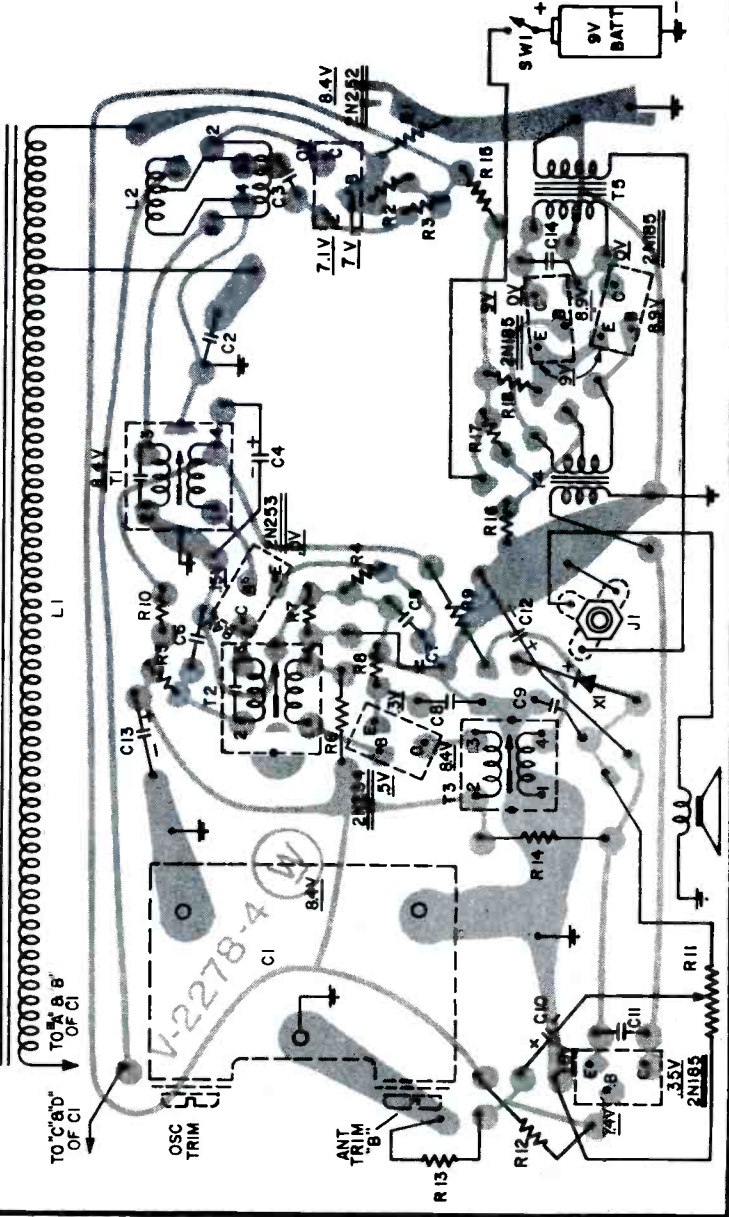
BOARD REMOVAL

1. Remove the screw located in center of the tuning knob. Turn the dial to the low 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 1/4" 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 towards the speaker bracket 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.



NO.	TYPE	FUNCTION
2N252	PNP	CONVERTER
2N253	NPN	1st I.F. AMPLIFIER
2N254	NPN	2nd I.F. AMPLIFIER
2N185	PNP	AUDIO DRIVER
2N185	PNP	AUDIO OUTPUT

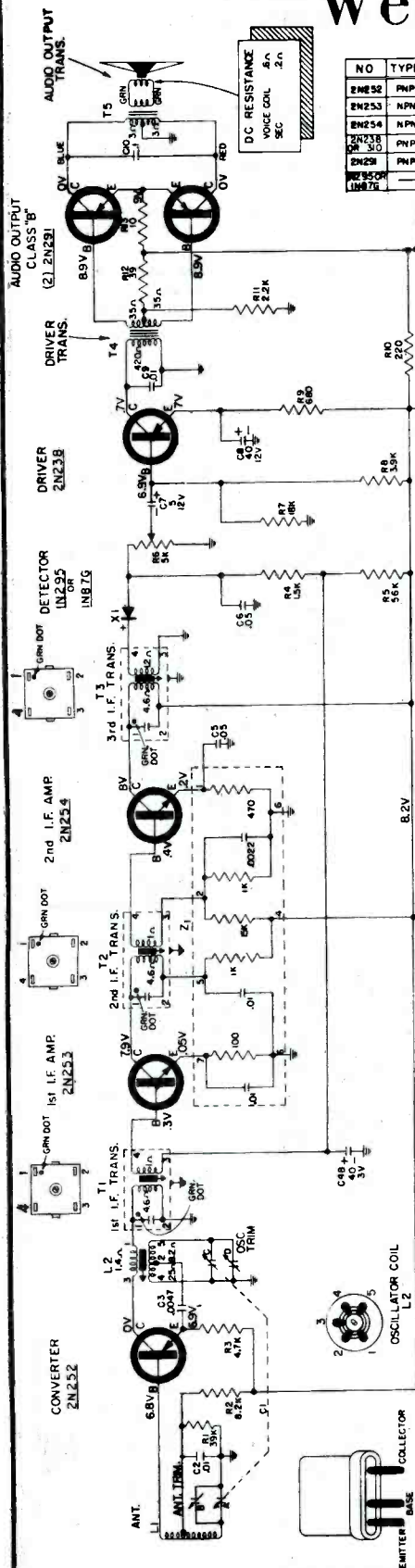
- NOTES:
1. DURING SERVICING, TOTAL CURRENT SHOULD BE MEASURED. WITH NO SIGNAL, AND VOLUME CONTROL AT MINIMUM, TOTAL BATTERY SHOULD BE APPROX. 6 MA.
 2. VOLTAGE MEASUREMENTS MADE WITH A V.T.V.M. FROM POINTS INDICATED TO GND. WITH TUNING CAPACITOR AT MAXIMUM, VOLUME CONTROL AT MINIMUM, BATTERY SOURCE AT 9 VOLTS.
 3. AUDIO OUTPUT TRANSISTORS 2N185 MUST BE MATCHED PAIRS.
 4. ALL CAPACITORS ARE IN MICROFARADS AND RESISTORS ARE IN OHMS.



BOTTOM VIEW OF PRINTED CIRCUIT BOARD SHOWING COMPONENTS SYMBOLICALLY

Westinghouse

Models H-621P6, H-622P6,
Chassis V-2296-1



NO	TYPE	FUNCTION
2N252	PNP	CONVERTER
2N253	NPN	I.F. AMPLIFIER
2N254	NPN	I.F. AMPLIFIER
2N238	PNP	AUDIO DRIVER
2N23B	PNP	AUDIO OUTPUT
IN295	—	DETECTOR

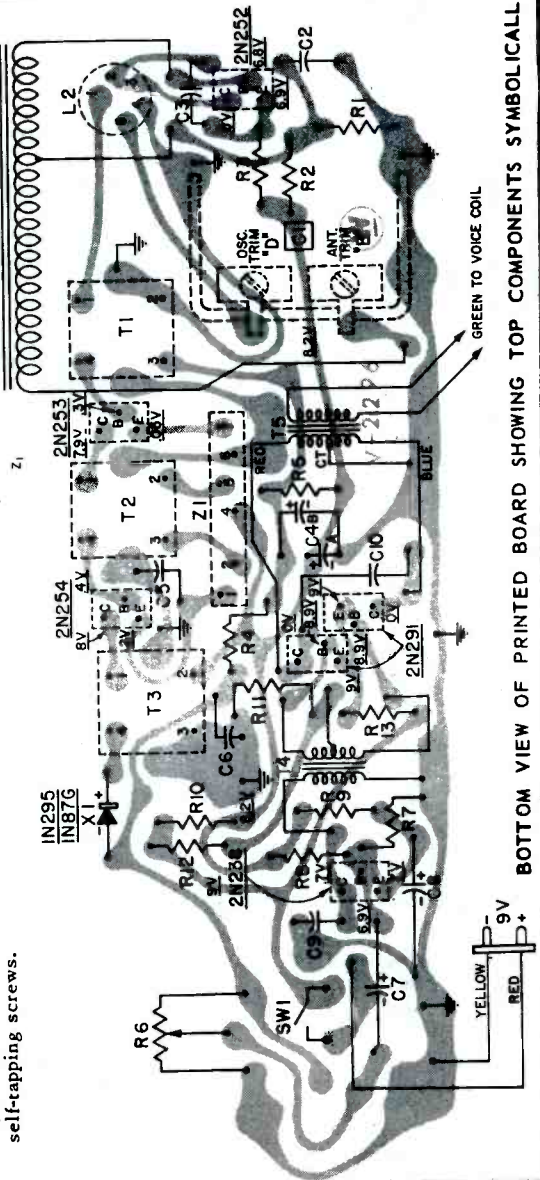
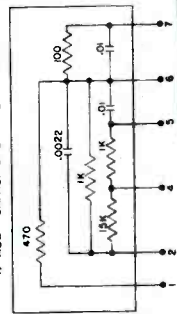
IF ALIGNMENT REQUIREMENTS

Loosely couple signal modulated from the generator to:	Generator Frequency	Connect VTVM or output meter across the voice coil and adjust:
Loop L1	455 KC	T3, T2, and T1 in order indicated for max. output (Reduce generator output if necessary for T2 and T1 adjustments.)*

RF ALIGNMENT REQUIREMENTS

Loosely couple modulated signal, from generator to:	Generator Frequency	C1 Setting	Connect VTVM or output meter across voice coil and adjust for max. output
Loop L1	1625 KC	Min.	Oscillator Trim "D"
" "	1400 KC	1400 KC	Antenna Trim "B"

NOTES:
1. DURING SERVICING TOTAL BATTERY CURRENT SHOULD BE METERED. VOLUME CONTROL AT MINIMUM. BATTERY DRAIN SHOULD BE APPROX. 10 M.A.
2. VOLTAGE MEASUREMENTS MADE WITH A V.T.V.M. FROM POINTS INDICATED TO GND. WITH BATTERY SOURCE AT 9 VOLTS.
3. AUDIO OUTPUT TRANSISTORS 2N291 MUST BE MATCHED PAIRS.
4. ALL CAPACITORS ARE IN MICROFARADS AND RESISTORS ARE IN OHMS.



BOTTOM VIEW OF PRINTED BOARD SHOWING TOP COMPONENTS SYMBOLICALLY

BOARD REMOVAL

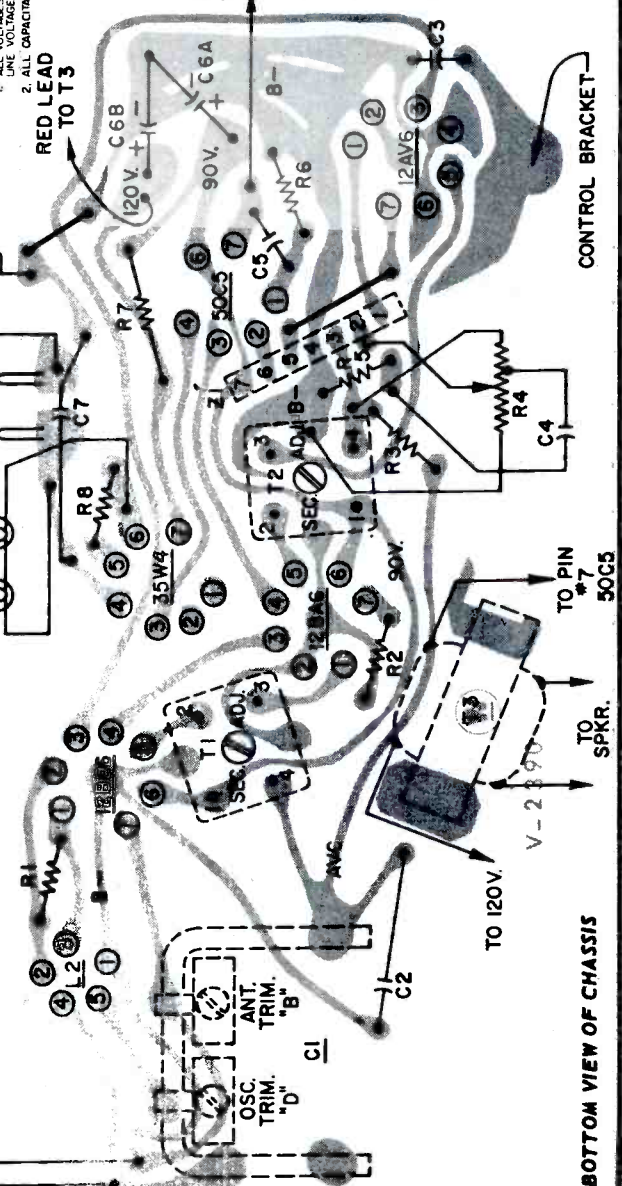
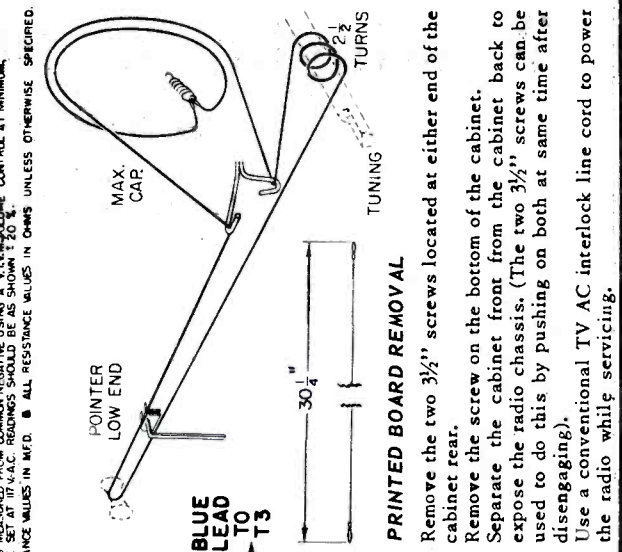
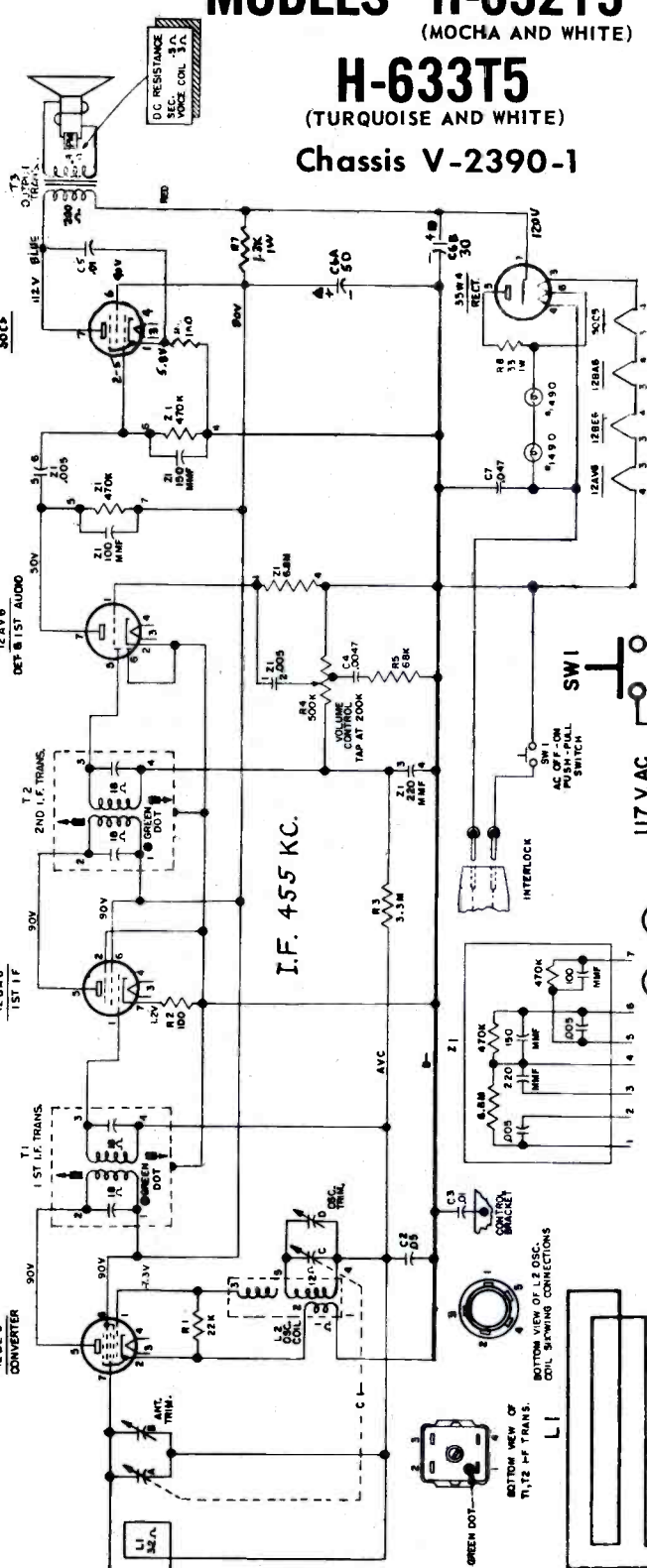
1. Remove the two control knobs.
2. Remove the three self tapping screws which secure the printed board to the interior of the cabinet.
3. Disconnect the two pronged plug from either the receptacle in the top cover or from the battery pack.
4. The radio chassis may now be removed from the cabinet for servicing without unsoldering the speaker leads.
5. When inserting the radio chassis into the cabinet use the reverse procedure, being careful to insert the reinforced side of the printed board into the grooves on the inside front of the cabinet and then secure with self-tapping screws.

