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1958

Volume 18

RADIO DIAGRAMS

and Servicing Information

Compiled by

M. N. BEITMAN

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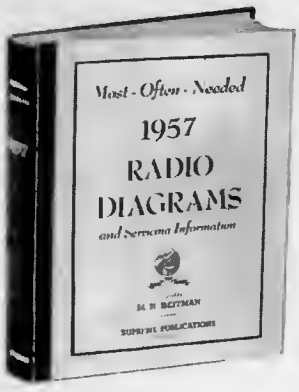

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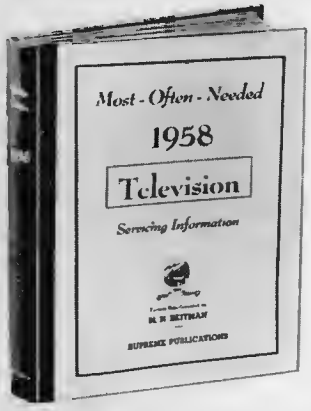

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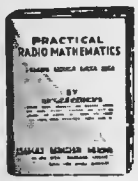

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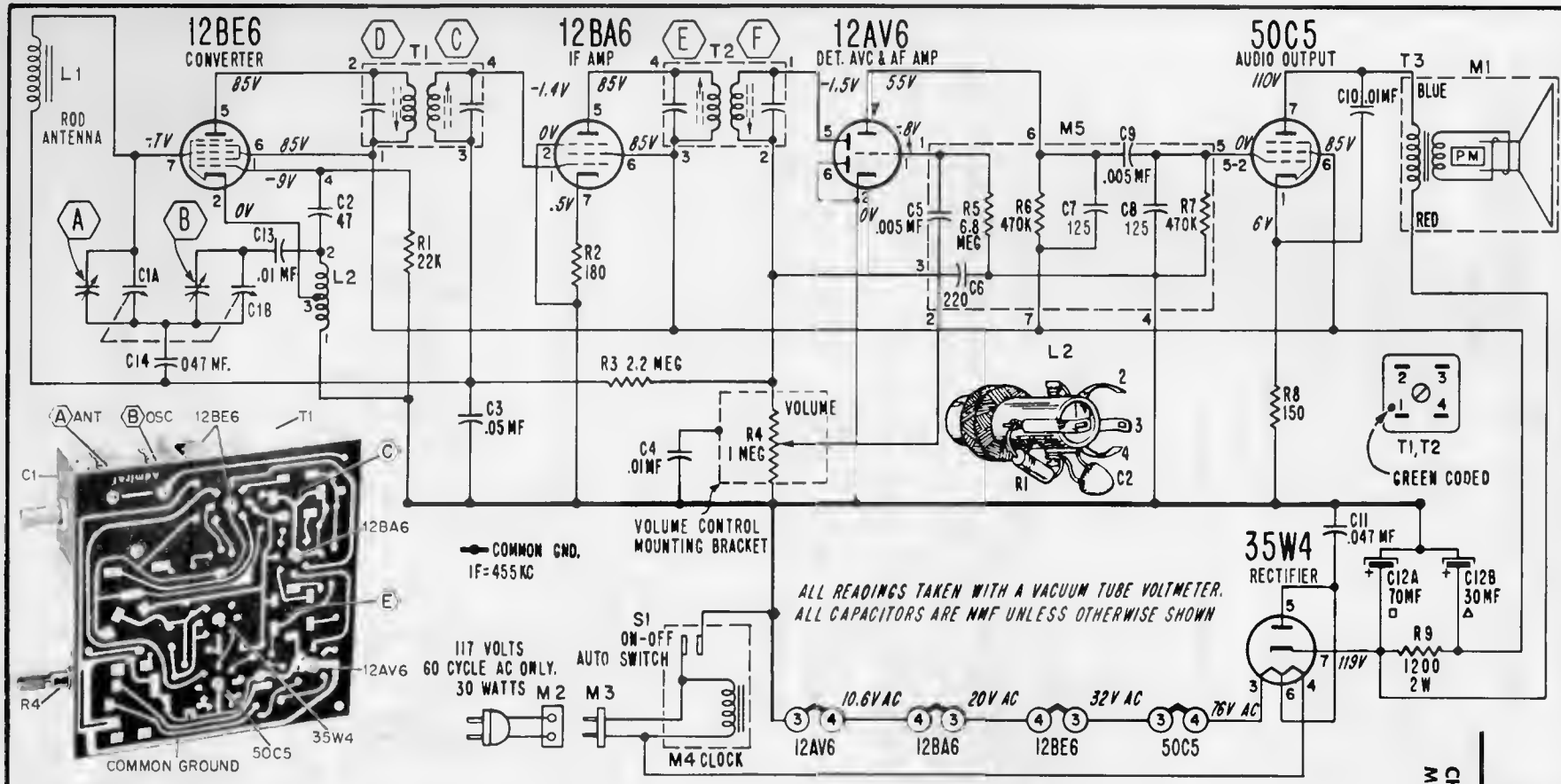

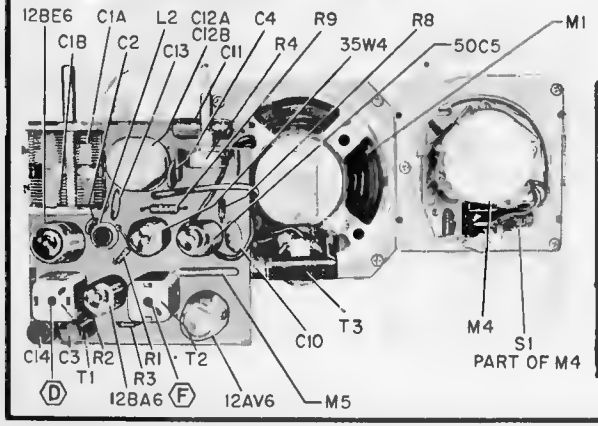

ALIGNMENT PROCEDURE

STEP	CONNECTION OF SIGNAL GENERATOR	SIGNAL GENERATOR FREQUENCY	RECEIVER GANG SETTING	ADJUSTMENT
1	Through o .1 mf copacitor to stator, Antenna section of gang tuning capacitor	455 KC	Gang fully open	"F", *"E", "D" and *"C" for maximum output
2	Same as "STEP 1"	1620 KC	Gong fully open	"B" for maximum output
3	Radiated Signal. Loop of severol 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 5C4
MODELS 263 · 264 · 265 · 268

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.

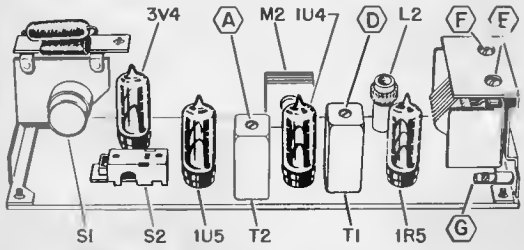

Figure 1. Top View of Chassis 200. Tube Locations and Alignment Points Shown.

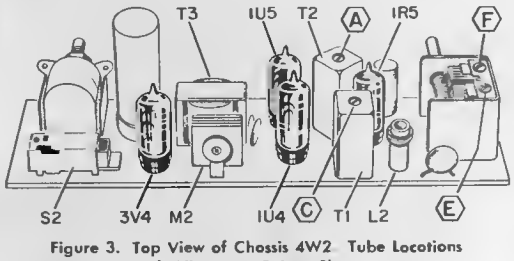

Figure 3. Top View of Chassis 4W2 Tube Locations and Alignment Points Shown.

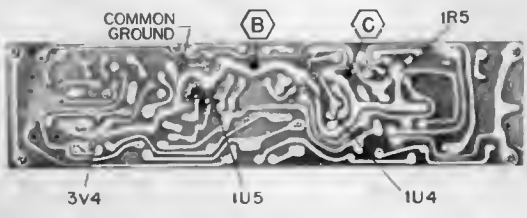

Figure 2 Bottom View of Chassis 200. Tube Locations and Alignment Points Shown.

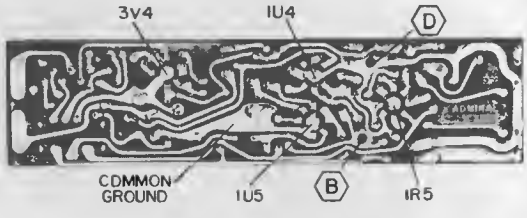

Figure 4. Bottom View of Chassis 4W2. Tube Locations and Alignment Points Shown.

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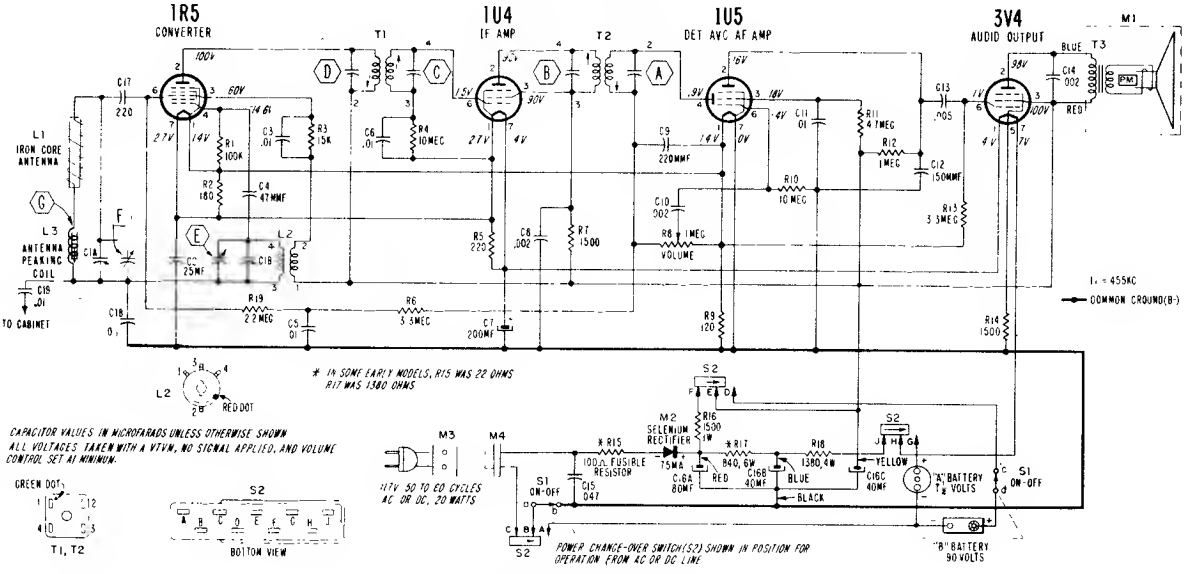
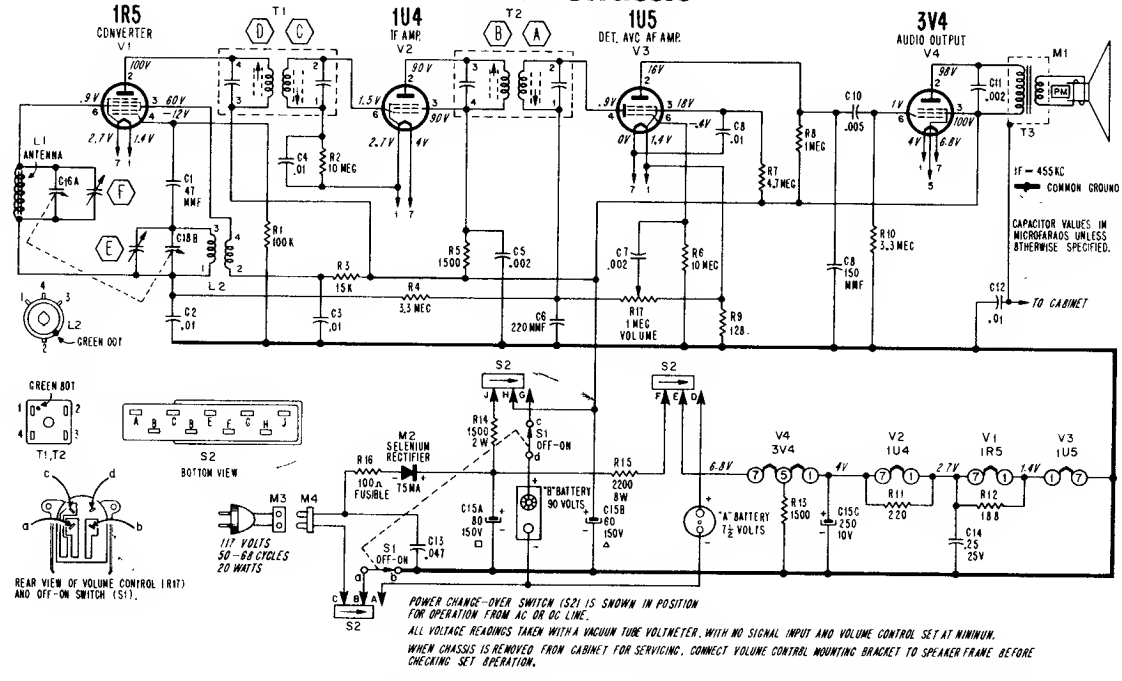
CHASSIS 200 and 4W2
MODELS 202 • 215 • 217 • 218

(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

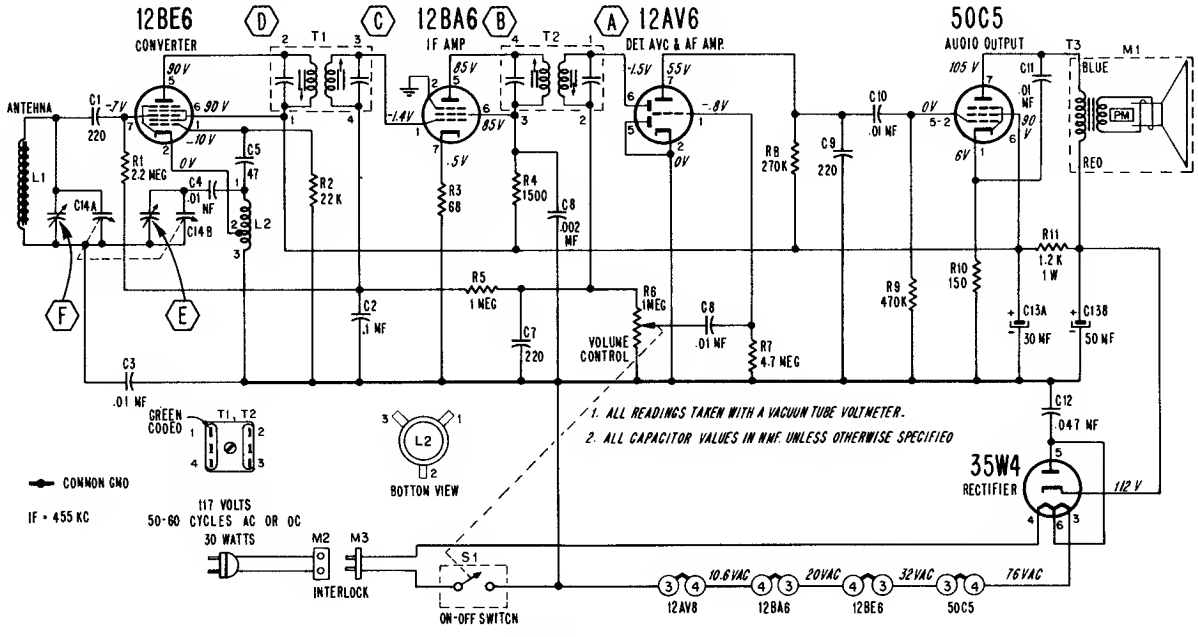
Figure 2, refers to the foil side of the printed circuit board. It shows alignment points, tube locations, and location of the common ground line.

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

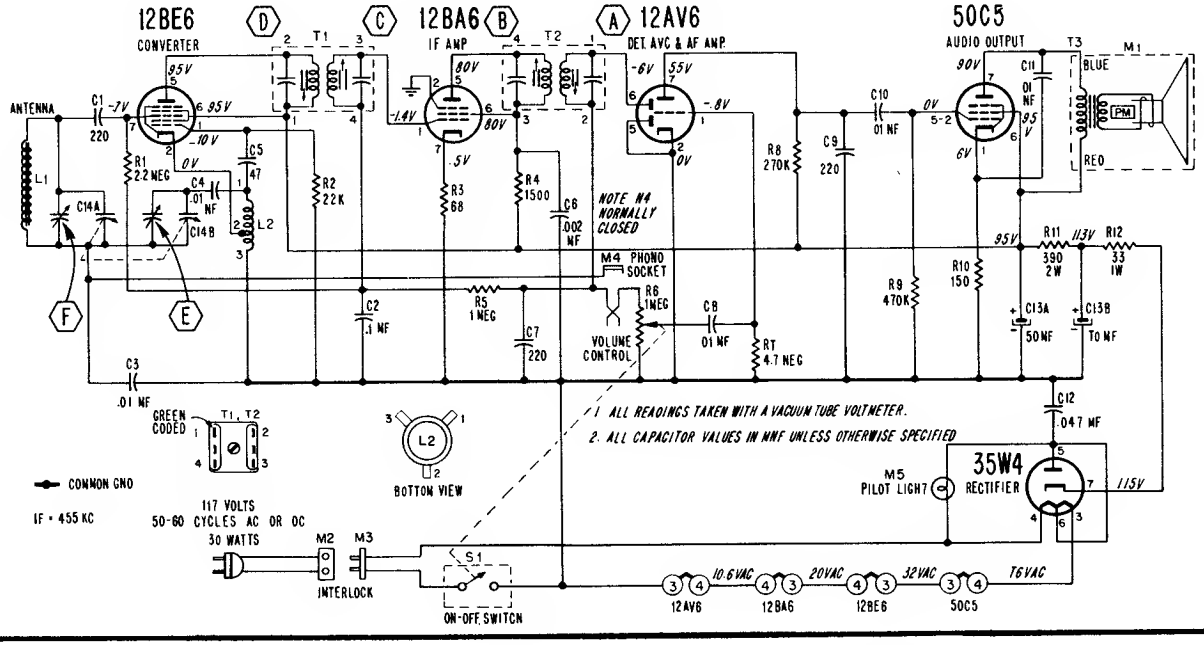
Figures 3 and 4 show the location of all resistors, capacitors, coils and transformers.

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)
5D4 (275 • 278 • 279)

(Continued from page 6)

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.

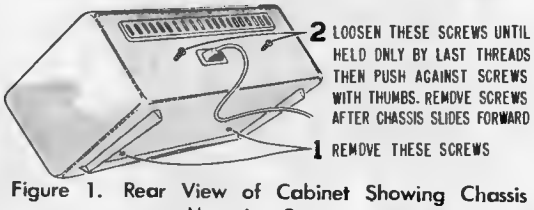

Figure 1. Rear View of Cabinet Showing Chassis Mounting Screws.

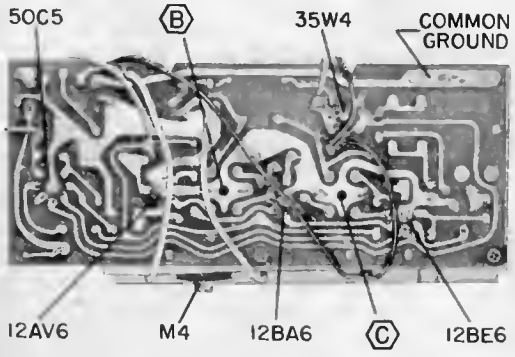

Figure 2. Bottom View of 5D4 Chassis Showing Alignment Points and Tube Locations. 5B4 chassis has same location for tubes and alignment points. Common ground is also the same.

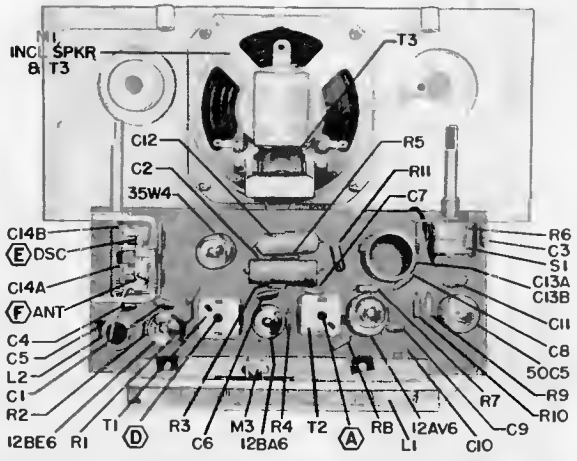

Figure 3. Top View of 5B4 Chassis Showing Location of Components and Alignment Points.

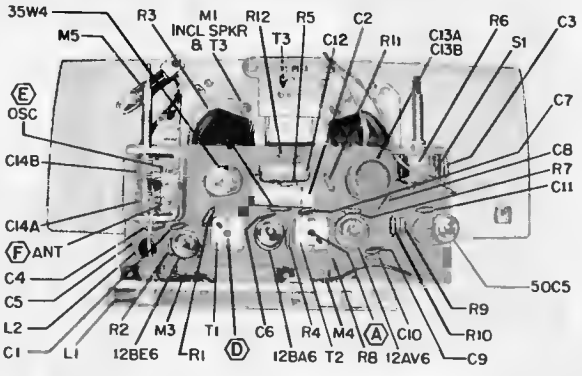

Figure 4. Top View of 5D4 Chassis Showing Location of Components and Alignment Points.

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 IF 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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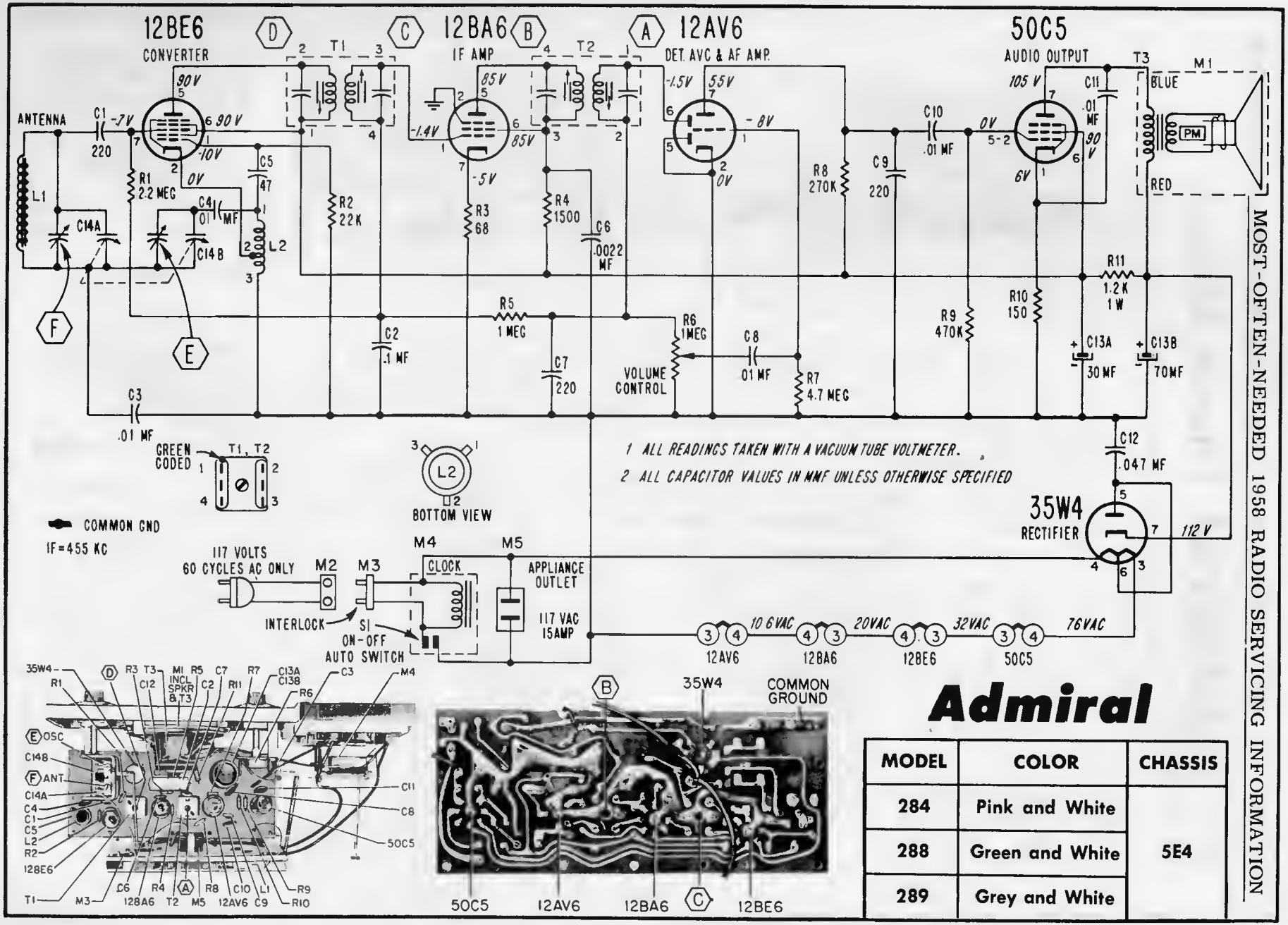
CHASSIS 4P2

MODELS 4P21 · 4P22 · 4P24 · 4P28

Top View of Chassis Showing Parts Locations

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



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MODEL	COLOR	CHASSIS
284	Pink and White	5E4
288	Green and White	
289	Grey and White	

Admiral Chassis 5F4

Models 292, 296, 298, 299

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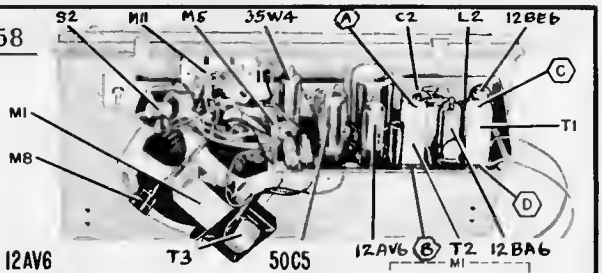
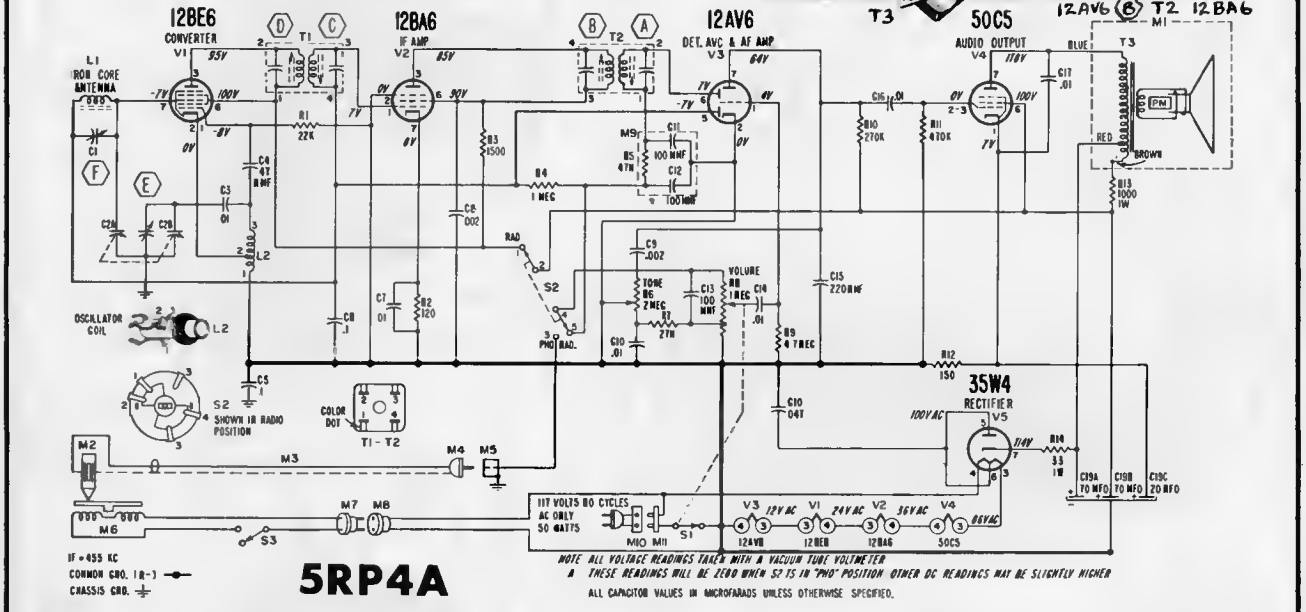
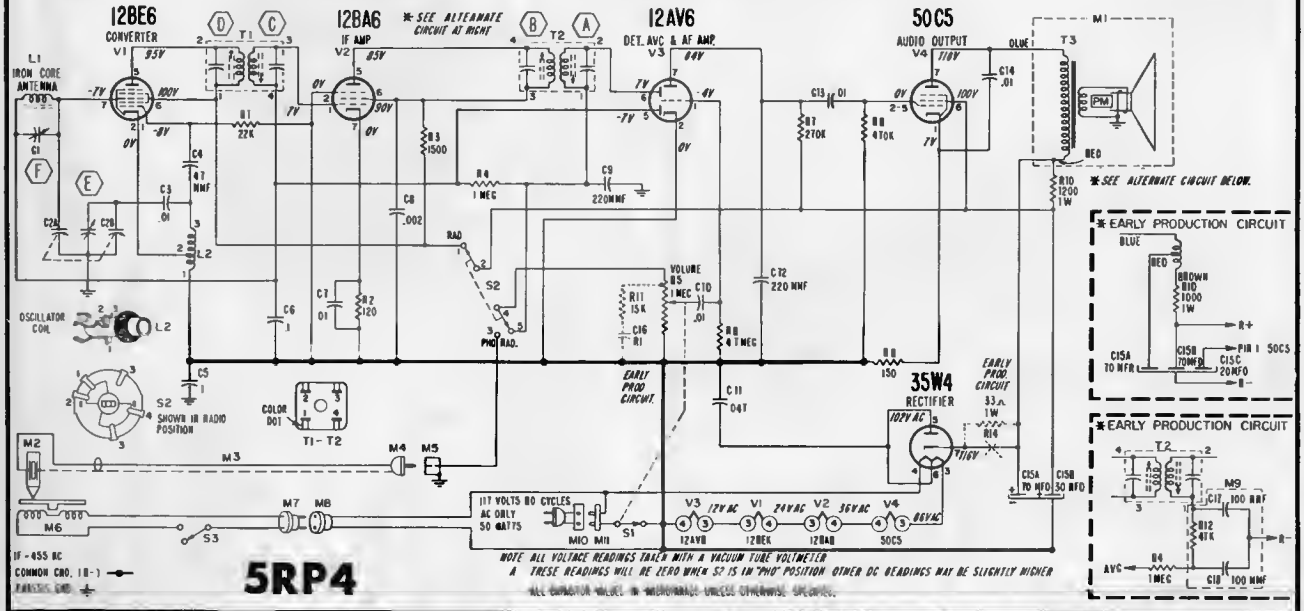
CHASSIS 5RP4, 5RP4A
MODELS 5RP41, 5RP42



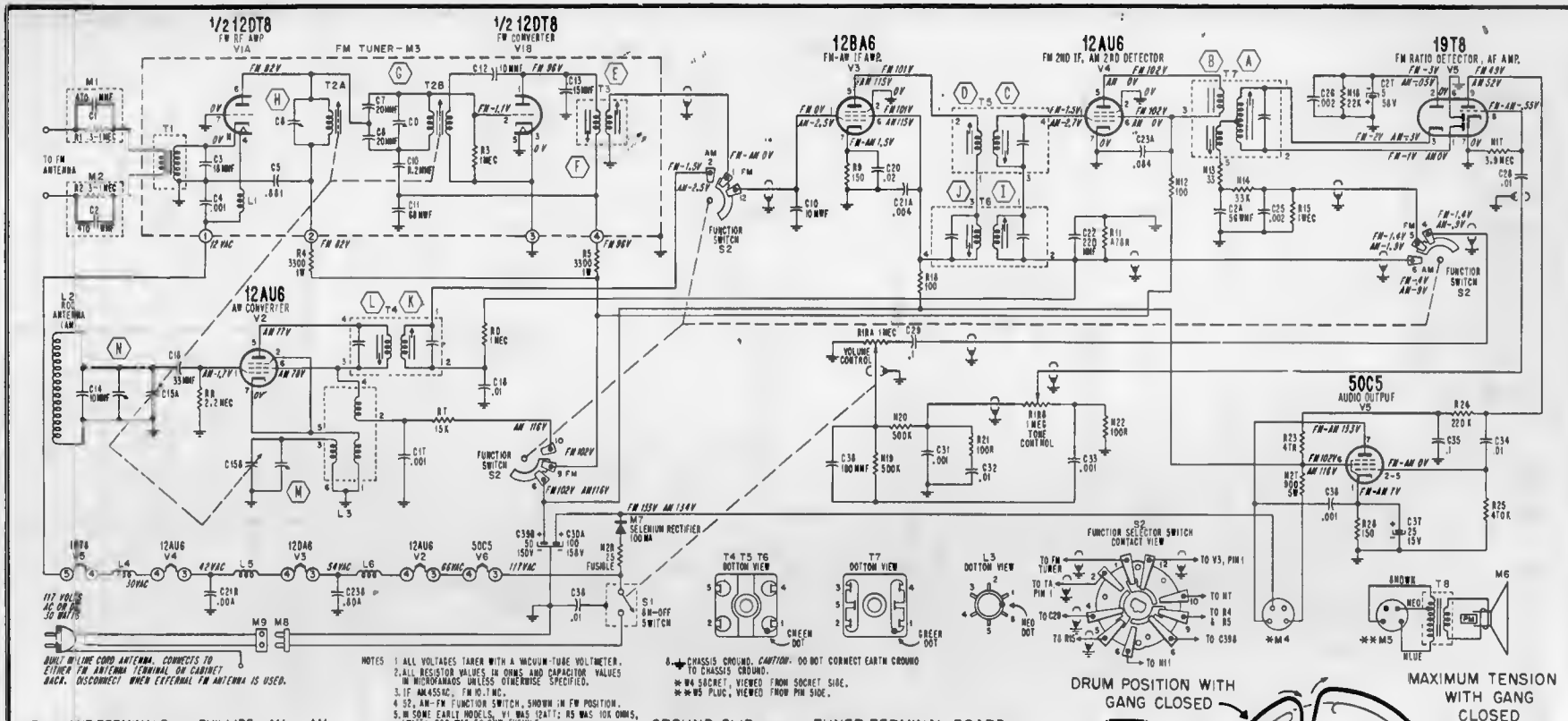


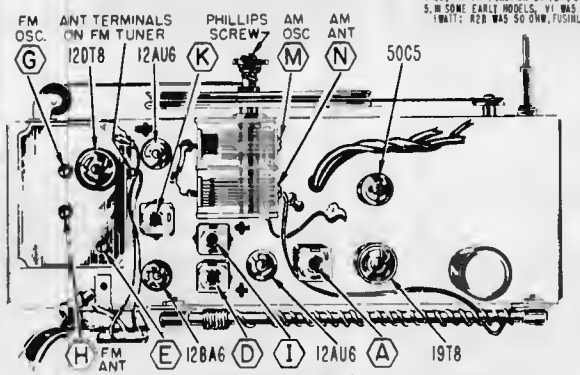
5RP4A



5RP4

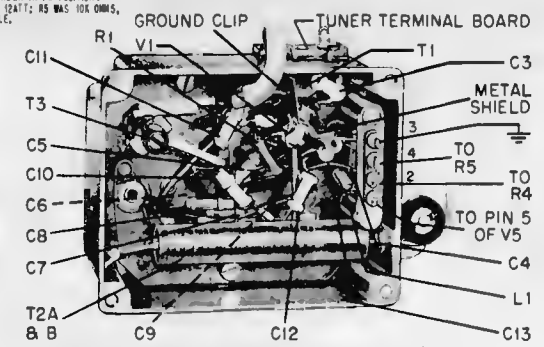
Step	Connection Of Signal Generator	Signal Generator Frequency	Receiver Gang Setting	Adjustment
1	Through a .1 mf capacitor to pin 7 of the 12BE6 (Converter) tube.	455 KC	Gang fully open	"A", *"B", "C" and "D" for maximum output
2	Same as "Step 1"	1620 KC	Gang fully open	"E" for maximum output
3	Radiated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



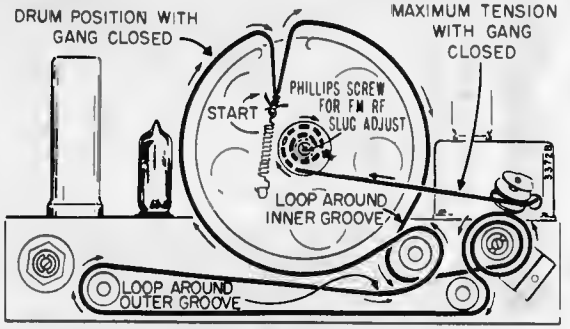


Top View of Chassis (tube locations and alignment points shown).

INTERMEDIATE FREQUENCY:
AM, 455 KC.
FM, 10.7 MC.



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



Dial Stringing (present production models).

MODEL	COLOR	CHASSIS
303	Blond	6B3
304	Sierra	

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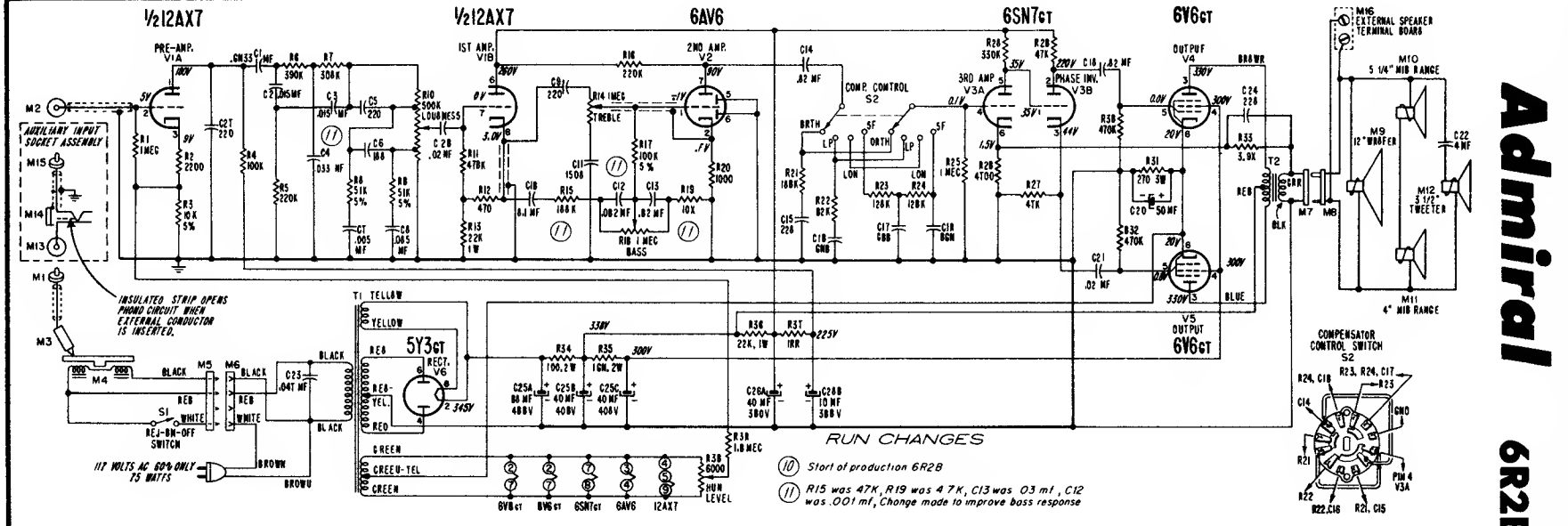
Admiral 6R2B



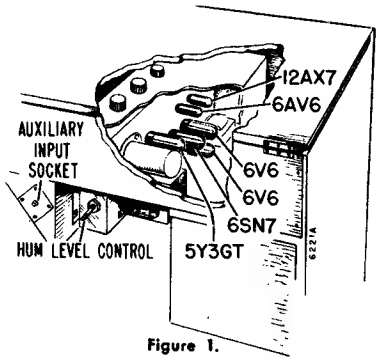


Figure 1.

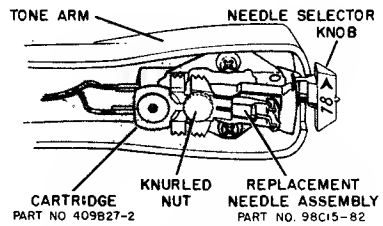


Figure 2.

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.

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 V1A 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

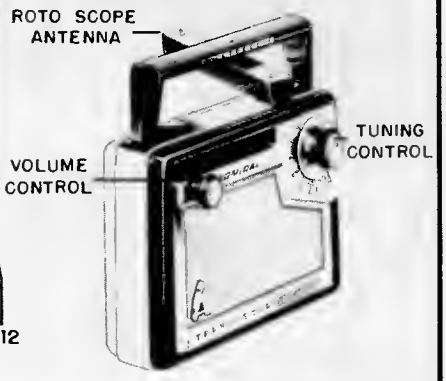
Voltage readings made in reference to chassis ground.

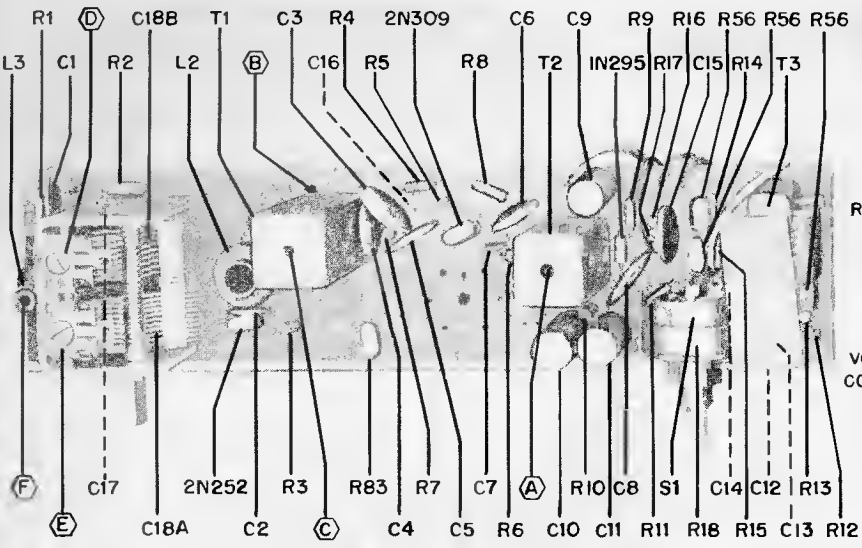
HI-FI CONSOLE PHONOGRAPH

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

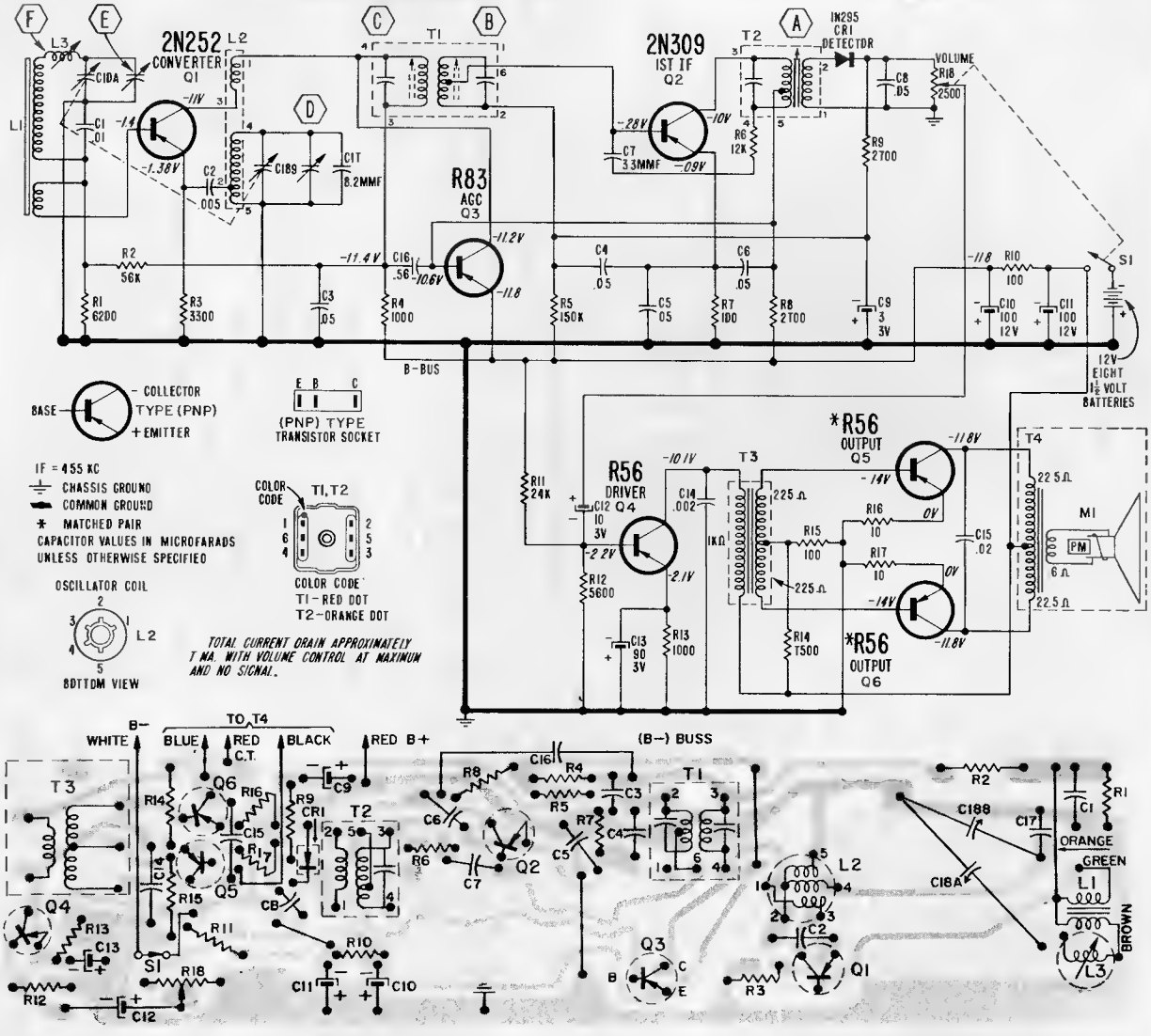
Admiral
6S2 CHASSIS

Models 221, 227, 228





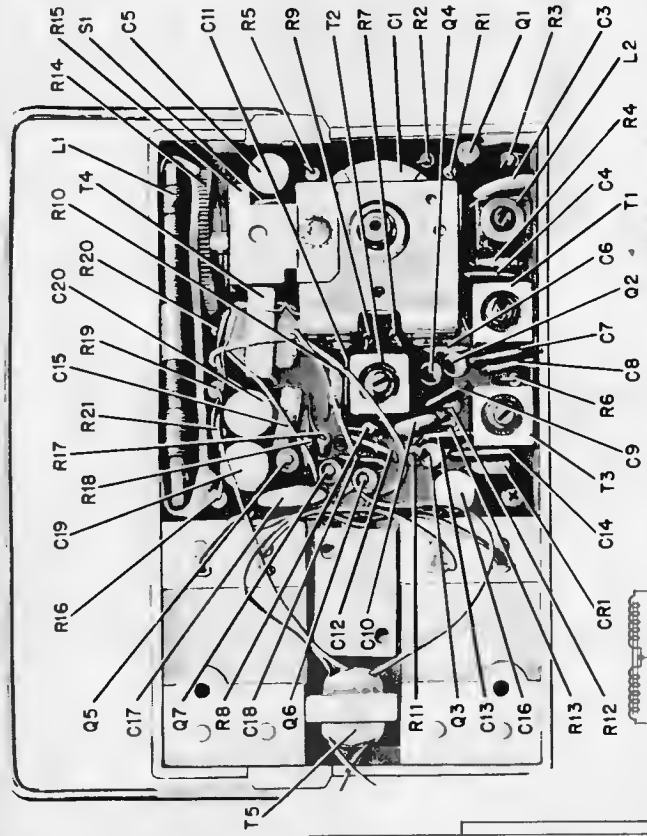
INTERMEDIATE FREQUENCY: 455 KC.

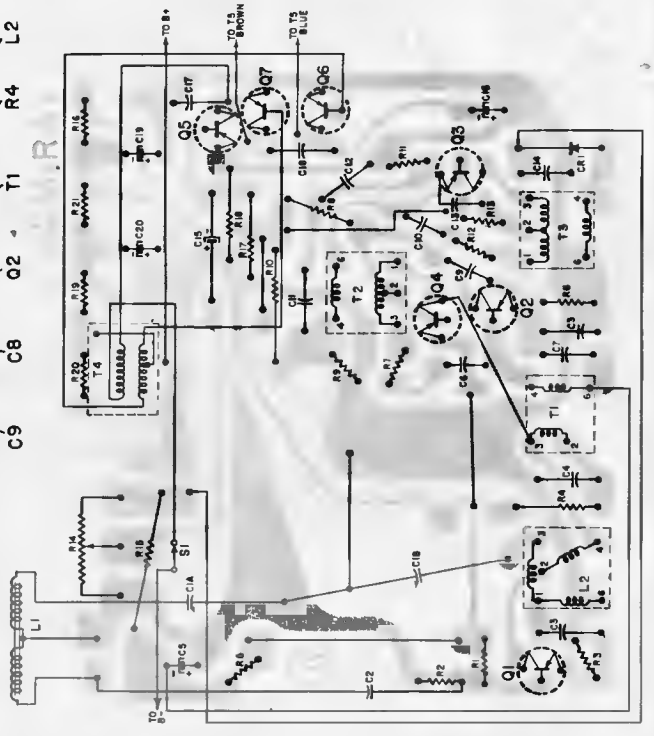


View of Printed Wiring Board. NOTE: Gray area represents printed wiring, black symbols and lines represent components, wiring and connections on opposite side.

Admiral

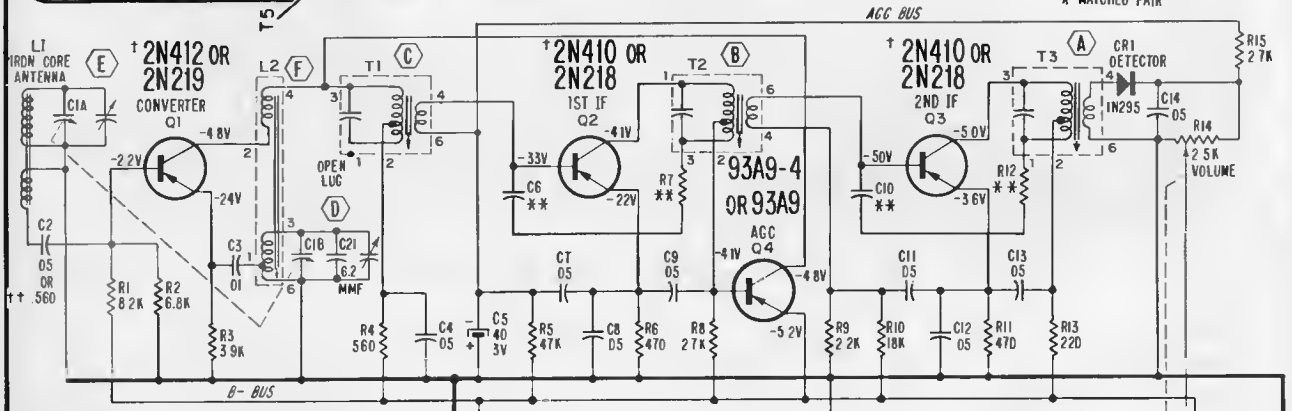
CHASSIS 7M1
MODELS 7M11 · 7M12 · 7M14 · 7M15 · 7M16 · 7M18

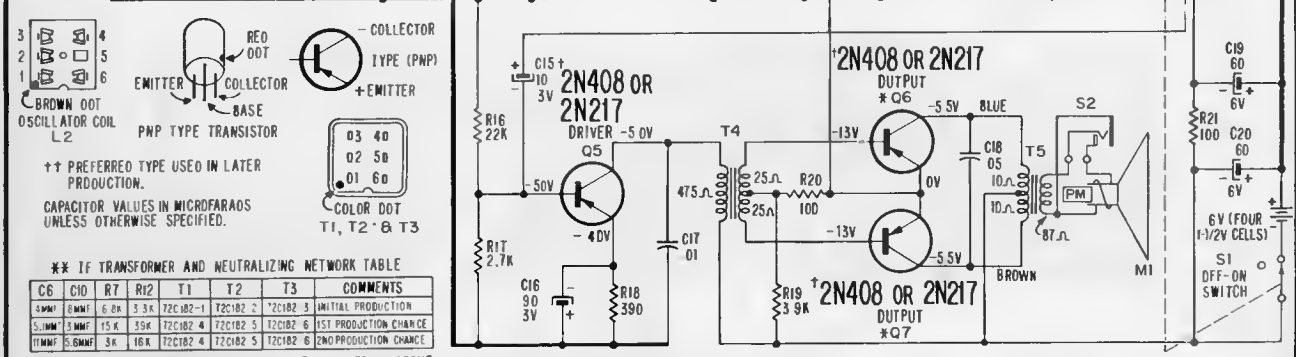




I.F. 455 KC.

IF = 455KC
COMMON GROUND
* MATCHED PAIR





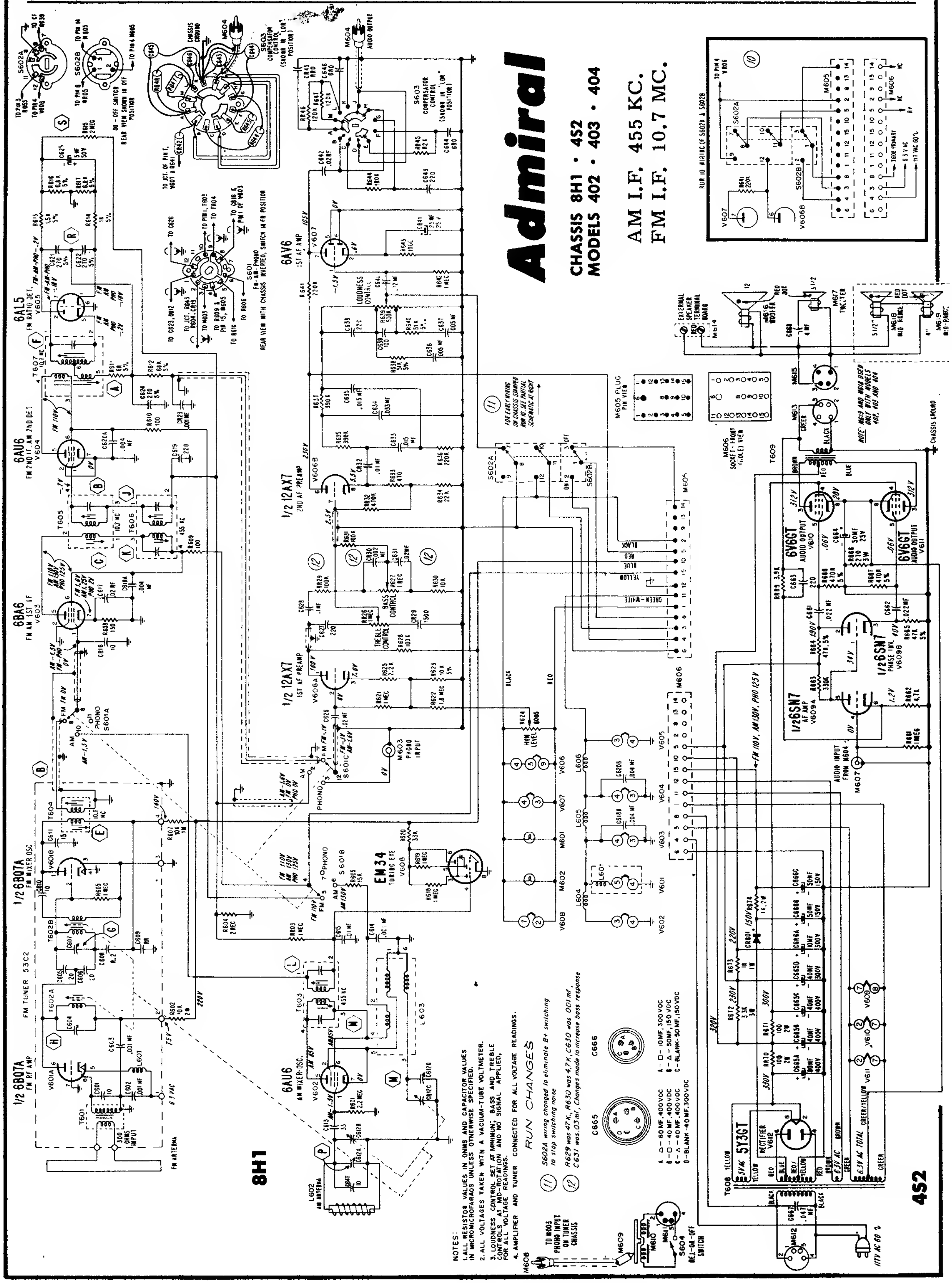
** IF TRANSFORMER AND NEUTRALIZING NETWORK TABLE

C6	C10	R7	R12	T1	T2	T3	COMMENTS
6MMF	8MMF	6.8K	3.3K	72C182-1	72C182-2	*72C182-3	INITIAL PRODUCTION
5.1MMF	7MMF	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.

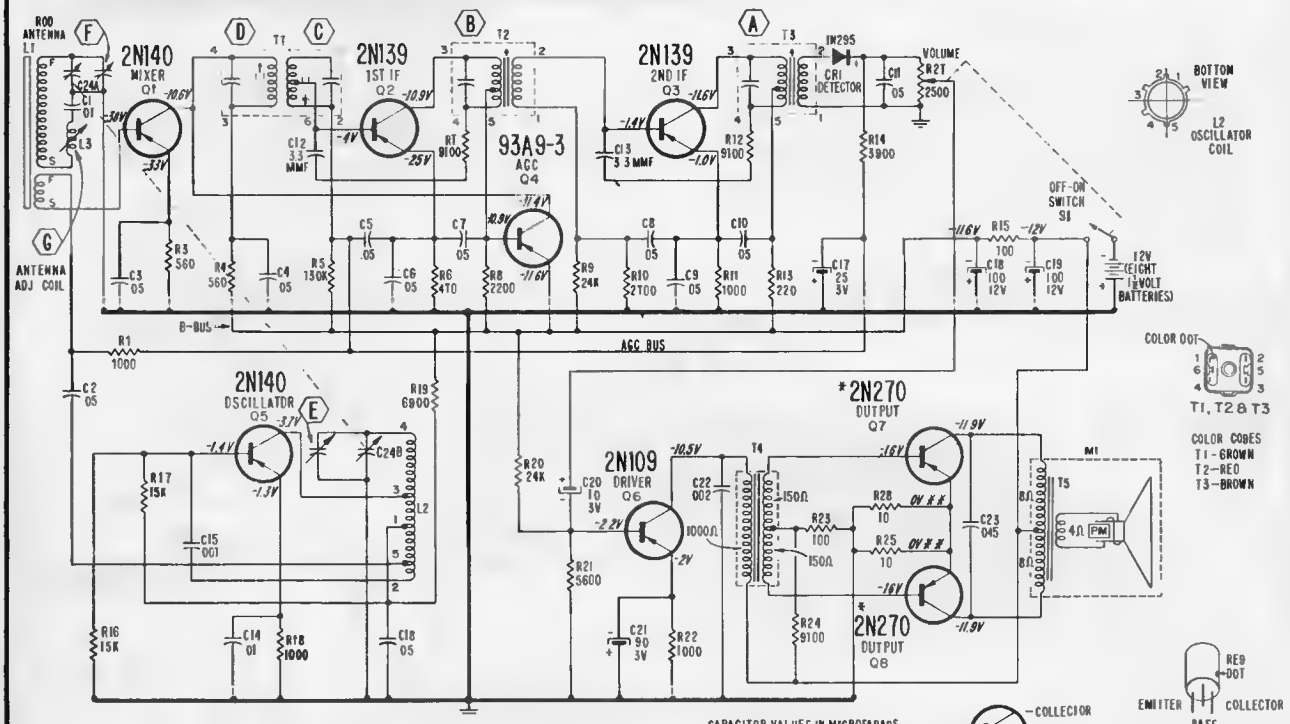
† 400 SERIES TRANSISTORS USED IN LATER PRODUCTION CHASSIS INTERCHANGEABLE WITH CORRESPONDING 200 SERIES SHOWN

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

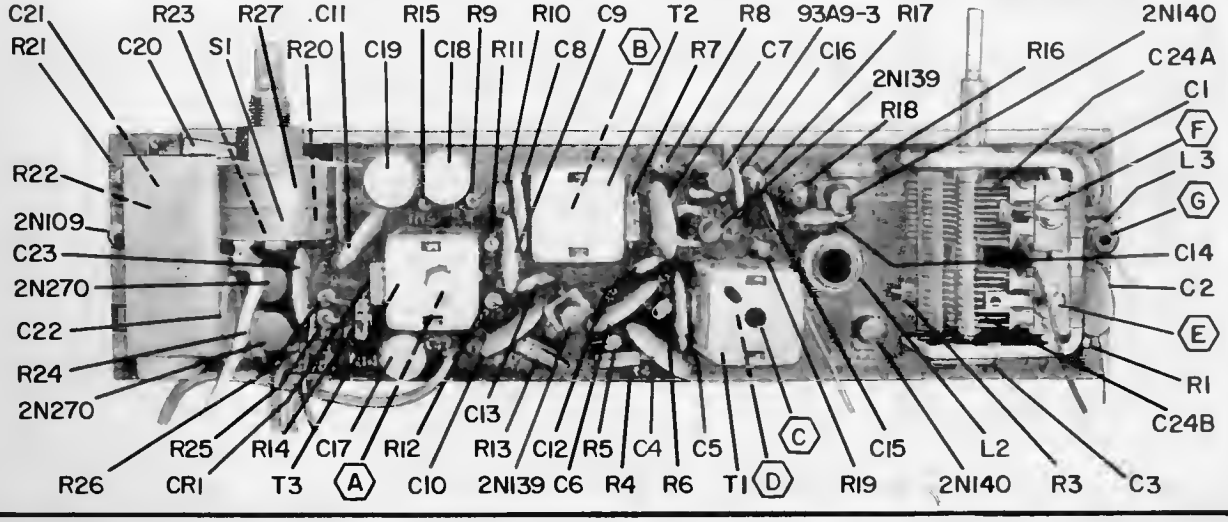

Admiral
CHASSIS 8H1 · 4S2
MODELS 402 · 403 · 404
AM I.F. 455 KC.
FM I.F. 10.7 MC.
8H1
4S2
NOTES:
1. ALL RESISTOR VALUES IN OHMS AND CAPACITOR VALUES IN MICROMICROFARADS UNLESS OTHERWISE SPECIFIED.
2. ALL VOLTAGES TAKEN WITH A VACUUM-TUBE VOLTMETER.
3. LOUDNESS CONTROL SET AT MINIMUM; BASS AND TREBLE CONTROLS AT MID-ROTATION AND NO SIGNAL APPLIED, FOR ALL VOLTAGE READINGS.
4. AMPLIFIER AND TUNER CONNECTED FOR ALL VOLTAGE READINGS.
RUN CHANGES
(11) S602A wiring changed to eliminate B+ switching to stop switching noise
(12) R629 was 4.7K, R630 was 4.7K, C630 was .001 mf, C631 was .03 mf. Changes made to increase bass response

Admiral 8K1 CHASSIS

Models 231, 237



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



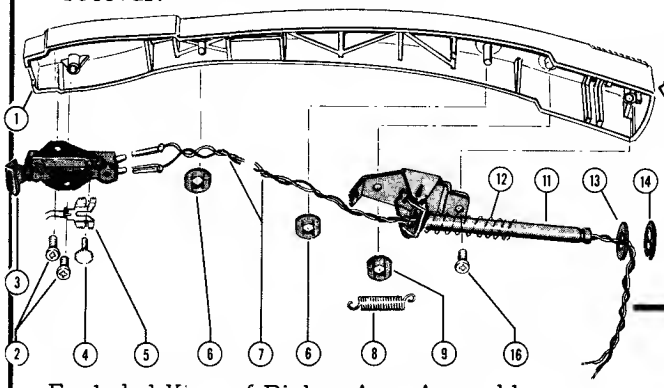
Admiral

CHASSIS 1B1·1C1·1D1

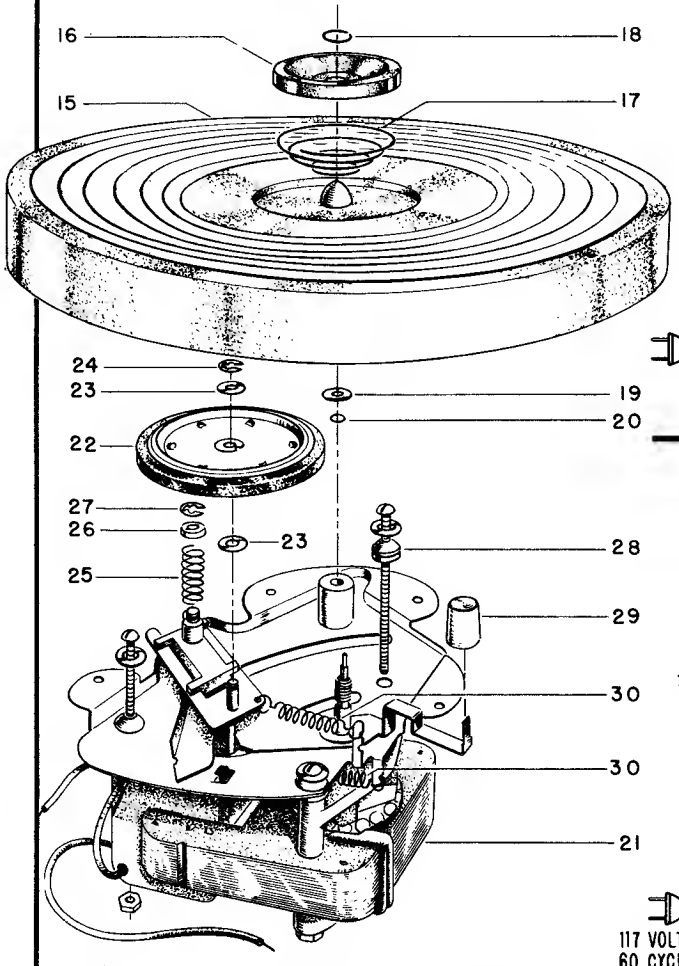
MODELS 1B11·1C12·1C14·1D11·1D12·1E13·1E14

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.

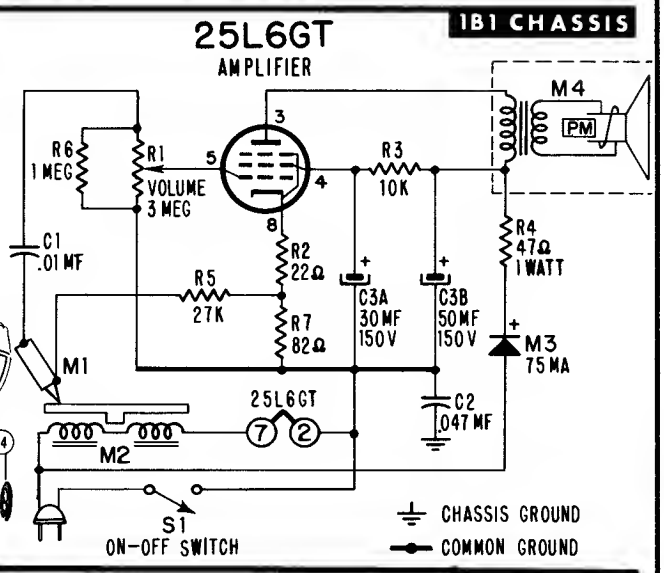


Exploded View of Pickup Arm Assembly.

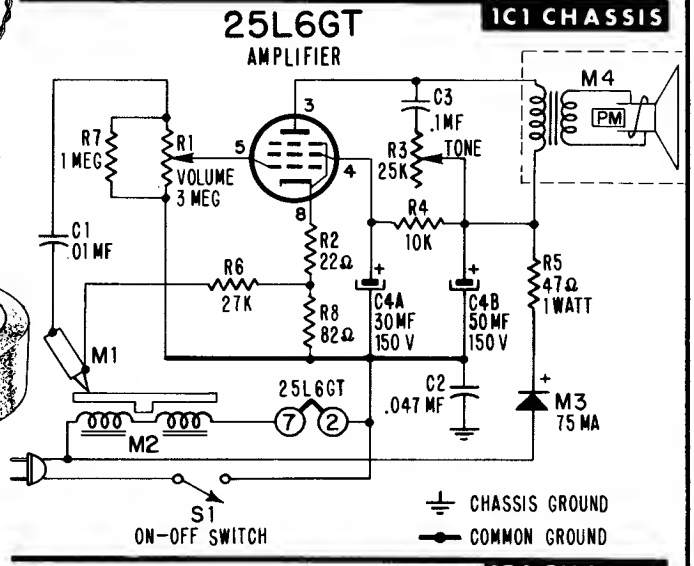


Exploded View of Motor and Turntable.

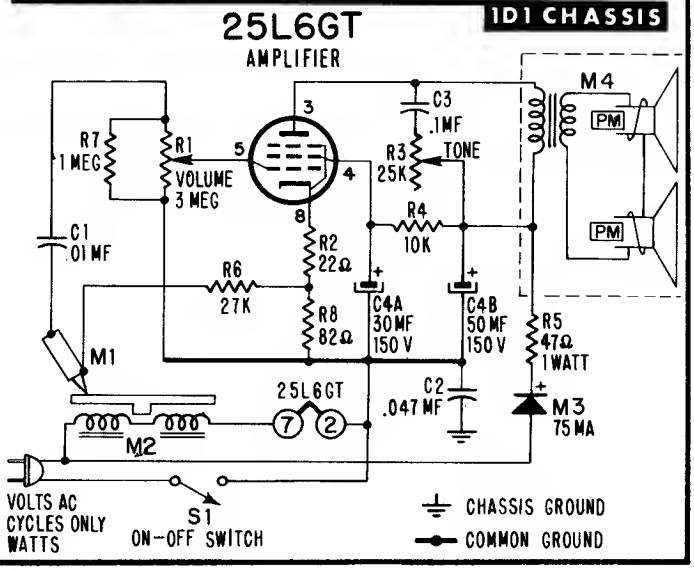
1B1 CHASSIS



1C1 CHASSIS



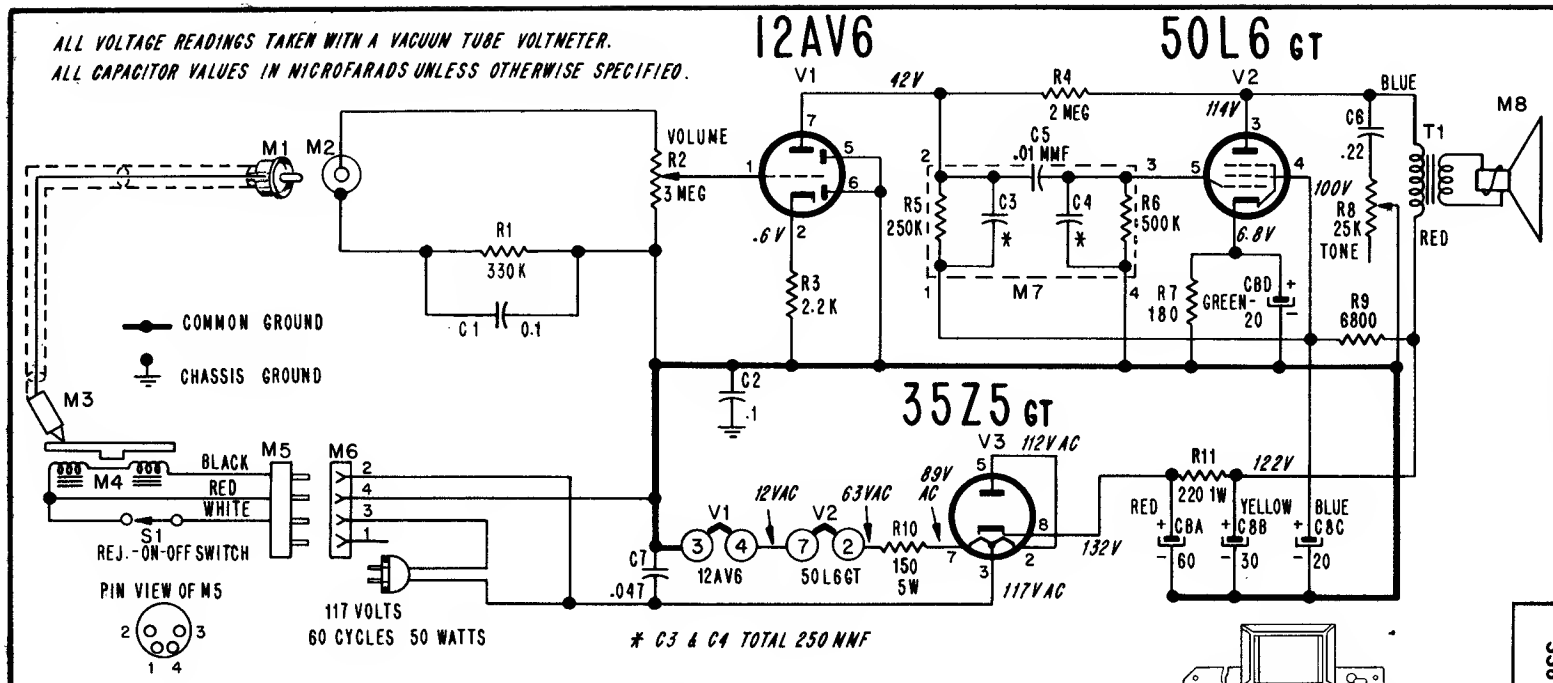
1D1 CHASSIS



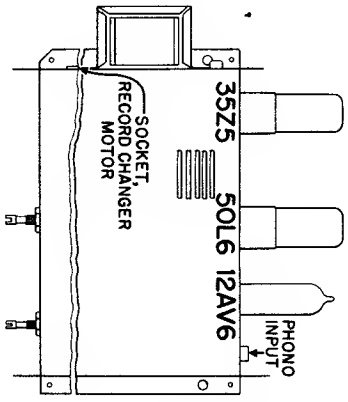
Admiral

CHASSIS 3J1A

PORTABLE PHONOGRAPH



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



TROUBLE SHOOTING HINTS

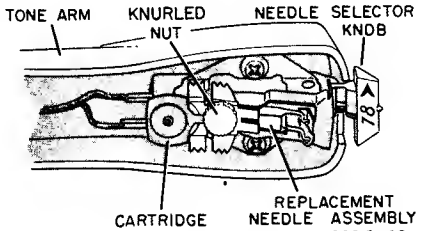
If the phonograph sounds weak or distorted, examine the needles for wear. A worn needle will cause excessive needle scratch and a harshness of treble tones. Test the tubes by substitution and then, if possible, try a new cartridge. Check voltage at tube pins against voltage shown on schematic.

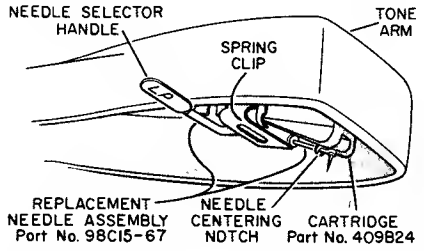
SERVICE NOTE: The **Rej-On-Off** pointer (S1) on the record changer is used to turn both amplifier and record changer motor on and off. To turn the amplifier on with the record changer disconnected, a short, temporary jumper wire must be connected from common ground (4) to the single lead from the AC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

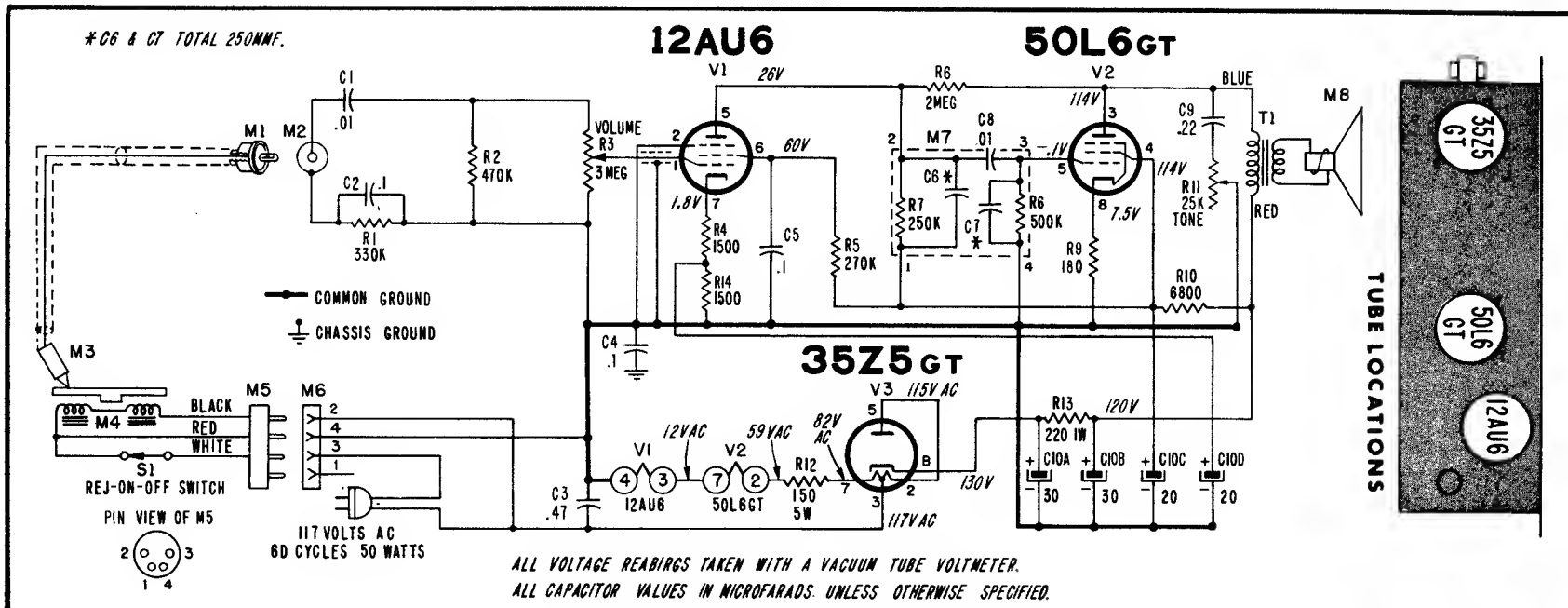
Capacitors C3 and C4 (included in printed circuit M7, Couplate) total 250 mmf. If it ever becomes necessary to replace M7 with individual components, use any combination totaling 250 mmf to replace C3 and C4 or else place 250 mmf across R6.

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.





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.

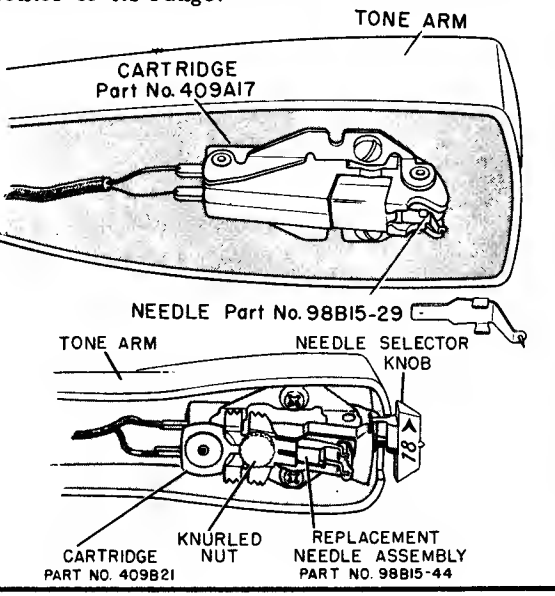
TO REMOVE THE CHASSIS from the cabinet, follow the procedure outlined under, "To Replace Tubes", then proceed as follows:

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.

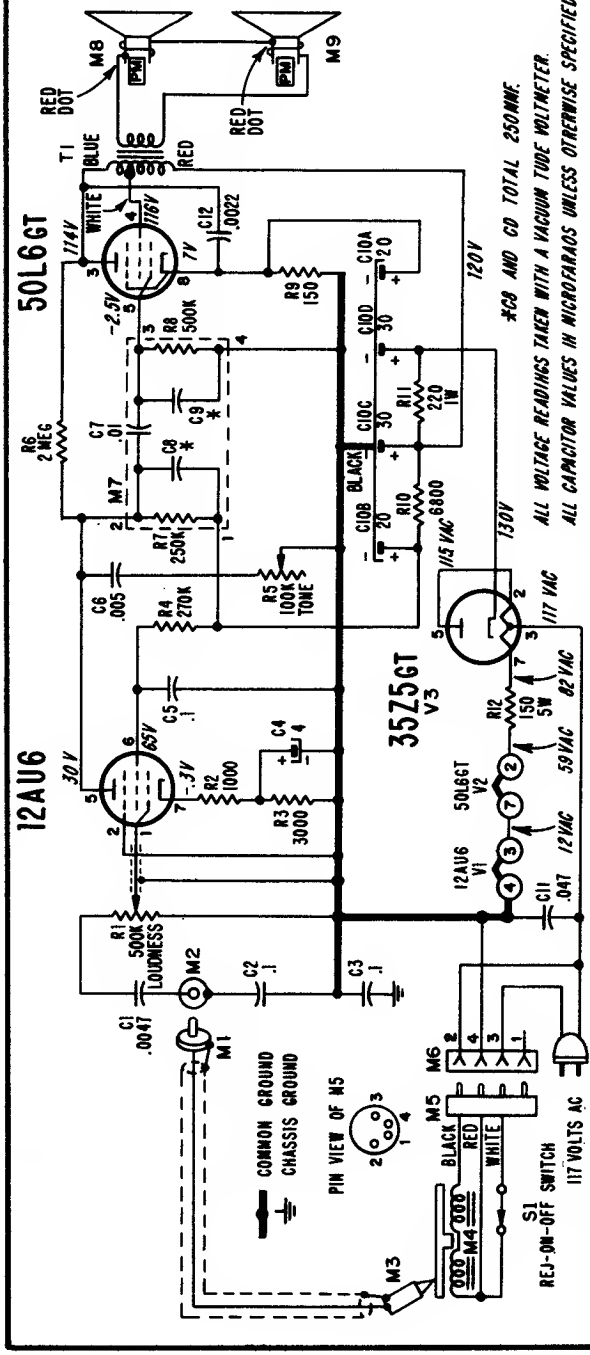


Admiral

Chassis 3K1

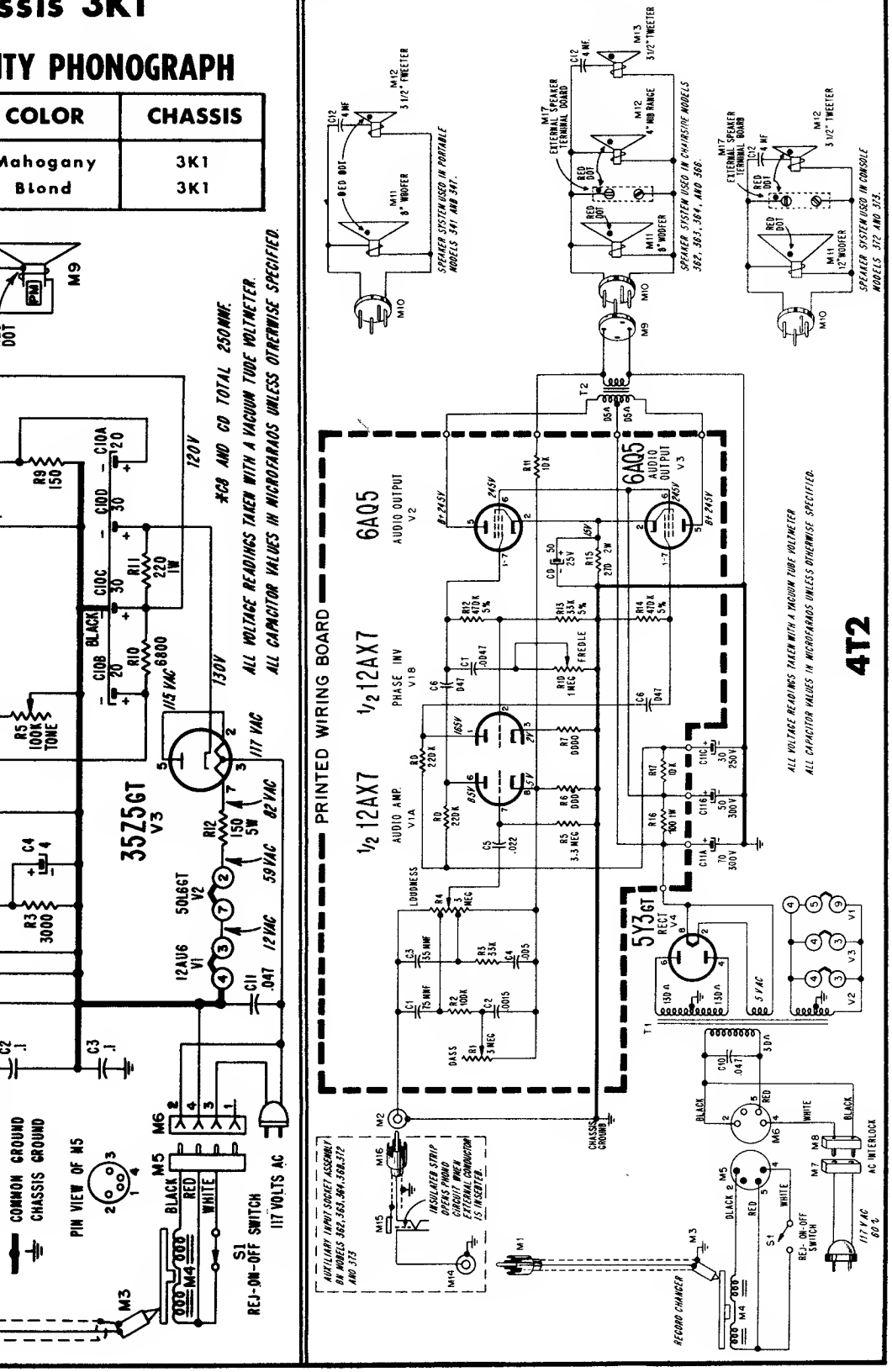
HIGH FIDELITY PHONOGRAPH

MODEL	COLOR	CHASSIS
HT2236	Mahogany	3K1
HT2237	Blond	3K1



Admiral CHASSIS 4T2

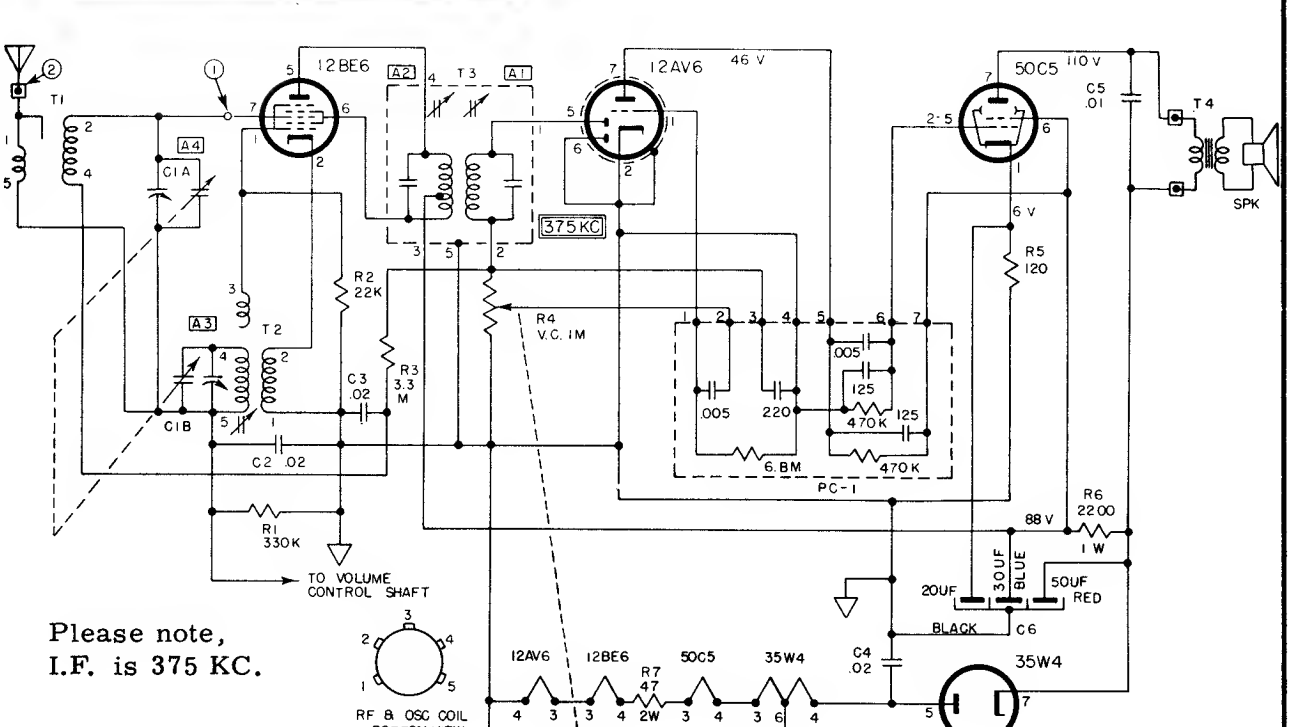
Models 341, 347, 362, 363, 364, 366, 372, 373



Arvin

MODEL 1581

CHASSIS 1.44000



Please note,
I.F. is 375 KC.

⏚ = B-

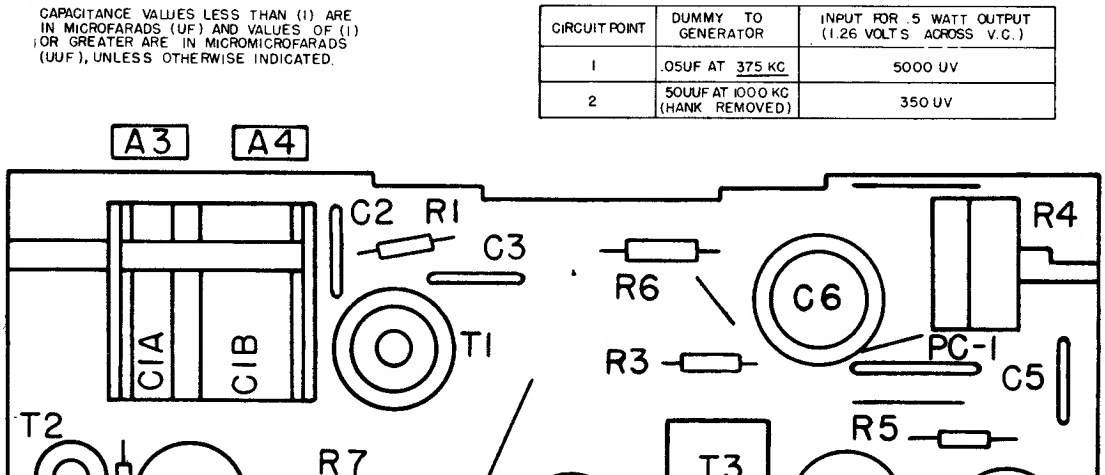
⊡ = EXTERNAL CONNECTIONS

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.