Westinghouse

MODELS H-632T5 (MOCHA AND WHITE)

H-633T5 (TURQUOISE AND WHITE)

Chassis V-2390-1



PRINTED BOARD REMOVAL

Remove the two 3/2" screws located at either end of the cabinet rear.

Remove the screw on the bottom of the cabinet.

Separate the cabinet front from the cabinet back to expose the radio chassis. (The two 3/2" screws can be used to do this by pushing on both at same time after disengaging).

Use a conventional TV AC interlock line cord to power the radio while servicing.

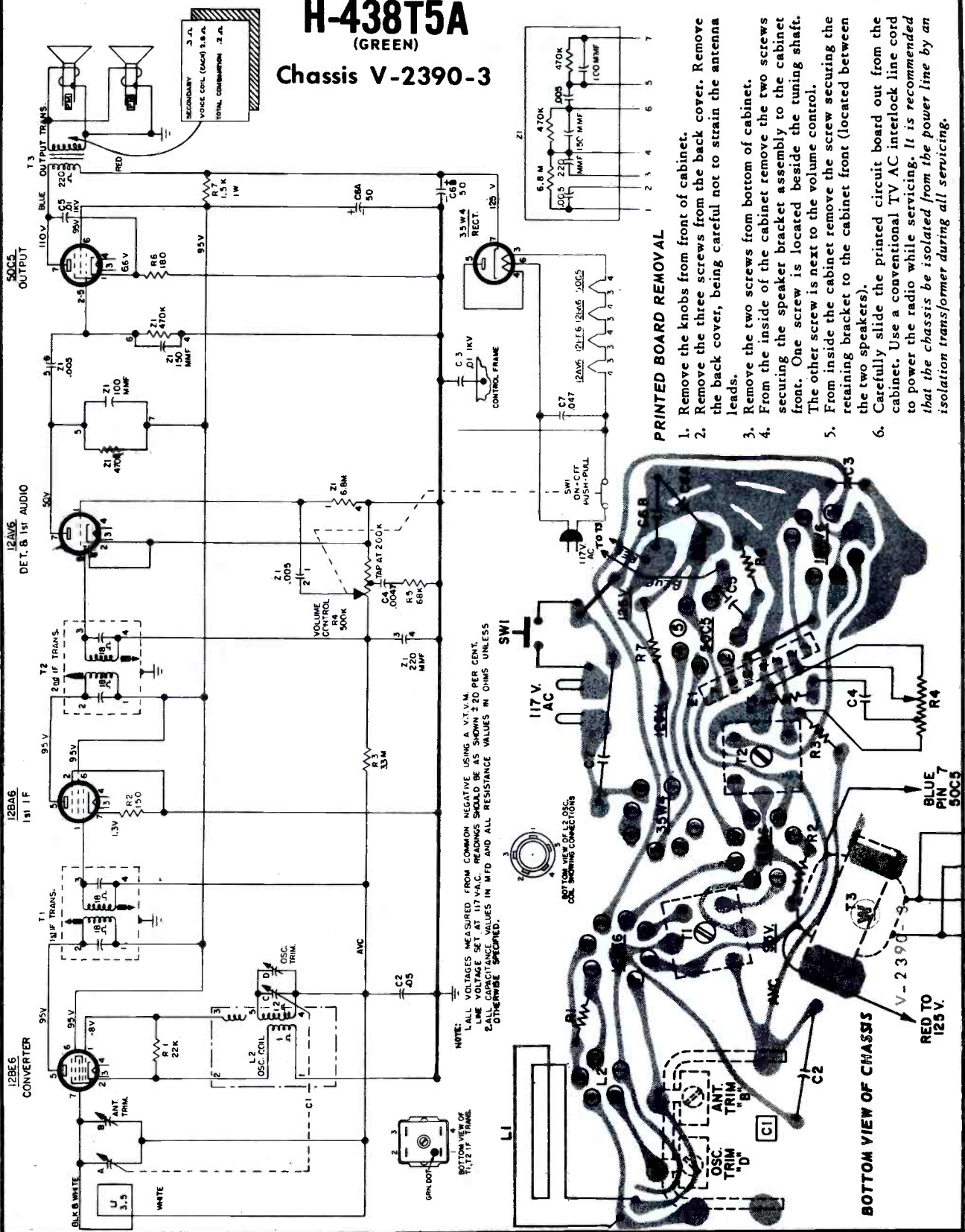
Westinghouse MODELS H-435T5A, H-437T5A,

(IVORY)

(TAN)

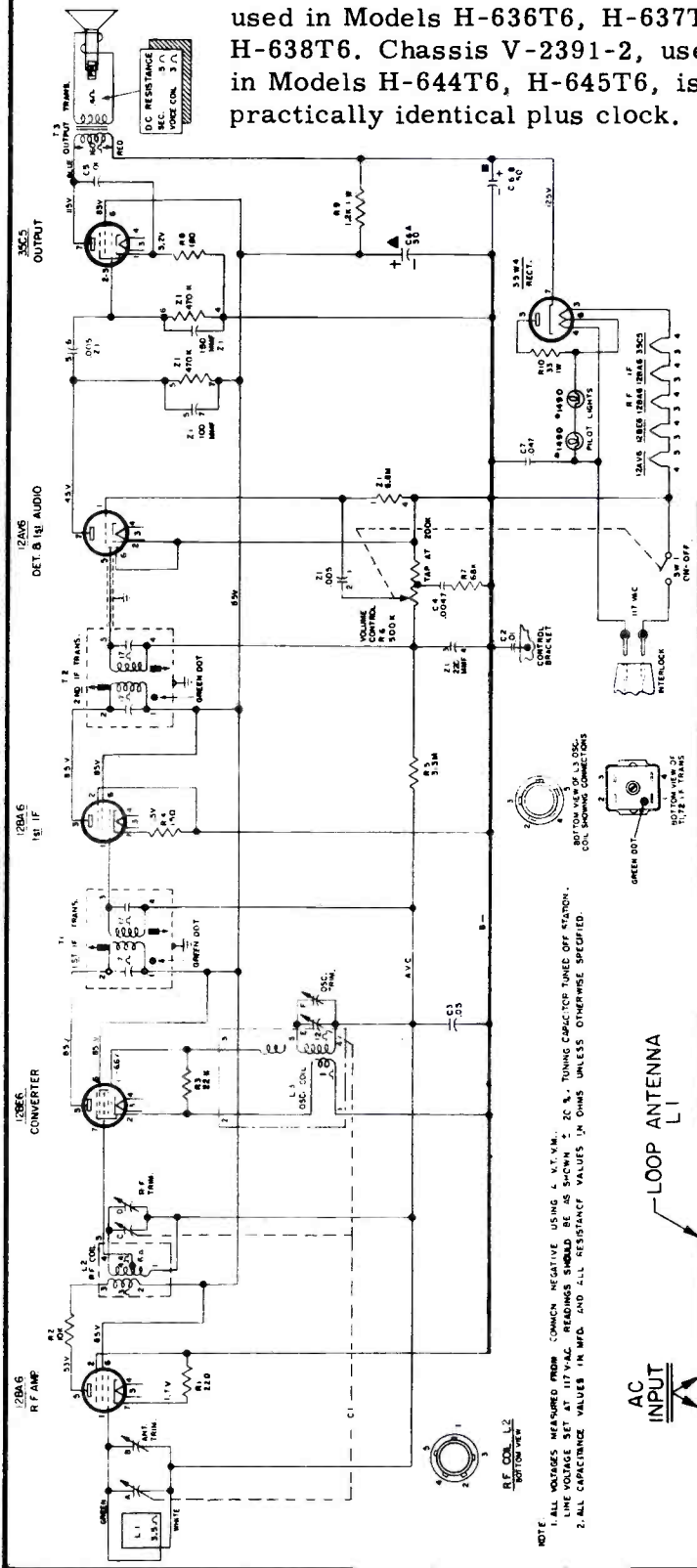
H-438T5A (GREEN)

Chassis V-2390-3

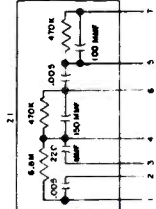


Westinghouse

This material is exact for Chassis V-2391-1, used in Models H-636T6, H-637T6, H-638T6. Chassis V-2391-2, used in Models H-644T6, H-645T6, is practically identical plus clock.

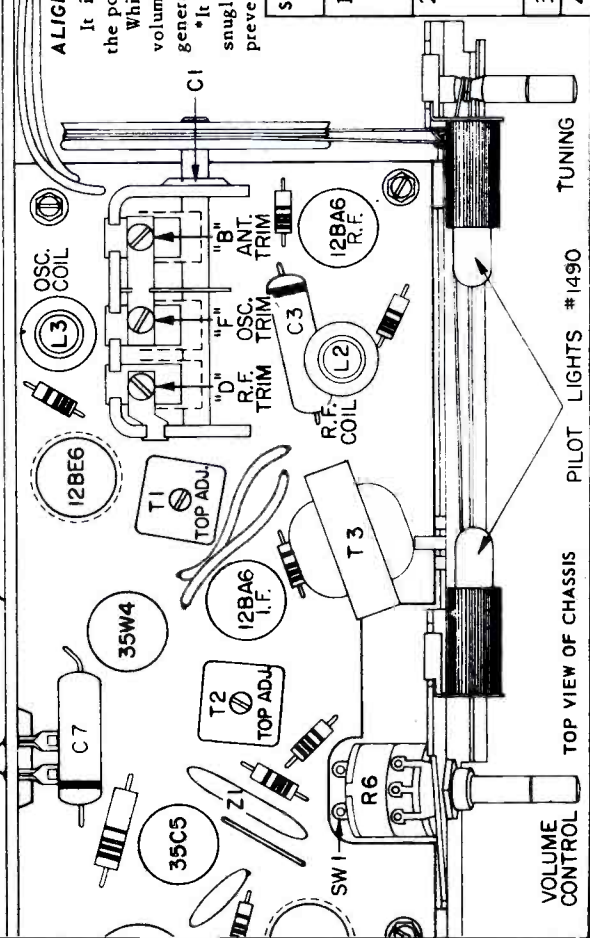


NOTE:
 1. ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING A V.T.V.M.
 LINE VOLTAGE SET AT 117 V.A.C. READINGS SHOULD BE AS SHOWN ± 2% TUNING CAPACITOR TUNED OFF STATION.
 2. ALL CAPACITANCE VALUES IN MFD. AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.



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 generator output attenuated to avoid AVC action. *It is recommended that a fiber alignment tool that snugly fits the slot in the powdered iron core be used to prevent chipping of the slot.



STEP	CONNECT SIGNAL GENERATOR TO	SIG. GEN. FREQ. MOD. 400 CYCLES	RADIO DIAL SETTING	V.T.V.M. ACROSS VOICE COIL ADJUST FOR MAX. OUTPUT
1	Pin No. 7 of the 12BE6 through a 200 mmf. cap.	455kc	minimum cap.	Top & bottom slugs of T2 and T1 in order given.*
2	Stator of antenna tuning capacitor (A) through a 200 mmf. capacitor	1625kc	minimum capacity	Oscillator Trimmer (F)
3	Same as Step 2	1400kc	1400kc	RF Trimmer (D)
4	Radiated signal	1400kc	1400kc	Antenna Trimmer (B)

Westinghouse

Models HF100BN, HF101BN,
Chassis V-2500-1

CIRCUIT INFORMATION

The V 2500-1 amplifier circuit, used in models HF100BN and HF101BN, is shown in figure 2.

An audio signal of about .7 volts is amplified to about 6 watts through a straightforward amplifier circuit. A 12AX7 serves as audio amplifier and phase inverter to drive the 6V6 push-pull output tubes. This output stage is operated class AB₁.

Degeneration, for improved fidelity, is obtained through the use of unbypassed cathode resistors and the inverse feedback loop through R116.

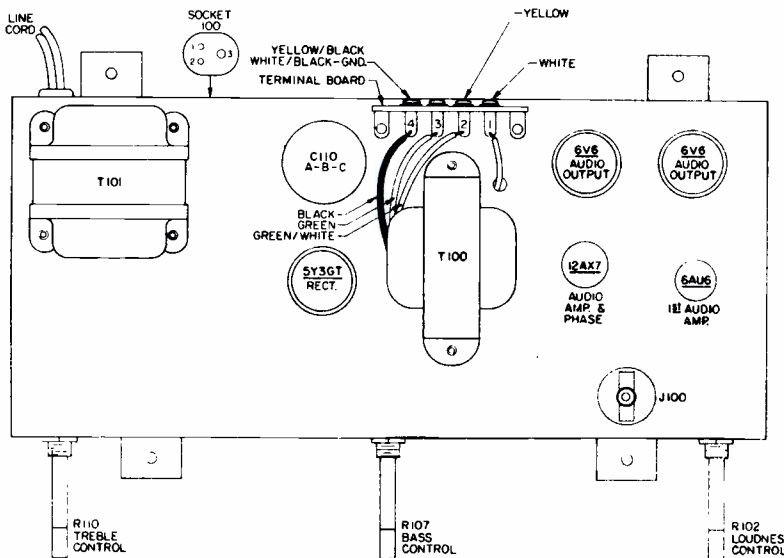
A 2.7 ohm resistor is used in series with the 6AU6 heater to reduce hum.

The impedance of each speaker voice coil is 12.8 ohms. If a replacement speaker is required, use the correct Westinghouse replacement speaker listed in the parts list.

When operating the amplifier with speakers disconnected (during tests), connect four 50 ohm, 2 watt resistors in parallel across output terminals 2 and 4.

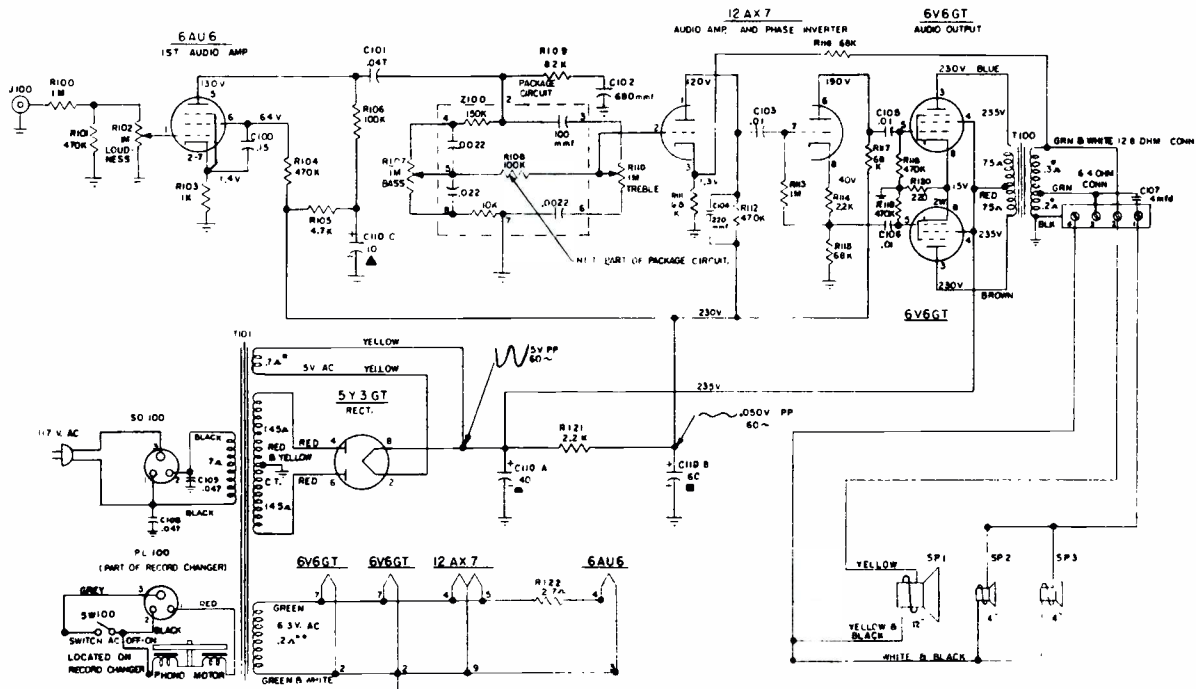
The function of C107 is to pass only high frequencies to the parallel high frequency speakers.

AC input (to the power transformer primary) is connected to 1 and 3 of the socket, SO 100; the AC on-off switch is located on the record changer.



VOLTAGE GAIN MEASUREMENTS

An audio signal generator and VTVM are required for voltage gain measurements. To measure over-all amplifier gain, proceed as follows: 1) Disconnect speaker. Connect four 50 ohm, 2 watt resistors in parallel across terminals 2 and 4. 2) Set loudness control, R102, to maximum loudness. 3) Set bass control, R107, and treble control, R110, to mid-range. 4) Connect generator output to J100. Set generator for 1Kc, at about .7 volts output. 5) Connect VTVM across output terminals 2 and 4. Approximate correct voltage reading is 8 volts.



Westinghouse

Models HF104DP, HF105DP, HF106DP,
Chassis V-2501-1

AMPLIFIER CIRCUIT INFORMATION

Input

Two input jacks, J100A and J100B, are provided. SW100 selects the input signal fed to the 12AU6 1st audio amplifier. The output from the phono pick-up is fed to J100B; other audio signals may be fed to J100A.

1st audio amplifier

To minimize hum, the first audio amplifier heater receives direct current, fed from the cathode circuit of the push-pull output stage. R101 is unbypassed to provide degeneration for improved fidelity.

Equalizer

Package circuit Z101 contains the record equalization capacitors and resistors. Equalization is selected by SW101 to modify the amplifier response, adapting the response to the type of record being played. Equalization positions are as follows:

R1AA: Compensates for R1AA recording curve.

LP: Compensates for standard 33 1/3 RPM records.

EUR: In this position, Z101 is switched out of the circuit. European records usually require this setting.

78: Compensates for older 78 RPM records.

Tone controls

Except for R106, the tone control fixed resistors and capacitors are contained within packaged circuit Z100. Tone control characteristics are as follows:

BASS: Provides up to 20 db boost at 40 cycles.

TREBLE: Provides up to 15 db boost at 15,000 cycles.

Audio amplifier and phase inverter stage

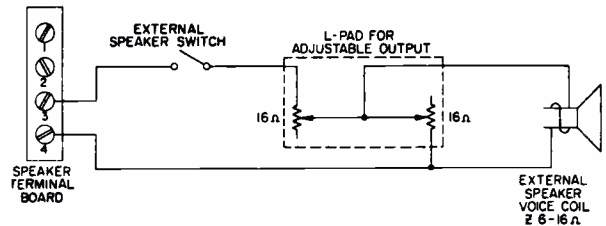
A 12AX7 is used as audio amplifier and phase inverter. Inverse feedback voltage is fed to the cathode of the audio amplifier (pin 3) to provide additional improvement in fidelity and stability. Grid drive to one 6L6 output tube is fed from the plate (pin 6); grid drive to the other 6L6 is fed from the junction of R111 and R112 in the cathode circuit of the phase inverter.

Audio output stage

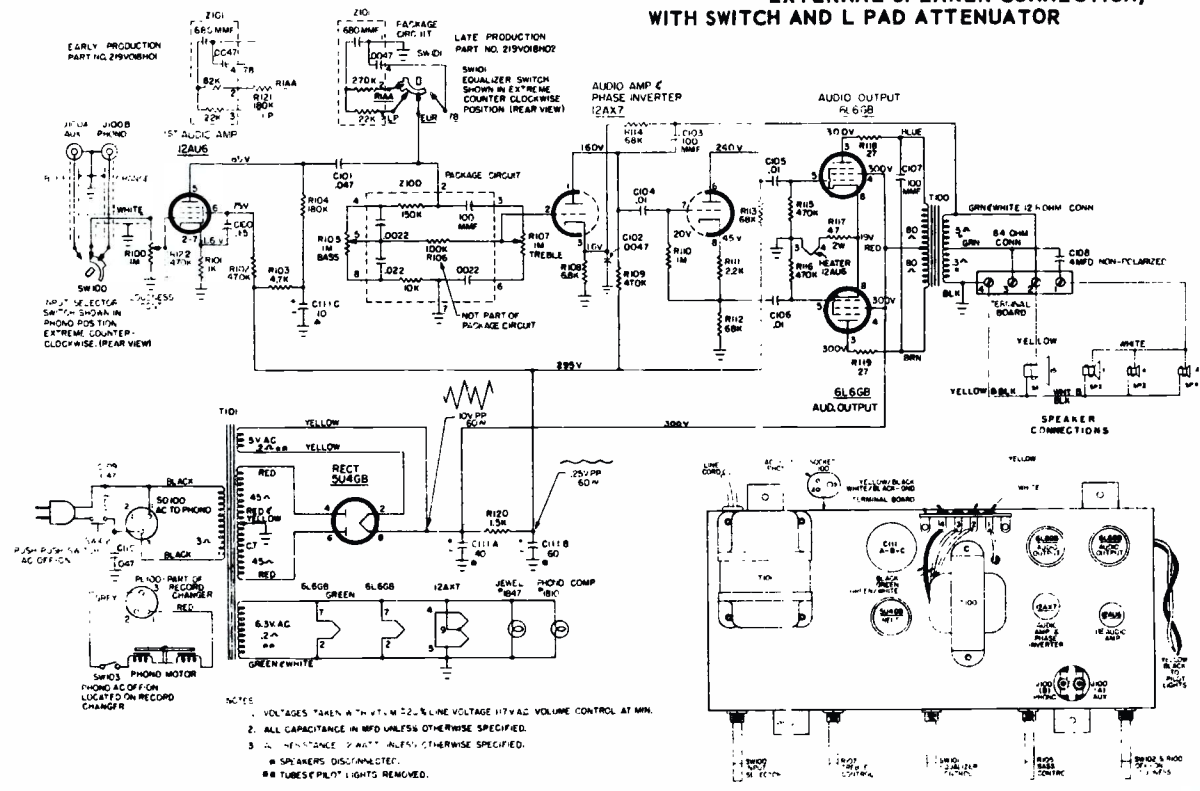
The 6L6 push-pull audio output tubes operate class AB₁. R118 and R119 prevent oscillation (ringing). The 12AU6 heater serves as part of the common cathode resistor for the 6L6 tubes. (This circuit arrangement provides DC for the 12AU6 heater).

Output circuit

Normal DC resistance across the primary and secondary of T100 is shown in figure 1. Output impedance, between terminals 2 and 4 is 12.8 ohms; impedance between terminals 3 and 4 is 6.4 ohms. C108 is the cross-over capacitor which passes the high frequencies to the paralleled high frequency speakers.



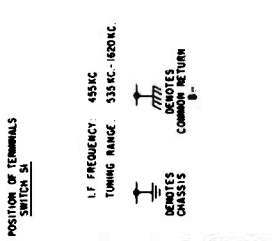
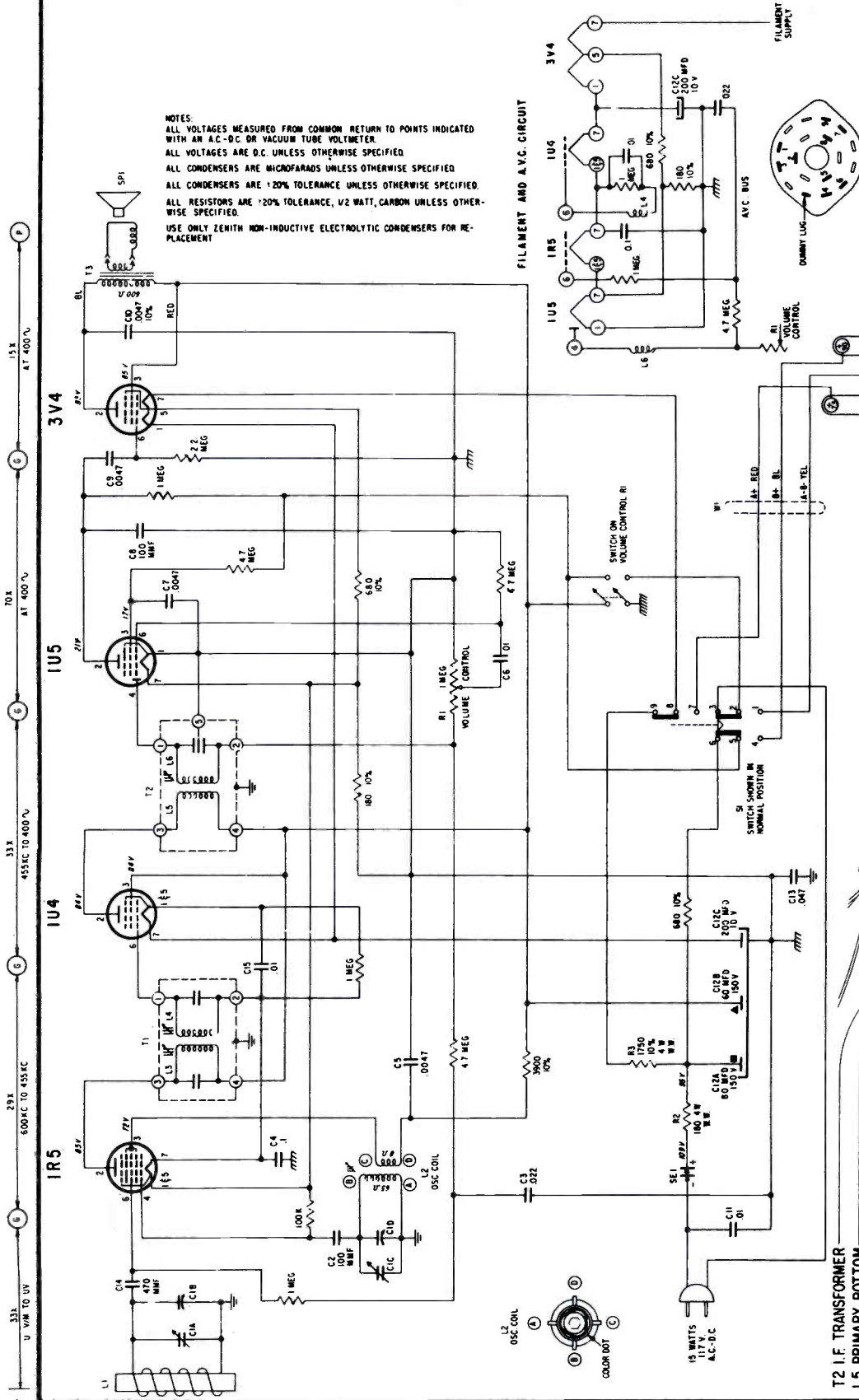
EXTERNAL SPEAKER CONNECTION, WITH SWITCH AND L PAD ATTENUATOR



- NOTES
1. VOLTAGES TAKEN WITH VT-1M D.C. LINE VOLTAGE 117VAC VOLUME CONTROL AT MIN.
 2. ALL CAPACITANCE IN MFD UNLESS OTHERWISE SPECIFIED.
 3. ALL RESISTANCE IN OHMS UNLESS OTHERWISE SPECIFIED.
 4. SPEAKERS DISCONNECTED.
 5. TUBES & PILOT LIGHTS REMOVED.

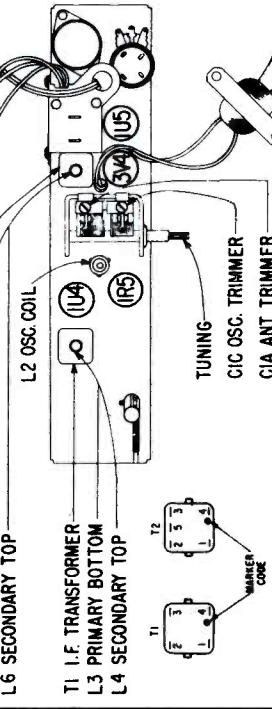
ZENITH RADIO MODEL A402 CHASSIS 4A41

NOTES
 ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH AN A.C.-D.C. OR VACUUM TUBE VOLTMETER.
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED.
 ALL CONDENSERS ARE MICROFARADS UNLESS OTHERWISE SPECIFIED.
 ALL CONDENSERS ARE ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED.
 ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED.
 USE ONLY ZENITH NON-INDUCTIVE ELECTROLYTIC CONDENSERS FOR REPLACEMENT.