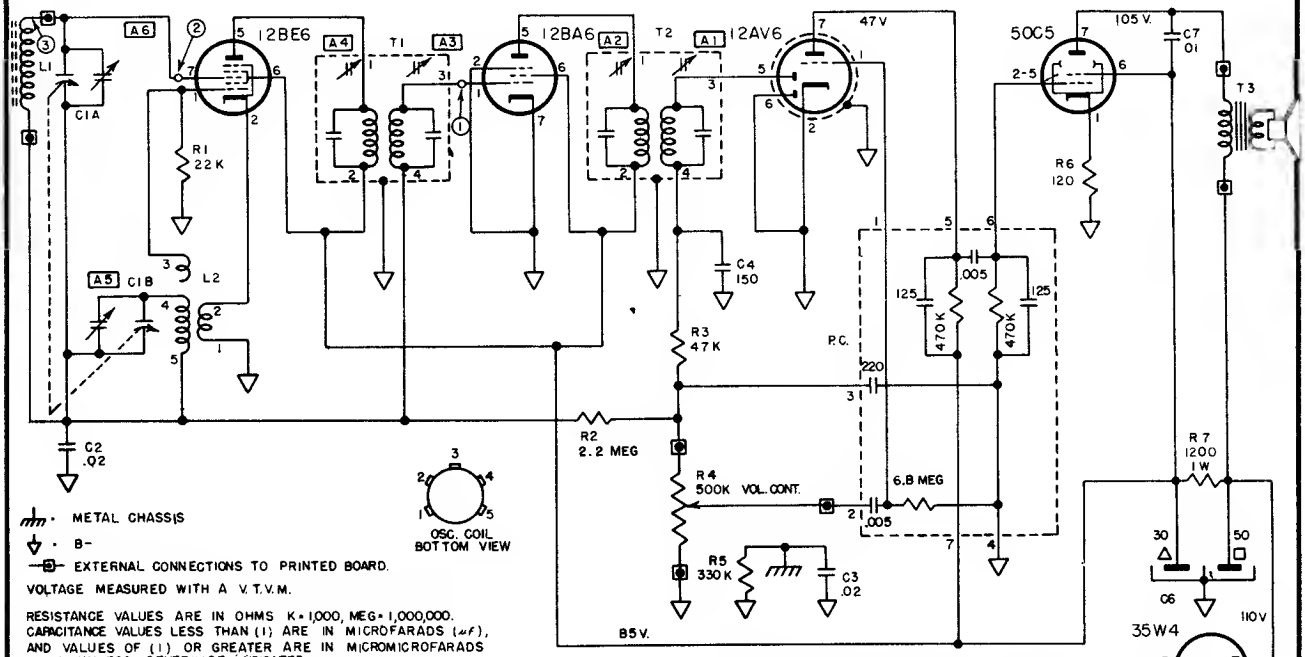
APPROXIMATE SENSITIVITIES

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

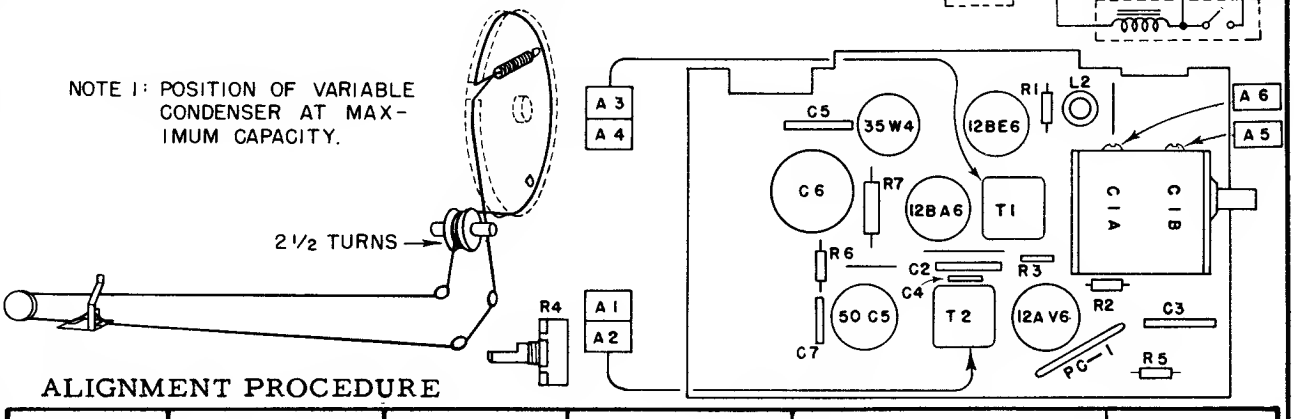


LOCATION OF PARTS

ARVIN INDUSTRIES RADIO MODEL 5578, CHASSIS 1.43500



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	.05μf AT 455 KC	2000 UV	5000 UV
2	.05μf AT 455 KC	60	150
3	STANDARD LOOP AT 1000 KC	200 UV / M	500 UV / M



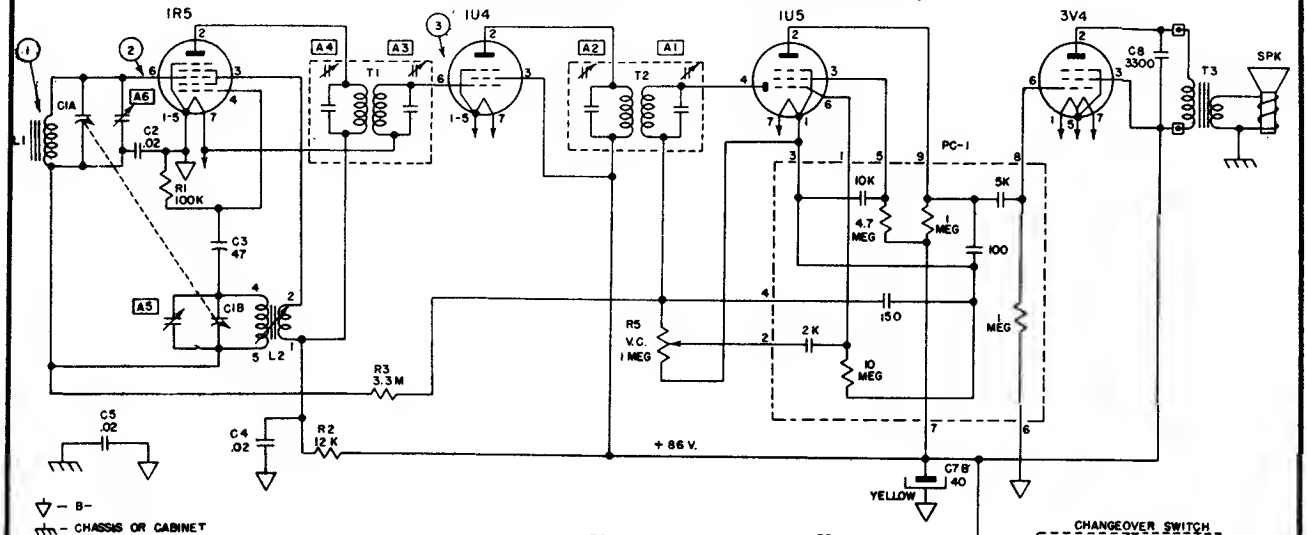
ALIGNMENT PROCEDURE

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 μ fd	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 C1A Plates	

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

The alignment procedure should be repeated for greatest accuracy.

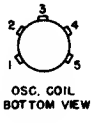
ARVIN INDUSTRIES, Models 8571, 8573, Chassis 1.41100, Model 8572, Chassis 1.41300, is similar.

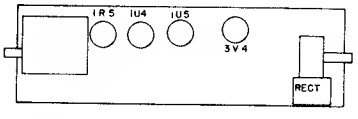


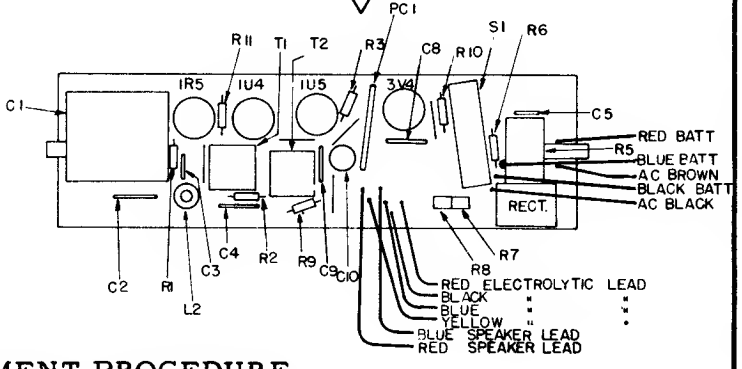
VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO B- AND ARE TAKEN WITH NO SIGNAL, LINE VOLTAGE AT 117 V. AC, MEASURED WITH VACUUM TUBE VOLTMETER.

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

CIRCUIT POINT	DUMMY TO GENERATOR	INPUT FOR .05 WATT OUTPUT (0.4 VOLTS ACROSS V.C.)
1	.05 AT 455 KC	2000 UV
2	.05 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

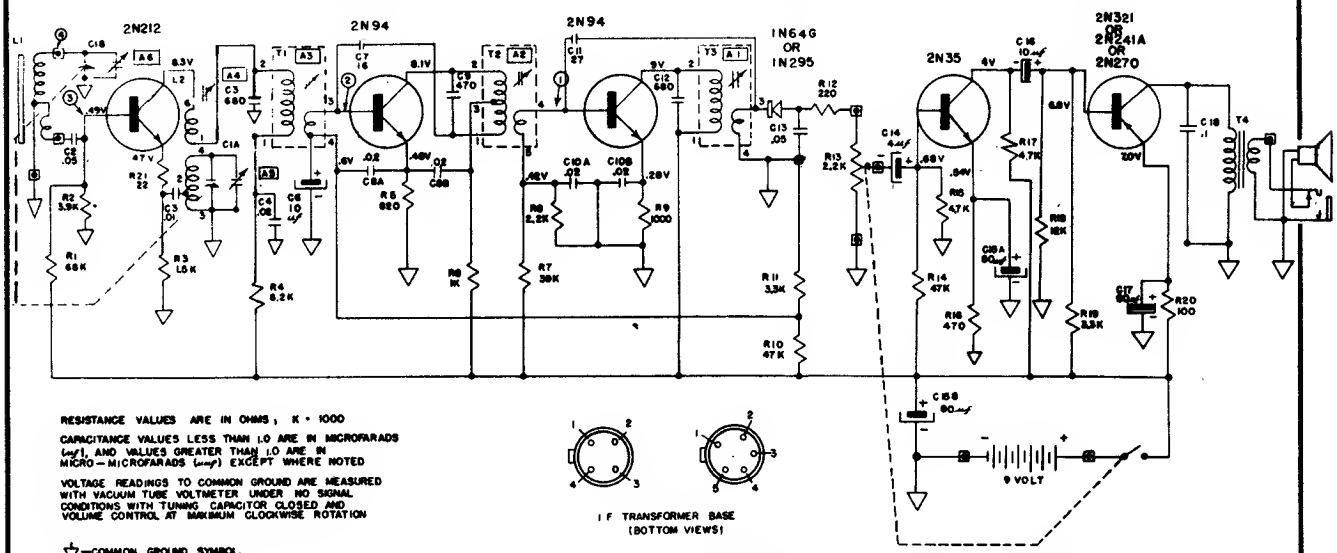
ALIGNMENT PROCEDURE

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 μf	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.

ARVIN INDUSTRIES RADIO MODEL 8576, CHASSIS 1.41400



RESISTANCE VALUES ARE IN OHMS, K = 1000

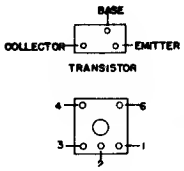
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (µf), AND VALUES GREATER THAN 1.0 ARE IN MICRO-MICROFARADS (µµf) EXCEPT WHERE NOTED

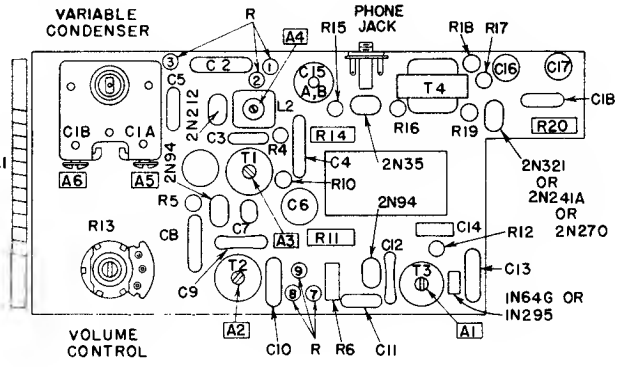
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION

▽—COMMON GROUND SYMBOL.

▣—EXTERNAL CONNECTION TO PRINTED CIRCUIT

I F TRANSFORMER BASE (BOTTOM VIEWS)





SIGNAL TEST POINT	TEST FREQUENCY	SERIES CAPACITOR TO GENERATOR	INPUT FOR .02 WATT OUTPUT (0.5 V ACROSS VC)
①	455 KC	.05 µf	4 µV
②	453 KC	.05 µf	70 µV
③	455 KC	.05 µf	2000 µV
④	1000 KC	STANDARD LOOP	300 µV

ALIGNMENT PROCEDURE

PRELIMINARY

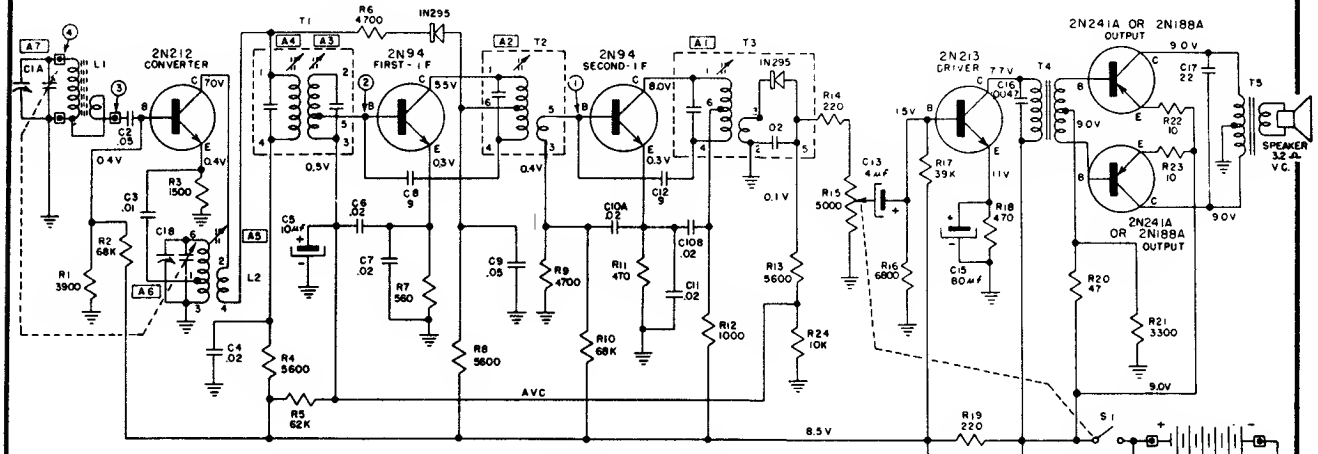
Output meter reading to indicate 20 milliwatts 0.5V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 40 Cycles
Position of Volume Control ..... Fully Clockwise

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.

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

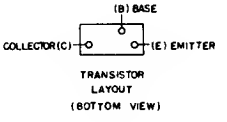
RESISTANCE VALUES ARE IN OHMS; K = 1000

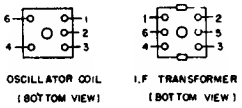
CAPACITANCE VALUES LESS THAN 1.0 ARE IN MICROFARADS (μf), AND VALUES GREATER THAN 1.0 ARE IN MICRO - MICROFARADS (μμf) EXCEPT WHERE NOTED.

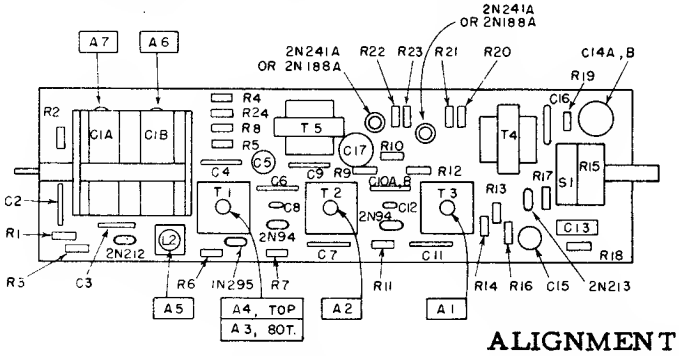
VOLTAGE READINGS TO COMMON GROUND ARE MEASURED WITH VACUUM TUBE VOLTMETER UNDER NO SIGNAL CONDITIONS WITH TUNING CAPACITOR CLOSED AND VOLUME CONTROL AT MAXIMUM CLOCKWISE ROTATION

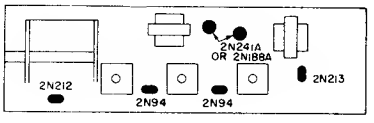
⏚ - COMMON GROUND SYMBOL.

⊡ - EXTERNAL CONNECTION TO PRINTED CIRCUIT









ALIGNMENT PROCEDURE

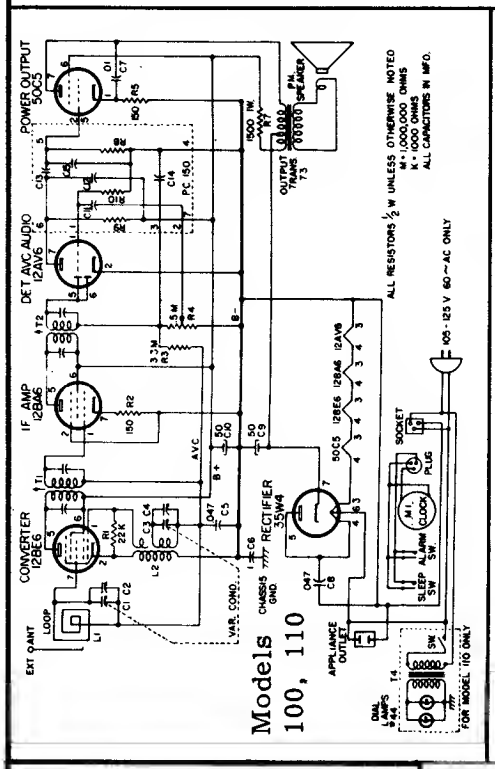
Output meter reading to indicate 50 milliwatts 0.4V
Output meter connection ..... Across speaker voice coil
Connection of generator ground lead ..... Common Ground
Generator Modulation ..... 30% 400 cycles
Position of volume control ..... Fully Clockwise

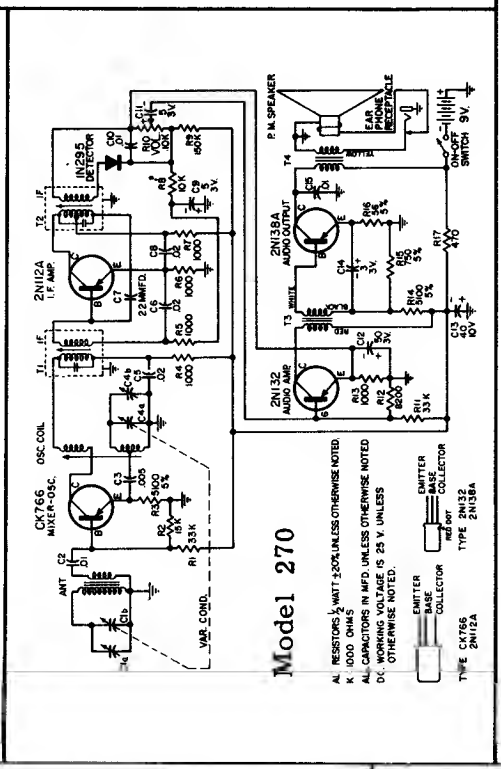
Position of Variable	Generator Frequency	Dummy Antenna	Generator Connections	Trimmers Adj. in order shown for Max. Output	Function of Trimmer
Open	455 Kc	.05 μf	C1A	A1 (Top of T3)	I.F.
				A2 (Top of T2)	I.F.
				A3 (Bottom of T1)	I.F.
				A4 (Top of T1)	I.F.
Open	1670 Kc		*Test Loop	A6	Oscillator
1400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

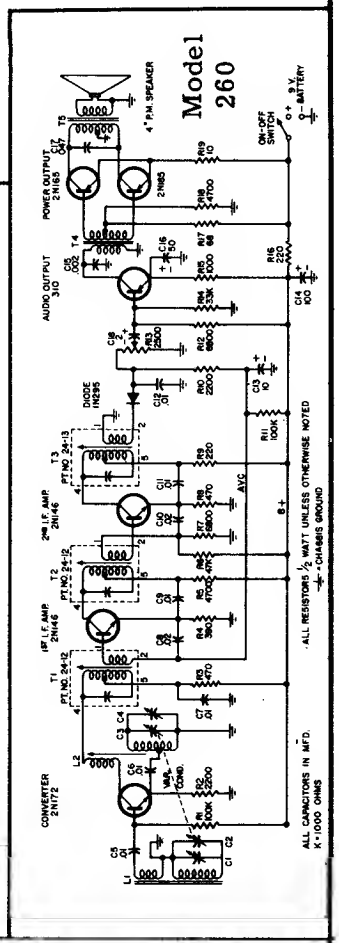
* Standard Hazeltine Test Loop Model 1150 or 3 turns of wire about 6" in diameter placed about one foot from the set loop.

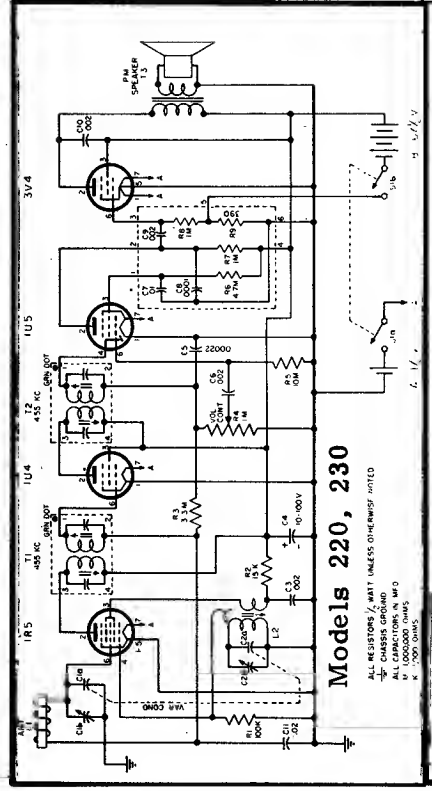
BULOVA

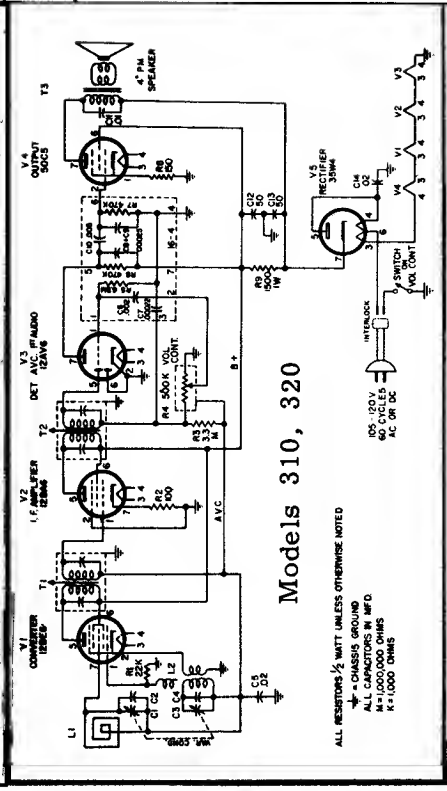
Circuit diagrams of various sets manufactured by Bulova Watch Co. The IF is 455 KC. for these sets.

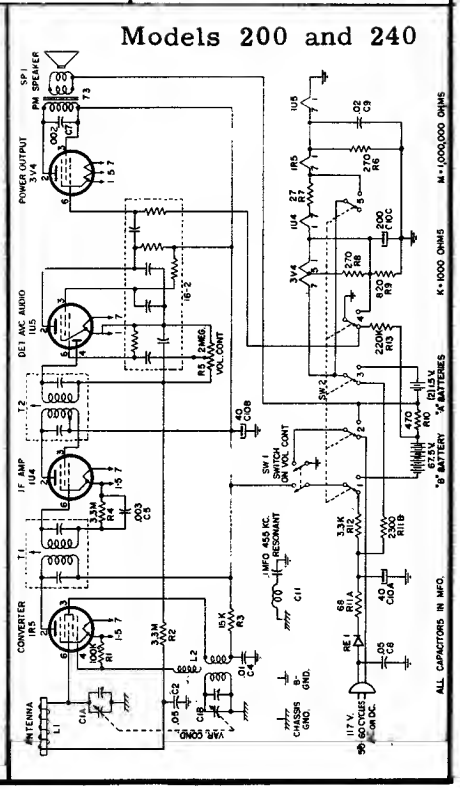










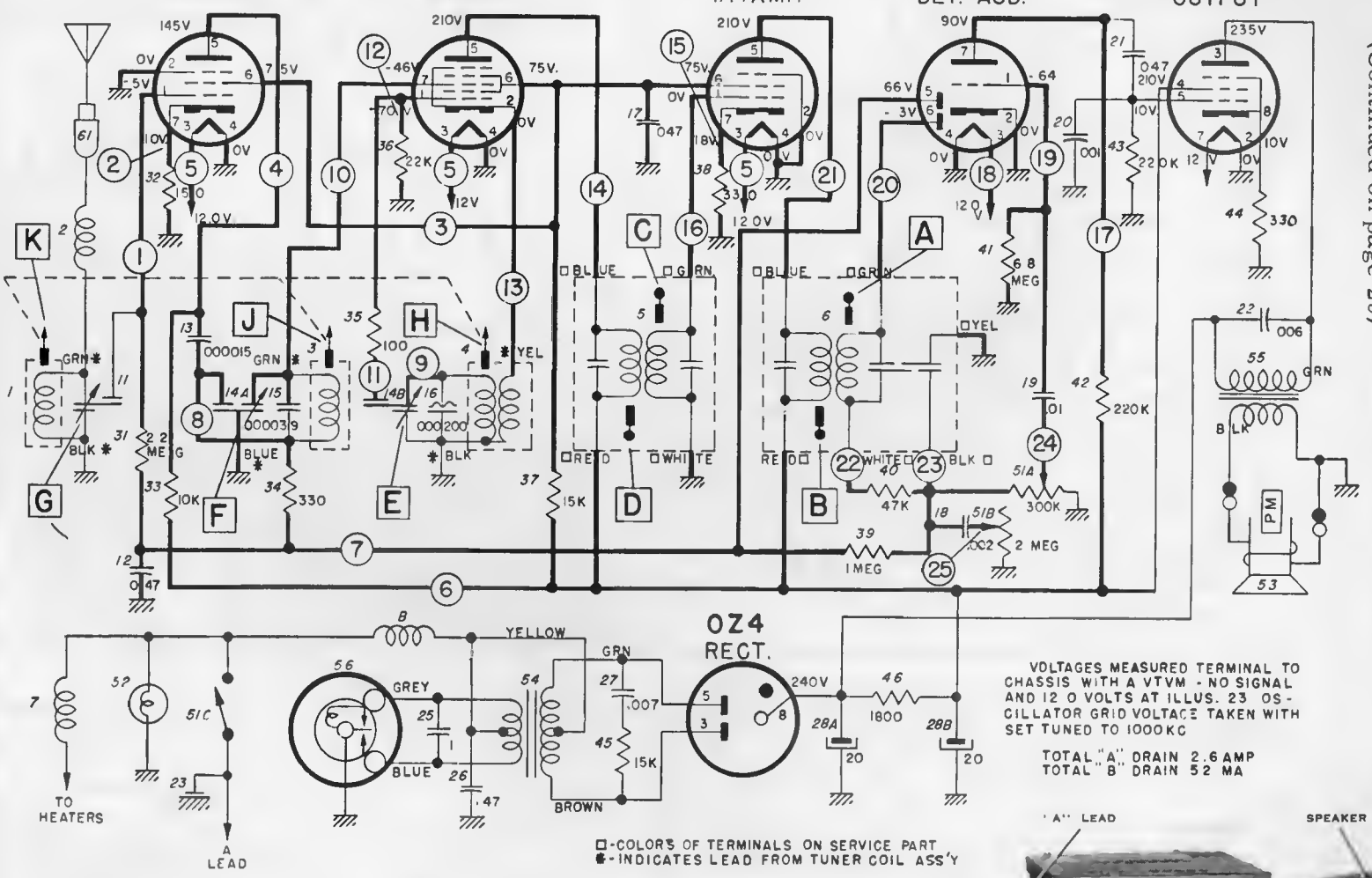


DELCO

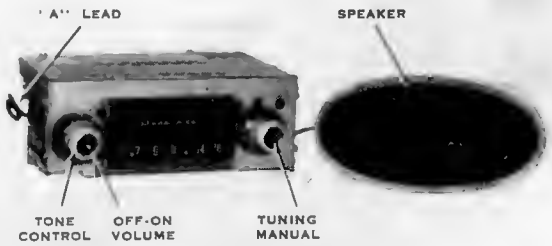
STUDEBAKER
MODEL AC-2905

CHEVROLET MODEL 987724 is practically identical.

(Continued on page 29)



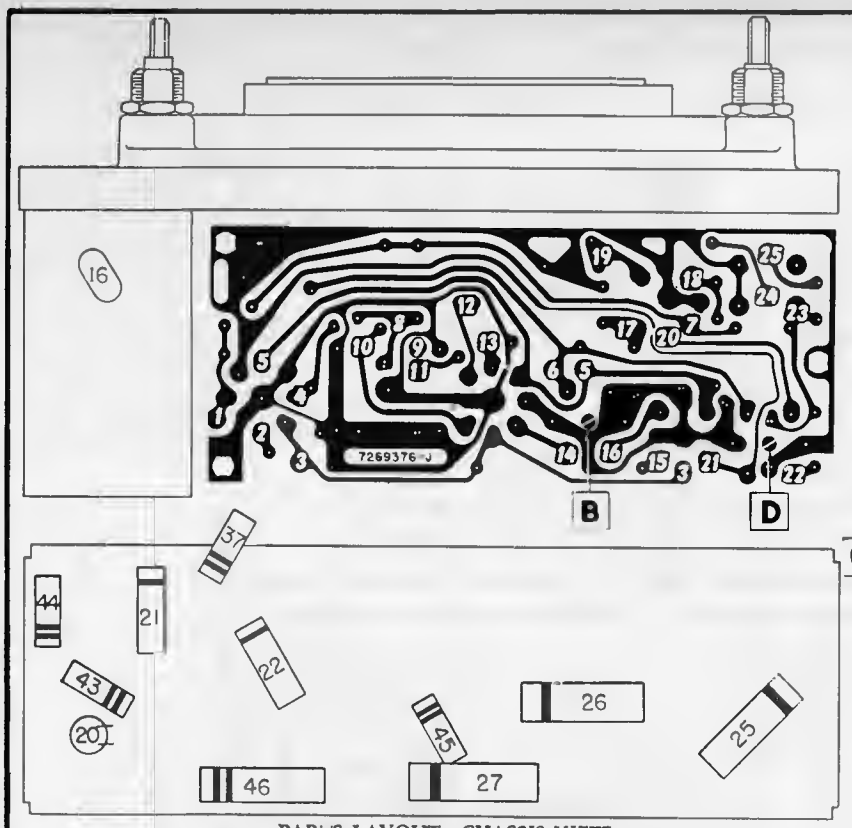
STUDEBAKER AC-2905
PRINTED CIRCUIT SHOWN IN HEAVY LINE.
NUMBERS IN CIRCLES CORRESPOND TO PRINTED CIRCUIT NUMBERS IN CHASSIS VIEW



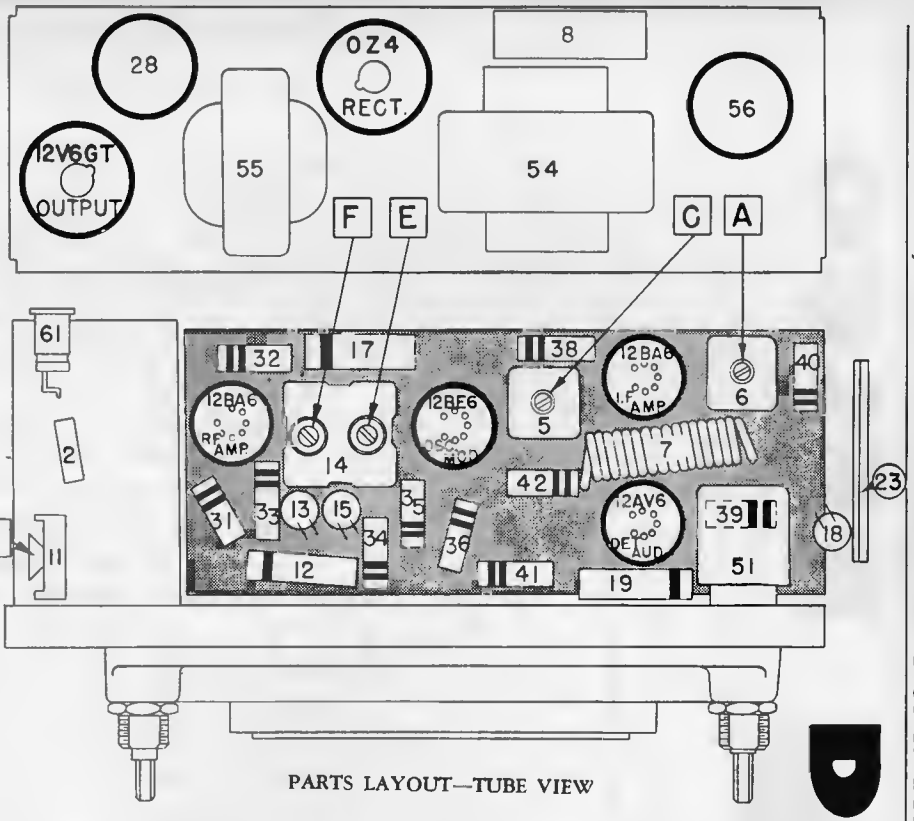
MODEL AC-2905

CHEVROLET MODEL 987724 is practically identical.

(Alignment and additional service material is on page 29)



PARTS LAYOUT—CHASSIS VIEW

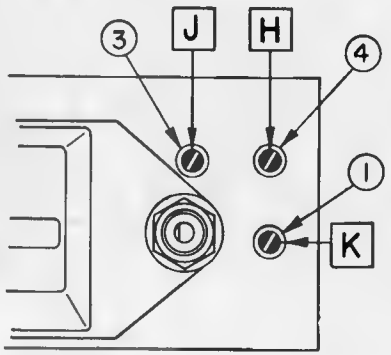


PARTS LAYOUT—TUBE VIEW

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 1⅝" 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.

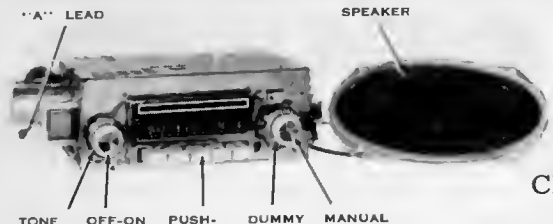
**Tune in 1100 KC signal and adjust pointer on the dial cord so that the pointer is on the 1100 KC mark of the dial. This setting is to give the correct relationship beween the pointer and dial when the radio is installed in a car.
With the radio installed and the car antenna plugged in adjust the antenna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



IRON CORE ALIGNMENT

DELCO

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

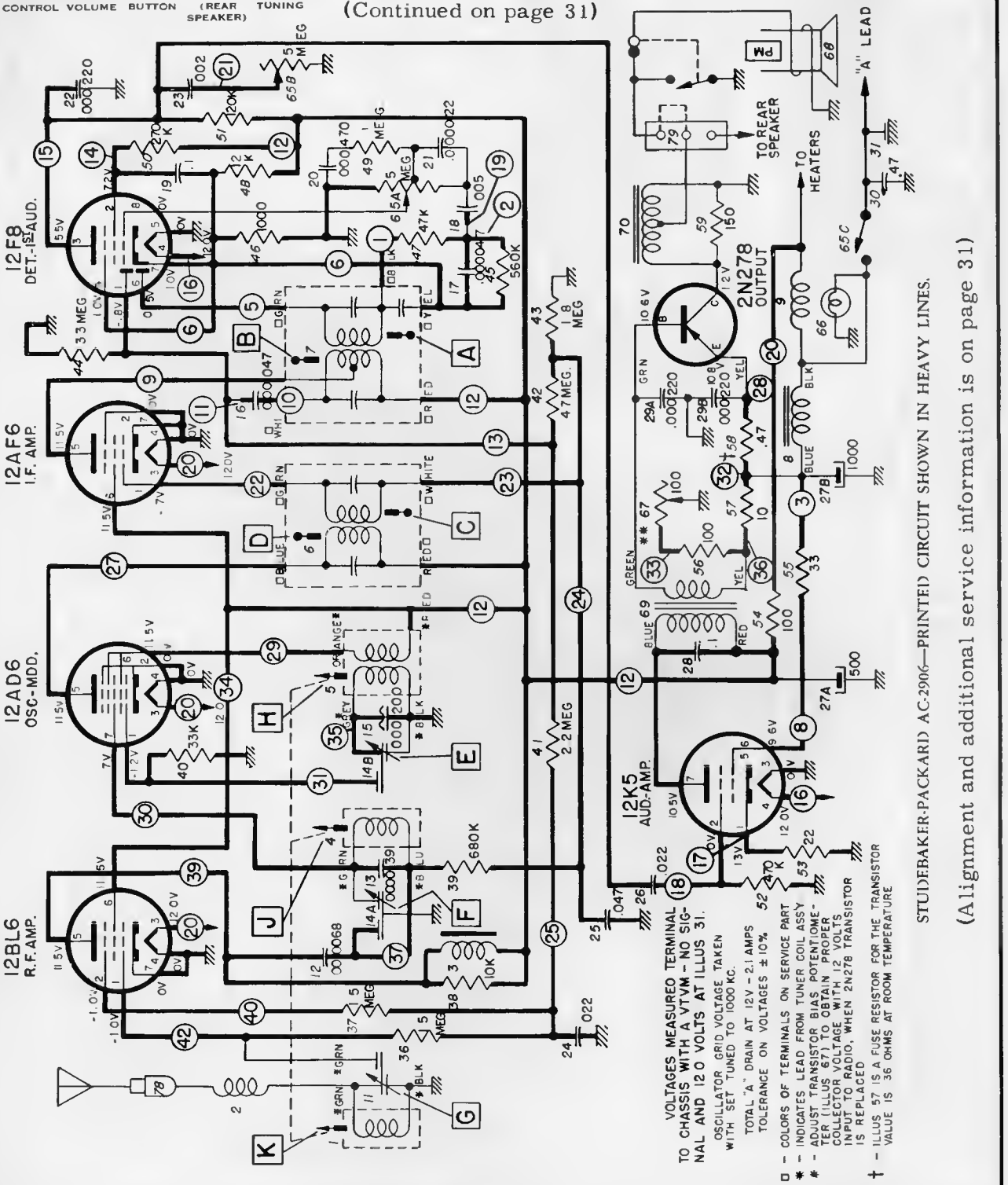


DELCO

STUDEBAKER-PACKARD MODEL AC-2906

CHEVROLET Model 987727 practically identical.

(Continued on page 31)



(Alignment and additional service information is on page 31)

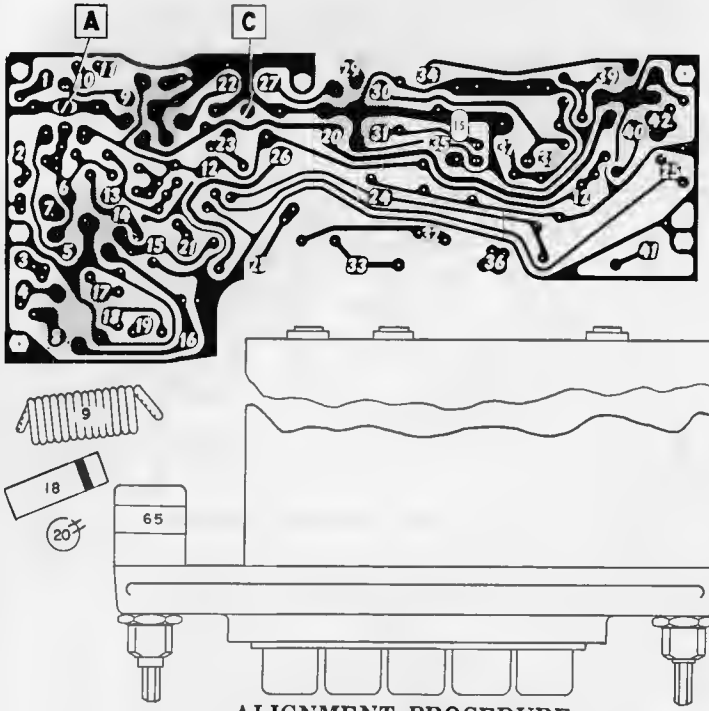
DELCO RADIO

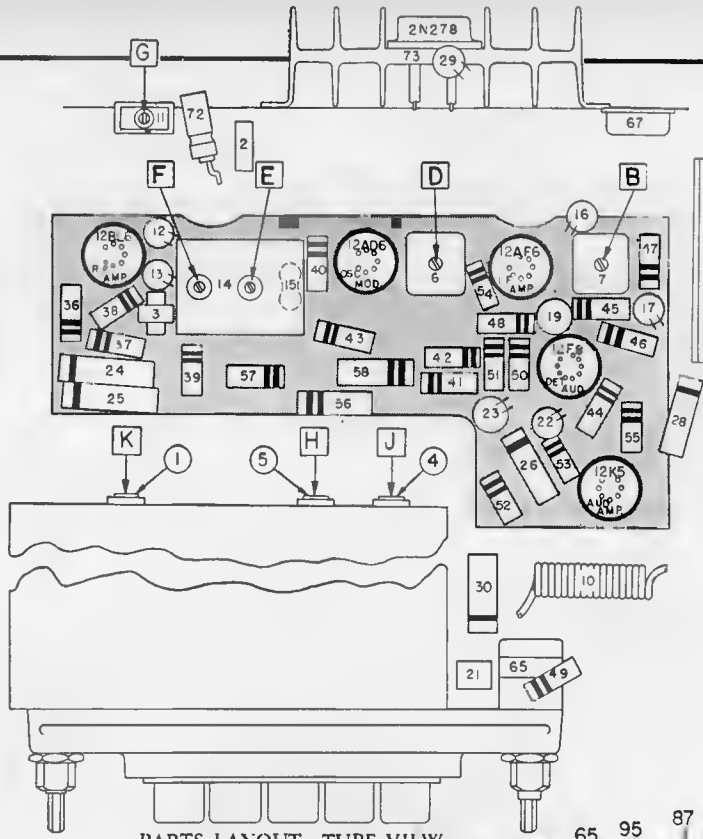
Studebaker-Packard Model AC-2906,
Chevrolet 987727 practically identical.

(Continued from page 30)

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

PARTS LAYOUT—CHASSIS VIEW





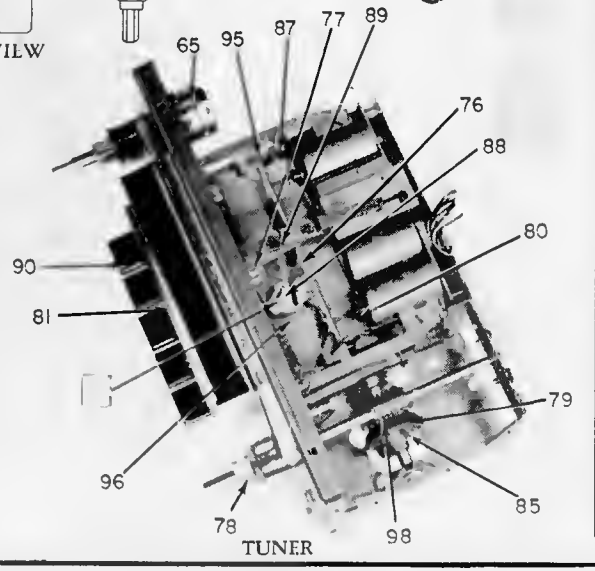
PARTS LAYOUT—TUBE VIEW

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 1⅝" 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.)

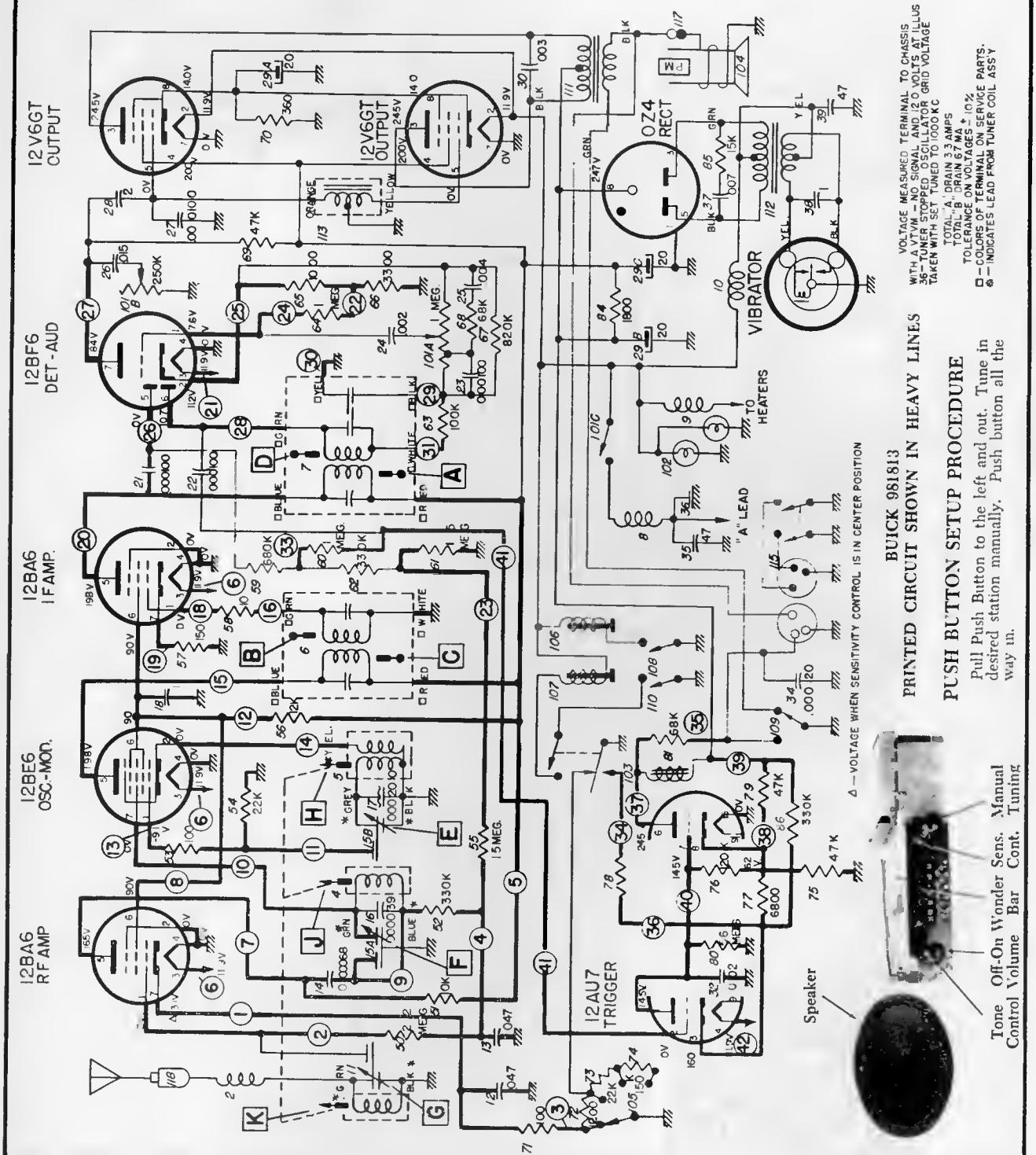


CONNECT VACUUM TUBE VOLTMETER ACROSS SPEAKER VOICE COIL DURING ALIGNMENT.

DELCO

BUICK SELECTRONIC MODEL 981813

(Alignment and other service material is on page 33)



BUICK 981813

PRINTED CIRCUIT SHOWN IN HEAVY LINES

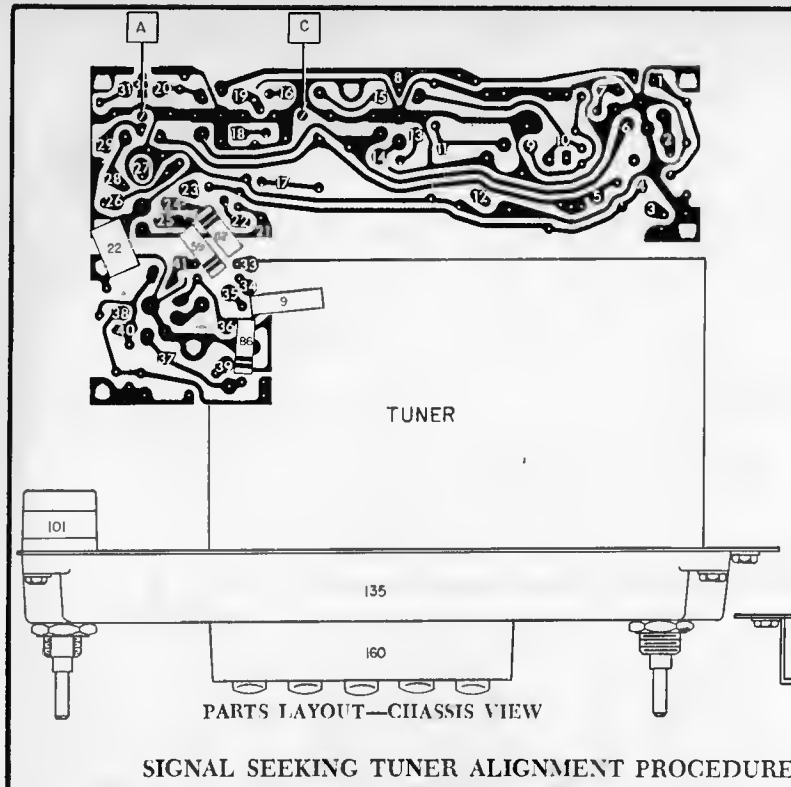
PUSH BUTTON SETUP PROCEDURE

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

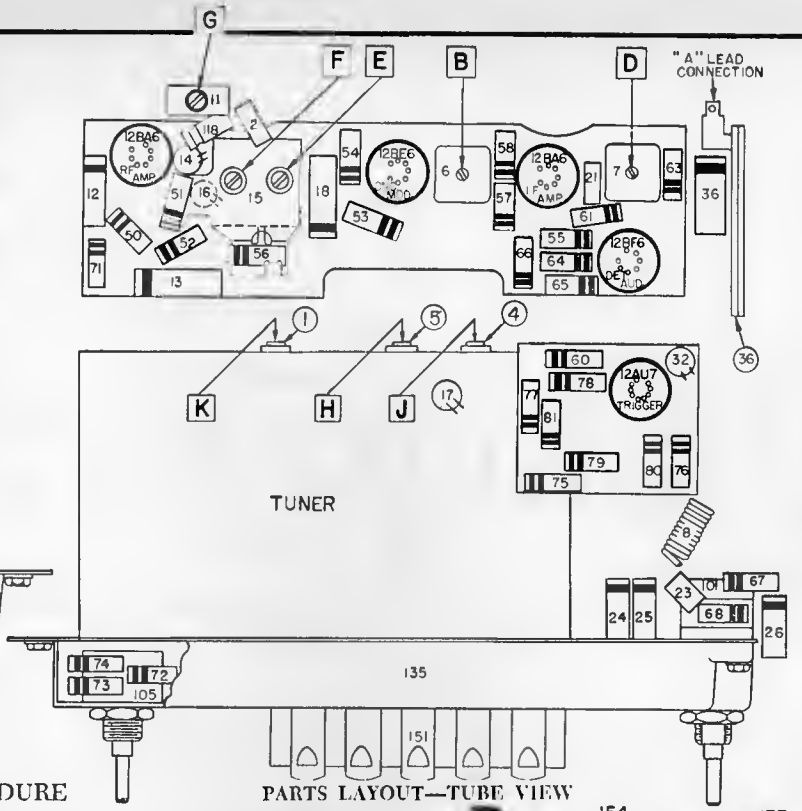
DELCO

BUICK SELECTRONIC MODEL 981813

(Continued from page 32)



PARTS LAYOUT—CHASSIS VIEW



PARTS LAYOUT—TUBE VIEW

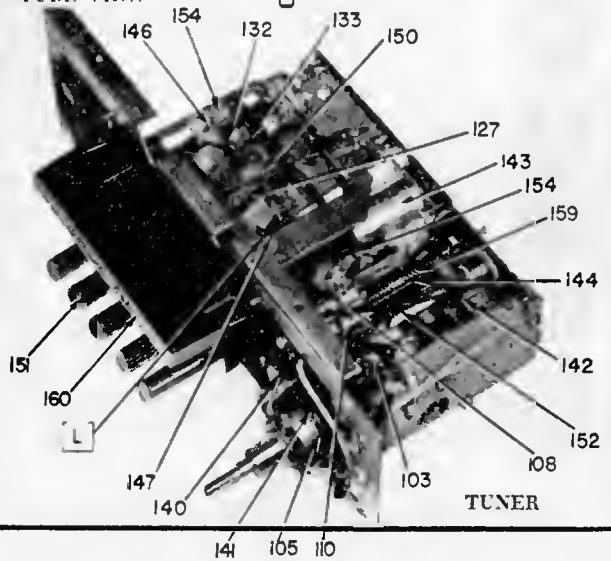
SIGNAL SEEKING TUNER ALIGNMENT PROCEDURE

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 1⅝" 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 "G" for maximum volume with the radio tuned to a weak station between 600 and 1000 KC (see sticker on case.)



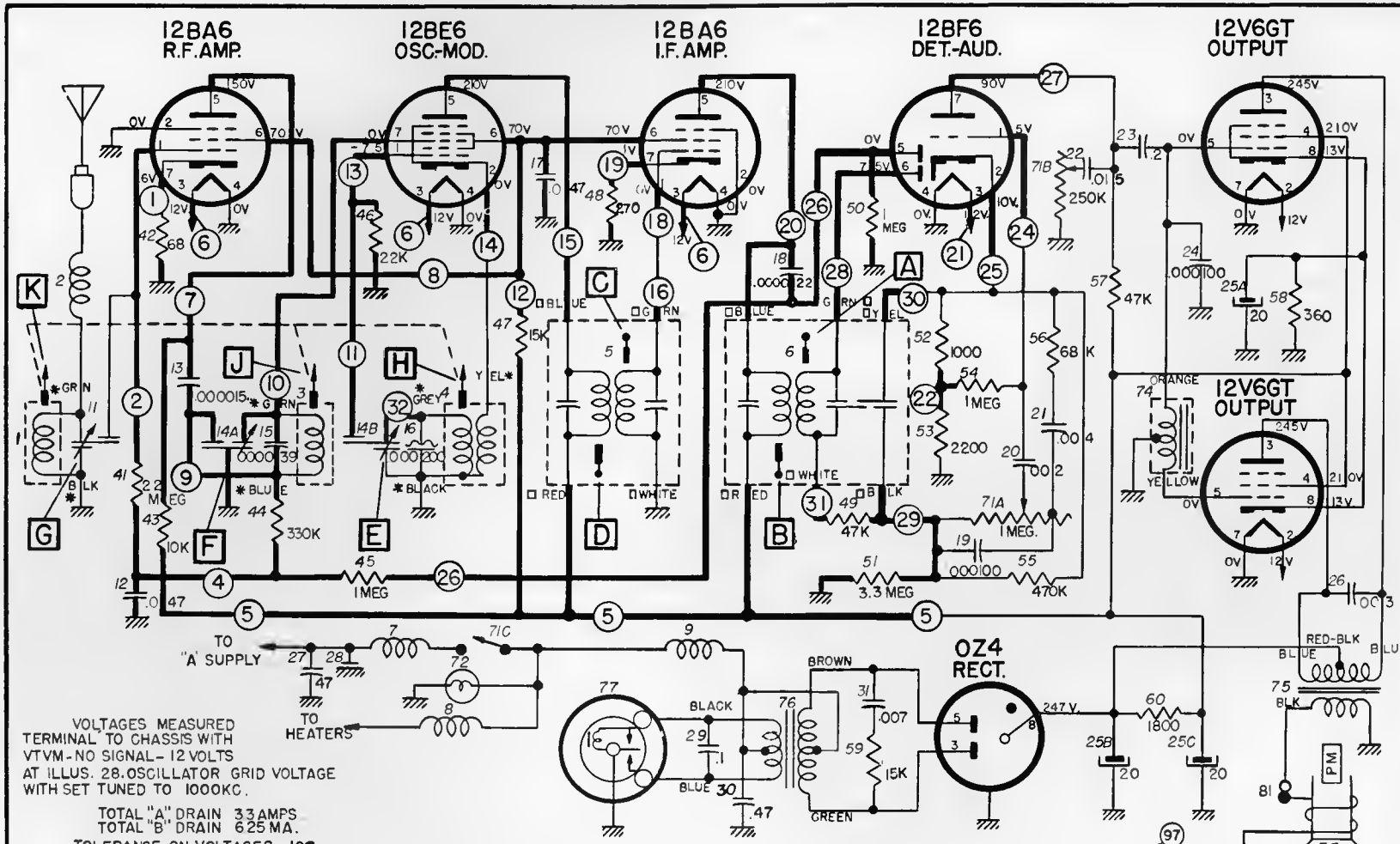
CONNECT A VTVM FROM AVC LINE (#4 ISLAND ON CIRCUIT BOARD) TO GROUND FOR OUTPUT INDICATIONS DURING ALIGNMENT.

DELCO

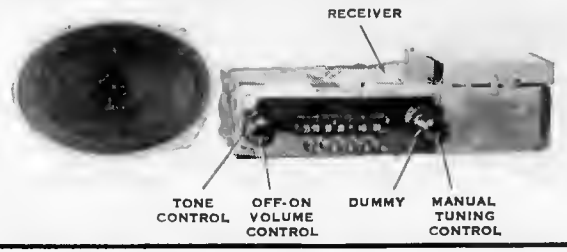
BUICK MODEL 981814

BUICK Model 981902 practically identical.

(Continued on page 35)



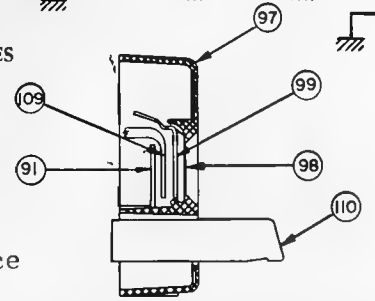
BUICK 981814—PRINTED CIRCUIT SHOWN IN HEAVY LINES



PUSH BUTTON SET-UP PROCEDURE

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

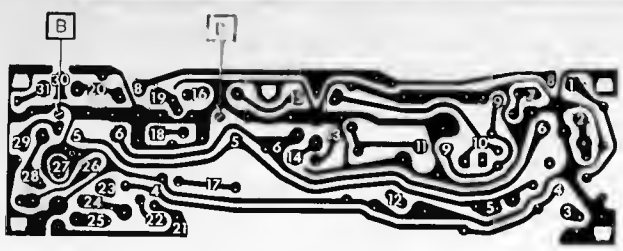
(For alignment and other service information see page 35)

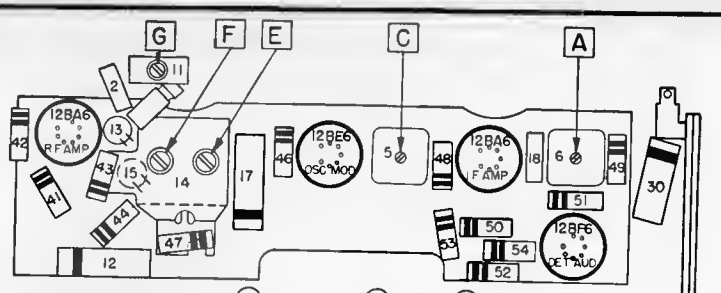


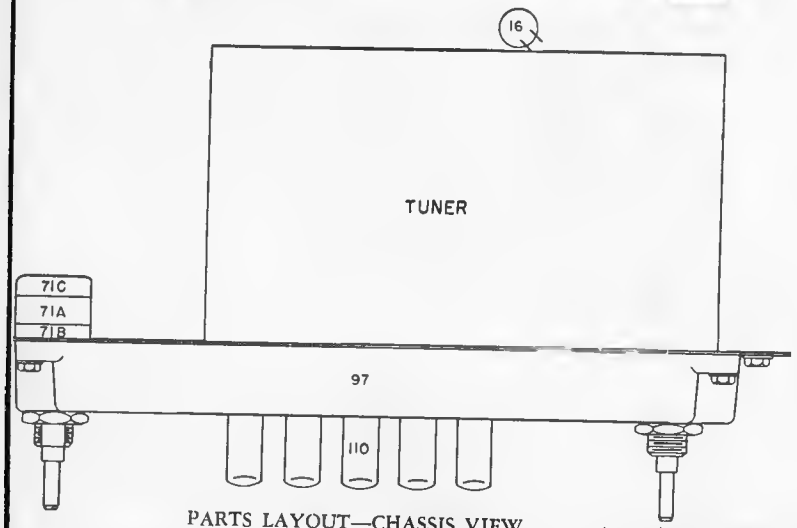
ESCUTCHEON CROSS SECTION

DELCO

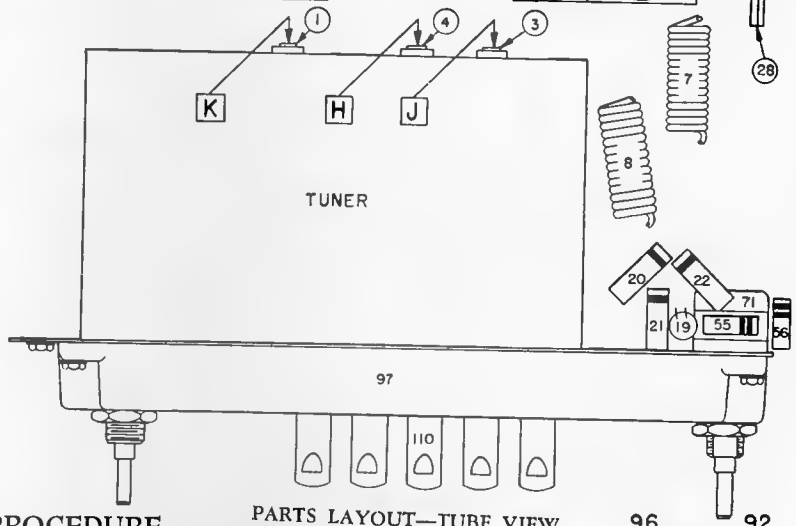
BUICK Model 981814 (Continued from page 34)
BUICK Model 981902 is practically identical.







PARTS LAYOUT—CHASSIS VIEW



PARTS LAYOUT—TUBE VIEW

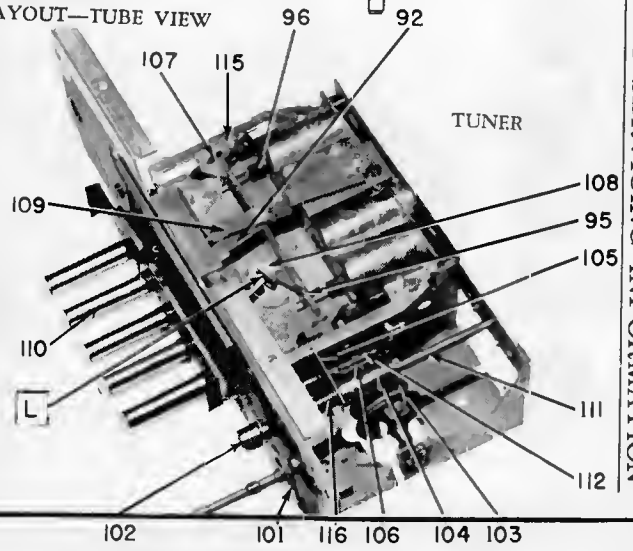
ALIGNMENT PROCEDURE

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 1⅝" 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.

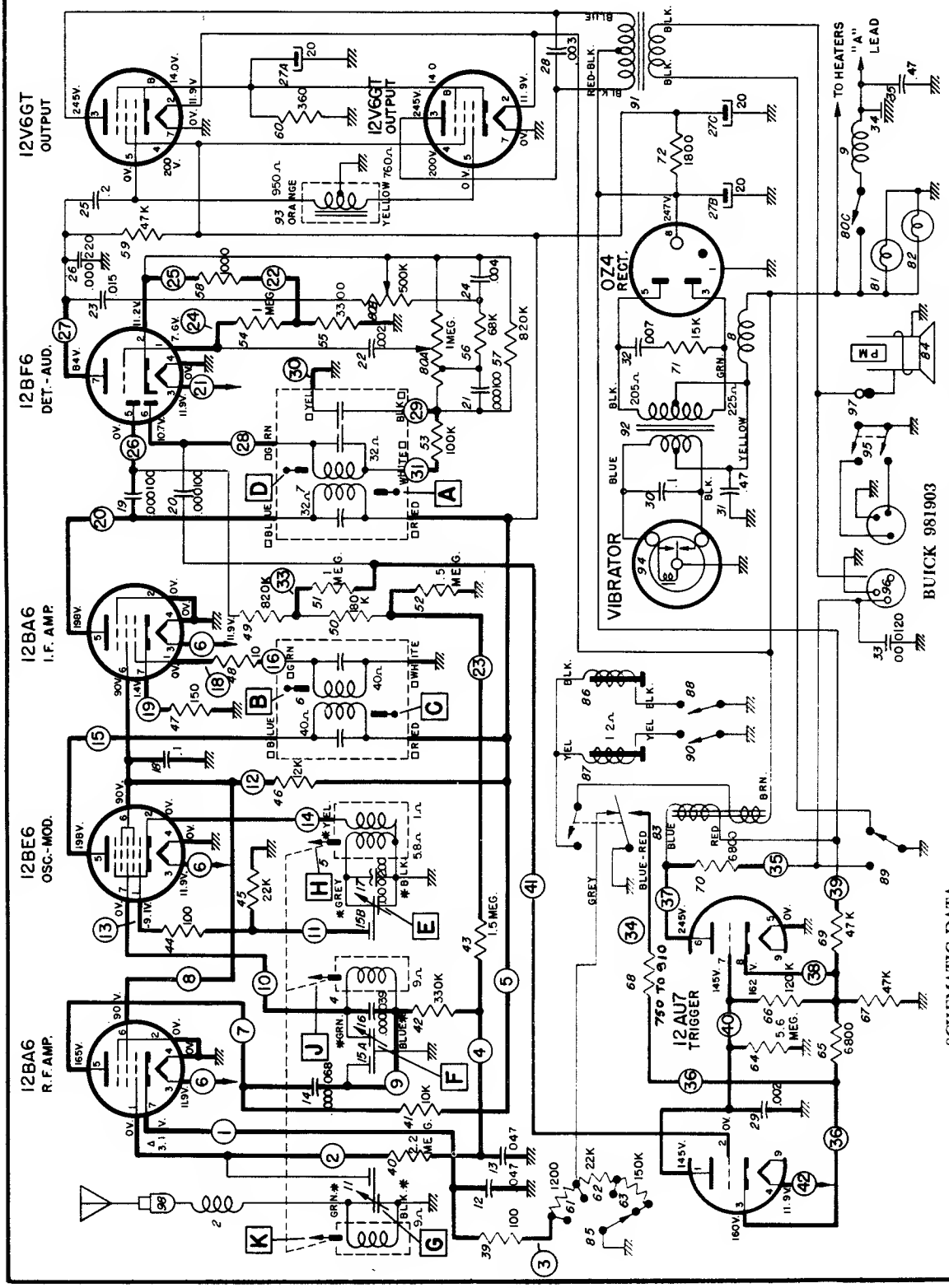
With the radio installed and the car antenna plugged in, adjust the antenna trimmer "G" for maximum volume with the radio tuned to a weak station between 600 - 1000 KC (see sticker on case.)



DELCO

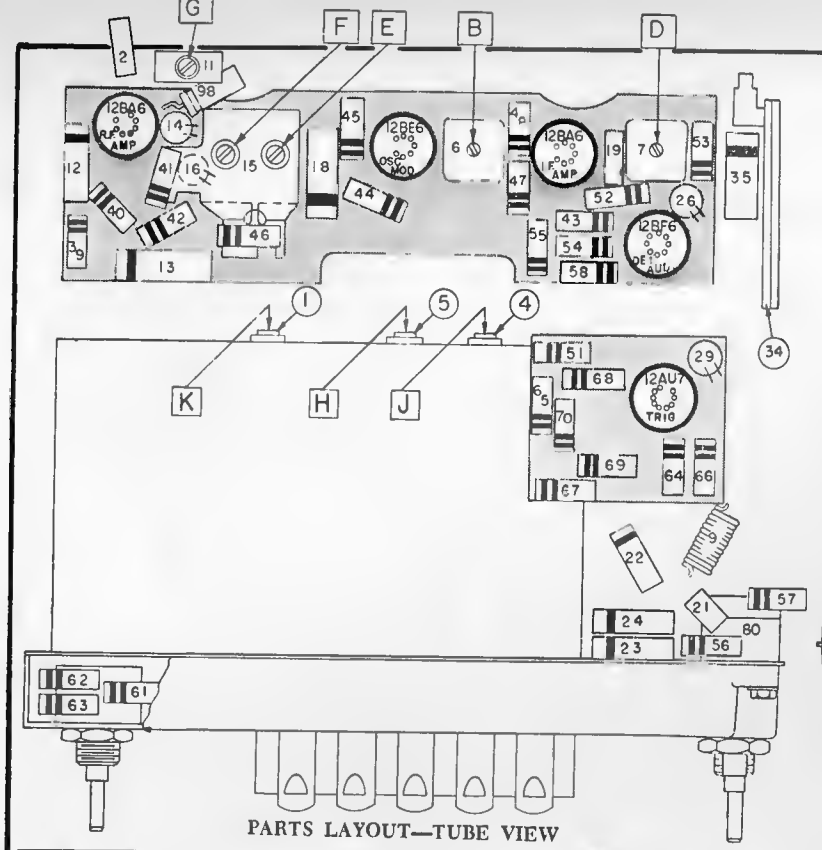
BUICK WONDER BAR MODEL 981903

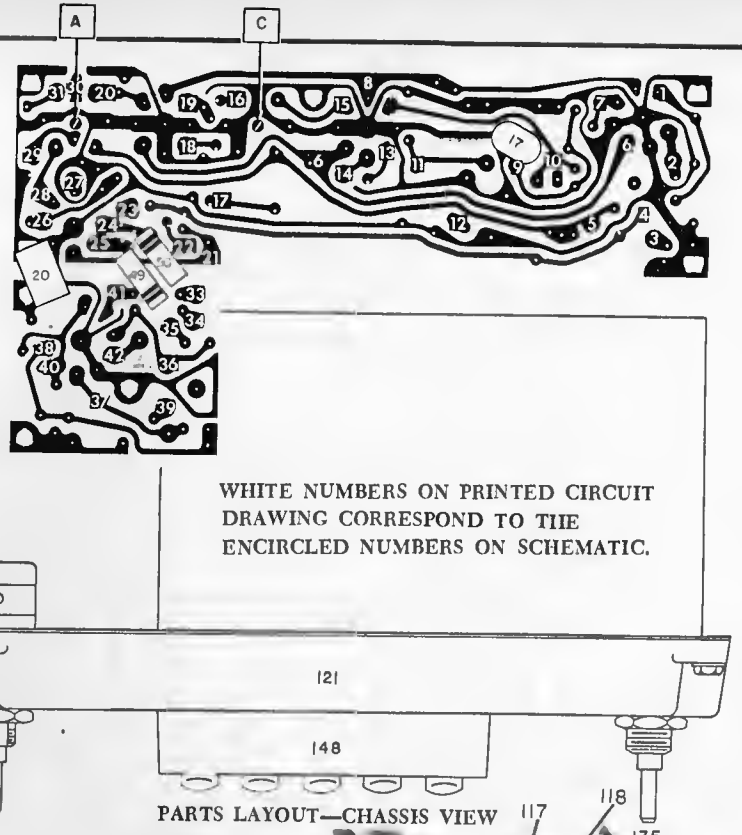
(Alignment is on page 37, adjacent at right)



DELCO

BUICK Model 981903 Alignment, Continued



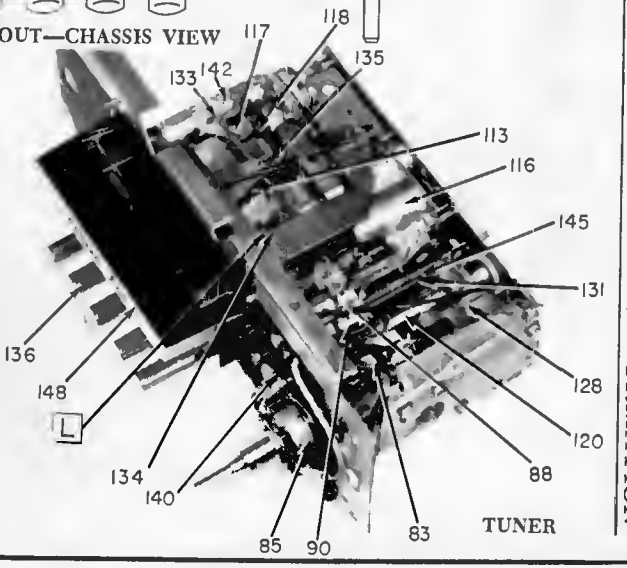


Step	Dummy Antenna	Connect Signal Generator To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence For Output Indicated
1	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	*High Frequency Stop	A, B, C (Max.)
2	0.1 Mfd.	12BE6 Grid (Pin 7)	262 KC	High Frequency Stop	D (Min.)
3	.000082 Mfd.	Antenna Connector	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 .070" feeler gauge 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. 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 1⅝" 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.

***"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.)

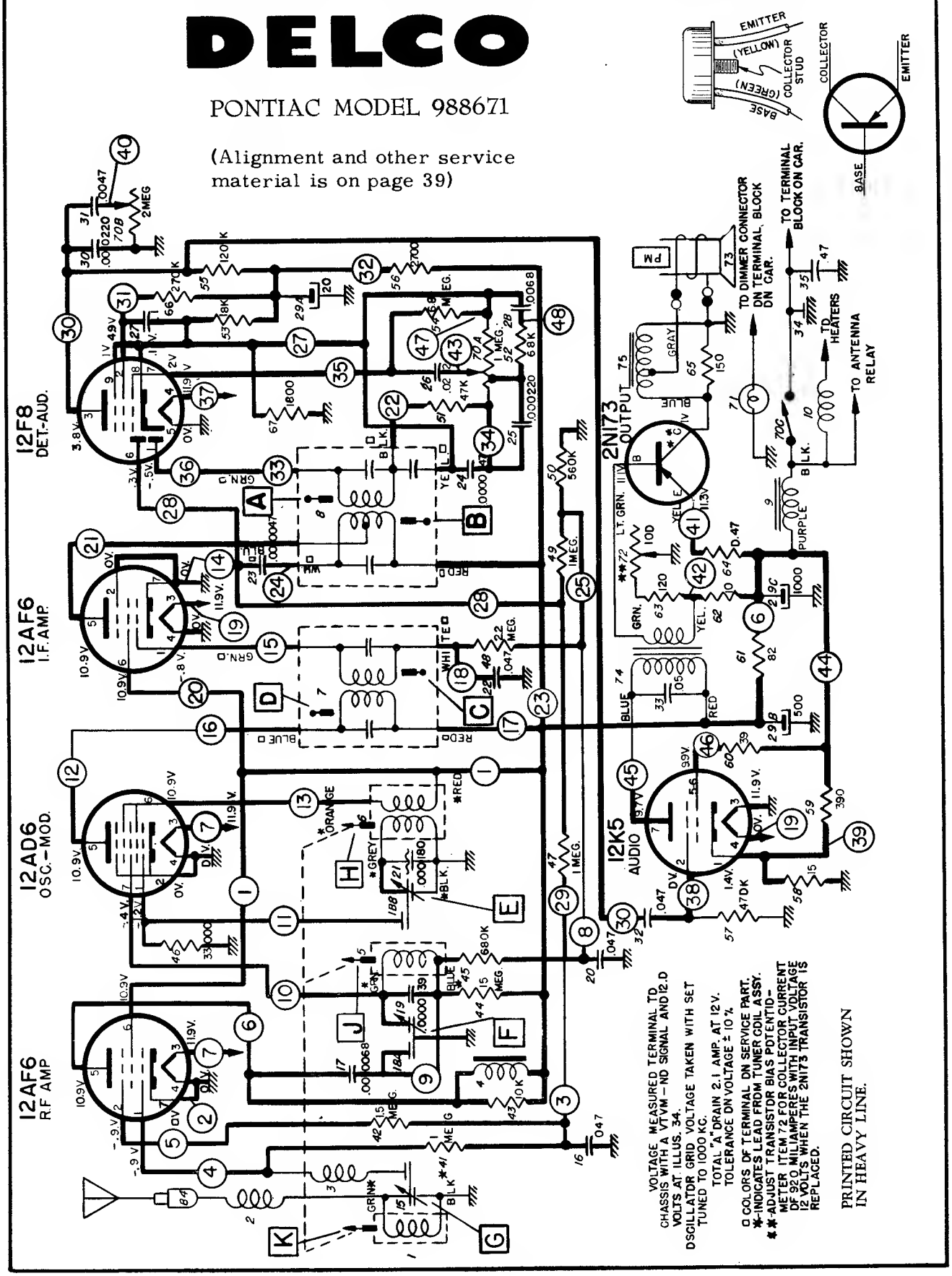


CONNECT A VTVM FROM AVC LINE (#4 ISLAND ON CIRCUIT BOARD) TO GROUND FOR OUTPUT INDICATIONS DURING ALIGNMENT.

DELCO

PONTIAC MODEL 988671

(Alignment and other service material is on page 39)



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 1⅝" 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.

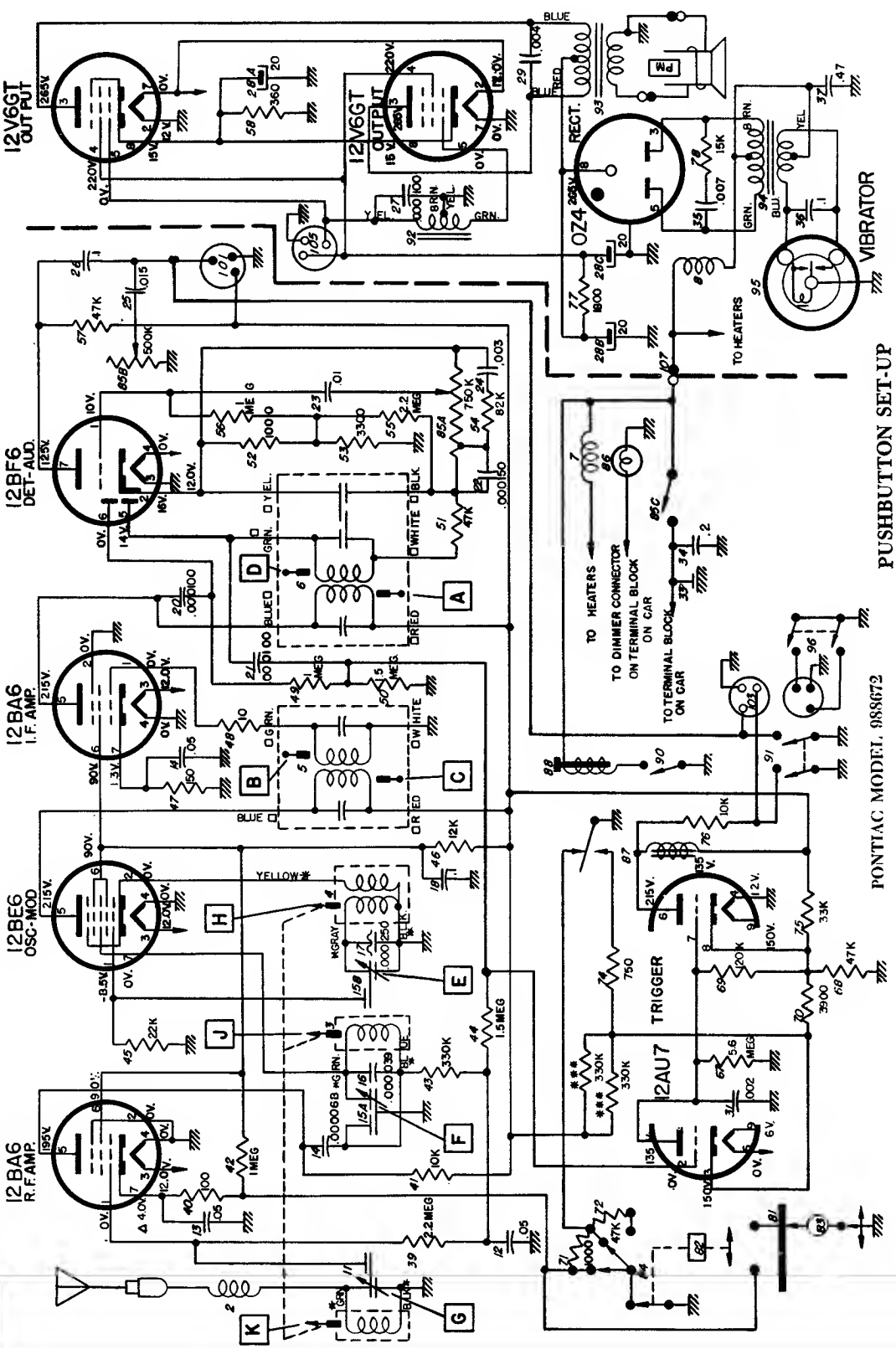
**"L" is the pointer adjustment screw which is on the pointer connecting link (see turner drawing) and should be adjusted so the pointer reads 1000 KC.

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)

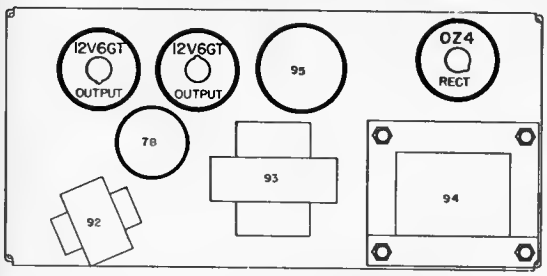


PUSHBUTTON SET-UP

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.

Voltages measured to chassis with a VTVM — No signal and 12.0 volts at Illus. 33.
—Tuner stopped. Oscillator grid voltage taken with set tuned to 1000 KC.
Total "A" Drain 3.3 Amps. Total "B" Drain 67 MA.
Δ—Sensitivity Control in Position #2. *—Indicates Lead from Tuner Coil Ass'y.
□—Colors of Terminals on Service Part. ***—Either or Both Resistors May Not Be Found on All Sets.

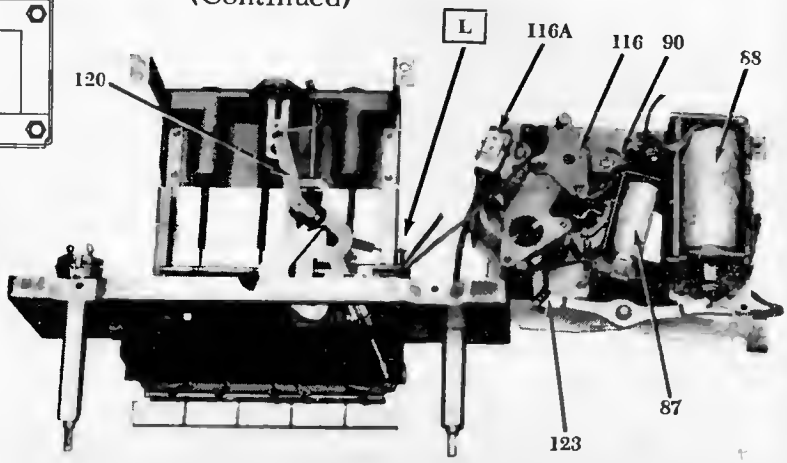
AUDIO—POWER SUPPLY UNIT



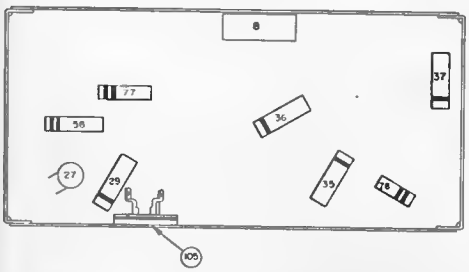
PARTS LAYOUT — TUBE VIEW

DELCO

PONTIAC Model 988672
(Continued)

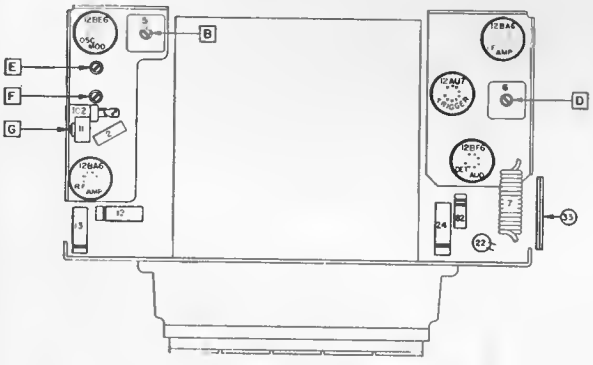


TUNER UNFOLDED

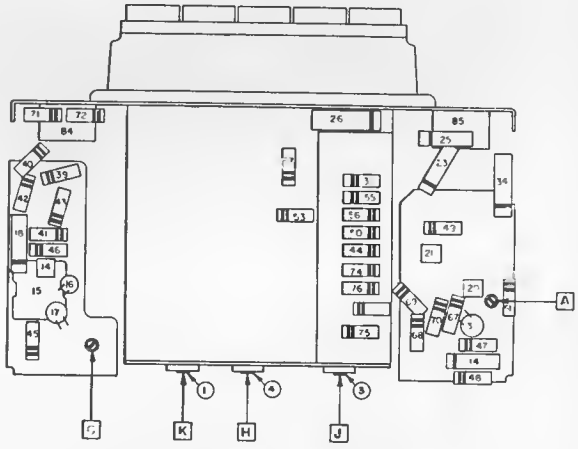


PARTS LAYOUT — CHASSIS VIEW

RF—UNIT



PARTS LAYOUT — TUBE VIEW



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.

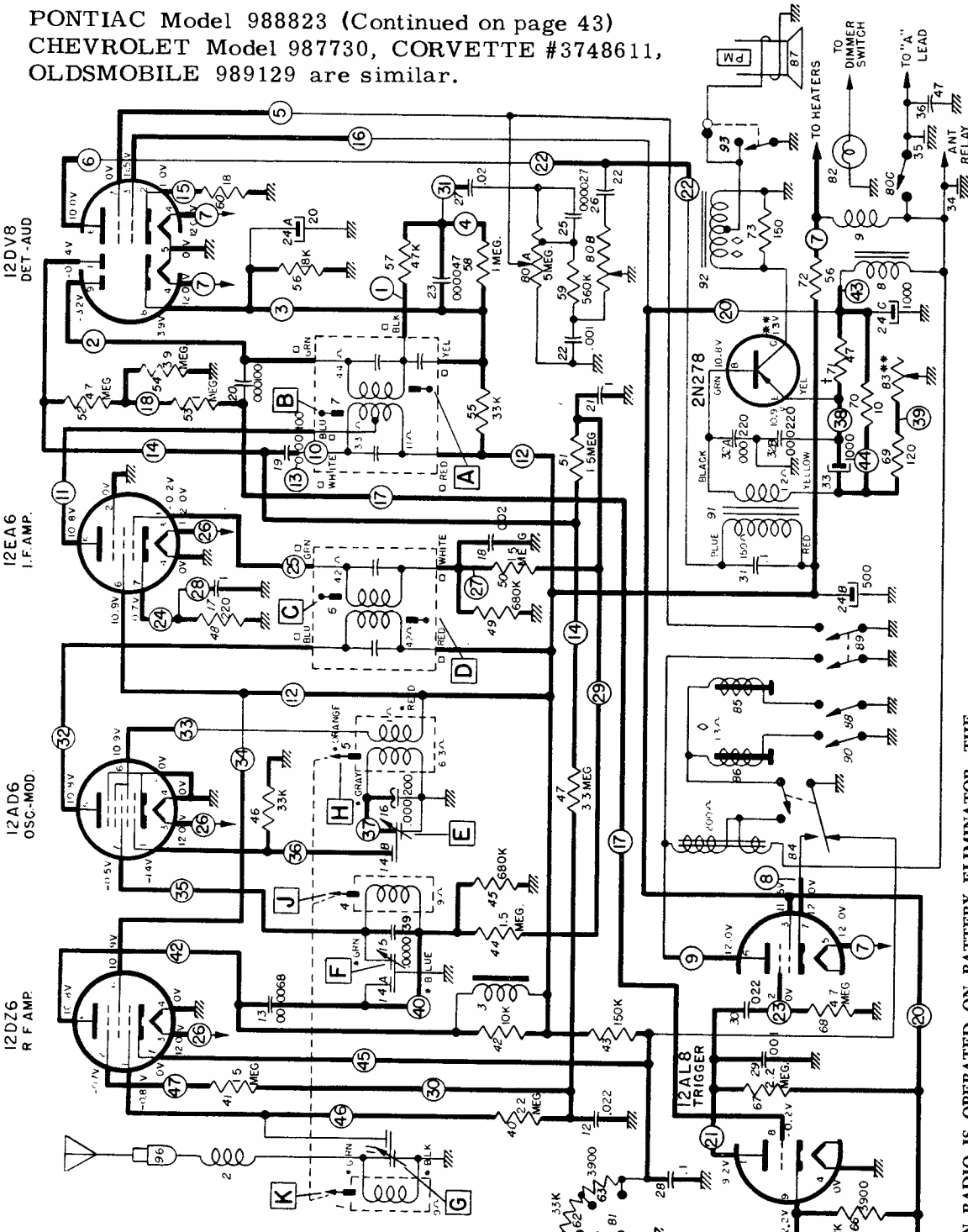
**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be $1\frac{55}{64}$" from the mounting end of the coil form. This measurement is readily made by inserting a suitable plug in the mounting end of the coil form. The core adjustment is made from the 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.



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.

SCHEMATIC NOTES

Voltages 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.

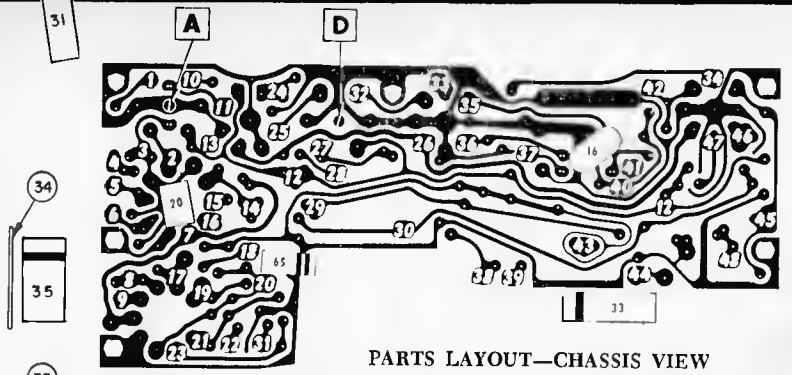
PUSHBUTTON SETUP PROCEDURE

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

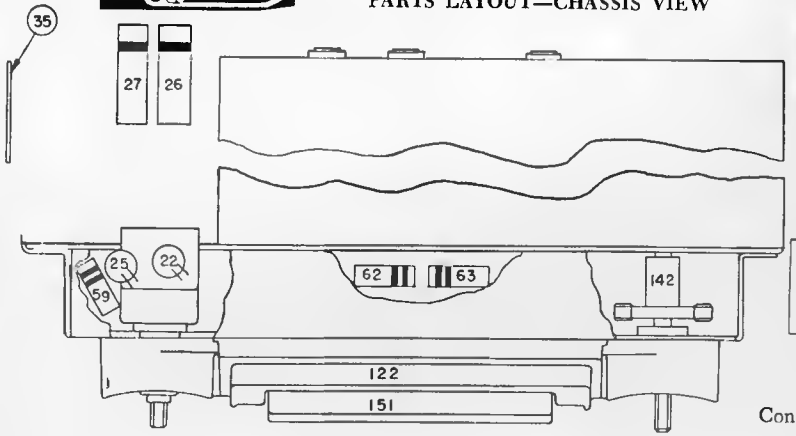
DELCO

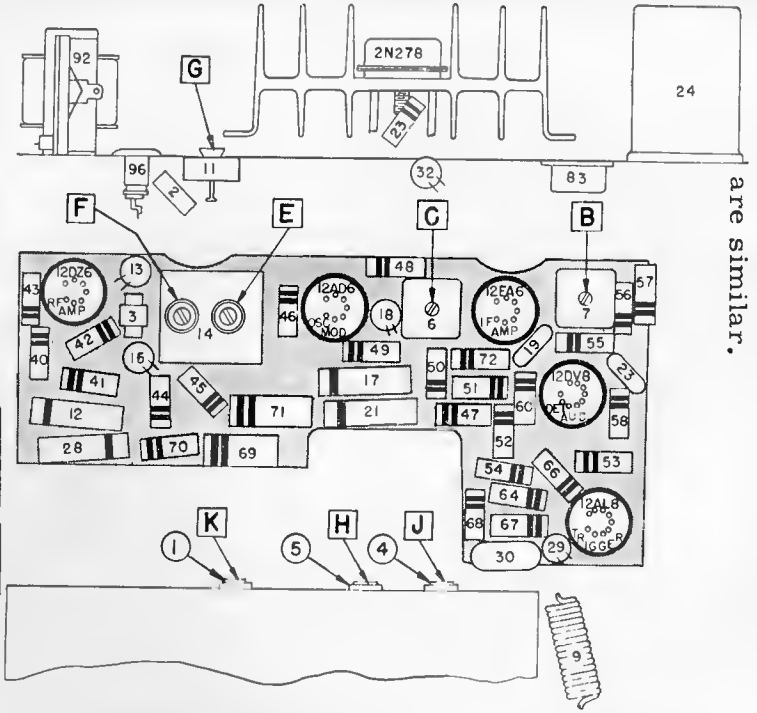
PONTIAC Model 988823 (Continued)
CHEVROLET 987730, CORVETTE 3748611,
and OLDSMOBILE Model 989129
are similar.

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



PARTS LAYOUT—CHASSIS VIEW





PARTS LAYOUT—TUBE VIEW

Connect vacuum tube voltmeter across speaker voice coil during alignment.

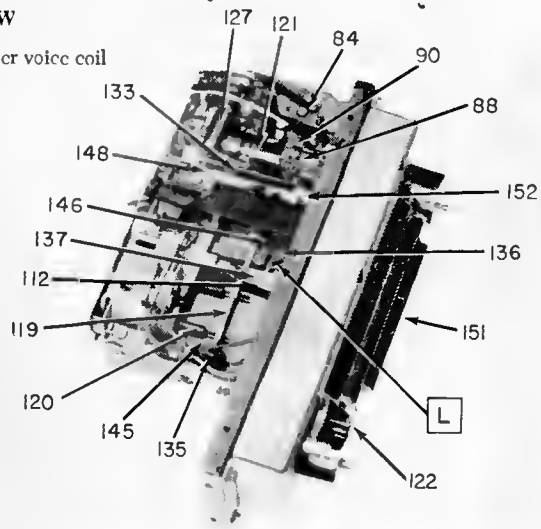
Step	Dummy Antenna	Connect To	Signal Generator Frequency	Tune Receiver To	Adjust in Sequence
1	0.1 Mfd.	12AD6 Grid (Pin 7)	262 KC	°High Frequency Stop	A, D, B, C (Max.)
2	.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	°°E, F, G (Max.)
3	.000068 Mfd.	Antenna Connector	600 KC	Signal Generator 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 1⅝" 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).



TUNER

DELCO

PONTIAC DELUXE MODEL 988822

(Continued on page 45 adjacent at right)

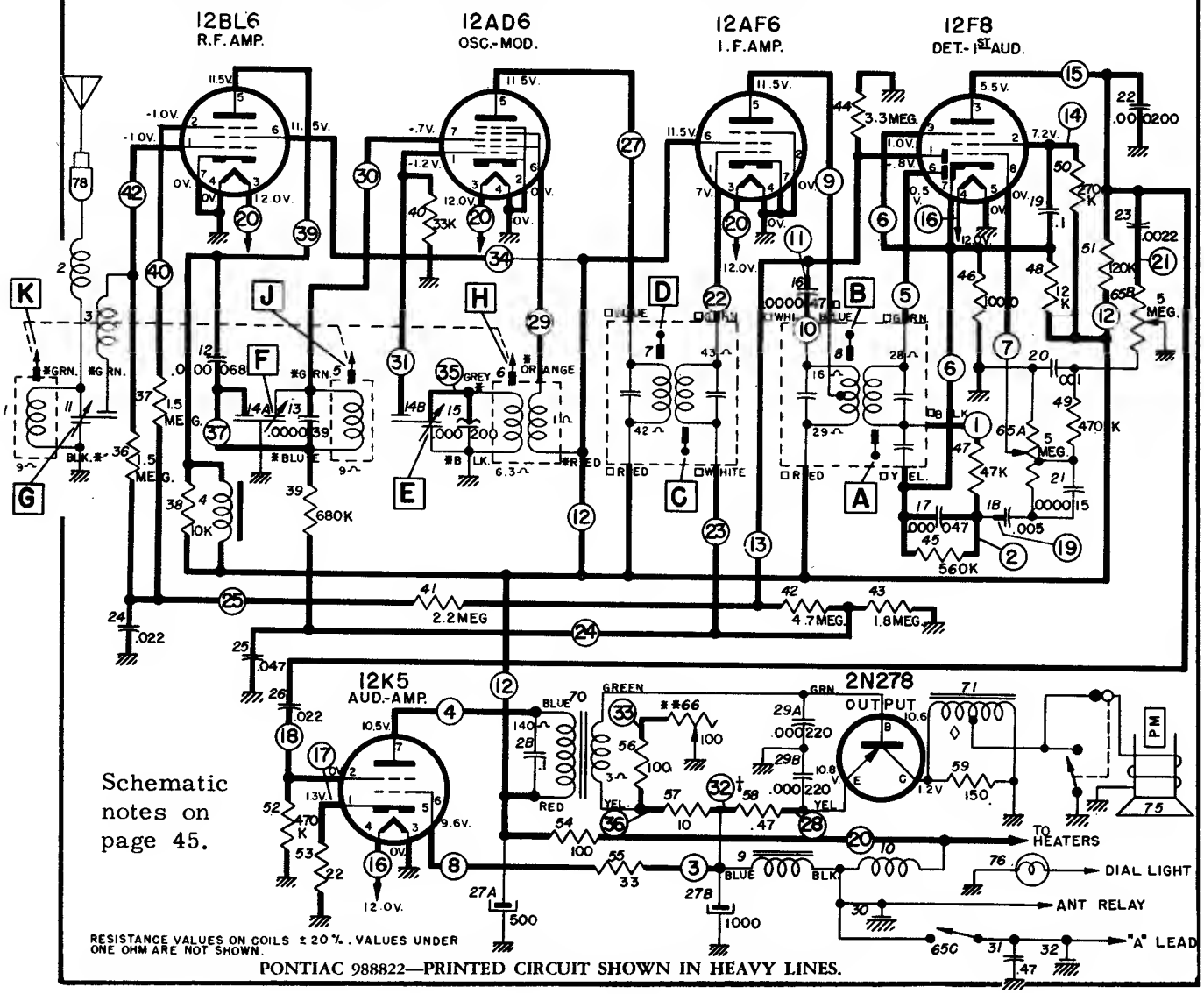
ALIGNMENT PROCEDURE

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 1⅝" 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.)



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

DELCO

PONTIAC RADIO MODEL 988837

OLDSMOBILE Model 989131 is similar.

(Continued on page 47, at right)

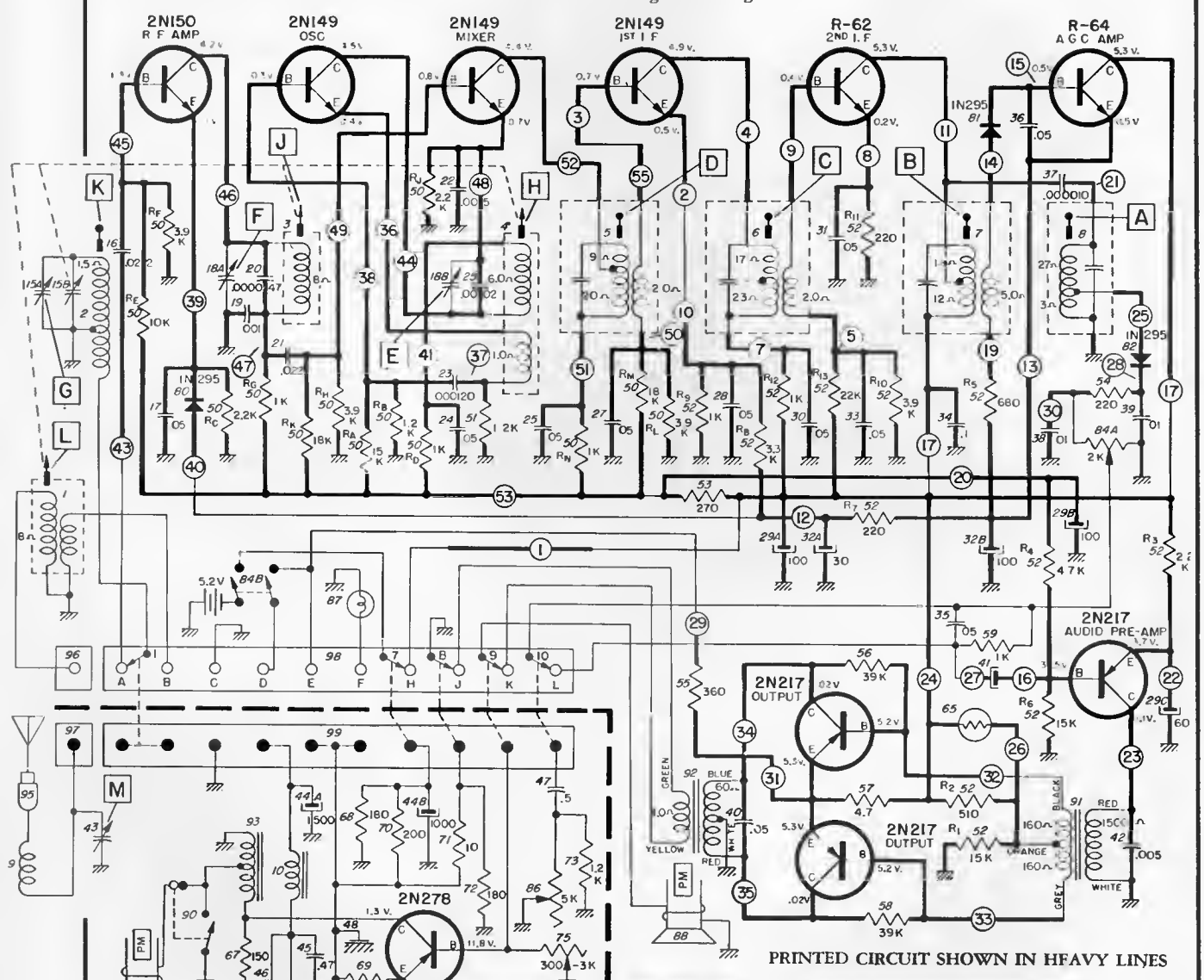
SCHEMATIC DATA

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.

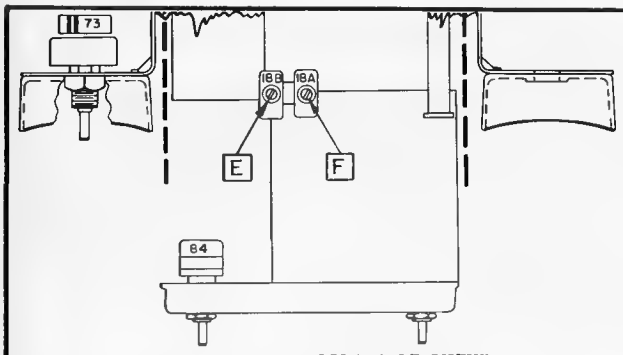
Total "A" Drain of Portable 7.6 ma.

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

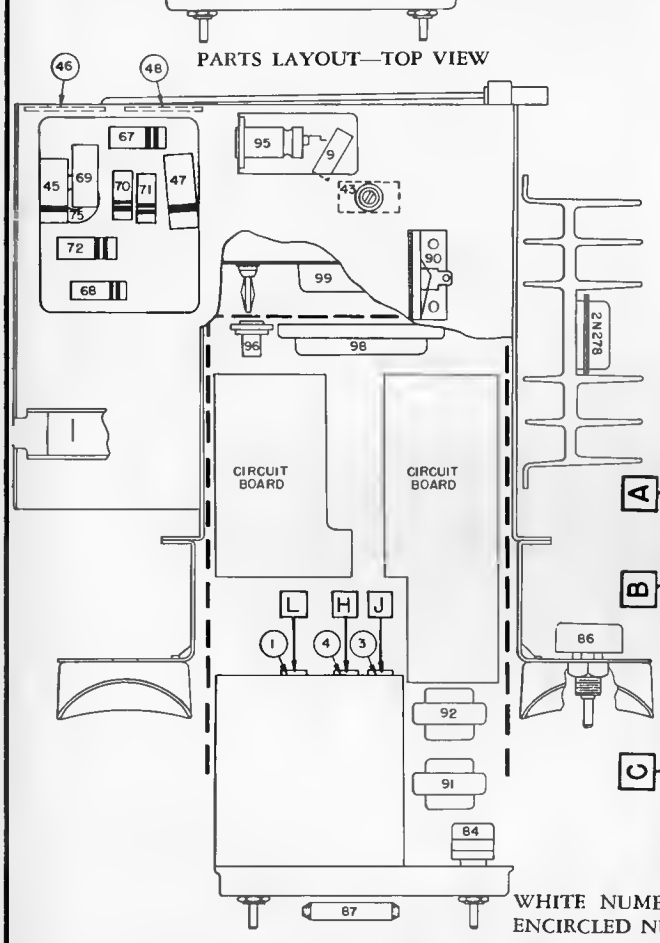


DELCO

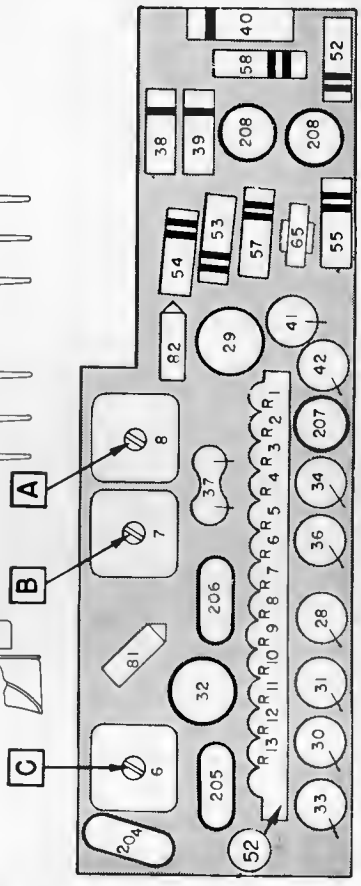
PONTIAC Radio Model 988837,
OLDSMOBILE 989131 very similar.
(Continued from page 46, at left)

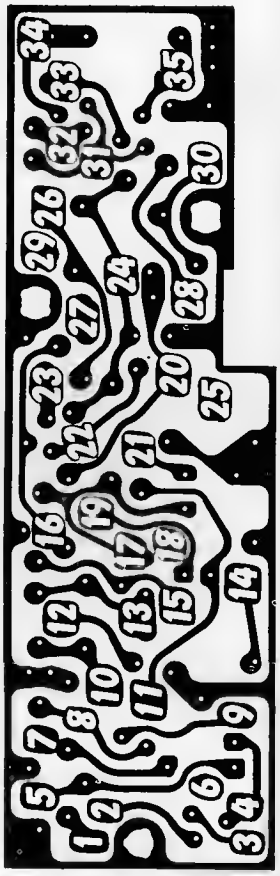


PARTS LAYOUT—TOP VIEW



PARTS LAYOUT—BOTTOM VIEW





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

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.

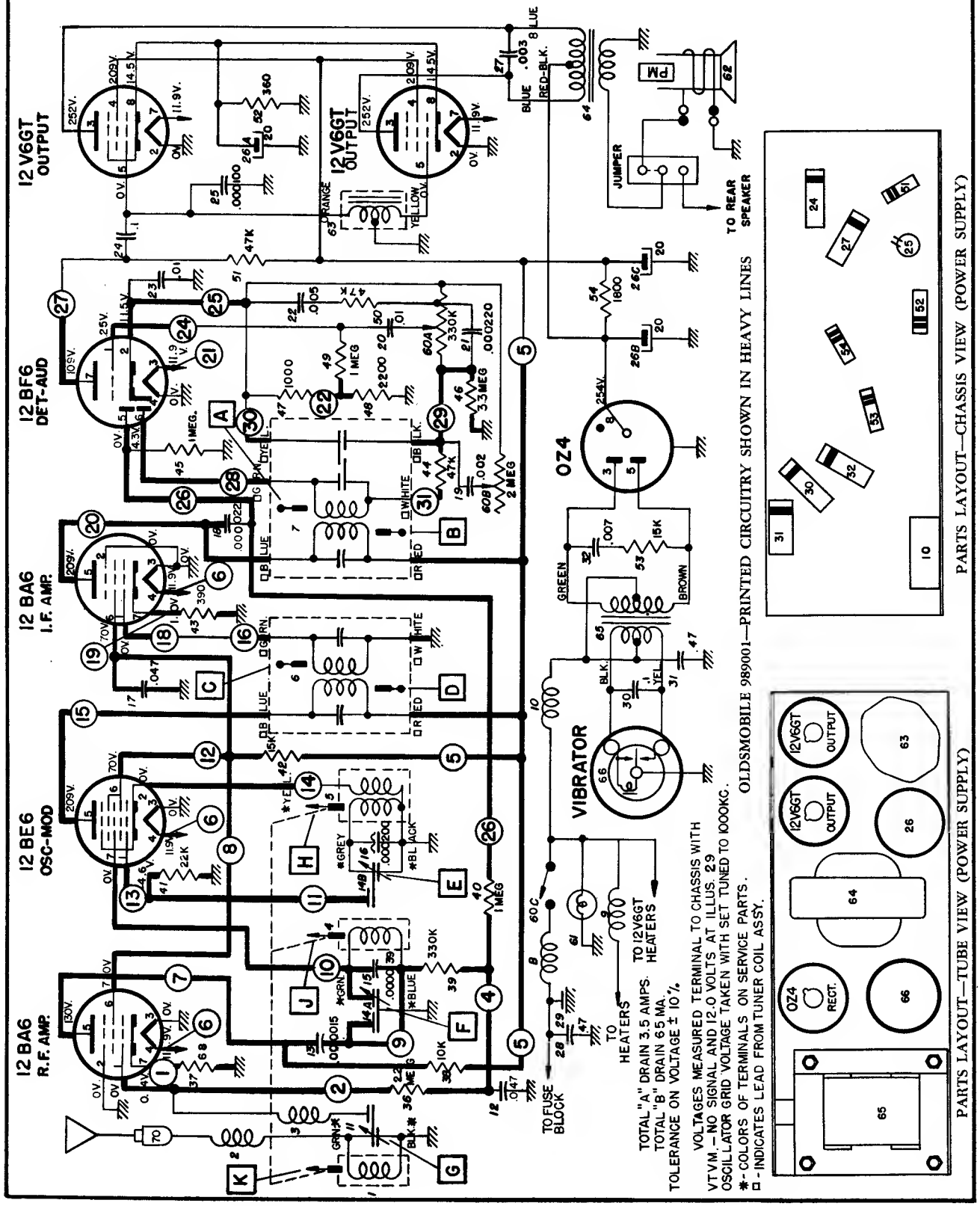
‡‡Trimmer on gang capacitor

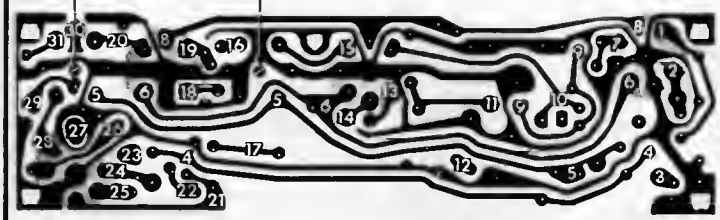
‡‡‡This step is needed only when antenna coil or core is replaced. The portable unit must be in the rack and the cover on portable and cover on rack must be removed to make this adjustment.

DELCO

OLDSMOBILE DELUXE MODEL 989001

(Continued on page 49 adjacent at right)



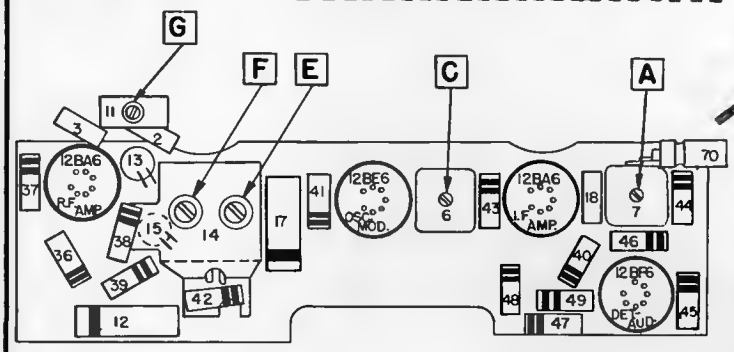


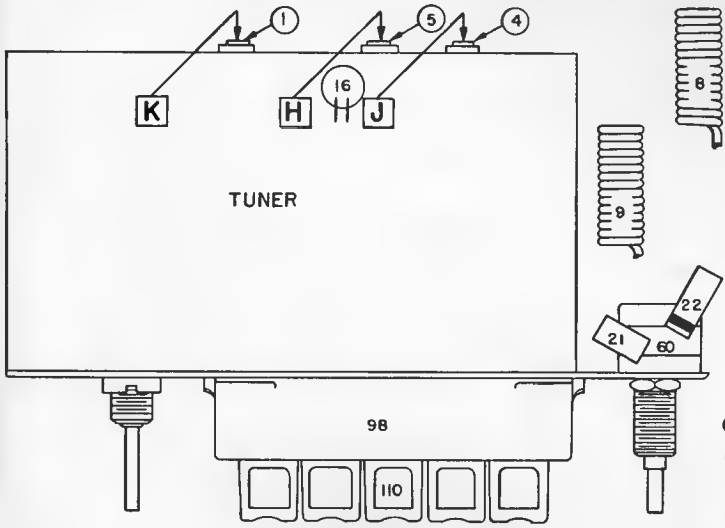
WHITE NUMBERS ON PRINTED CIRCUIT BOARD DRAWING CORRESPOND TO NUMBERS ENCIRCLED ON SCHEMATIC.

DELCO

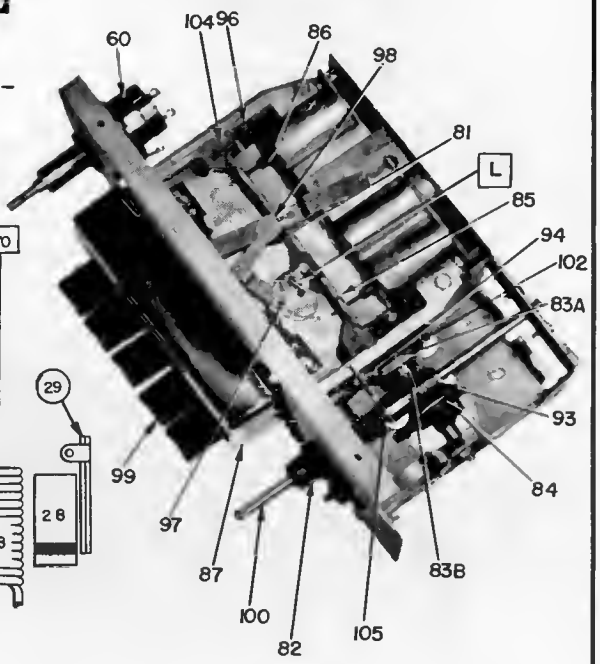
OLDSMOBILE Model 989001

(Continued from page 48)





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 1⅝" 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

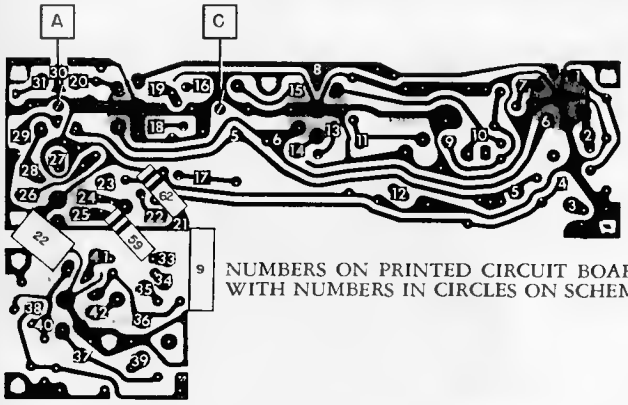
(Alignment and other service material on page 51, adjacent at right.)

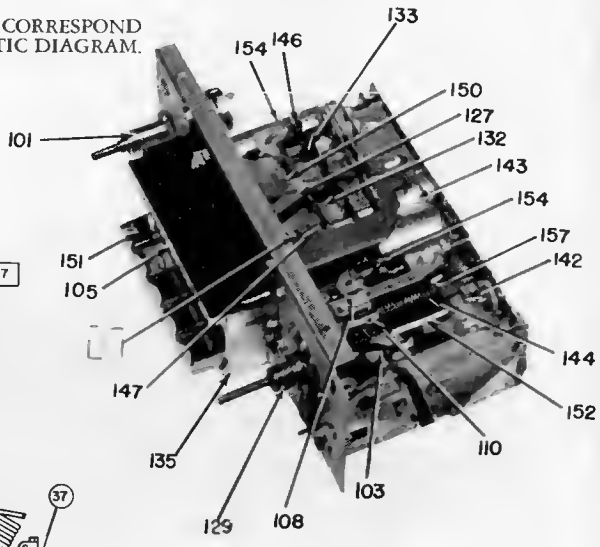
PARTS LAYOUT—TUBE VIEW (POWER SUPPLY)

DELCO

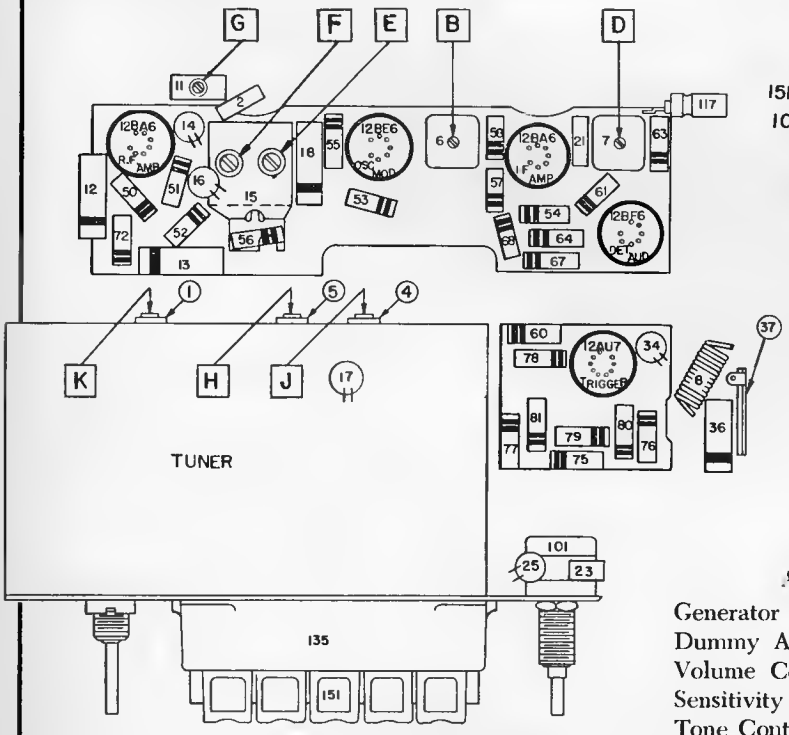
OLDSMOBILE MODEL 989002

(Continued from page 50)





TUNER



PARTS LAYOUT—TUBE VIEW

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 Control ..... Treble (max. clockwise)
Generator Output ..... Not 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 rim against the feeler gauge.

**Before making this adjustment, check the setting of oscillator core "H." The rear of the core should be 1⅝" 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

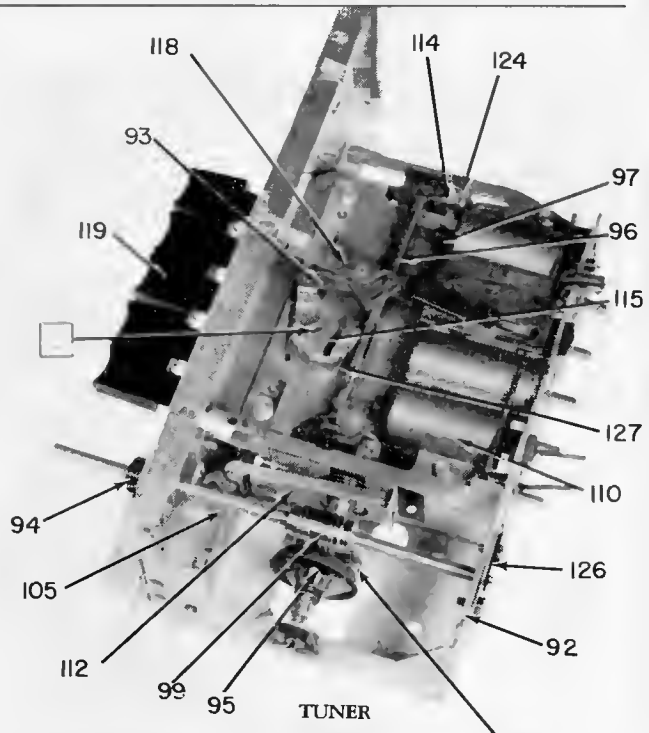
OLDSMOBILE MODEL 989127

(Continued on page 53)

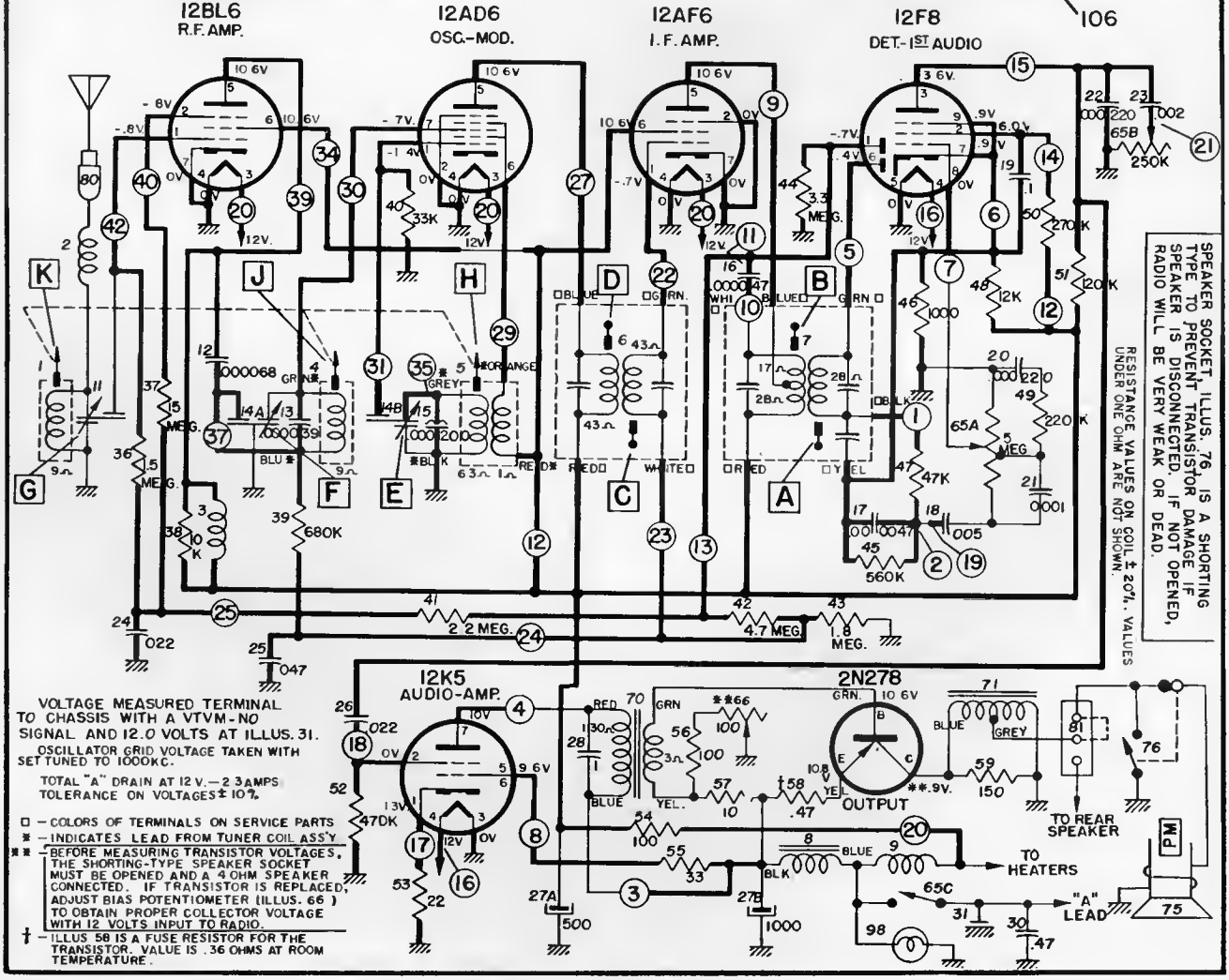
TROUBLE SHOOTING THE OUTPUT STAGE

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 "O".

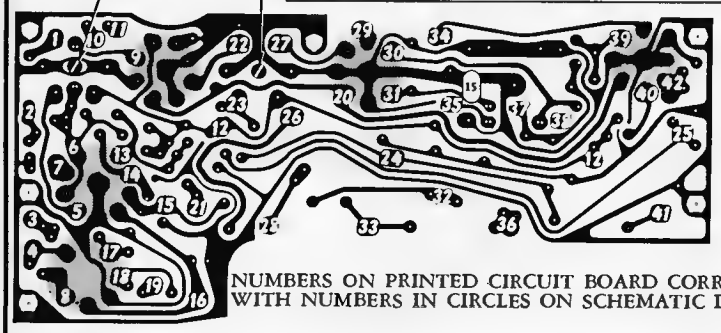


PRINTED CIRCUIT SHOWN IN HEAVY LINES.

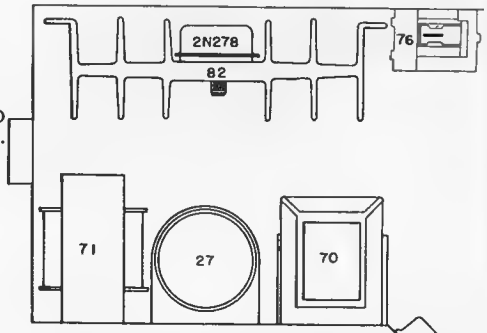


DELCO
OLDSMOBILE Model 989127

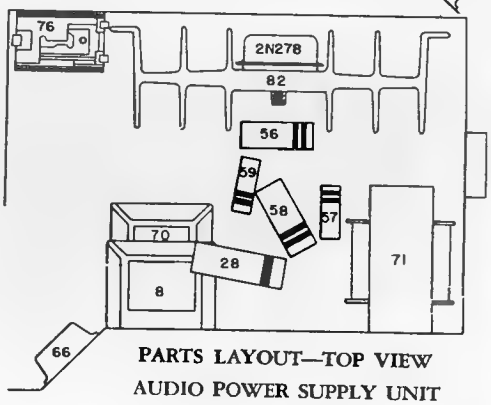
(Continued from page 52)



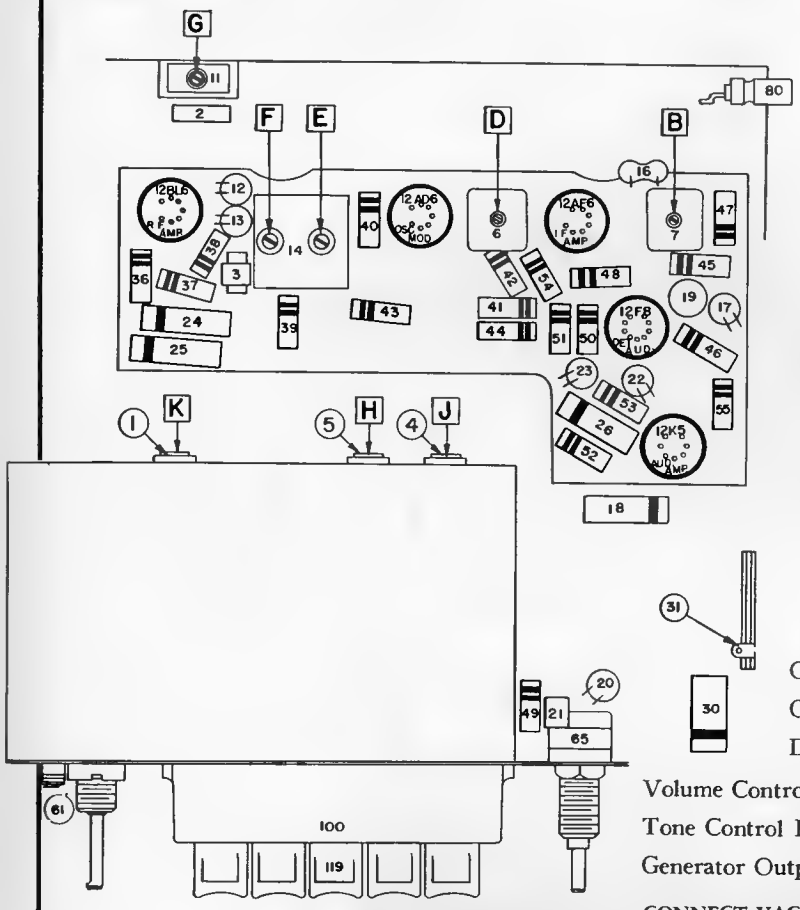
NUMBERS ON PRINTED CIRCUIT BOARD CORRESPOND WITH NUMBERS IN CIRCLES ON SCHEMATIC DIAGAM.



PART LAYOUT—BOTTOM VIEW



PARTS LAYOUT—TOP VIEW
AUDIO POWER SUPPLY UNIT



PARTS LAYOUT—TUBE VIEW

ALIGNMENT PROCEDURE

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

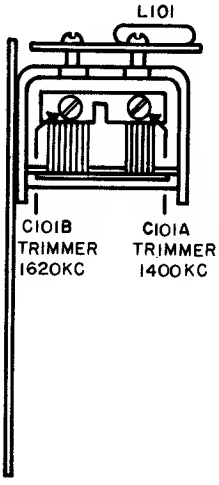
CONNECT VACUUM TUBE VOLTMETER ACROSS SPEAKER VOICE COIL DURING ALIGNMENT.

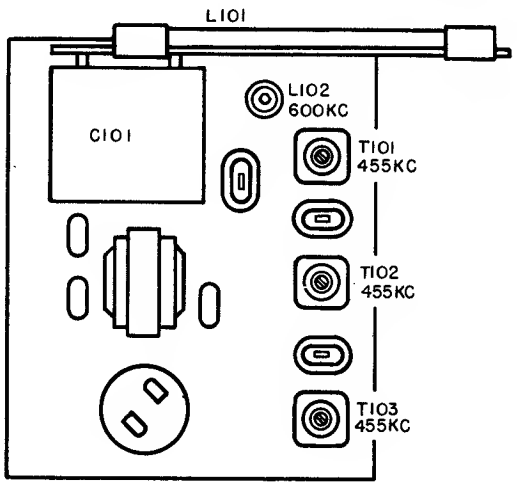
Steps	Series Capacitor or Dummy Antenna	Connect Signal Generator to	Signal Generator Frequency	Tune Receiver to	Adjust in Sequence For Max. Output
1	0.1 Mfd.	12AD6 Grid (Pin #7)	262 KC	High Frequency Stop	A, B, C, D
2	0.000068 Mfd.	Antenna Connector	1615 KC	High Frequency Stop	*E, F, G
3	0.000068 Mfd.	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 1⅝" 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.)

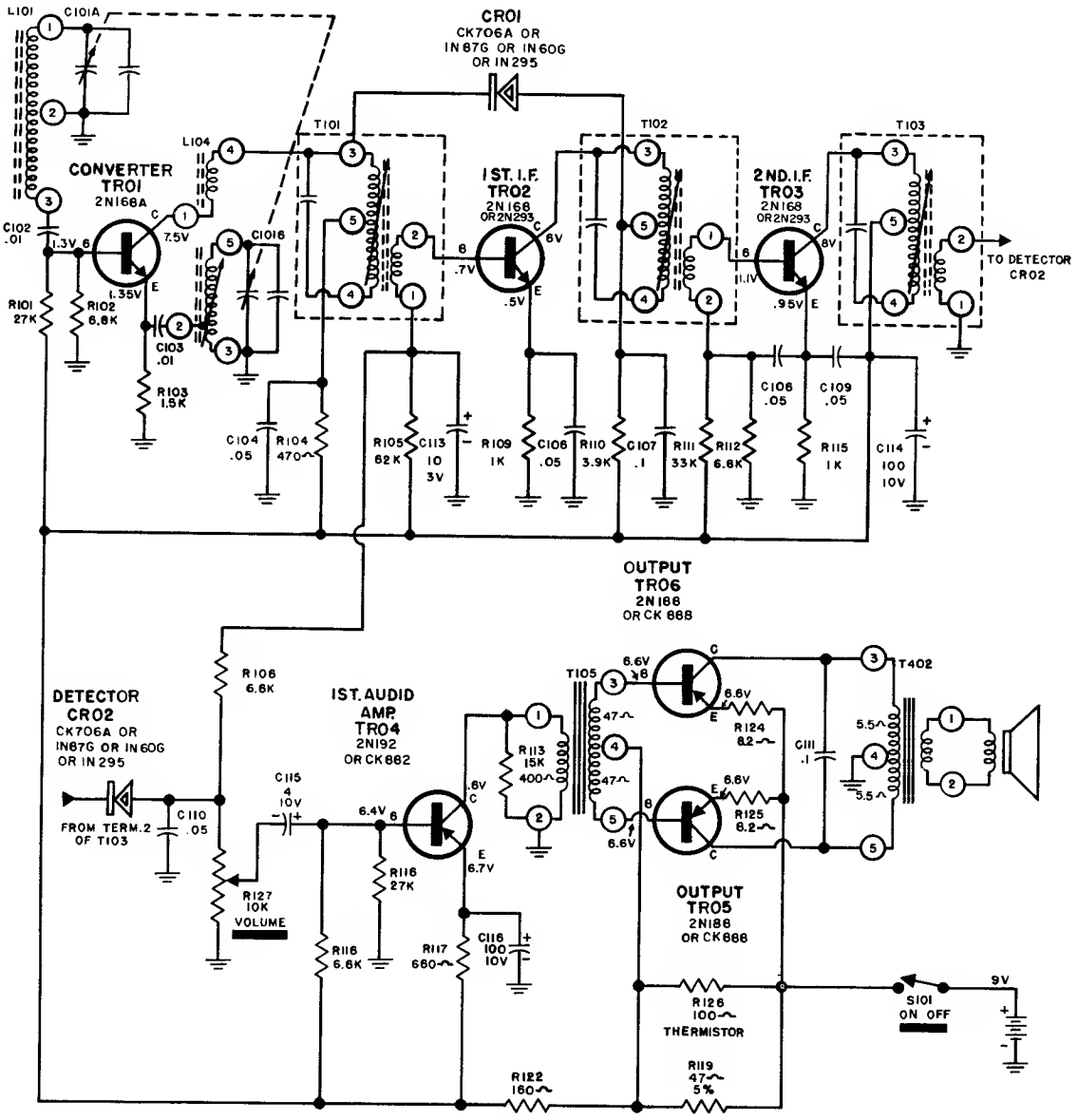




DU MONT

Model 1210 (RA-902)

(Continued on page 55, adjacent at right.)



DU MONT

MODEL 1210 (RA-902)

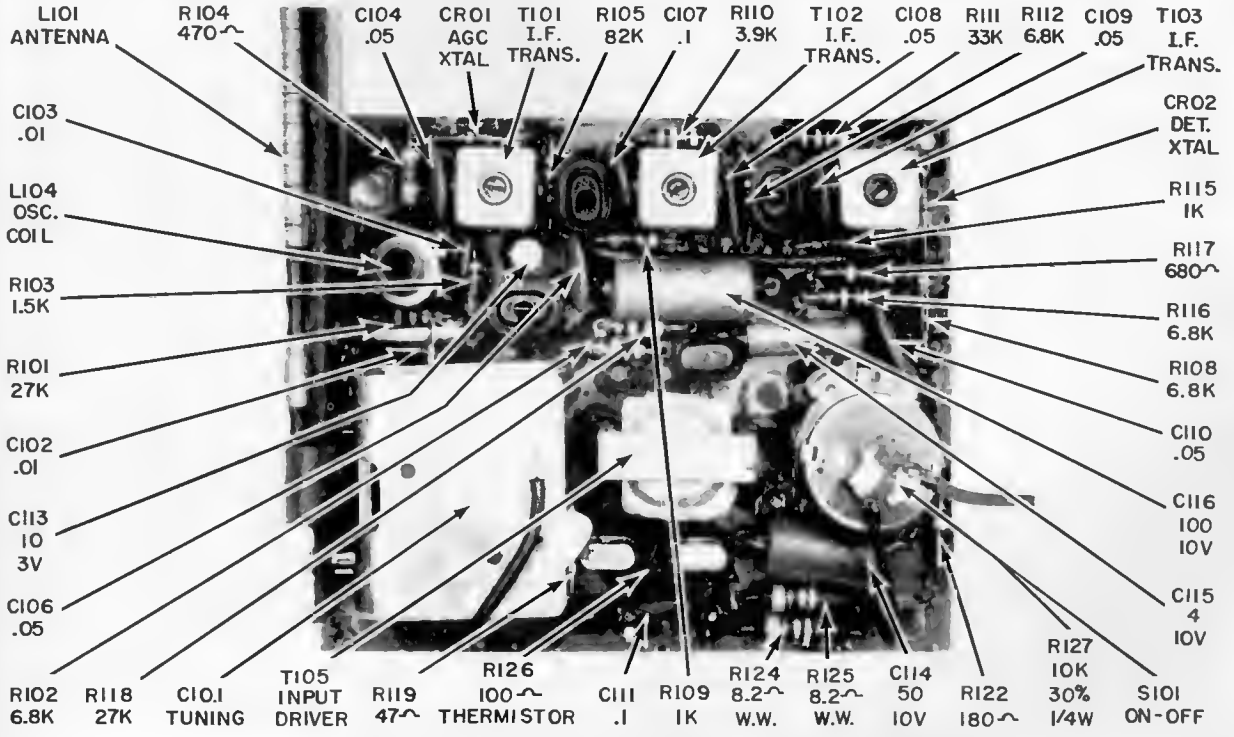
(Continued from page 54, adjacent at left)

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	AC meter across speaker voice coil	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.

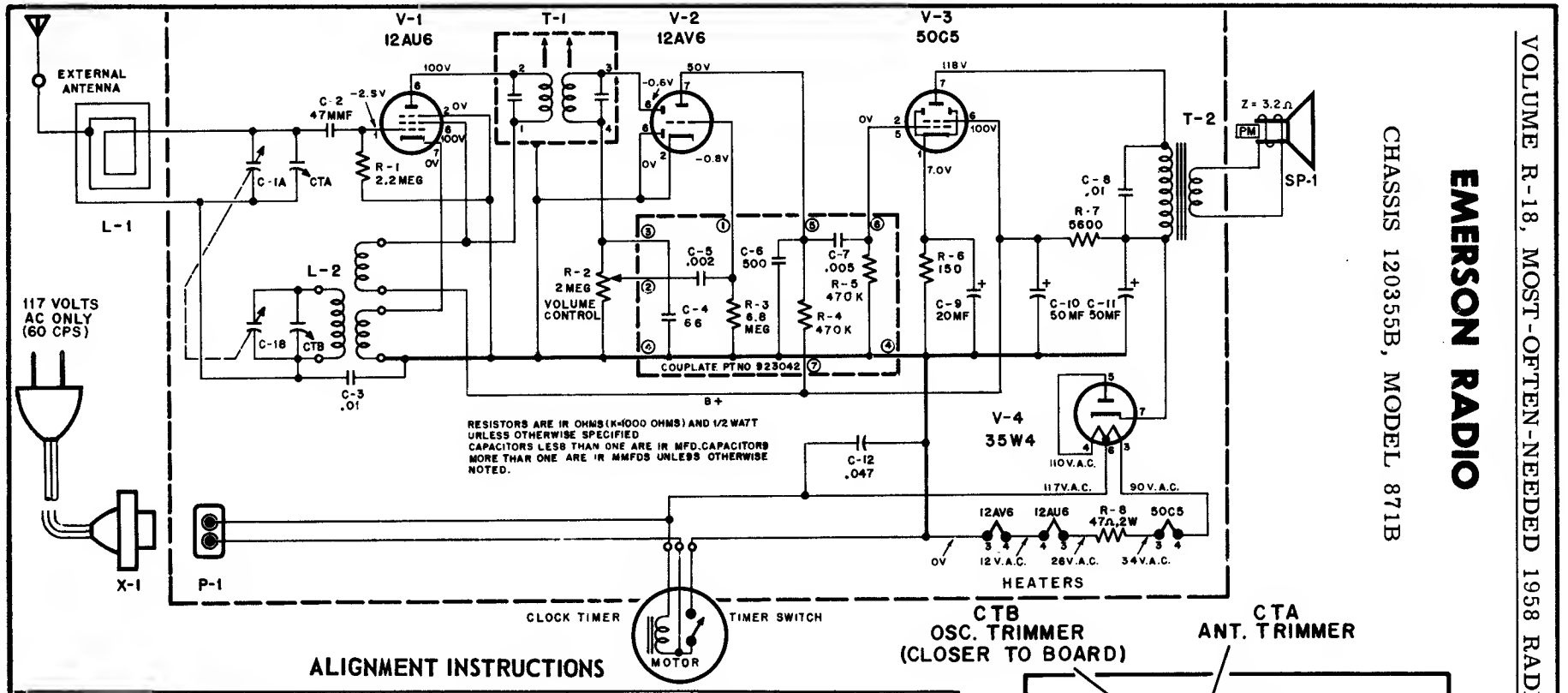
NOTE: When the chassis and/or battery comportment are reinstalled in the case, tune the radio to a weak AM station above 1400 KC, and retouch the antenna trimmer capacitor, C101A, for peak performance.



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

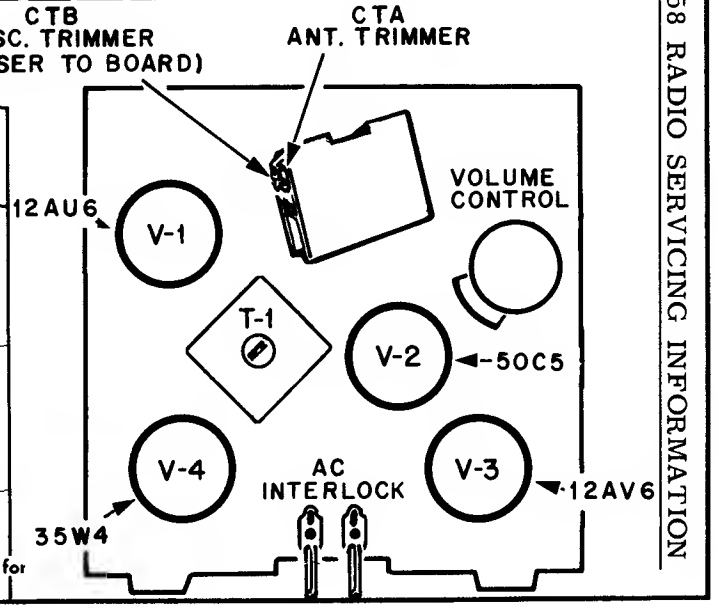
EMERSON RADIO

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) of V1 (12AU6). 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	Adjust for maximum output. (Repeat steps 2 and 3 for optimum results.)



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

Emerson Radio

MODELS 851B, 870B, 874B
CHASSIS 120363A

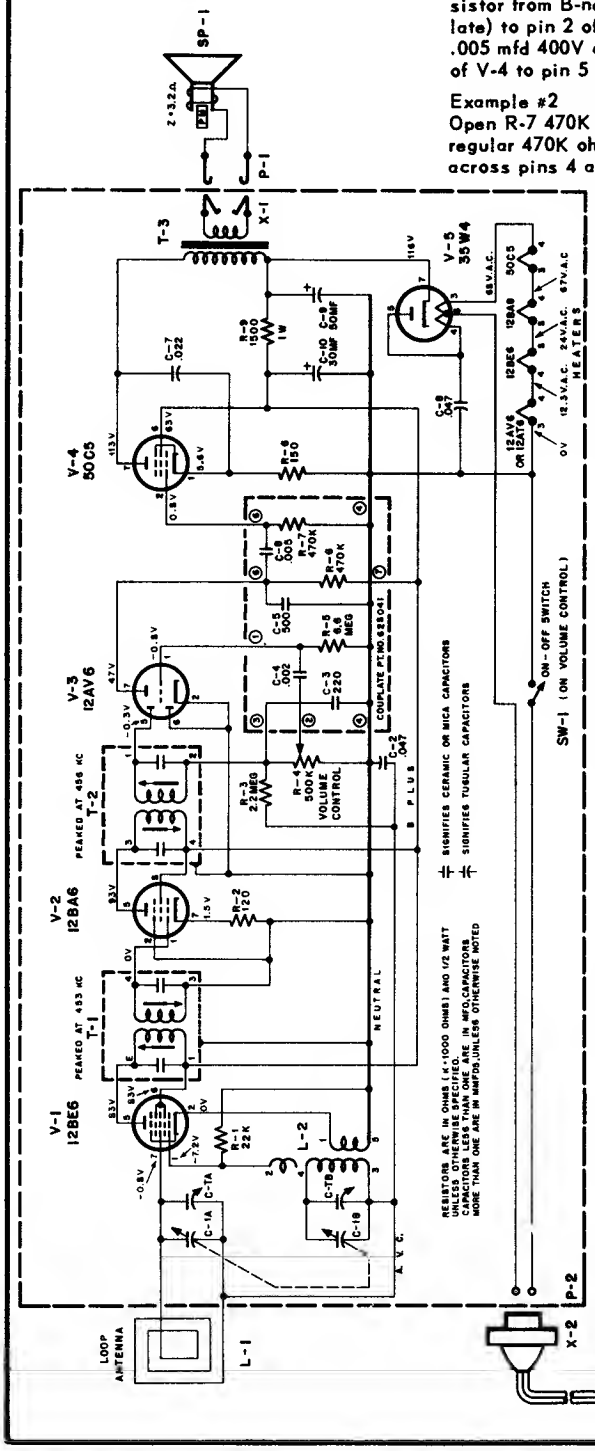
REPAIR OF COUPLATES

Whenever possible couplates should be repaired instead of replaced. This practice could readily become o 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-1A	900153	Variable Capacitor, R. F. Section
C-TA	Pt. of C-1A	Trimmer, R. F. Section
C-1B	Pt. of C-1A	Variable Capacitor, OSC. Section
C-TB	Pt. of C-1A	Trimmer, OSC. Section
C-2	923554	.047 MF Paper ± 20% 400 V
C-3		
C-4	Pt. of Coup-late	
C-5		.022 MF Paper ± 20% 400V
C-6		.047 MF Paper ± 20% 400V
C-7	923524	
C-8	923554	
C-9	925402 or 925372	50 MF Electrolytic 150V

SYM.	PART NO.	DESCRIPTION
C-10	Pt. of C-9	30 MF Electrolytic 150V
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
L-2	716108	Oscillator Coil
T-1	720294	1st I.F. Transformer
T-2	720295	2nd I.F. Transformer
T-3	734138	Audio Output Transformer

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

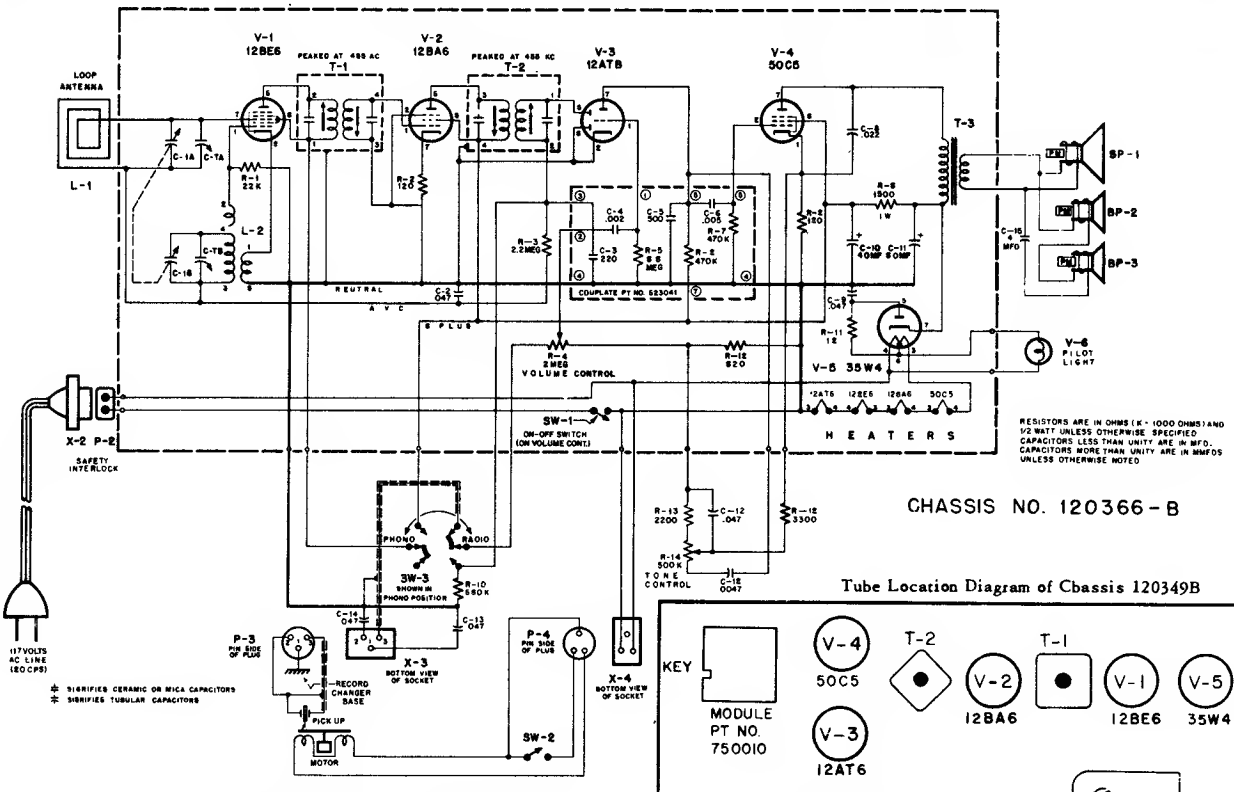
† Wait for meter to settle (about 30 seconds).
* Resistances measured to Pin 7 of 35W4 (Bt).

RESISTANCE READINGS

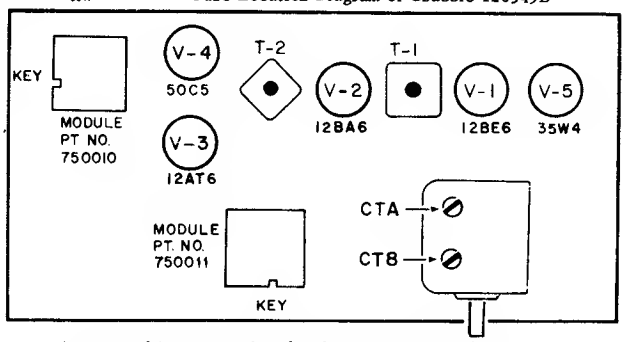
Emerson Radio

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.



Tube Location Diagram of Cbassis 120349B



DISASSEMBLY INFORMATION

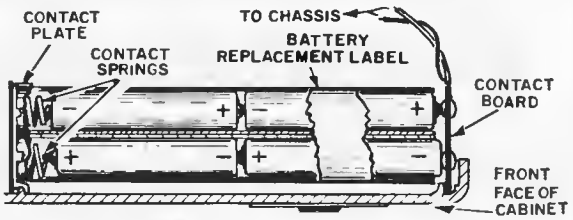
1. Remove all knobs and remove masonite back.
2. Remove 2 "C" and 2 standard washers securing changer hold down bolts to mounting board (which is part of cabinet), remove 2 three-prong plugs and remove changer (unstaple fish paper wire holders.)
3. To remove radio:
   a) Remove AC interlock, slide off 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

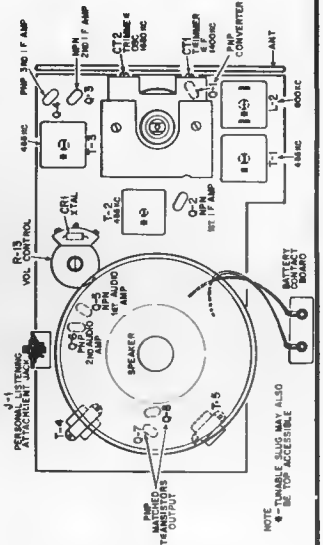


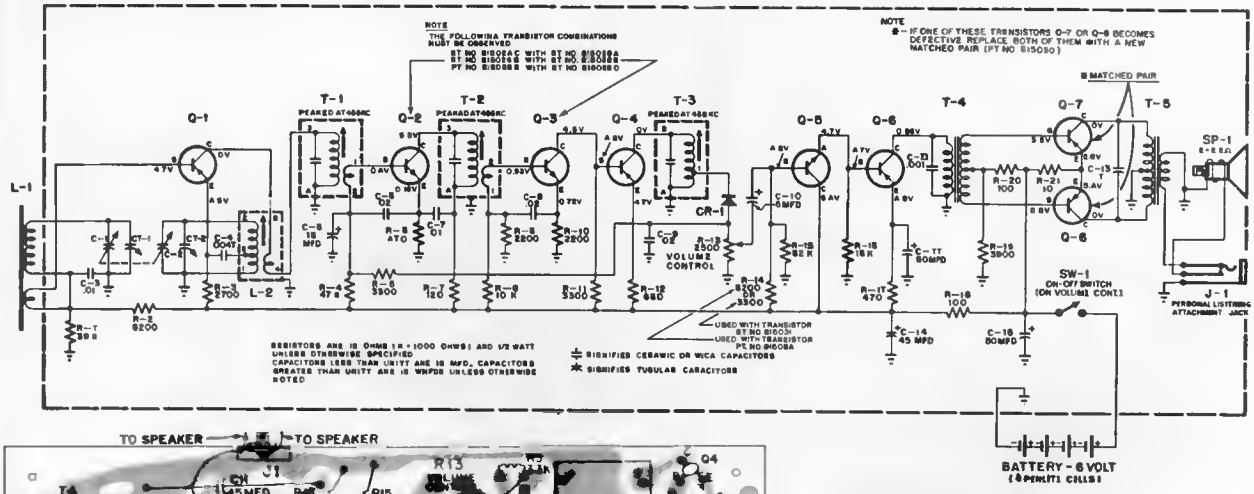
ALIGNMENT INSTRUCTIONS

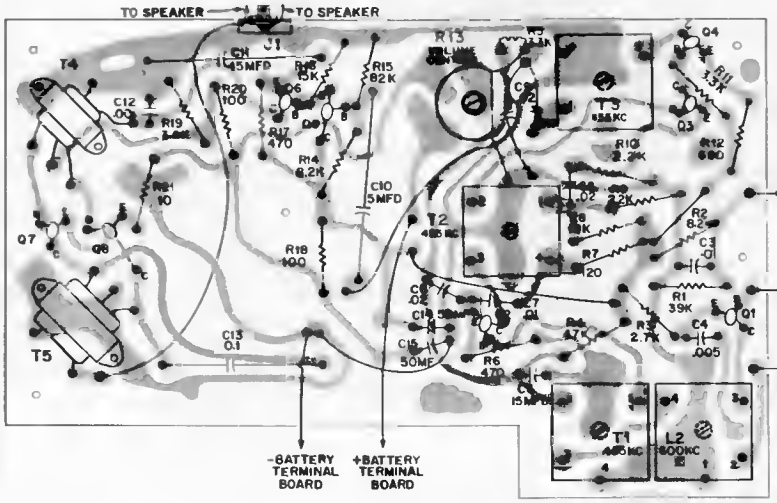
Volume control should be at maximum; output of signal generator should be no higher than necessary to obtain an output reading with a 30% audio modulated R.F. Use an insulated alignment screwdriver for adjusting.

	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) See note below	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 Volt 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.

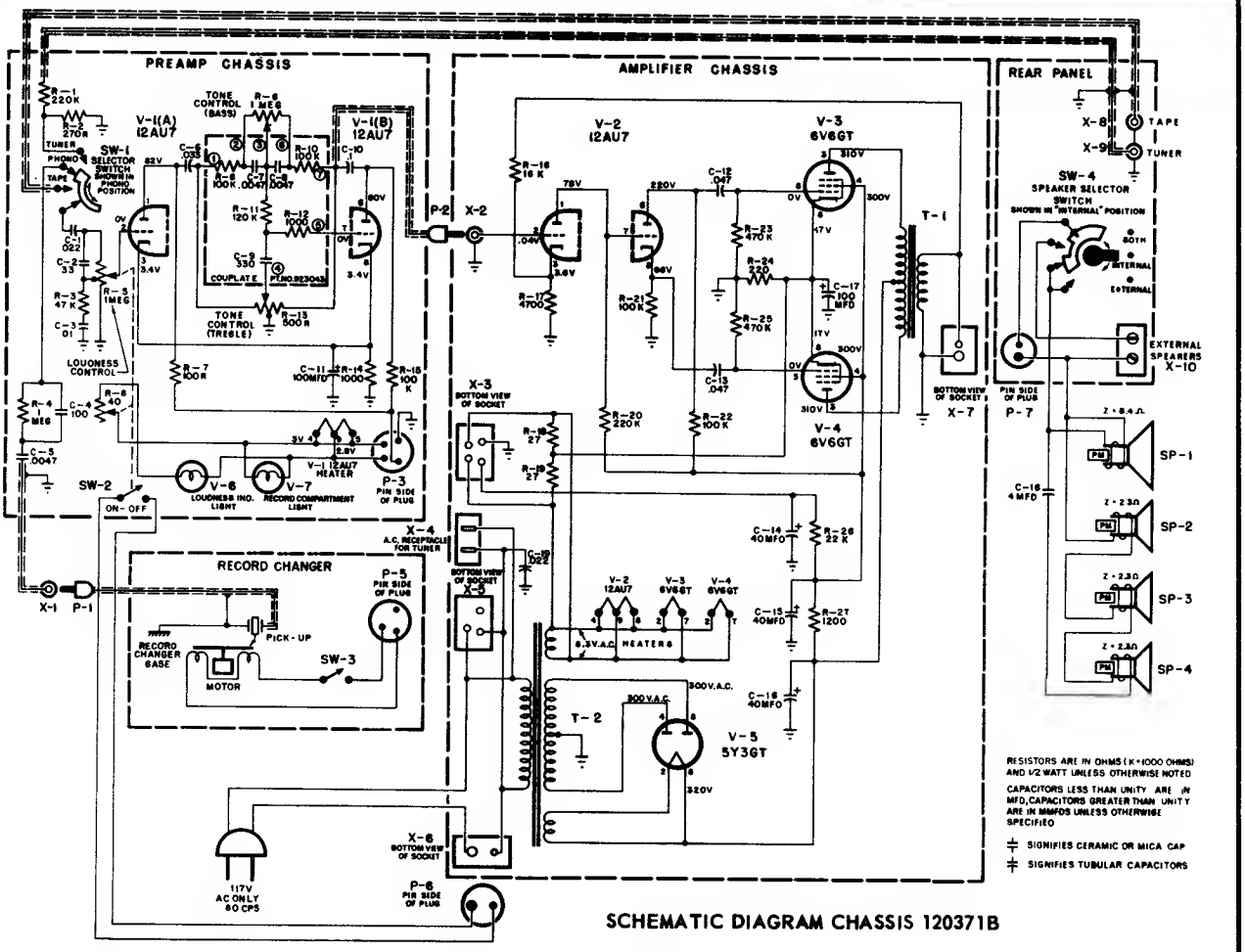
5. Nominal tolerances in component values make possible a variation of ± 15% in readings.

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.

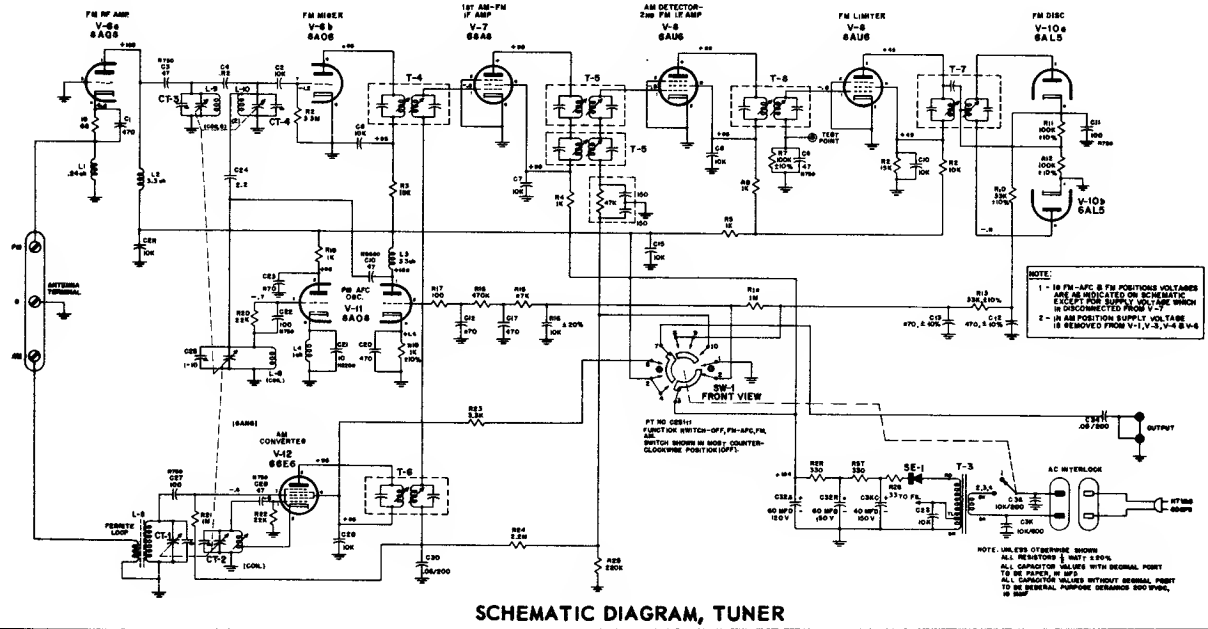
Emerson Radio

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

(Material continued on the next page adjacent at right)



SCHEMATIC DIAGRAM CHASSIS 120371B



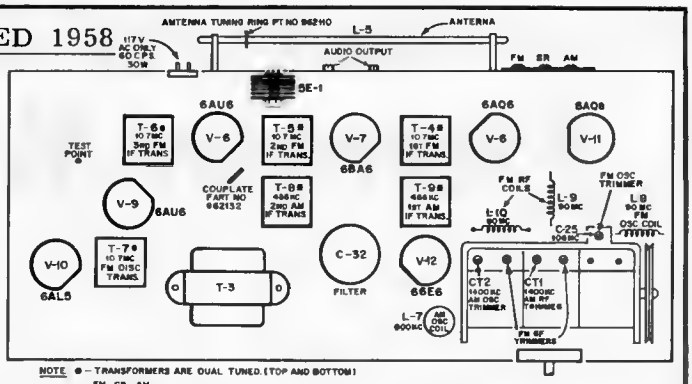
SCHEMATIC DIAGRAM, TUNER

Emerson

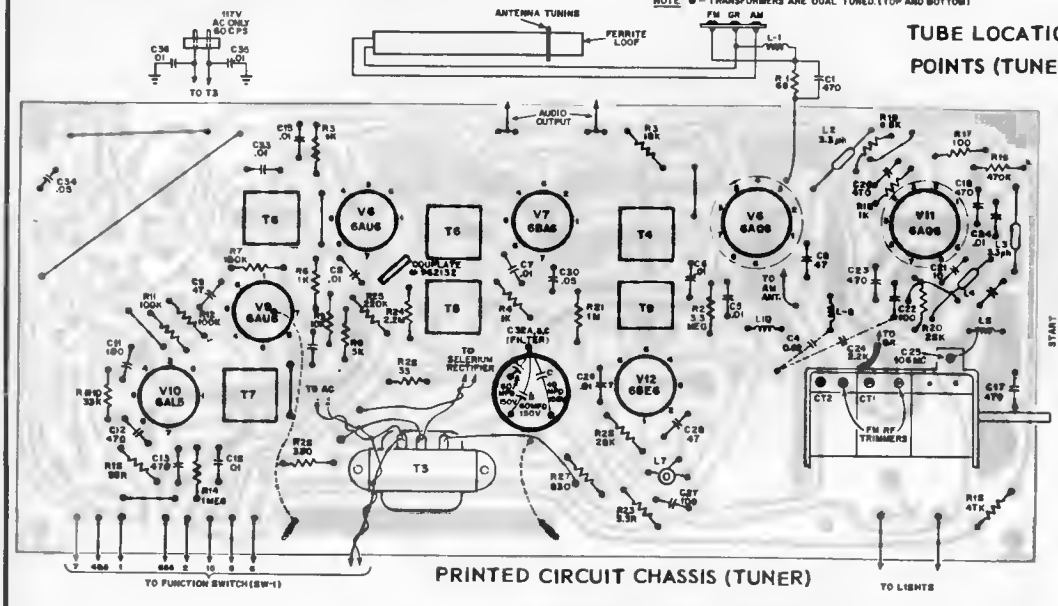
CHASSIS 120371B

Models 885B and 886B

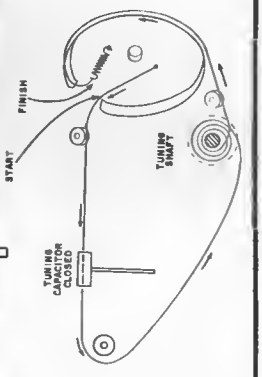
(Continued from preceding page adjacent at left.)



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. terminal. 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. terminal. 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 ±300KC. Marker generotor 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 pottern) 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

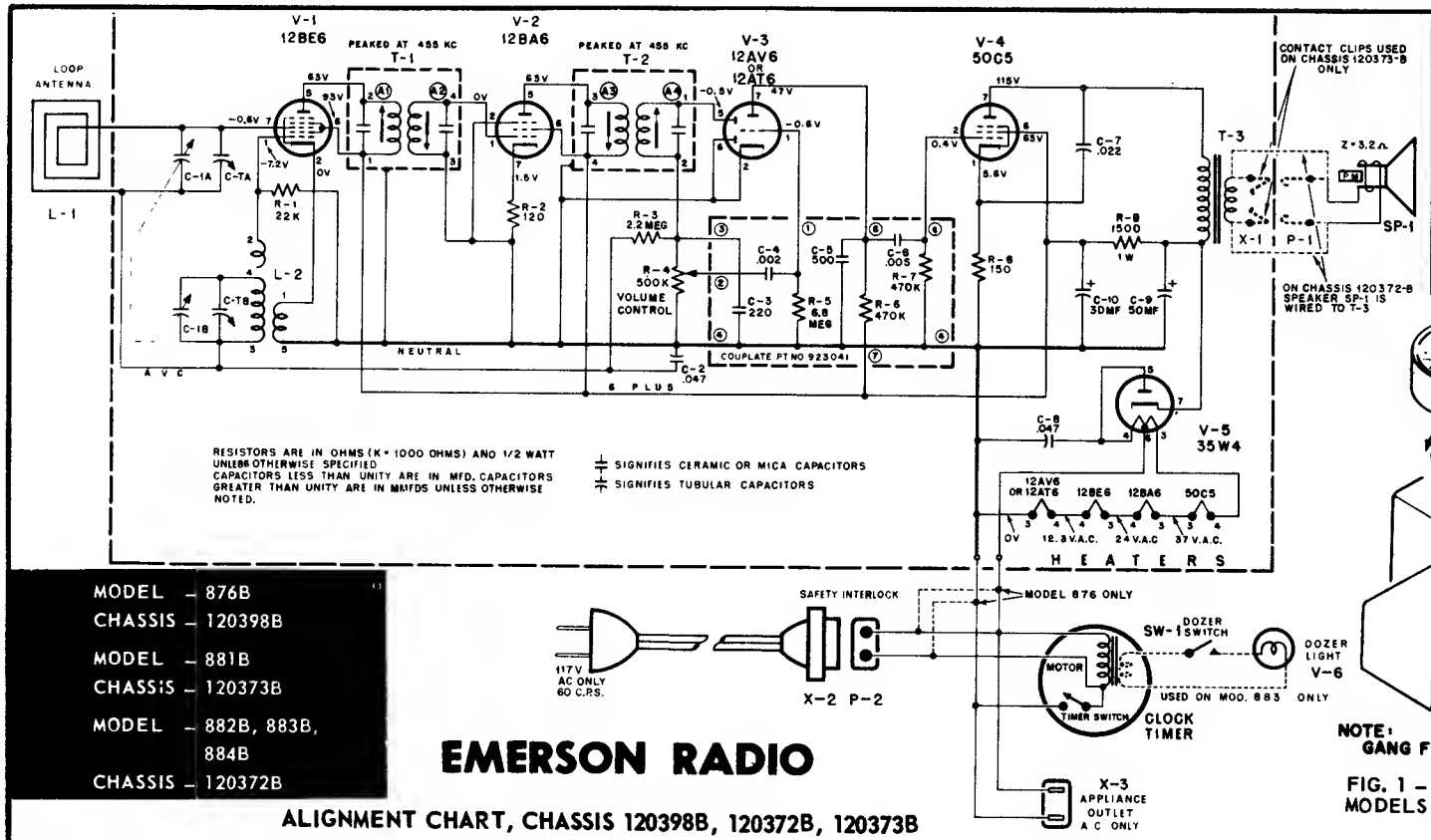
1. Remove all knobs, remove three screws mounting masonite back, remove back, remove 45 r.p.m. spindle holder.
2. Loosen four screws securing chonger mounting board to cabinet. Tilt chonger mounting board up and back while disconnecting two 3-prong plugs.
3. Remove two screws securing chassis mounting 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.

TYPE OF TUBES:

V-1 – 12BE6, converter
V-2 – 12BA6, i-f amplifier
V-3 – 12AT6, detector, a.v.c. a-f
V-4 – 50C5, power output
V-5 – 35W4, rectifier

EMERSON RADIO

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



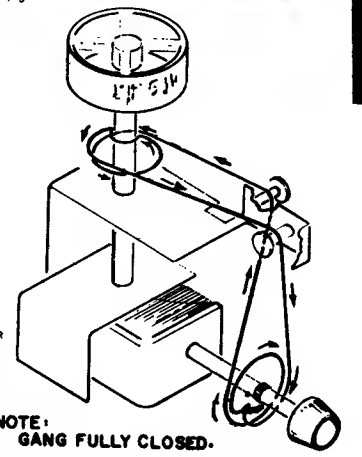


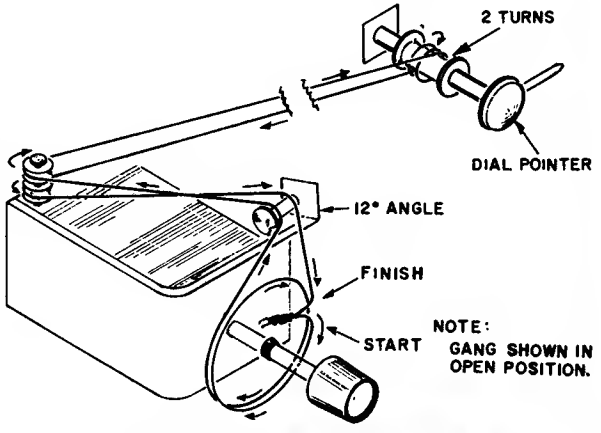
FIG. 1 – DIAL CORD STRINGING, MODELS 882B, 883B, 884B

EMERSON RADIO

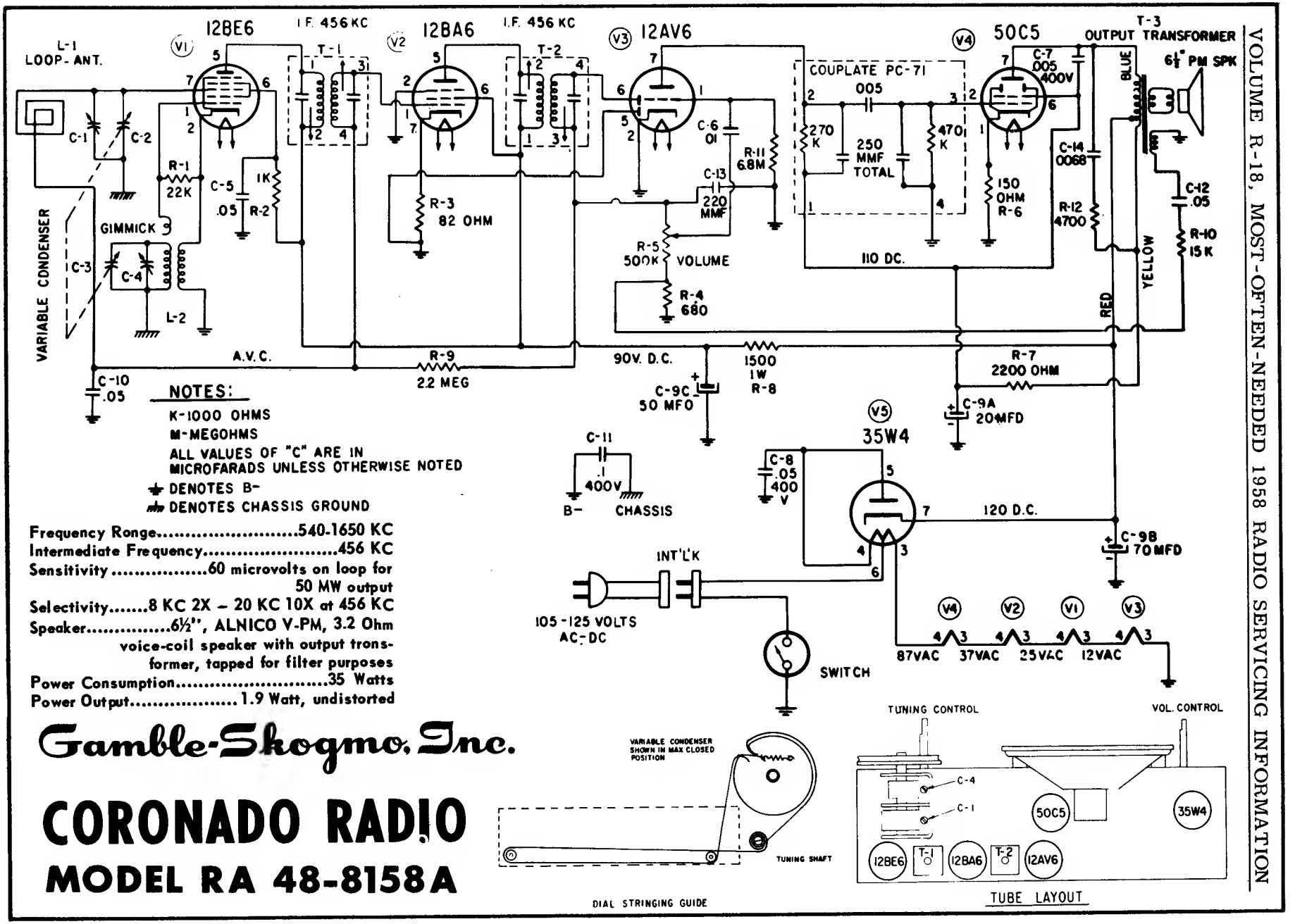
MODEL – 876B
CHASSIS – 120398B
MODEL – 881B
CHASSIS – 120373B
MODEL – 882B, 883B, 884B
CHASSIS – 120372B

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.



DIAL CORD STRINGING, MODEL 876B



Frequency Ronge.....540-1650 KC
Intermediate Frequency.....456 KC
Sensitivity.....60 microvolts on loop for 50 MW output
Selectivity.....8 KC 2X – 20 KC 10X at 456 KC
Speaker.....6½", ALNICO V-PM, 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.

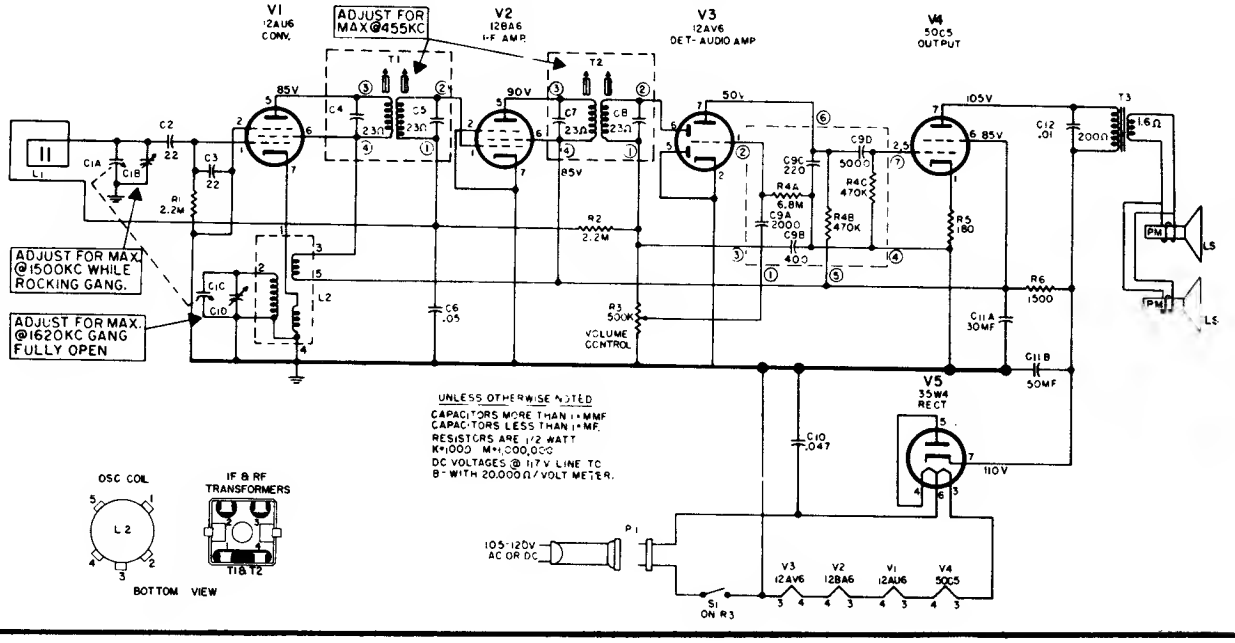
TO REPLACE A TUBE SOCKET

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.

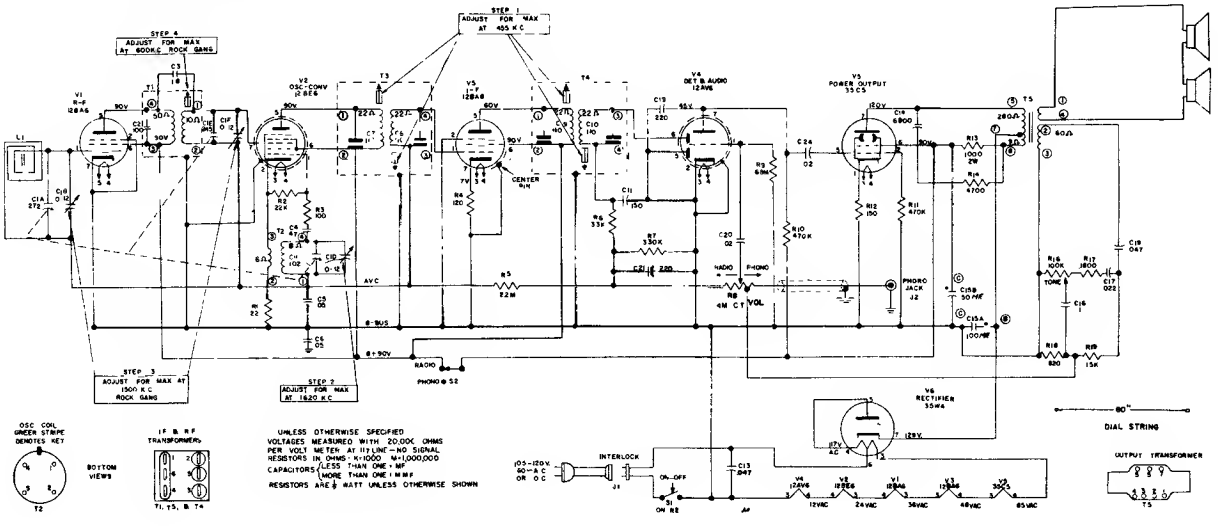
NOTE: The radio-phono switch on the rear of the cabinet should be in the "radio" position before starting alignment procedures.

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	12BA6
	V2	Oscillator-Converter	12BE6
	V3	I. F. Amplifier	12BA6
	V4	Det. & Audio amplifier	12AV6
	V5	Power Output	35C5
	V6	Rectifier	35W4

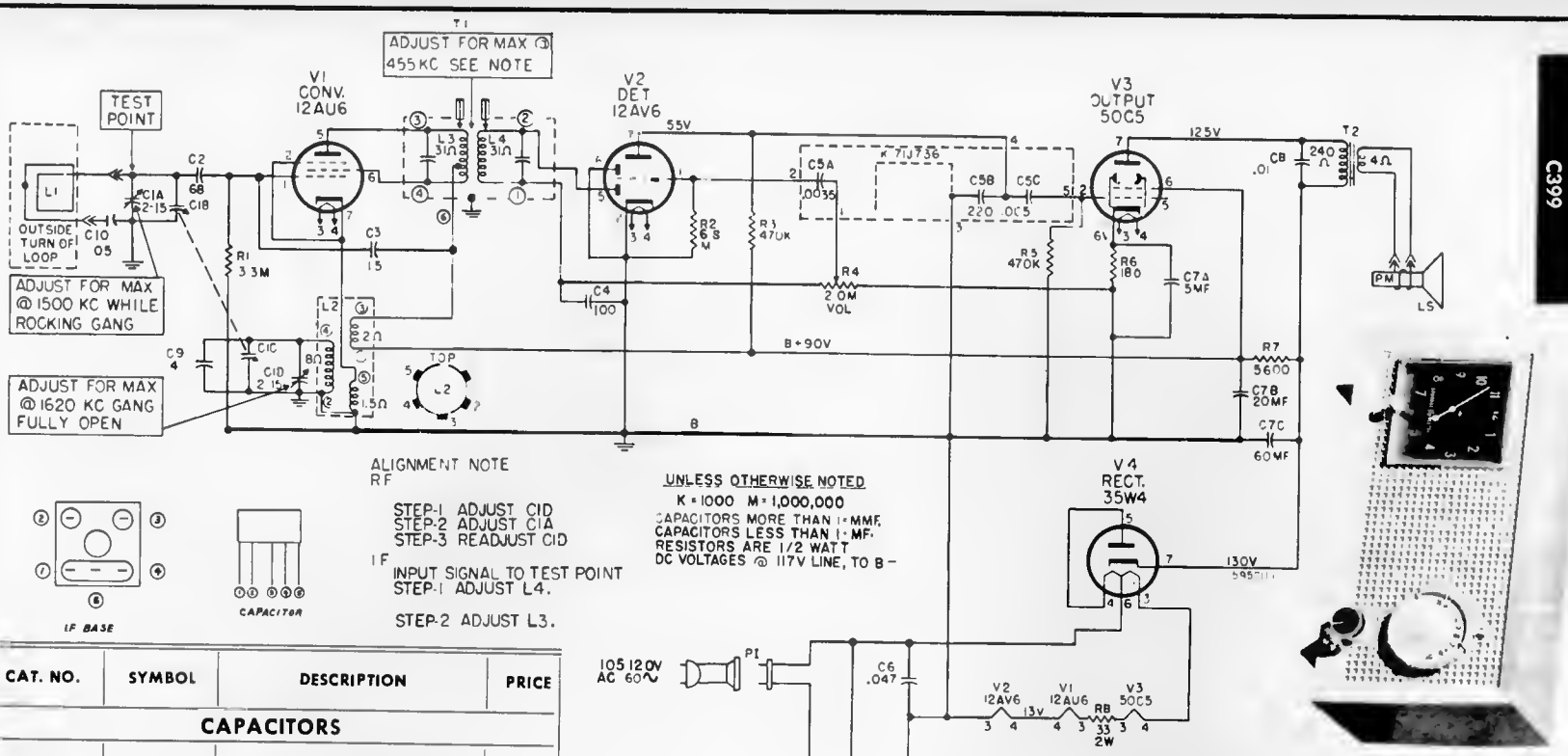
ALIGNMENT CHART

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	C1D, oscillator trimmer
5		1500KC	For Maximum Signal	C1F, r-f trimmer
6				C1B, 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



CAT. NO.	SYMBOL	DESCRIPTION	PRICE
CAPACITORS			
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
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.

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

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.

GENERAL ELECTRIC

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

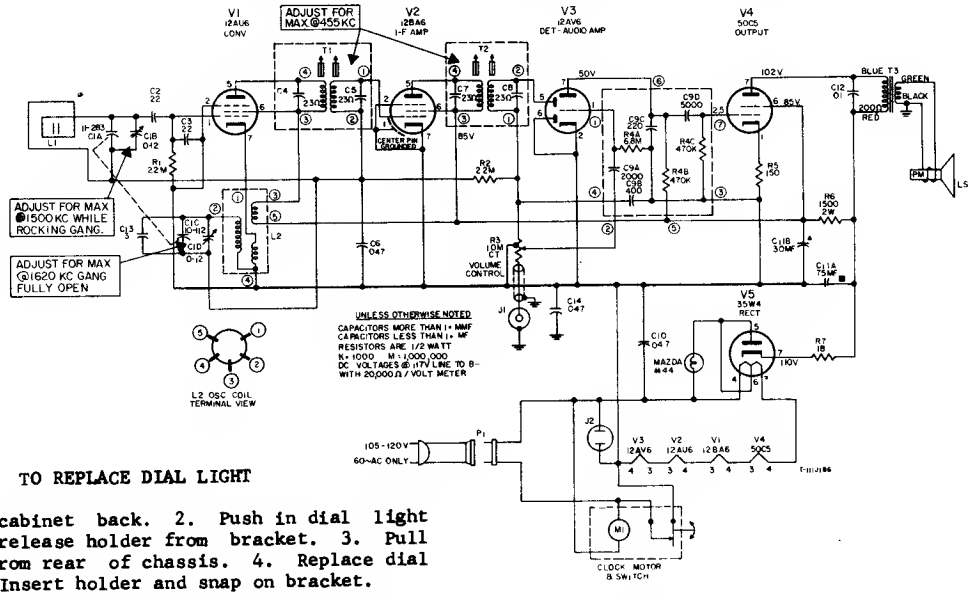
TO REMOVE CHASSIS FROM CABINET

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 interconnecting 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

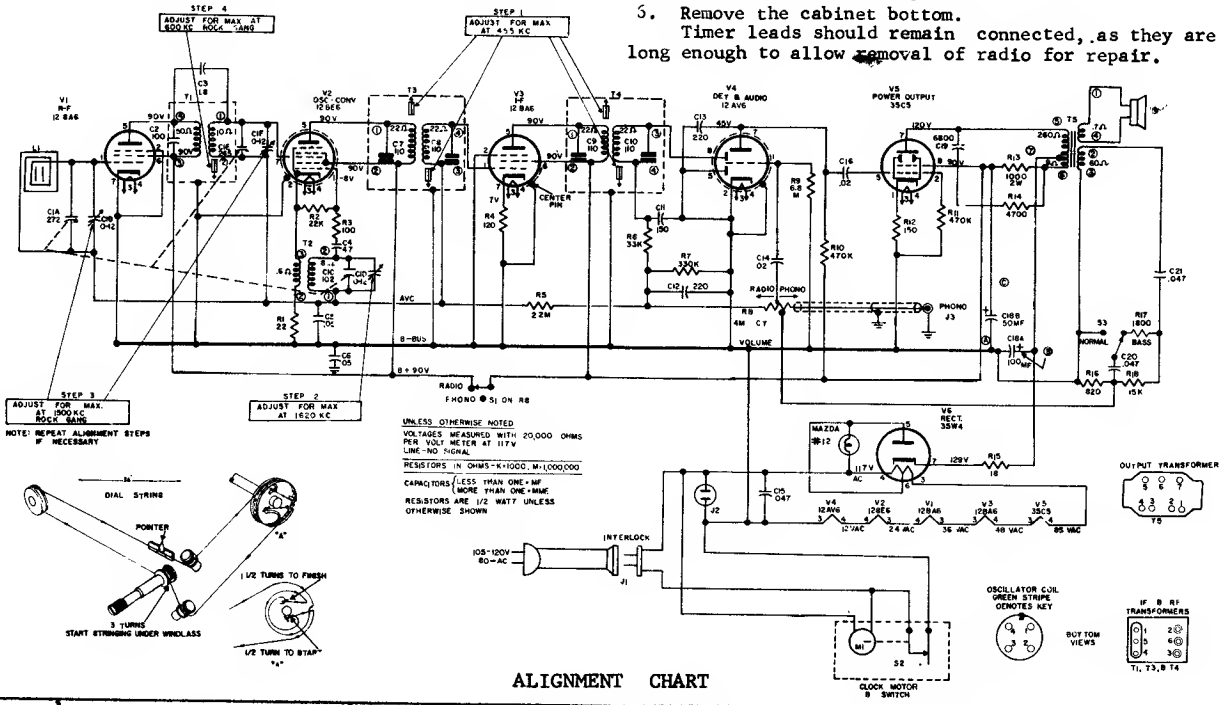
Models C420 and C421

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



ALIGNMENT CHART

Step	Connect Test Oscillator	Test Oscillator Setting	Receiver Tuning	Adjust for Maximum Output
1.	12BA6, V3 grid (pin 1) in series with a .05 mf.	455KC.	Tuning Gang Open (minimum capacity)	Cores of 2nd I. F. Transformer T4
2.	12BE6, V2 grid (pin 7) in series with a .05 mf.			Cores of 1st I. F. Transformer T3
3.				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, -C$_1$, and P711A, -B, -C, -C$_1$ (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 loudspeaker; 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 one 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

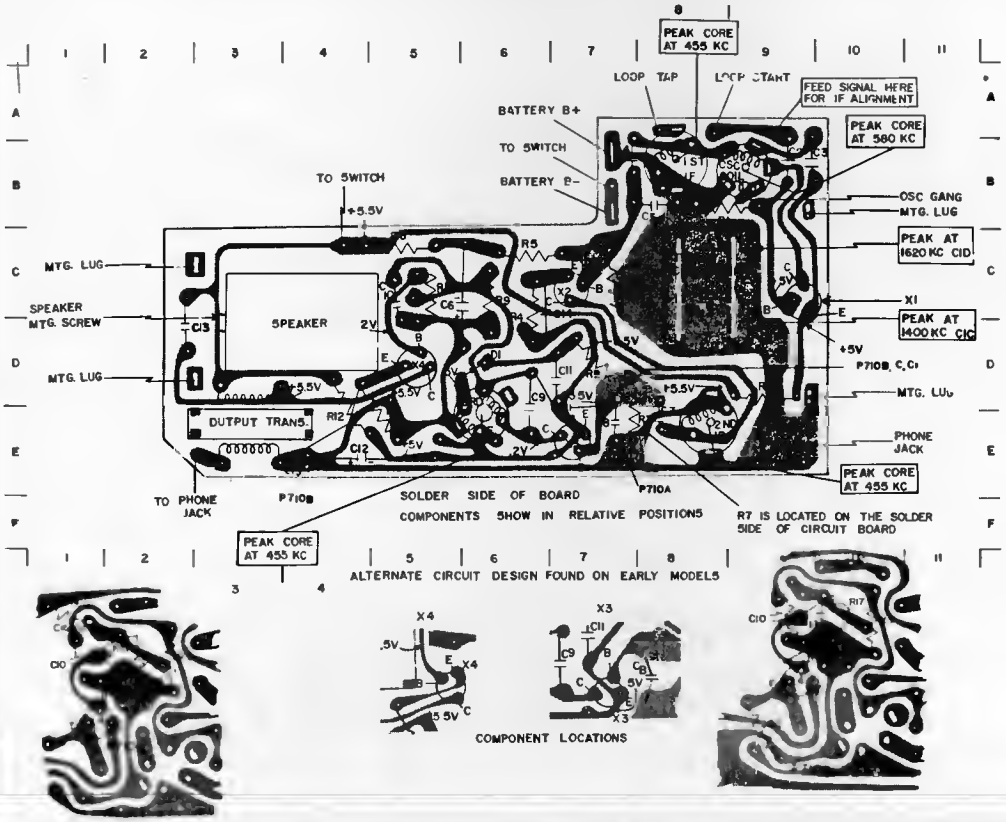
Feed the output from the signal generator to the junction of C2 and the loop antenna for IF alignment. For oscillator and antenna peaking, radiate a signal to the receiver by connecting a ferrite-rod antenna to the signal generator output leads.