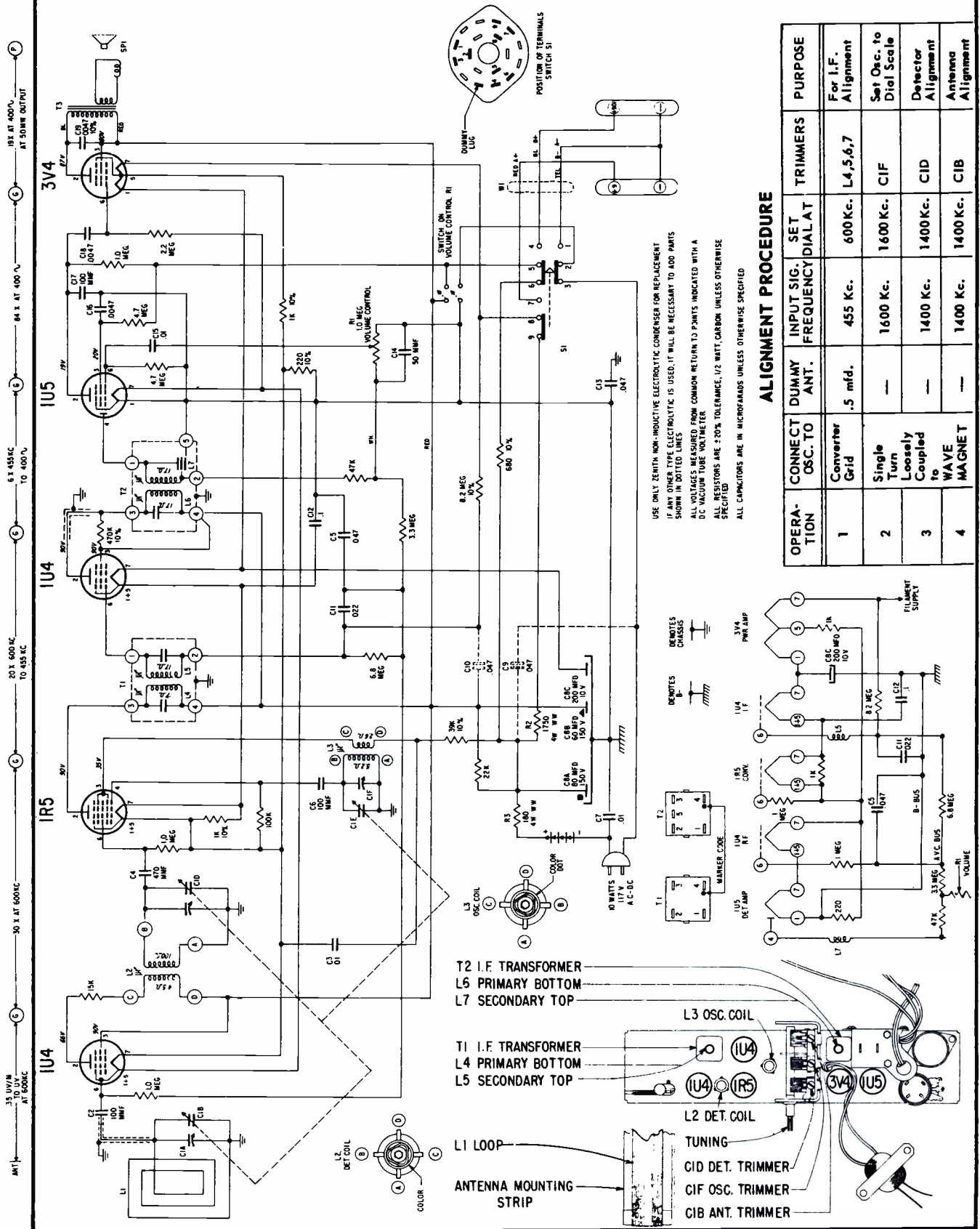


ALIGNMENT PROCEDURE

OPERATION	CONNECT OSC. TO	DUMMY ANT.	INPUT SIG. FREQUENCY	SET DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 mfd.	455 Kc.	600 Kc.	L3,4,5,6	For I.F. Alignment
2	Single turn loosely coupled to WAVE-MAGNET	—	1600 Kc.	1600 Kc.	C10	Set Osc. to Dial Scale
3	—	—	1400 Kc.	1400 Kc.	C11	Antenna Alignment



ZENITH RADIO MODEL A504 CHASSIS 5A41

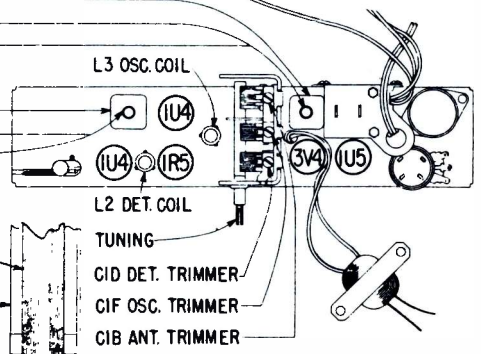


ALIGNMENT PROCEDURE

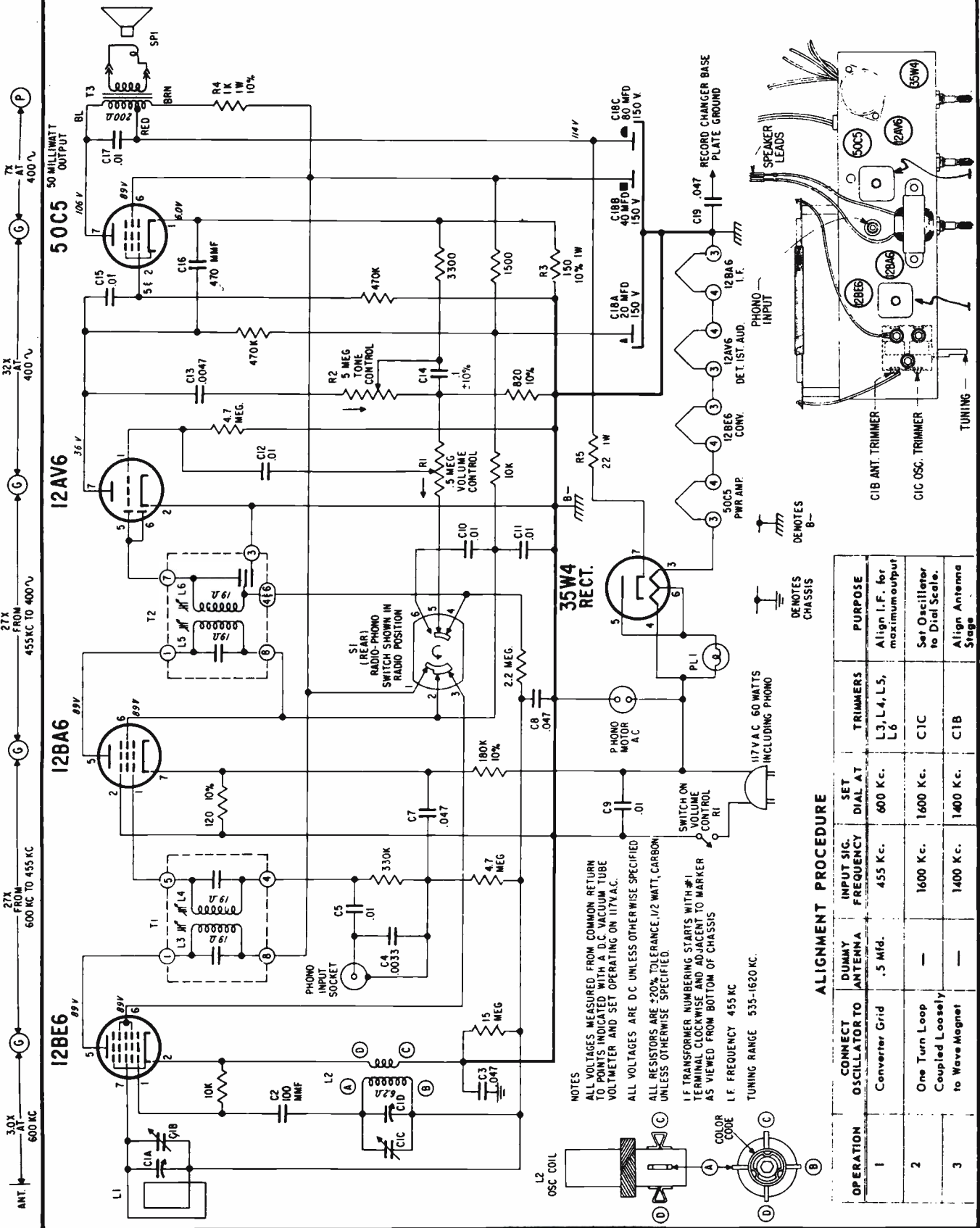
OPERATION	CONNECT OSC. TO ANT.	DUMMY ANT.	INPUT SIG. FREQUENCY	SET FREQUENCY DIAL AT	TRIMMERS	PURPOSE
1	Converter Grid	.5 mfd.	455 Kc.	600 Kc.	L4, 5, 6, 7	For I.F. Alignment
2	Single Turn Loosely Coupled to WAVE MAGNET	—	1600 Kc.	1600 Kc.	C1F	Set Osc. to Dial Scale
3	—	—	1400 Kc.	1400 Kc.	C1D	Detector Alignment
4	—	—	1400 Kc.	1400 Kc.	C1B	Antenna Alignment

USE ONLY ZENITH NON-INDUCTIVE ELECTROLYTIC CONDENSER FOR REPLACEMENT IF ANY OTHER TYPE ELECTROLYTIC IS USED, IT WILL BE NECESSARY TO ADD PARTS SHOWN IN DOTTED LINES
 ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH A DC VACUUM TUBE VOLTMETER
 ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
 ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED

- T2 I.F. TRANSFORMER
- L5 PRIMARY BOTTOM
- L7 SECONDARY TOP
- T1 I.F. TRANSFORMER
- L4 PRIMARY BOTTOM
- L5 SECONDARY TOP
- L3 OSC. COIL
- L2 DET. COIL
- L1 LOOP
- ANTENNA MOUNTING STRIP



Zenith Radio Corporation Model A555 Chassis 5A08



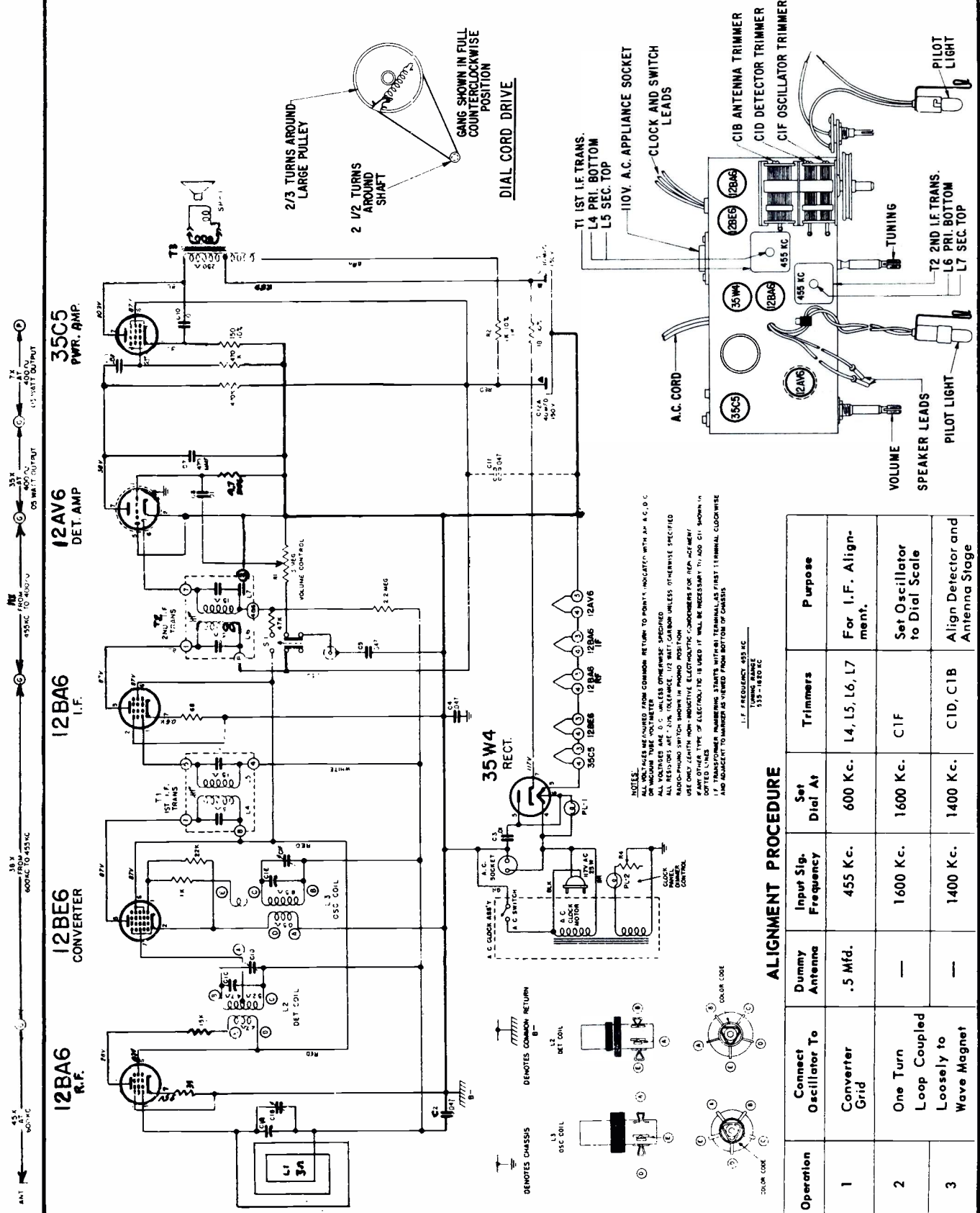
NOTES
 ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS INDICATED WITH A D.C. VACUUM TUBE VOLTMETER AND SET OPERATING ON 117V.A.C.
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
 IF TRANSFORMER NUMBERING STARTS WITH #1 TERMINAL CLOCKWISE AND ADJACENT TO MARKER AS VIEWED FROM BOTTOM OF CHASSIS
 I.F. FREQUENCY 455 KC
 TUNING RANGE 535-1620 KC.

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 maximum output
2	One Turn Loop Coupled Loosely to Wave Magnet	—	1600 Kc.	1600 Kc.	C1C	Set Oscillator to Dial Scale.
3	—	—	1400 Kc.	1400 Kc.	C1B	Align Antenna Stage

T1 1ST. I.F. TRANSFORMER
 L3 PRIMARY BOTTOM
 L4 SECONDARY TOP
 T2 2ND I.F. TRANSFORMER
 L5 PRIMARY BOTTOM
 L6 SECONDARY TOP