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 C1D to peak at 1620KC.
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.



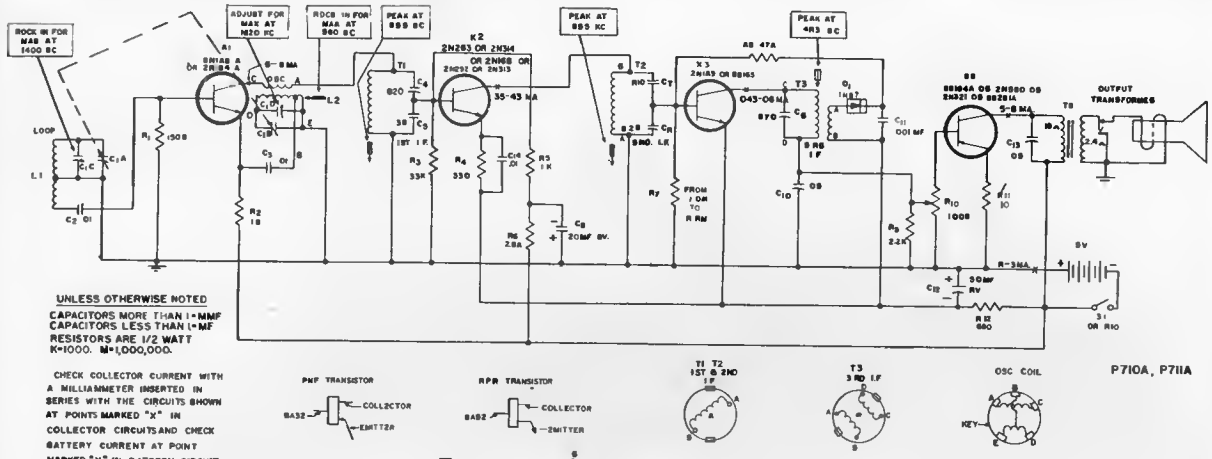
TRANSISTOR REPLACEMENT

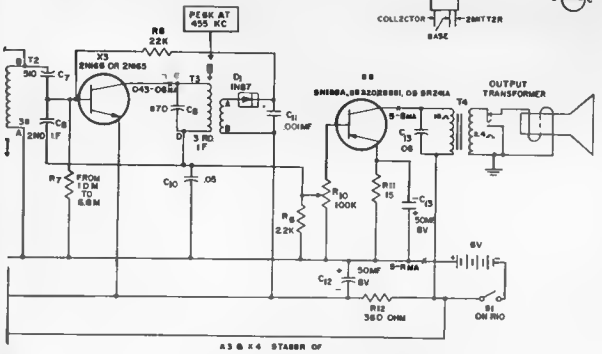
To replace X4, remove the speaker as described above.

To remove X2, use needle nose pliers through the hole near the volume control.

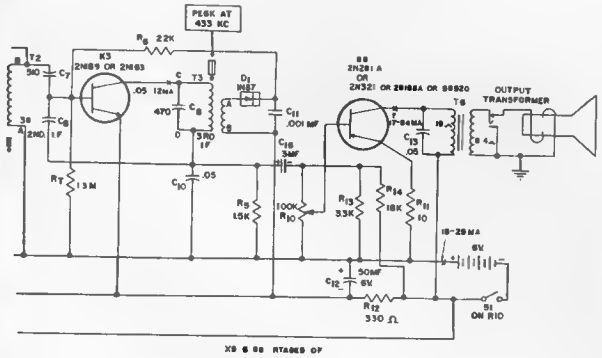
GENERAL ELECTRIC

Models P710A, -B, -C, -C$_1$, and P711A, -B, -C, -C$_1$ (Continued from the preceding page)

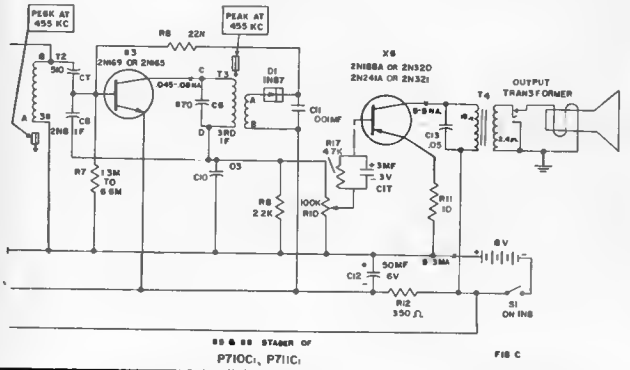




X3 & X4 STAGES OF
P710B, P711B
FIG A



X3 & X4 STAGES OF
P710C, P711C
FIG B



X3 & X4 STAGES OF
P710C$_1$, P711C$_1$
FIG C

Production Changes

P710B

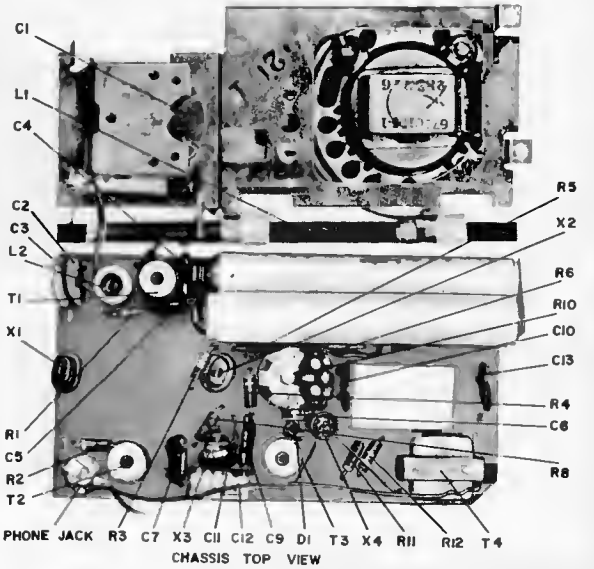
C8-- 3000mmf., connected to junction of C9 and C10.
C15- 50mf., 6V, connected across R11
R8-- 22K
R12- 390 ohms
See Fig. A for X3 and X4 stages.

P710C

C8-- 3000mmf., 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.

P710C$_1$

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.



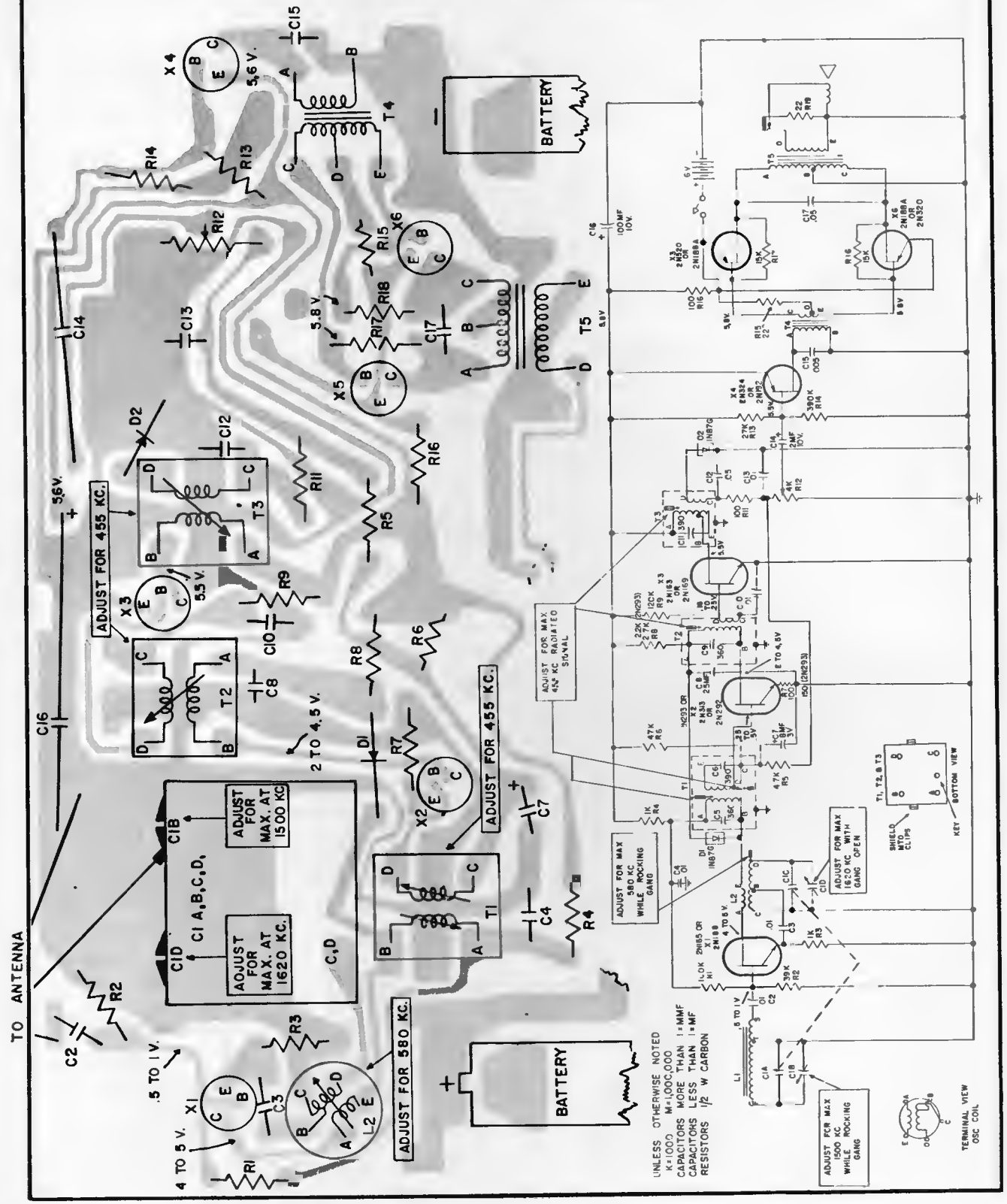
CHASSIS TOP VIEW

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.

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

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

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:

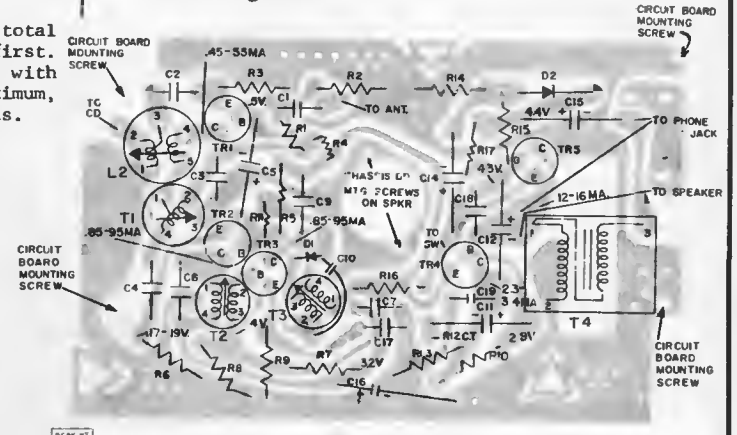
1. Check battery voltage and battery contacts.
2. Check on-off switch.
3. Check all antenna lead connections.
4. Check coil L2.

WEAK AUDIO:

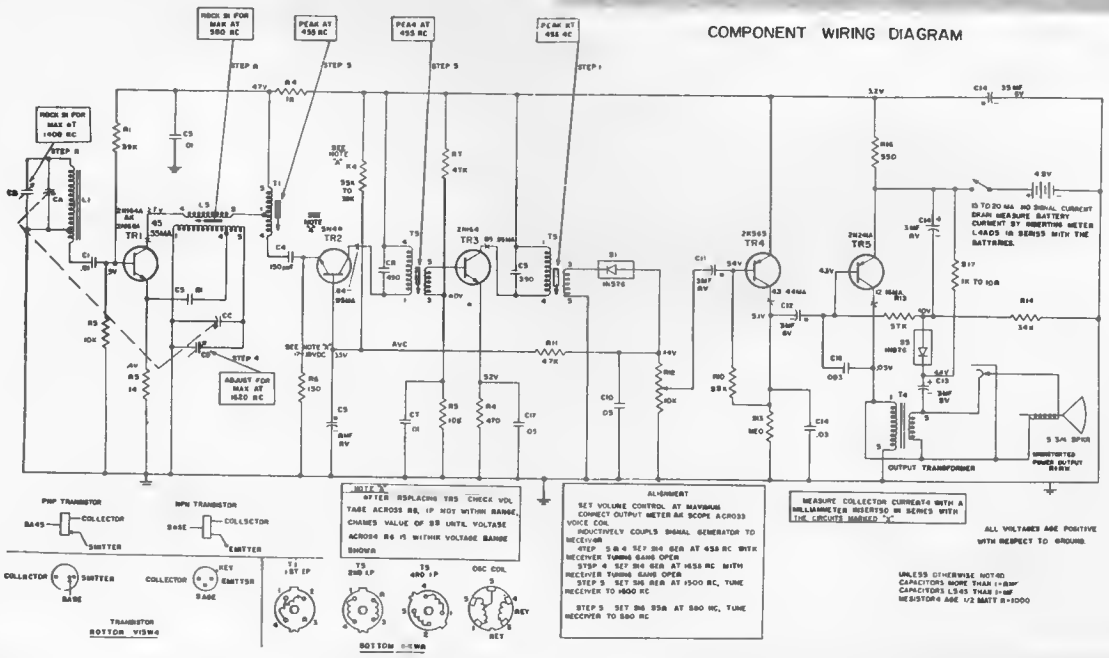
1. Check battery voltage for 4.5 volts.
2. Check battery current.
3. Check transistor collector currents.
4. Check alignment.

CAPACITORS

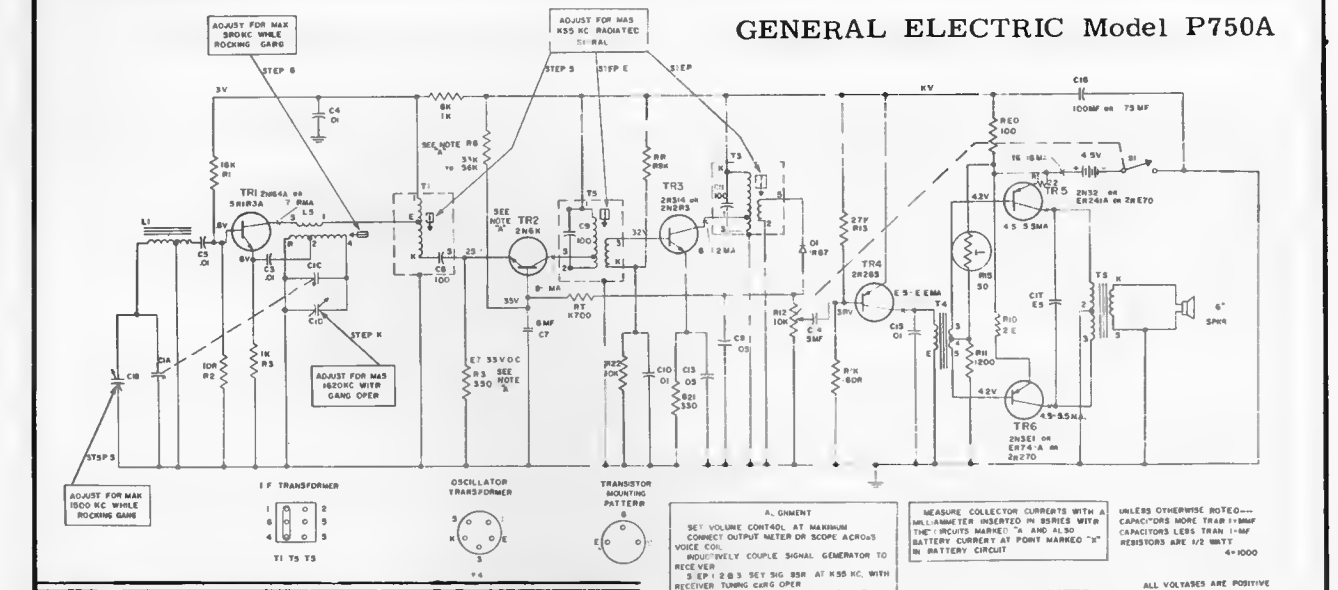
RS-1378	CA,B,C,D	Tuning Capacitor.....
RS-1022	C1, 3	.01mf., 450V.....
	C2, 7	.01mf., 50V.
	C4	150mmf., 300V.
RS-1462	C5	8mf., 6 V. .....
	C6, 9	390mmf., 300V.
RS-1024	C10,17,19	.05mf., 50V.....
	C18	.003mf., 100V
RS1463	C16	32mf., 6V. .....
RS-1460	C11,12,14,15	3mf., 6V. .....

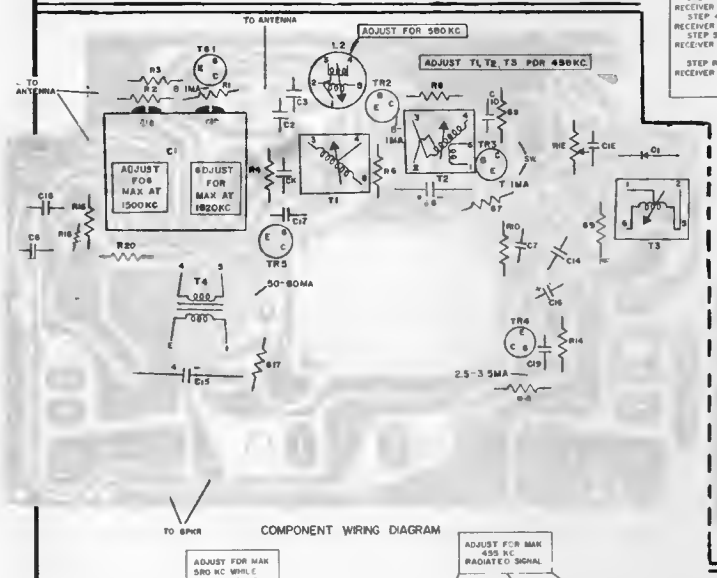


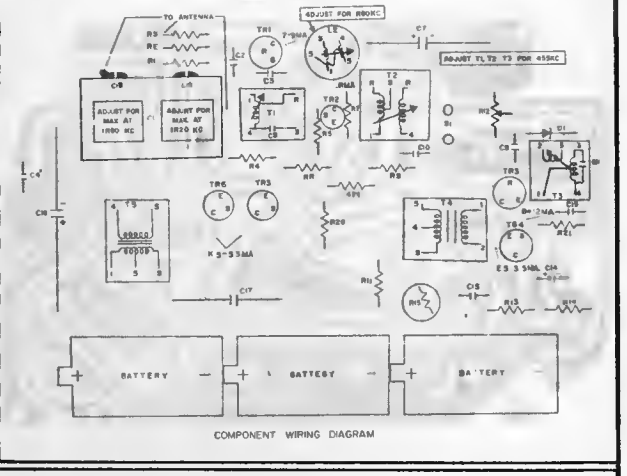
COMPONENT WIRING DIAGRAM



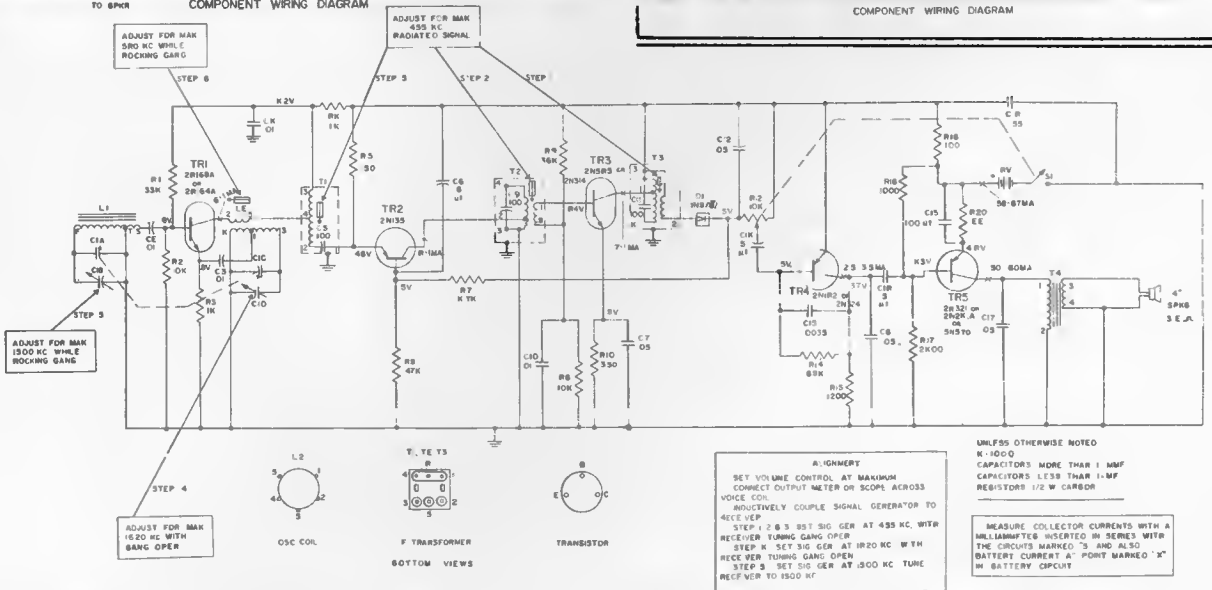
GENERAL ELECTRIC Model P750A







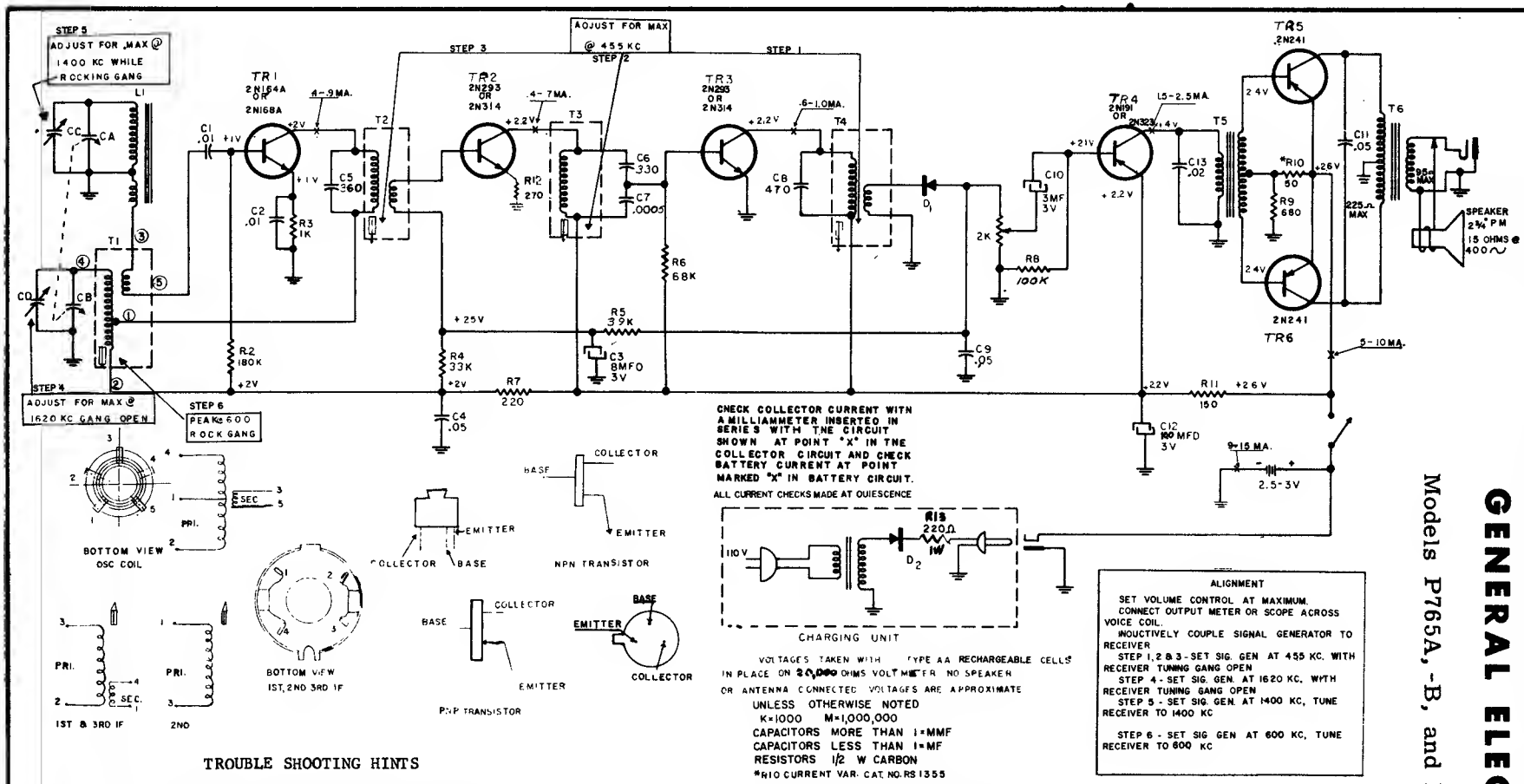
COMPONENT WIRING DIAGRAM



GENERAL ELECTRIC Models P760A, P761A

GENERAL ELECTRIC

Models P765A, -B, and P766A, -B



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.

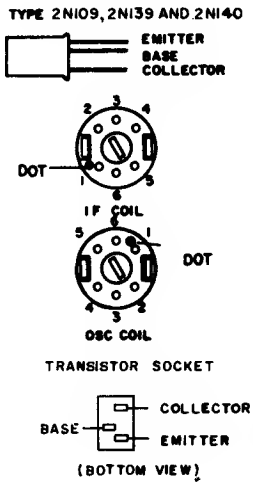
With the radio controls set accordingly, a current flow check between the battery end cap and the negative end of the battery should indicate properly operating transistors. If excessive total current is noted when this check is made, individual current checks should be made at the collector section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

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.

MONTGOMERY WARD Transistor Radio Model BR-1102A

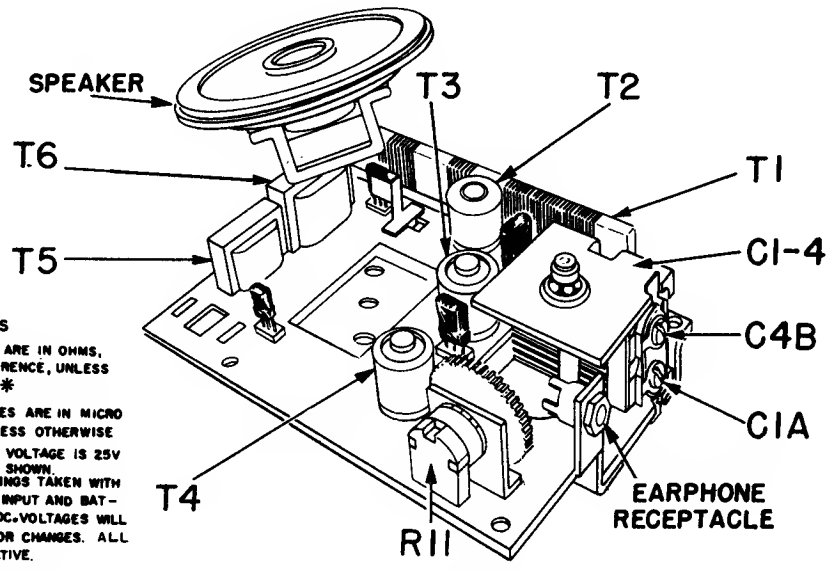


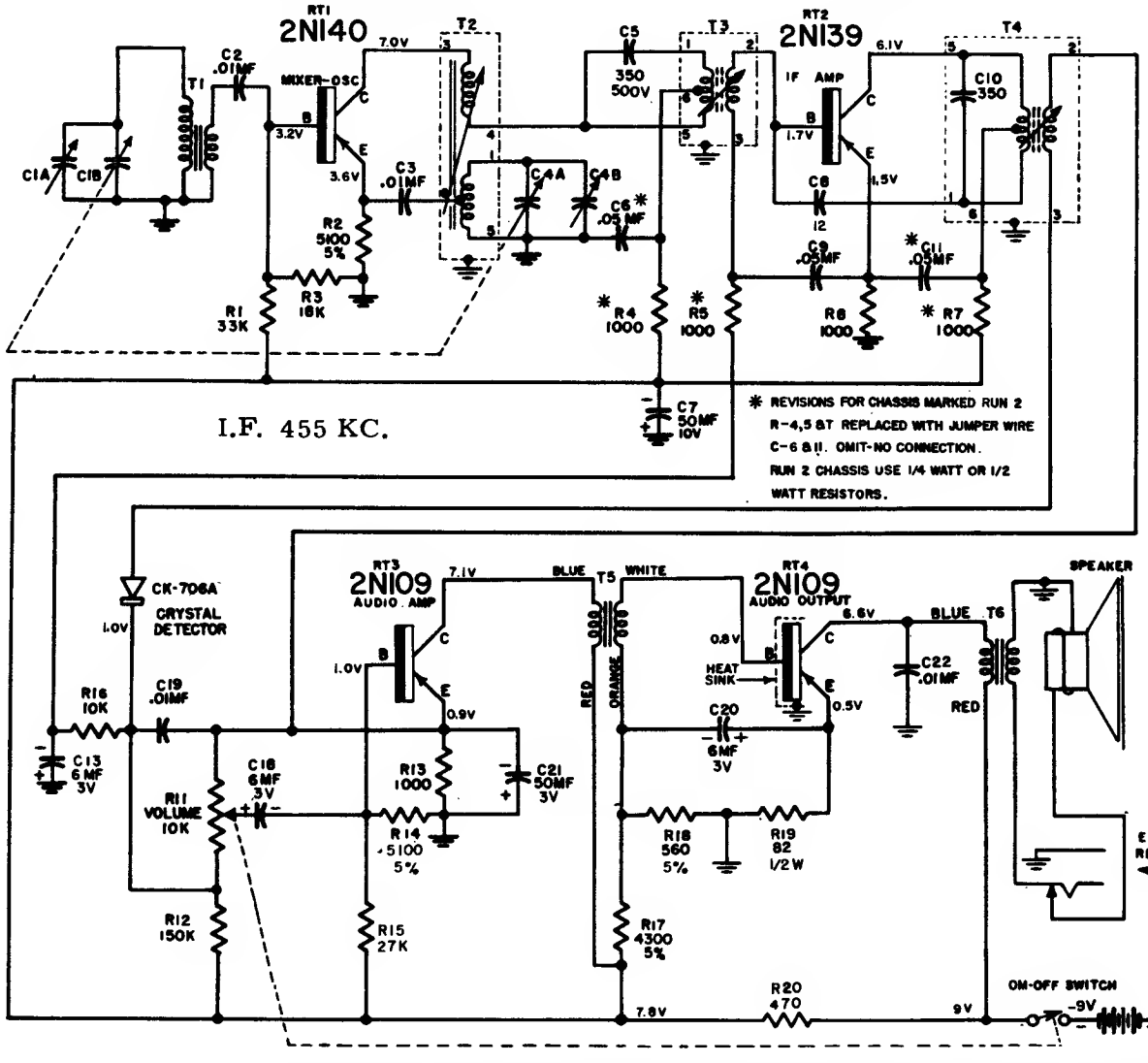
NOTES

RESISTOR VALUES ARE IN OHMS, 1/4 WATT, 10% TOLERENCE, UNLESS OTHERWISE SHOWN. *

CAPACITOR VALUES ARE IN MICRO-MICROFARADS UNLESS OTHERWISE SHOWN. DC WORKING VOLTAGE IS 25V UNLESS OTHERWISE SHOWN.

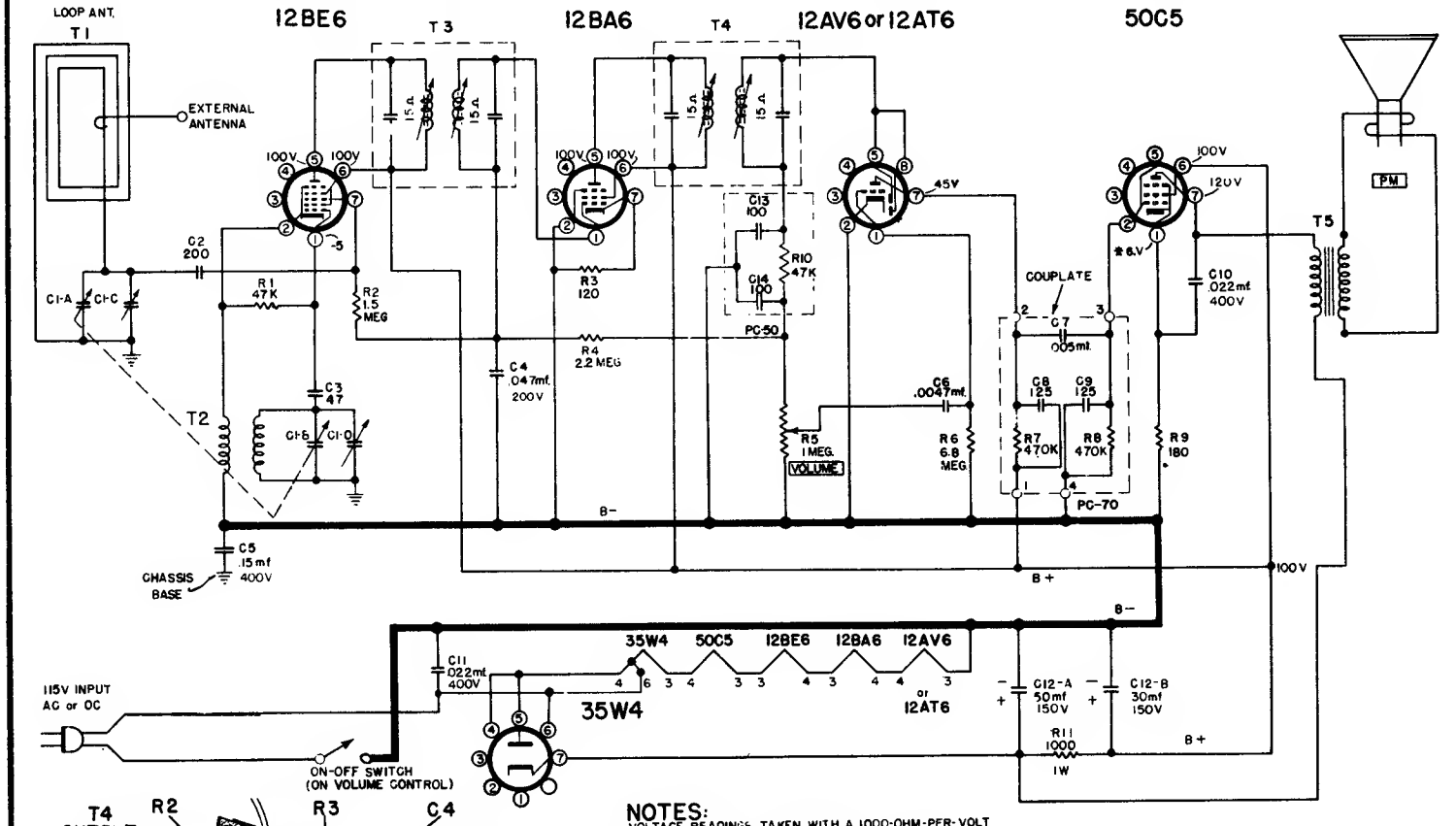
DC VOLTAGE READINGS TAKEN WITH VTVM, NO SIGNAL IN INPUT AND BATTERY VOLTAGE - 9VDC. VOLTAGES WILL VARY WITH TRANSISTOR CHANGES. ALL VOLTAGES ARE NEGATIVE.

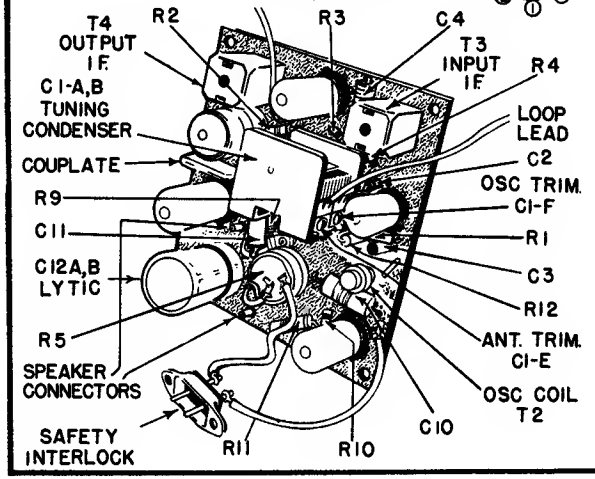




MONTGOMERY WARD

Models BR-1557B, BR-1558B





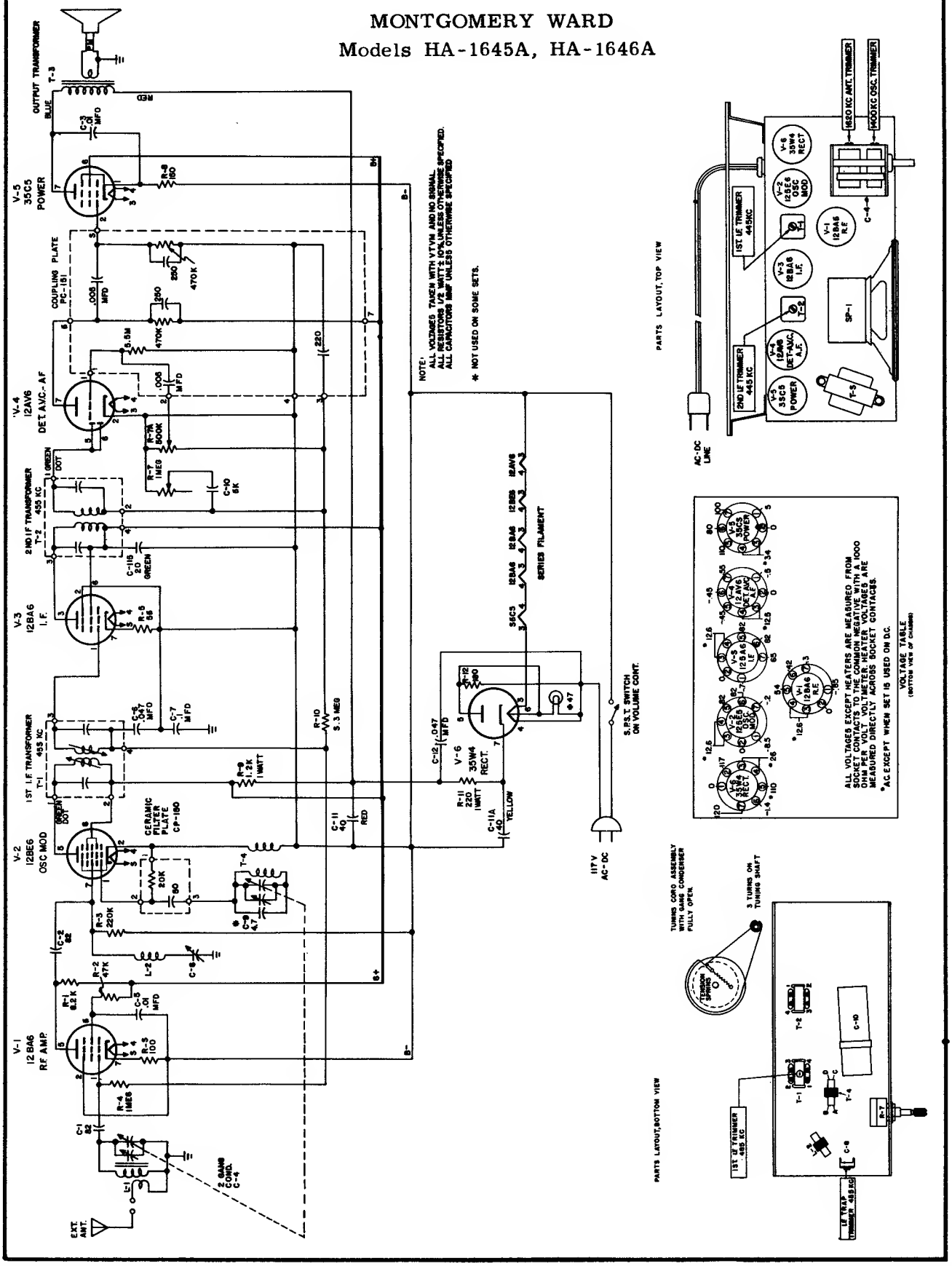
NOTES:
VOLTAGE READINGS TAKEN WITH A 1000-OHM-PER-VOLT VOLTMETER ON THE 250 VOLT SCALE
*READ ON THE 10 VOLT SCALE OF THE VOLTMETER
LINE VOLTAGE 115V. A.C.
UNLESS OTHERWISE SHOWN, RESISTOR VALUES ARE IN OHMS AND ARE 1/2 WATT
CAPACITOR VALUES ARE IN MICRO-MICROFARADS

ALIGNMENT PROCEDURE

SIGNAL GENERATOR					TUNER SETTING	ADJUST FOR MAXIMUM OUTPUT
	FREQUENCY	COUPLING CAPACITY	CONNECTION TO RADIO	GROUND SIDE		
I.F.	455 KC	.1 mfd.	GREEN LOOP LEAD	SHELL OF LYTIC	GANG OPEN (plates out of mesh)	Top and Bottom cores T4 and T3
Osc.	1620 KC	.1 mfd.	FRONT TRIMMER ON GANG	SHELL OF LYTIC	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

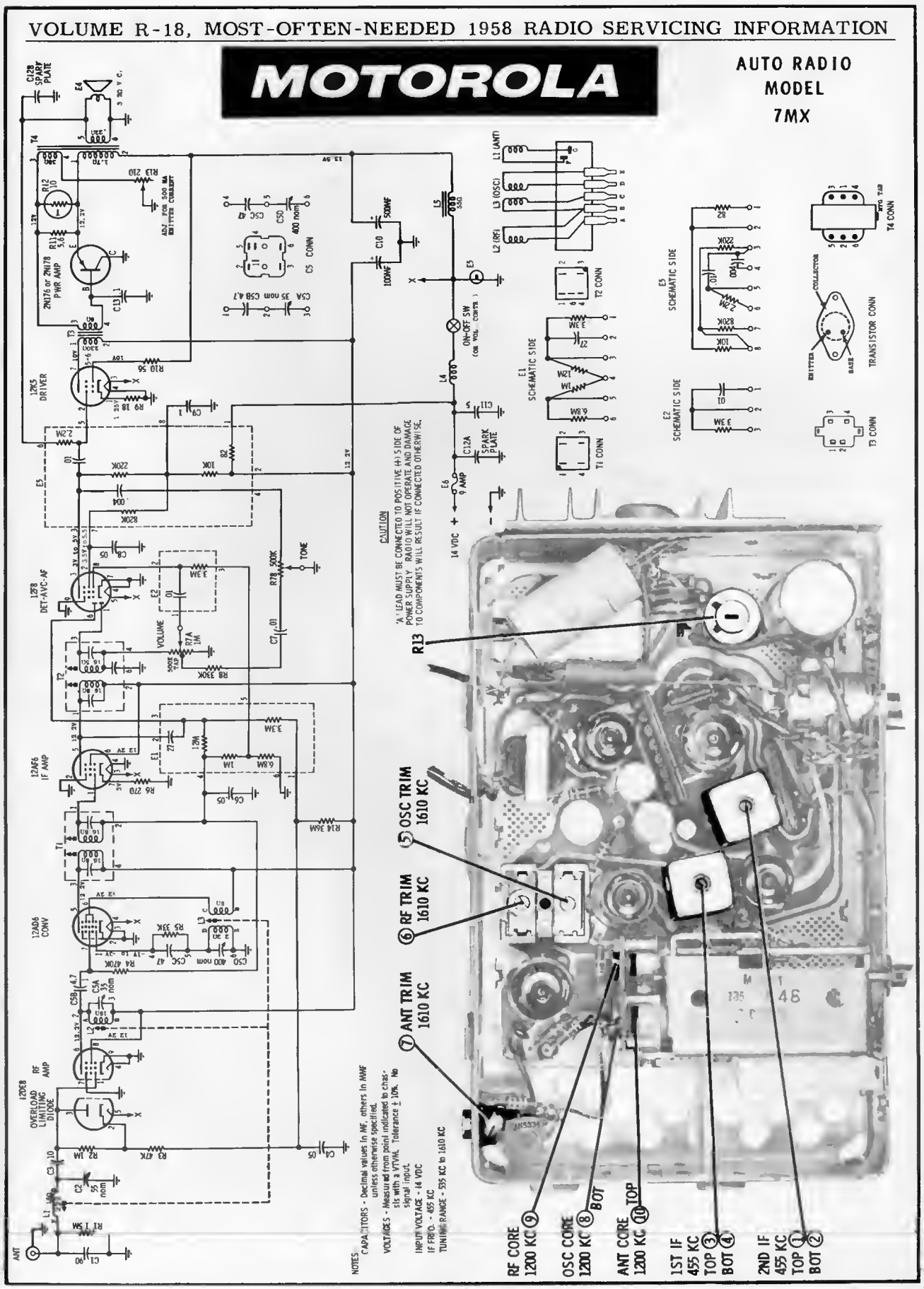
CHECK FOR ALIGNMENT AND DIAL CALIBRATION AT 1000 AND 600 KC.

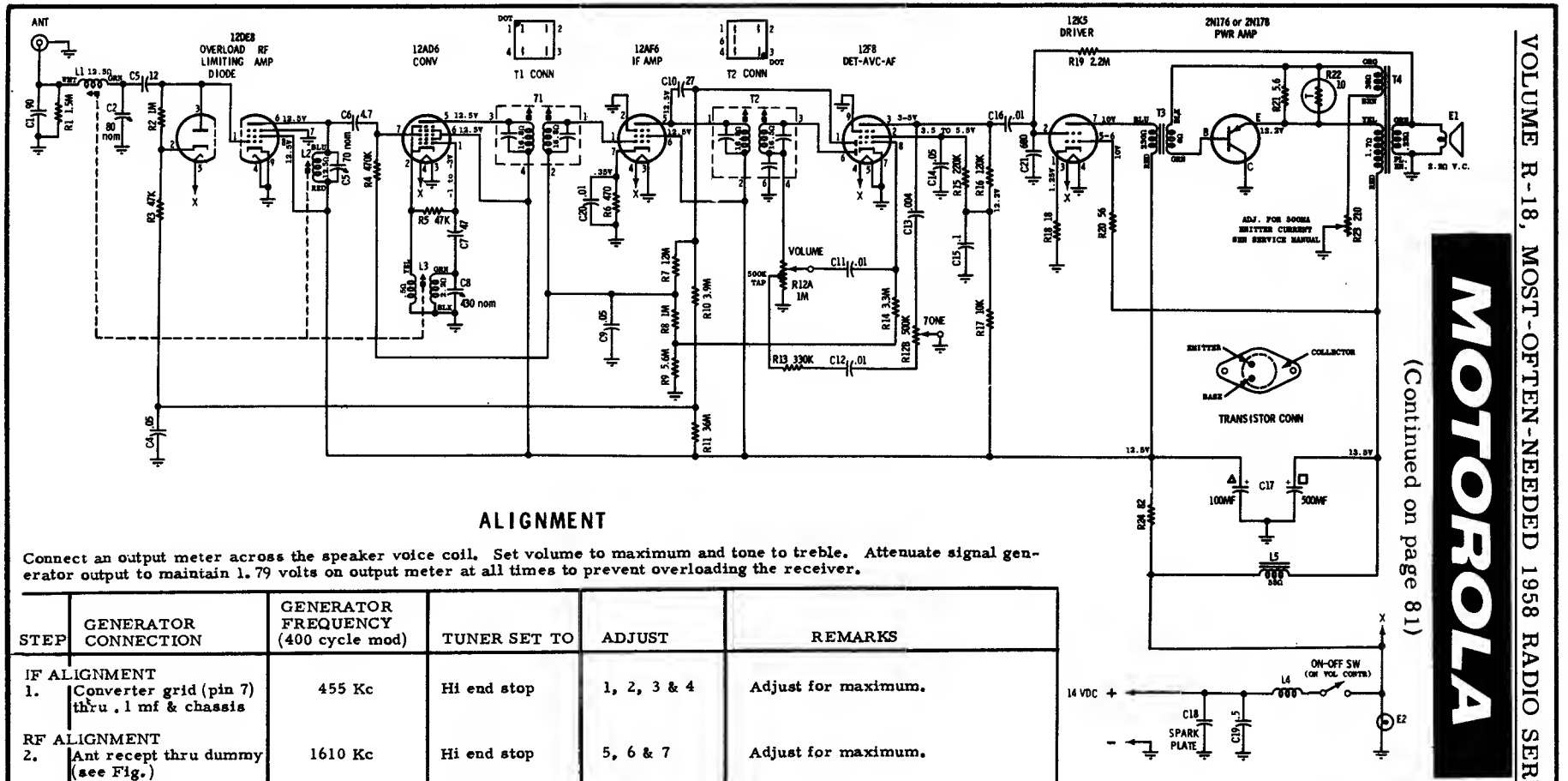
MONTGOMERY WARD
Models HA-1645A, HA-1646A



MOTOROLA

AUTO RADIO MODEL 7MX





(Continued on page 81)

MOTOROLA

AUTO RADIO
MODEL
CTM7X

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
	IF ALIGNMENT				
1.	Converter grid (pin 7) thru .1 mf & chassis	455 Kc	Hi end stop	1, 2, 3 & 4	Adjust for maximum.
	RF ALIGNMENT				
2.	Ant recept 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 recept 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.

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.

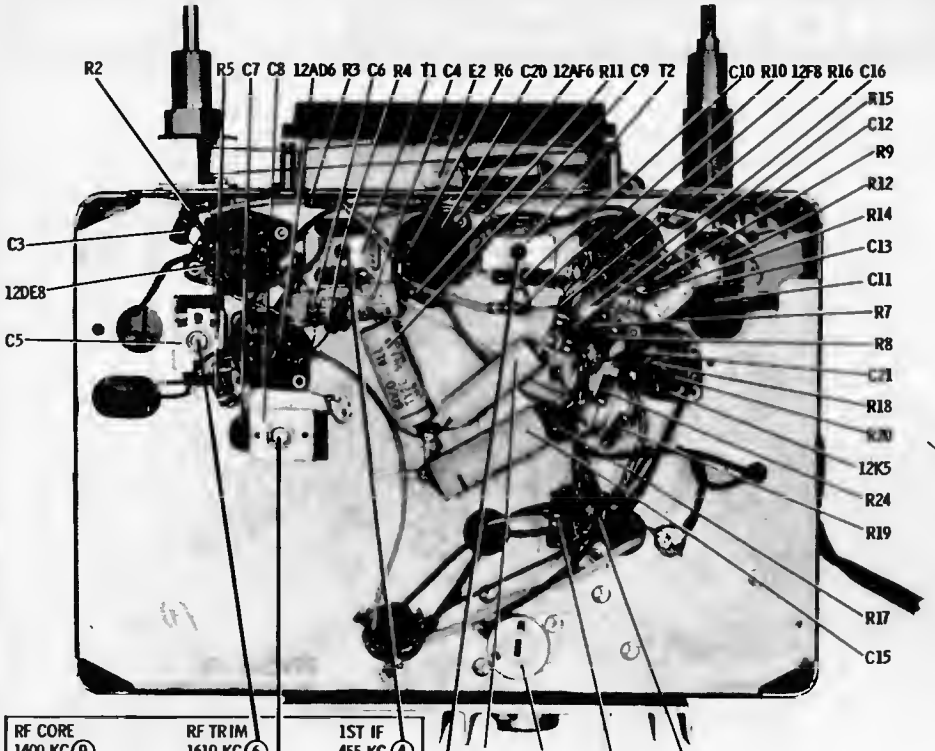
NOTES:
CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM. Tolerance ± 10%. No signal input.
INPUT VOLTAGE - 14 VDC.
TUNING RANGE - 535 KC to 1605 KC.
IF FREQ. - 455 KC.

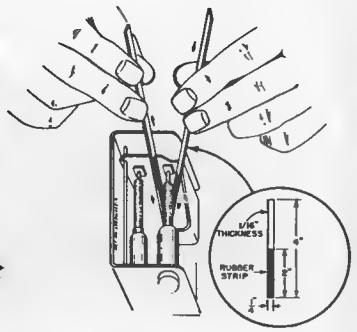
(See page 81 for views of locations of adjustments and parts)

MOTOROLA

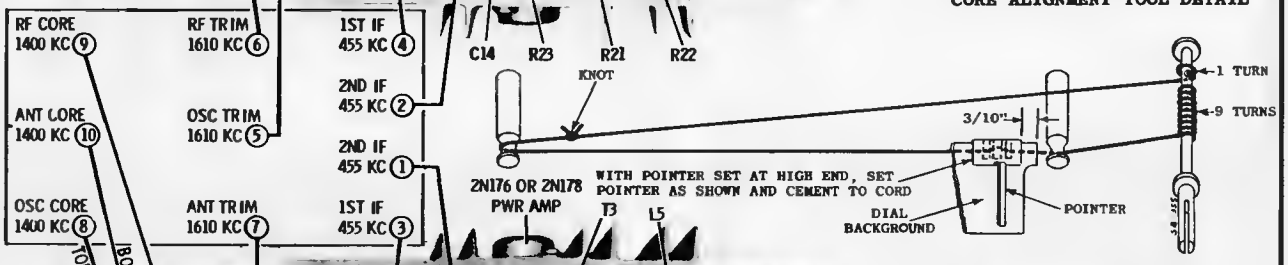
Model CTM7X

(Continued from page 80)

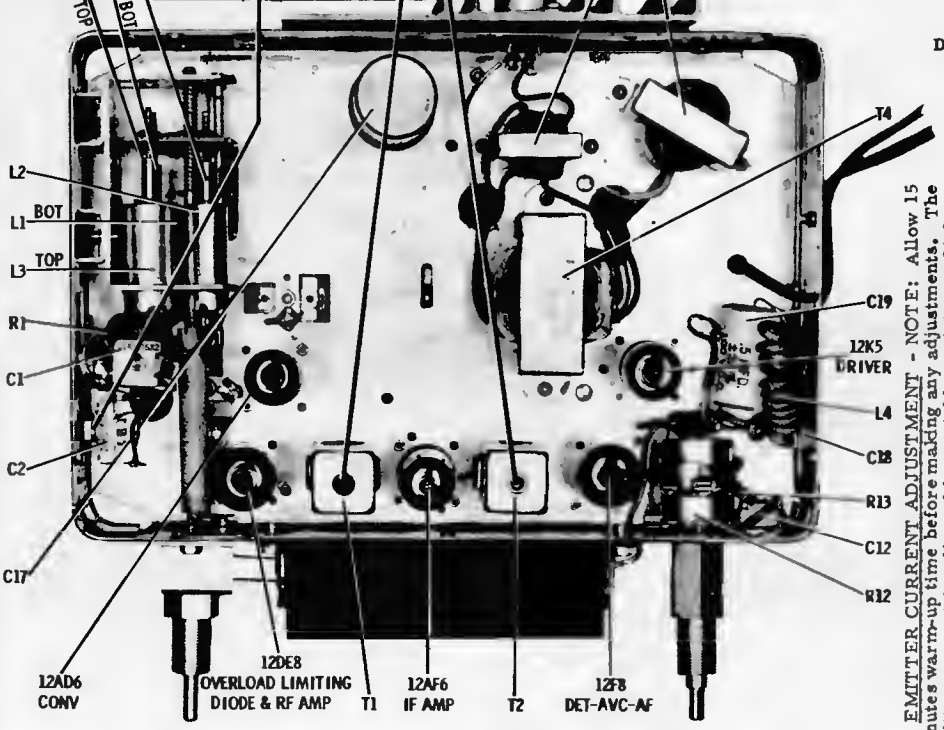




CORE ALIGNMENT TOOL DETAIL

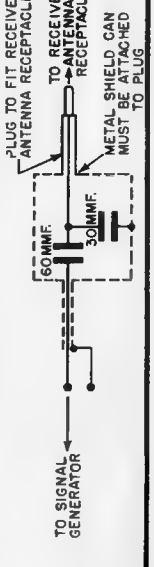


DIAL RESTRINGING DETAIL



ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS

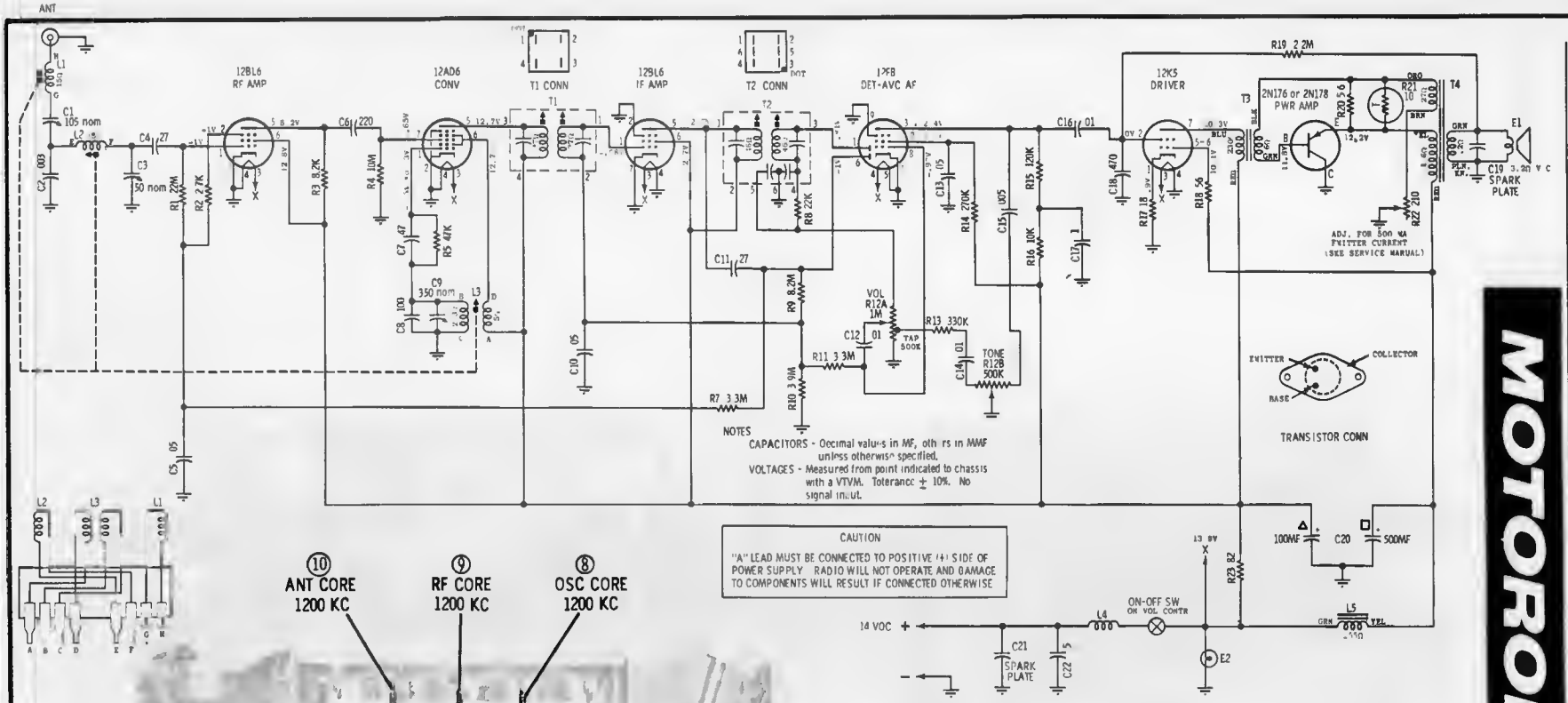
EMITTER CURRENT ADJUSTMENT - NOTE: Allow 15 minutes warm-up time before making any adjustments. The emitter current is adjusted by variable resistor R-23 for a 500 Ma flow through the transistor with 14 volts at the receiver's "A" lead. Disconnect yellow lead which goes to the emitter contact of the 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.

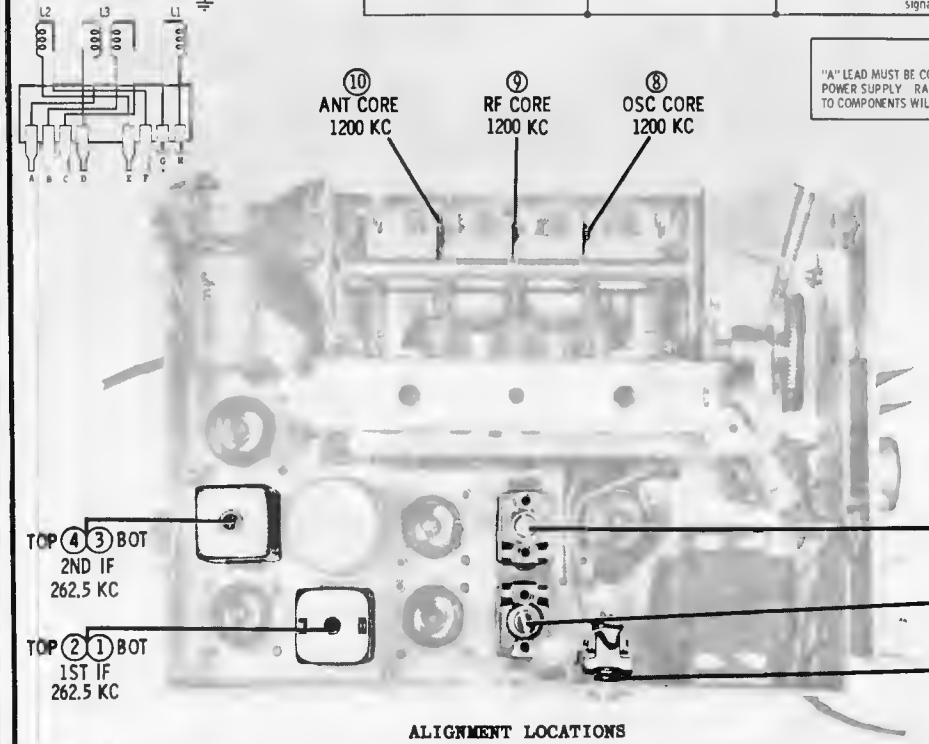


DUMMY ANTENNA

MOTOROLA

AUTO RADIO
MODEL
OEA7X





ALIGNMENT LOCATIONS

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 500 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:

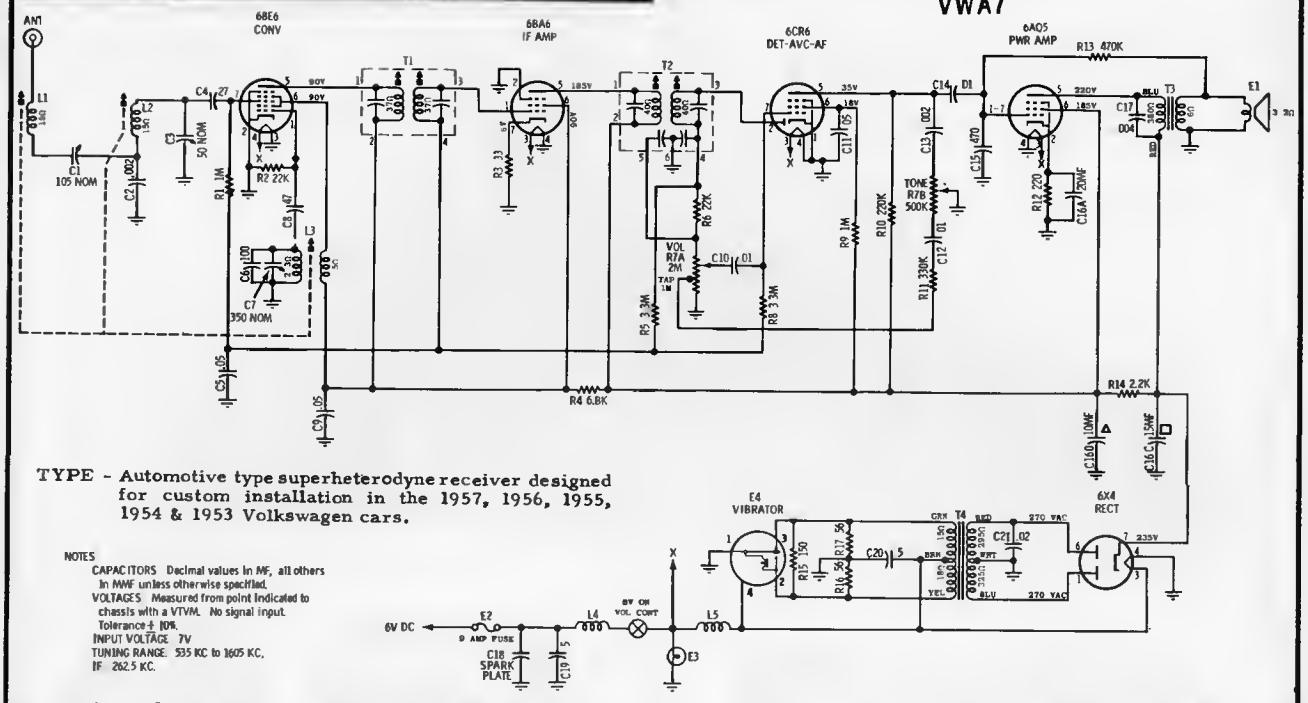
1. Tune in the desired station with the manual tuning knob. Tune carefully until you are exactly on the station.

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.

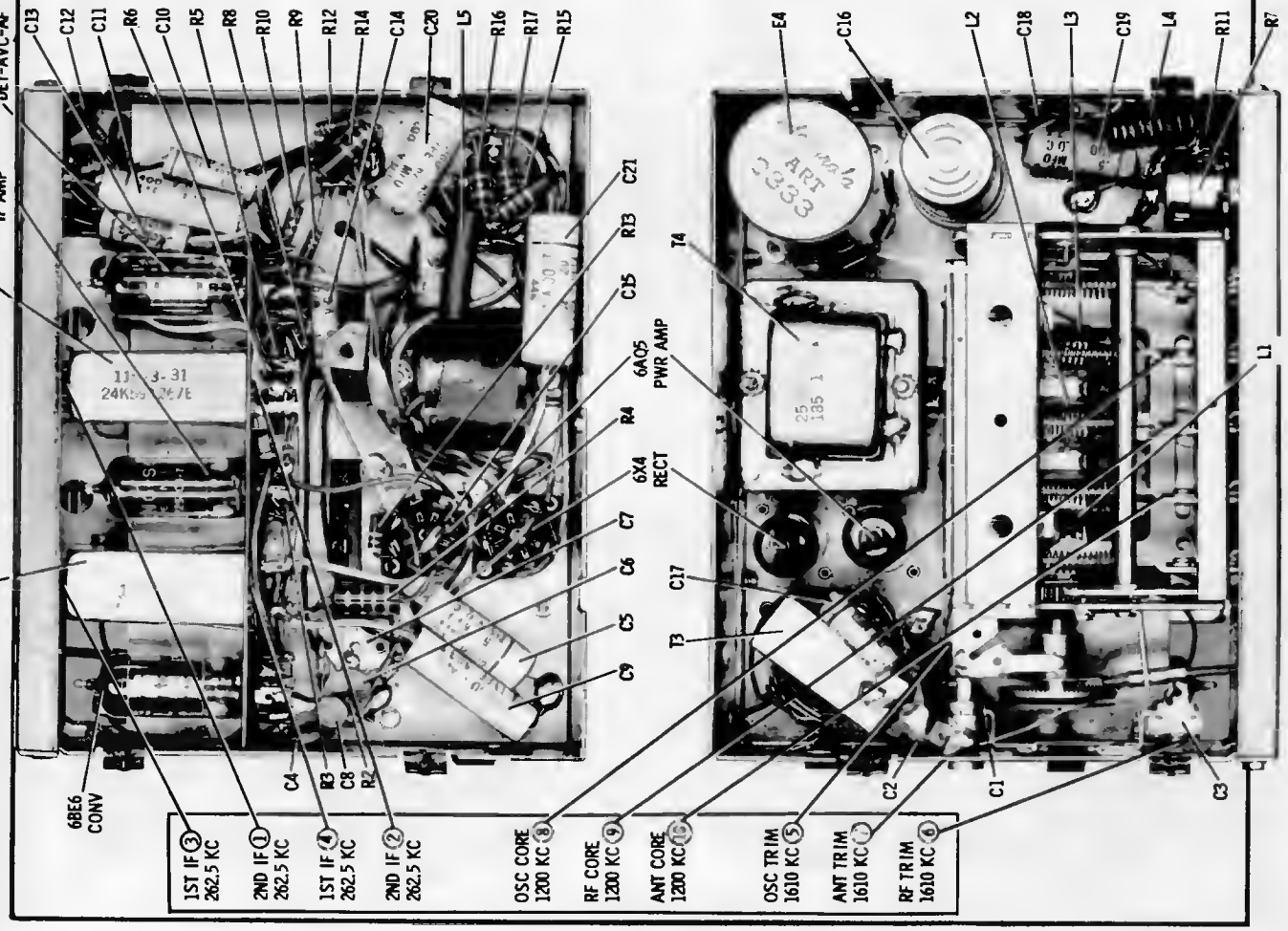
MOTOROLA

AUTO RADIO MODEL VWA7



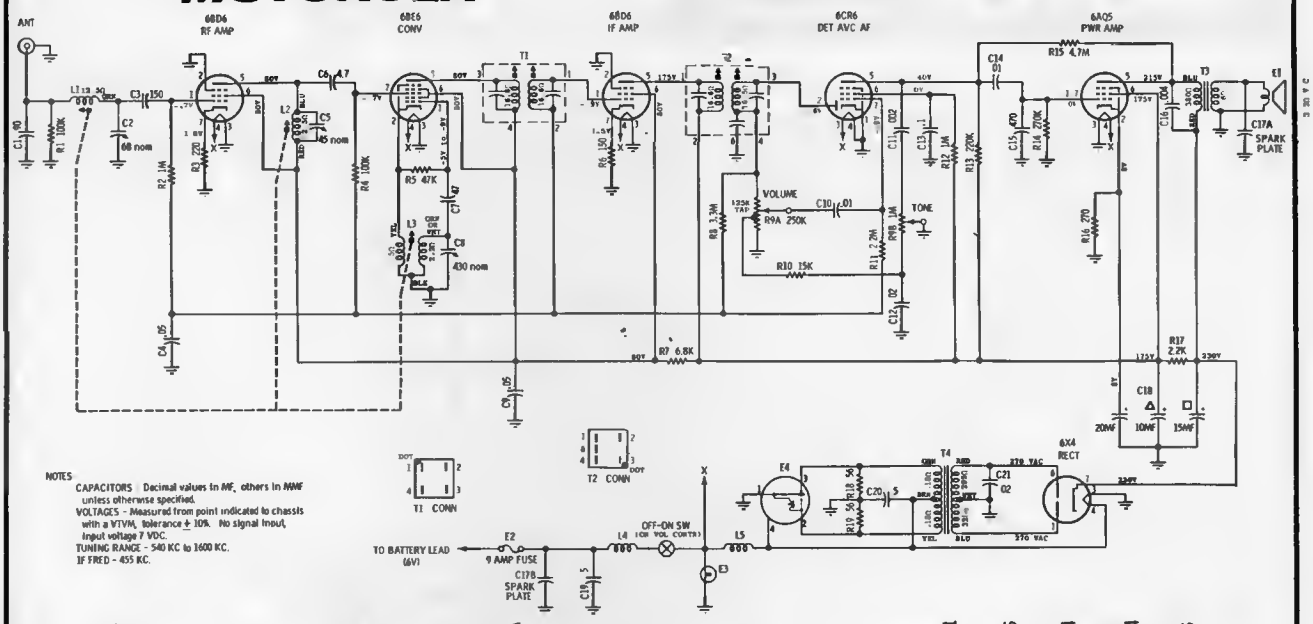
TYPE - Automotive type superheterodyne receiver designed for custom installation in the 1957, 1956, 1955, 1954 & 1953 Volkswagen cars.

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 ± 10%.
INPUT VOLTAGE 7V
TUNING RANGE 535 KC to 1605 KC.
IF 262.5 KC.



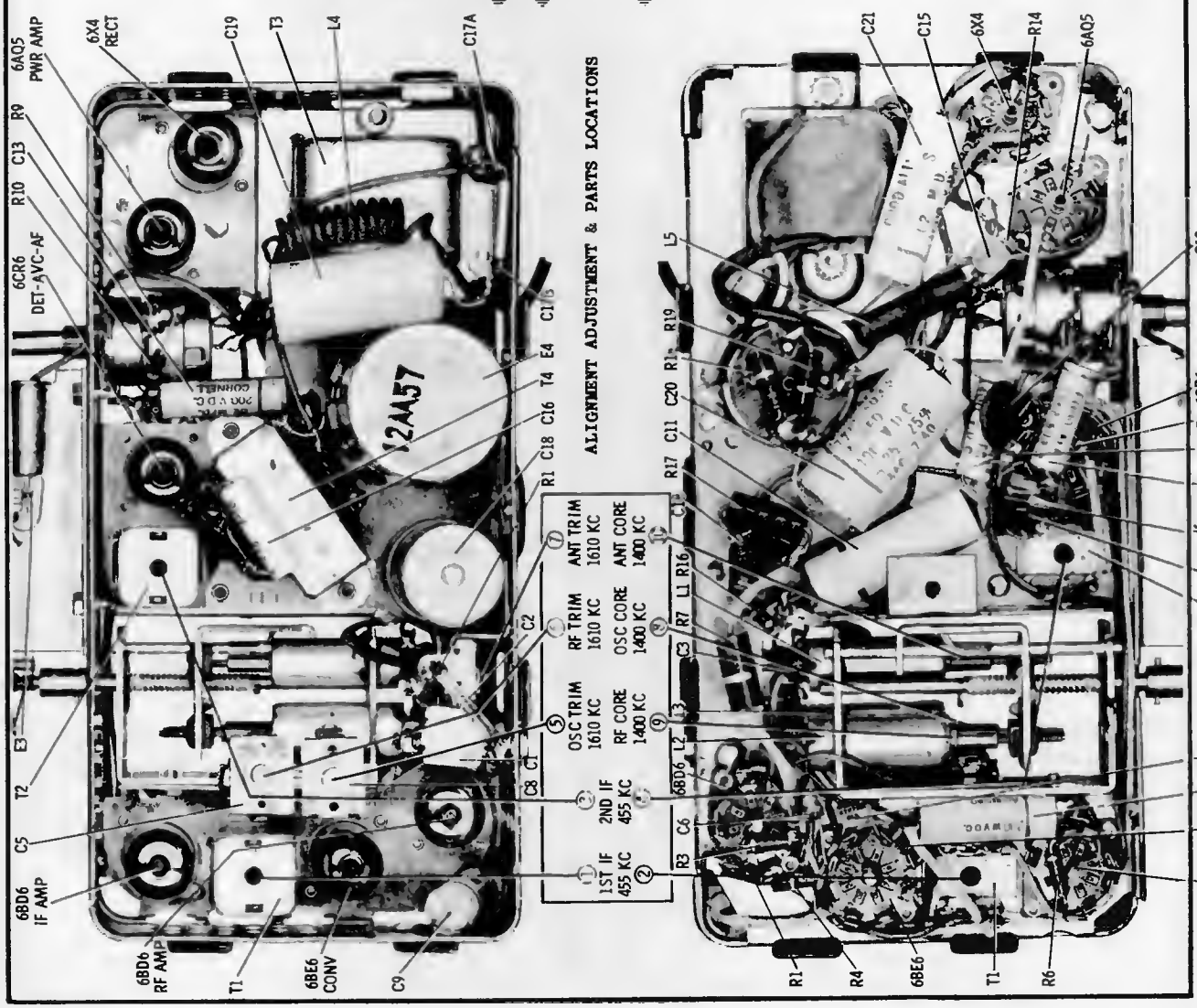
ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

MOTOROLA Auto Radio Model 8M



NOTES
CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to chassis with a VTVM, tolerance ± 10%. No signal input, input voltage 7 VDC.
TUNING RANGE - 540 KC to 1600 KC.
IF FREQ - 455 KC.

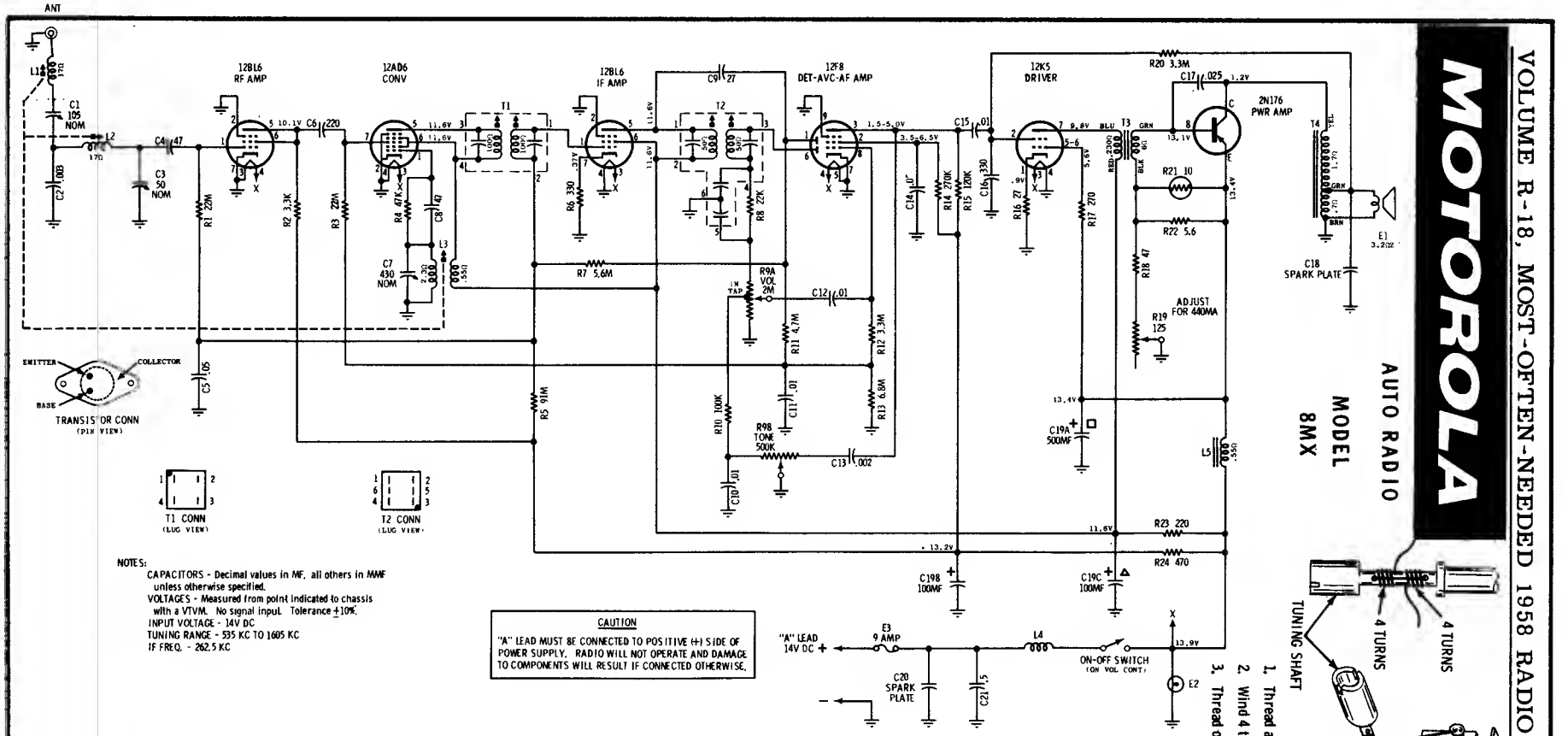
ALIGNMENT ADJUSTMENT & PARTS LOCATIONS



MOTOROLA

AUTO RADIO

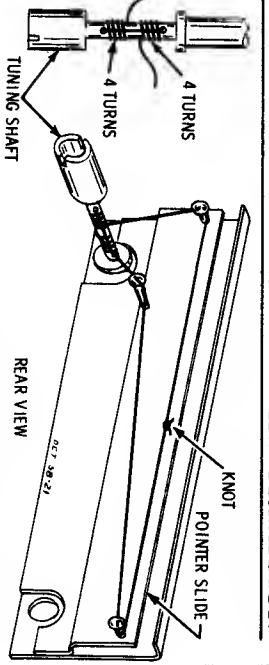
MODEL 8MX



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 ±10%.
INPUT VOLTAGE - 14V DC
TUNING RANGE - 535 KC TO 1605 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 RESULT IF CONNECTED OTHERWISE.



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.

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 he 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.

a. 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.

b. 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.

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.

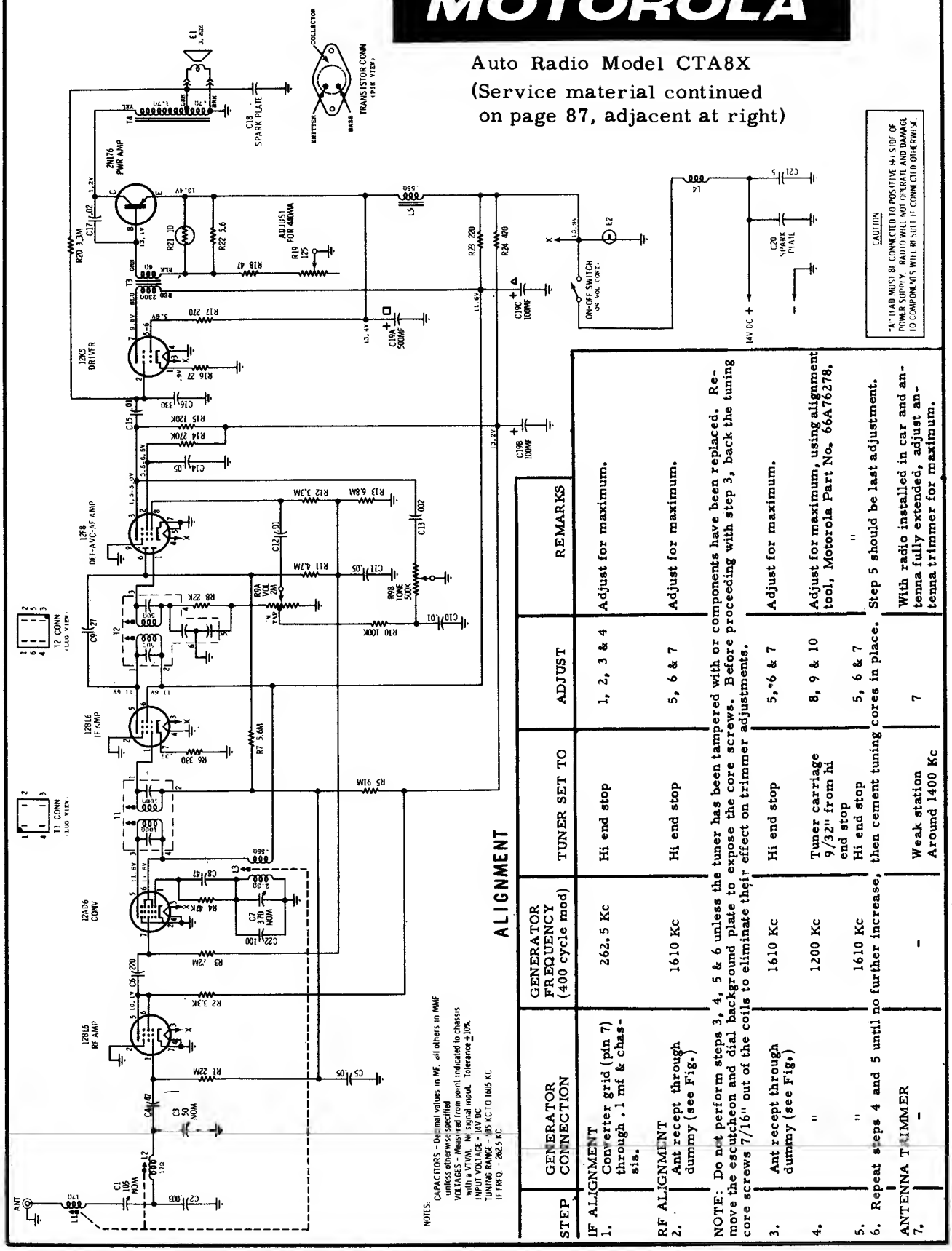
TRANSISTOR CHECK - Substituting a known good transistor for a suspected one is the simplest and most positive method of checking transistors. NOTE: When checking, be sure transistor insulator is in place (see SERVICE NOTE 6).

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

MOTOROLA

Auto Radio Model CTA8X

(Service material continued on page 87, adjacent at right)



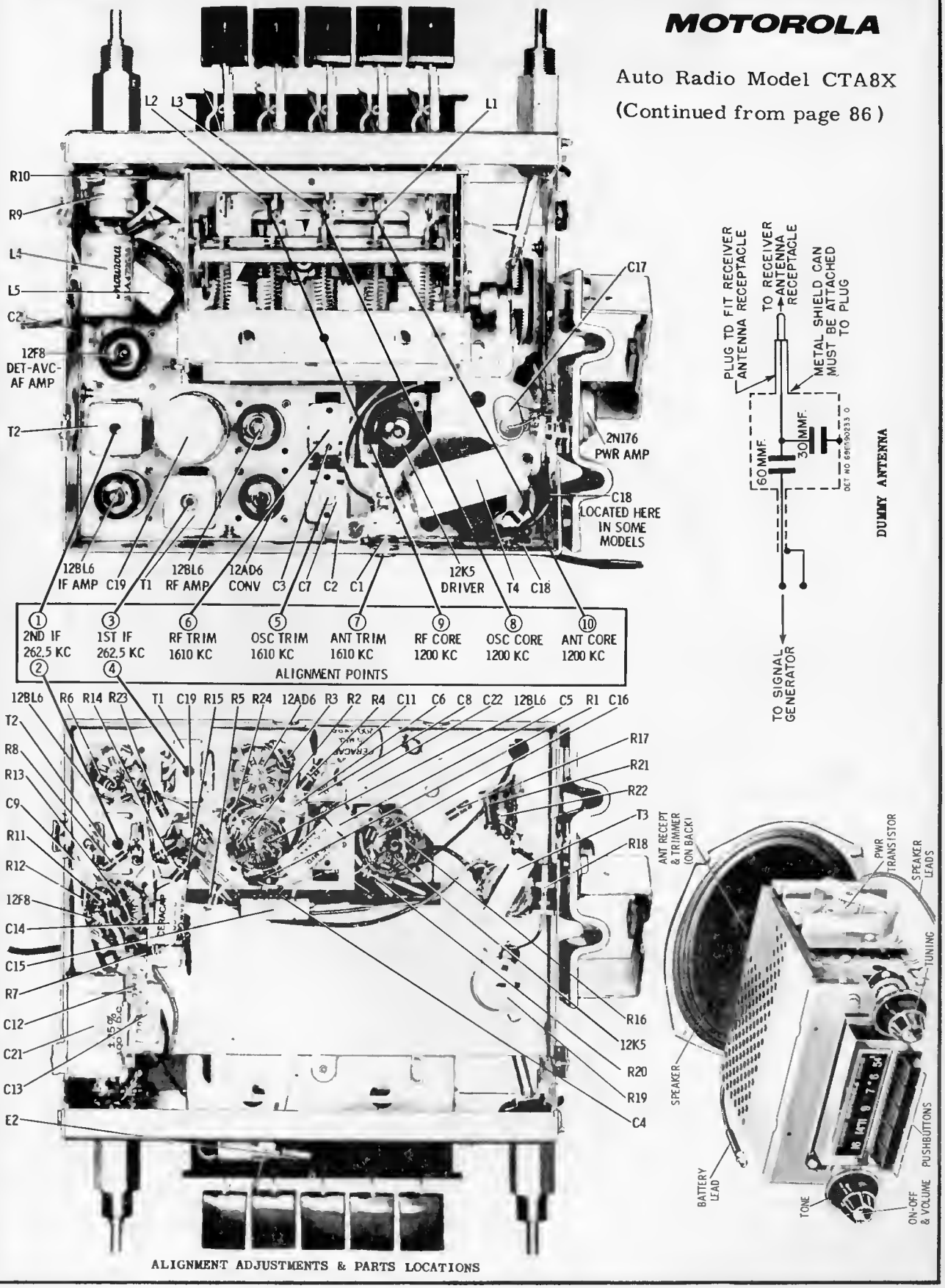
ALIGNMENT

STEP	GENERATOR CONNECTION	GENERATOR FREQUENCY (400 cycle mod)	TUNER SET TO	ADJUST	REMARKS
IF ALIGNMENT					
1.	Converter grid (pin 7) through .1 mf & chassis.	262.5 Kc	Hi end stop	1, 2, 3 & 4	Adjust for maximum.
RF ALIGNMENT					
2.	Ant recept through 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. Remove the escutcheon and dial background plate to expose the core screws. Before proceeding with step 3, back the tuning core screws 7/16" out of the coils to eliminate their effect on trimmer adjustments.					
3.	Ant recept 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.
ANTENNA TRIMMER					
7.	-	-	Weak station Around 1400 Kc	7	With radio installed in car and antenna fully extended, adjust antenna trimmer for maximum.

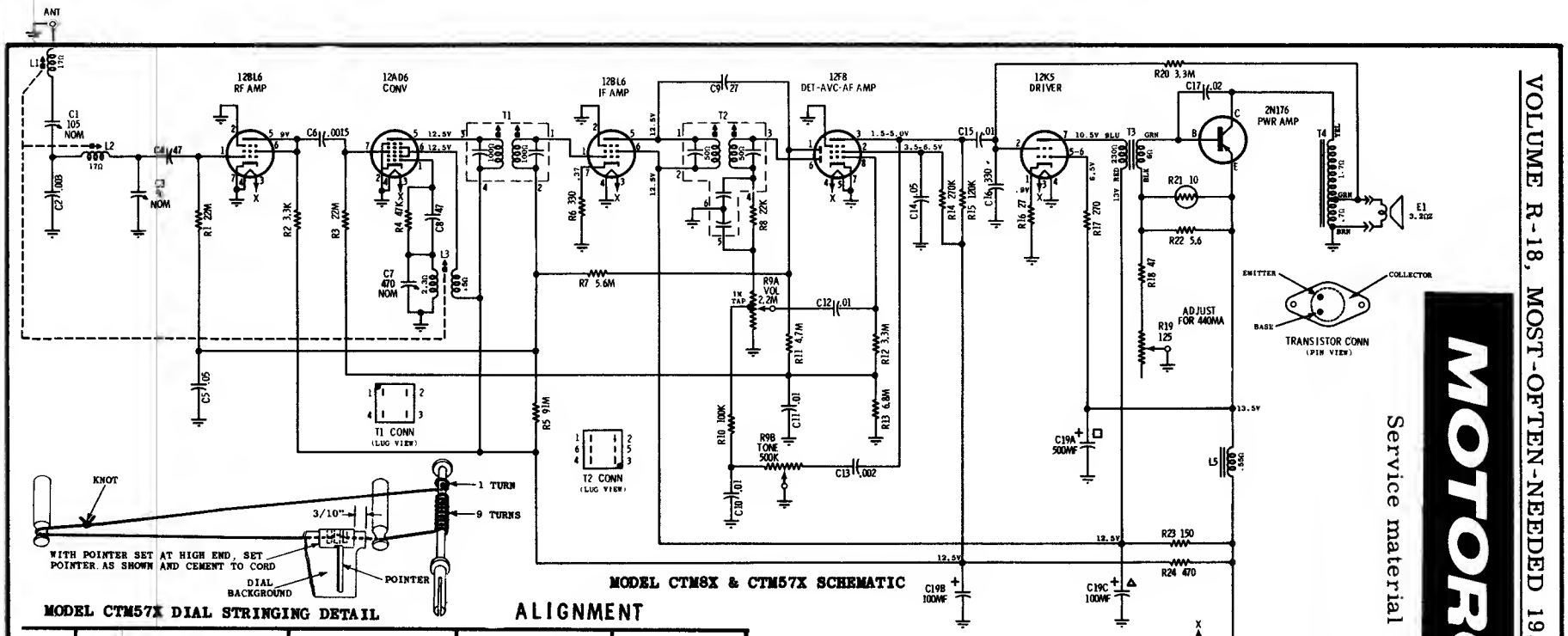
MOTOROLA

Auto Radio Model CTA8X

(Continued from page 86)



ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



MODEL CTM57X DIAL STRINGING DETAIL

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 recept 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 recept 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.

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 with a VTVM. No signal input. Toterance ±10%.
INPUT VOLTAGE - 14V DC
TUNING RANGE - 540 KC TO 1610 KC
IF FREQ. - 262.5 KC

MOTOROLA

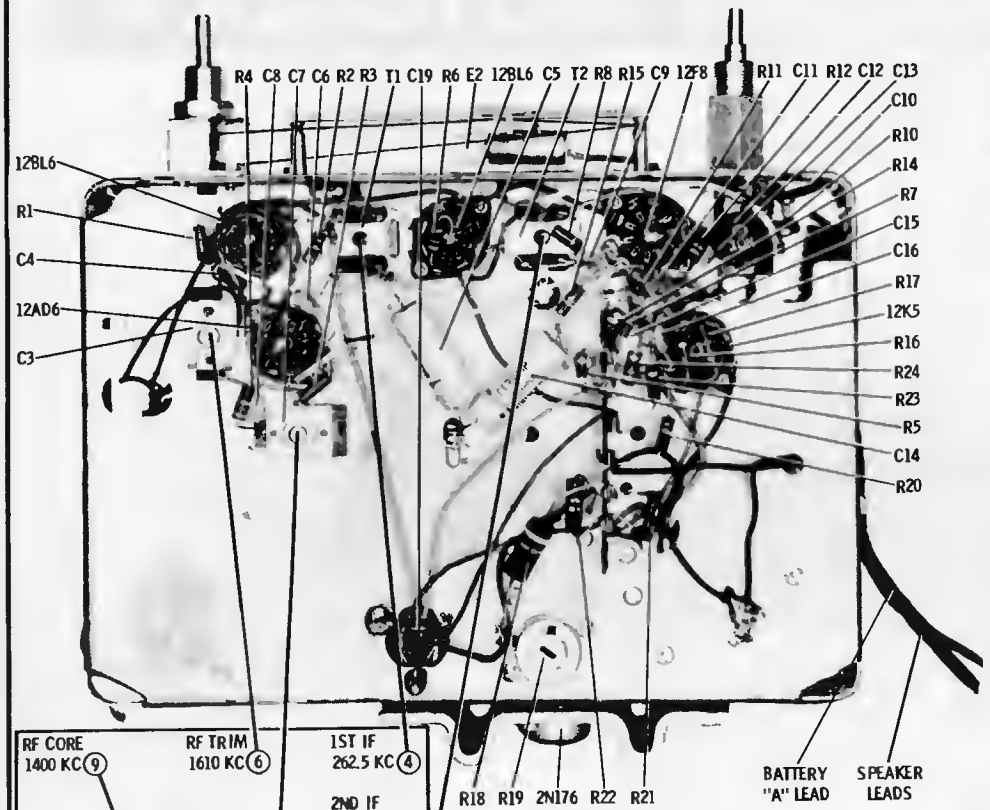
MODELS
CTM8X
CTM57X

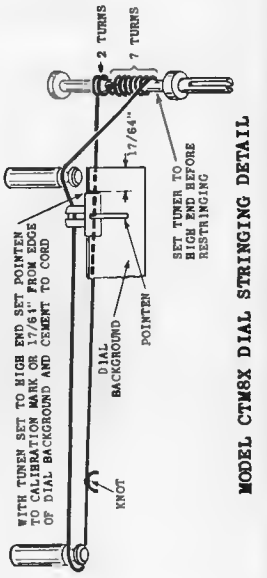
Service material continued on page 89.

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

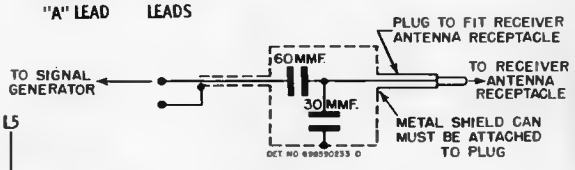
MOTOROLA Models CTM8X and CTM57X (Continued)

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

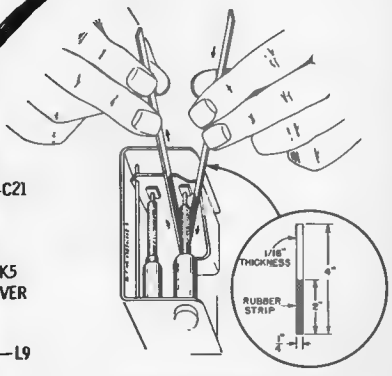




MODEL CTM8X DIAL STRINGING DETAIL



DUMMY ANTENNA



CORE ALIGNMENT TOOL DETAIL

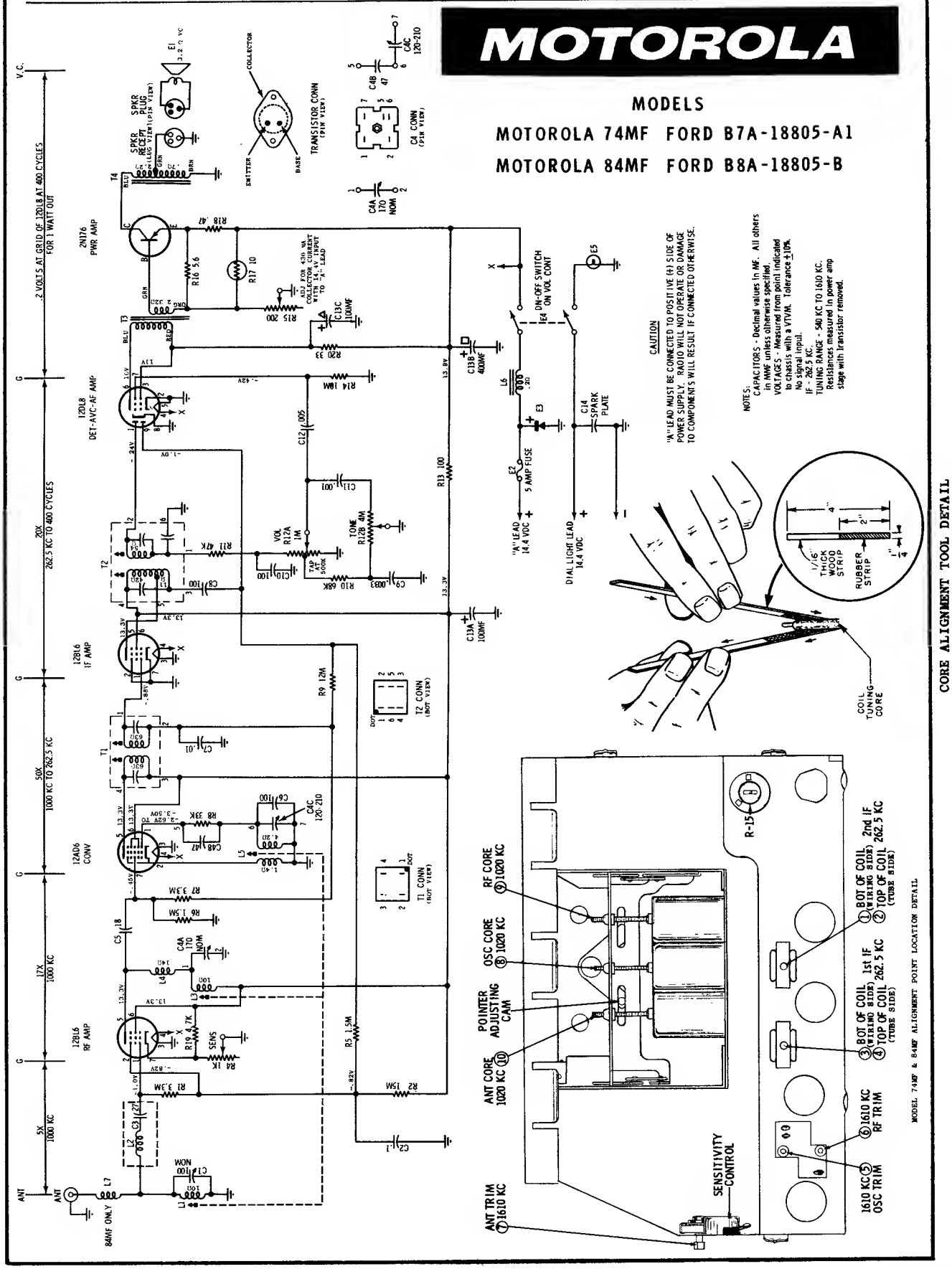
Model CTM8X Alignment adjustments and parts locations. CTM57X is similar.

MOTOROLA

MODELS

MOTOROLA 74MF FORD B7A-18805-A1

MOTOROLA 84MF FORD B8A-18805-B



MODEL 74MF & 84MF ALIGNMENT POINT LOCATION DETAIL

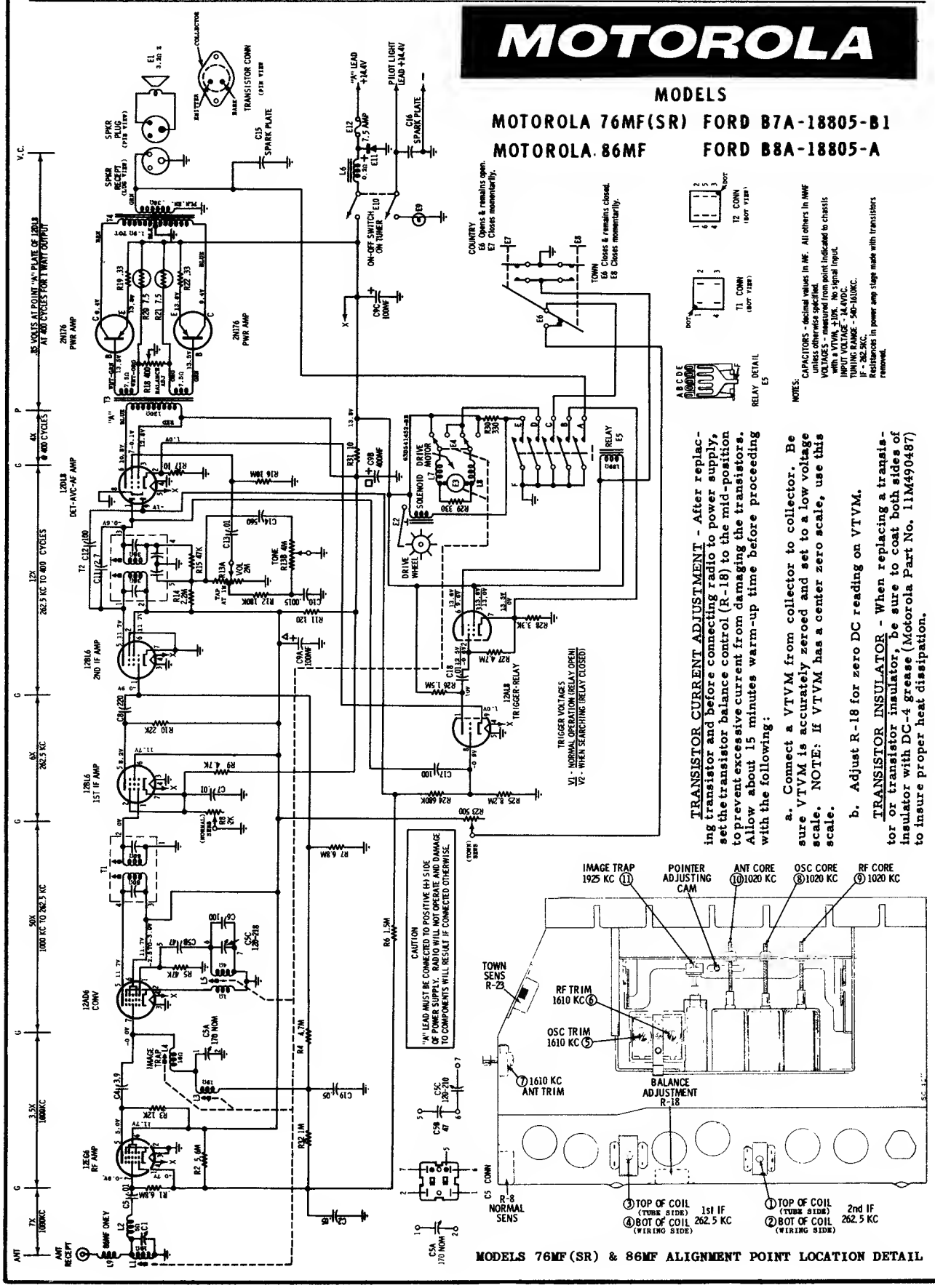
CORE ALIGNMENT TOOL DETAIL

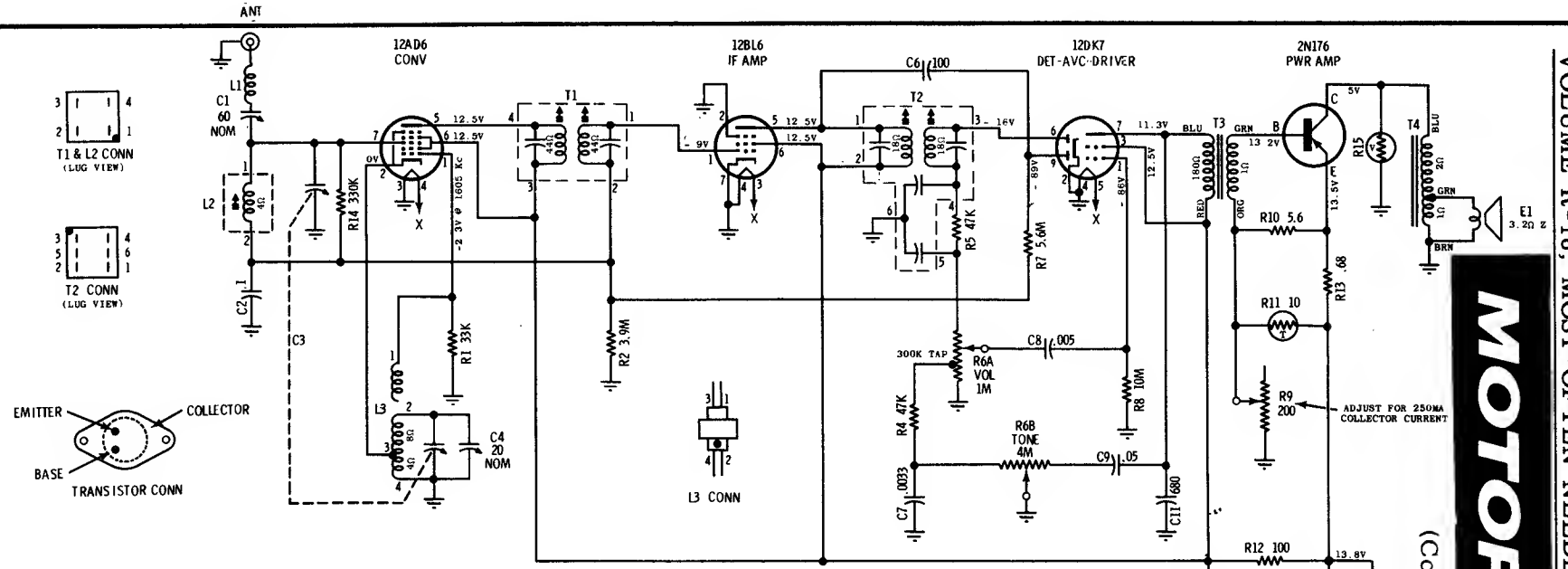
MOTOROLA

MODELS

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

MOTOROLA 86MF FORD B8A-18805-A





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					
1.	Grid of conv (pin 7 12AD6) through .1 mf capacitor & chassis	455 Kc	Fully open	1, 2, 3 & 4	Peak for maximum.
RF ALIGNMENT					
2.	Ant recept through dummy antenna.	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					
6.	—	—	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)

(Continued 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

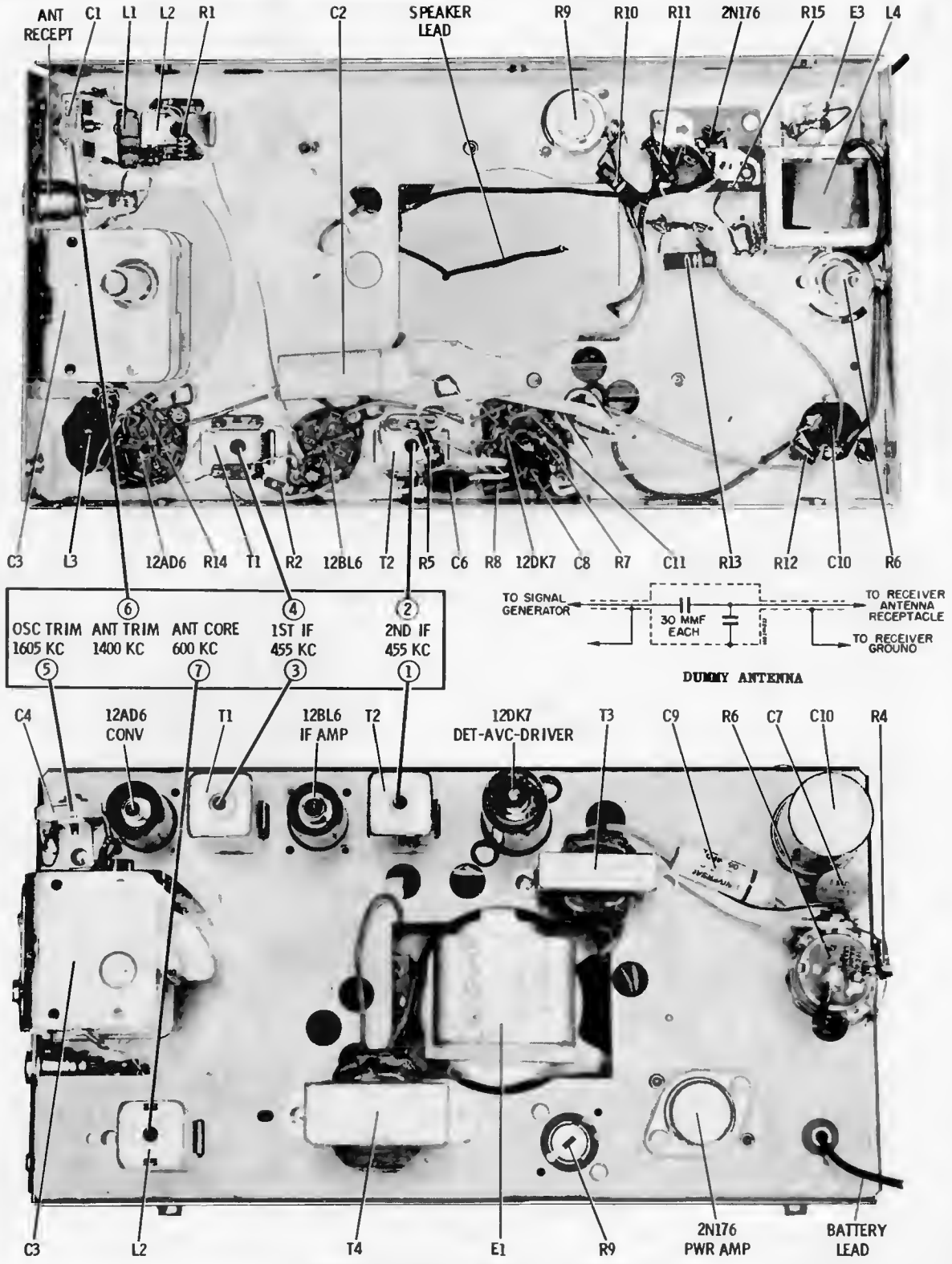
MOTOROLA

MODEL
AMERICAN MOTORS 8990543
MOTOROLA 83MR

MOTOROLA

Model 83MR, American Motors 8990543

(Continued from page 92)

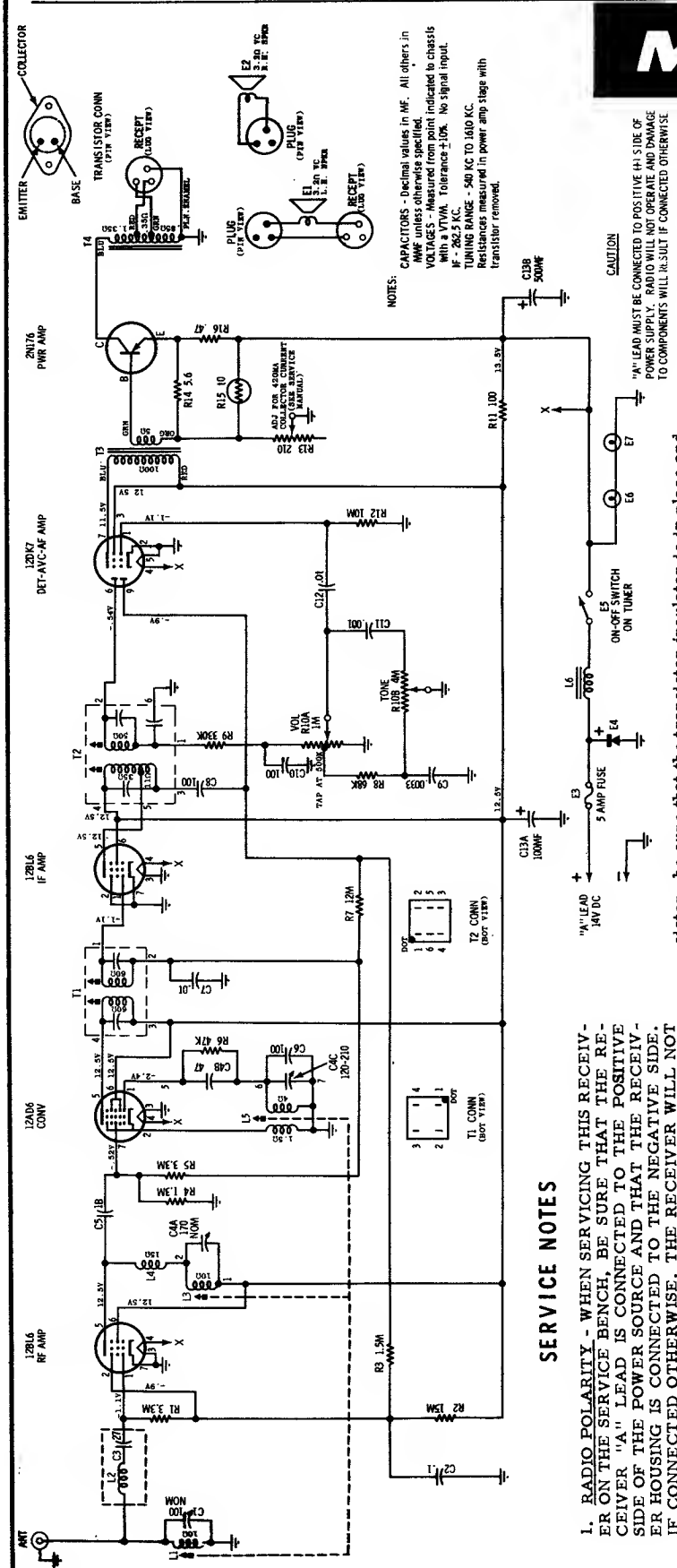


ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

MOTOROLA

MODEL
AMERICAN MOTORS 8990494
MOTOROLA 84MA

(Continued on page 95)



SERVICE NOTES

1. 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.

2. 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.

3. 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.

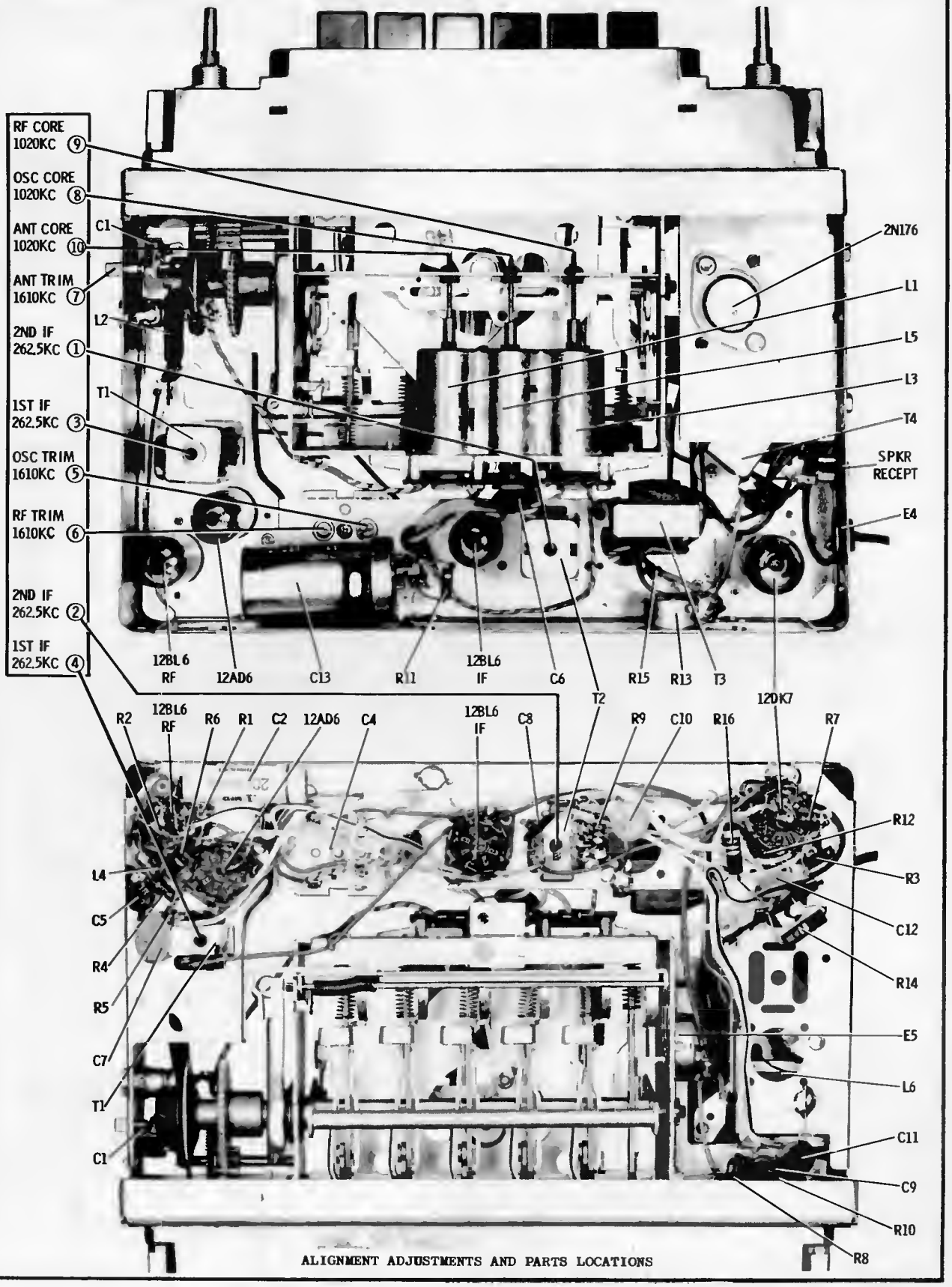
4. TRANSISTOR REPLACEMENT - When replacing a transistor, be sure that the transistor insulator is in place and that the mounting screws are securely tightened. If insulator is not in place the transistor will be shorted to chassis and set will not operate. If mounting screws are not tight, the transistor 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).

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.

MOTOROLA Model 84MA, American Motors 8990494, Continued from page 94



ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS

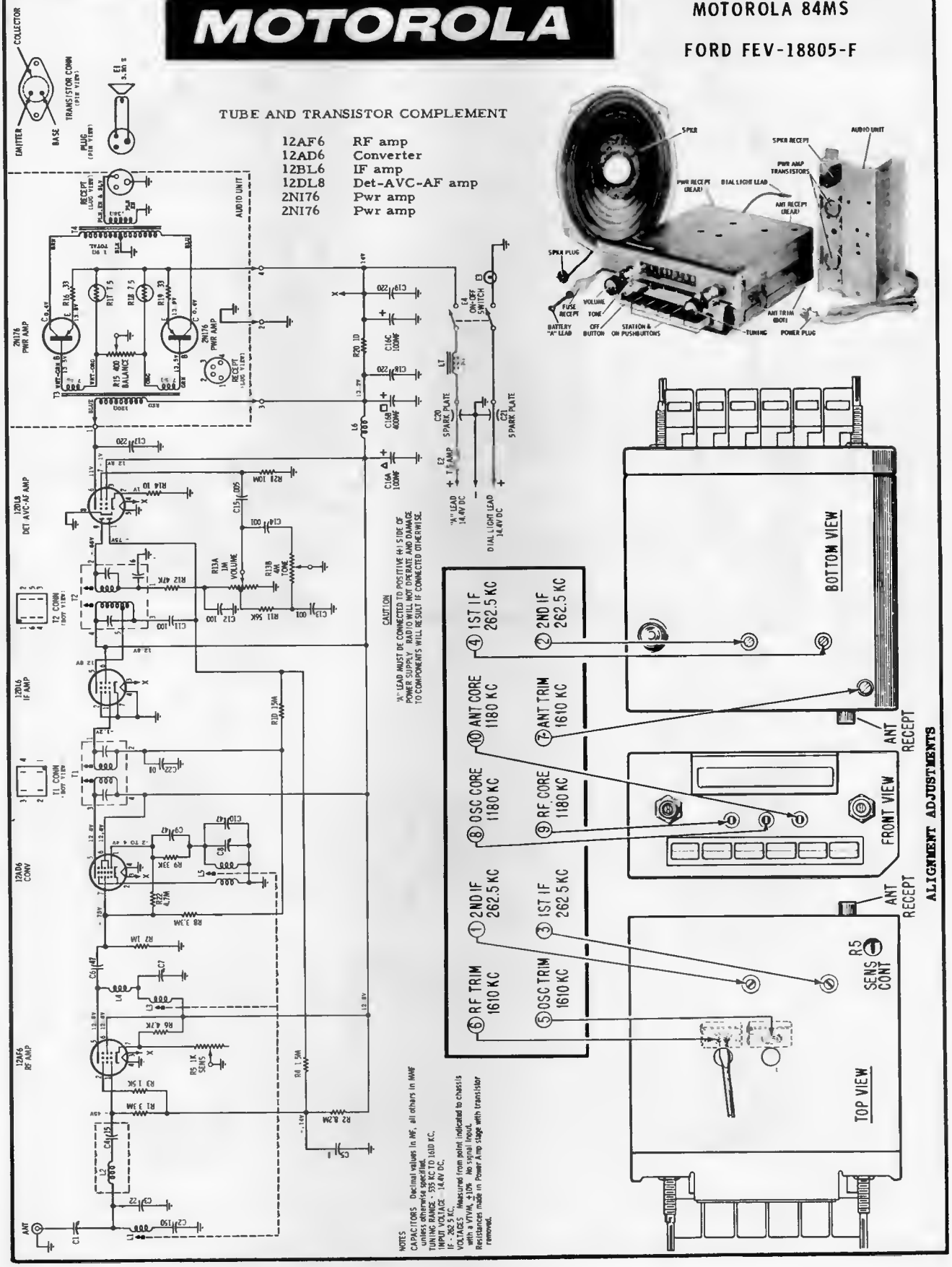
MOTOROLA

MOTOROLA 84MS

FORD FEV-18805-F

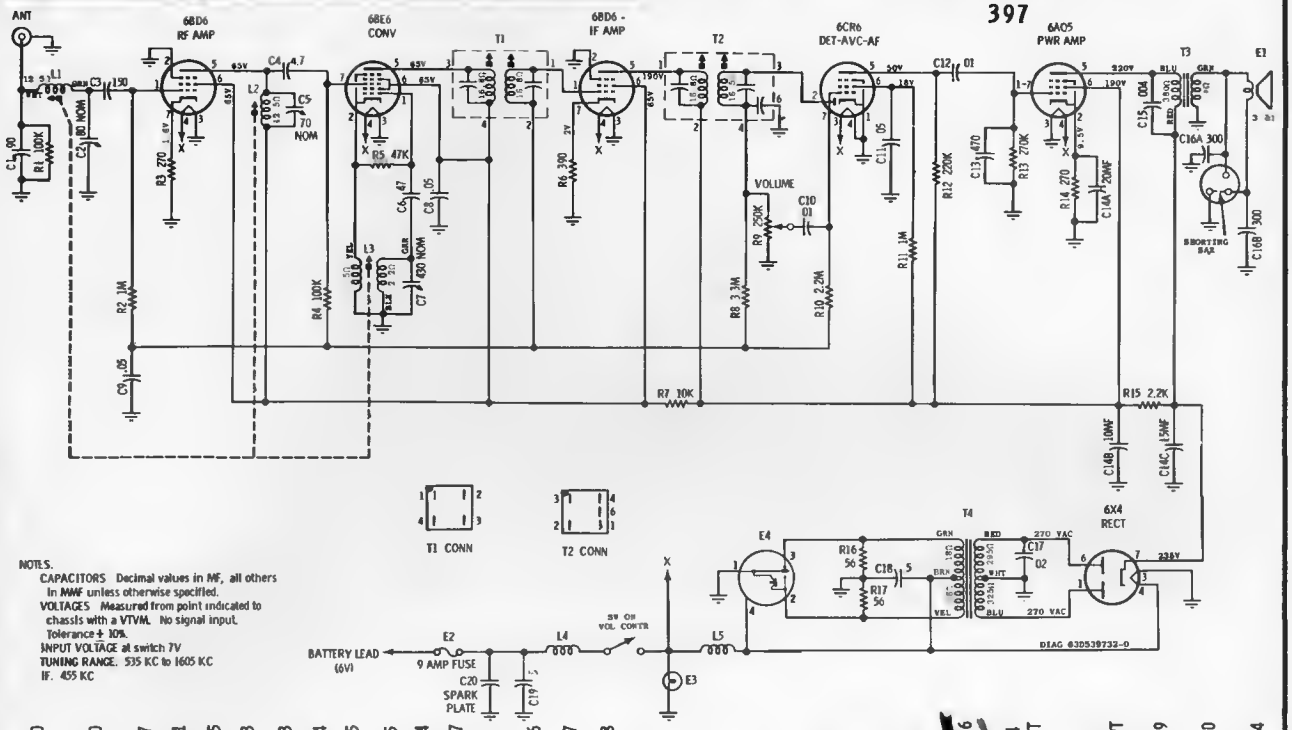
TUBE AND TRANSISTOR COMPLEMENT

12AF6	RF amp
12AD6	Converter
12BL6	IF amp
12DL8	Det-AVC-AF amp
2NI76	Pwr amp
2NI76	Pwr amp

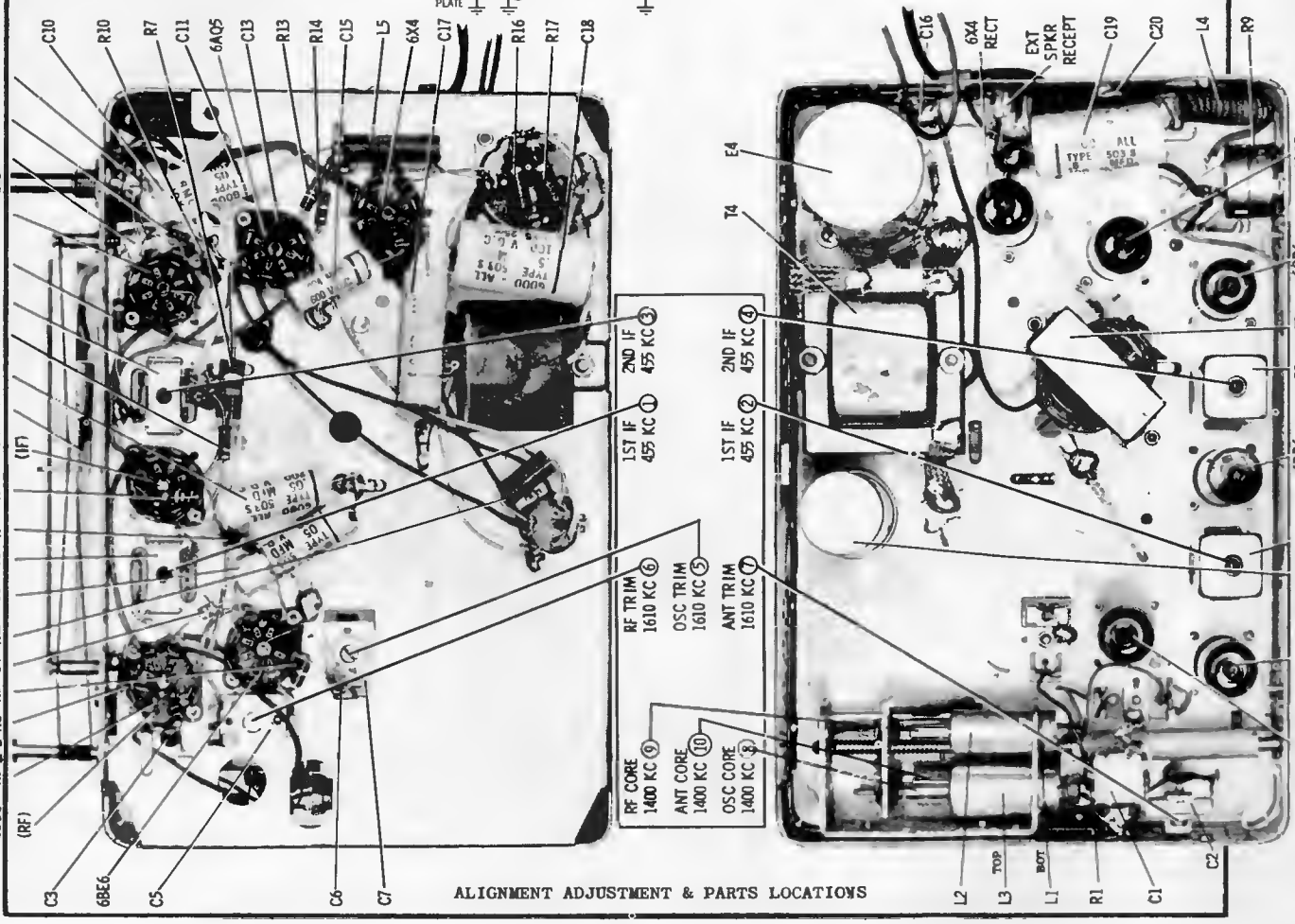


MOTOROLA

AUTO RADIO MODEL 397



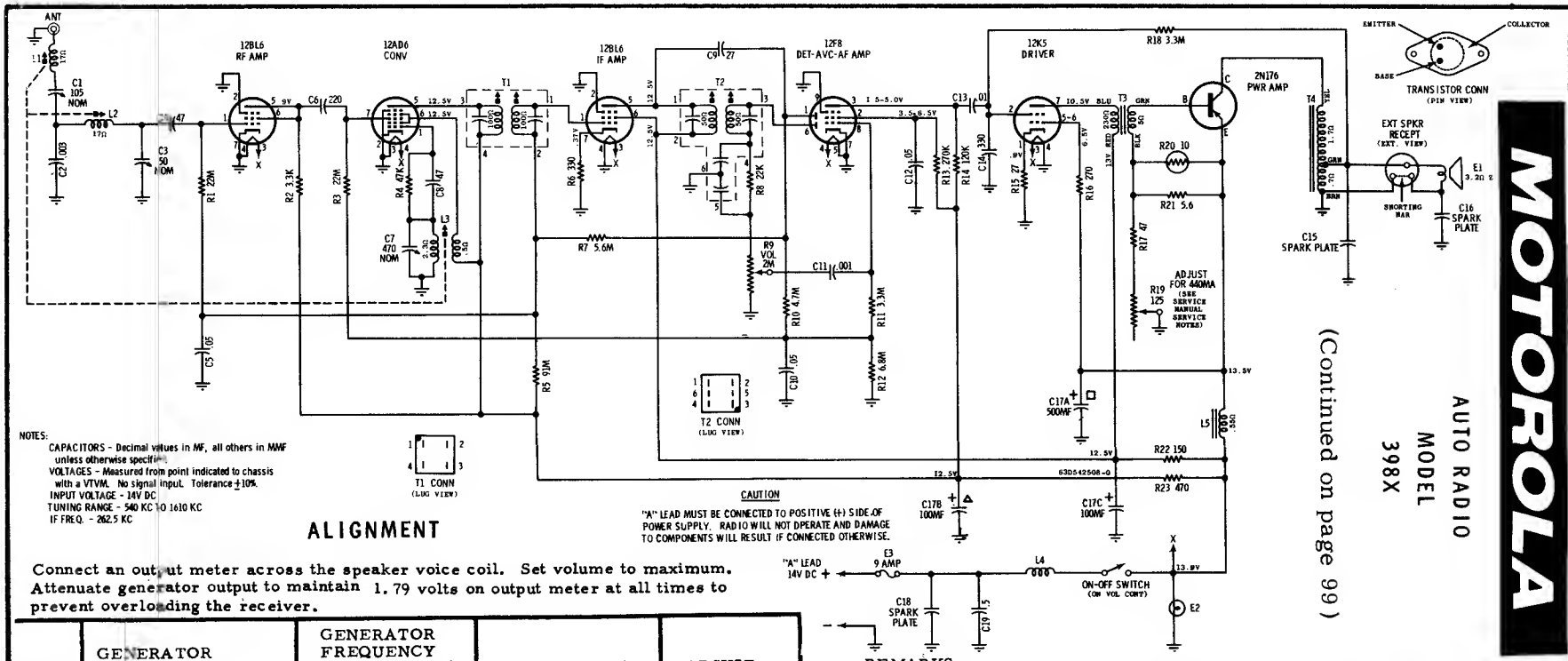
NOTES.
CAPACITORS Decimal values in MF, all others in MMF unless otherwise specified.
VOLTAGES Measured from point indicated to chassis with a VTVM. No signal input. Tolerance ± 10%.
INPUT VOLTAGE at switch 7V
TUNING RANGE. 535 KC to 1605 KC
IF. 455 KC



ALIGNMENT ADJUSTMENT & PARTS LOCATIONS

MOTOROLA

AUTO RADIO
MODEL
398X



(Continued on page 99)

ALIGNMENT

Connect an output meter across the speaker voice coil. Set volume to maximum. Attenuate 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
IF ALIGNMENT					
1.	Conv grid (pin 7) thru .1 mf capacitor and chassis	262.5 Kc	Hi end stop	1, 2, 3 & 4	Peak for maximum.
RF ALIGNMENT					
2.	Ant recept through dummy (see Fig.)	1610 Kc	Hi end stop	5, 6 & 7	Peak for maximum.
NOTE: Do not perform steps 3, 4, 5 & 6 unless tuner has been tampered with or components have heen replaced. Before proceeding with step 3, back tuning cores 1" out of coils to eliminate their effect on trimmer adjustments. Construct core alignment tools as shown below.					
3.	Ant recept through dummy (see Fig.)	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.					
ANTENNA TRIMMER					
7.	-	-	Weak station around 1400 Kc	7	With radio installed in car and antenna fully extended, peak antenna trimmer for maximum.

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.

A. 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.

B. 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.

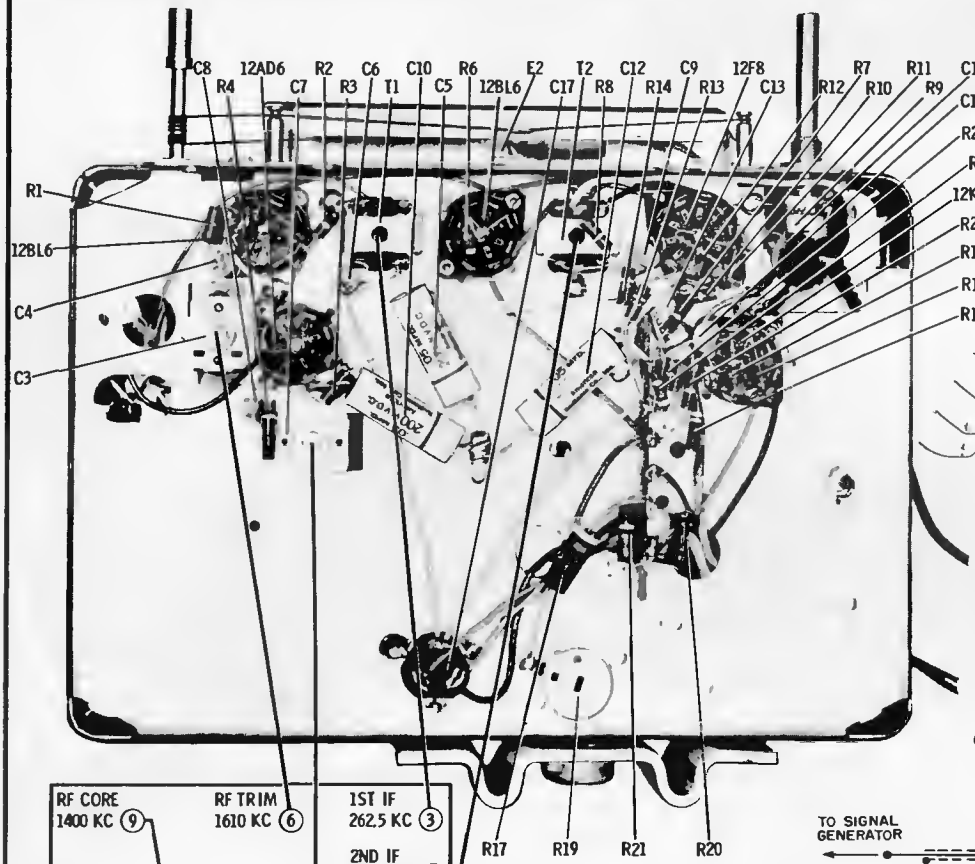
C. Adjust R-19 for a collector current reading of 360 ma with 12.6 volts input to radio "A" lead.

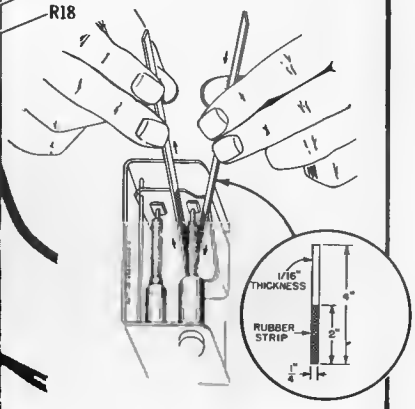
NOTE: Two values of radio input voltage are given as a convenience to service personnel to accommodate different power sources. The schematic collector current value of 440 ma is stated with 14 volts DC input to receiver "A" lead.

MOTOROLA

Model 398X

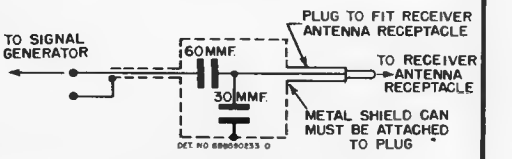
(Continued from page 98)



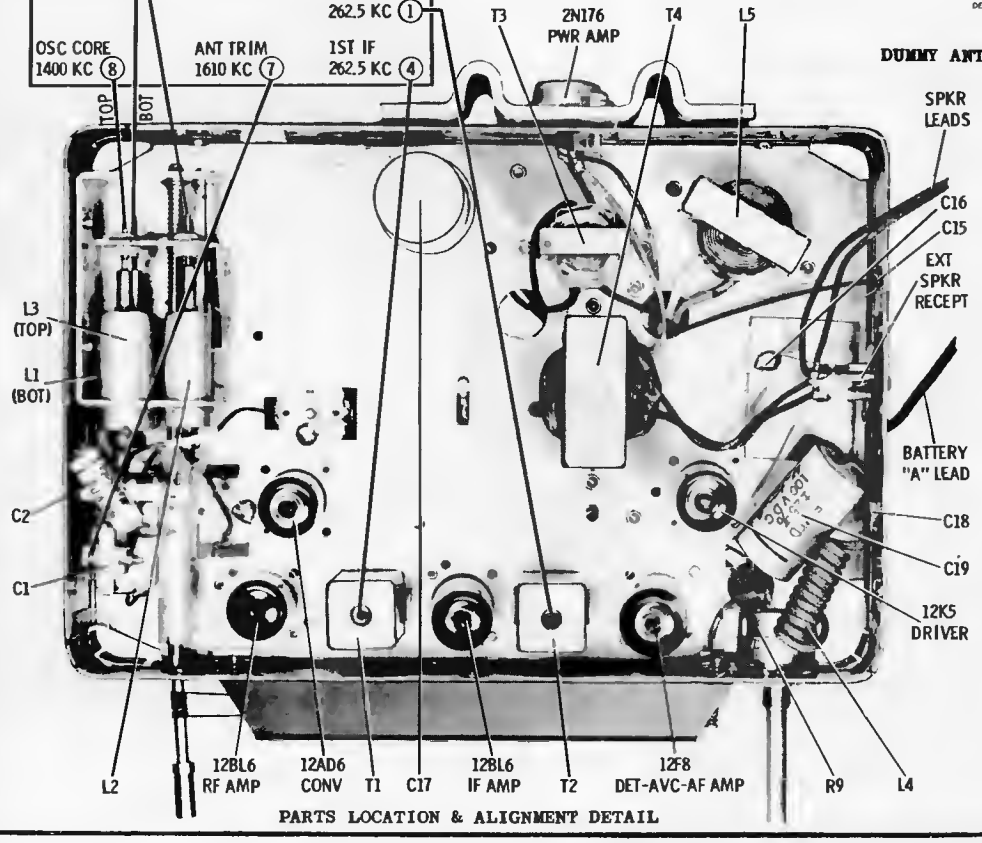


CORE ALIGNMENT TOOL DETAIL

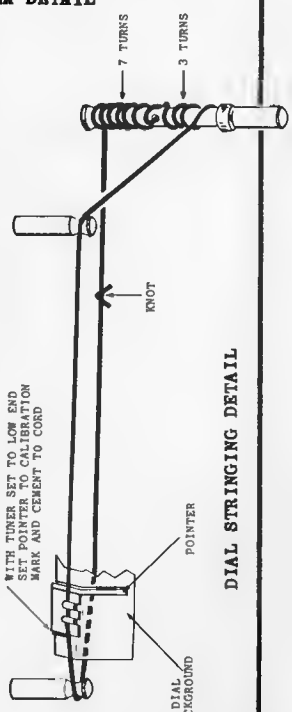
RF CORE 1400 KC (9)	RF TRIM 1610 KC (6)	1ST IF 262.5 KC (3)
		2ND IF 262.5 KC (2)
ANT CORE 1400 KC (10)	OSC TRIM 1610 KC (5)	
		2ND IF 262.5 KC (1)
OSC CORE 1400 KC (8)	ANT TRIM 1610 KC (7)	1ST IF 262.5 KC (4)



DUMMY ANTENNA DETAIL



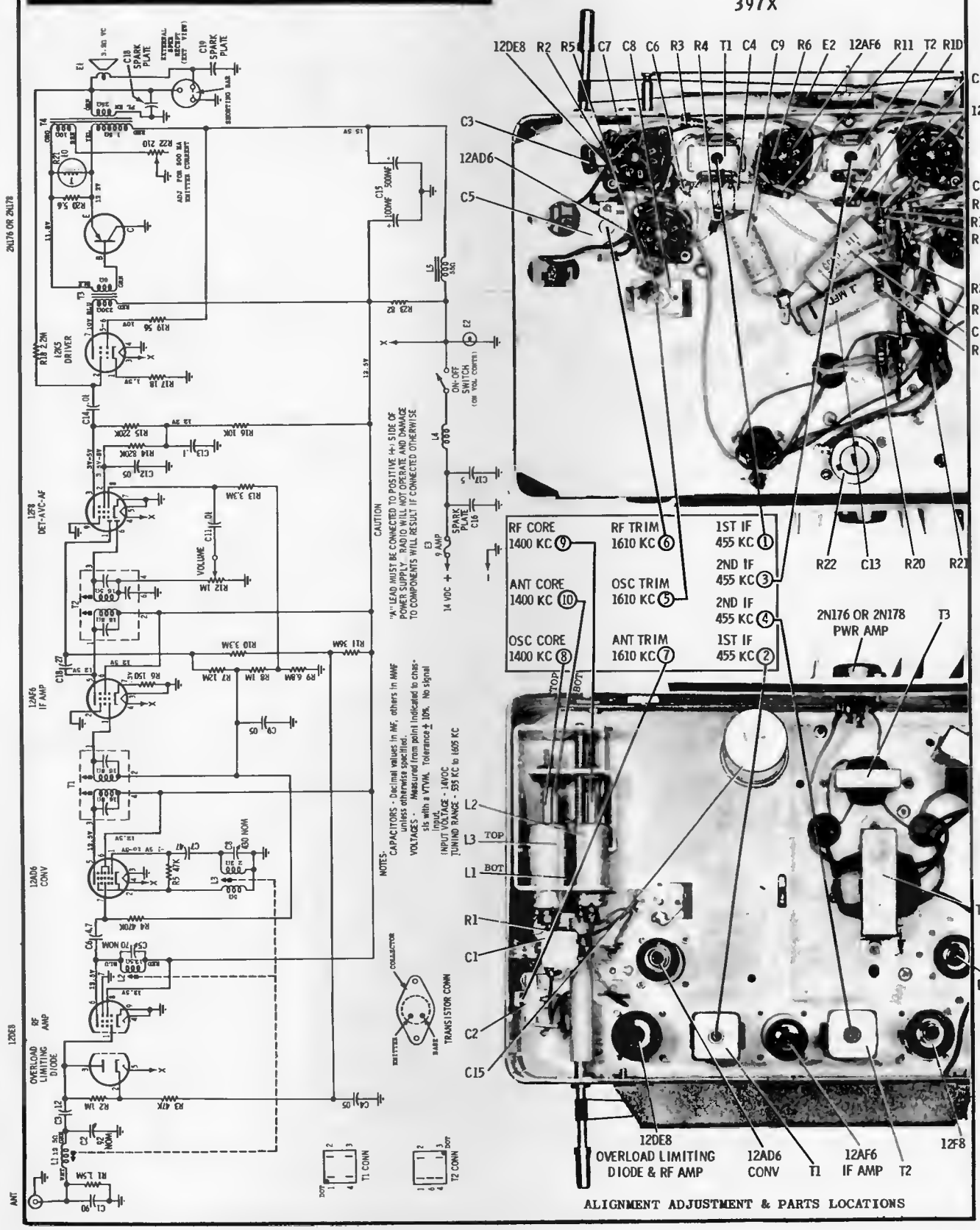
PARTS LOCATION & ALIGNMENT DETAIL



DIAL STRINGING DETAIL

MOTOROLA

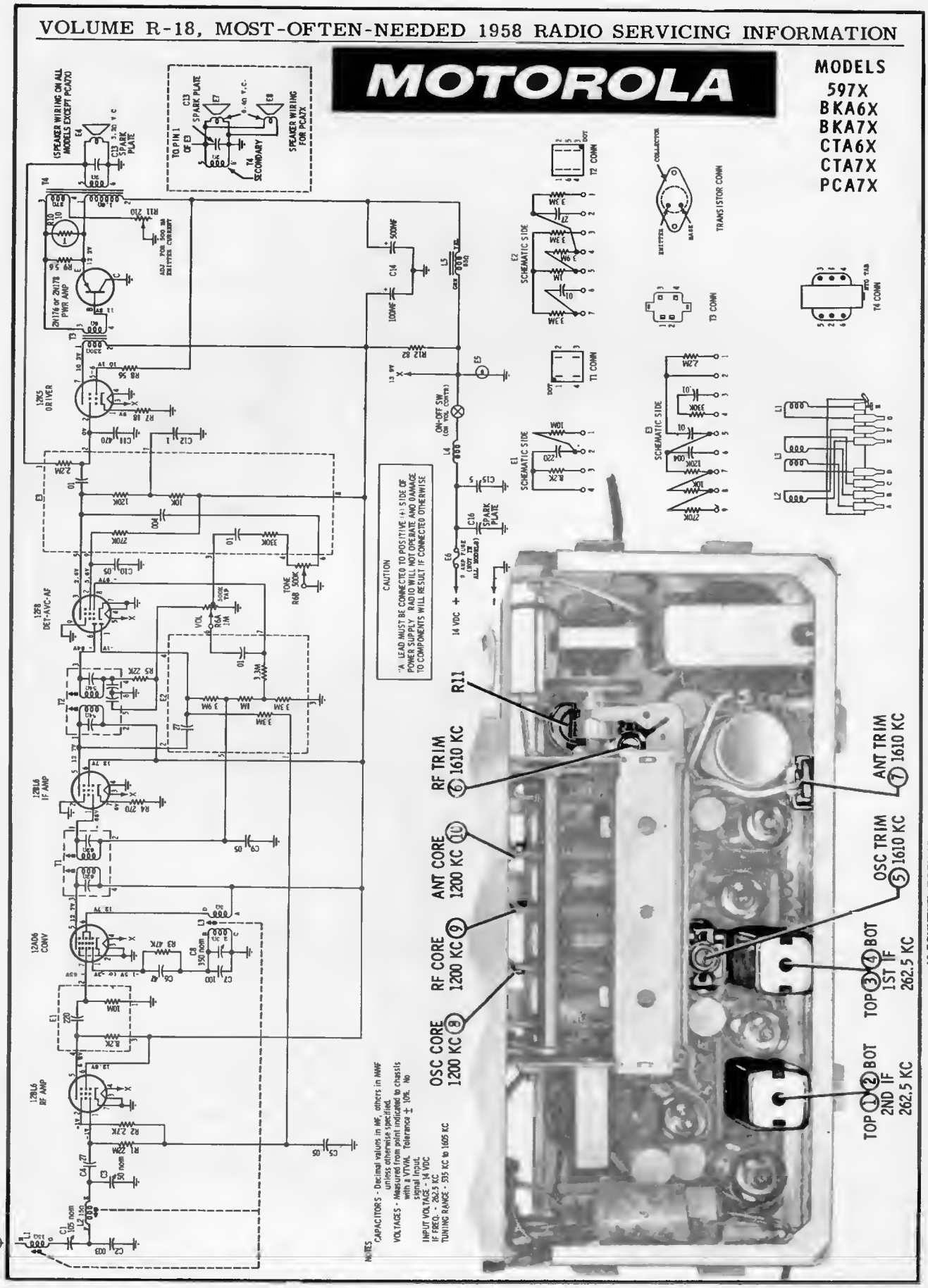
AUTO RADIO MODEL 397X



ALIGNMENT ADJUSTMENT & PARTS LOCATIONS

MOTOROLA

MODELS
597X
BKA6X
BKA7X
CTA6X
CTA7X
PCA7X



MOTOROLA

Model 600X

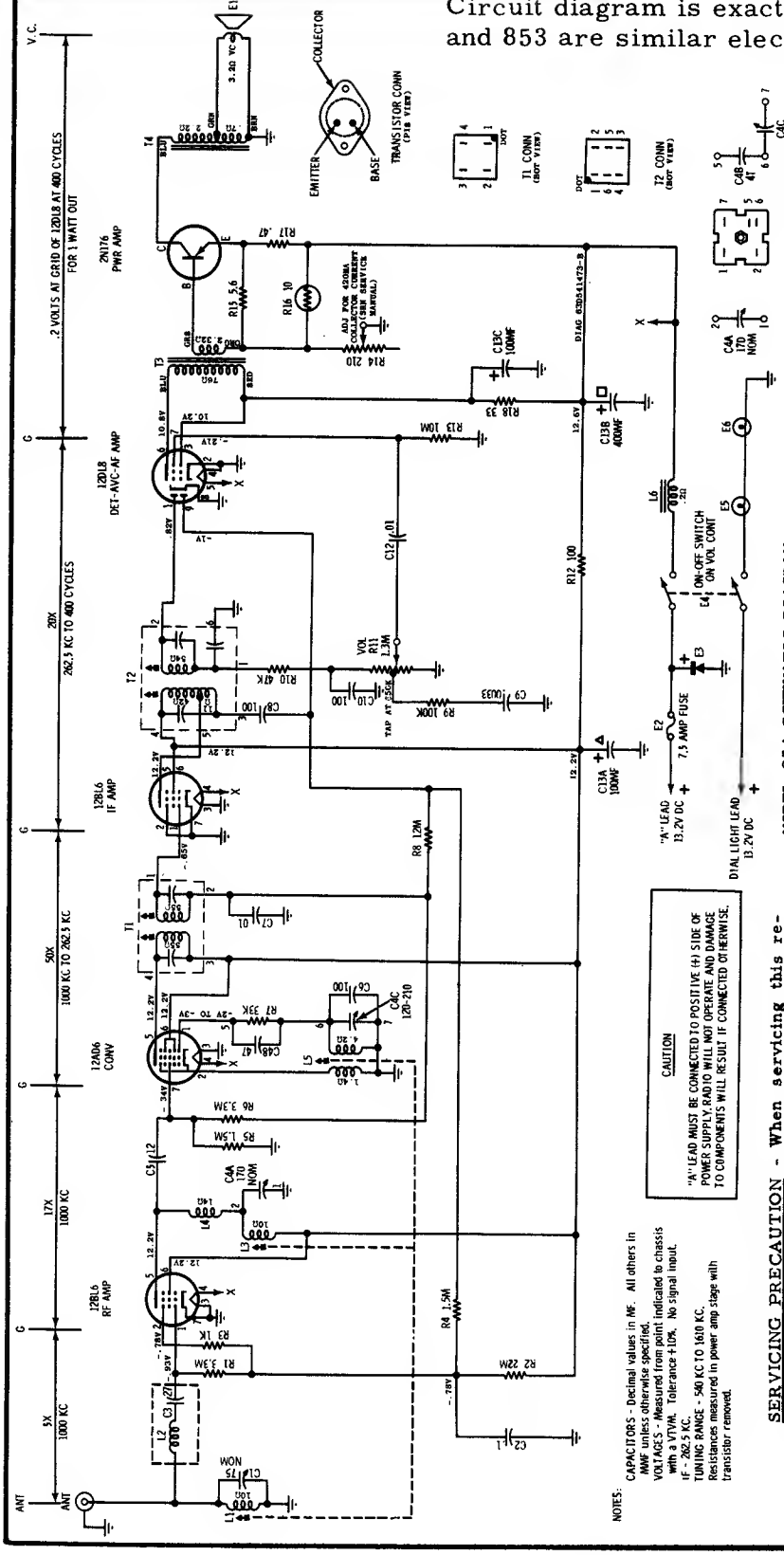
CHASSIS REMOVAL

A. Remove cover and back plate.
B. 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.
C. Unsolder chassis leads to Polarity Reversing Socket.
D. Unsolder chassis leads to mica capacitor (C16).
E. Unsolder chassis leads going to antenna receptacle and volume control.
F. Unsolder chassis leads to tuner.
G. Remove chassis.

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 854 SCHEMATIC DIAGRAM

Model 852	Dodge	LD1, LD2, LD3
Model 853	DeSoto	LS1, LS2, LS3
Model 854	Plymouth	LP1, LP2

a. Connect a VTVM from collector electrode (transistor shell) to chassis.

b. Adjust R-14 for .85 volts on VTVM. (this corresponds to a collector current of 425 Ma.)

c. 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:

MOTOROLA

Model MoPar 923

(Continued on page 105)

SERVICE NOTES

5. 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 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).

6. 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:

a. Connect a VTVM across the two ends of balance adjustment control R-18; be sure VTVM is accurately zeroed and set to a low voltage scale. NOTE: If VTVM has a center zero scale, use center zero scale.

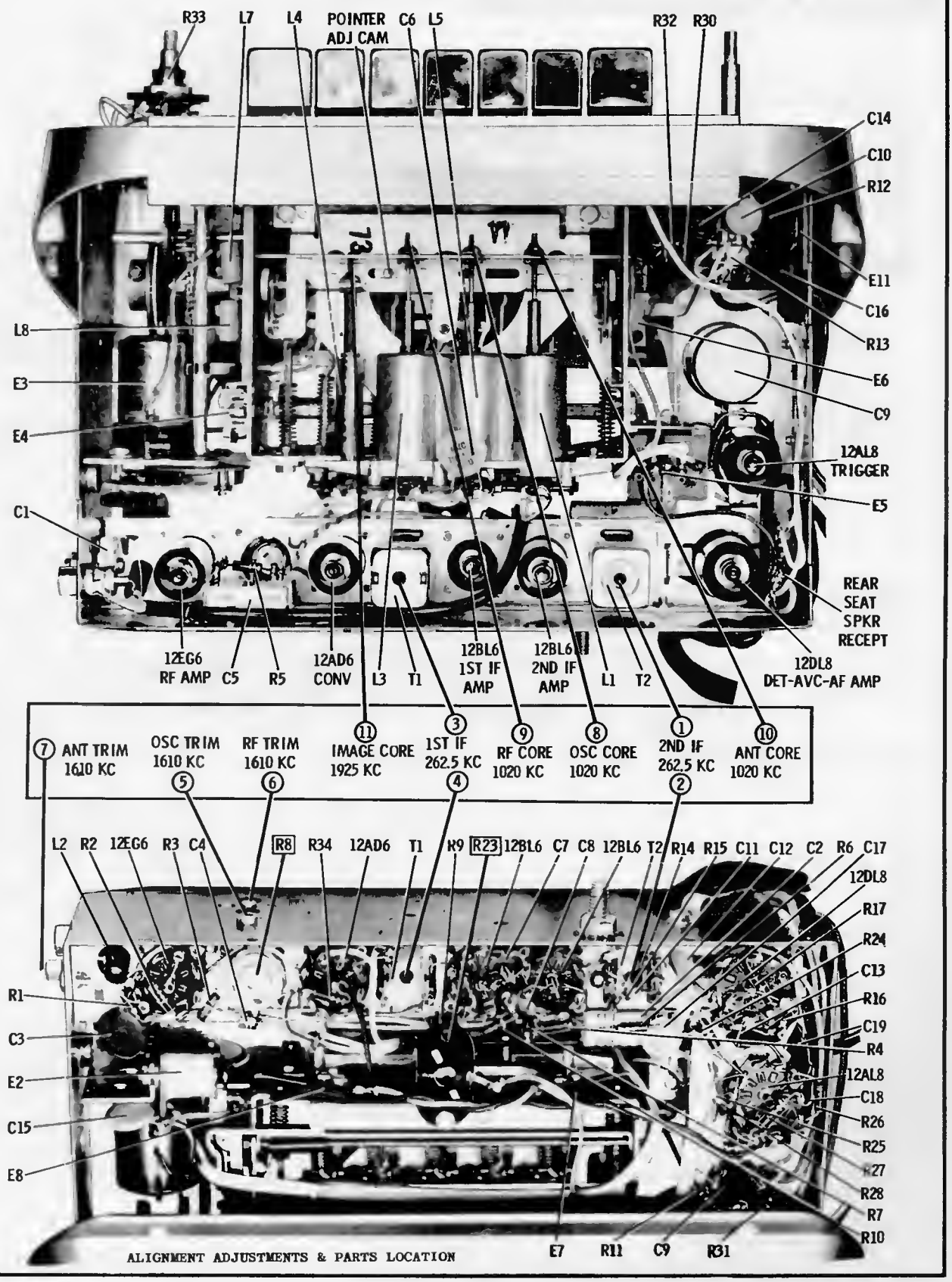
b. Adjust R-18 for zero reading on VTVM.

7. 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.

8. 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).

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

MOTOROLA Model MoPar 923 (Continued from page 104)

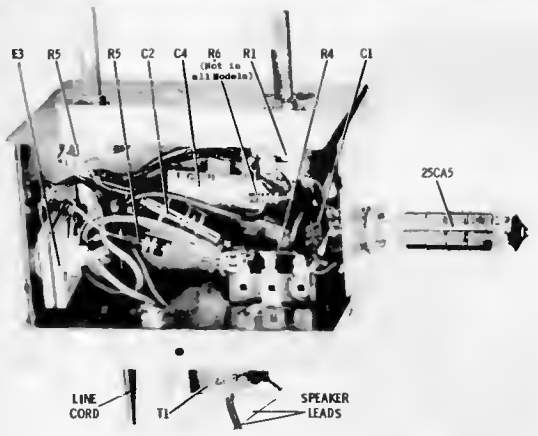


ALIGNMENT ADJUSTMENTS & PARTS LOCATION

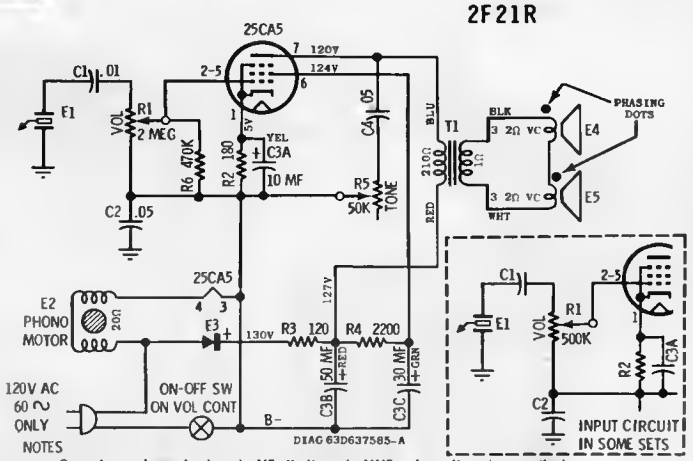
MOTOROLA

CHASSIS HS-598

MODELS 2F21B 2F21R



PARTS LOCATION



Capacitors - decimal values in MF all others in MMF unless otherwise specified.

Voltages - measured from point indicated to B— with a VTVM.

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.

DISASSEMBLY INSTRUCTIONS

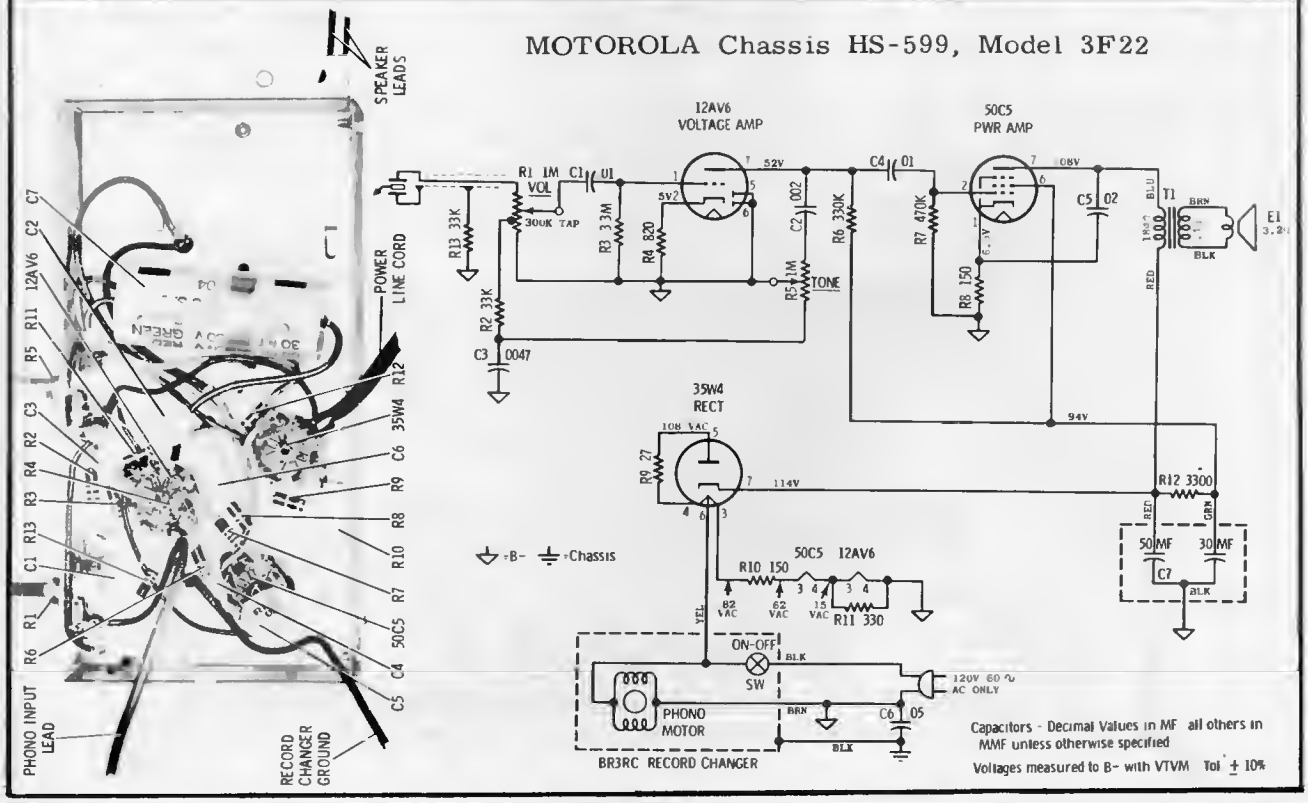
To Remove Chassis from Cabinet

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



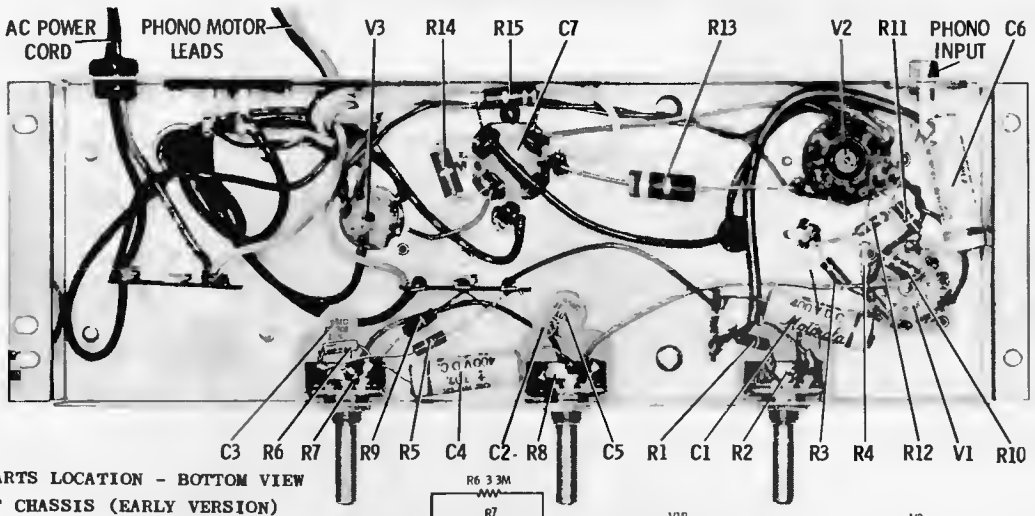
Capacitors - Decimal Values in MF all others in MMF unless otherwise specified

Voltages measured to B- with VTVM Tol ± 10%

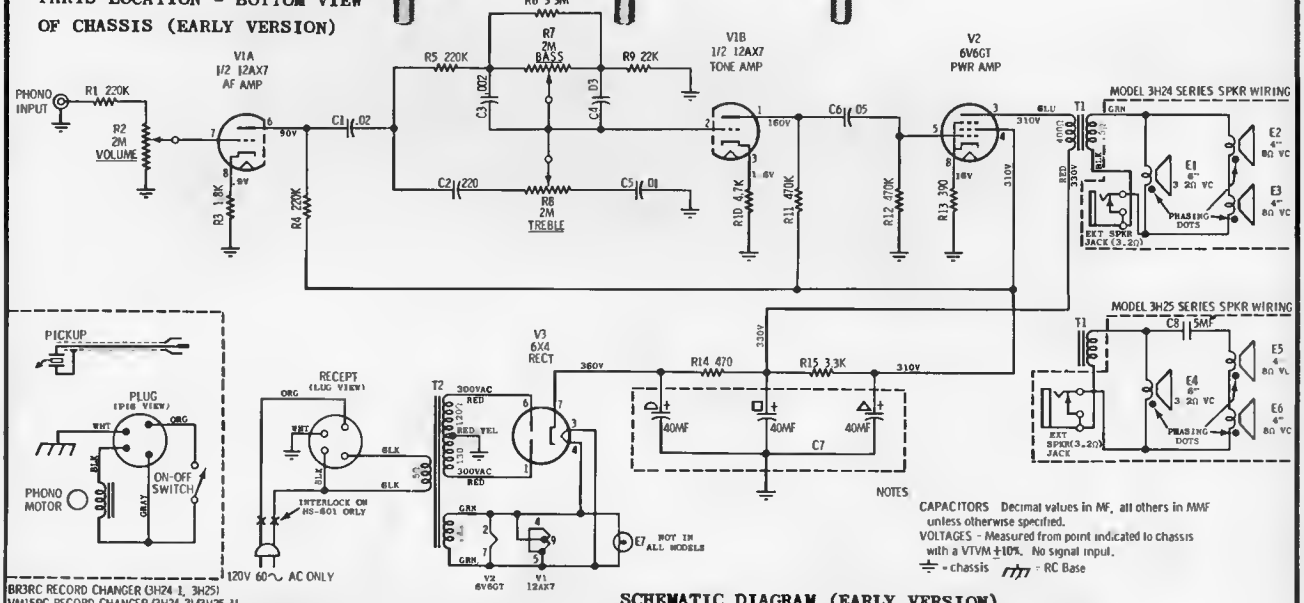
MOTOROLA

CHASSIS
HS-601
HS-602

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

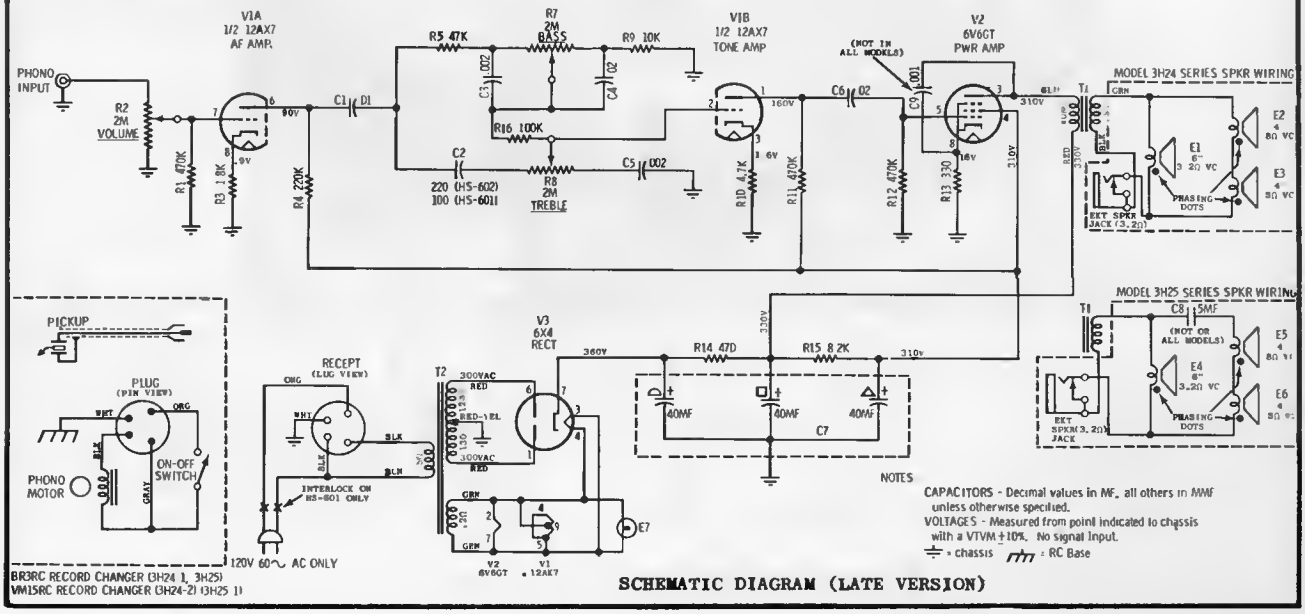


PARTS LOCATION - BOTTOM VIEW OF CHASSIS (EARLY VERSION)



BR3RC RECORD CHANGER (3H24-1, 3H25)
VM15RC RECORD CHANGER (3H24-2) (3H25-1)

SCHEMATIC DIAGRAM (EARLY VERSION)

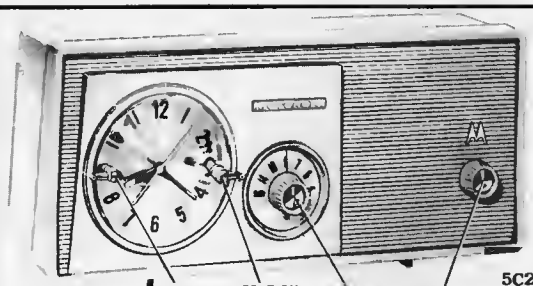


BR3RC RECORD CHANGER (3H24-1, 3H25)
VM15RC RECORD CHANGER (3H24-2) (3H25-1)

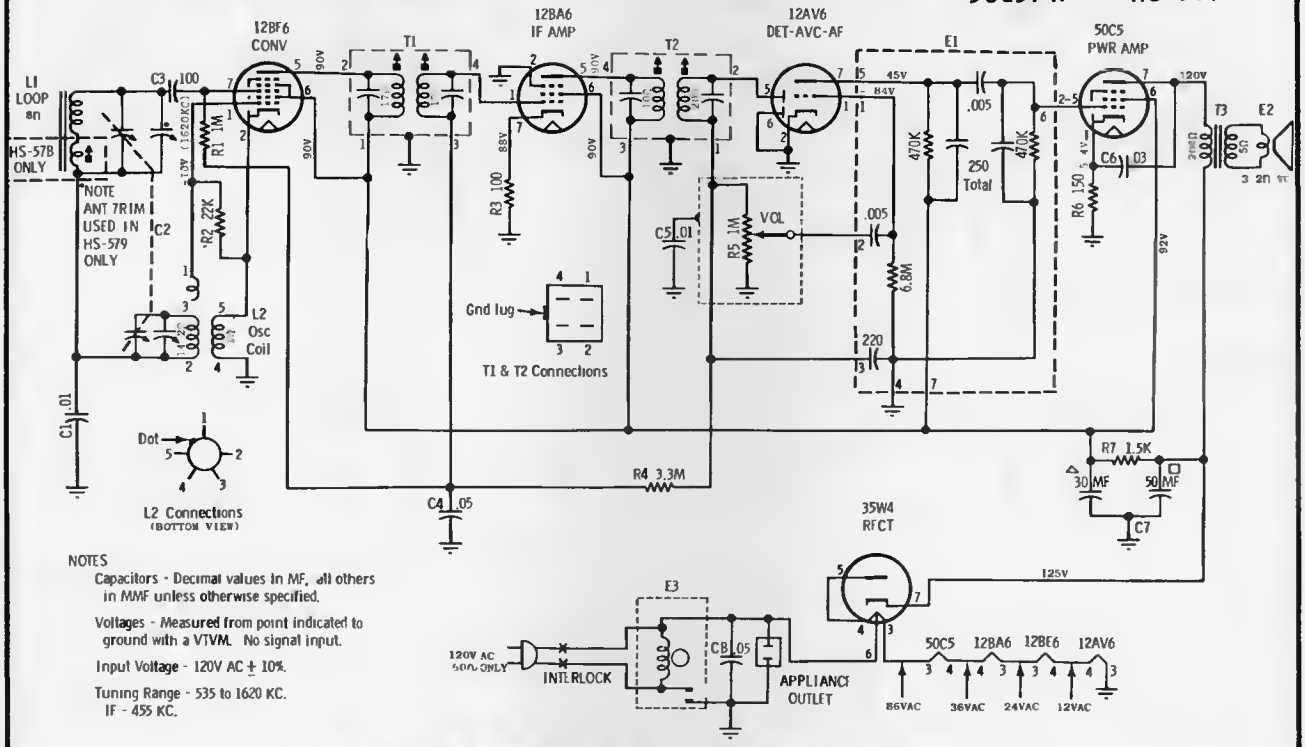
SCHEMATIC DIAGRAM (LATE VERSION)

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



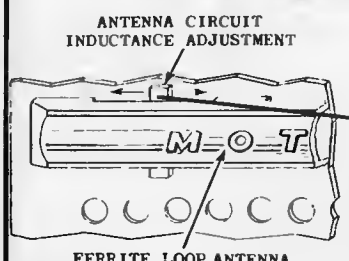
NOTES

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 ± 10%.

Tuning Range - 535 to 1620 KC.
IF - 455 KC.