ZENITH RADIO CORPORATION MODELS A624G, W & Y CHASSIS 6A03



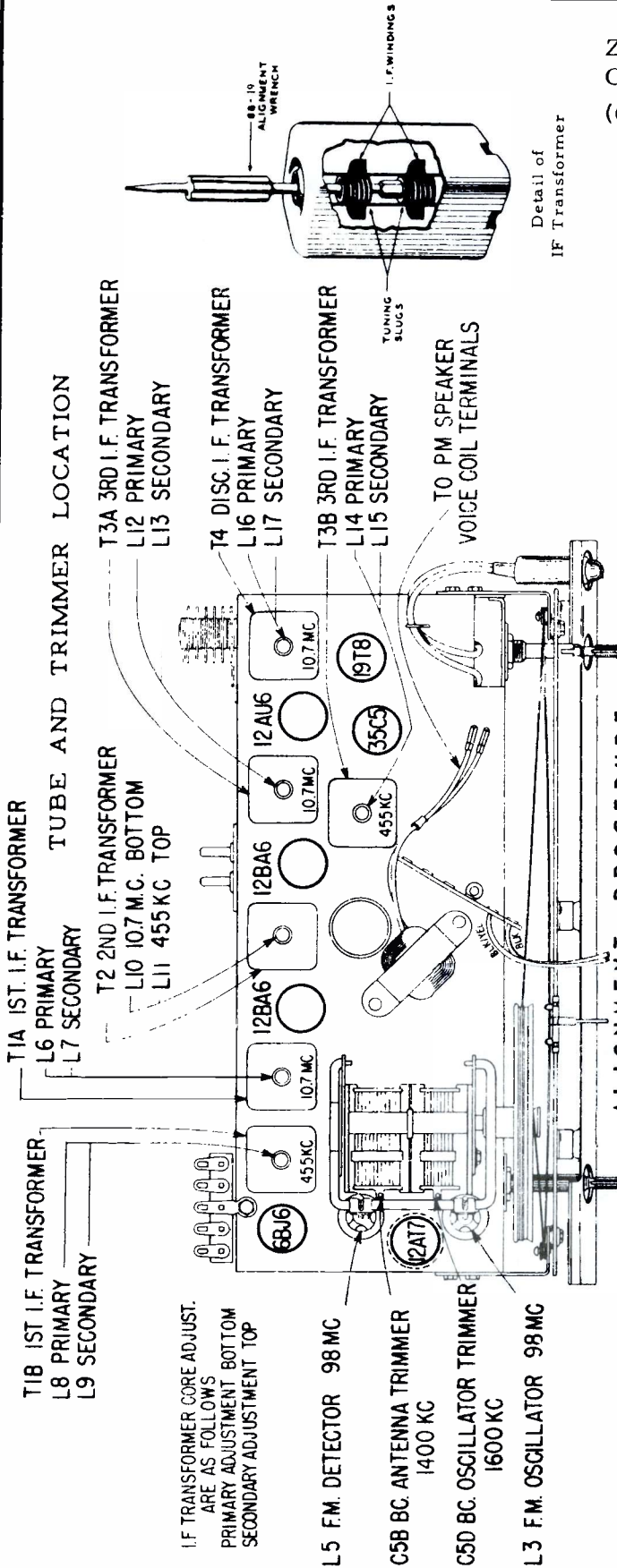
NOTES:
 ALL VALUES ARE VIEWED FROM COMMON RETURN TO POINTS INDICATED WITH AN A.C. D.C. OR INCLINE TUBE VOLTMETER
 ALL VALUES ARE D.C. UNLESS OTHERWISE SPECIFIED
 ALL VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED
 RADIO-PHONO SWITCH SHOWN IN PHONO POSITION
 USE ONLY LEATHY NON-INDUCTIVE ELECTROLYTIC CONDENSERS FOR I.F. AND A.F. STAGES
 IF ANY OTHER TYPE OF ELECTROLYTIC IS USED IT WILL BE NECESSARY TO ADD C11 SHOWN IN DOTTED LINES
 TRIMMER NUMBERS STARTS WITH (A) TERMINAL AS FIRST TERMINAL CLOCKWISE AND ADVANCE TO NUMBER AS VIEWED FROM BOTTOM OF CHASSIS

I.F. FREQUENCY 455 KC
 1535-1625 KC

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.	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

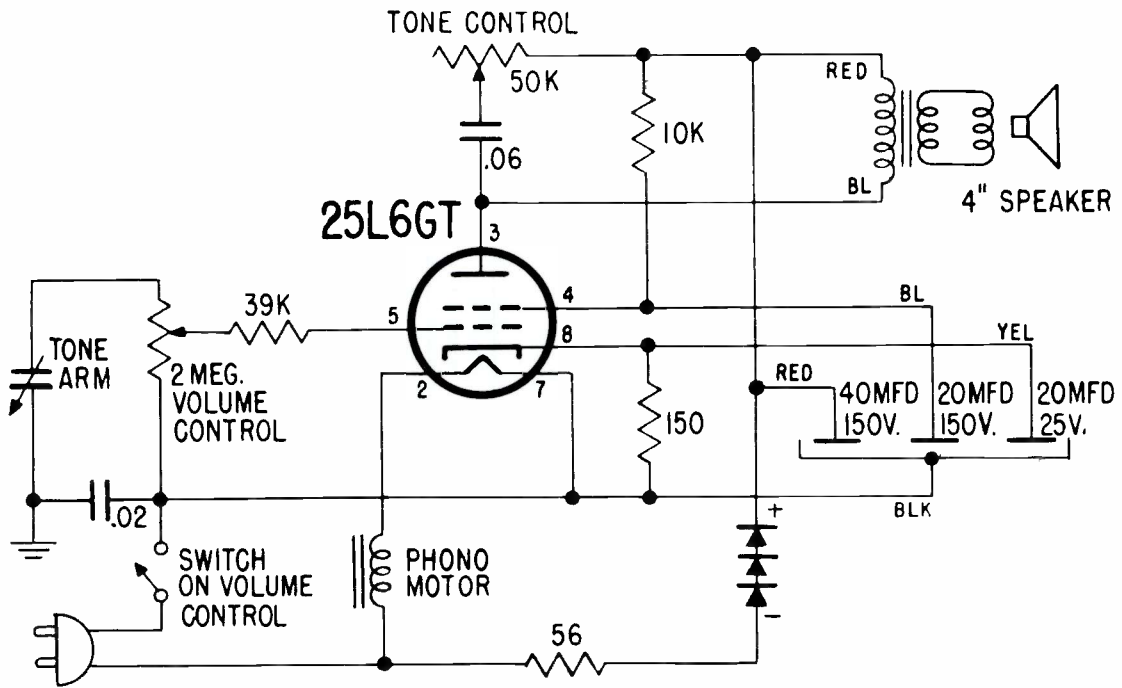
ZENITH RADIO Models A730E, A730R,
Chassis 7A05, Alignment Information
(Continued from page 178, at left)



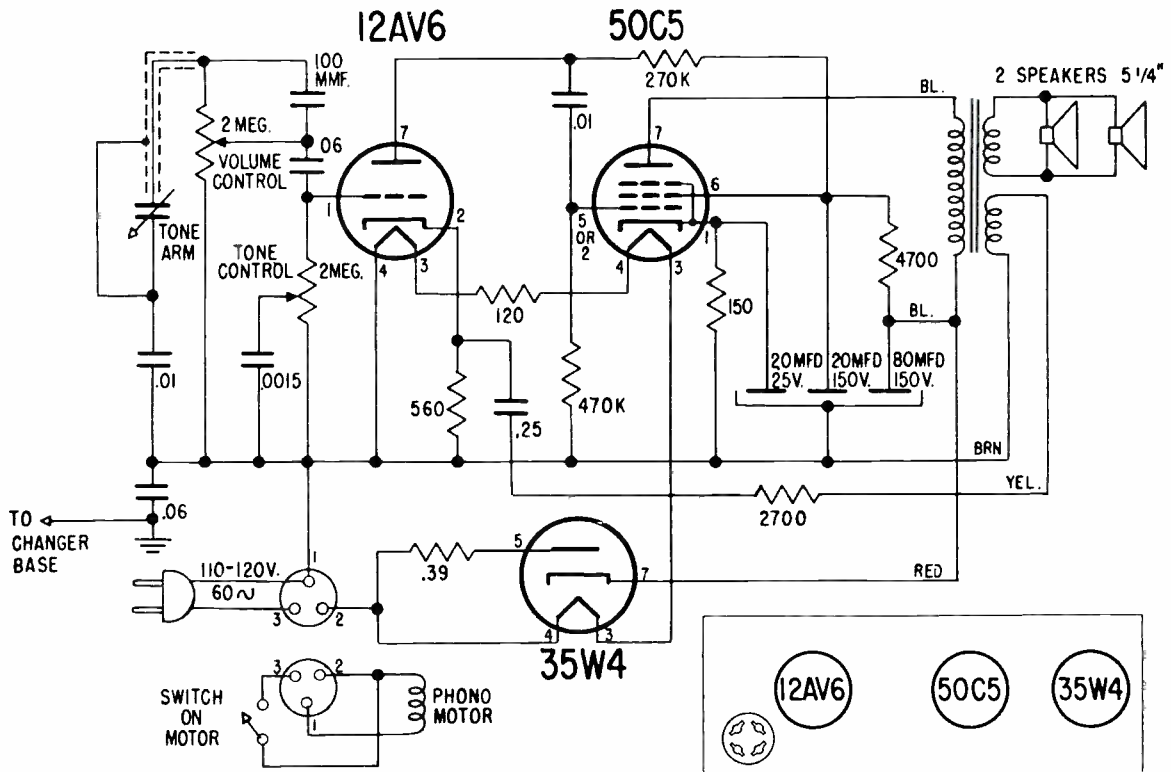
ALIGNMENT PROCEDURE

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 2 12AT7 Converter	.05 Mfd.	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 Mfd.	10.7 Mc. Unmodulated.	FM		L16 coil slug Primary discr.	Align primary of discriminator for maximum reading.
5 (b)	Pin 1 (grid) on 12AU6 limiter	.05 Mfd.	10.7 Mc. Unmodulated.	FM		L17 coil slug sec. of discr.	Adjust secondary of discriminator for zero reading.
6 (c)	Pin 1 (grid) on 12BA6 2nd IF.	.05 Mfd.	10.7 Mc. Unmodulated.	FM		L12 & L13 Prim. & Sec. of 3rd IF trans.	Align 3rd IF transformer for maximum reading.
7 (c)	Pin 1 (grid) on 12BA6 1st IF.	.05 Mfd.	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 Mfd.	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 Osc. 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.

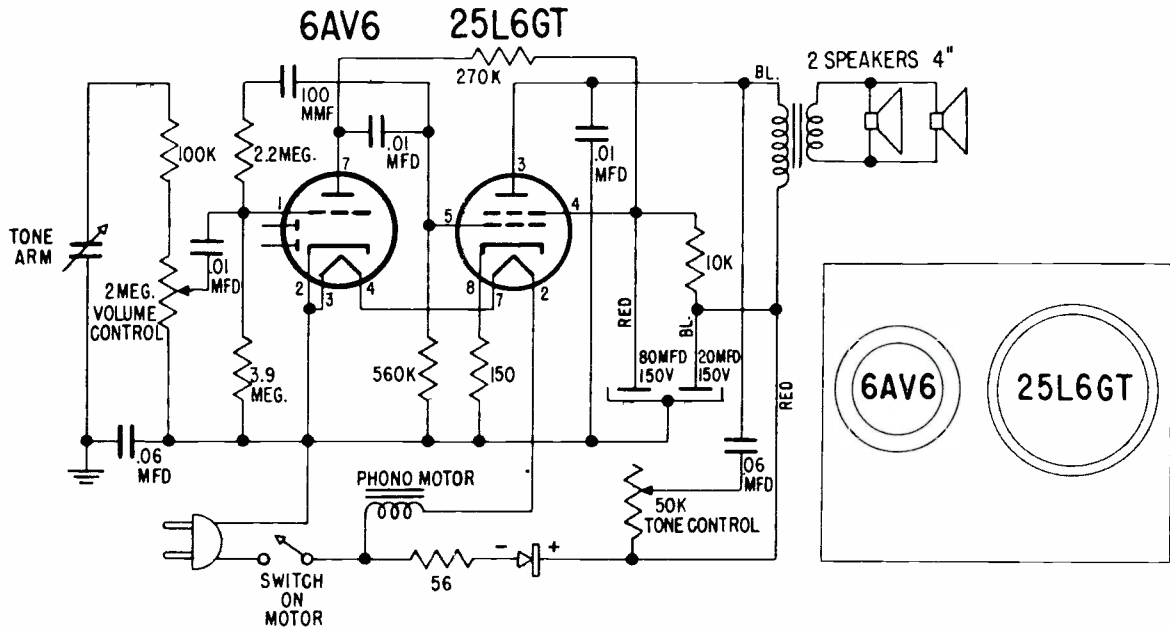
ZENITH RADIO CORPORATION MODELS AP6B,J,V



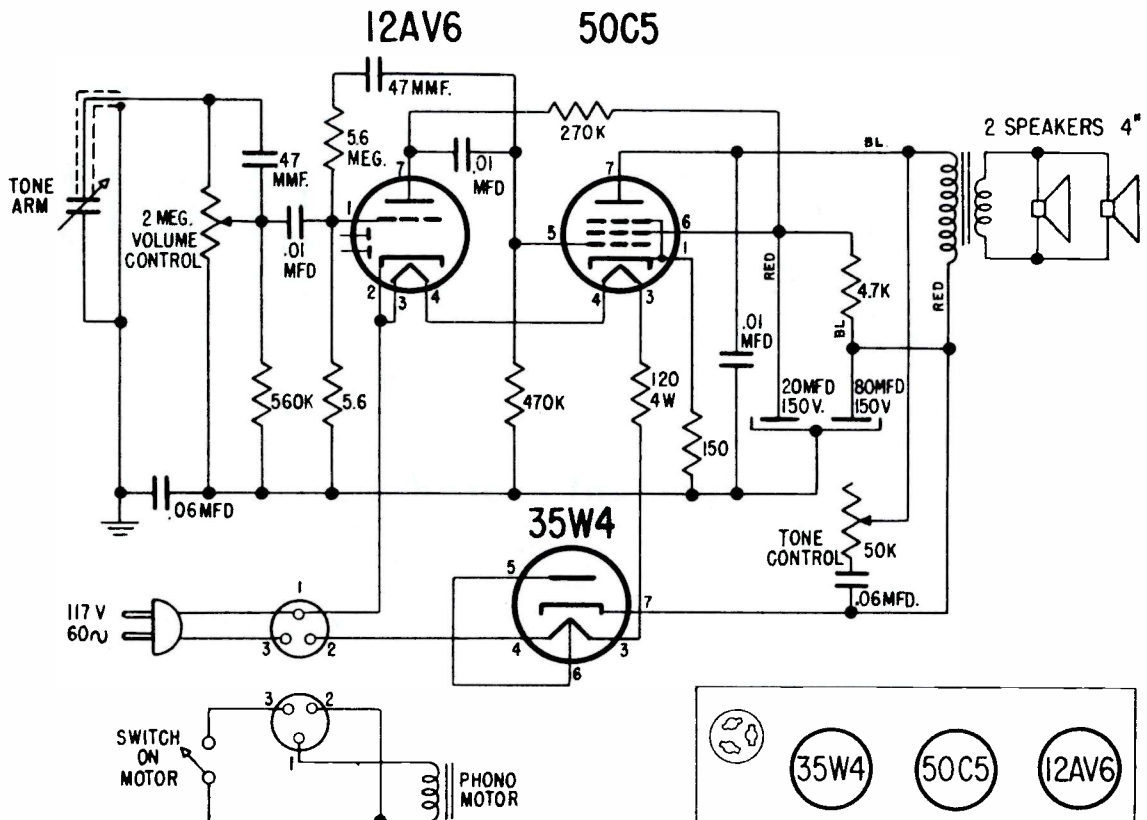
MODEL AP9B



ZENITH RADIO MODEL AP7F



MODEL AP8J



ZENITH RADIO Chassis 7AT42 & 7AT42Z1

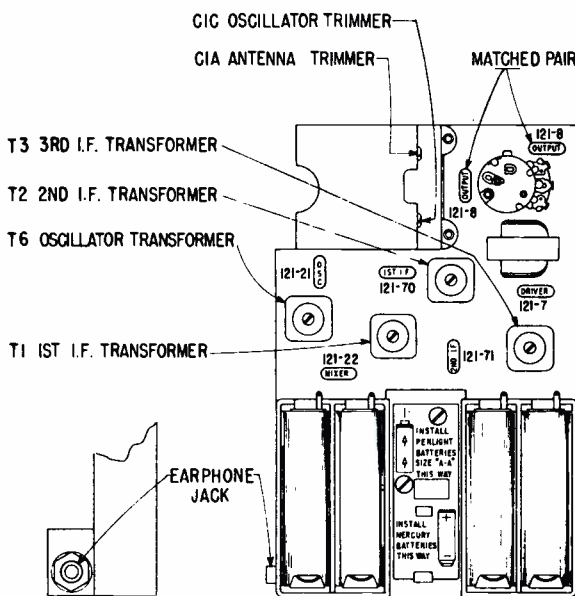
Model "Royal 300" (Continued on page 183)

CHASSIS IDENTIFICATION

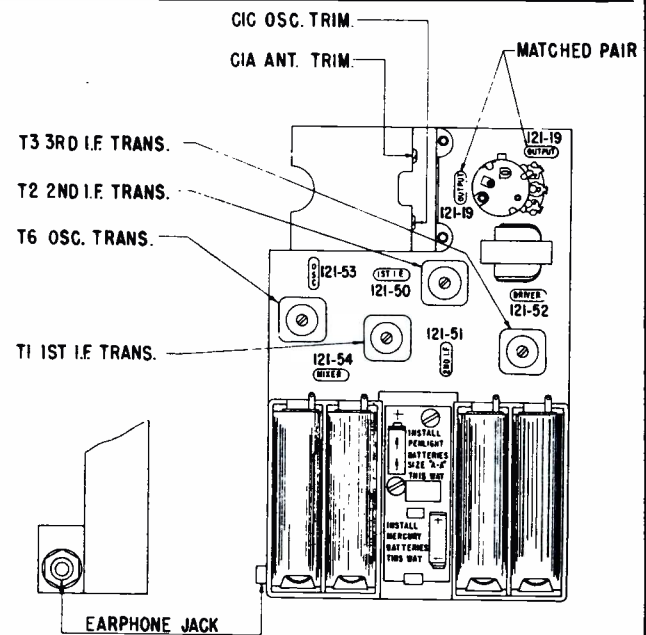
The "Royal 300" seven transistor portable has been produced with two basic chassis. This expedient was necessary to enable us to produce sufficient quantities by using transistors from several sources. Both chassis have the chassis number stamped on them as well as a color identifying code on the battery compartment just above the battery installation instruction label.

The 7AT42 chassis uses transistors manufactured by Sylvania. The 7AT42Z1 chassis uses transistors manufactured by Texas Instrument. In addition to this, both chassis have individual transistor layout labels. The color of the printing on these labels conforms respectively to the color dot on the chassis. The accompanying chart gives all the necessary information on chassis number, color dot, transistor layout labels, transistor numbers, Zenith part number, RETMA part number (where available), transistor supplier, etc.

Chassis	Chassis Color Dot	Transistor Layout Label Color	Part No.	Mixer	Osc.	1st. I.F.	2nd I.F.	Crystal Diode Detector	Driver	Output-Output	Supplier
7AT42	Green	Green 102-3498	Zenith RETMA Type	121-22 2N194 NPN	121-21 2N193 NPN	121-70 NPN	121-71 NPN	103-19 1N87G	121-7 2N35 NPN	121-8 2N35-2N35 Matched Pair NPN NPN	Sylvania
7AT42Z1	Red	Red 102-3474	Zenith Type	121-54 PNP	121-53 PNP	121-50 NPN	121-51 NPN	103-19 1N87G	121-52 PNP	121-19 Matched Pair PNP	Texas Instrument



TRANSISTOR & TRIMMER LAYOUT FOR 7AT42

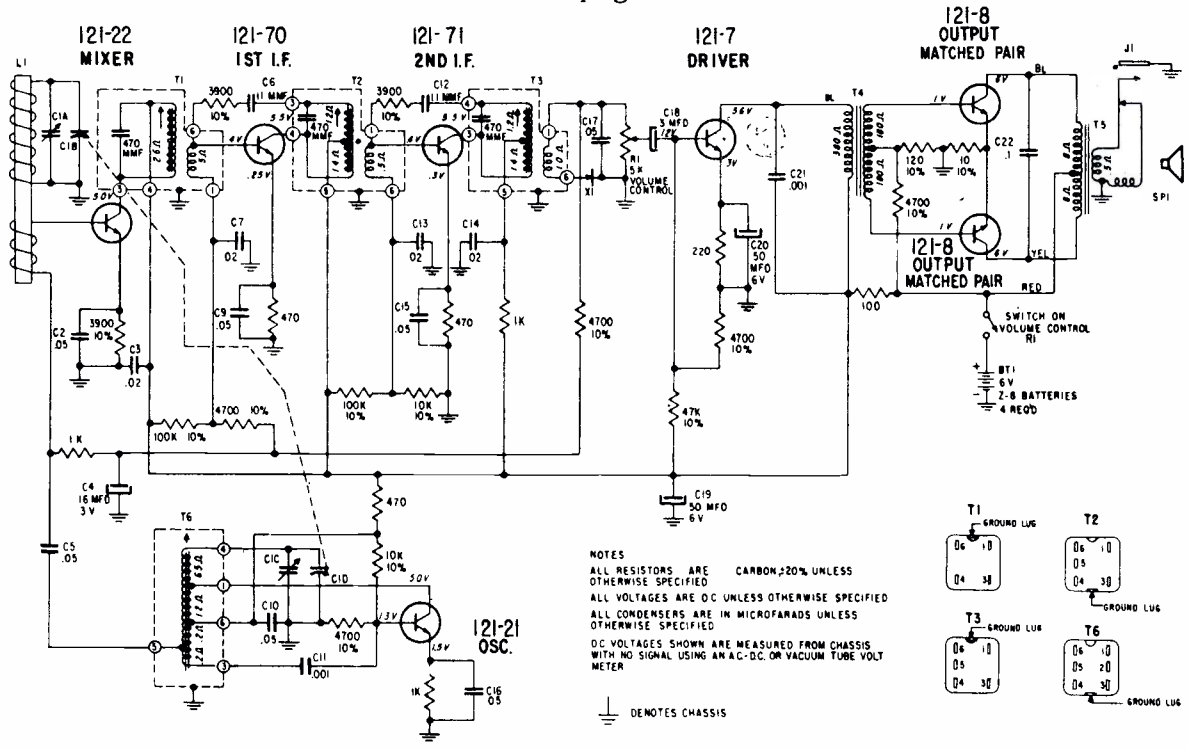


TRANSISTOR & TRIMMER LAYOUT FOR 7AT42Z1

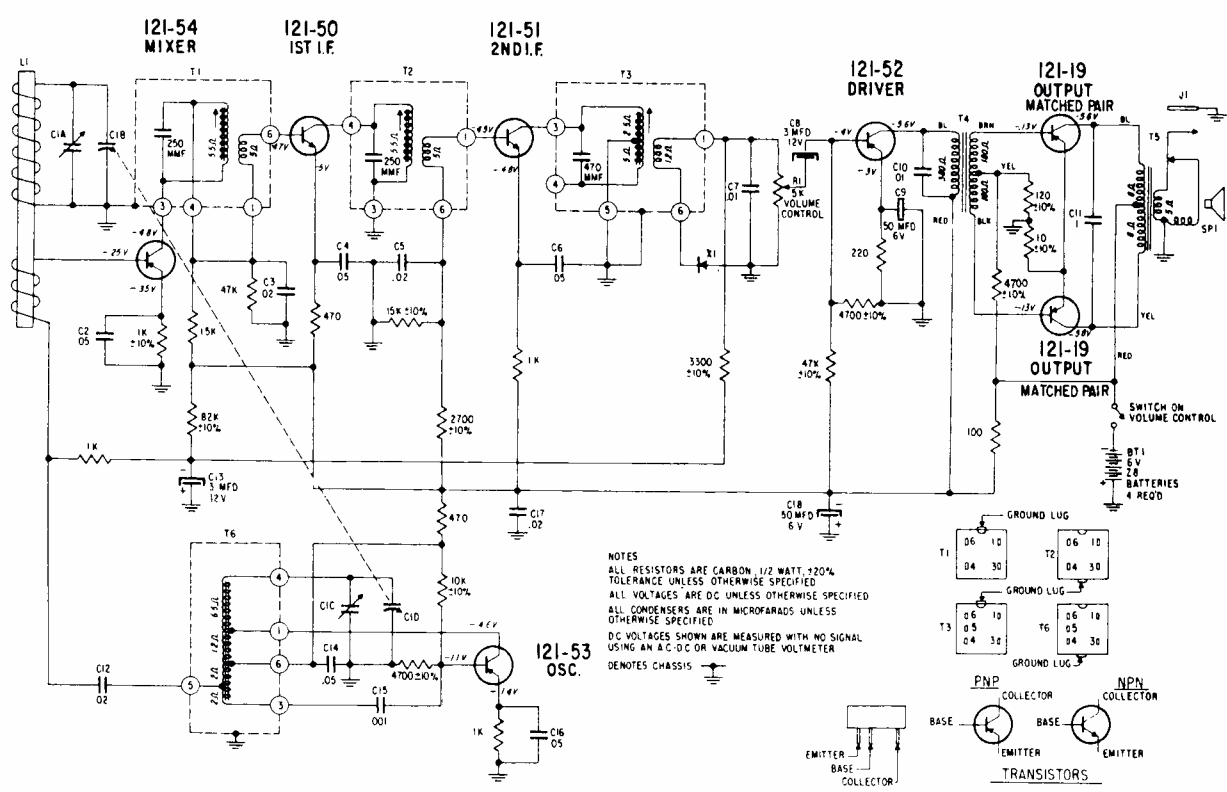
Alignment Procedure

Operation	Input Signal Frequency	Connect Inner Conductor From Oscillator To	Connect Outer Shield Conductor From Oscillator To	Set Dial At	Trimmers	Purpose	
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment	
2	1620 KC		—	Gang wide open.	CIC	Set Oscillator to dial scale.	
3	535 KC		—	Gang Closed	Adjust slug in T6	Set Oscillator to dial scale.	
4	REPEAT STEPS 2 & 3		—	—	—	—	—
5	1260 KC		—	—	1260 KC	CIA	Align loop ant.

ZENITH RADIO Chassis 7AT42 & 7AT42Z1, Model "Royal 300"
(Continued from page 182)



SCHEMATIC DIAGRAM FOR 7AT42



SCHEMATIC DIAGRAM FOR 7AT42Z1

ZENITH RADIO CORPORATION

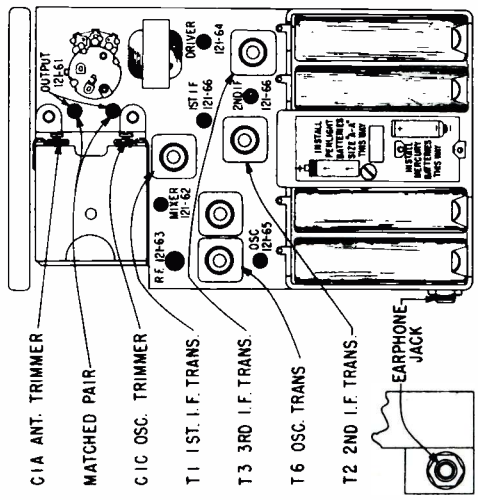
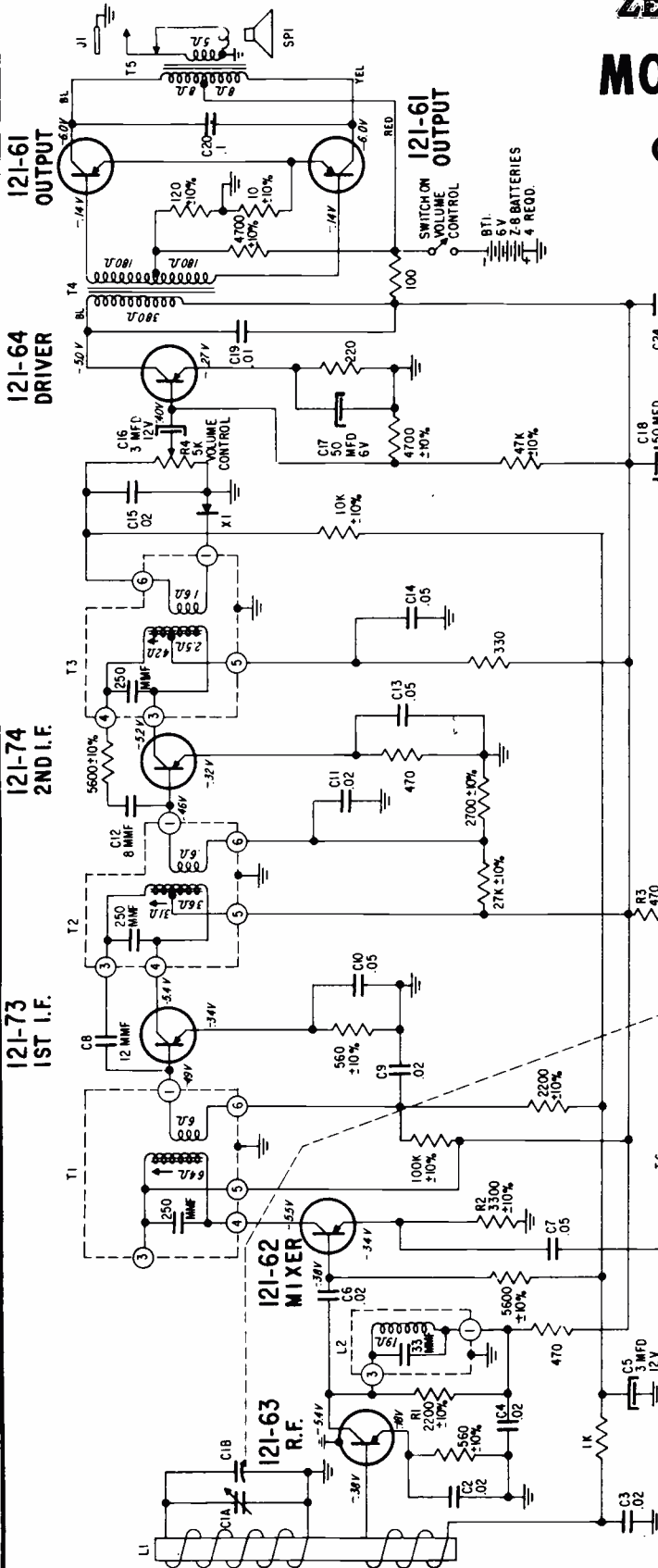
MODEL "ROYAL 500D"

CHASSIS 8AT40Z2

121-66
1ST I.F.

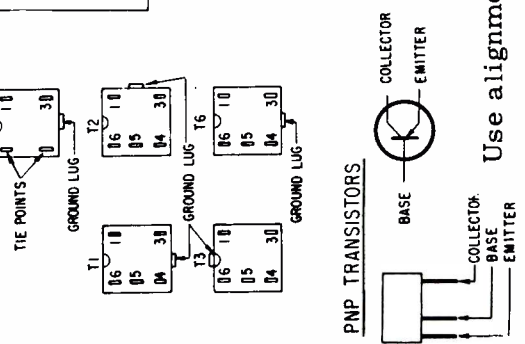
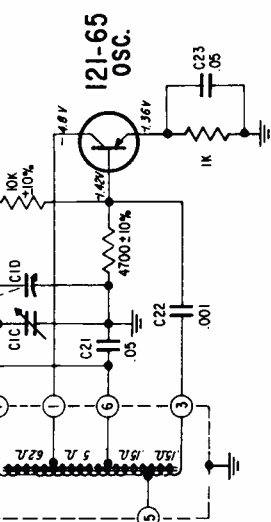
121-74
2ND I.F.

121-66
2ND I.F.