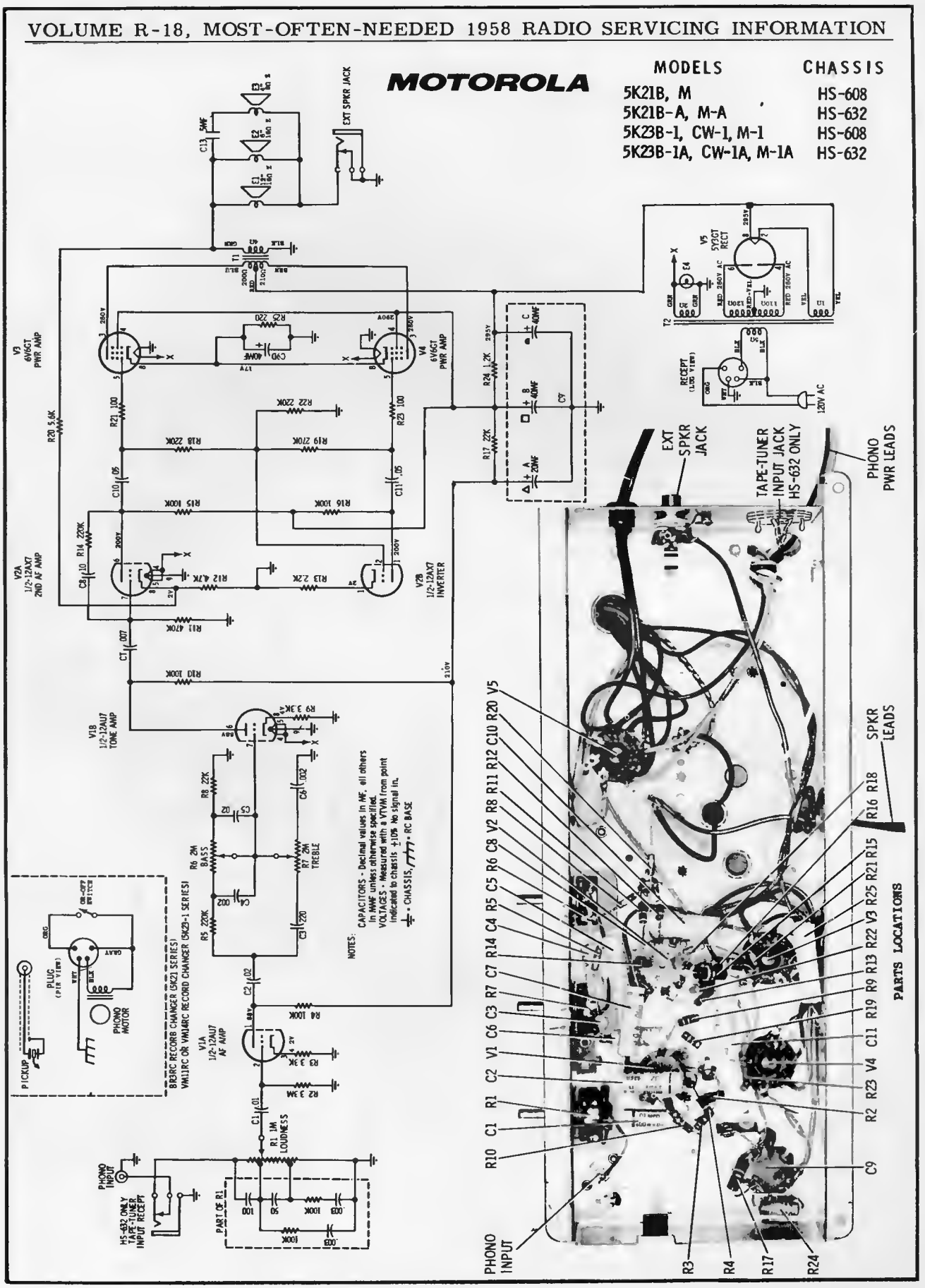


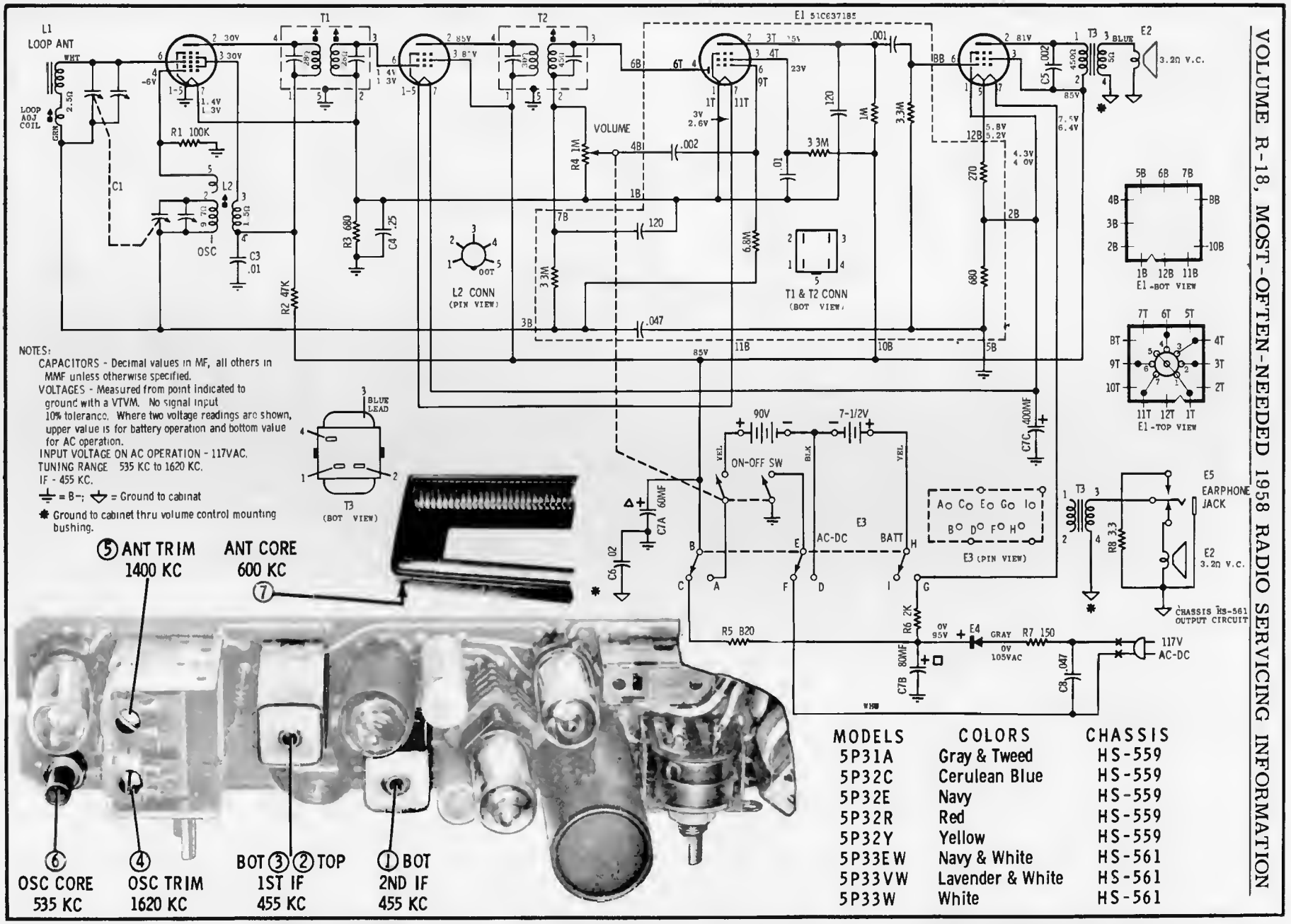
⑥ ANT CORE 600KC (5C22 ONLY)	TOP ① ② BOT 2ND IF 455KC	TOP ③ ④ BOT 1ST IF 455KC	⑦ ANT TRIM 1400KC (5C23 ONLY)	⑤ OSC 1620KC

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





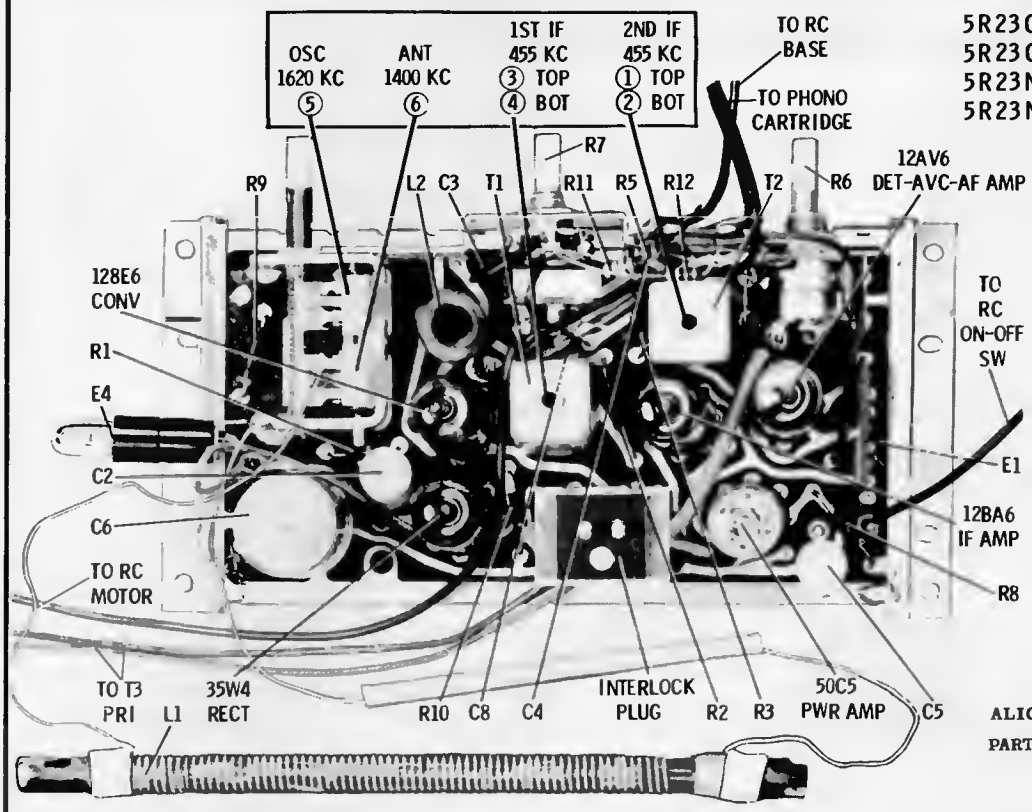
MODELS	COLORS	CHASSIS
5P31A	Gray & Tweed	HS-559
5P32C	Cerulean Blue	HS-559
5P32E	Navy	HS-559
5P32R	Red	HS-559
5P32Y	Yellow	HS-559
5P33EW	Navy & White	HS-561
5P33VW	Lavender & White	HS-561
5P33W	White	HS-561

ALIGNMENT LOCATIONS

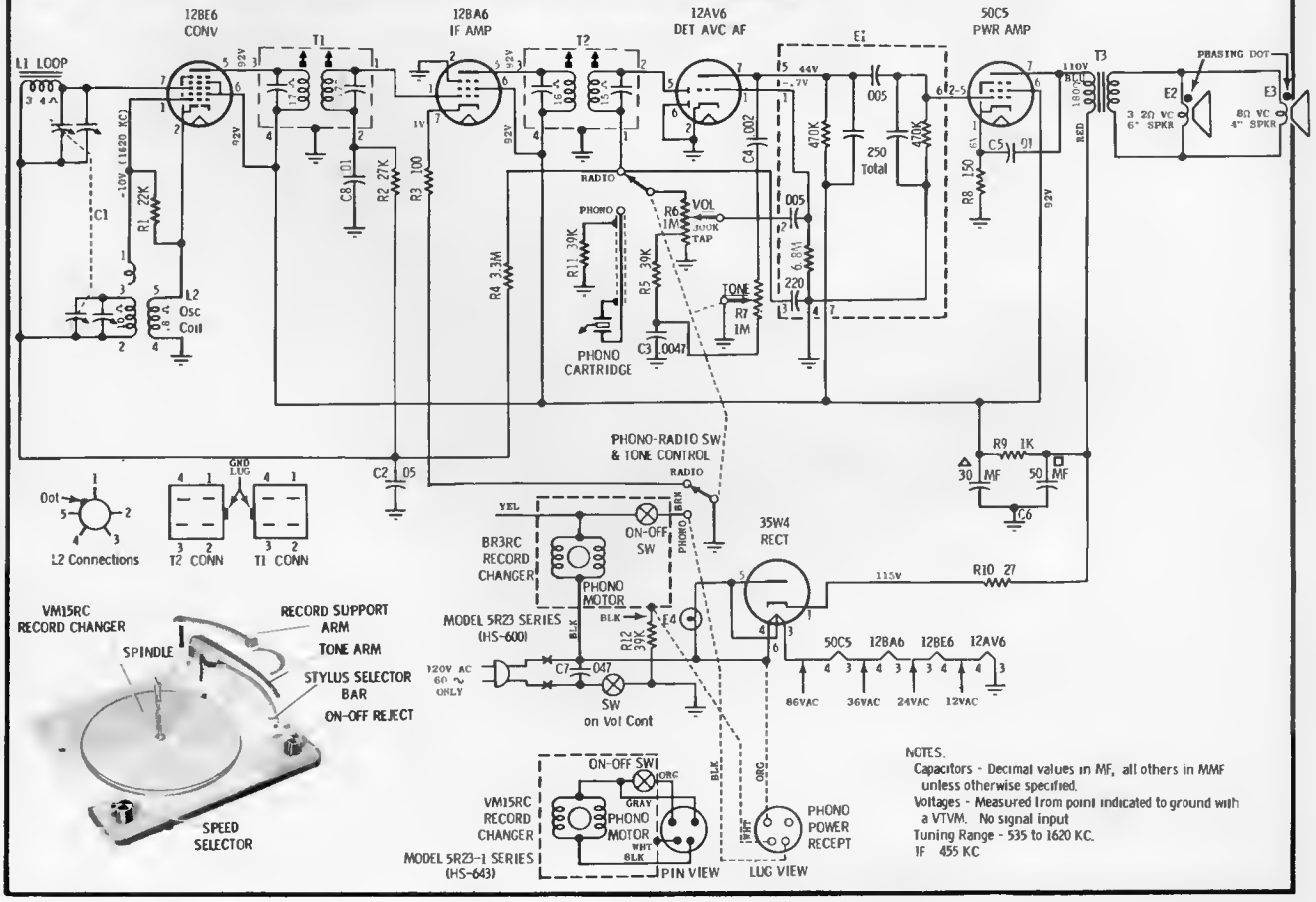
MOTOROLA

MOTOROLA

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



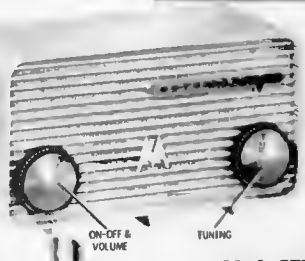
ALIGNMENT ADJUSTMENTS & PARTS LOCATIONS



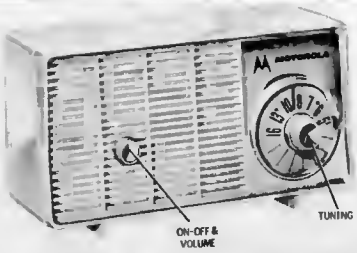
NOTES.
Capacitors - Decimal values in MF, all others in MMF unless otherwise specified.
Voltages - Measured from point indicated to ground with a VTVM. No signal input
Tuning Range - 535 to 1620 KC.
IF 455 KC

MOTOROLA

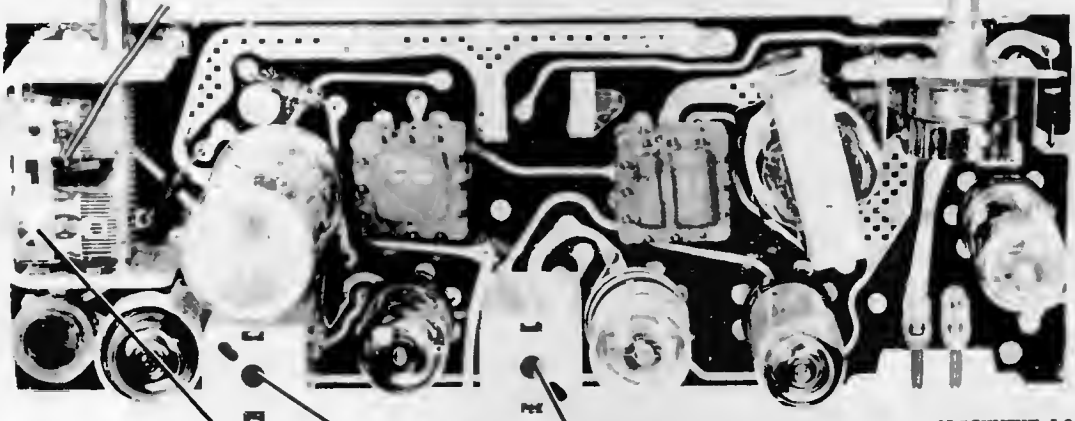
MODELS	CHASSIS
5T21W-1	HS-625
5T22M-1	HS-625
5T22R-1	HS-625
5T22W-1	HS-625
5T22Y-1	HS-627
5T23N-1	HS-627
5T23P-1	HS-627
5T23W-1	HS-627
5T23Y-1	HS-627



5T21-1 SERIES

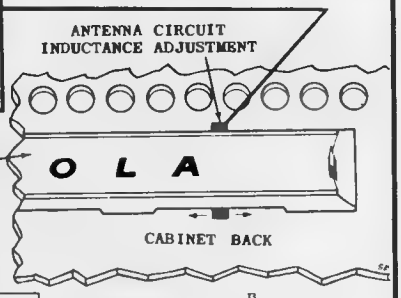


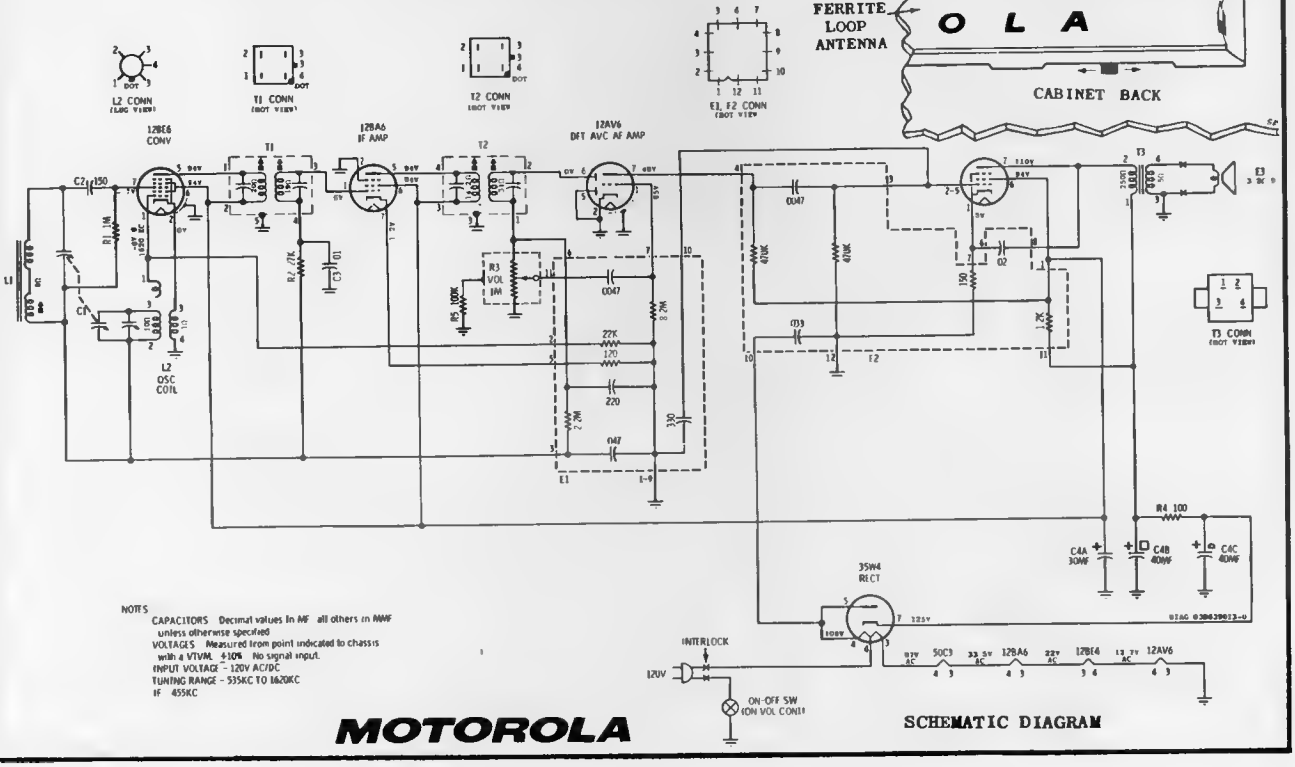
5T23-1 SERIES



ALIGNMENT LOCATIONS

⑤ OSC 1620KC	③ TOP 1ST IF 455KC ④ BOT	① TOP 2ND IF 455KC ② BOT	⑥ ANT CORE 600KC





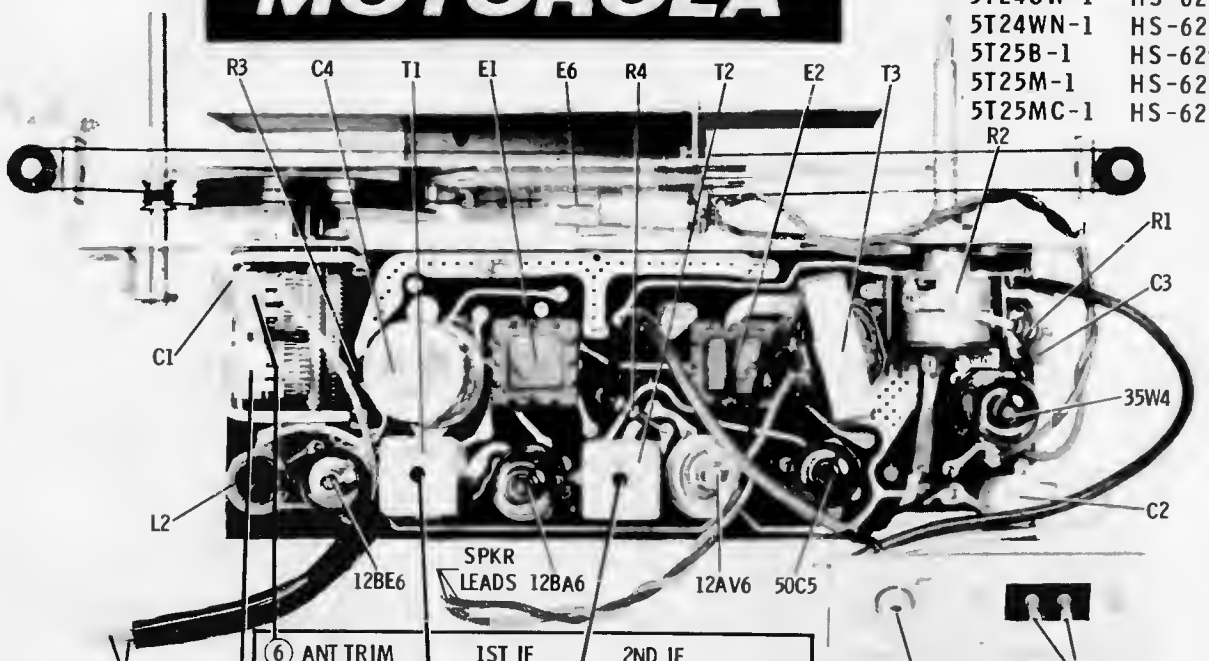
NOTES
CAPACITORS Decimal values in MF all others in MMF unless otherwise specified
VOLTAGES Measured from point indicated to chassis with a VTVM, ±10% No signal input.
INPUT VOLTAGE – 120V AC/DC
TUNING RANGE – 535KC TO 1620KC
IF 455KC

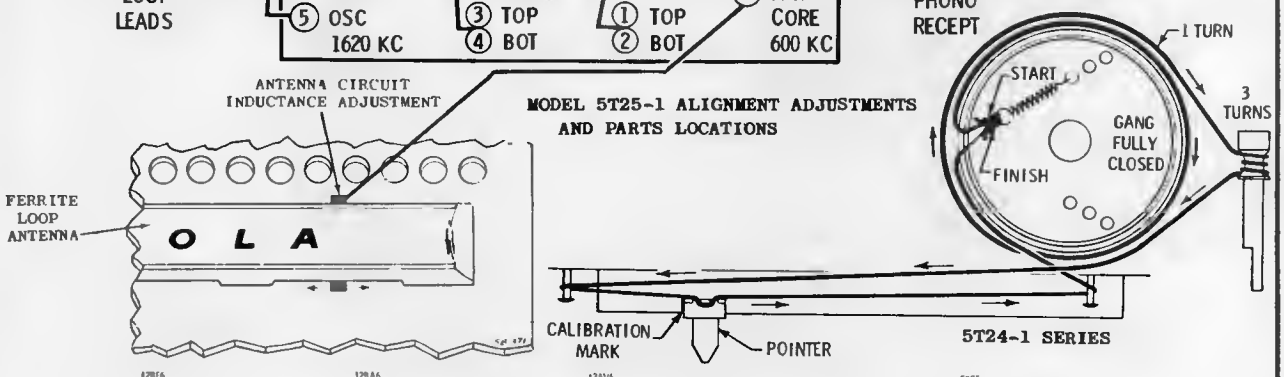
SCHEMATIC DIAGRAM

MOTOROLA

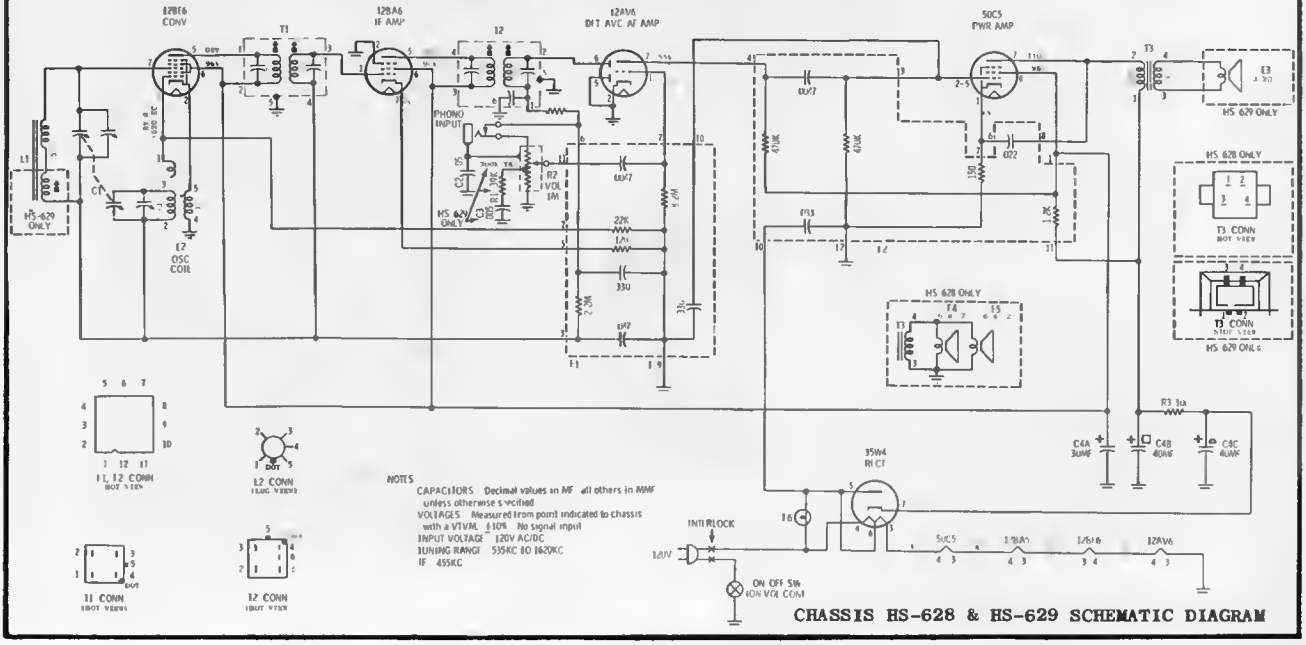
MOTOROLA

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

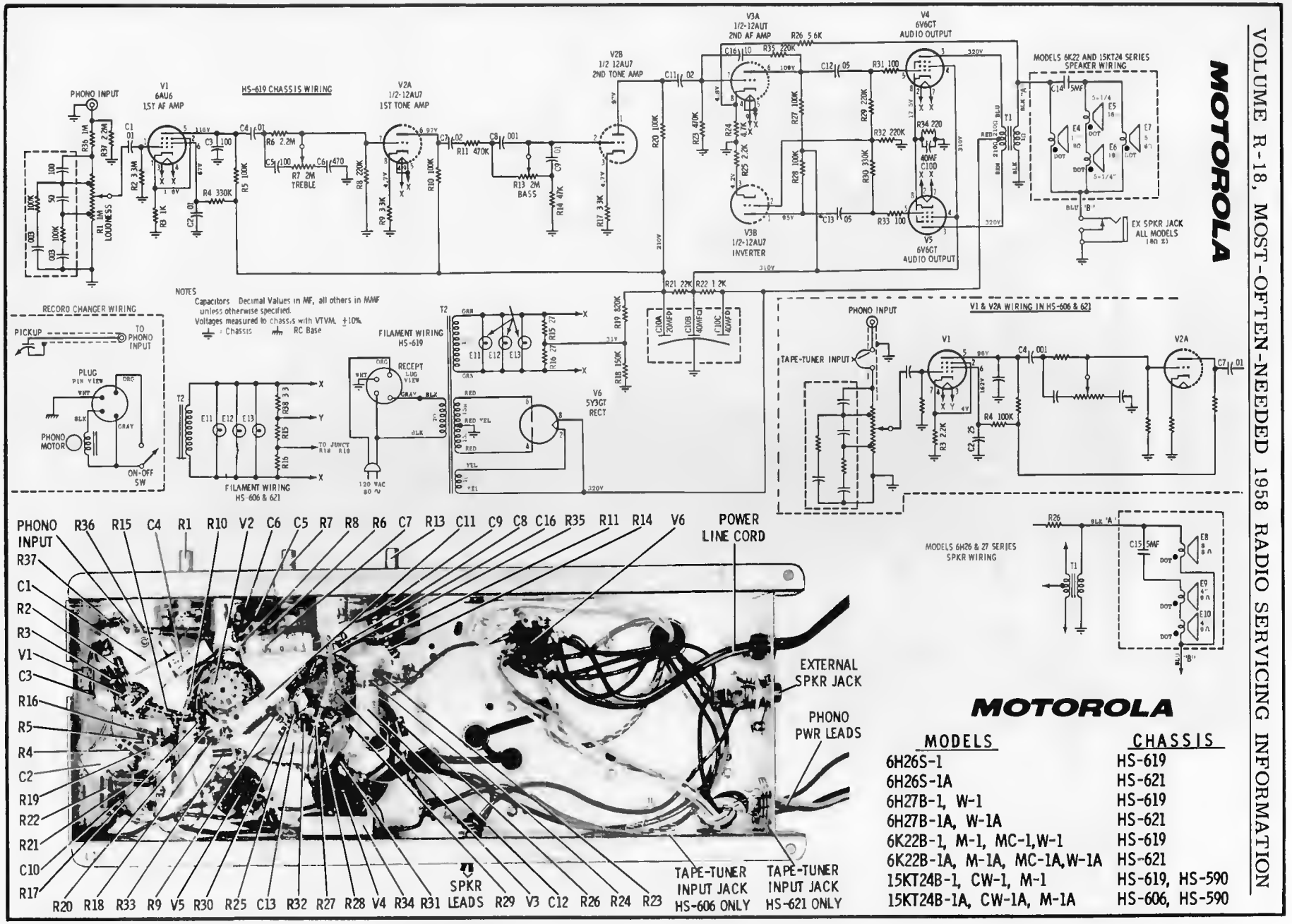




MODEL 5T25-1 ALIGNMENT ADJUSTMENTS AND PARTS LOCATIONS



CHASSIS HS-628 & HS-629 SCHEMATIC DIAGRAM



MOTOROLA

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

PARTS LOCATION

MOTOROLA

CHASSIS
HS-562

MODELS
6P34E Navy
6P34S Sun Tan

MOTOROLA

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

ALIGNMENT LOCATIONS

NOTES:
CAPACITORS - Decimal values in MF, others in MMF unless otherwise specified.
VOLTAGES - Measured from point indicated to ground with a VTVM ±10%. No signal input, volume at maximum.
TUNING RANGE - 530 KC to 1620 KC.
IF - 455 KC.
•Do not intermix power amplifier types, use two of the same type transistors in the output stage.
ΦESISTANCES - Measured with the transistors out of associated circuits

L2 CONN (TOP VIEW)

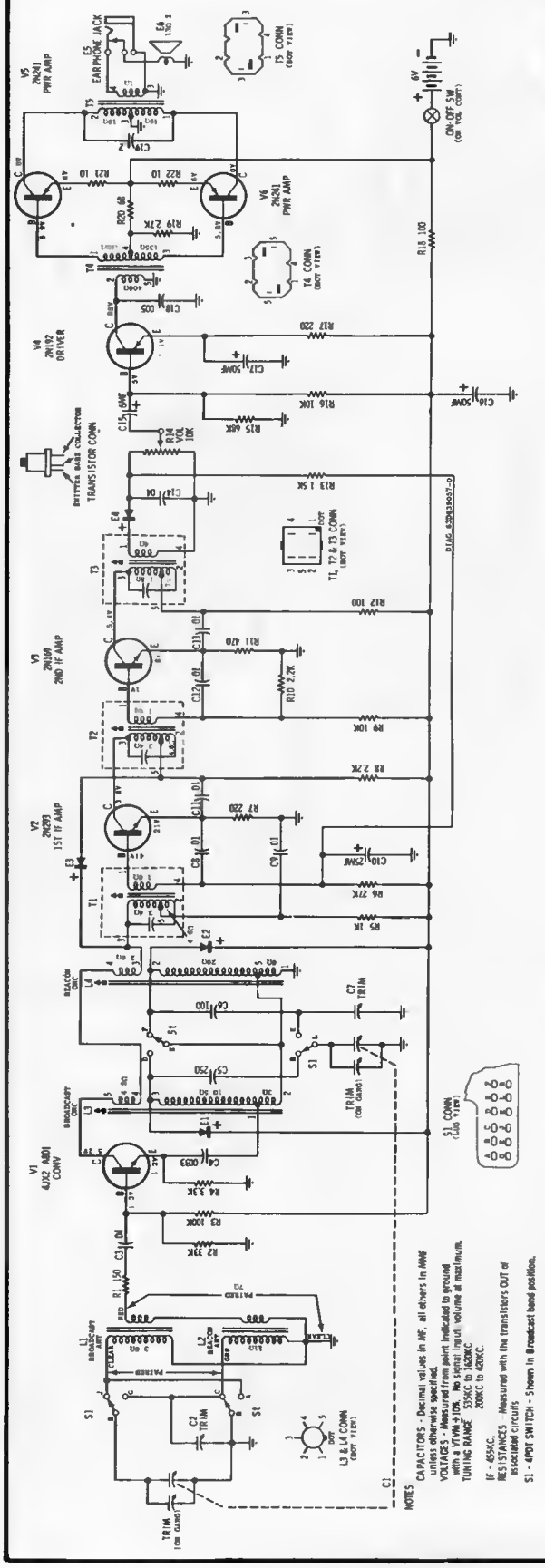
T1, T2, & T3 CONN (BOT VIEW)

T4 CONN (BOT VIEW)

T5 CONN (BOT VIEW)

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.



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 hushing, then lift handle, chassis and speaker plate out of cabinet.

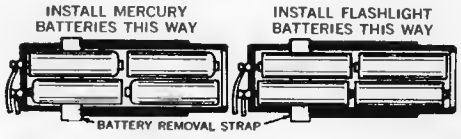
6. The plated chassis is separated from the speaker mounting plate as follows: unsolder the wire that connects from the gang to the plated chassis. Remove speaker, earphone jack, antenna & battery leads from plated chassis. Then unsolder one at a time the three chassis mounting support lugs.

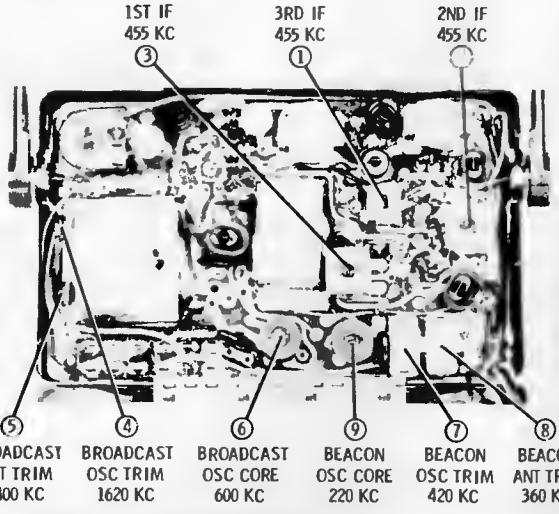
HANDLE REPLACEMENT

1. Remove chassis and speaker mounting plate from cabinet as described under CHASSIS REMOVAL.

2. Unsolder antenna leads from chassis.

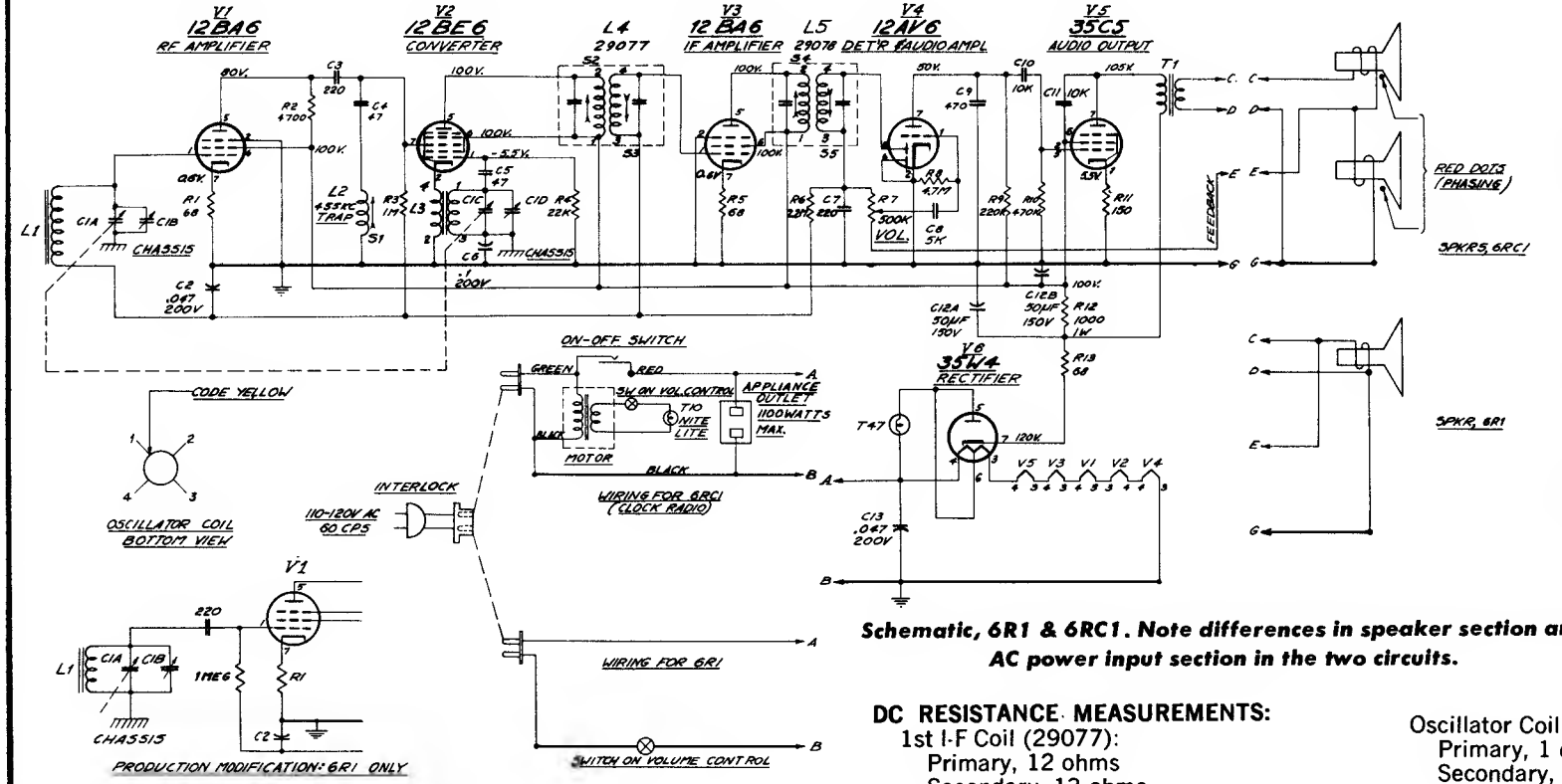
3. Turn handle perpendicular to chassis and slide out of handle clips.





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

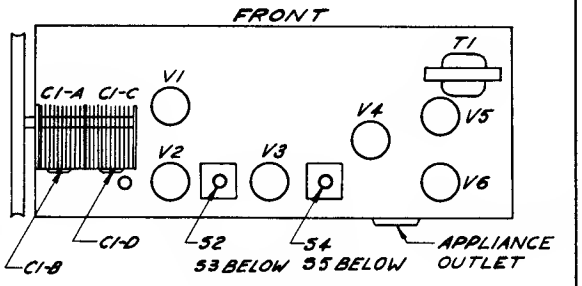
Loop antenna:
Resistance, 0.3 ohms

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.

ALIGNMENT PROCEDURE:

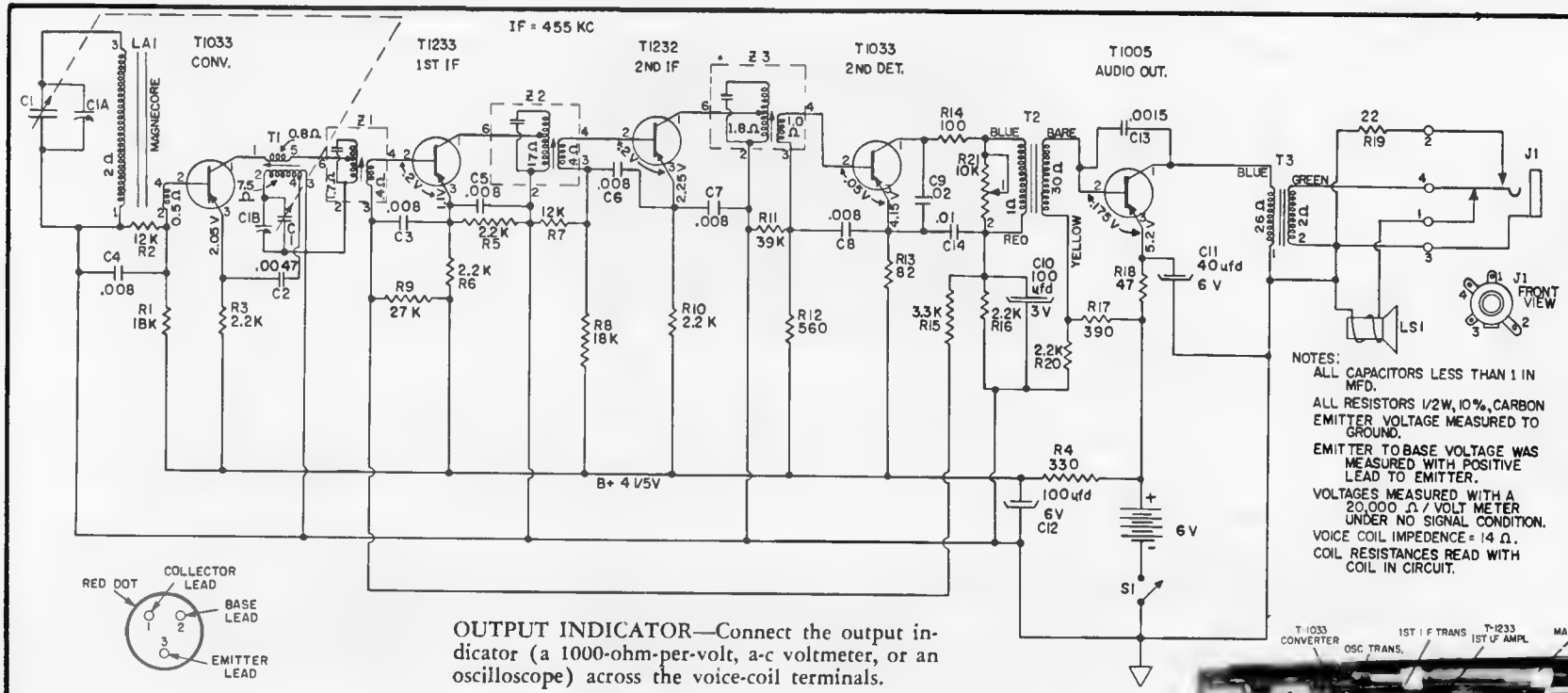
Step	Connect Test Oscillator to	Test Oscillator Frequency	Radio Dial Setting	Adjust
1.	Pin 1, V-1 (12BA6)	455 kc	540 kc	S-1 for minimum
2.	ditto	ditto	ditto	S-2, S-3, S-4, & S-5 for MAXIMUM
3.	ditto	1620 kc	Tune to	C1-D for MAXIMUM
4.	Loose-couple to antenna	1500 kc	1620 kc oscillator	C1-B for MAXIMUM



Adjustments

PHILCO TRANSISTOR RADIO

MODEL T-500 — CODE 124

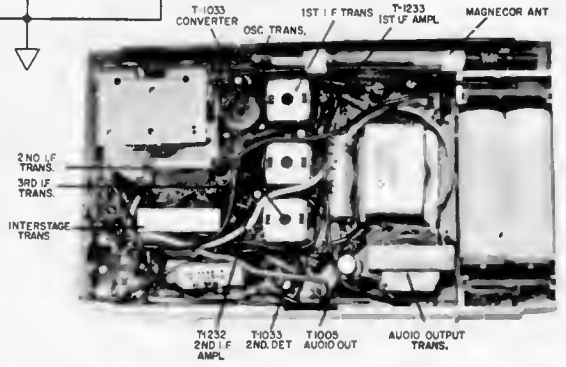


OUTPUT INDICATOR—Connect the output indicator (a 1000-ohm-per-volt, a-c voltmeter, or an oscilloscope) across the voice-coil terminals.

ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Panel must be removed from cabinet. Connect signal generator through a .1 uf condenser to antenna section of gang. Use the least generator signal necessary to give an output indication.	455 KC	Tuning gang fully open.	Adjust for maximum output in order given.	Z3—3rd IF Z2—2nd IF Z1—1st IF
2	Use radiating loop (See note 1 below).	1620 KC	1620 KC (gang fully open)	Pre-set C2A (Ant.) 1/2 turn from tight. Adjust for maximum output.	C1B—osc. trimmer
3	Same as step 2.	1400 KC	1400 KC	Adjust for maximum output.	C1A—ant. trimmer
4	Same as step 2. Panel MUST be re-mounted in cabinet.	600 KC	600 KC	Adjust for maximum output. Rock tuning gang while making this adjustment.	T1—osc. core
5	Repeat steps 2, 3 and 4 until no further improvement is obtained. Always stop on step 2.				

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



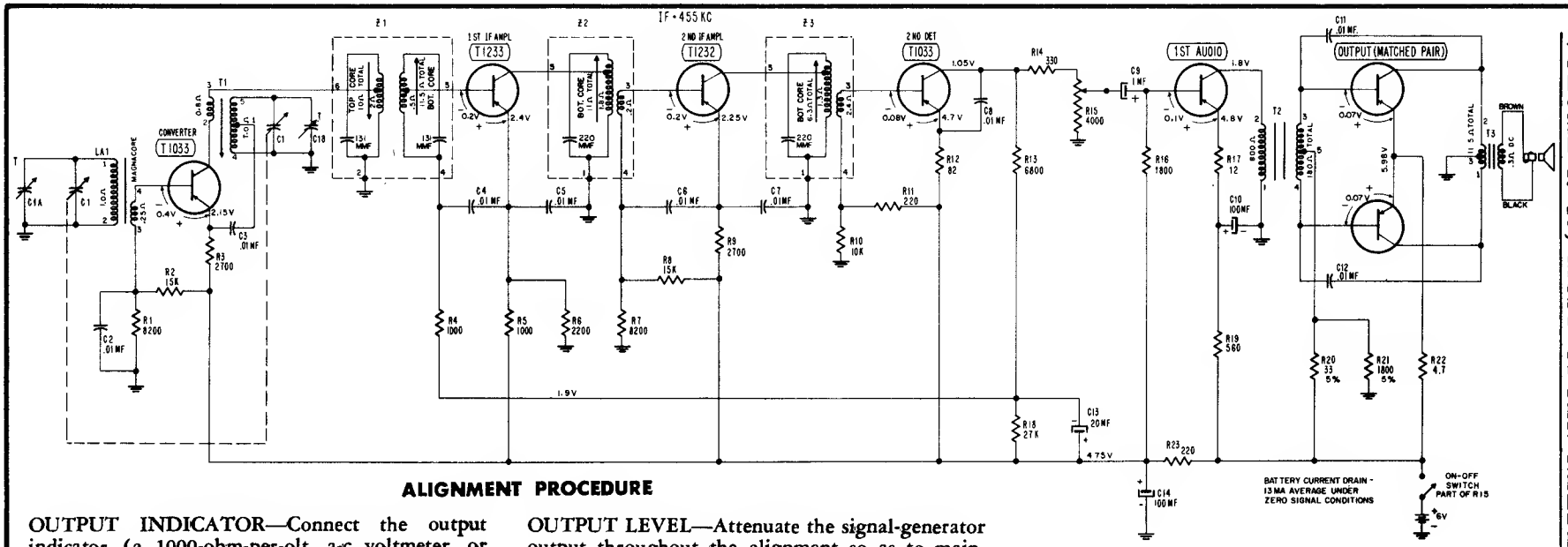
TERMINAL LUG IDENTIFICATION

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 arm 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-olt, a-c voltmeter, or an oscilloscope) across the voice-coil terminals.

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

OUTPUT LEVEL—Attenuate the signal-generator output throughout the alignment so as to maintain the output level below .4 volt.

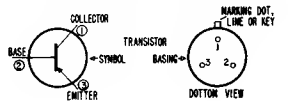
RADIO CONTROLS—Set the volume control to maximum. Set the tuning control as indicated in the alignment chart.

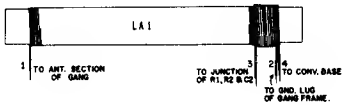
ALIGNMENT CHART

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

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

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





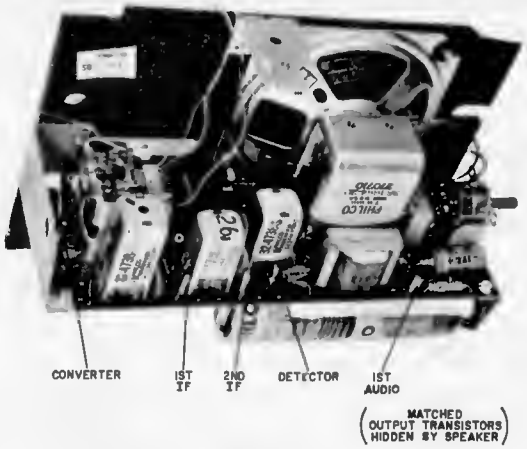
MODEL	CODE	TRANSISTORS 1ST AUDIO	TRANSISTORS OUTPUT
T-700	124	T 1001	T1007
T-700	126	T 1000	T1008
T-800	124	T 1001	T1007
T-800	126	T 1000	T1008

SERVICE NOTES

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

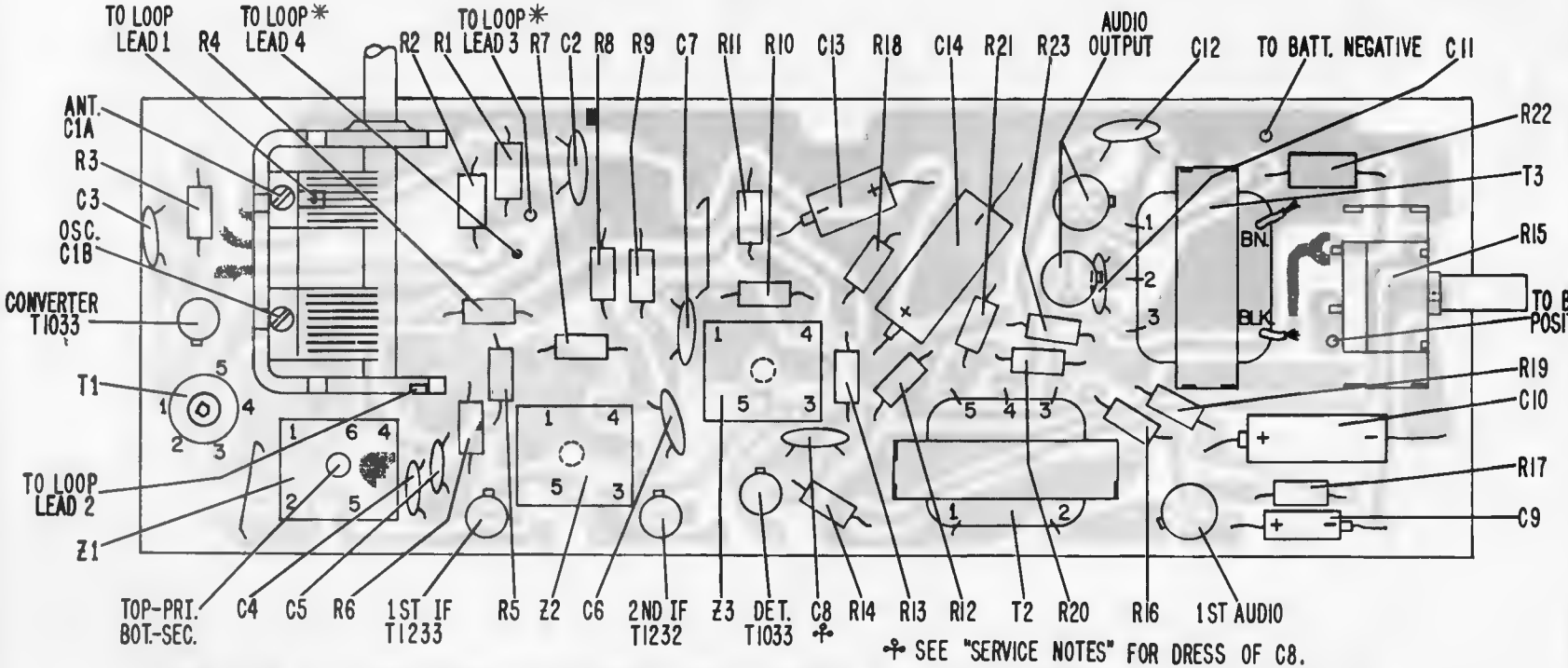
Normally, the transistors should be the last item suspected.

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.



REPLACEMENT PARTS LIST

T1	Transformer, oscillator	32-4869-2
T2	Transformer, audio driver	32-8813
T3	Transformer, audio output	32-8812
T1033	Transistor, 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	34-6001-16
	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	34-6009
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	54-6497
	Battery bracket and spring contact assy., end of panel	76-10141
	Battery bracket and contact assy., center	76-10142



✣ SEE "SERVICE NOTES" FOR DRESS OF C8.

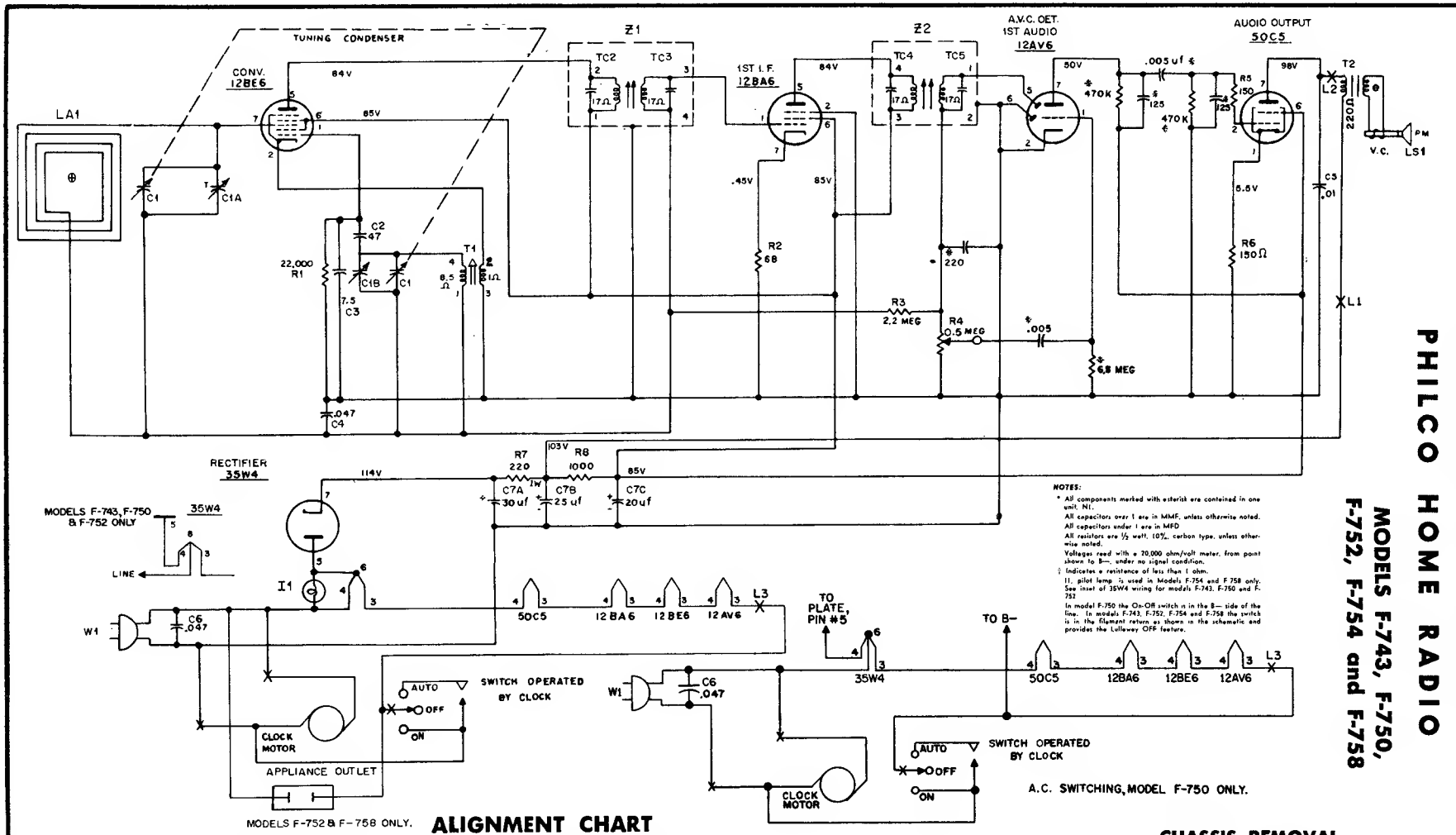
* LOOP LEADS 3 & 4 DRESS BETWEEN EDGE OF PRINTED PANEL & MASONITE FRONT PLATE & CONNECT TO TIE LUGS INDICATED ON FOIL SIDE OF PANEL.

Composite Panel View — Showing Parts Replacement and Tuning Adjustments

(Continued from page 120)

PHILCO HOME RADIO

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



ALIGNMENT CHART

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

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.

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.

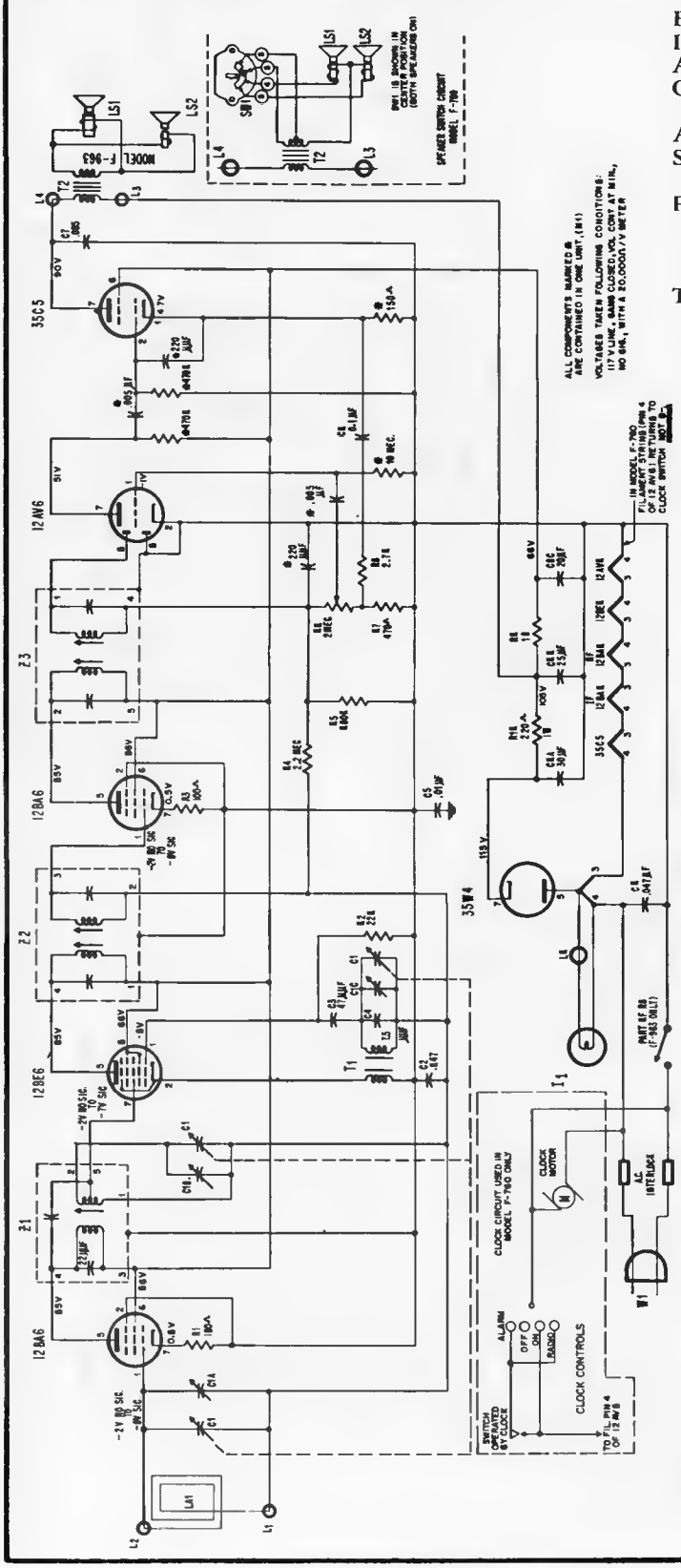
Operating Voltage: Model F-963—105 to 120 volts, AC-DC; Model F-760—105 to 120 volts, AC.

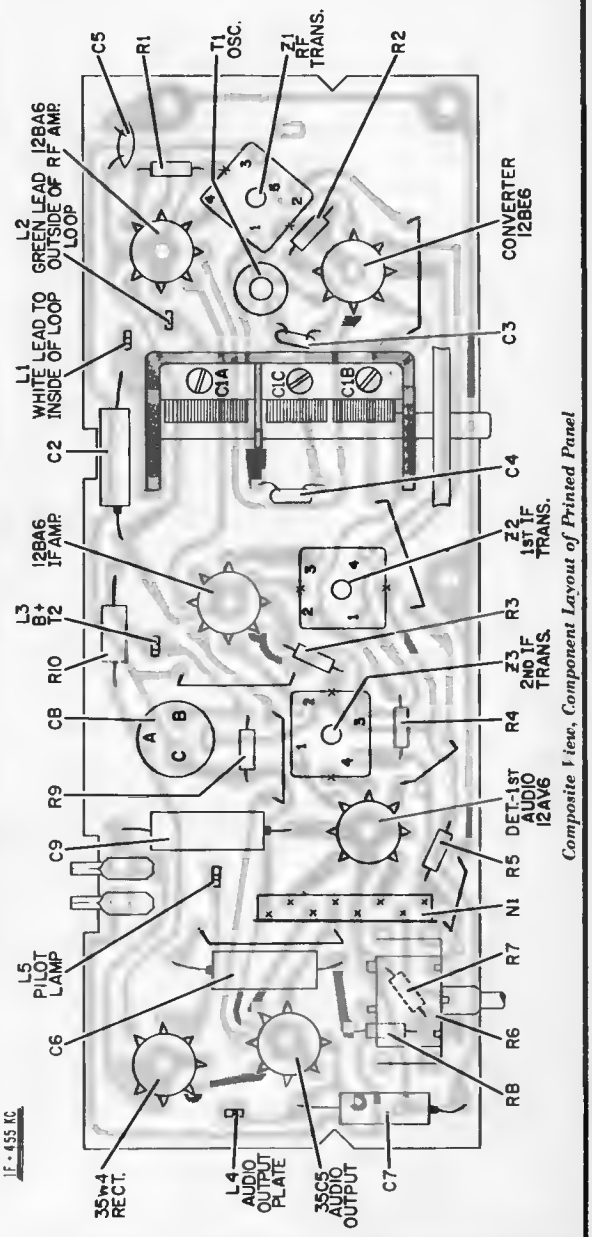
Aerial: High impedance loop mounted on back.

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.

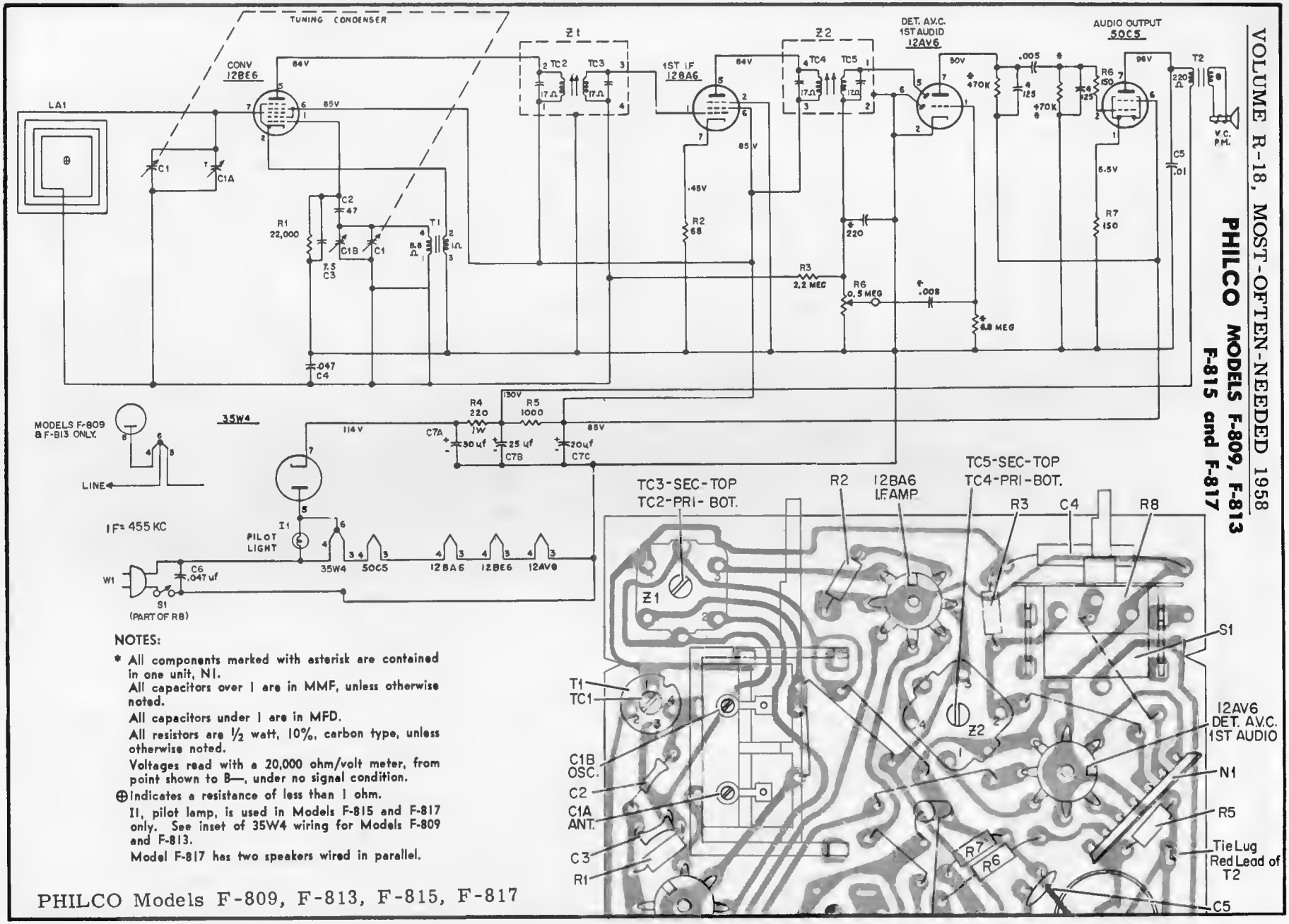
Timer: F-760 only—A fully automatic Telechron (type C-103) internal timer and clock. Includes Sleep-Switch, Buzzer Alarm, and "Lullaway" Slow Shut-off.





Composite View, Component Layout of Printed Panel

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 ½ 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.

I1, 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

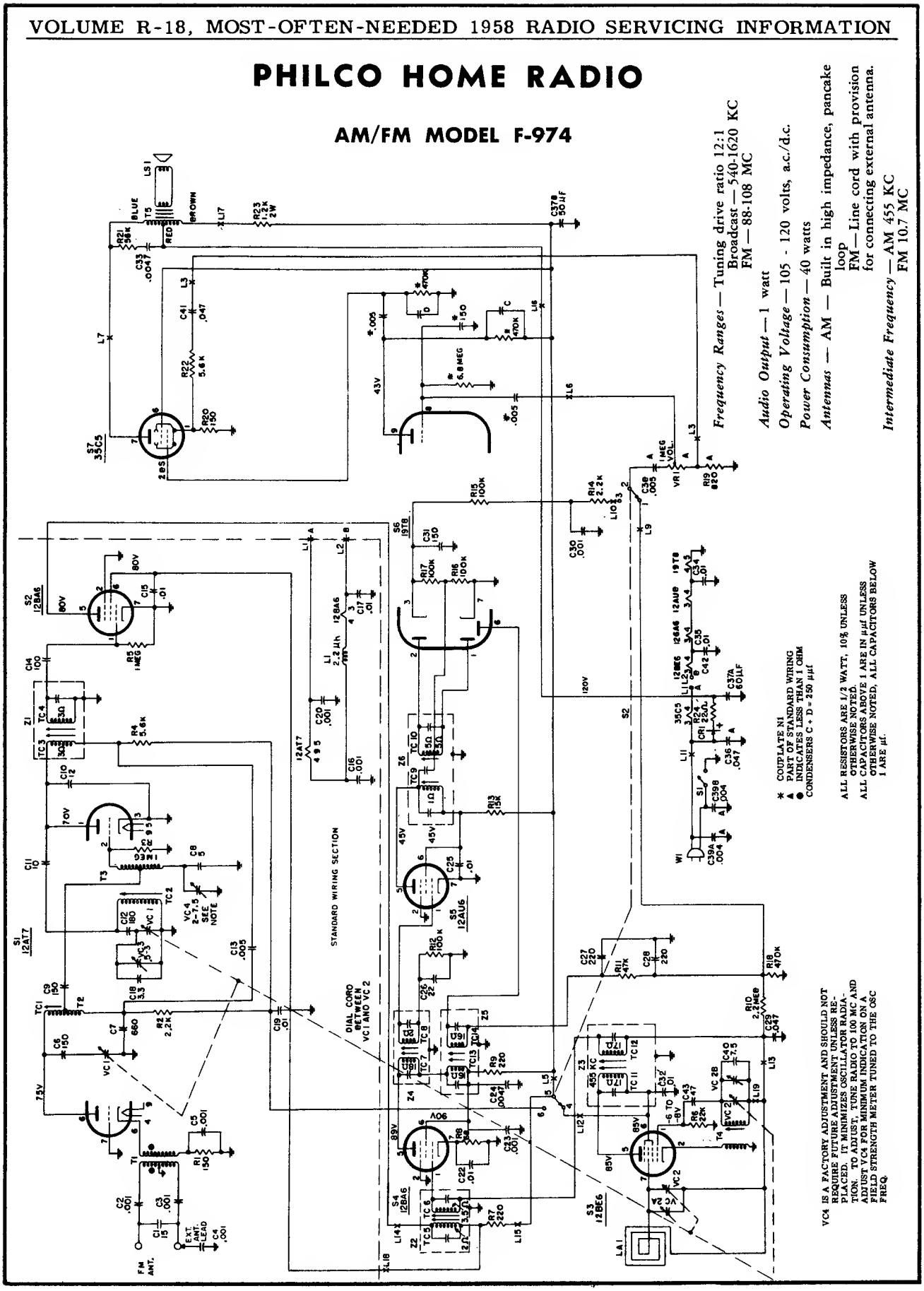
Audio Output — 1 watt

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

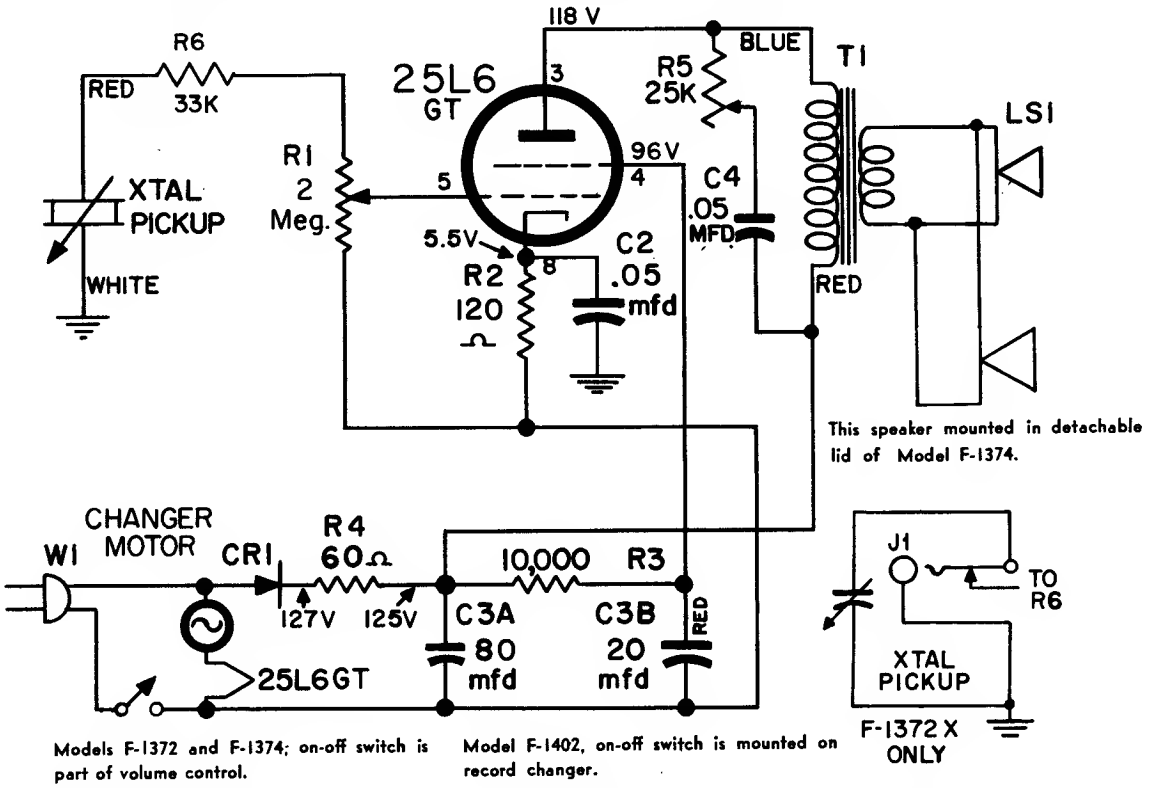
Power Consumption — 40 watts

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



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



Models F-1372 and F-1374; on-off switch is part of volume control.

Model F-1402, on-off switch is mounted on record changer.

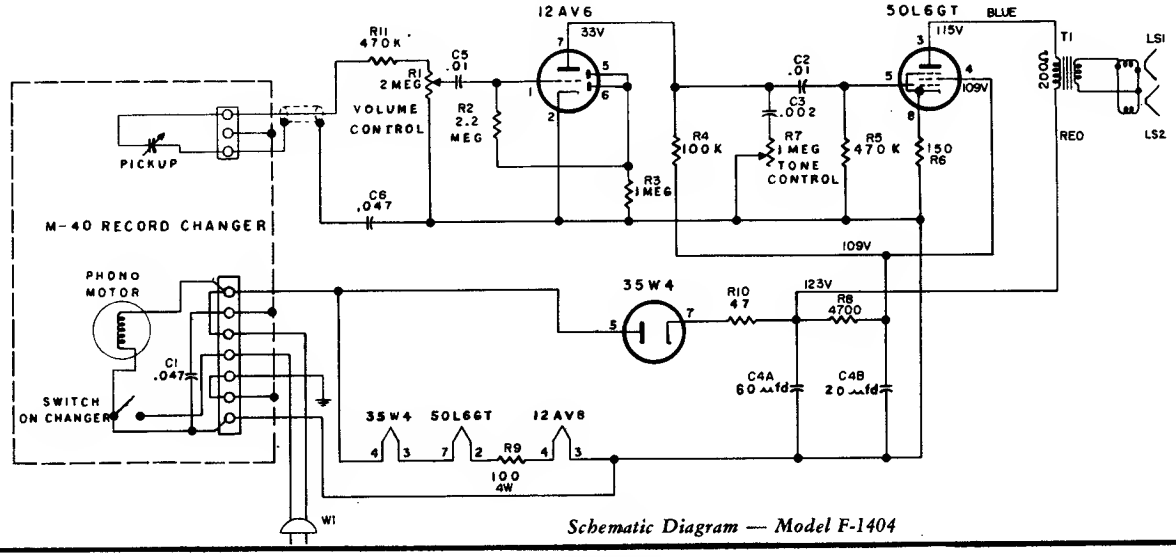
LEAD DRESS

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.

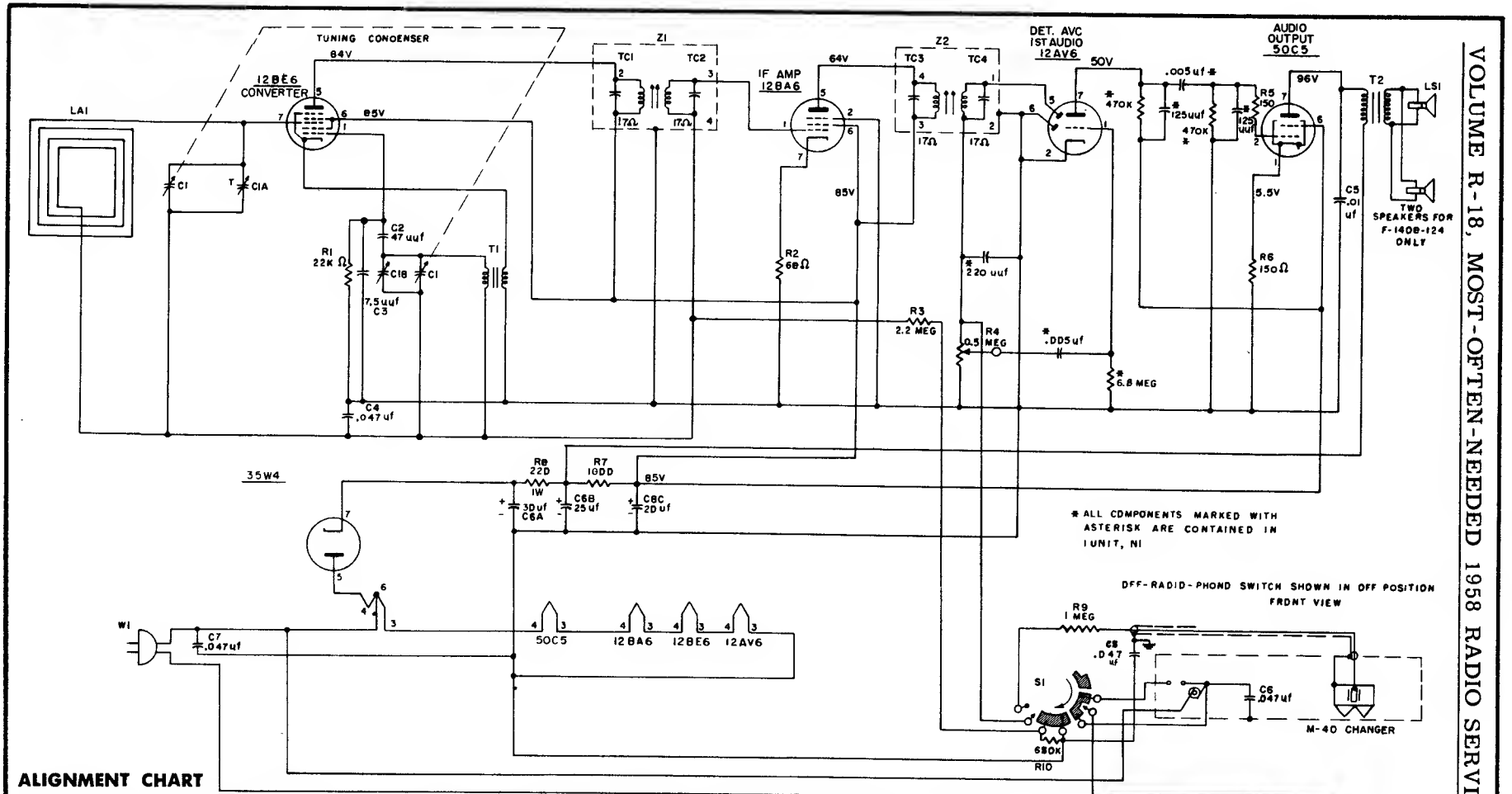
RECORD PLAYER (F-1372 and F-1374 Only)

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	76-11359
Spring, tone arm	28-10376-3
Washer, tone arm	28-10377
Bushing, tone arm	28-10374

PHILCO PHONOGRAPH MODEL F-1404



Schematic Diagram — Model F-1404



ALIGNMENT CHART

STEP	SIGNAL GENERATOR		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1.	Ground lead to B—; output lead through a .1 mf condenser to grid (pin 7) of 12BE6.	455 kc.	Tuning gang fully open.	Adjust tuning cores, in order given, for max. output. 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.	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.

* 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 pletes. 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

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.

PHILCO PHONOGRAPHS

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

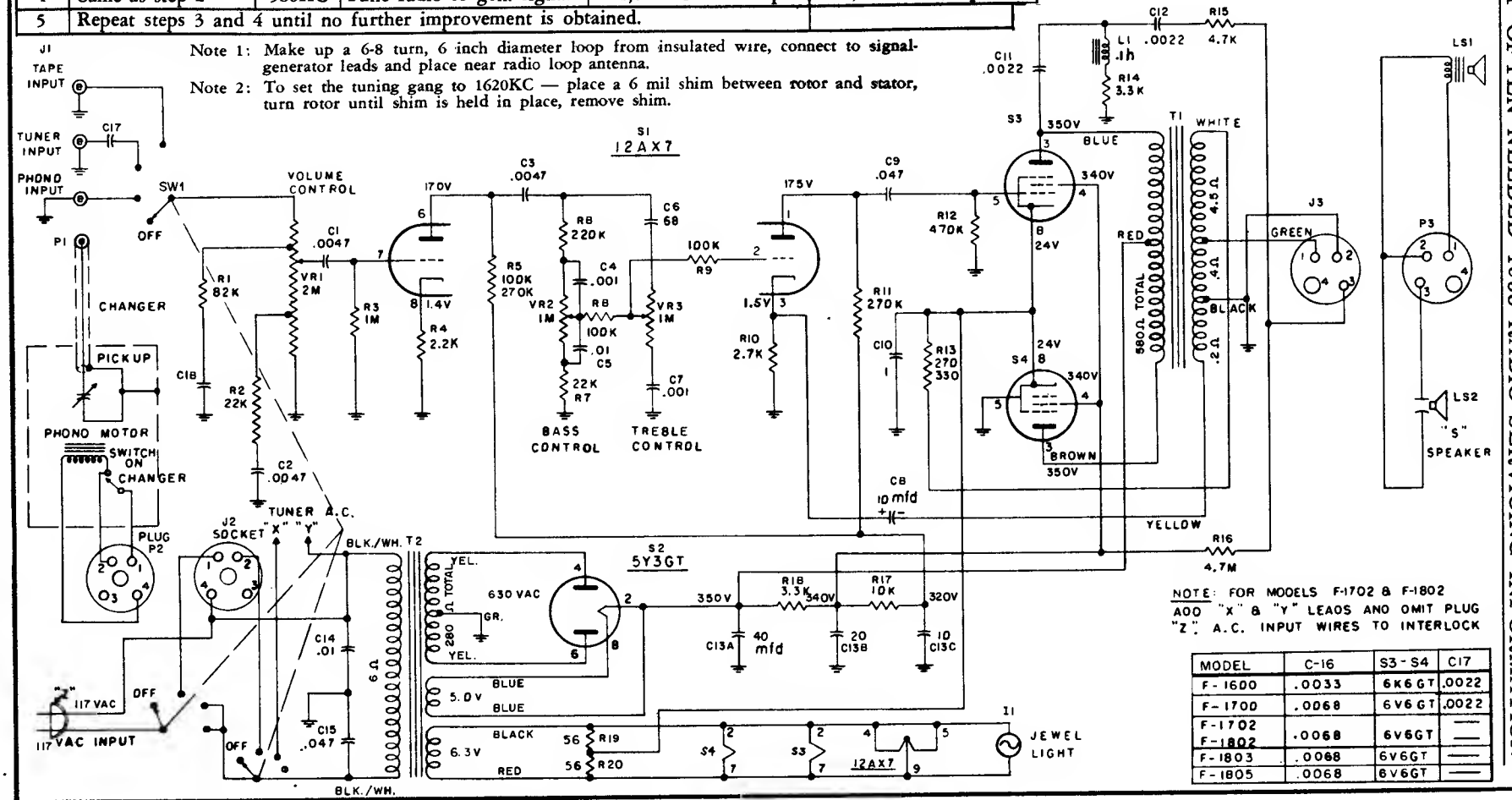
ALIGNMENT CHART

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	Adjust for max. output	C1C, osc. trimmer
3	Same as step 2	1520KC	Tune radio to gen. signal	Adjust for max. output	C1B, mixer grid trimmer C1A, ant. trimmer
4	Same as step 2	580KC	Tune radio to gen. signal	Adjust for max. output	Sec., RF trans., top Z1
5	Repeat steps 3 and 4 until no further improvement is obtained.				

Note 1: Make up a 6-8 turn, 6 inch diameter loop from insulated wire, connect to signal-generator leads and place near radio loop antenna.

Note 2: To set the tuning gang to 1620KC — place a 6 mil shim between rotor and stator, turn rotor until shim is held in place, remove shim.

(Continued on page 129, adjacent at right)



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 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)

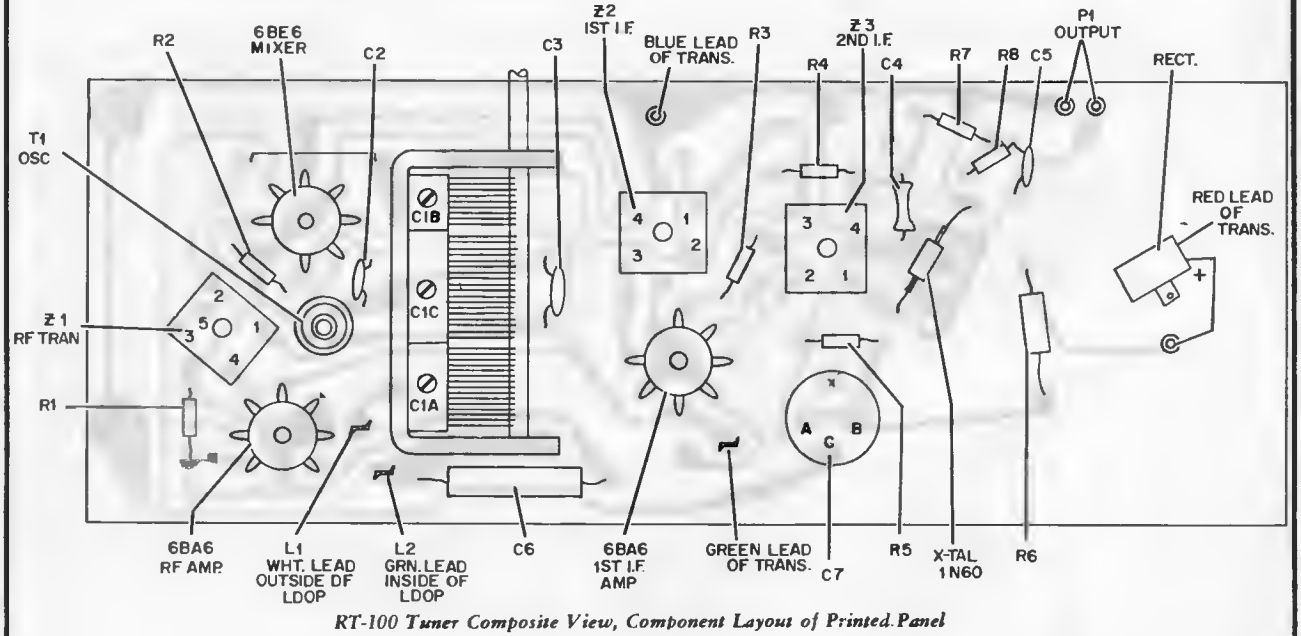
Circuit — Amplifier—Three tube amplifier plus rectifier. Includes base, treble and volume controls and a selector switch. Inputs provided for external tuner and tape recorder.

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.

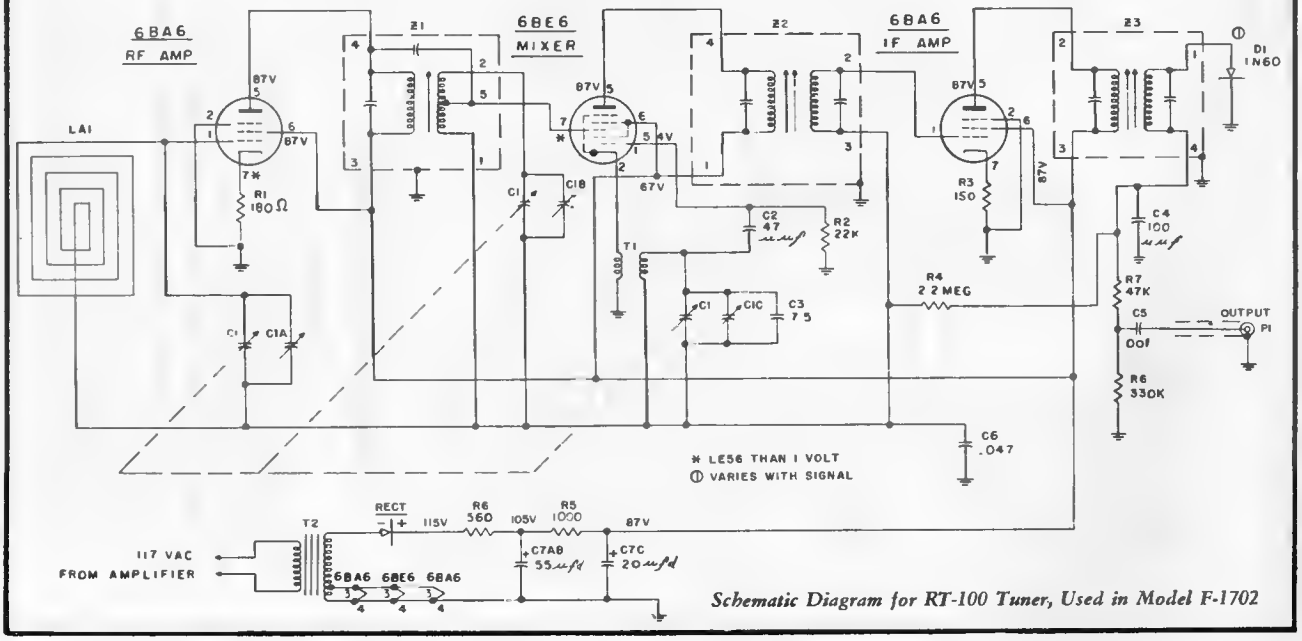
Audio Output — Model F-1600 — 6 watts. Models F-1700, F-1702, F-1802, F-1803 and F-1805 — 10 watts.

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

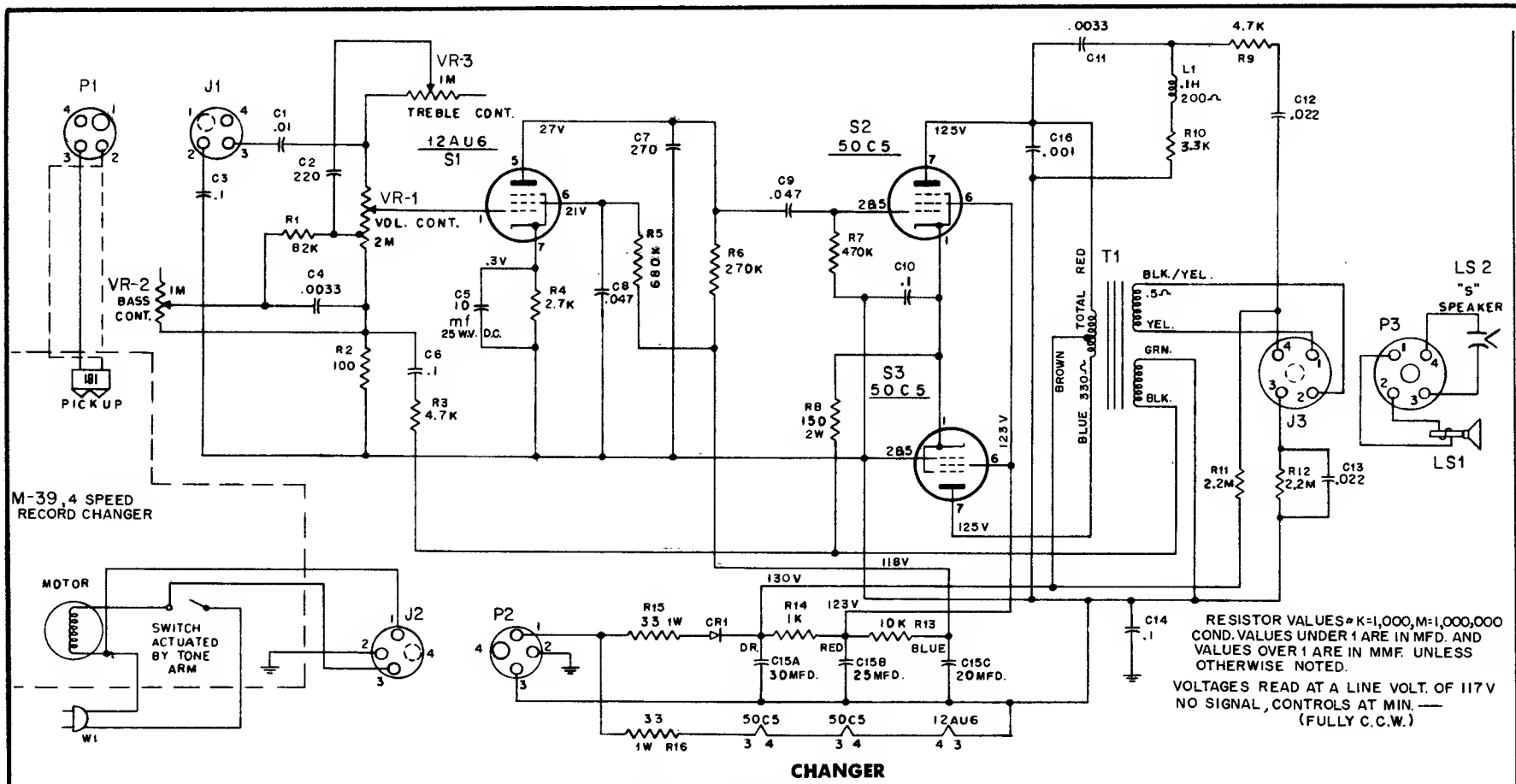
Power Consumption — Models F-1600 and F-1700 — 60 watts. Models F-1702, F-1802, F-1803 and F-1805 — 100 watts.



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



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



RESISTOR VALUES Ω K=1,000, M=1,000,000
COND. VALUES UNDER 1 ARE IN MFD. AND VALUES OVER 1 ARE IN MMF. UNLESS OTHERWISE NOTED.

VOLTAGES READ AT A LINE VOLT. OF 117 V NO SIGNAL, CONTROLS AT MIN. — (FULLY C.C.W.)

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.

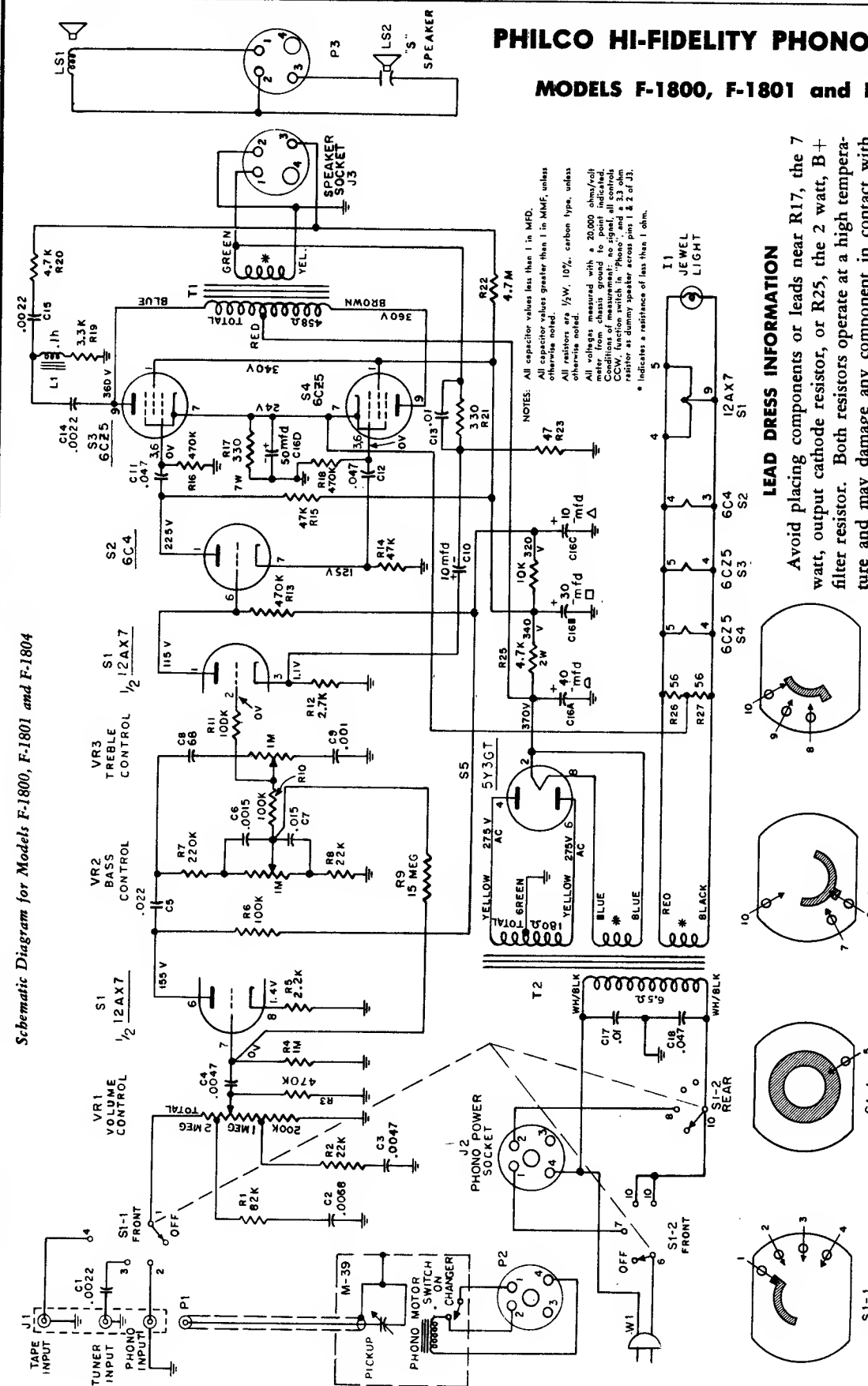
CHANGER

(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



SWITCH SHOWN IN MAX. COUNTER CLOCKWISE POSITION "OFF"

SWITCH VIEWED FROM KNOB END

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

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.

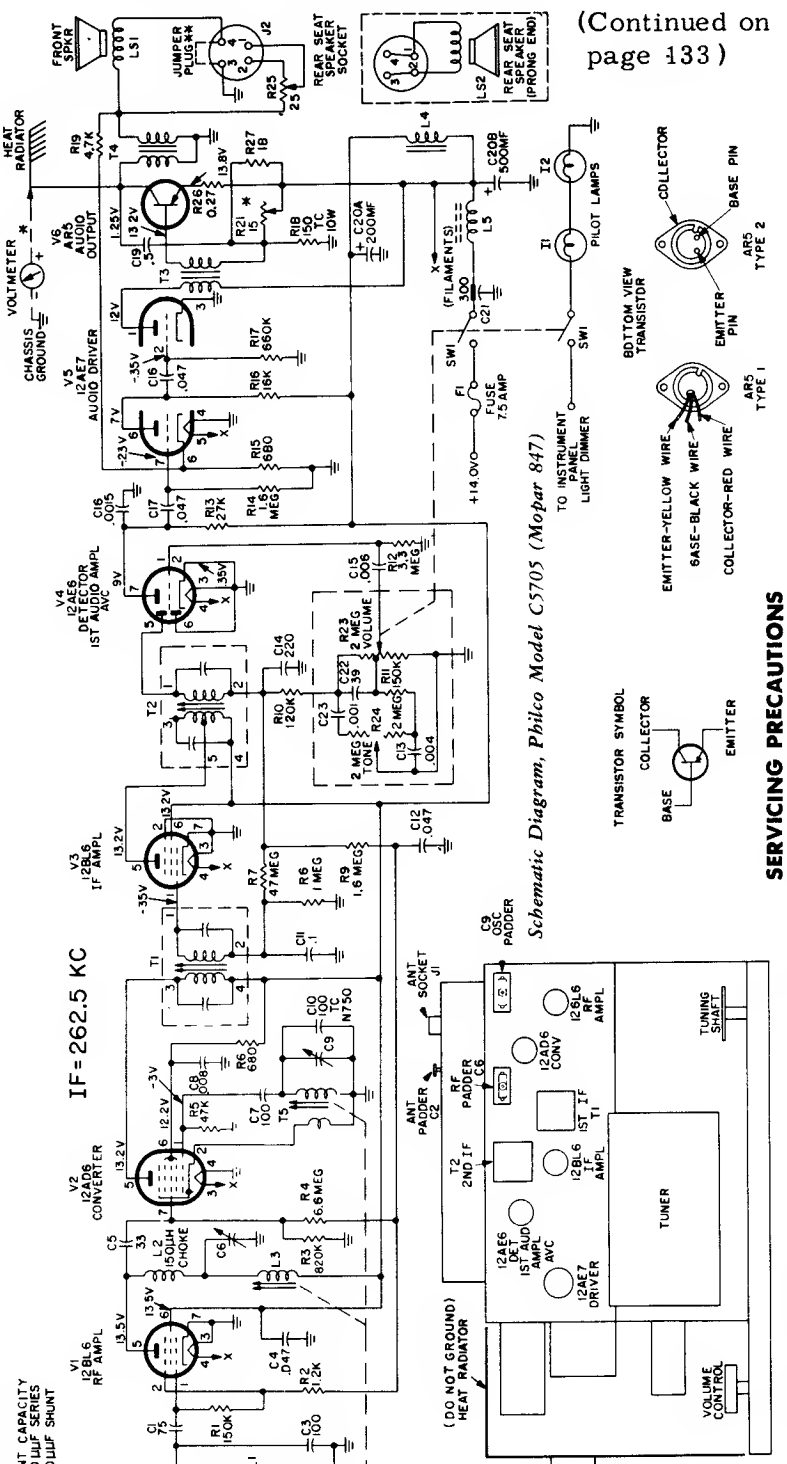
RECORD CHANGER—Philco 4-speed automatic record changer, model M-39. 7-in., 10-in. and 12-in. intermix. Automatic shut-off of entire instrument at end of last record.

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)



Schematic Diagram, Philco Model C5705 (Mopar 847)

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 500 MA COLLECTOR CURRENT OR 1.25V DC DROP ACROSS OUTPUT TRANSFORMER PRIMARY (NO SIGNAL 14V 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 14.0-VOLT, D-C SUPPLY; TUNING CONTROL SET AT LOW-FREQUENCY END OF BAND; 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			1.5 OHMS
L2			4.5 OHMS
L3			7.5 OHMS
L4			1.5 OHMS
L5			LESS THAN 1
T1	PRI	34	OHMS
	SEC	34	OHMS
T2	PRI	36	OHMS
	SEC	36	OHMS
T3	PRI	13.5	OHMS
	SEC	11.2	OHMS
T4	PRI	2	OHMS
	SEC	LESS	THAN 1
T5	TANK	2.5	OHMS
	PICKUP	LESS	THAN 1

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).

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.