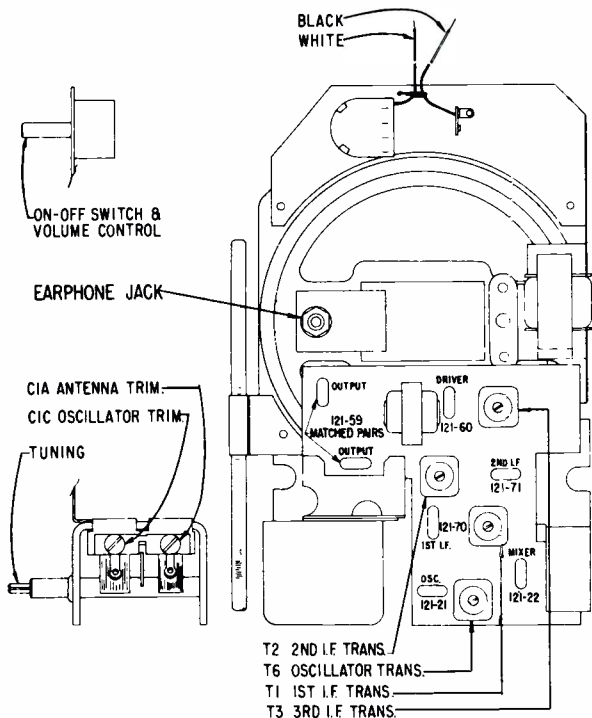
TRANSISTOR & TRIMMER LAYOUT FOR CHASSIS 8AT40Z2 USING 121-66 TRANSISTORS

NOTES
 ALL RESISTORS ARE 1/2 WATT, CARBON, ±20% TOLERANCE UNLESS OTHERWISE SPECIFIED
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
 ALL CONDENSERS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED
 D.C. VOLTAGES SHOWN ARE MEASURED FROM CHASSIS WITH NO SIGNAL USING AN A.C.-D.C. OR VACUUM TUBE VOLTMETER
 DEMOTES CHASSIS



Use alignment table on page 182 for this model also.

ZENITH RADIO MODEL "ROYAL 700L" CHASSIS 7AT43 & 7AT43Z3



RESISTANCE MEASUREMENTS

When making resistance measurements in the circuit, it is most important to remove the transistors in the circuit under test otherwise readings obtained will be incorrect. This is the direct result of a transistor acting as a diode.

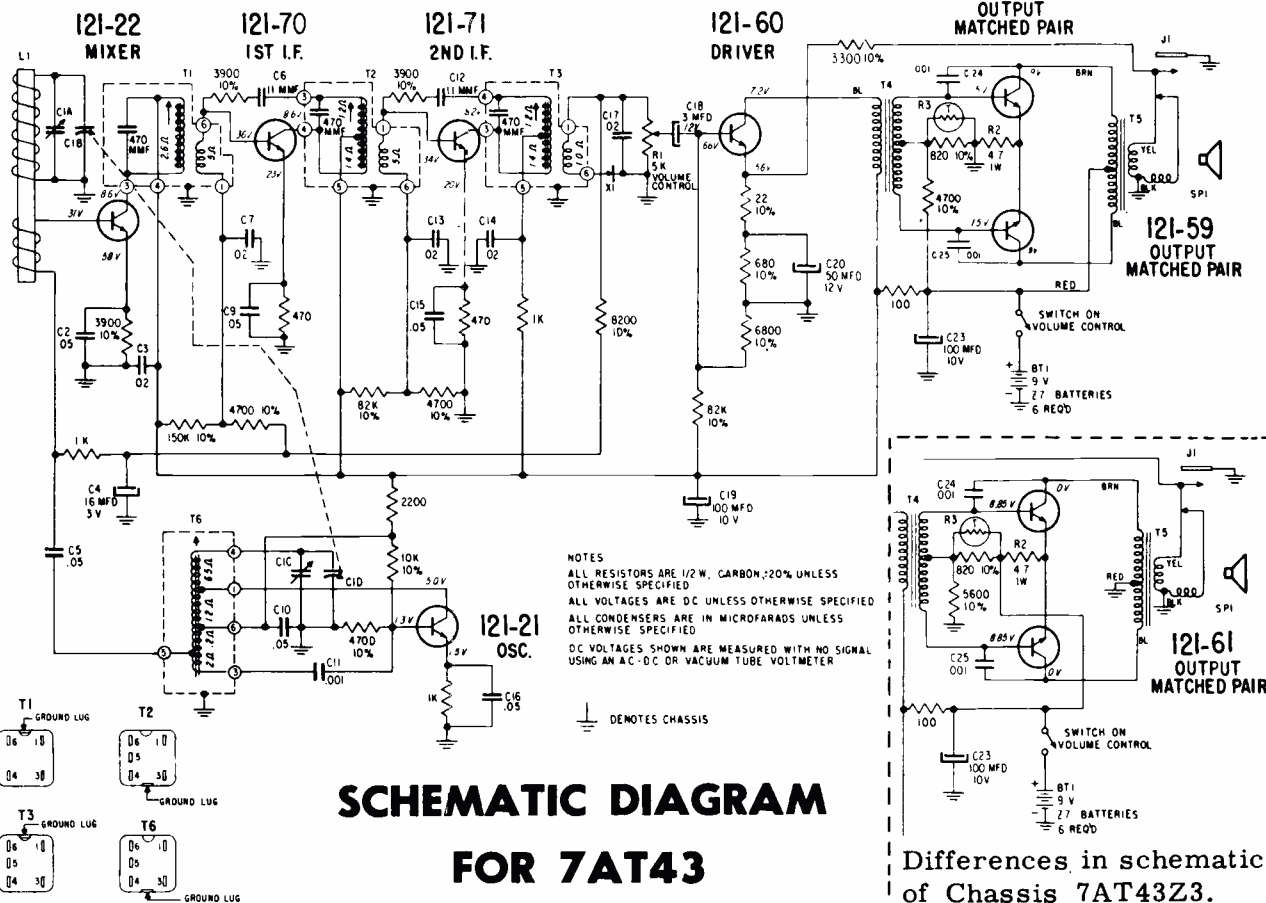
In addition to this, it is important to know the internal battery voltage of the ohm meter as well as battery polarity of the meter leads since incorrectly placing ohm meter leads across an electrolytic condenser with low working voltage may damage the capacitor due to excessive reverse current or excessive voltage.

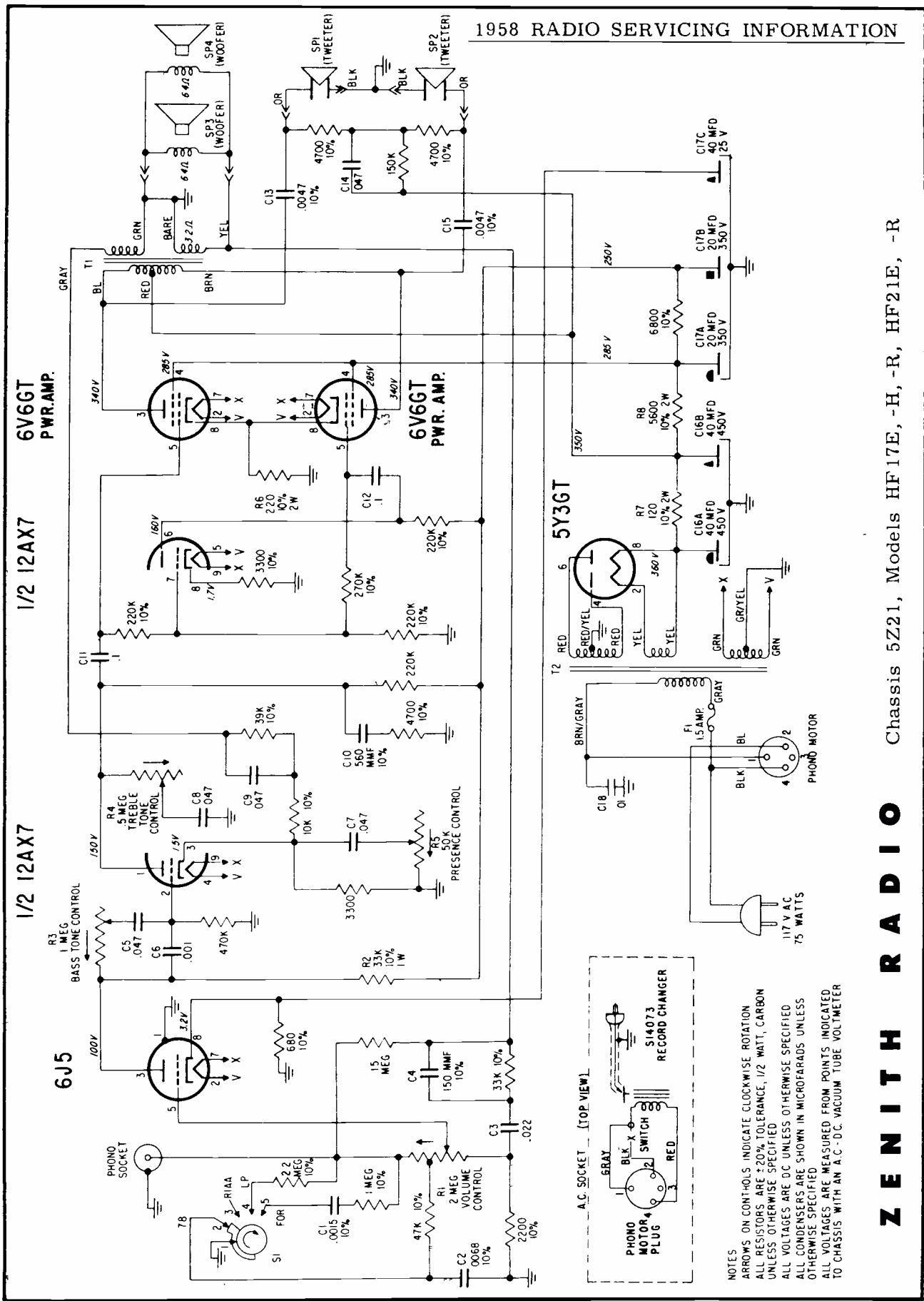
VOLTAGE READINGS

It is suggested that a VTVM with an excellent low range scale be used to measure all circuit voltages. All voltages indicated on the accompanying diagram have been measured under no signal conditions and a battery supply voltage of nine volts. Under these no signal conditions, a check can be made of the batteries. The total voltage should be nine volts.

Use alignment table on page 182 for this model also.

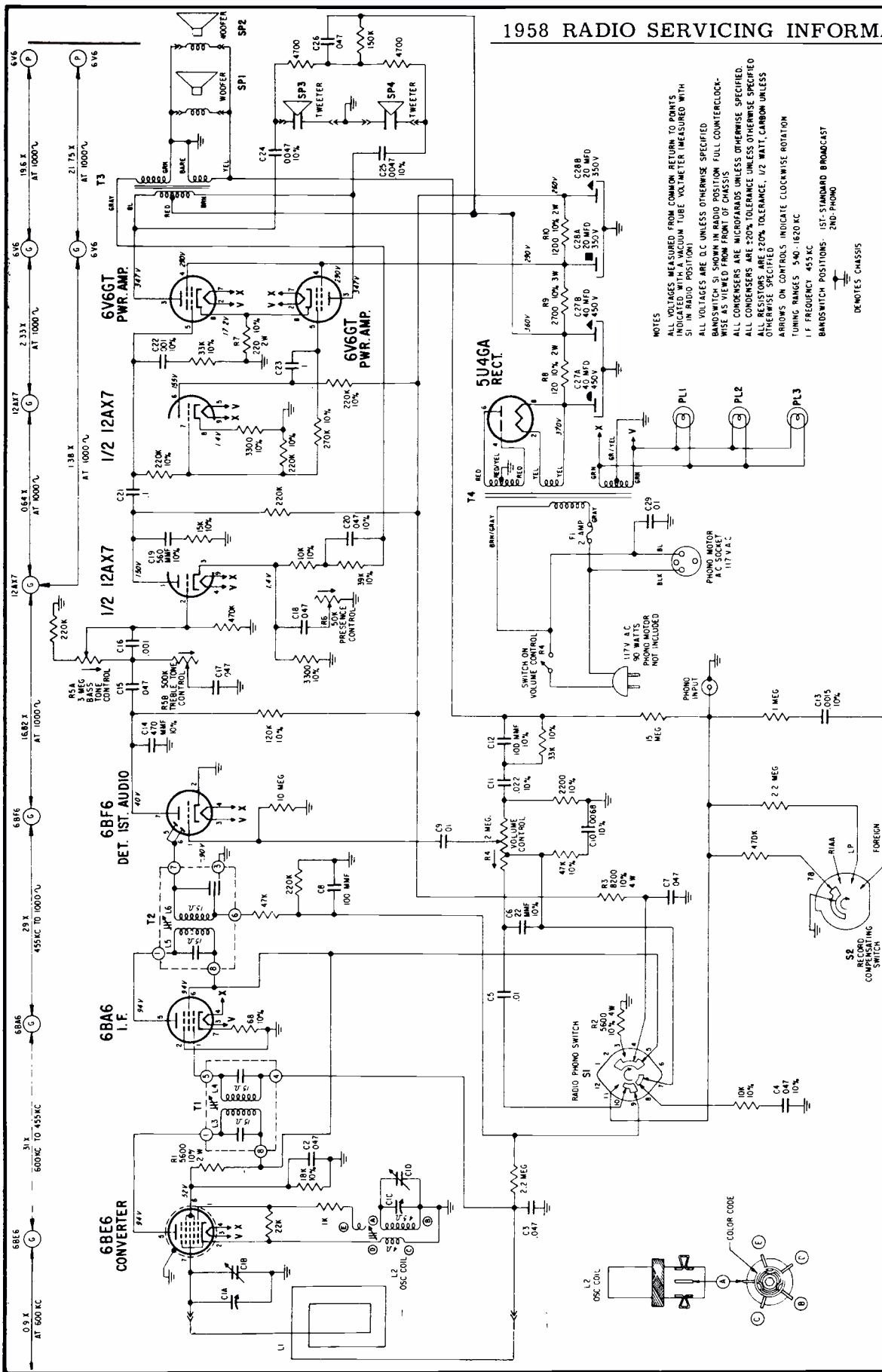
TRANSISTOR & TRIMMER LAYOUT FOR 7AT43





ZENITH RADIO Chassis 5Z21, Models HF17E, -H, -R, HF21E, -R

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 CONDENSERS ARE SHOWN IN MICROFARADS UNLESS OTHERWISE SPECIFIED
 ALL VOLTAGES ARE MEASURED FROM POINTS INDICATED TO CHASSIS WITH AN A.C.-D.C. VACUUM TUBE VOLTMETER



NOTES
 ALL VOLTAGES MEASURED FROM COMMON RETURN TO PRINTS INDICATED WITH A VACUUM TUBE VOLTMETER MEASURED WITH S1 IN RADIO POSITION
 ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
 BANDSWITCH S1 SHOWN IN RADIO POSITION FULL COUNTERCLOCKWISE AS VIEWED FROM FRONT OF CHASSIS
 ALL CONDENSERS ARE MICROFARADS UNLESS OTHERWISE SPECIFIED
 ALL RESISTORS ARE 20% TOLERANCE .1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
 ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION
 TUNING RANGES 540-1620 KC
 1 F FREQUENCY 455 KC
 BANDSWITCH POSITIONS: 1ST-STANDARD BROADCAST 2ND-PHONO