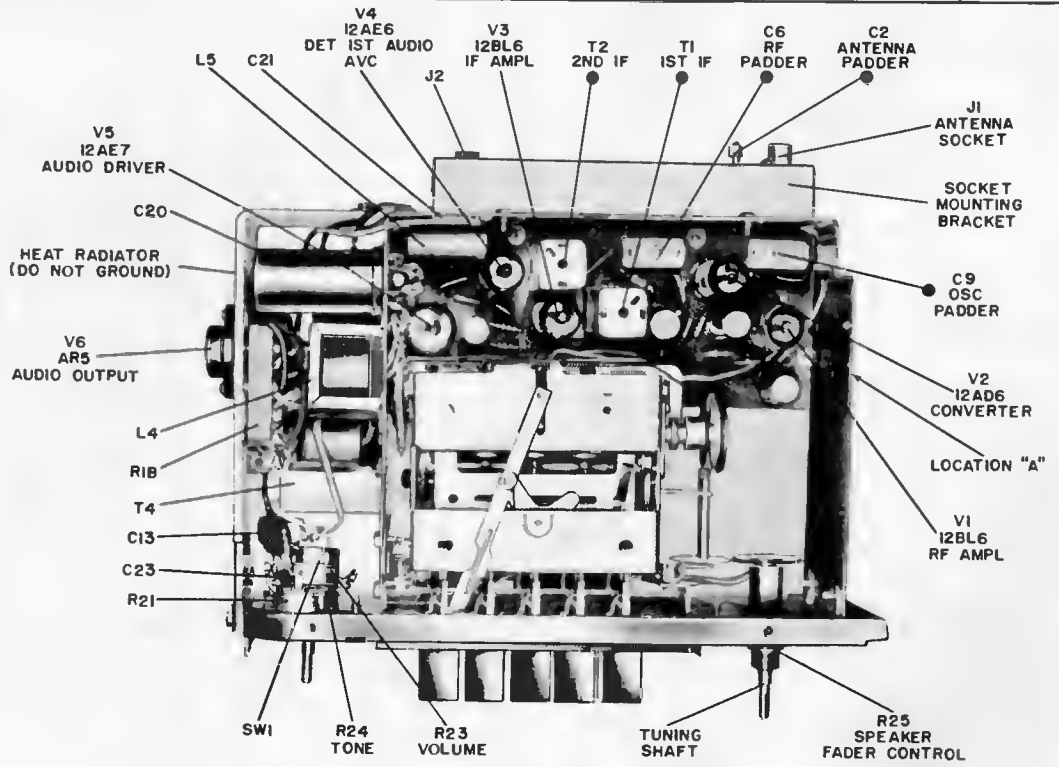
OUTPUT LEVEL—Attenuate the signal-generator output throughout the procedure to hold the output indication below 1 volt.

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-$\mu\mu$f. condenser to the antenna receptacle, and connect another 40-$\mu\mu$f. condenser from the antenna receptacle to the chassis.

ALIGNMENT CHART

SIGNAL GENERATOR			RADIO		
STEP	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
1	Through a .05 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.	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

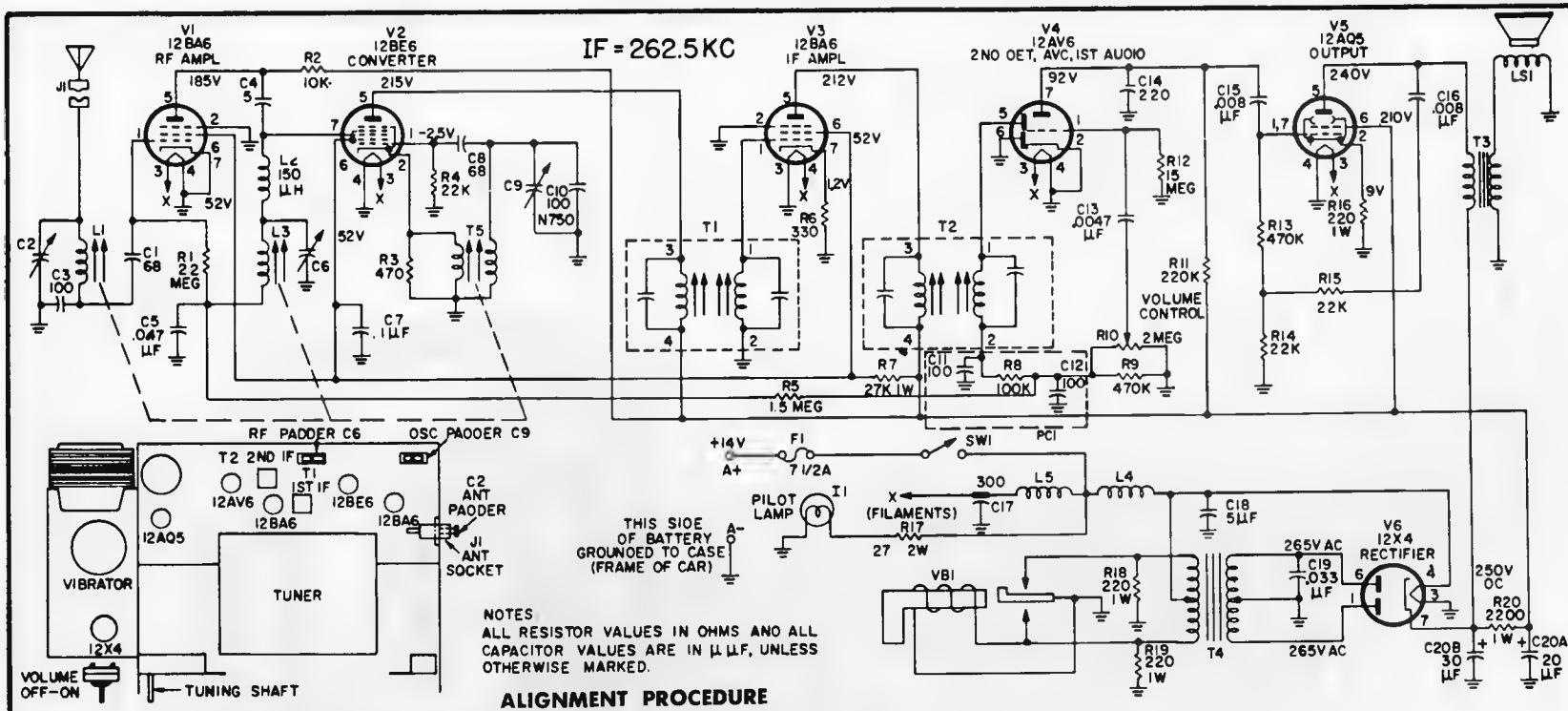


Top View of Philco Model C5705, Showing Alignment Points, Tubes, and Location of Parts

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



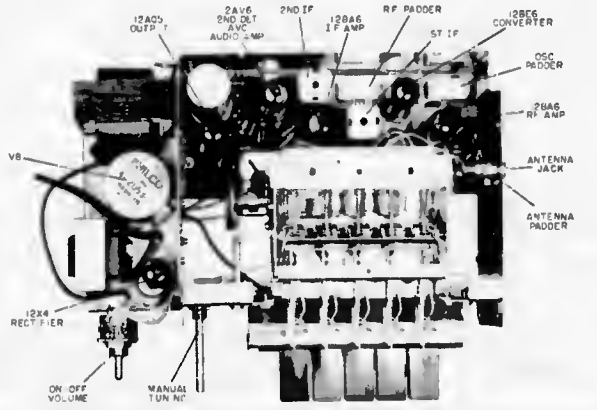
ALIGNMENT PROCEDURE

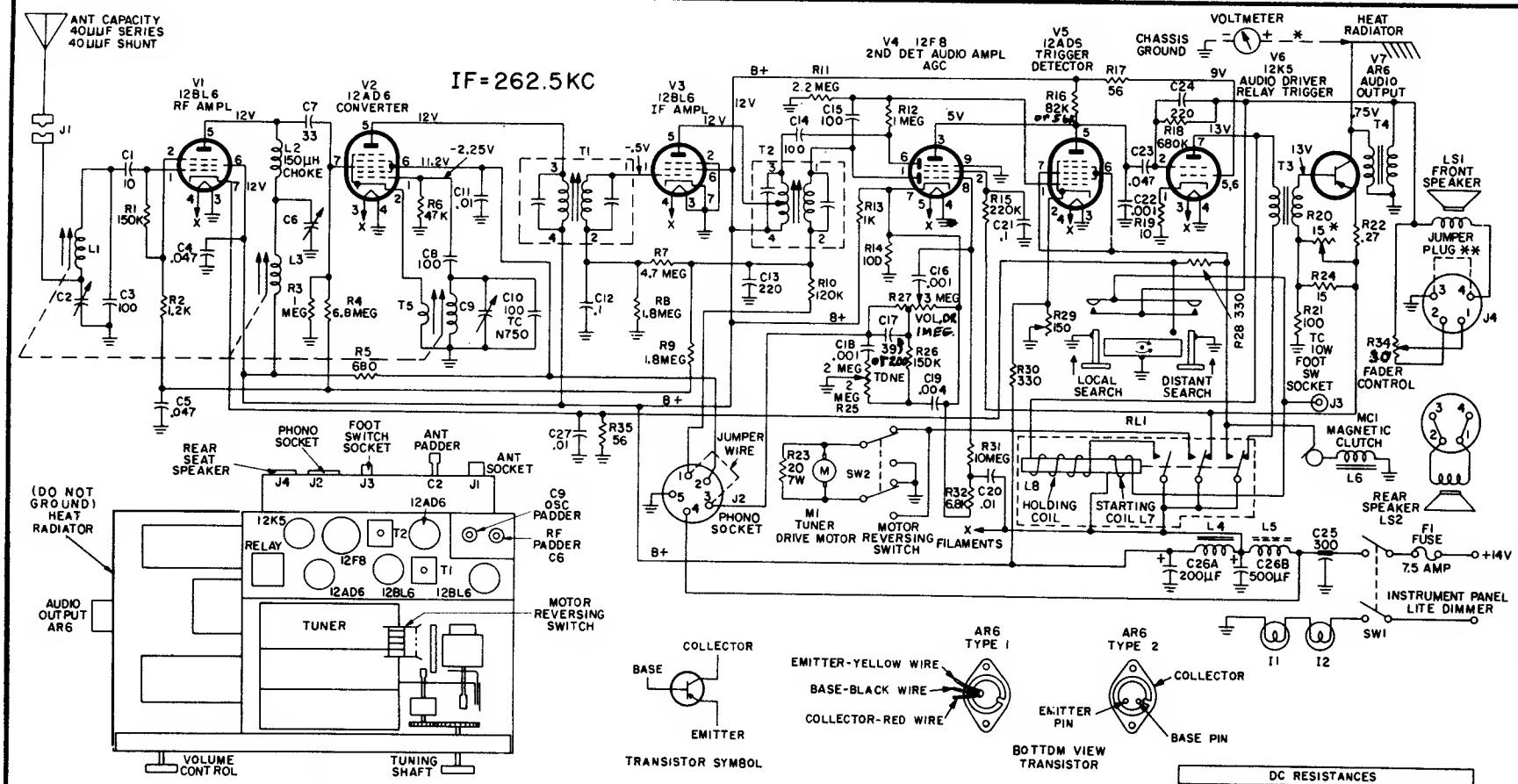
OUTPUT INDICATOR — Connect the output indicator (an oscilloscope or a 1000-ohms-per-volt, a-c voltmeter) across the voice-coil terminals.

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		RADIO		ADJUST
	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	
1	Through a .05 μf. condenser to mixer grid, pin 7, of 12BE6.	262.5 kc.	1605 kc.	Adjust in nrder given for maximum output.	T2 (tnp) — 2nd i-f secnndary T2 (boltom) — 2nd i-f primary
2	Same as step 1.	262.5 kc.	1605 kc.	Same as step 1.	T1 (tnp)—1st i-f secondary T1 (bottom) — 1st i-f primary
3	Through dummy antenna tn J1 (antenna socket).	1605 kc.	1605 kc.	Adjust for maximum output.	C9—osc. padder C2—ant. padder C6—r-f padder
4				With radin 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 ±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 750 MA COLLECTOR CURRENT OR 0.75V DC DROP ACROSS OUTPUT TRANSFORMER PRIMARY (NO SIGNAL 14V 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 14.0-VOLT, D-C SUPPLY, TUNING CONTROL SET AT LOW-FREQUENCY END OF BAND, 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	T1 PRI	34 OHMS
L2	5 OHMS	T1 SEC	34 OHMS
L3	7.5 OHMS	T2 PRI	36 OHMS
L4	15. OHMS	T2 SEC	36 OHMS
L5	LESS THAN 1	T3 PRI	38 OHMS
L6	33 OHMS	T3 SEC	2.5 OHMS
L7	20 OHMS	T4 PRI	1.5 OHMS
L8	500 OHMS	T4 SEC	LESS THAN 1
		T5 TICKLER	LESS THAN 1
		T5 TANK	2.5 OHMS

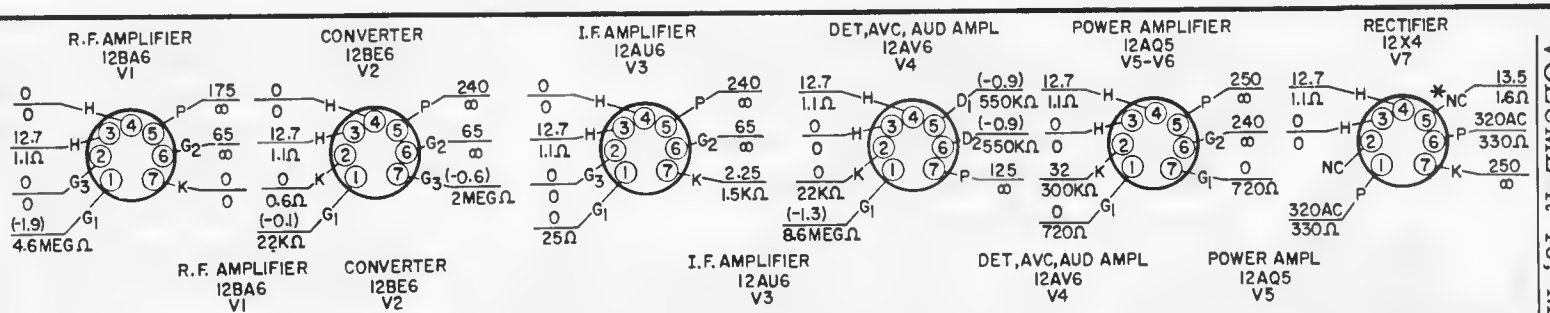
SETTING PUSH BUTTONS

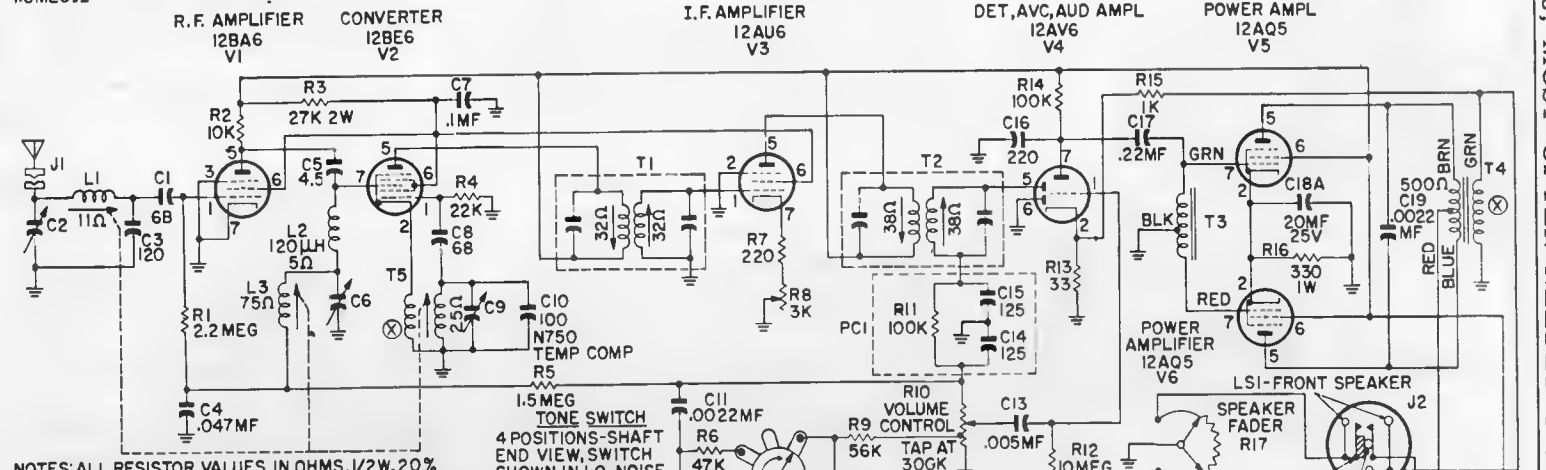
1. Turn radio on and allow it to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock push buttons by pulling them out.
3. Accurately tune in a station with manual tuning knob.
4. Lock one push button to that station by pushing firmly in.
5. Repeat above procedure for remaining push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

PHILCO 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.



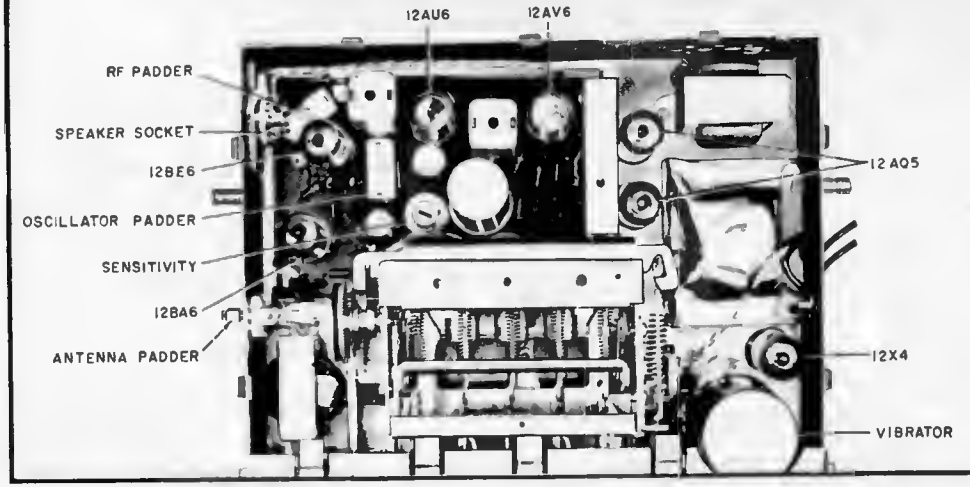


NOTES: ALL RESISTOR VALUES IN OHMS, 1/2W, 20% UNLESS OTHERWISE STATED. K=1000 OHMS. ALL CAPACITOR VALUES IN MICROMICROFARADS, 200V, AND 25% TOLERANCE UNLESS OTHERWISE STATED.
I.F. FREQUENCY 262.5KC
TUNING RANGE 540KC→1600KC

Ⓧ LESS THAN 1 OHM

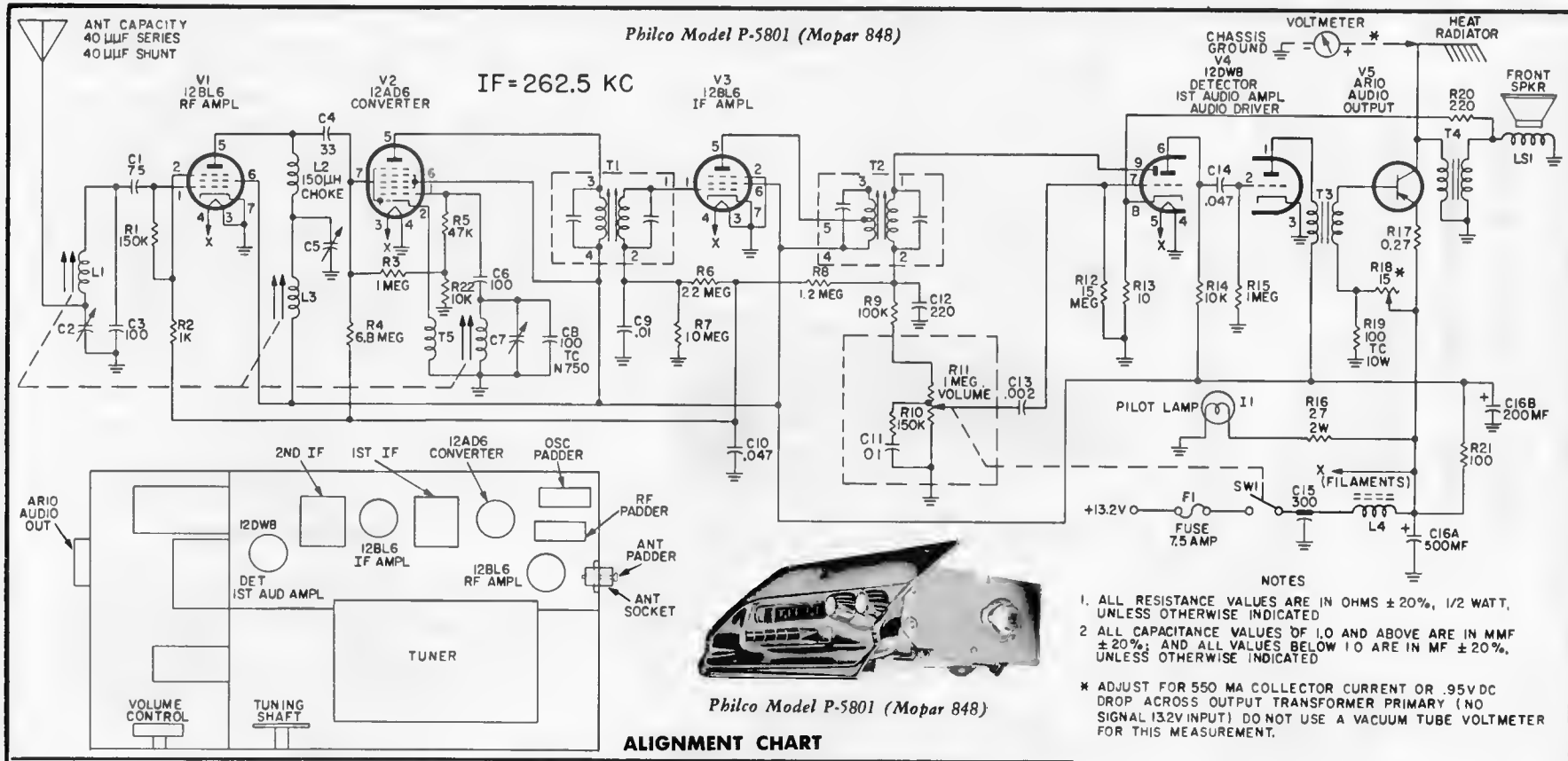
VOLTAGE MEASUREMENTS
1-VOLTAGES IN PARENTHESIS ARE MEASURED WITH VTVM.
2-ALL OTHER DC VOLTAGES MEASURED WITH 20,000Ω/VOLT METER.
3-ALL AC VOLTAGES MEASURED WITH 1,000Ω/VOLT METER.
4-ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS.
5-ALL VOLTAGES MEASURED WITH +14.4 VOLTS INPUT WITH NEGATIVE GROUND.

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%.



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.

PHILCO MODEL M-5741



Philco Model P-5801 (Mopar 848)

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 .95 V DC DROP ACROSS OUTPUT TRANSFORMER PRIMARY (NO SIGNAL 13.2 V INPUT) DO NOT USE A VACUUM TUBE VOLTMETER FOR THIS MEASUREMENT.

ALIGNMENT CHART

SIGNAL GENERATOR			RADIO		
STEP	CONNECTION TO RADIO	DIAL SETTING	DIAL SETTING	SPECIAL INSTRUCTIONS	ADJUST
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

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)

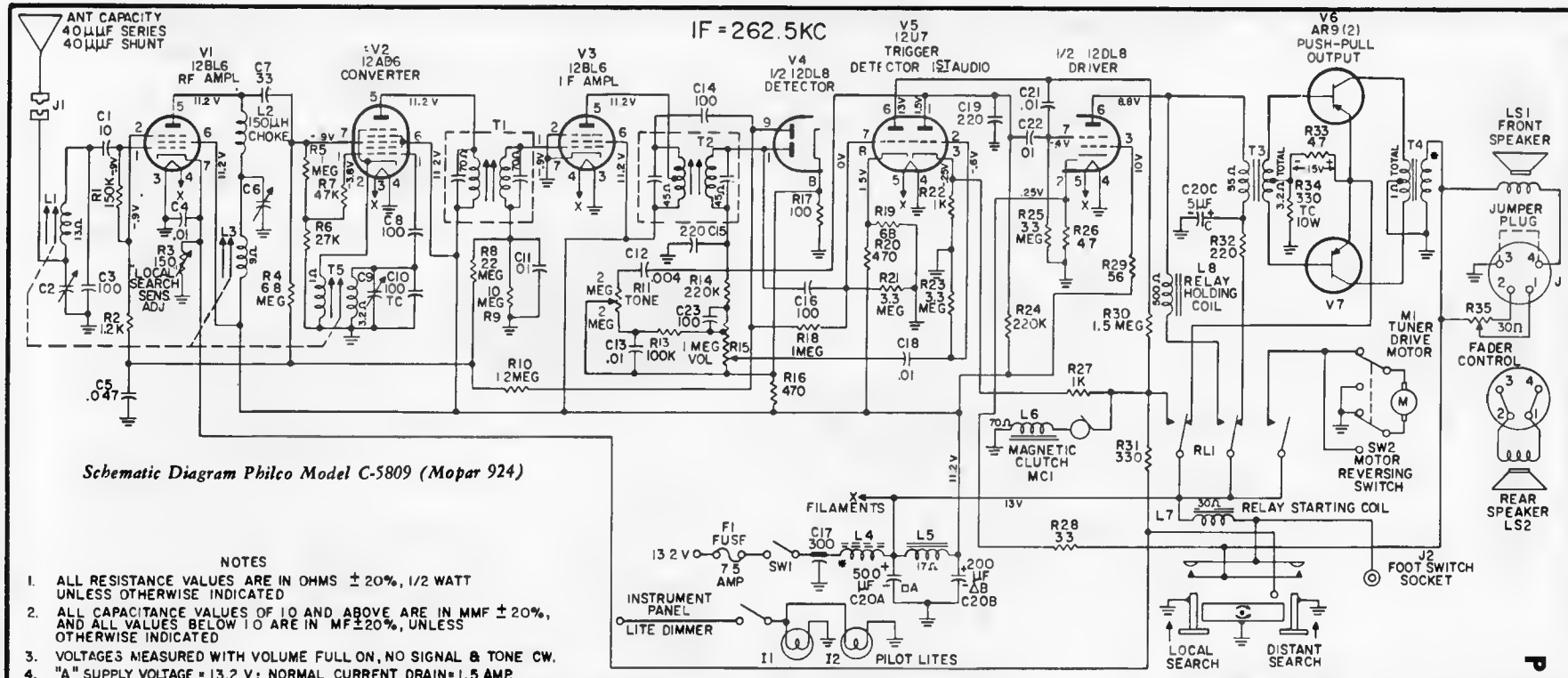
SERVICING PRECAUTIONS

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.

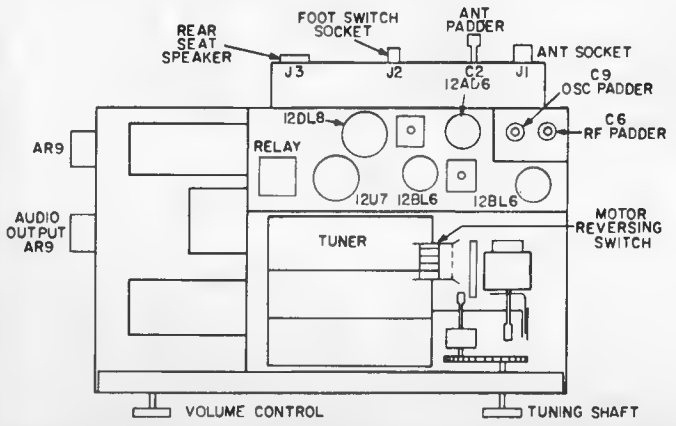


Schematic Diagram Philco Model C-5809 (Mopar 924)

NOTES

1. ALL RESISTANCE VALUES ARE IN OHMS ± 20%, 1/2 WATT UNLESS OTHERWISE INDICATED
2. ALL CAPACITANCE VALUES OF 10 AND ABOVE ARE IN MMF ± 20%, AND ALL VALUES BELOW 10 ARE IN MF ± 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.

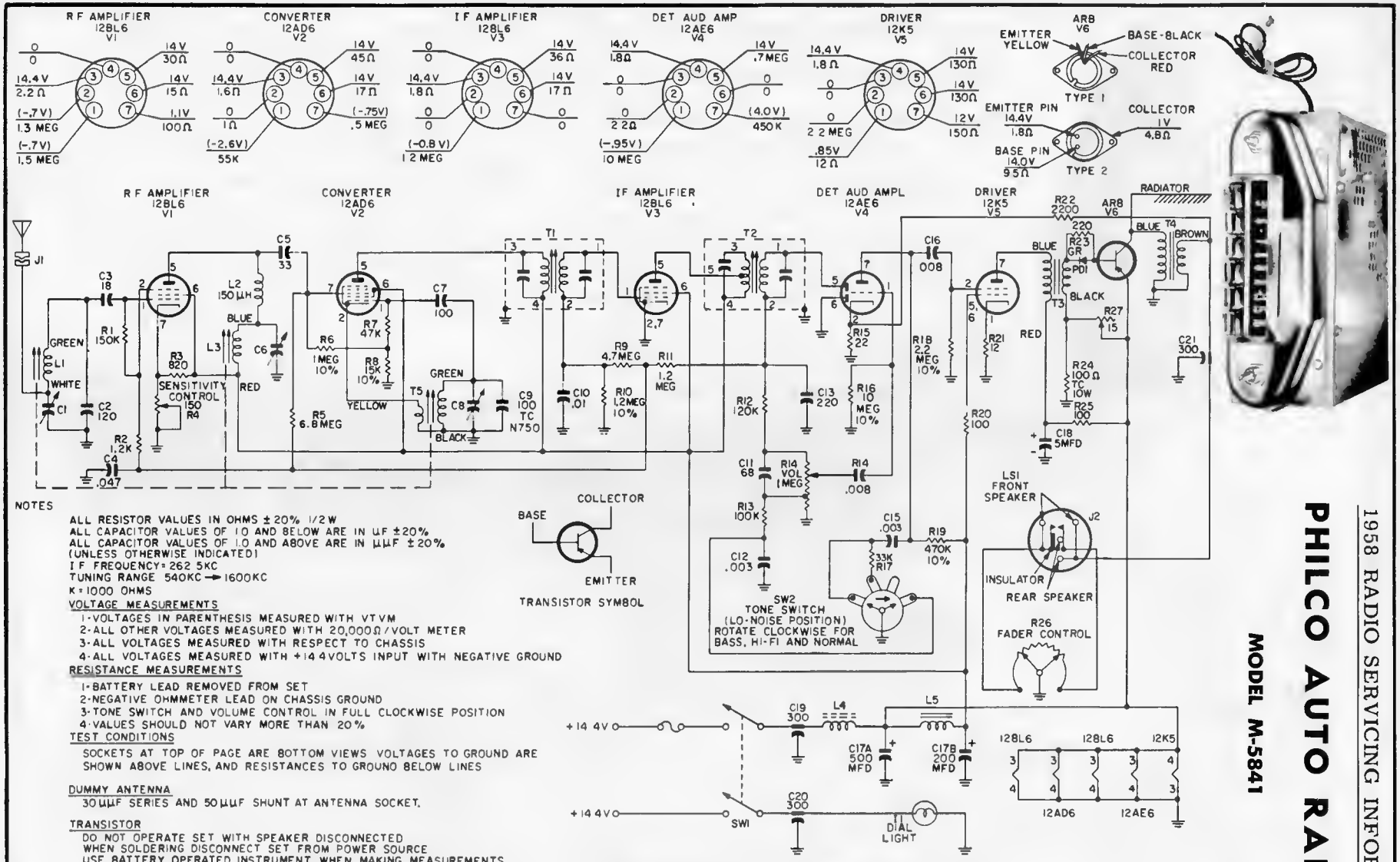
1. Turn radio on and allow it to operate for fifteen minutes. Antenna should be fully extended.
2. Unlock push buttons by pulling them out.
3. Accurately tune in a station with manual tuning knob.
4. Lock one push button to that station by pushing firmly in.
5. Repeat above procedure for remaining push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

PHILCO AUTO RADIO

MODEL C-5809

PHILCO AUTO RADIO

MODEL M-5841



NOTES

ALL RESISTOR VALUES IN OHMS ±20% 1/2W
ALL CAPACITOR VALUES OF 1.0 AND BELOW ARE IN µF ±20%
ALL CAPACITOR VALUES OF 1.0 AND ABOVE ARE IN µµF ±20%
(UNLESS OTHERWISE INDICATED)
I F FREQUENCY=262.5KC
TUNING RANGE 540KC → 1600KC
K=1000 OHMS

VOLTAGE MEASUREMENTS
1-VOLTAGES IN PARENTHESIS MEASURED WITH VTVM
2-ALL OTHER VOLTAGES MEASURED WITH 20,000Ω/VOLT METER
3-ALL VOLTAGES MEASURED WITH RESPECT TO CHASSIS
4-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%

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 µµF SERIES AND 50 µµF 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 µµf. series, 30 µµf. shunt)
INTERMEDIATE FREQUENCY	262.5 kc.

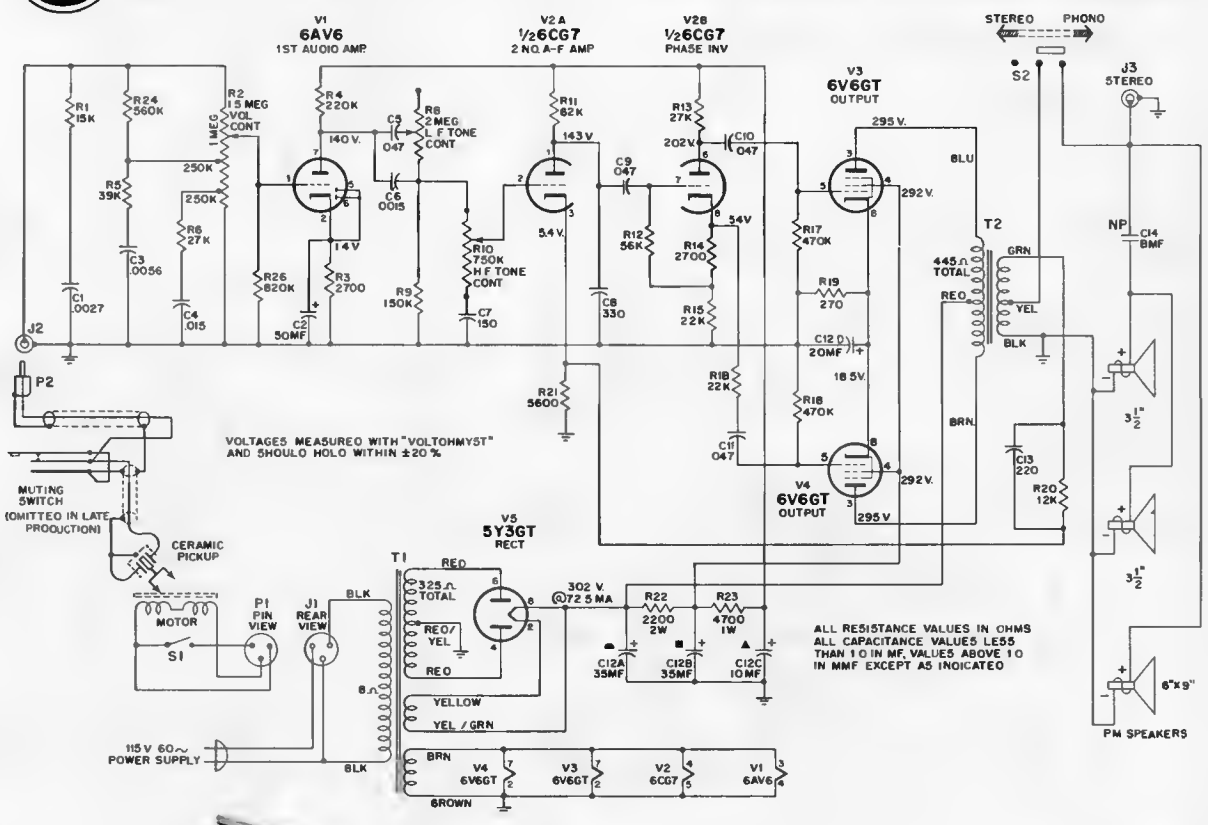
IMPORTANT: When connecting radio to "A" supply, either in car or on test bench, polarity must be observed. "A+" lead is positive, "A−" is chassis ground.

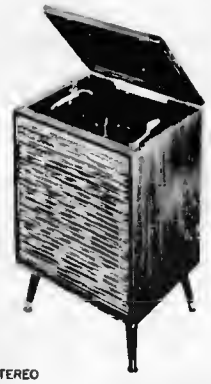
PHILCO AUTO RADIO MODEL M-5841

RCA VICTOR

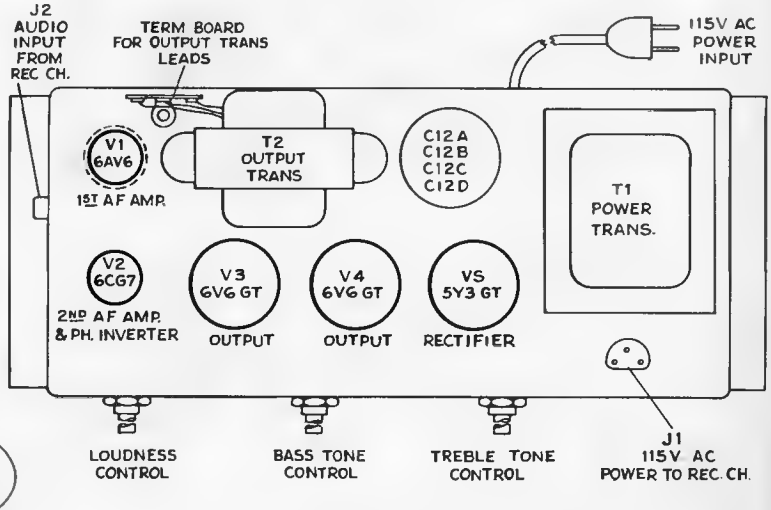
HFP RECORD PLAYER

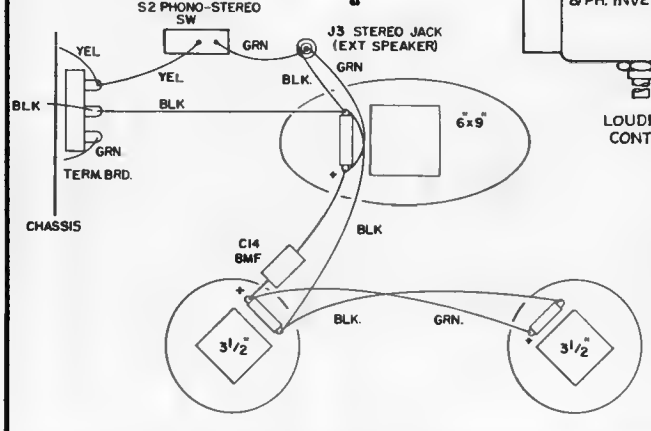
Chassis RS-164B, Rec. Changer RP-205D-2





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





Speaker Connection Diagram—Model HFP

POWER SUPPLY
115 volts, 60 cycles ..... 85 watts

POWER OUTPUT 10 watts undistorted, 12 watts maximum

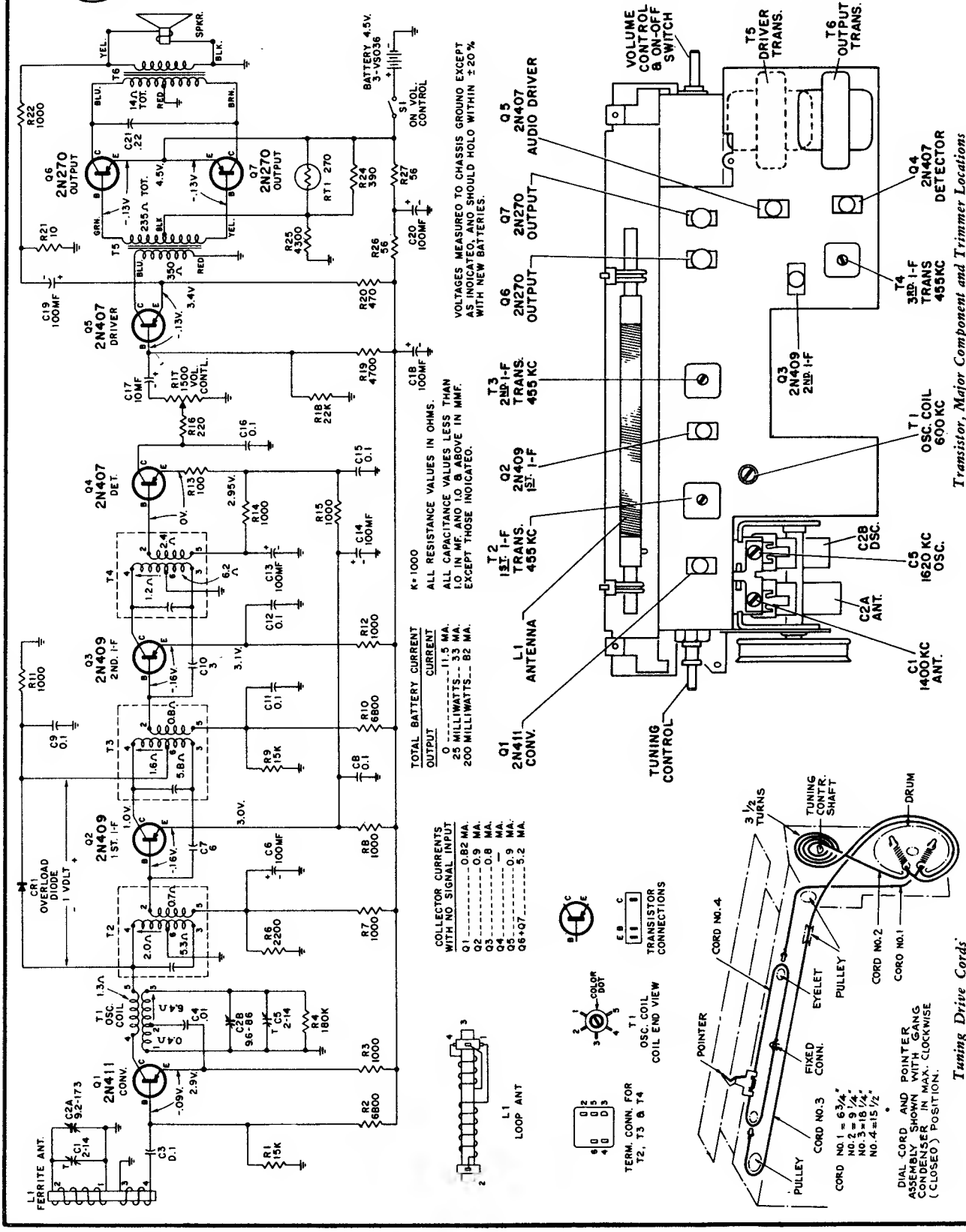
FREQUENCY RESPONSE .... 60 to 20,000 cycles

LOUDSPEAKERS
One 6" x 9" PM "woofer". . . 3.2 ohms @ 400 cy.
Two 3½" PM "tweeters". 7.6 ohms each @ 6000 cy.

RCA VICTOR

MODEL 1-BT-58

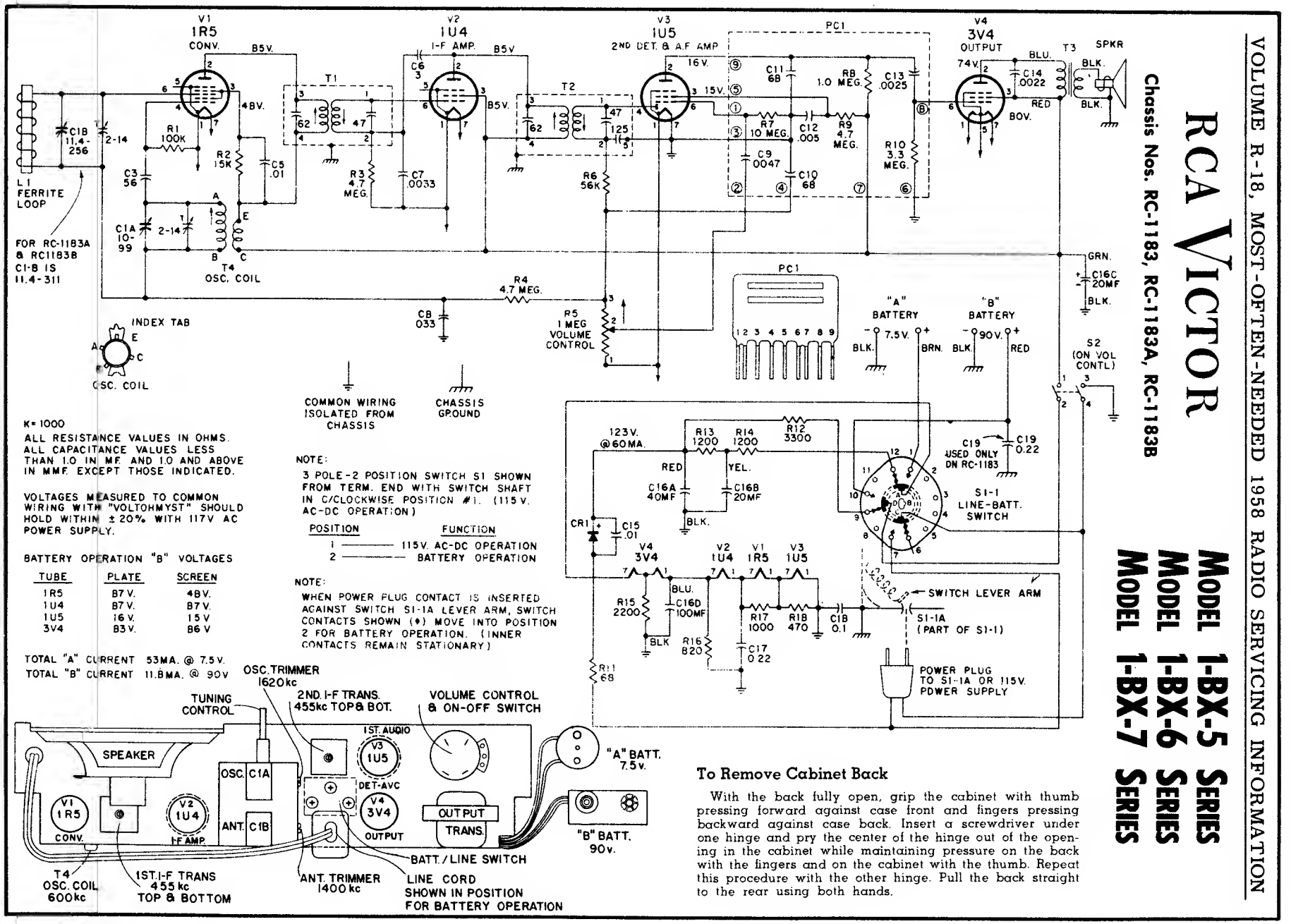
Chassis No. RC-1156B



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



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 WIRING WITH "VOLTOHMYST" SHOULD HOLD WITHIN ± 20% WITH 117V AC POWER SUPPLY.

BATTERY OPERATION "B" VOLTAGES

TUBE	PLATE	SCREEN
1R5	87 V.	48V.
1U4	87 V.	87 V.
1U5	16 V.	15 V
3V4	83 V.	86 V

TOTAL "A" CURRENT 53MA. @ 7.5 V.
TOTAL "B" CURRENT 11.8MA. @ 90 V

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

POSITION	FUNCTION
1	115 V. 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)

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.

RCA VICTOR

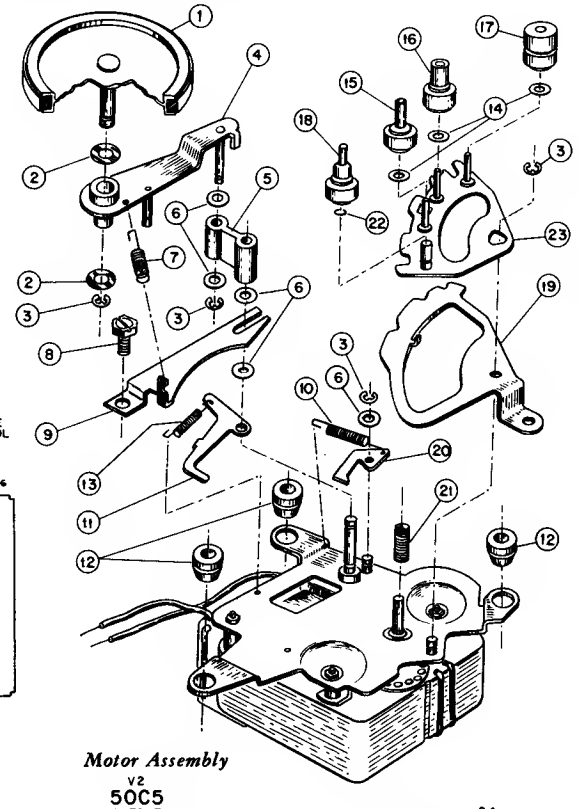
MODEL HRD-2

Chassis No. RS-158J

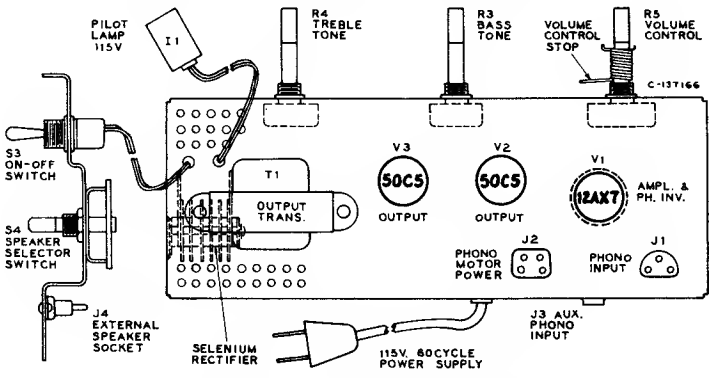
Record Player Mechanism No. RP-200-2

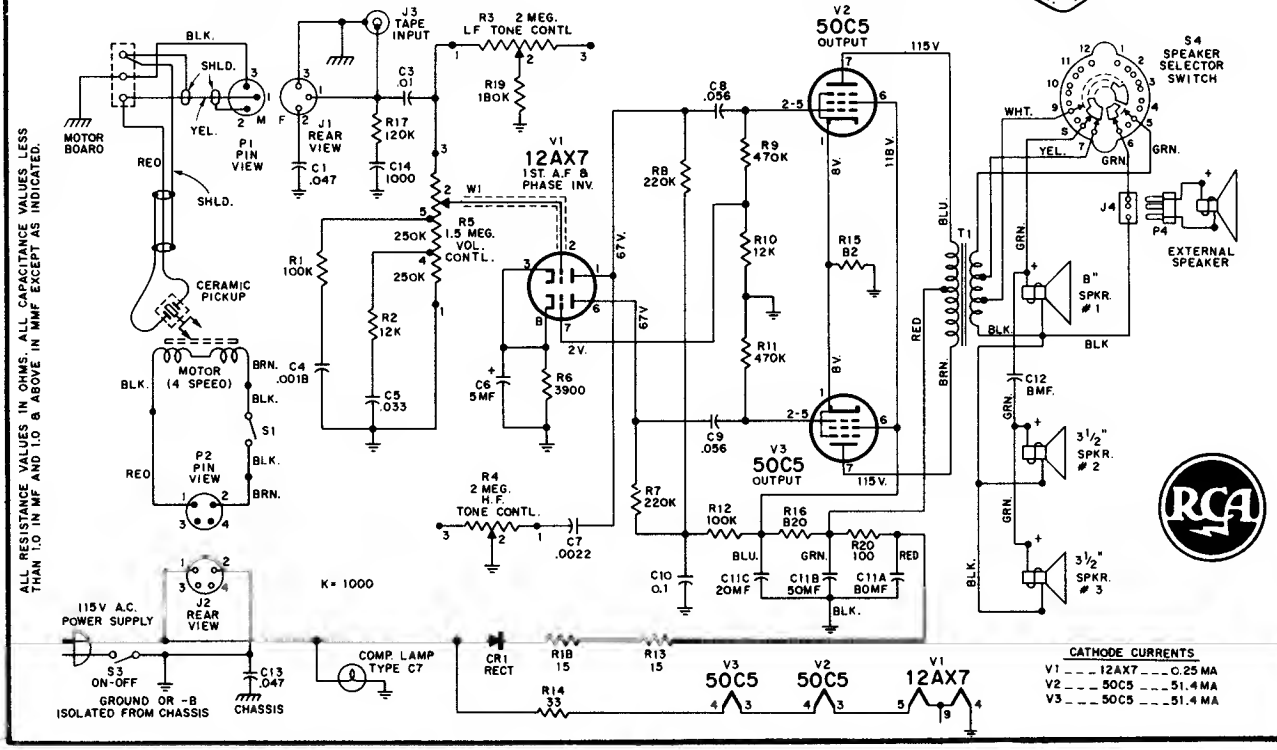
MOTOR ASSEMBLY

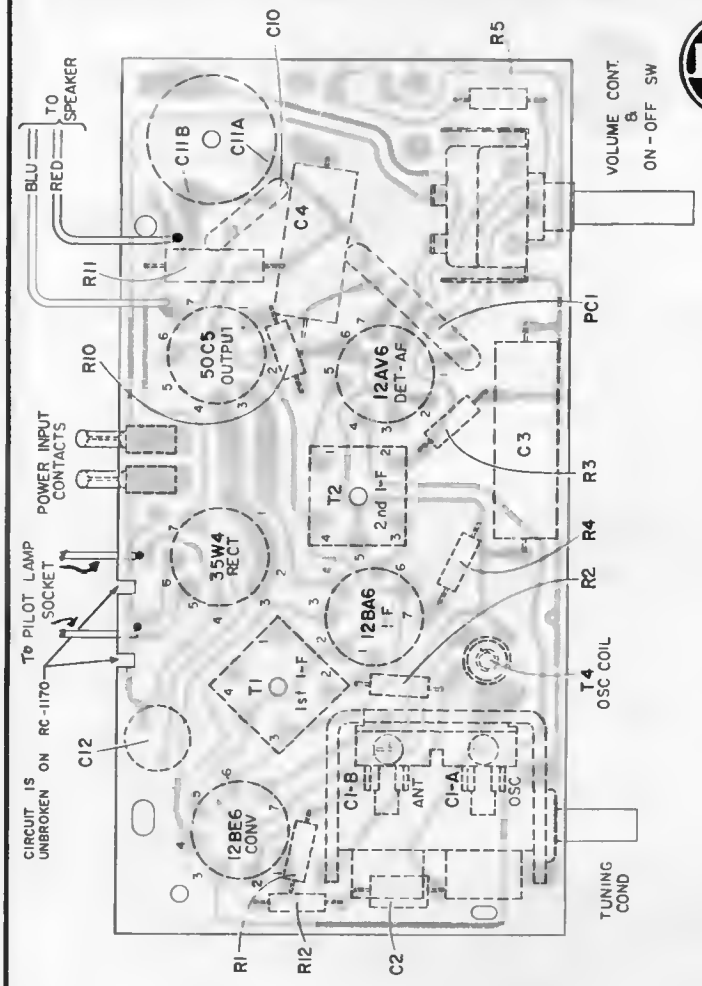
ILL. NO.	STOCK NO.	DESCRIPTION
1	102968	Wheel—Idler wheel
2	78509	Washer—Fibre washer (.015" thk. x 31/64" O.D. x 7/32" I.D.)
3	78652	Washer—"C" type retaining washer
4	102969	Plate—Idler plate assembly
5	78517	Link—Idler link
6	78515	Washer—Metal washer
7	78512	Spring—Idler spring
8	....	Screw—Hold 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—33⅓ RPM pulley assembly
16	78526	Pulley—45 RPM pulley assembly
17	78527	Pulley—78 RPM pulley assembly
18	102972	Pulley—16⅔ 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,



Motor Assembly







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.

RCA VICTOR

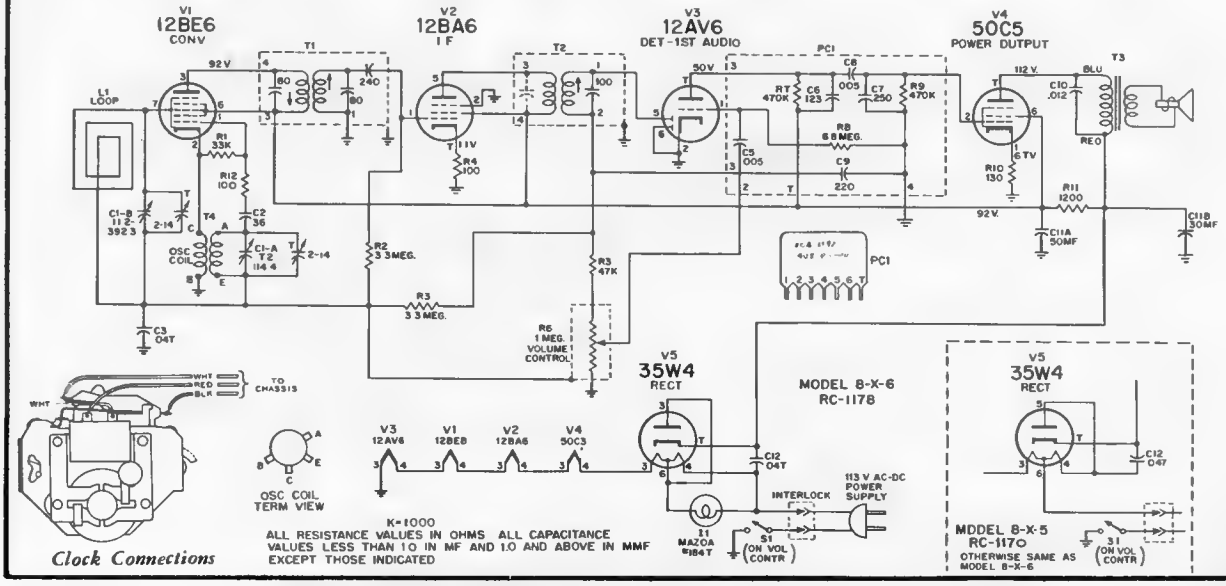
8-X-5 SERIES, 8-X-6 SERIES
MODEL 8-X-51

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.

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		



Clock Connections

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

RCA VICTOR

Battery-Operated Pocket Radio

MODEL 9-BT-9 Series

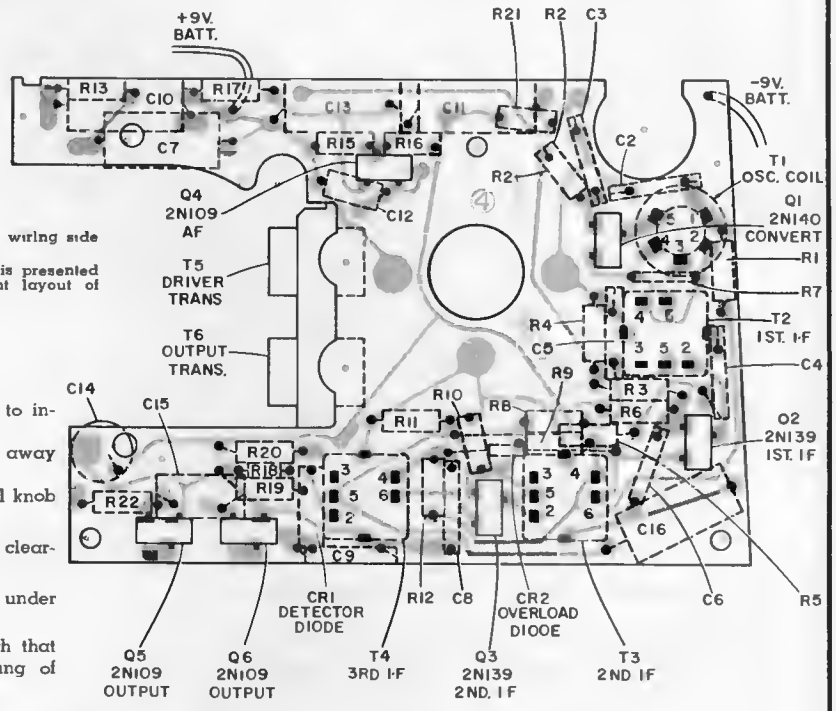
Chassis No. RC-1164A, RC-1164B

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

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

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.

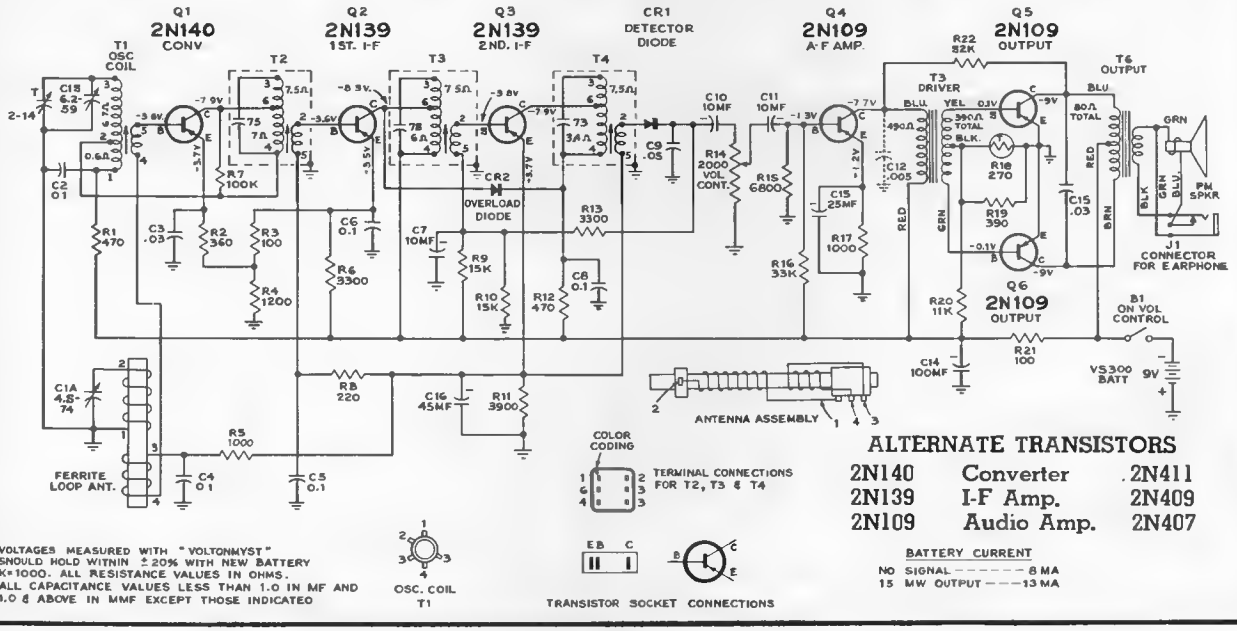
Dress lead from antenna to gang ant. terminal away from metal parts as far as practicable.

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.



VOLTAGES MEASURED WITH "VOLTOHMYST". 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

ALTERNATE TRANSISTORS

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

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.

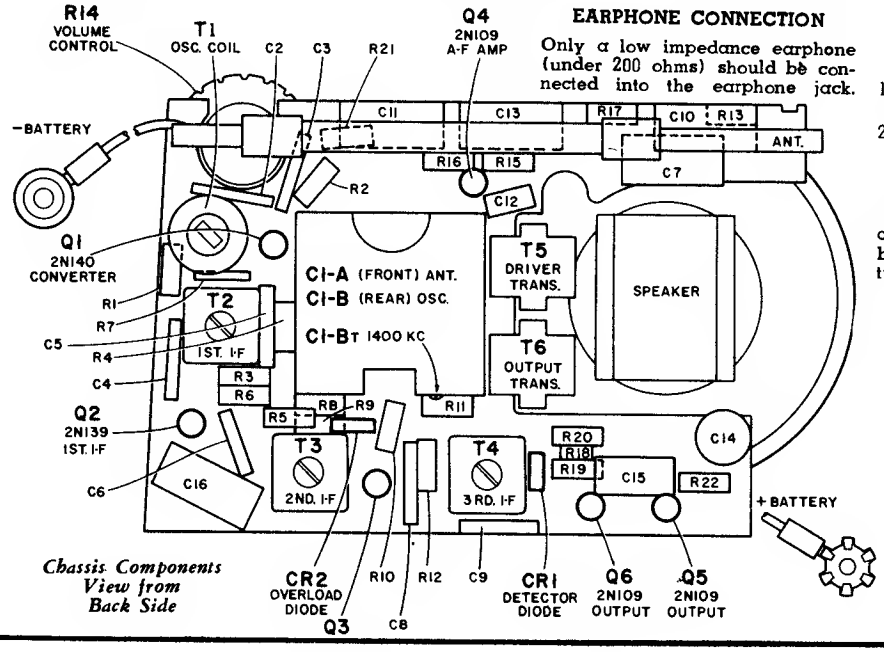
1. The first thing to check when the receiver is inoperative, is the battery. With the receiver turned on, a new battery should show 9 volts although the receiver can be expected to operate on any battery which checks between 6 volts and 9 volts.
2. To check for a circuit defect which would cause excessive 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 VoltOhymst®.
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.



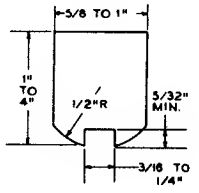
EARPHONE CONNECTION

Only a low impedance earphone (under 200 ohms) should be connected into the earphone jack.

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.

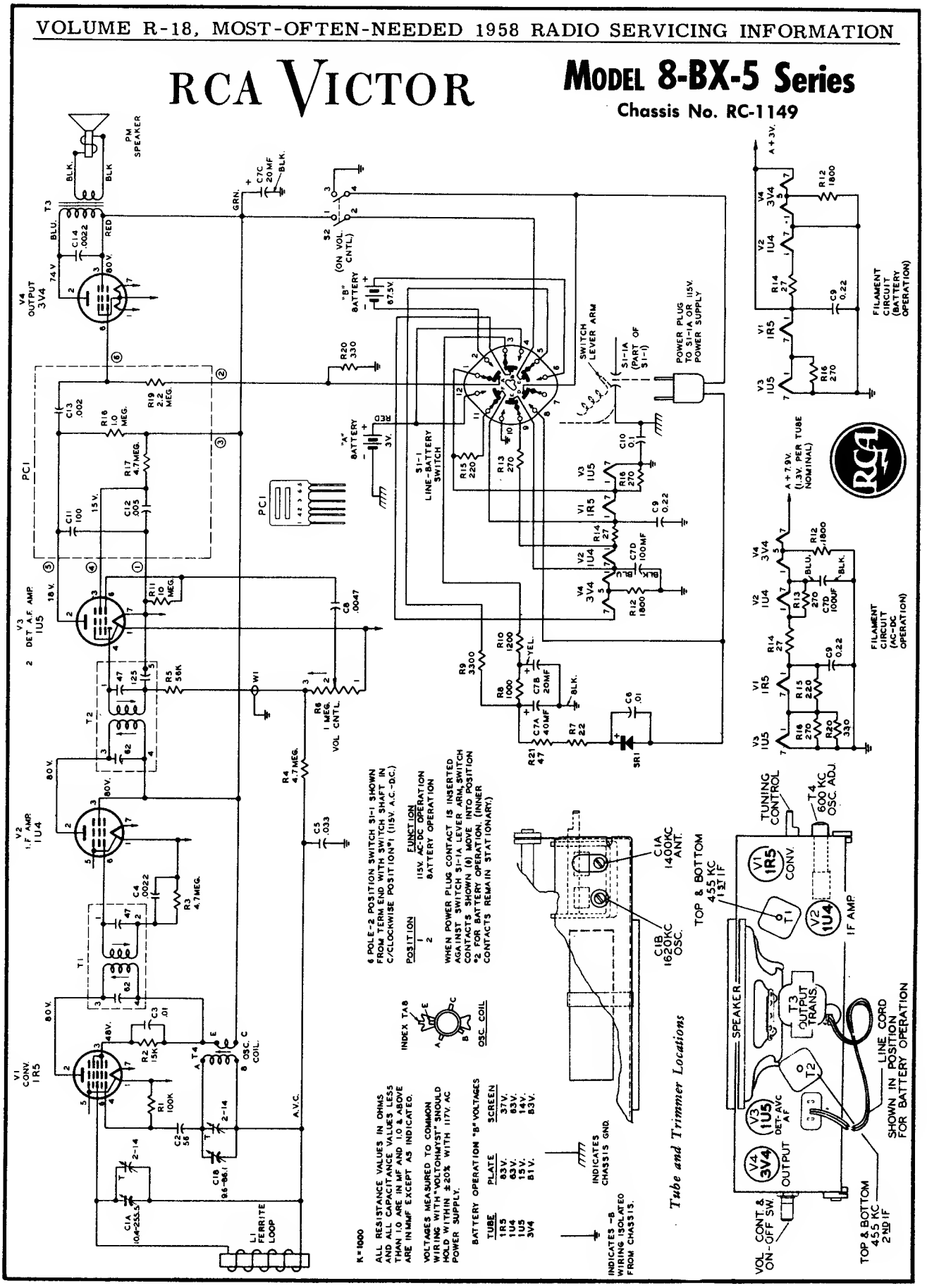
A simple case of low output and distortion has resulted from one pin of one output transistor being bent at right angles and not in its socket; the other two pins held the transistor in place.

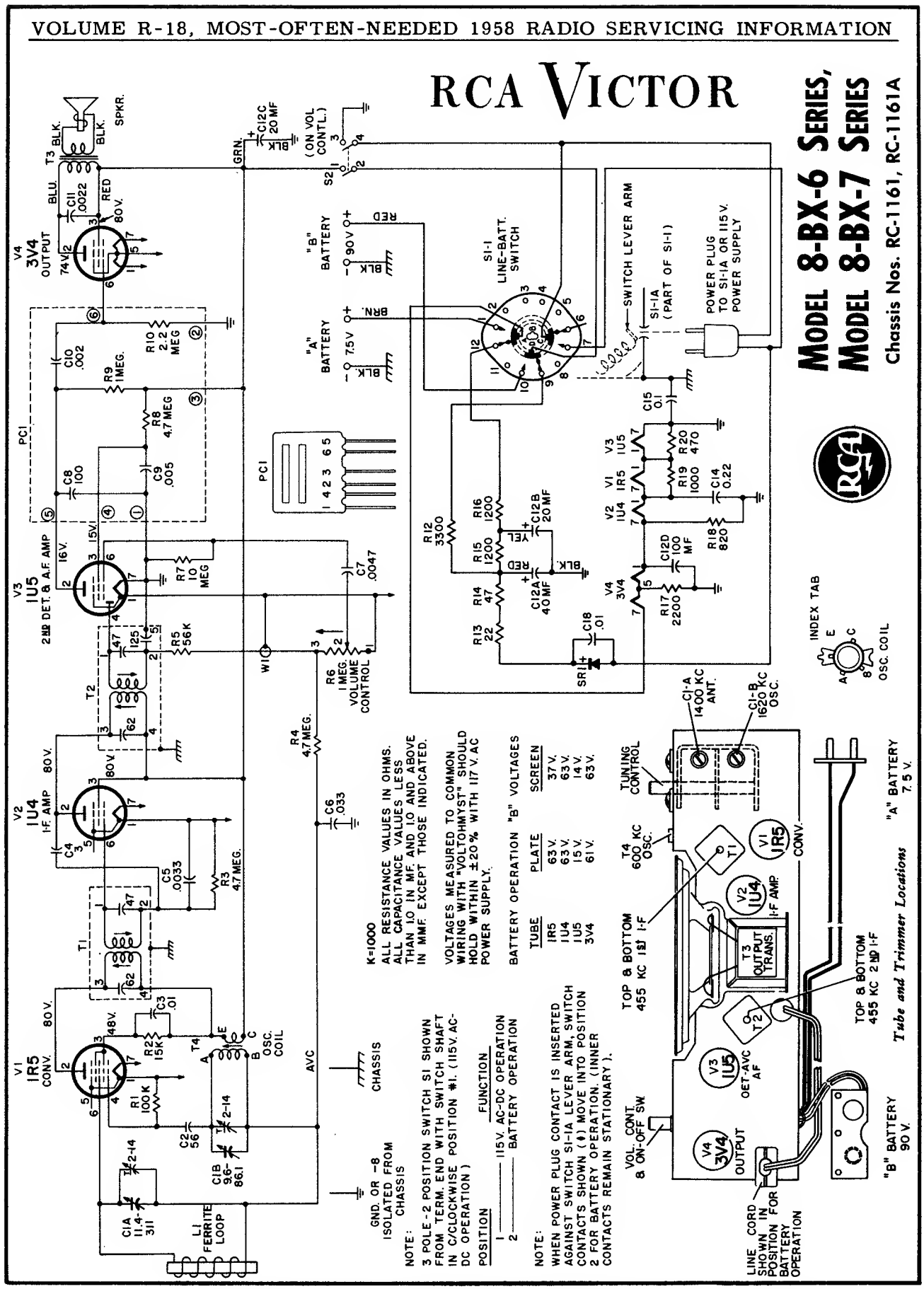
In factory production, selected pairs of transistors are used for Class "B" output. Mismatched transistors will result in some distortion, this may or may not be noticeable during listening. Transistors may be matched by injecting an audio signal at the volume control and measuring the audio signal from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

RCA VICTOR

MODEL 8-BX-5 Series

Chassis No. RC-1149

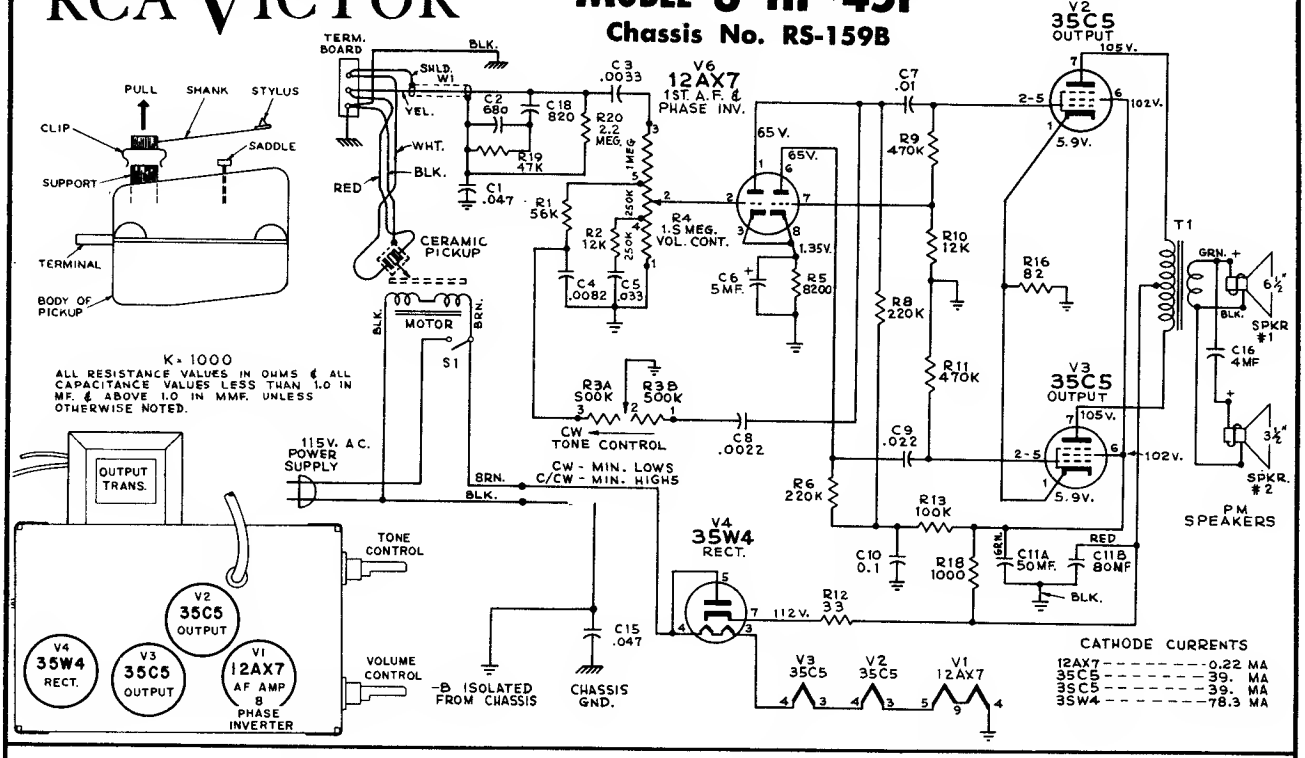



RCA VICTOR
MODEL 8-BX-6 SERIES,
MODEL 8-BX-7 SERIES
Chassis Nos. RC-1161, RC-1161A
V1 1R5 CONV.
V2 1U4 I-F AMP
V3 1U5 2ND DET. & A.F. AMP
V4 3V4 OUTPUT
T1
T2
T3 OUTPUT TRANS.
T4 600 KC OSC.
L1 FERRITE LOOP
C1A 11-411
C1B 9.6-86.1
C1-A 1400 KC ANT.
C1-B 1620 KC OSC.
TUNING CONTROL
R6 1 MEG. VOLUME CONTROL
S1-1 LINE-BATT. SWITCH
S1-A (PART OF S1-1)
SWITCH LEVER ARM
POWER PLUG TO S1-A OR 115 V. POWER SUPPLY
"A" BATTERY
"B" BATTERY
INDEX TAB
OSC. COIL
SPKR.
VOL. CONT. & ON-OFF SW
OET-AVC AF
I-F AMP.
CONV.
TOP & BOTTOM 455 KC 1ST I-F
TOP & BOTTOM 455 KC 2ND I-F
LINE CORD SHOWN IN POSITION FOR BATTERY OPERATION
"B" BATTERY 90 V.
"A" BATTERY 7.5 V.
Tube and Trimmer Locations
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 — 115 V. AC-DC OPERATION
2 — BATTERY OPERATION
GND. OR -8 ISOLATED FROM CHASSIS
CHASSIS
AVC
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 WIRING WITH "VOLTOHMYST" SHOULD 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 61 V. 63 V.
NOTE: WHEN POWER PLUG CONTACT IS INSERTED AGAINST SWITCH S1-1A LEVER ARM, SWITCH CONTACTS SHOWN (6) MOVE INTO POSITION 2 FOR BATTERY OPERATION. (INNER CONTACTS REMAIN STATIONARY).

RCA VICTOR

MODEL 8-HF-45P

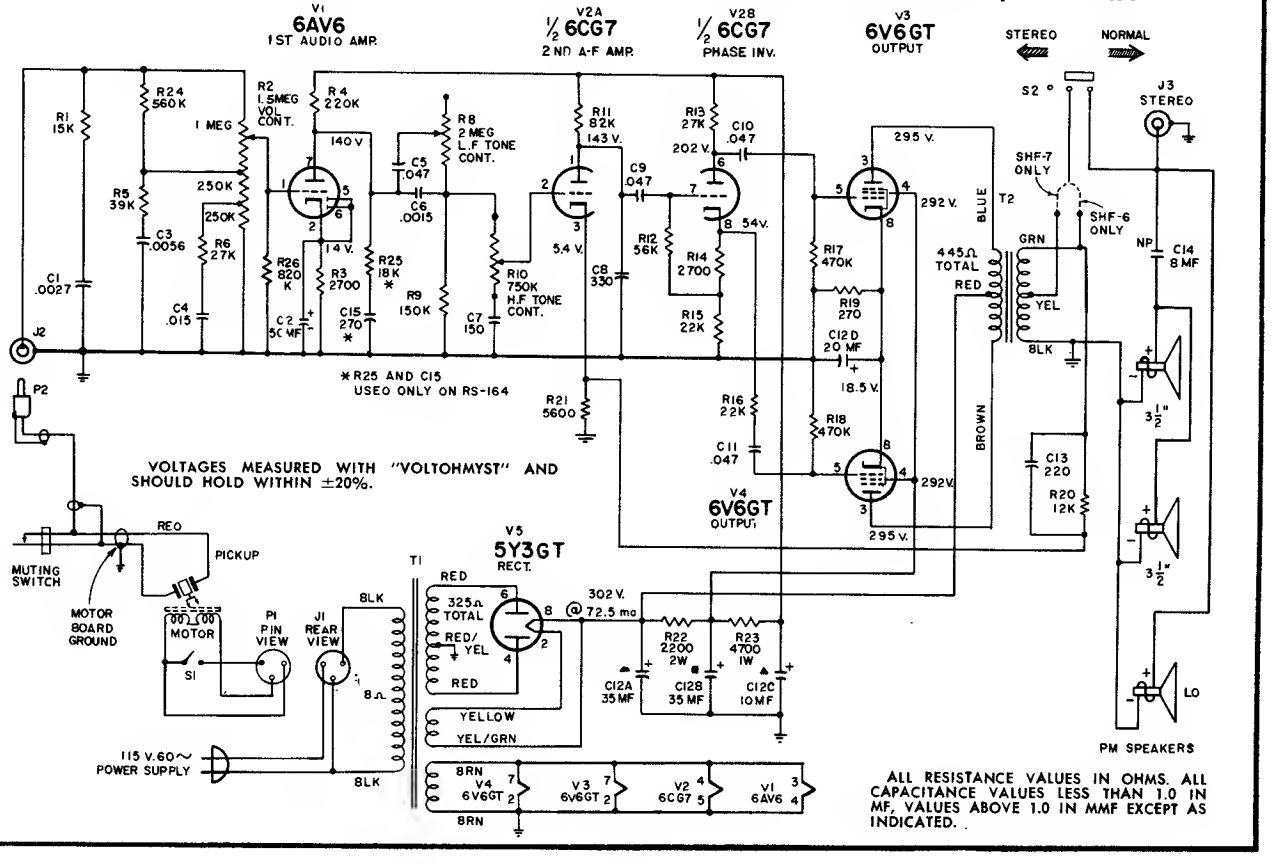
Chassis No. RS-159B



RCA VICTOR

MODELS SHF-6, SHF-7

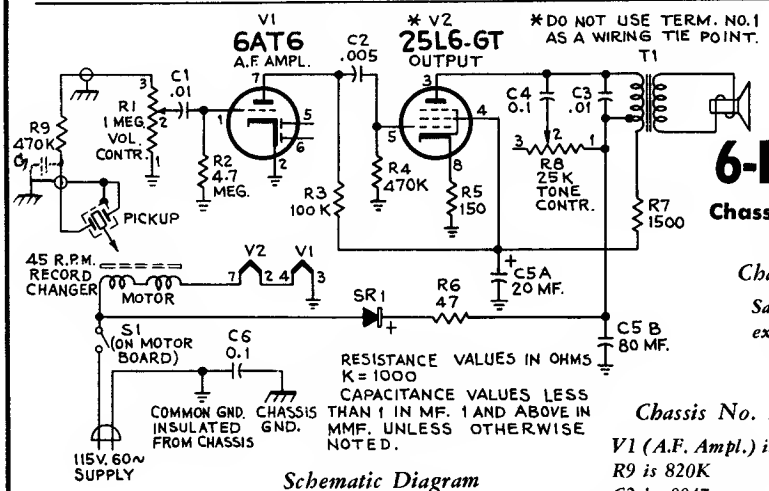
Chassis Nos. RS-164, RS-164A



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-152B

Same as shown for RS-152A except C2 is .0047 mf

Chassis No. RS-152D

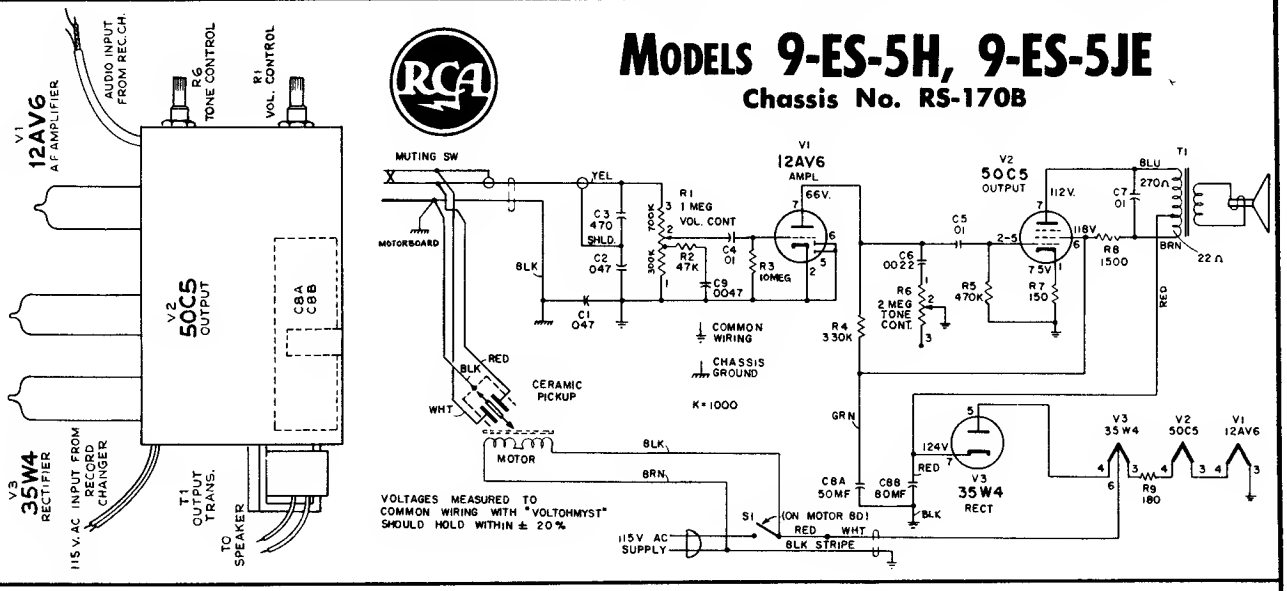
V1 (A.F. Ampl.) is type 6AV6
R9 is 820K
C2 is .0047
otherwise same as shown for Chassis No. RS-152A

Chassis No. RS-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

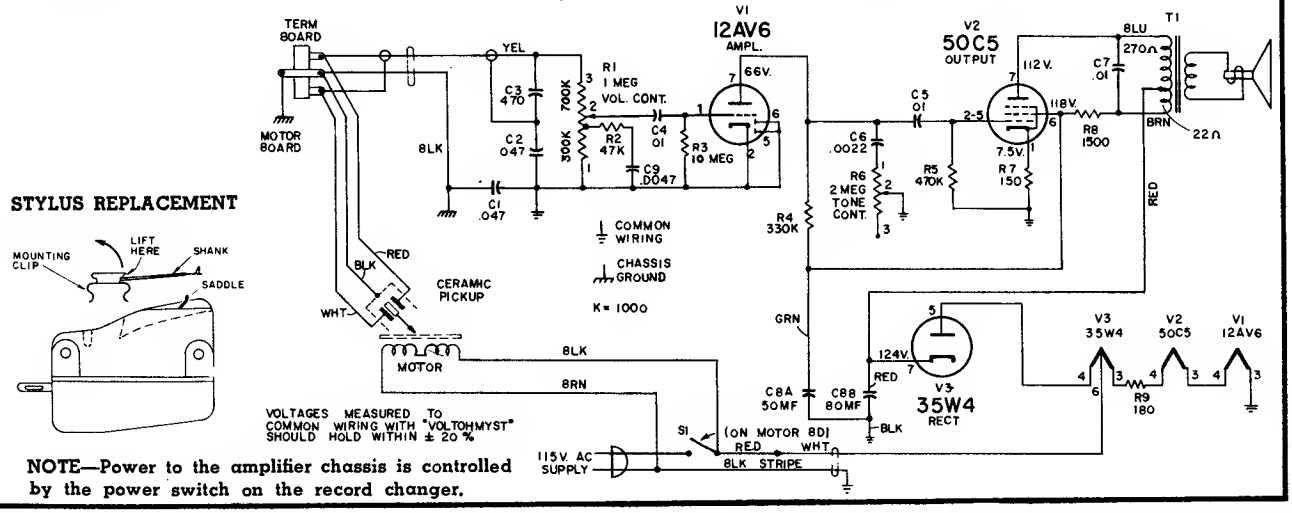
MODELS 9-ES-5H, 9-ES-5JE

Chassis No. RS-170B



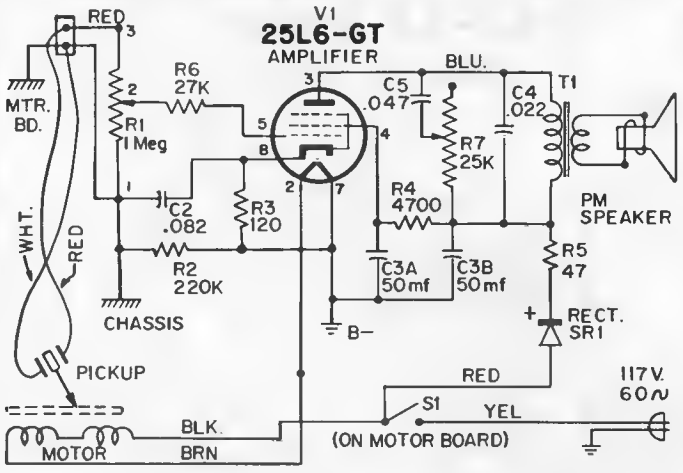
RCA VICTOR MODELS 9-ED-2LE, 9-ED-2KF

Chassis No. RS-170D



STYLUS REPLACEMENT

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



RCA VICTOR

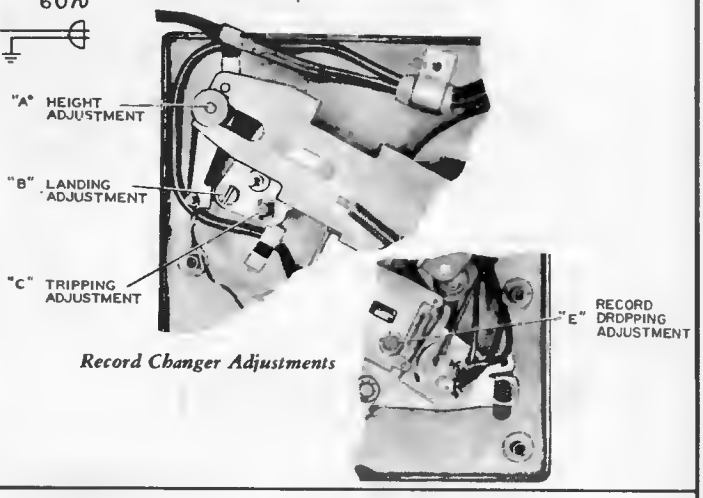
Automatic Record Player

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.



Record Changer Adjustments

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 1⅛".

Pickup Landing Adjustment

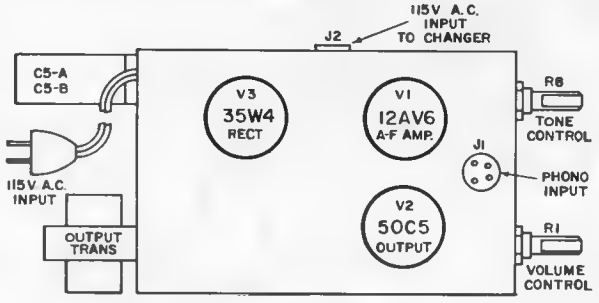
Adjust the screw driver landing adjustment stud "B" so the stylus lands 2⅝" ±1/64" from the side of the center post.

Tripping Adjustment

Adjust the eccentric tripping stud "C" until the mechanism trips when the stylus is 1 9/32" from the side of the center post.

Record Dropping Adjustment

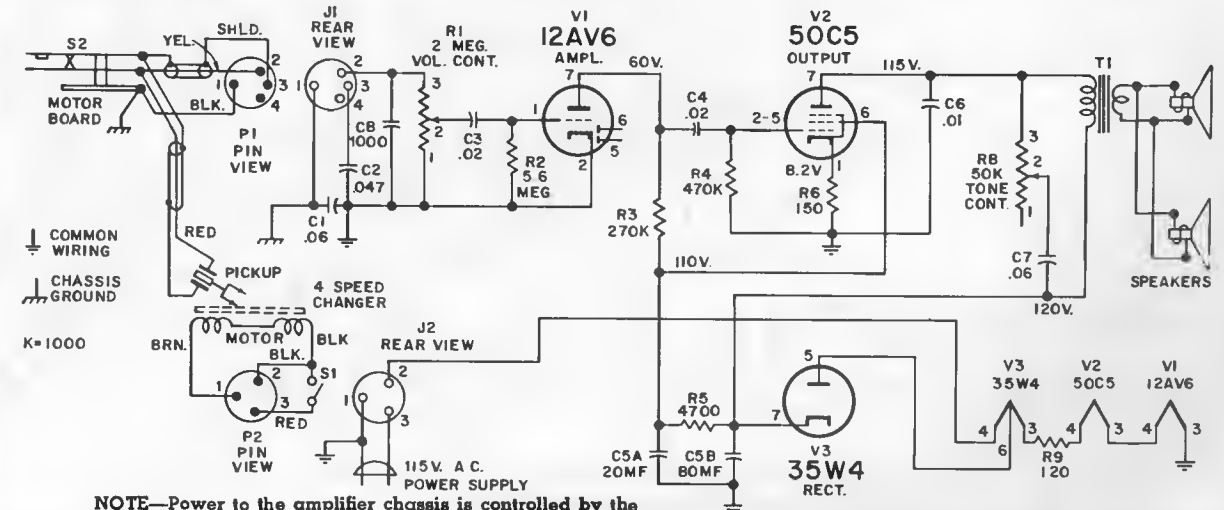
Turn the eccentric screw "E" until the record drops to the turntable without striking the pickup arm.



RCA VICTOR

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

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



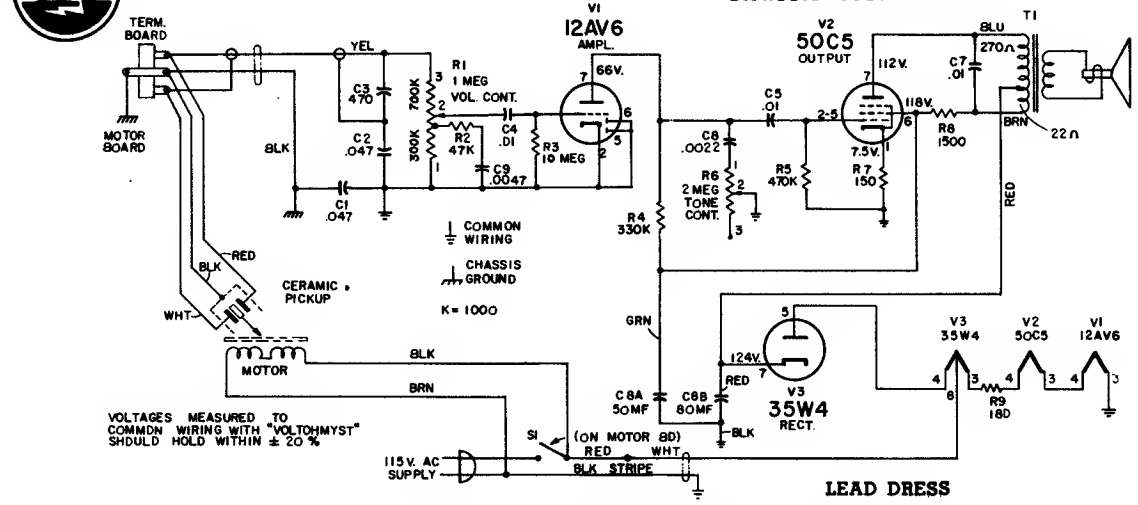
NOTE—Power to the amplifier chassis is controlled by the power switch on the record changer.