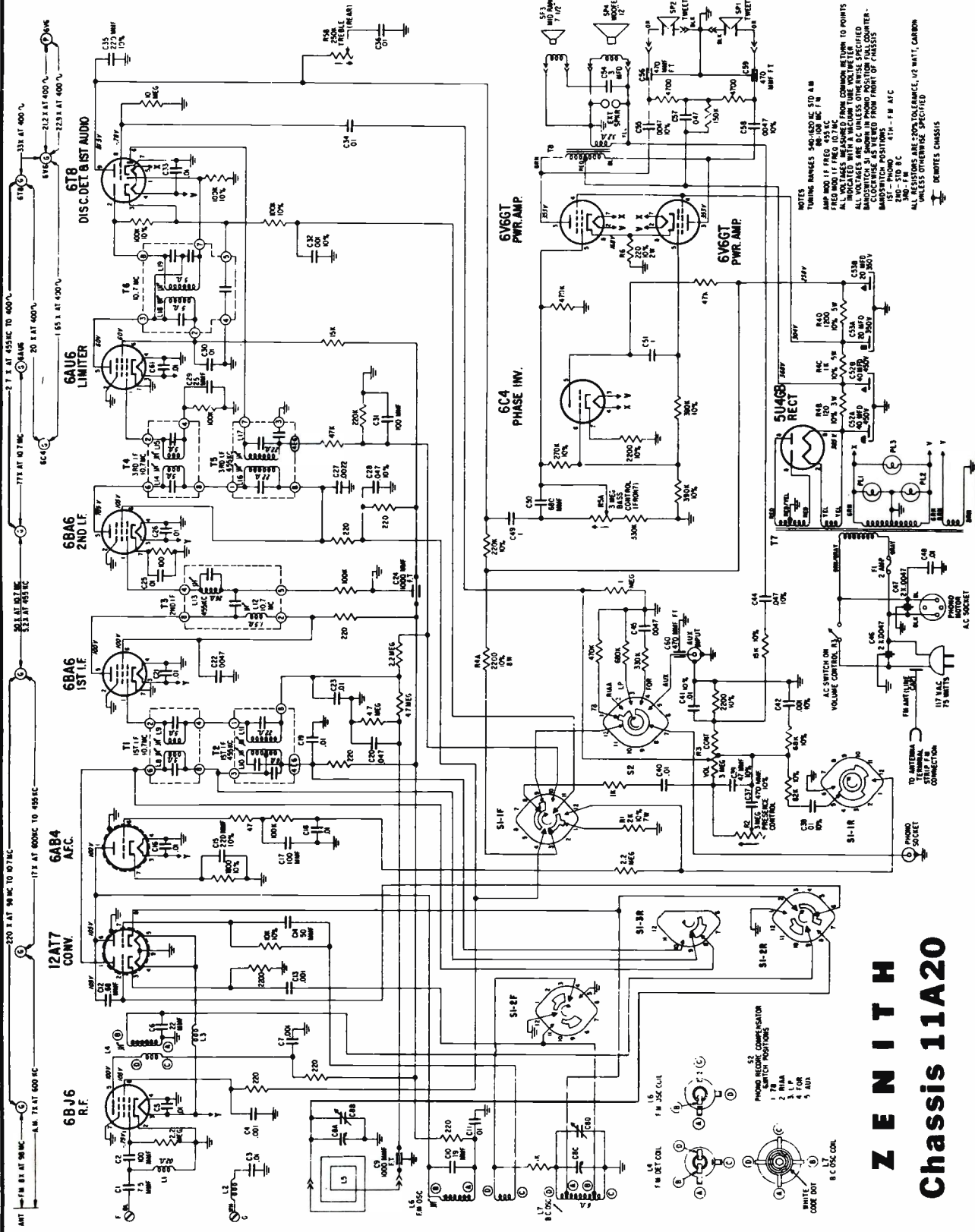
DE NOTES CHASSIS

ZENITH RADIO Chassis 7Z20, Models HF774E, -H, -R

ZENITH RADIO CORPORATION

(Alignment data is on page 189)

HF1178RD MODELS HF1185MD CHASSIS 11A20 HF1185RD



NOTES
TUNING RANGES 540-1650 KC STD AM
AMP MOD IF FREQ 455 KC
FREQ MOD IF FREQ 10 MC
ALL VOLTAGES ARE DC UNLESS OTHERWISE SPECIFIED
ALL RESISTOR VALUES ARE IN OHMS UNLESS OTHERWISE SPECIFIED
RESISTOR POSITIONS AS SHOWN FROM FRONT OF CHASSIS
100K 100,000 OHMS
1M 1,000,000 OHMS
250-510 KC 411-175 MC
UNLESS OTHERWISE SPECIFIED
REWORKS CHASSIS

ZENITH Chassis 11A20

Z E N I T H Alignment Chassis 11A20 and 11A21

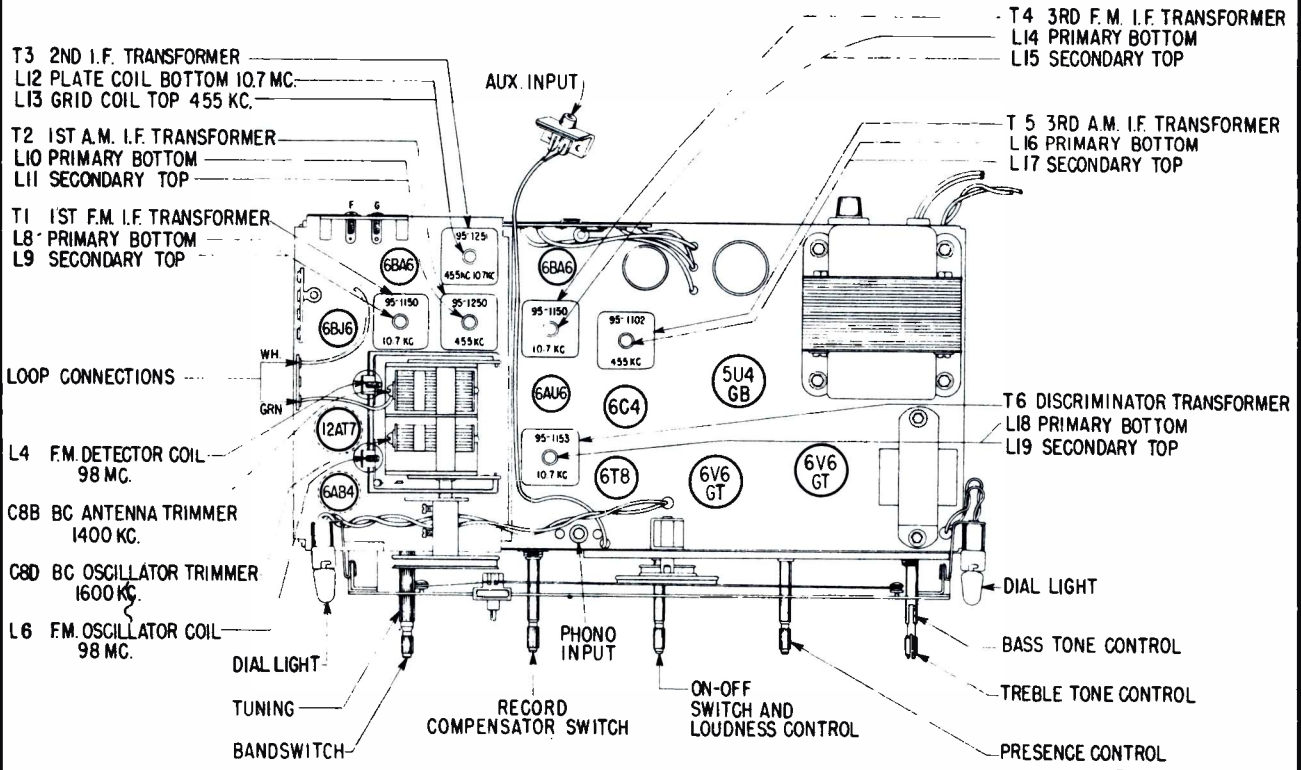
(See page 188 for circuit of 11A20, and page 190 for circuit of 11A21)

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.

OPERATION	CONNECT OSCILLATOR TO	DUMMY ANTENNA	INPUT SIGNAL FREQUENCY	BAND	SET DIAL TO	ADJ. TRIMMERS	PURPOSE
1	Pin 2 12AT7 Converter	.05 mfd.	455 Kc. Modulated	AM	600 Kc.	L10, 11, 13, 16 & 17	Align I.F. channel for maximum output.
2	Antenna Post AM	.05 mfd.	1600 Kc. Modulated	AM	1600 Kc.	C8D	Set oscillator to dial scale.
3	Antenna Post AM	.05 mfd.	1400 Kc. Modulated	AM	1400 Kc.	C8B	Align antenna stage.
4	IMPORTANT: Before attempting to align the FM portion of this receiver the Band switch should be turned to "FM".						
5 (a)	Pin 1 (grid) on 6AU6 limiter	.05 mfd.	10.7 Mc. Unmodulated	FM		L18	Align primary of discriminator for maximum reading.
6 (b)	Pin 1 (grid) on 6AU6 limiter	.05 mfd.	10.7 Mc. Unmodulated	FM		L19	Adjust secondary of discriminator for zero reading.
7 (c)	Pin 1 (grid) on 6BA6 2nd IF	.05 mfd.	10.7 Mc. Unmodulated	FM		L14, 15	Align 3rd IF transformer for maximum reading.
8 (c)	Pin 1 (grid) on 6BA6 1st IF	.05 mfd.	10.7 Mc. Unmodulated	FM		L12	Align primary 2nd IF transformer for maximum reading.
9 (c)	Pin 2 on 12AT7 converter	.05 mfd.	10.7 Mc. Unmodulated	FM		L8, 9	Align 1st. IF transformer for maximum reading.
10 (c)	REPEAT STEPS 7, 8 & 9						
11 (c)	Antenna Post FM (Remove line antenna)	270 ohms	98 Mc. Unmodulated	FM	98 Mc.	L6 Osc. Coil Slug.	Set Oscillator to dial scale.
12 (c) (d)	Antenna Post FM (Remove line antenna)	270 ohms	98 Mc. Unmodulated	FM	98 Mc.	L4 Det. Coil Slug.	Align det. stage to maximum reading.



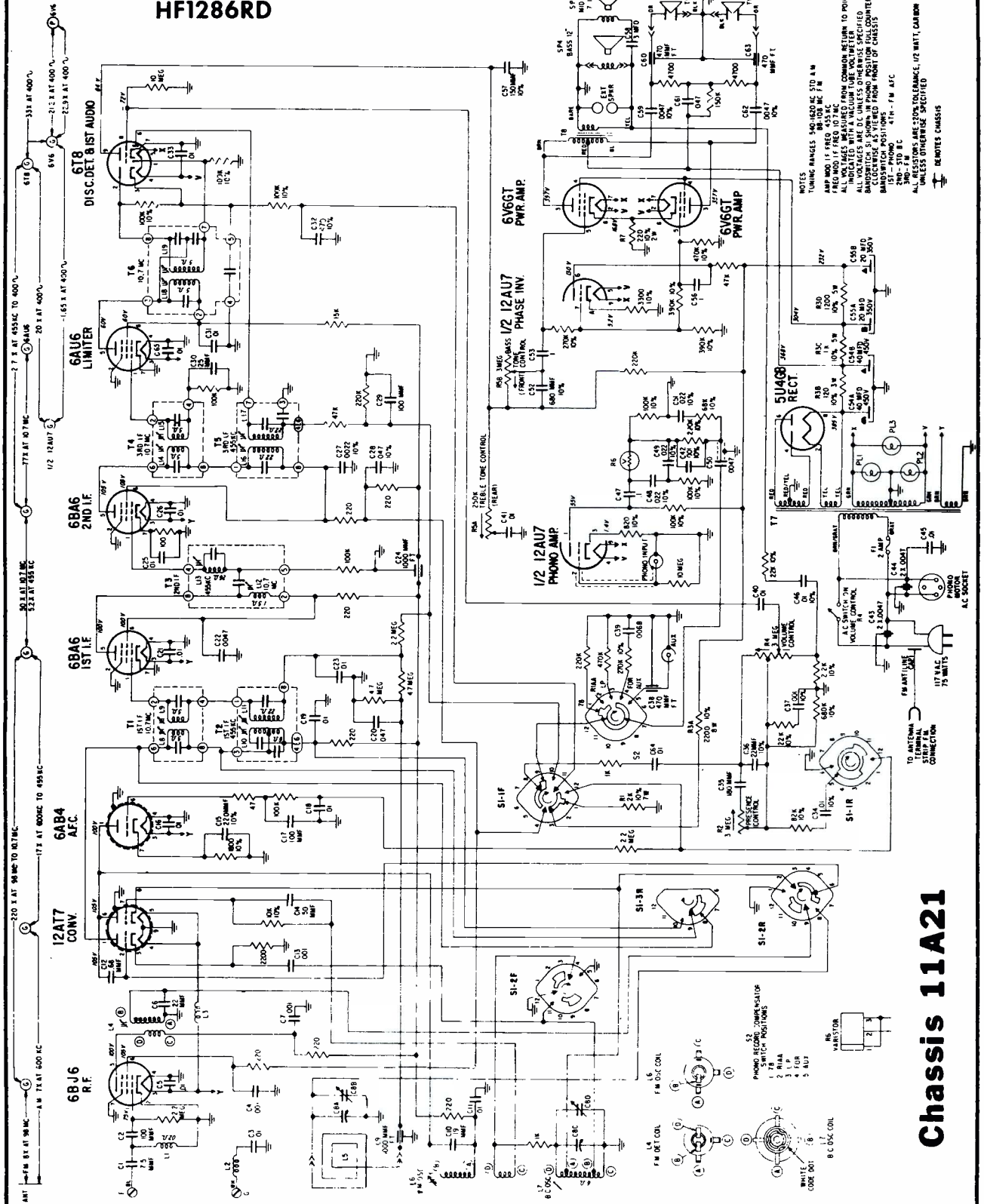
Tube & Trimmer Location Chassis 11A20

(Chassis 11A21 is practically identical in layout except that 12AU7 replaces 6C4)

HF1284D
HF1284ED
MODELS HF1284LD CHASSIS 11A21
HF1284YD
HF1286RD

ZENITH RADIO CORPORATION

(Alignment data is on page 189)



Chassis 11A21

VOLUME R-18, MOST-OFTEN-NEEDED 1958 RADIO SERVICING INFORMATION

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1B1	18	227	14	1581	22	RA-902	P760A
1B11	18	228	14	5578	23	1210	P761A
1C1	18	231	17	8571	24		P765A, -B
1C12	18	237	17	8572	24	<u>Emerson Radio</u>	P766A, -B
1C14	18	242	6	8573	24	851B	
1D1	18	244	6	8576	25	867B	
1D11	18	245	6	9574	26	870B	<u>Montgomery-</u>
1D12	18	248	6	1.41100	24	871B	<u>Ward</u>
1E13	18	263	3	1.41300	24	874B	BR-1102A
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3J1	20	265	3	1.43000	26	876B	BR-1558B
3J1A	19	268	3	1.43500	23	881B	HA-1645A
3J14	20	275	6	1.44000	22	882B	HA-1646A
3J16	20	278	6			883B	
3K1	21	279	6	<u>Buick</u>		884B	<u>Motorola, Inc.</u>
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4P21	8	288	9	981814	34	886B	3F22
4P22	8	289	9	981902	34	888	3H24B-1
4P24	8	292	10	981903	36	120349B	3H24B-2
4P28	8	296	10			120355B	3H24S-1
4S2	16	298	10	<u>Bulova Watch</u>		120363A	3H24S-2
4T2	21	299	10	100	27	120365B	3H25B, -1
4W2	4	303	12	110	27	120366B	3H25M, -1
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5C4	3	331	19	220	27	120372B	5C23+
5D4	6	335	19	230	27	120373B	5K21+
5E4	9	338	19	240	27	120374	5K23+
5RP4, -A	11	341	21	260	27	120398B	5P31A
5RP41	11	347	21	270	27		5P32+
5RP42	11	362	21	270	27	<u>Ford (Auto)</u>	5P33+
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7M15	15	384	13	3748611	42	<u>Gamble-Skogmo</u>	6H26S-1A
7M16	15	402	16			RA48-8158A	6H27+
7M18	15	403	16	<u>Delco</u>			6K22+
8H1	16	404	16	AC-2905	28	<u>General-Elect.</u>	6P34E, -S
8K1	17	HT2236	21	AC-2906	30	T105	6X31+
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221	14	8990543	92	987727	30	C416, -A, -B	7MX
				987730	42	C417	BKA 7X
				988671	38	C420	CTA 7X
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				989001	48	P711C, -C,	8M
				989002	50	P725	8MX
				989127	52	P726	CTA 8X
				989129	42	P745A	CTM8X
				989131	46	P746A	15KT24+
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