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

RCA VICTOR

9-ED-32 Series

Chassis No. RS-170



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

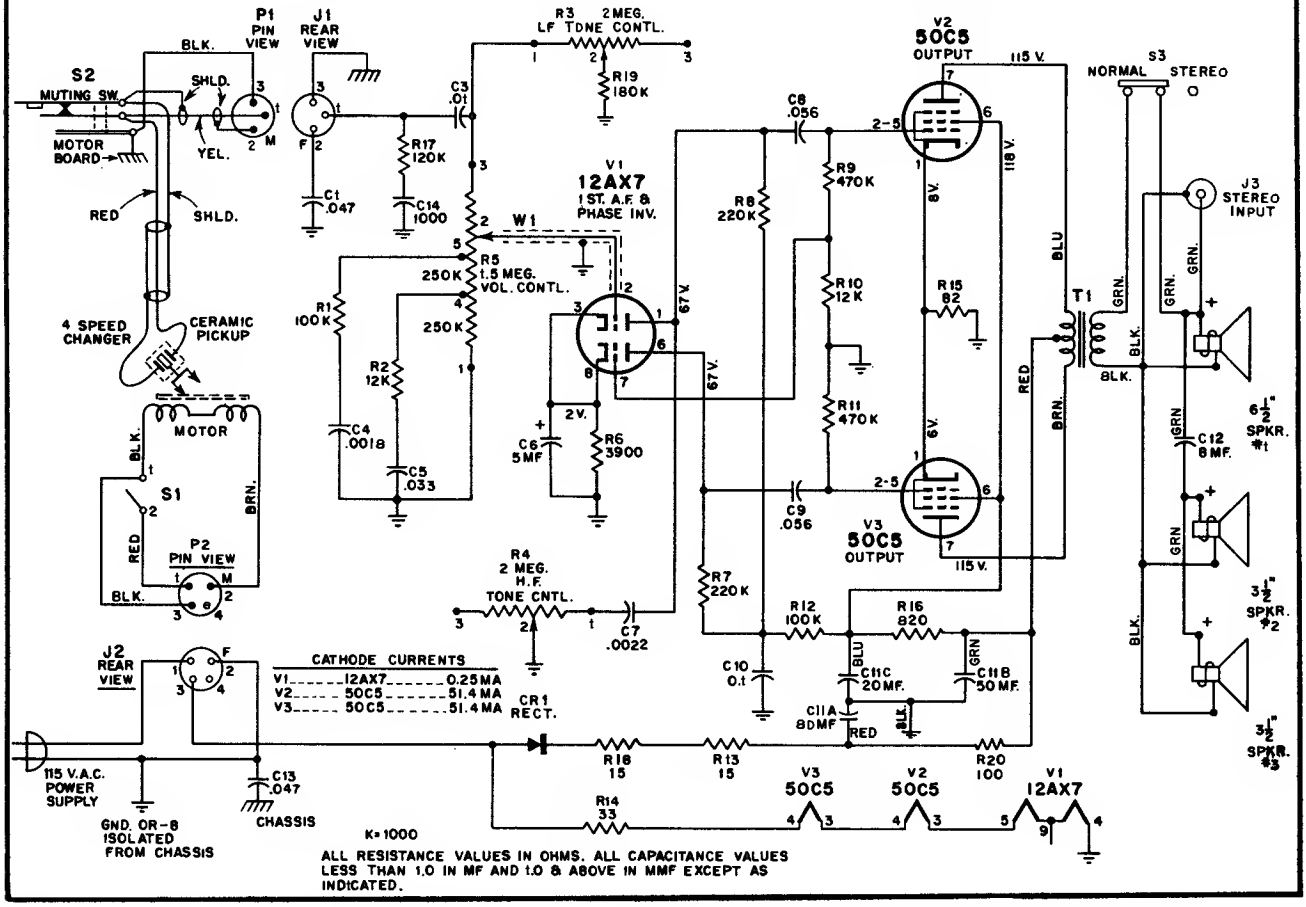
LEAD DRESS

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.

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.

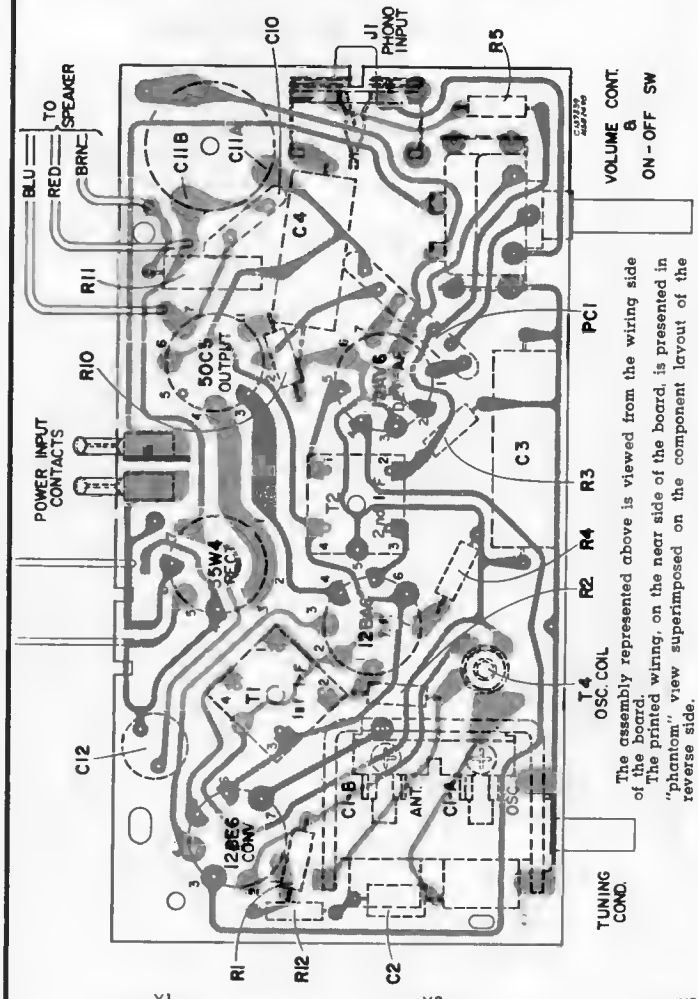
Disconnect three speaker leads.

Remove bottom screw.

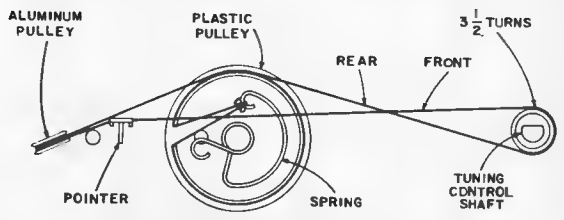
Remove one screw at outside of cradle (close to speaker).

Swing right end of chassis (as viewed from rear) to the rear of the cradle.

Disengage chassis from cradle by moving endways.



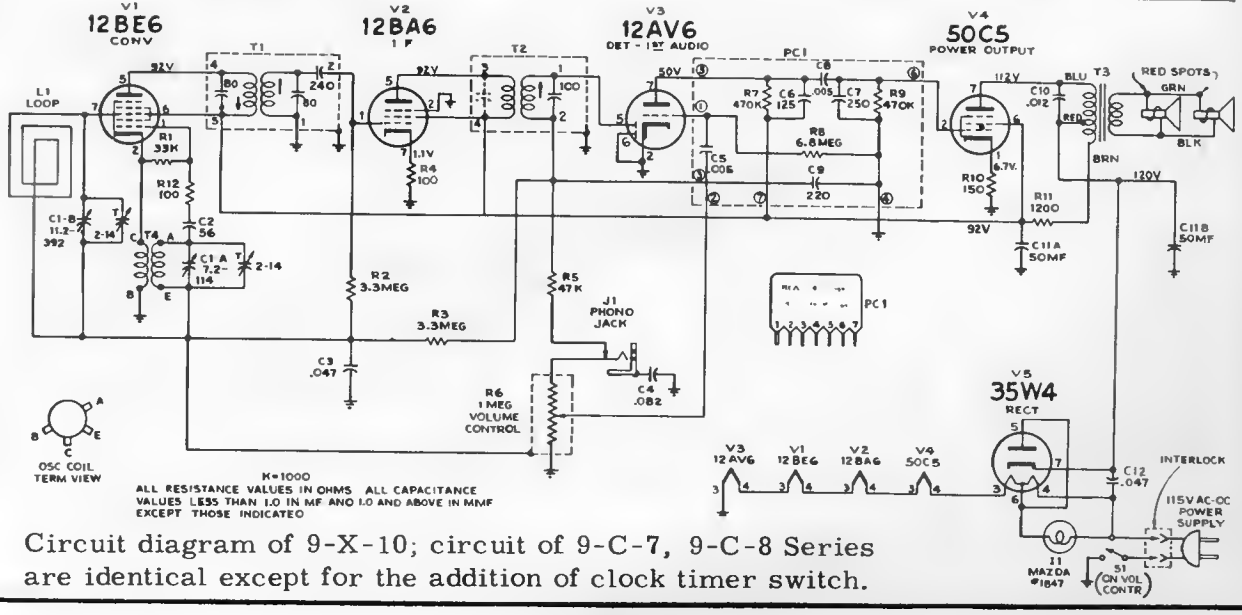
The assembly represented above is viewed from the wiring side of the board. The printed wiring, on the near side of the board, is presented in "phantom" view superimposed on the component layout of the reverse side.



ASSEMBLY SHOWN WITH TUNING CONDENSER PLATES FULLY MESHED.

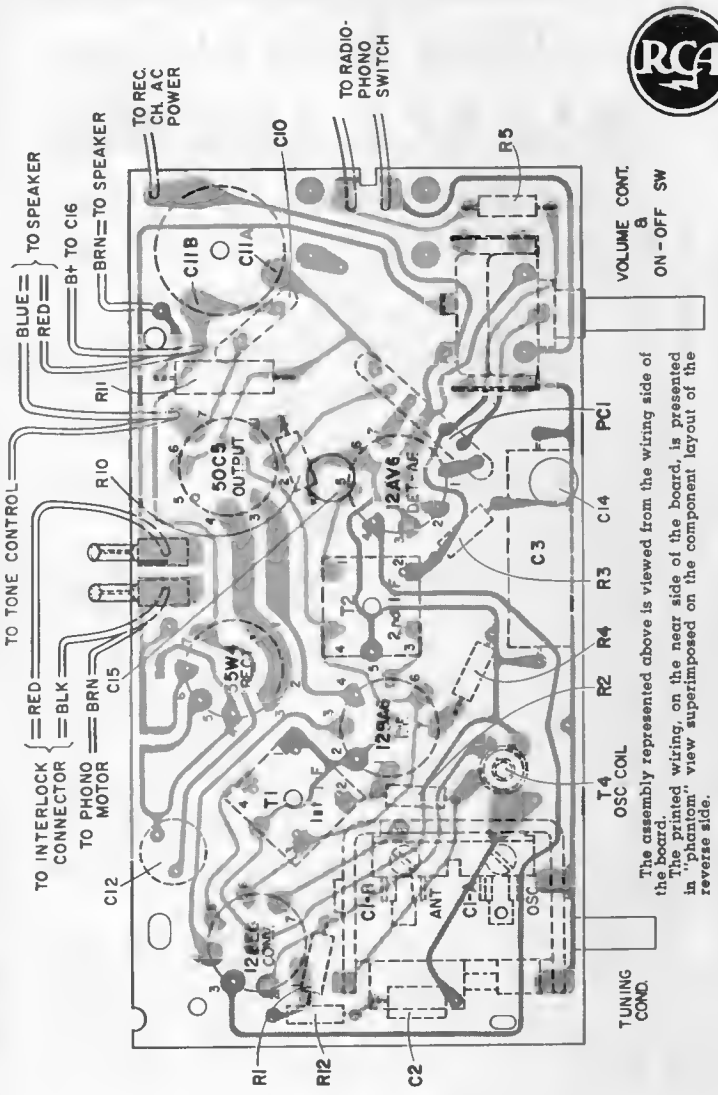
ALIGNMENT PROCEDURE

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.

Circuit Board Wiring and Components — View from Wiring Side



RCA VICTOR

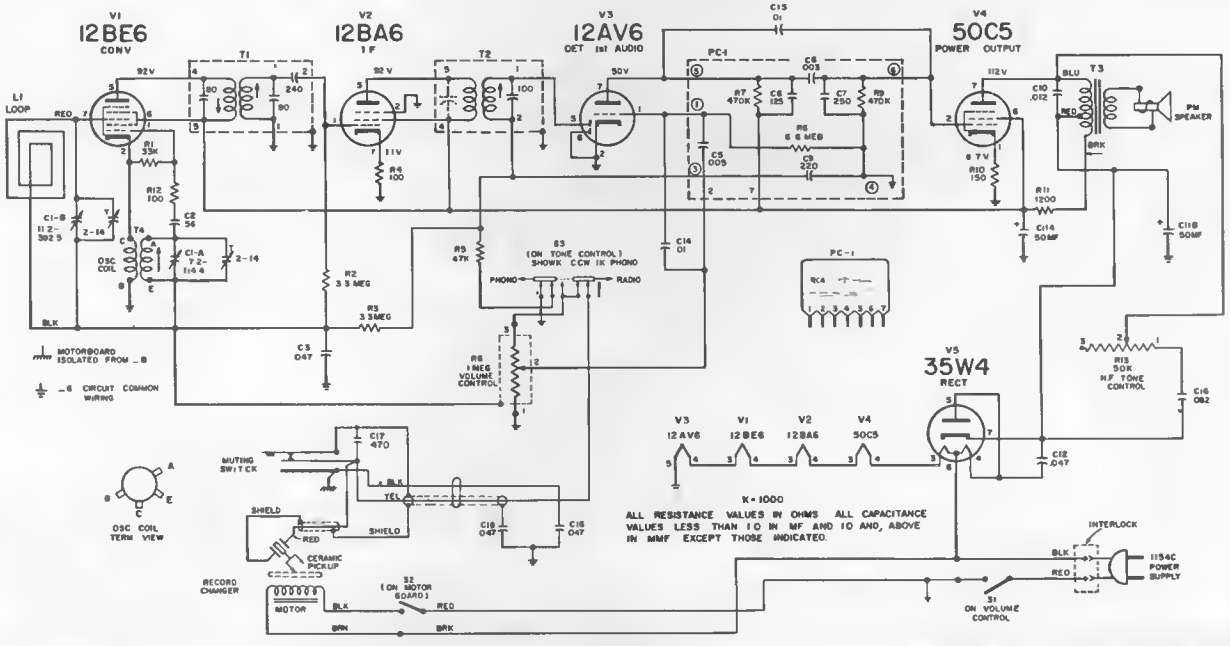
MODELS 9-US-5H, 9-US-5KE

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.			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		



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

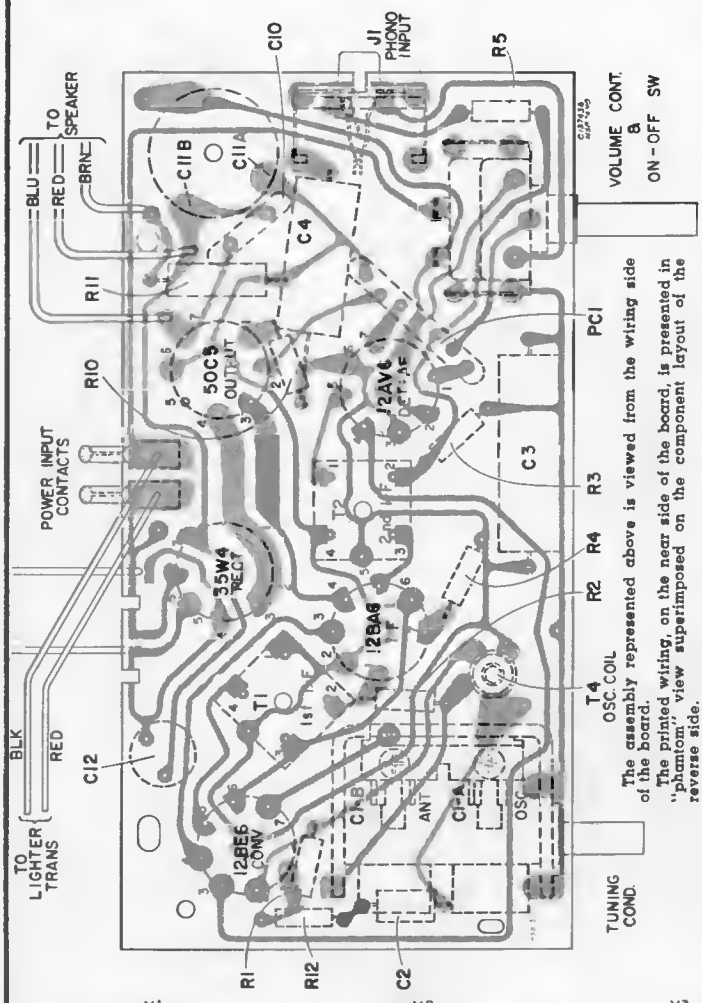
1. Pull off volume control and tuning knobs.
2. Remove back cover.
3. Remove two screws holding dial assembly to cabinet.

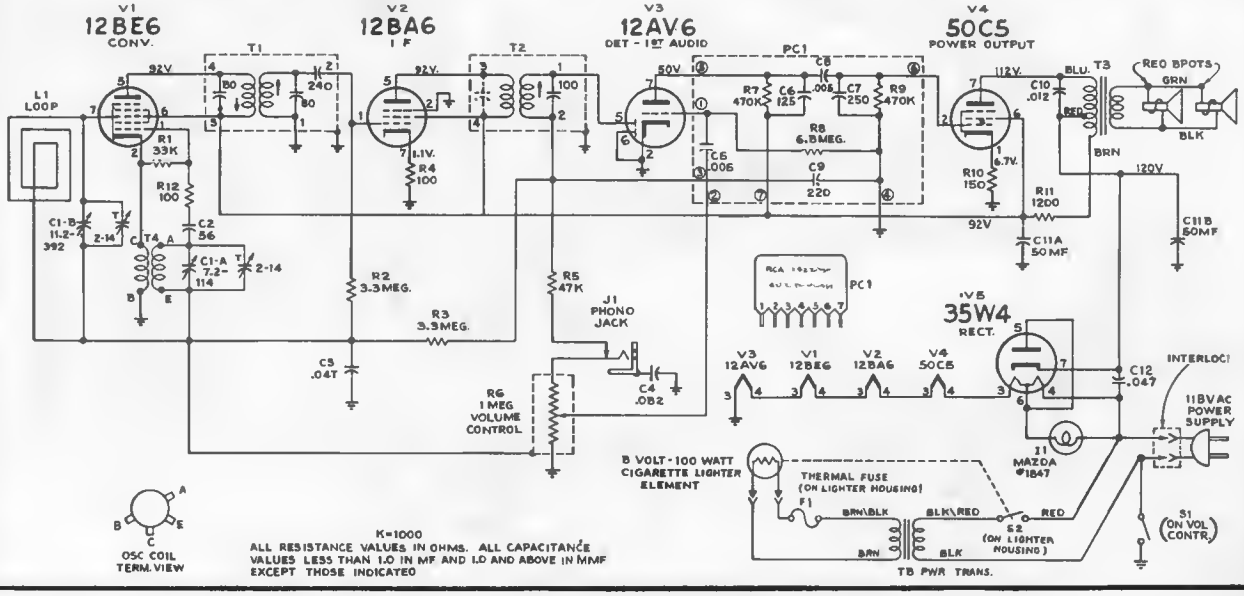
LEAD DRESS

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

ALIGNMENT PROCEDURE

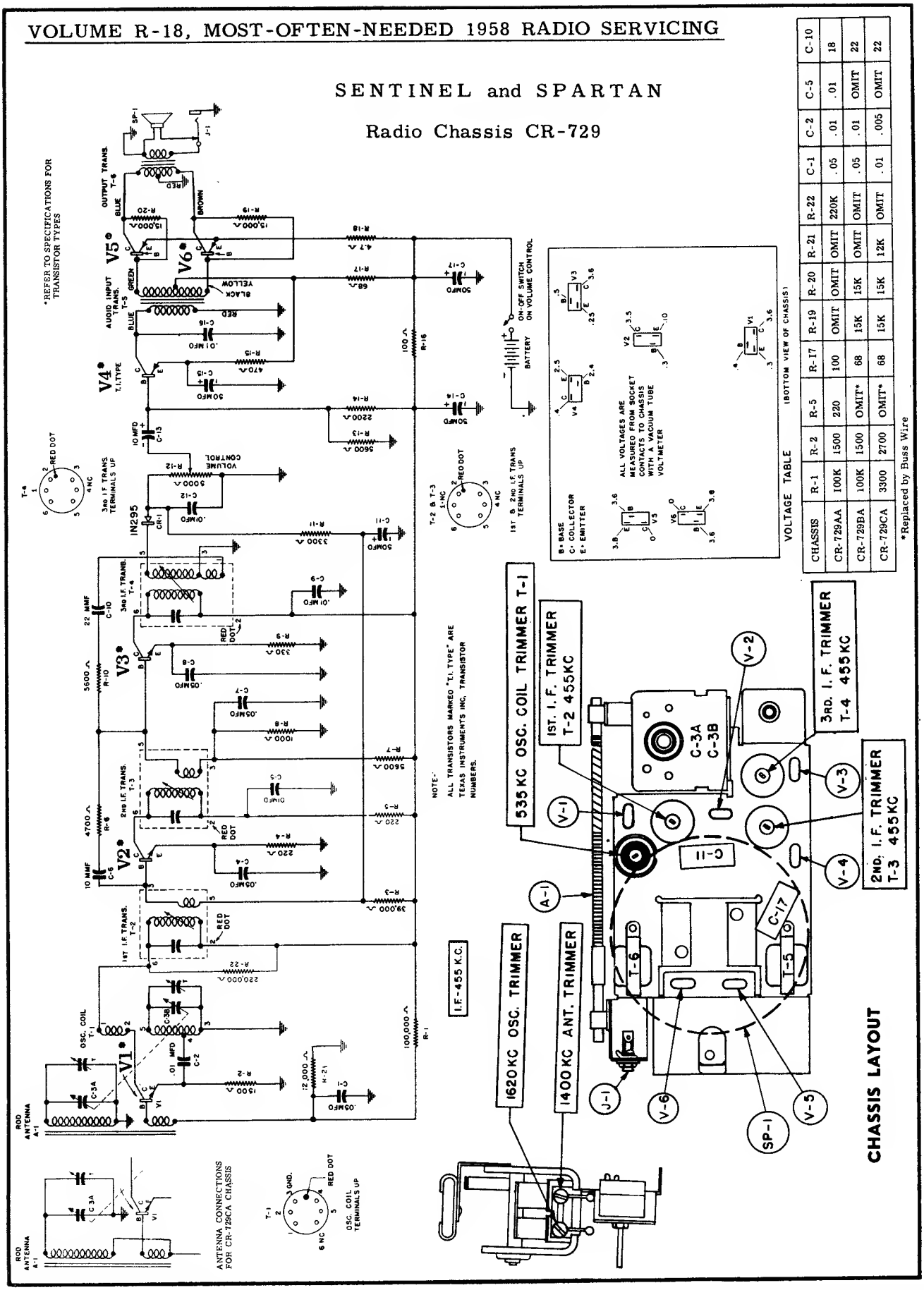
Step	Connect the high side of test-oscillator to—	Tune test-osc. to—	Turn radio dial to—	Adjust the following for max. output
1	12BA6 I-F grid through .01 mfd. capacitor	455 kc	Quiet-point 1,600 kc end of dial	T2 (top) 2nd I-F trans.
2	Stator of C1-B through .01 mfd.			T1 (top and bottom) 1st I-F trans.
3	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		





SENTINEL and SPARTAN

Radio Chassis CR-729

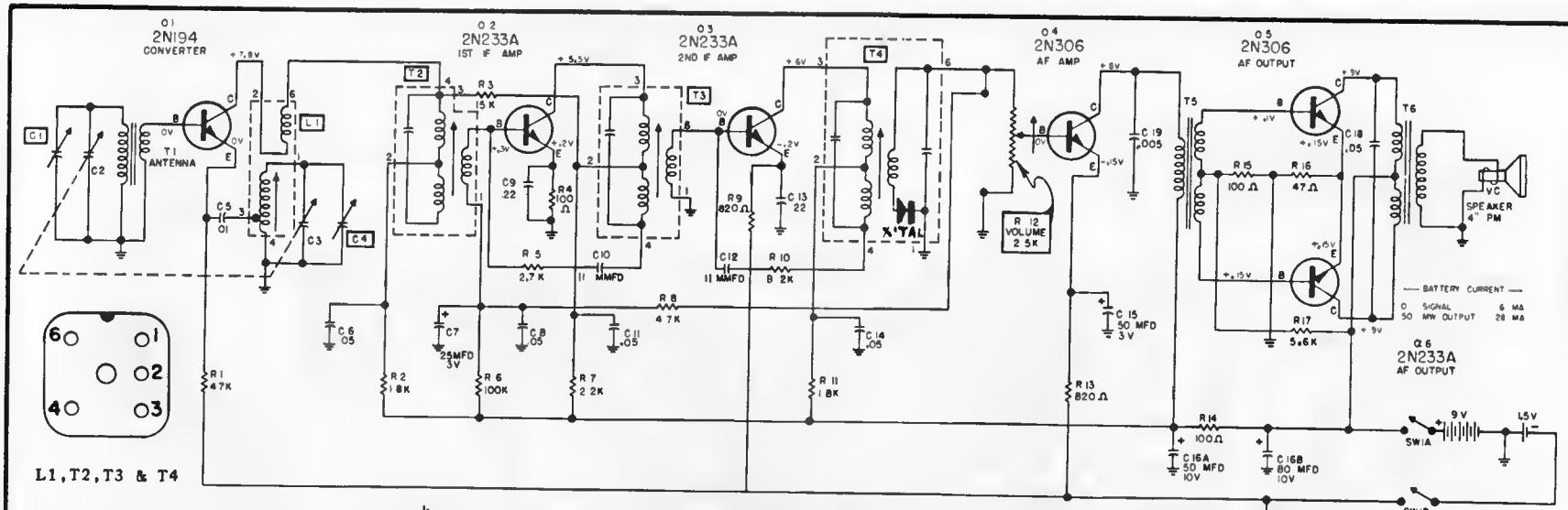


CHASSIS	R-1	R-2	R-5	R-17	R-19	R-20	R-21	R-22	C-1	C-2	C-5	C-10
CR-729AA	100K	1500	220	100	OMIT	OMIT	OMIT	220K	.05	.01	.01	18
CR-729BA	100K	1500	OMIT*	68	15K	15K	OMIT	OMIT	.05	.01	OMIT	22
CR-729CA	3300	2700	OMIT*	68	15K	15K	12K	OMIT	.01	.005	OMIT	22

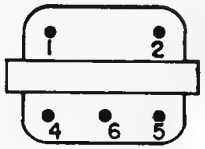
*Replaced by Buss Wire

SYLVANIA

CHASSIS: 1-617-1
MODELS: 3203 AND 3204

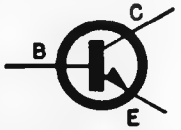


L1, T2, T3 & T4



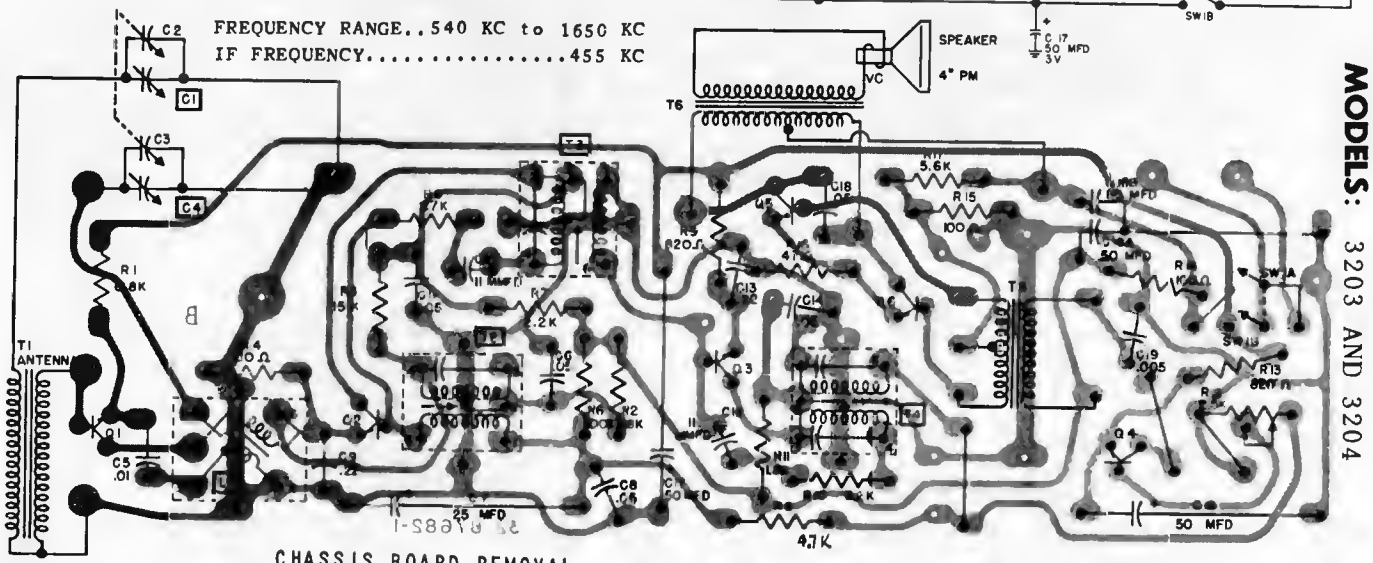
BOTTOM VIEW OF T5

TRANSISTOR

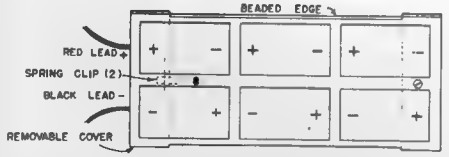


B-BASE
C-COLLECTOR
E-EMITTER

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



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.

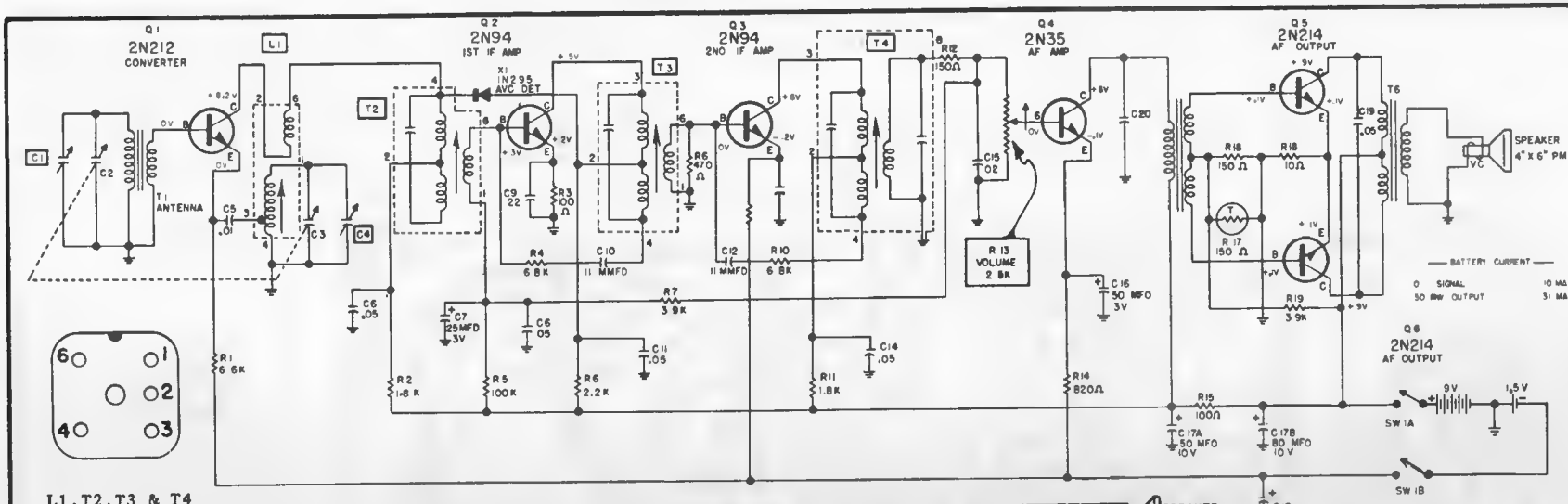
3. Remove screws (2) securing chassis board to mounting brackets. (NOTE: One screw is insulated from chassis by a fiber washer. Replace this washer when installing chassis board.)

The chassis may now be lifted from case for alignment and maintenance.

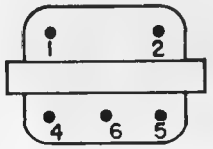
SYLVANIA

CHASSIS: 1-620-1

MODELS: 3305

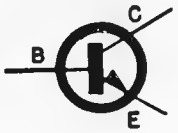


L1, T2, T3 & T4



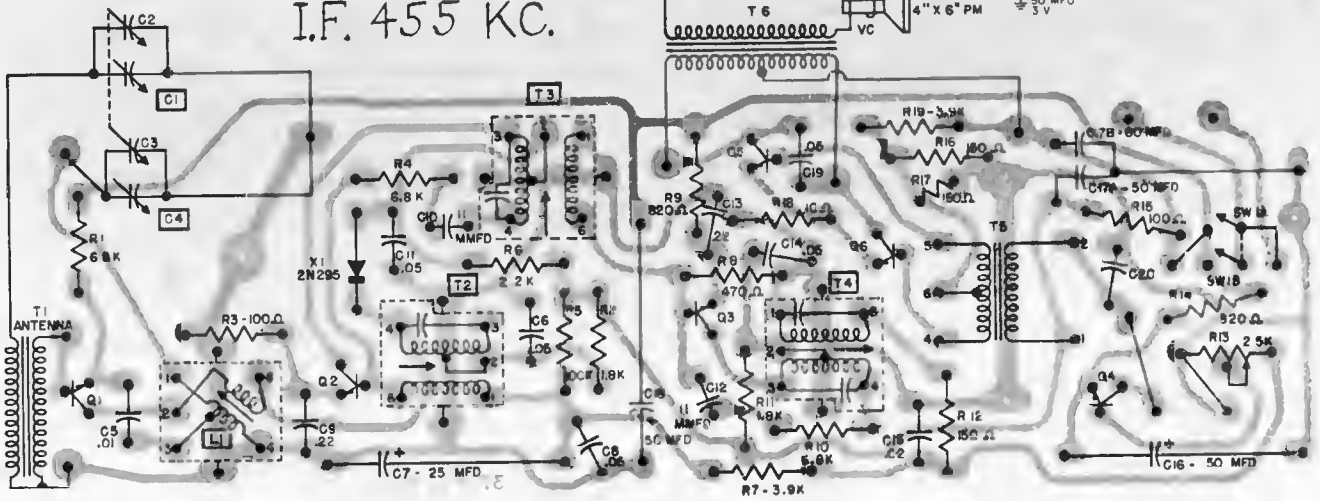
BOTTOM VIEW OF T5

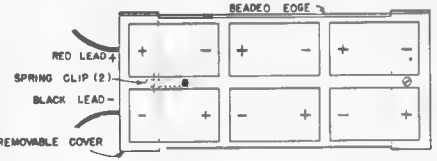
TRANSISTOR



B-BASE
C-COLLECTOR
E-EMITTER

I.F. 455 KC.





CHASSIS BOARD REMOVAL

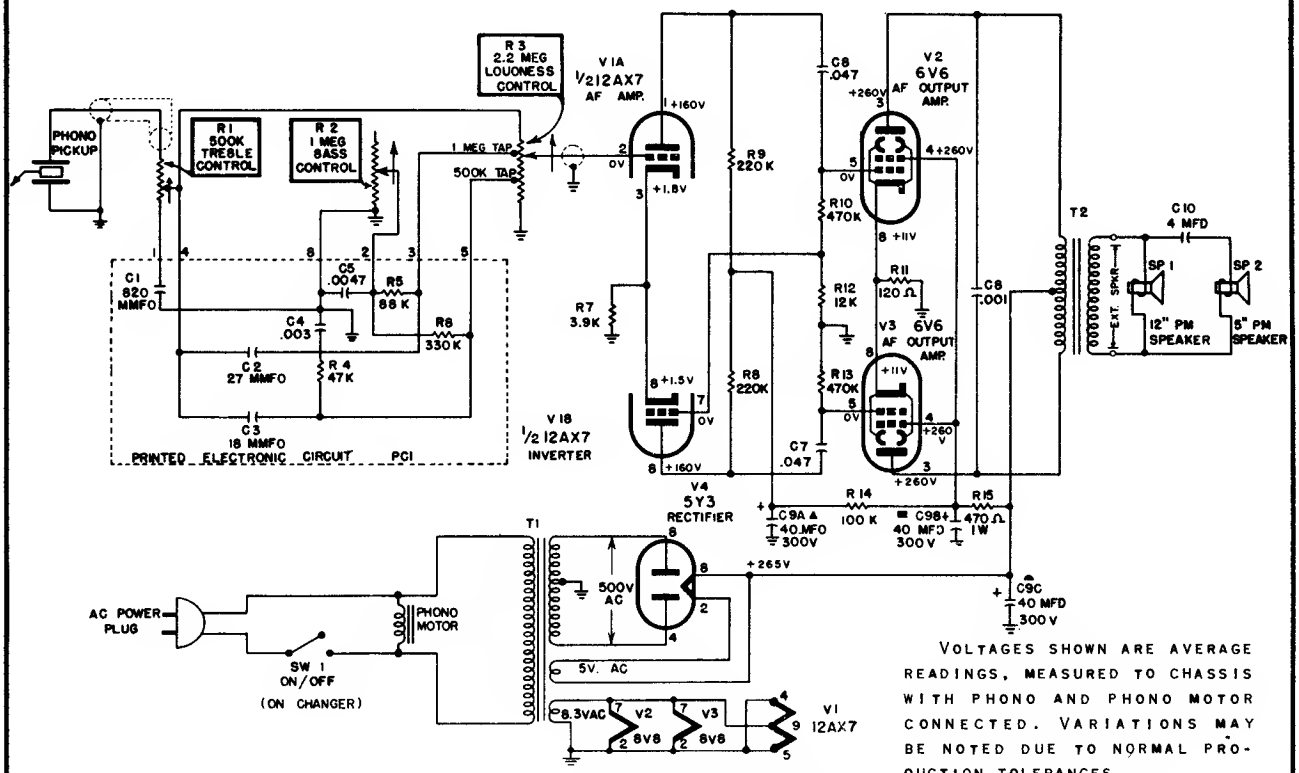
1. Open case by depressing top of front cover near handle ends while pulling top of rear cover backward.

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.)

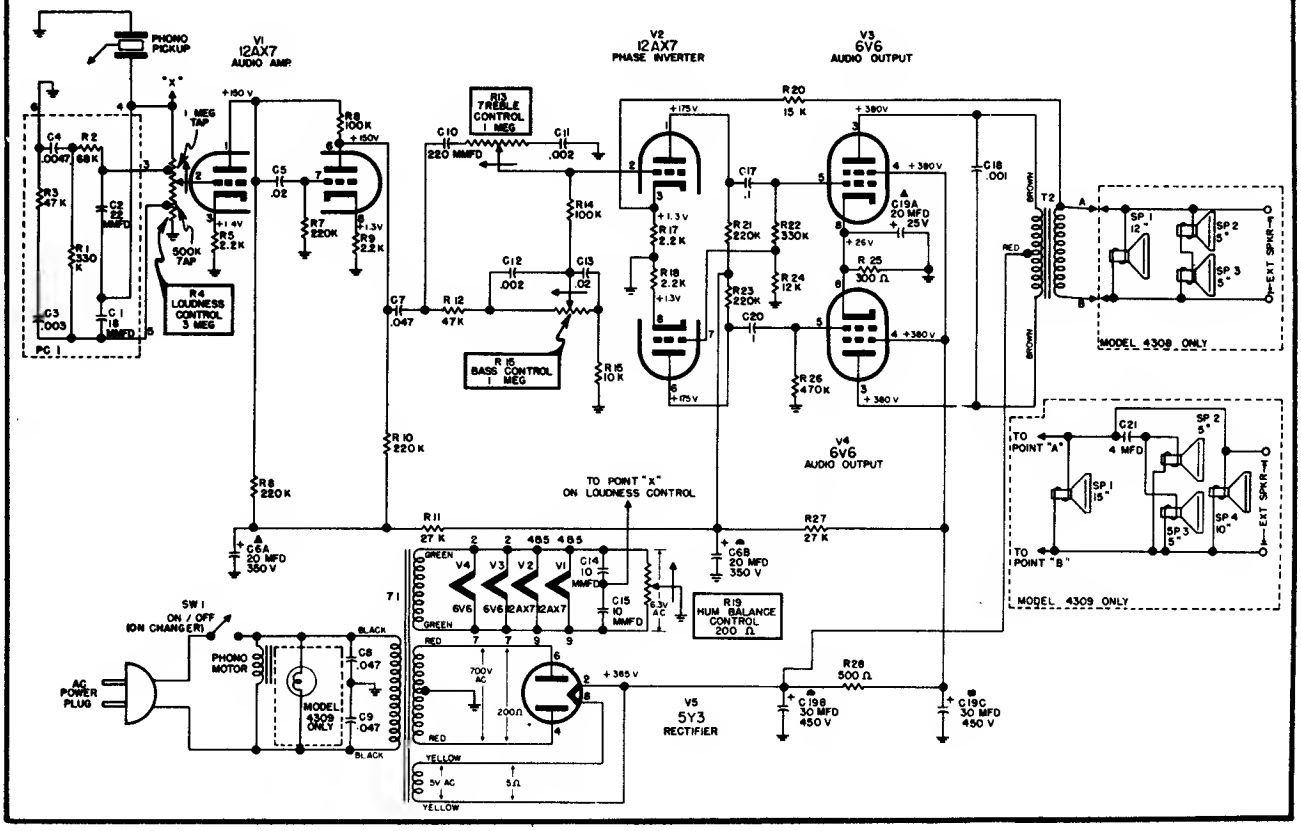
The chassis may now be lifted from case for alignment and maintenance.

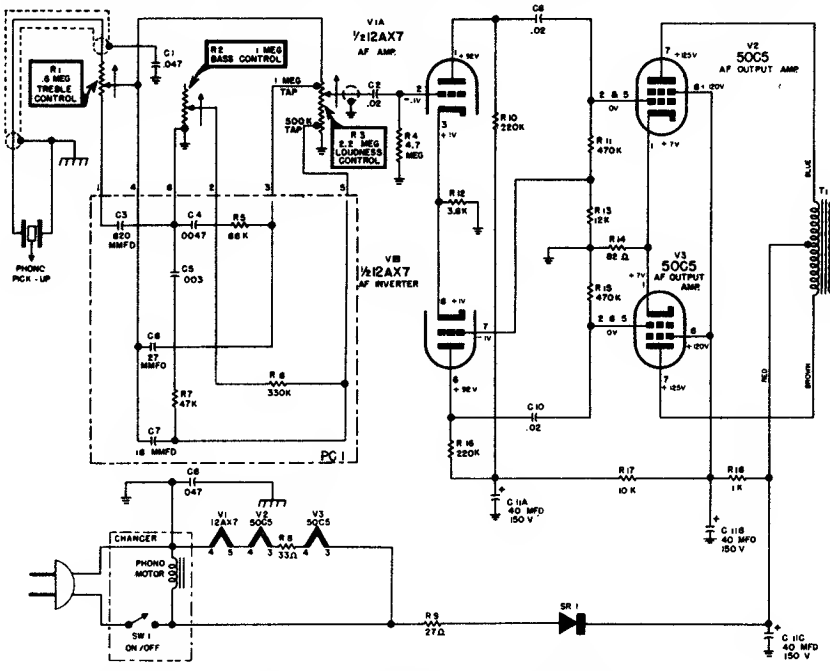
SYLVANIA Amplifier Chassis 1-609-6, Model 4307



VOLTAGES SHOWN ARE AVERAGE READINGS, MEASURED TO CHASSIS WITH PHONO AND PHONO MOTOR CONNECTED. VARIATIONS MAY BE NOTED DUE TO NORMAL PRODUCTION TOLERANCES.

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

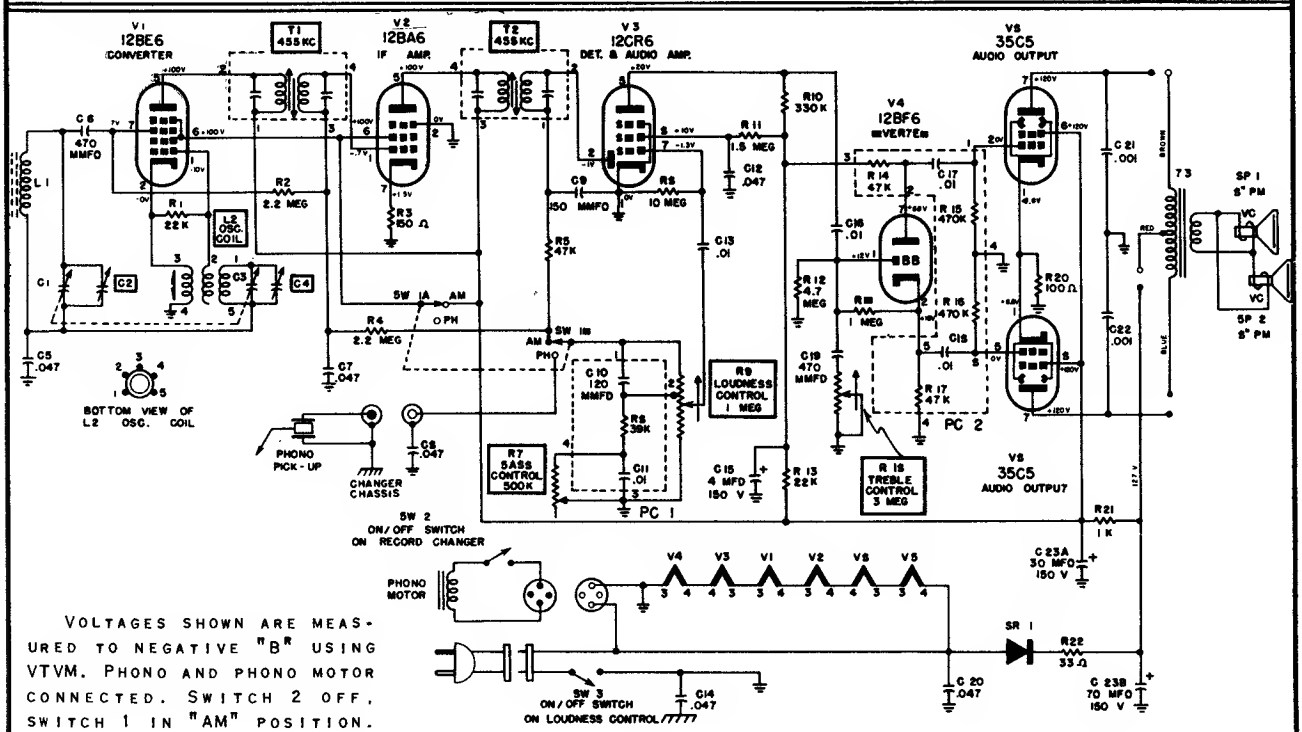




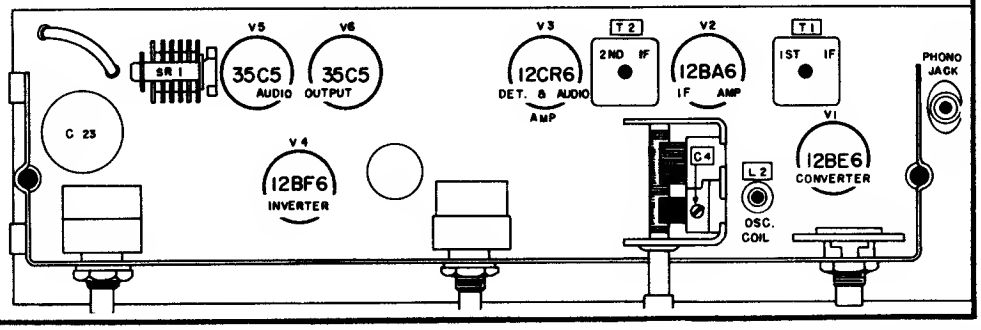
SYLVANIA
Chassis 1-623-1
Model 4406

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.



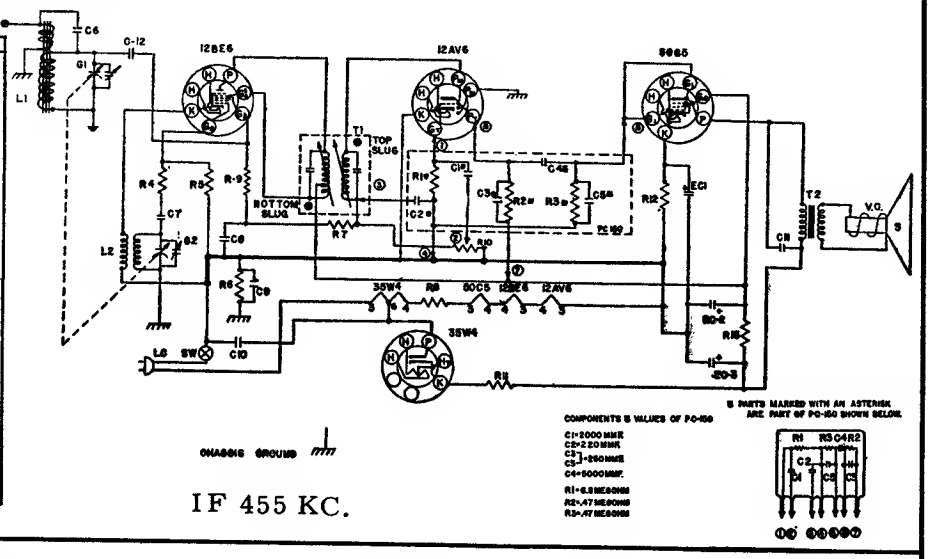
VOLTAGES SHOWN ARE MEASURED TO NEGATIVE "B" USING VTVM. PHONO AND PHONO MOTOR CONNECTED. SWITCH 2 OFF, SWITCH 1 IN "AM" POSITION.



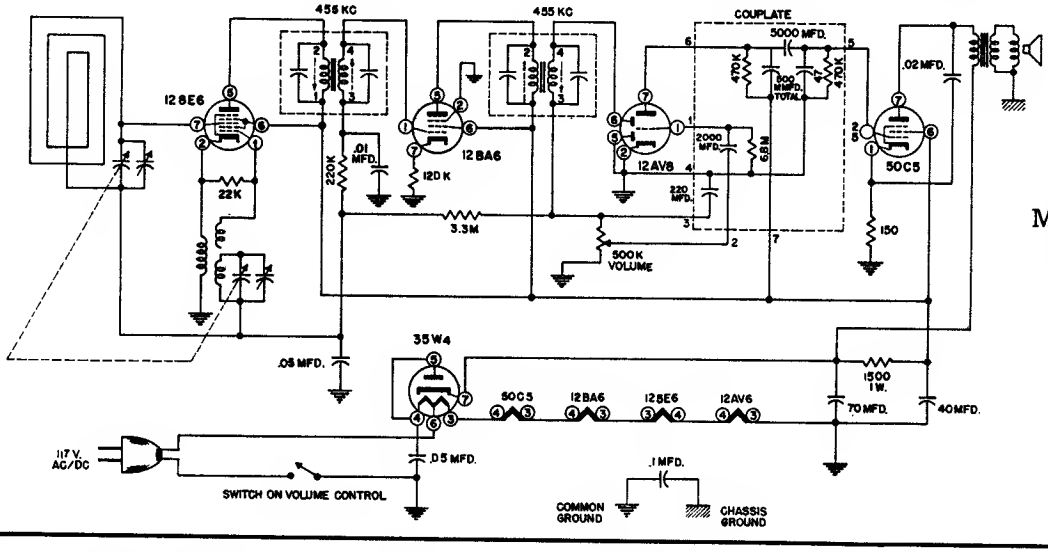
SYLVANIA
Chassis 1-624-1
Model 4501

TRAV-LER MODEL 46-37

PART NO.	SYMBOL	DESCRIPTION
CC-21	C6	10MME CERAMIC CONDENSER
CC-12	D7	47MME CERAMIC CONDENSER
PC-5	C8	.05ME PAPER CONDENSER 400 V.
PC-5	C9	.05MF PAPER CONDENSER 400 V.
PC-5	C10	.05 ME PAPER CONDENSER 400V.
PC-6	C11	.006MF PAPER CONDENSER 600V.
MC-19	PC-150	COUPLATE
IR-17	R-4	33 OHM 1/2 W. 20% CARBON RESISTOR
IR-8	R-5	2.2K OHM 1/2 W. 20% CARBON RESISTOR
IR-20	R-6	220K OHM 1/2 W. 20% CARBON RESISTOR
IR-23	R-7	3.3 MEGOHM 1/2 W. 20% CARBON RESISTOR
IR-41	R-8	47 OHM 1 W. 10% CARBON RESISTOR
IR-12	R-9	1 MEGOHM 1/2 W. 20% CARBON RESISTOR
CC-33	C-12	220MMFD. 500V. 20% CERAMIC TUB. COND.
VC-64	R-10	1 MEGOHM VOLUME CONTROL
IR-17	R-11	33 OHM 1/2 W. 20% CARBON RESISTOR
IR-14	R-12	150 OHM 1/2 W. 20% CARBON RESISTOR
IR-25	R-13	2200 OHM 1W. 10% CARBON RESISTOR
EC-28	EC-1	10ME-25 W.V.D.C.
	EC-2	20MF-150 W.V.D.D. — ELECTROLYTIC CONDENSER
	EC-3	40MF-150 W.V.D.C.
CO-4	LC	A.C. LINE CORD
GC-15	G1	ANT. SECTION-WITH TRIMMER — GANG CONDENSER
	G2	OSC. SECTION-WITH TRIMMER
LL-32	L1	FERRAMIC ROD ANTENNA COIL
LO-21	L2	OSCILLATOR COIL
LI-13	T1	455 KC. TAPPED PRIMARY-IF COIL
	SW	S.P.S.T. SWITCH(PART OF VOLUME CONTROL)
SPK-37	T2	OUTPUT TRANSFORMER — PM SPEAKER
	VC	VOICE COIL WINDING
	S	SPEAKER

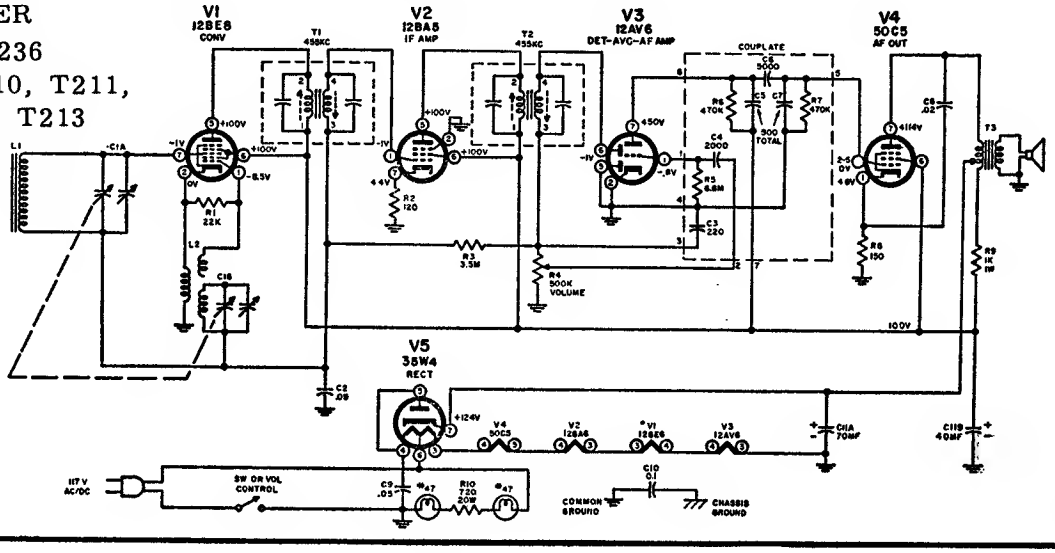


IF 455 KC.



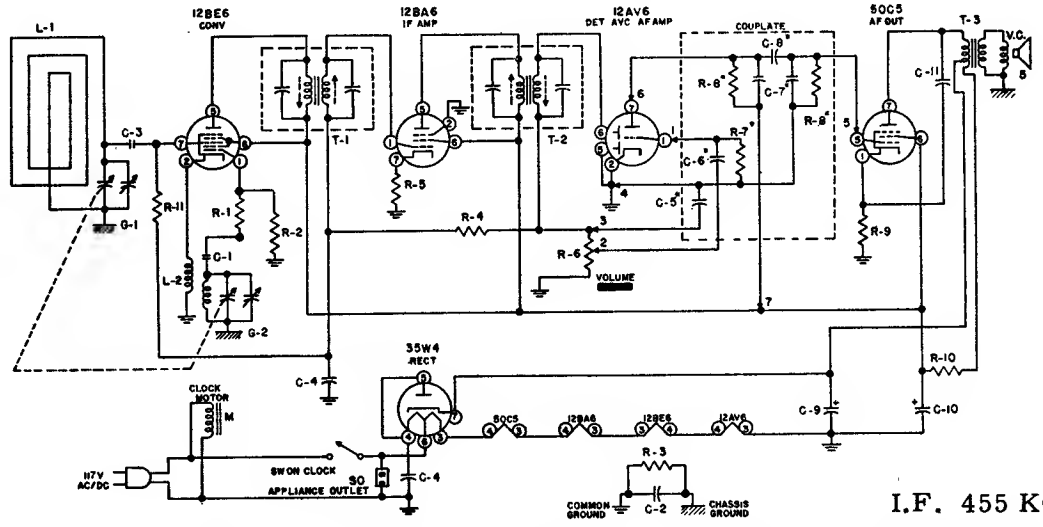
TRAV-LER
Models T200,
T201, T202,
T203, T204

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



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

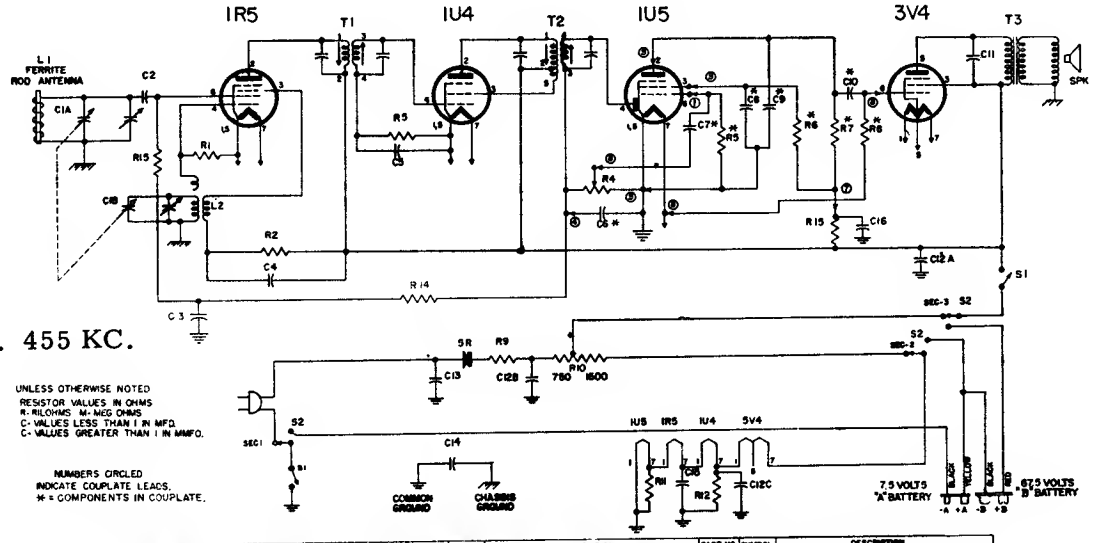
The diagram below is exact for above listed sets. Model 56C240 is very similar but includes pilot light and phono input jack and switch.



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-55	S	4"-6" P.M SPEAKER
IR-45	R-2	22M.Ω. RESISTOR 1/2W. 10%	PC- 5	C- 2	.1 MFD. CONDENSER 400 V.		V.C.	VOICE COIL
IR-20	R-3	220M.Ω RESISTOR 1/2W. 20%	CC-33	C- 3	220 MMFD. 500V. 20% CER COND.	AT-24	T-3	OUTPUT TRANSFORMER
IR-23	R-4	3.3MEG.RESISTOR 1/2W. 20%	PC- 5	C- 4	.05 MFD. CONDENSER 400 V.	LL-48	L-1	LOOP ANTENNA
IR-155	R-5	120.Ω RESISTOR 1/2W. 10%		C- 5*	220 MMFD.	LO-27	L-2	OSC COIL
VC-101	R-6	1 MEG. VOLUME CONTROL	MO-19	C- 6*	.002 MFD.	SO-54	SO	APPLIANCE OUTLET SOCKET
MC-18	R-7*	6.8 MEG.		C- 7*	250 MMFD.			
	R-8*	470M.Ω.		C- 8*	.005 MFD.	CK- 7	M	ELECTRIC CLOCK
IR-98	R-9	150.Ω. RESISTOR 1/2W. 10%	EC-68	C- 9	70 MFD. 150 W.V.D.C. ELECTROLYTIC		SW	
IR-42	R-10	1000Ω RESISTOR 1 W. 10%		C-10	40 MFD;			
IR-12	R-11	1MEG. RESISTOR 1/2W. 20%	PC-47	C-11	.02 MFD. CONDENSER 400 V.			
	T- 1	INPUT I.F. TRANSFORMER	BC-24	C- 1	TUNING CONDENSER			
LI-18	T- 2	OUTPUT I.F. TRANSFORMER		C- 2				

TRAV-LER RADIO MODEL 5220



UNLESS OTHERWISE NOTED
RESISTOR VALUES IN OHMS
R-KILOHMS M-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
GC-21	C1A	TUNING CAPACITOR
	C1B	" "
CC-57	C2	220 MMFD CERAMIC CONDENSER 500V.
PC-2	C3	.047 MFD PAPER CONDENSER 200V.
CC-36	C4	.01 MFD. CERAMIC CONDENSER 500V.
CC-37	C5	.001 MFD. CERAMIC CONDENSER 600V
MC-19	*C6	150 MMFD
	*C7	.002 MFD.
	*C8	.01 MFD. CONDENSERS IN COUPLATE
	*C9	150 MMFD.
	*C10	.005 MFD.
CC-58	C11	.002 MFD. CERAMIC CONDENSER 500 V.
EC-68	C12A	90 MFD. @ 150V. ELECTROLYTIC CONDENSER
	C12B	" " " "
	C12C	100 MFD. @ 25 V. " "
PC-91	C13	.047 MFD. MOLDED PAPER CONDENSER 400V.
PC-9	C14	.1 MFD. PAPER CONDENSER 400 V.
PC-3	C15	.1 MFD. " " 300 V.
PC-9	C16	.1 MFD PAPER CONDENSER 400 V
IR-63	R1	100K Ω 1/2W. 10% CARBON RESISTOR
IR-49	R2	47K Ω 1/2 W 10% "
IR-131	R3	10 MEGOHM 1/2 W. 10% CARBON RESISTOR
VC-87	R4	2 MEGOHM VOLUME CONTROL
	*R5	10 MEGOHM
MC-78	*R6	4.7 "
	*R7	1 "
	*R8	3.3 MEGOHM
WR-30	R9	75 OHM 2 WATT FLEXIBLE WIREWOUND RESISTOR
WR-29	R10	5250 OHMS TAPPED AT 750 OHMS - CARDOHM
IR-148	R11	150 OHMS 1/2 W. 5% CARBON RESISTOR
IR-149	R12	680 OHMS 1/2 W. 5% CARBON RESISTOR
IR-105	R13	1 MEGOHM 1/2 W. 10% CARBON RESISTOR
IR-100	R14	3.3 MEGOHMS 1/2 W. 10% CARBON RESISTOR
IR-150	R15	270 R OHM 1/2 W. 10% CARBON RESISTOR
LL-48	L1	IRON ROD ANTENNA
LO-24	L2	OSCILLATOR COIL

RESISTORS IN COUPLATE

PART NO	SYMBOL	DESCRIPTION
LI-19	T1	1st IF COIL
LI-19	T2	2nd IF COIL
AT-21	T3	OUTPUT TRANSFORMER
	S1	SWITCH ON VOLUME CONTROL D.P.S.T.
SW-23	S2	POWER CHANGEOVER, 3 POLE, 3 POSITION
SR-2	SR	75 MIL. SELENIUM RECTIFIER
SPK-51	SPK	4" DIA. SPEAKER

Westinghouse

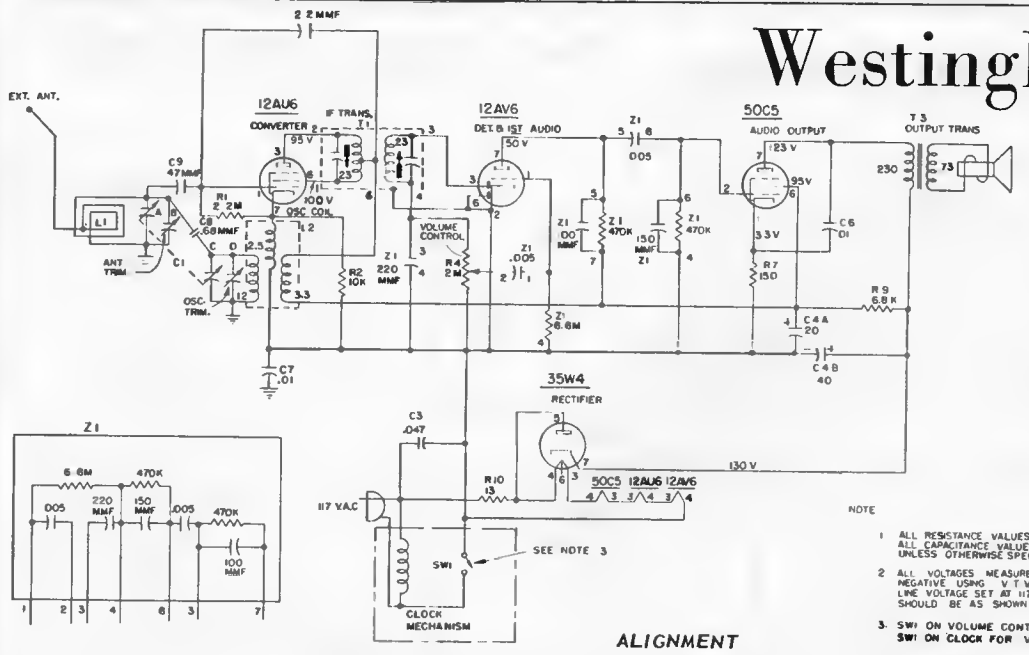
MODELS

H-570T4
(Mocha)

H-571T4
(Ivory)

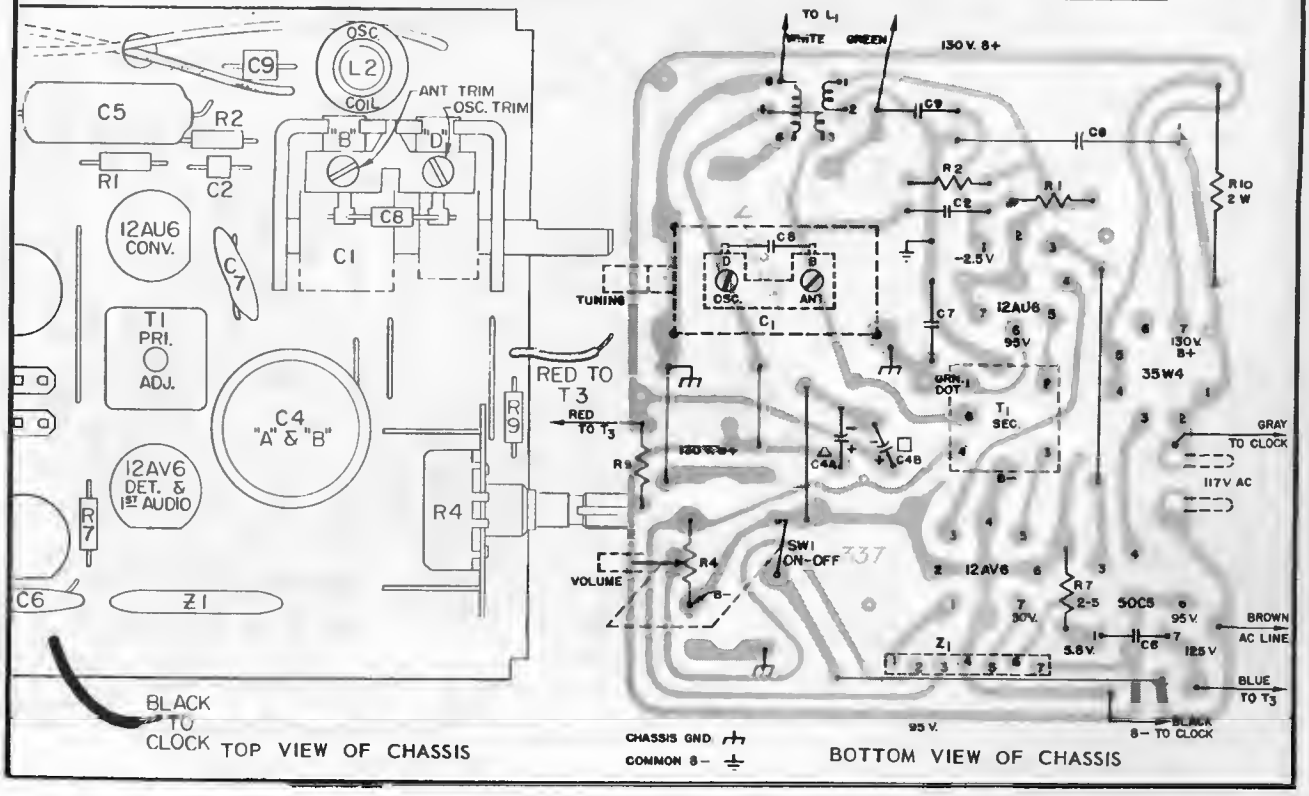
H-572T4
(Pink)

Chassis V-2239-4



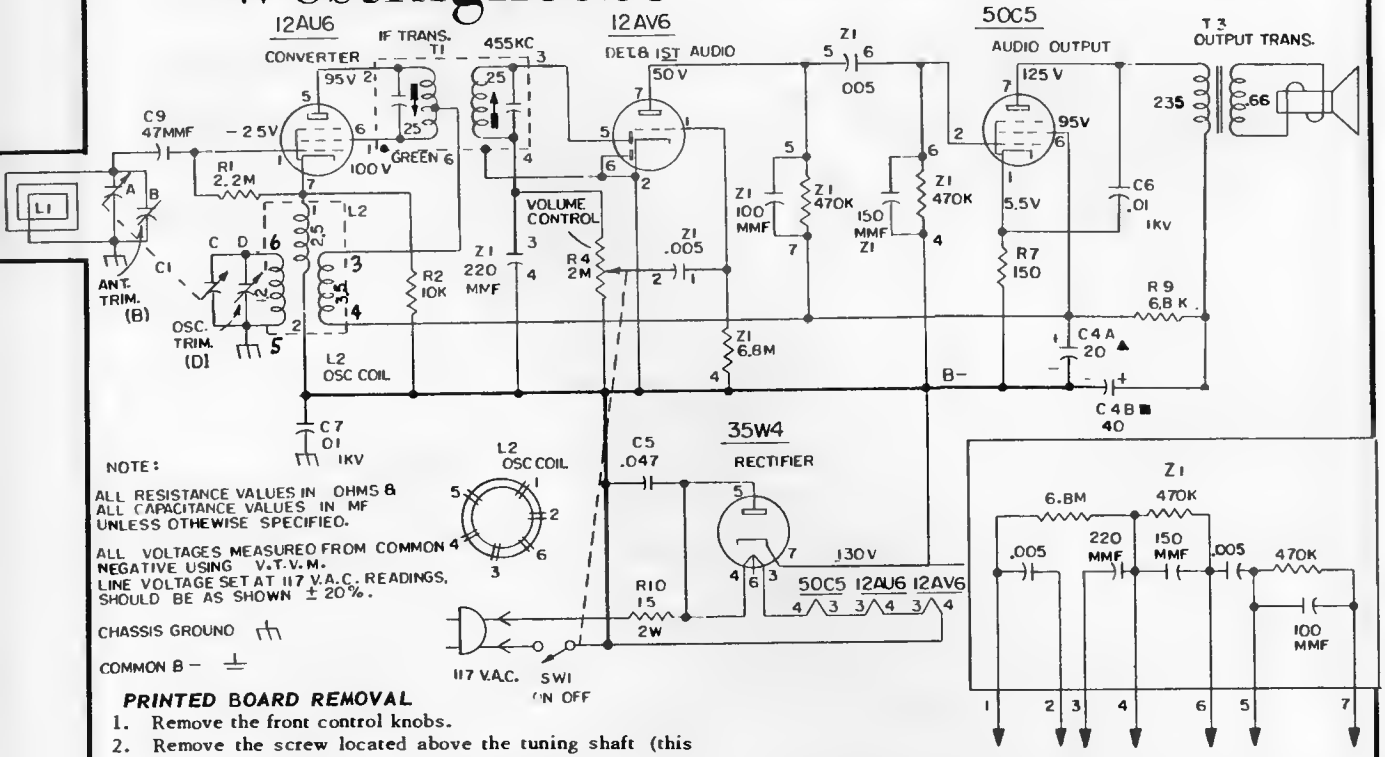
ALIGNMENT

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)



Westinghouse

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



NOTE:

ALL RESISTANCE VALUES IN OHMS &
ALL CAPACITANCE VALUES IN MF
UNLESS OTHEWISE SPECIFIED.

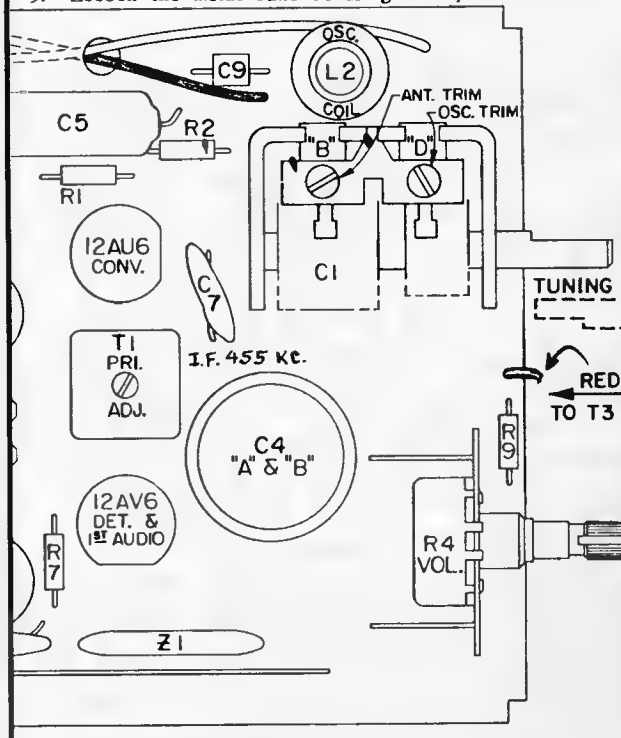
ALL VOLTAGES MEASURED FROM COMMON NEGATIVE USING V.T.V.M.
LINE VOLTAGE SET AT 117 V.A.C. READINGS, SHOULD BE AS SHOWN ± 20%.

CHASSIS GROUND

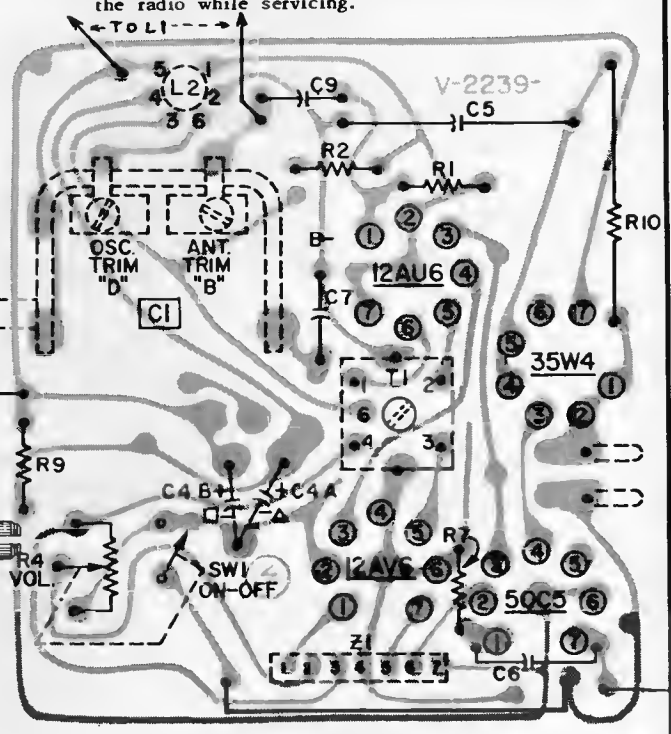
COMMON B –

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 the speaker to provide slack in the leads.
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



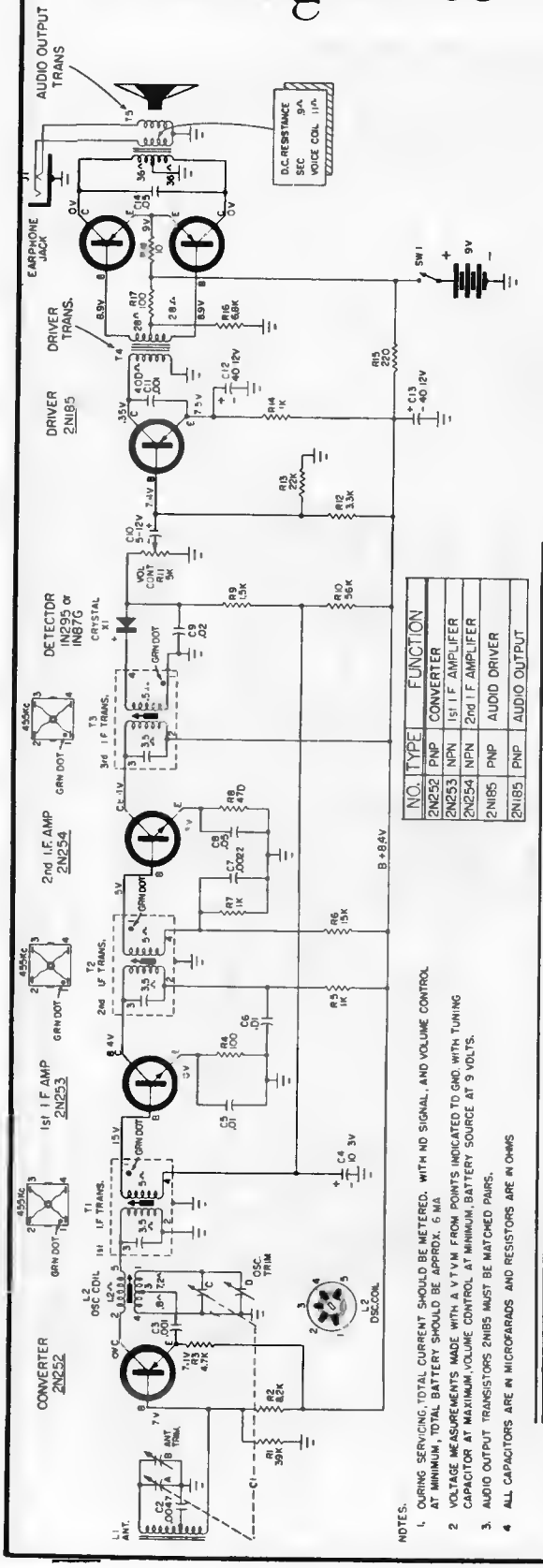
BOTTOM VIEW OF CHASSIS

Westinghouse

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

BOARD REMOVAL

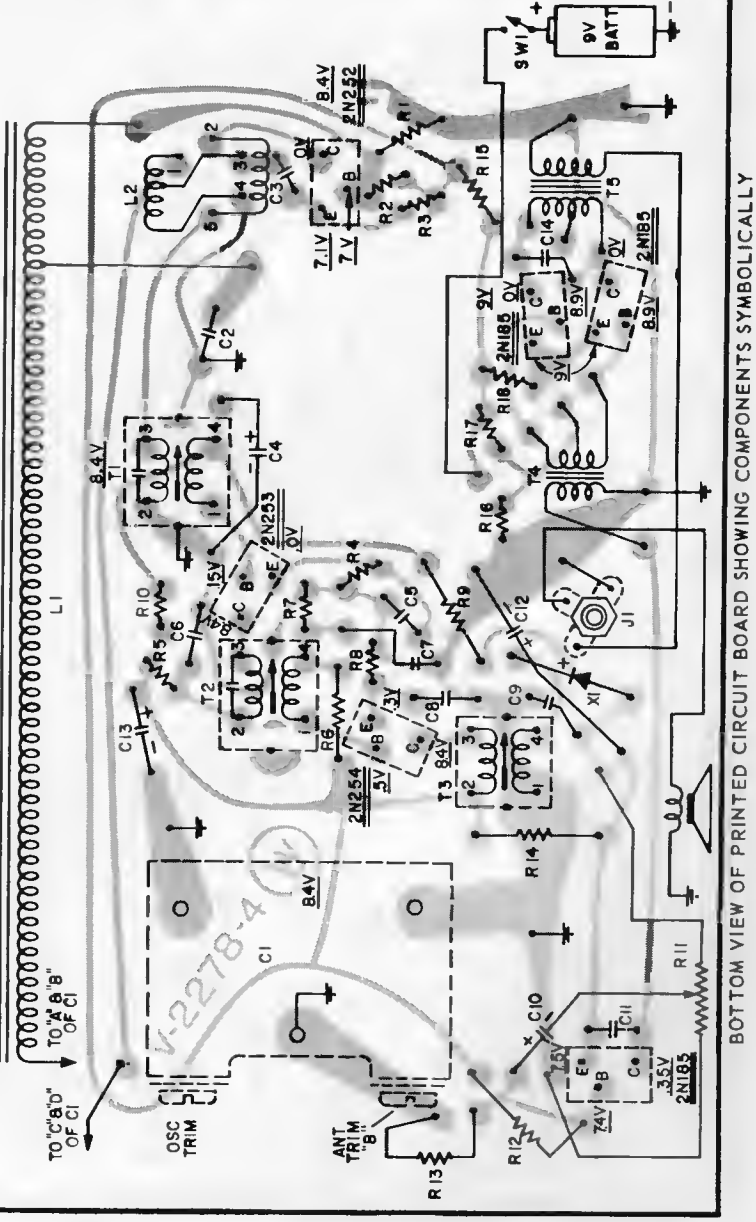
1. Remove the screw located in center of the tuning knob. Turn the dial to the low frequency end and grip the tuning knob with one hand. Remove the screw by turning it in a counter clockwise direction. Do not cause any undue strain on the tuning capacitor.
2. Remove back of cabinet by loosening coin-slot screw on back. Remove the ¼" 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 tuning capacitor end of the cabinet, until the upper end of the speaker bracket is free of the plastic lip. Now raise this end of the bracket over lip and slide it out of the cabinet.
4. To insert the board into the cabinet use the reverse procedure, being careful to lock the speaker bracket under both recesses provided in the cabinet front.



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

NOTES.

1. DURING SERVICING, TOTAL CURRENT SHOULD BE METERED. 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 OR 3V0	PNP	AUDIO DRIVER
2N291	PNP	AUDIO OUTPUT
IN295 OR IN87G	—	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, WITH NO SIGNAL, AND VOLUME CONTROL AT MINIMUM. TOTAL BATTERY DRAIN SHOULD BE APPROX. 10 MA. GND. WITH 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.
2. AUDIO OUTPUT TRANSISTORS 2N291 MUST BE MATCHED PAIRS.
3. ALL CAPACITORS ARE IN MICROFARADS AND RESISTORS ARE IN OHMS.

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 unreinforced side of the printed board into the grooves on the inside front of the cabinet and then secure with self-tapping screws.

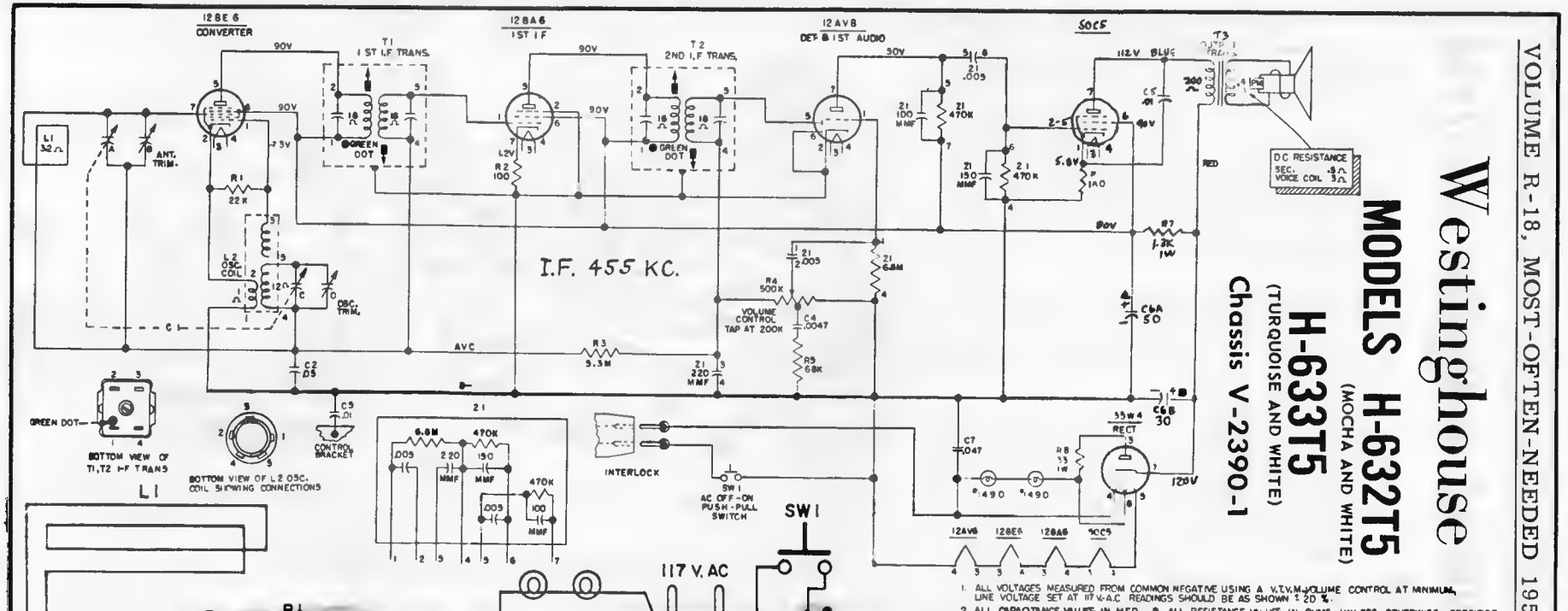
BOTTOM VIEW OF PRINTED BOARD SHOWING TOP COMPONENTS SYMBOLICALLY

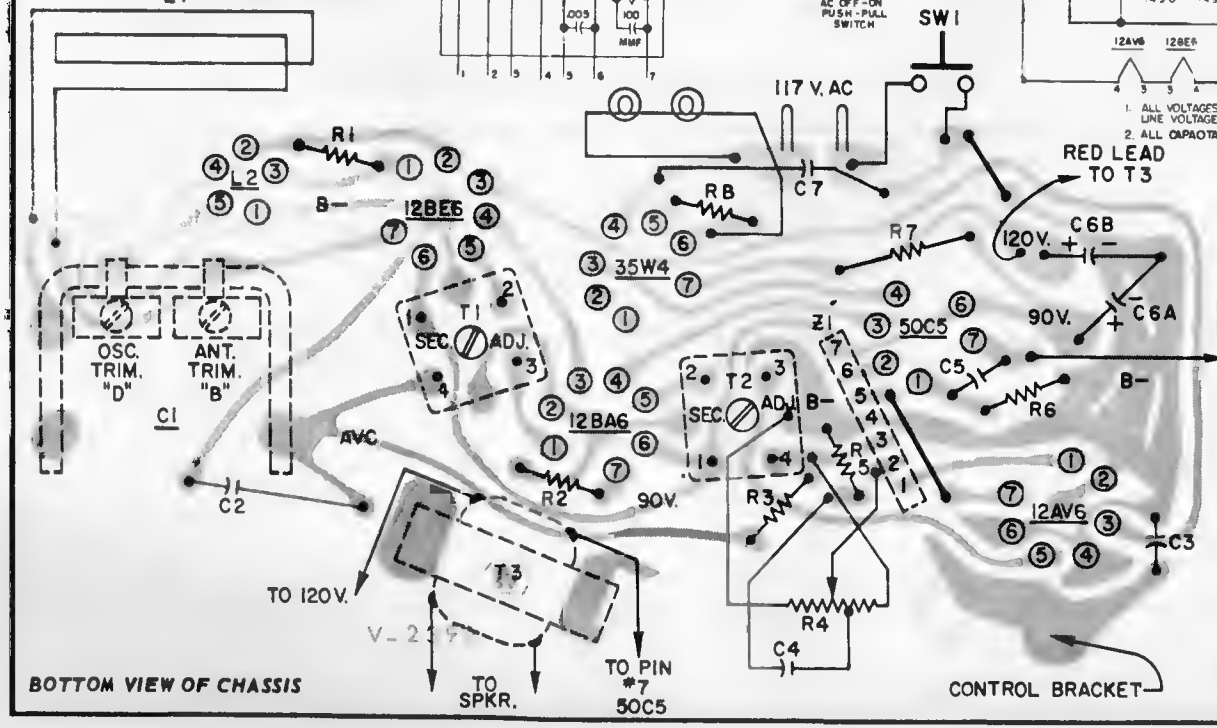
Westinghouse

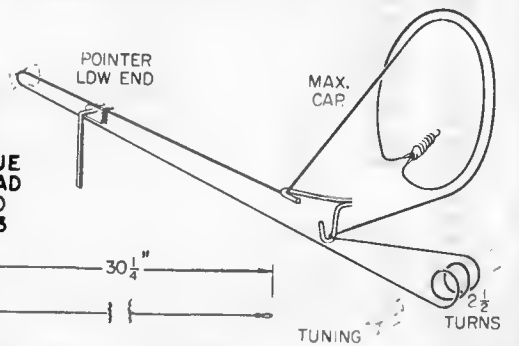
MODELS H-632T5 (MOCHA AND WHITE)

H-633T5 (TURQUOISE AND WHITE)

Chassis V-2390-1







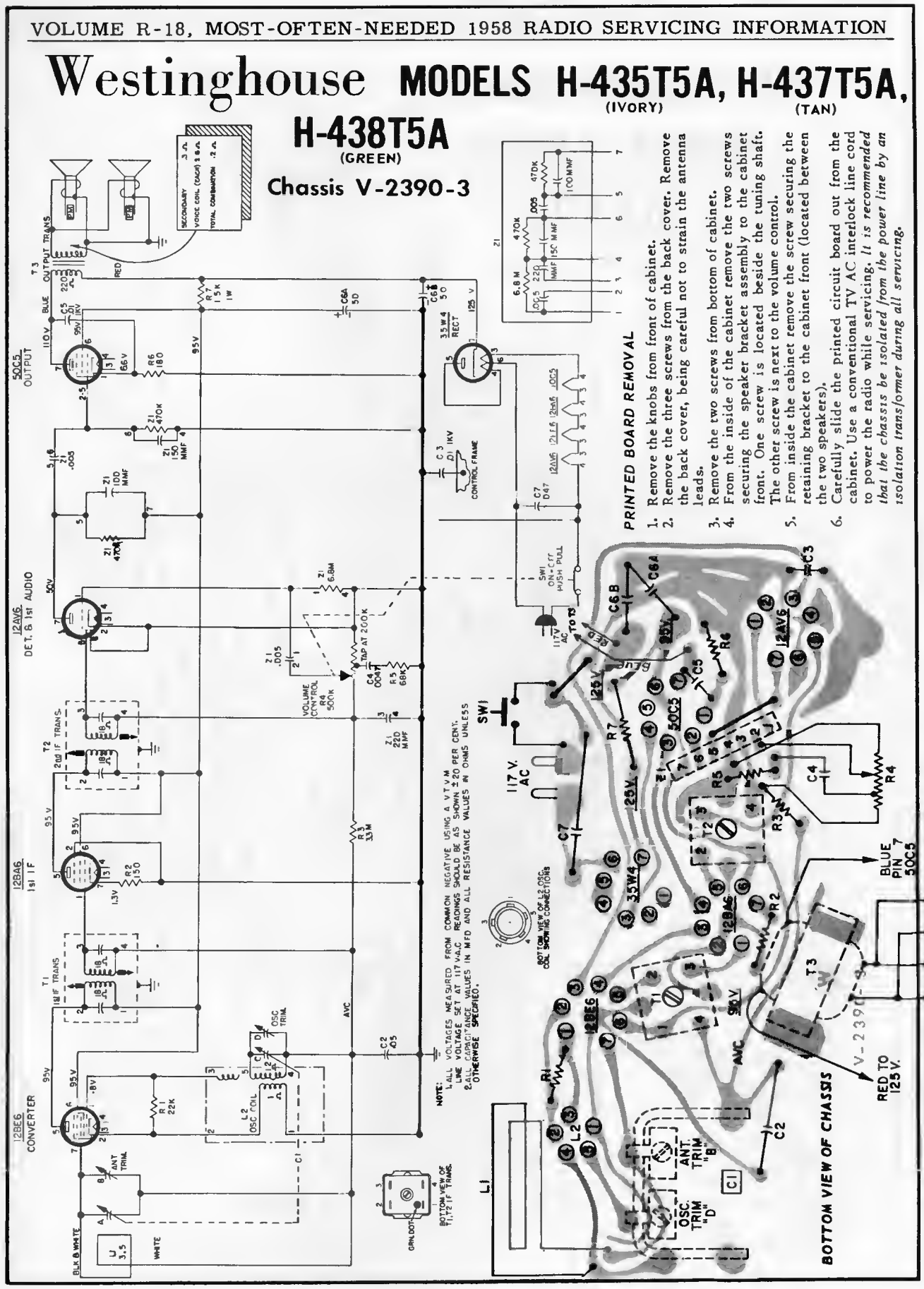
PRINTED BOARD REMOVAL

Remove the two 3½" 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 3½" 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, H-438T5A

(IVORY) (TAN) (GREEN)

Chassis V-2390-3

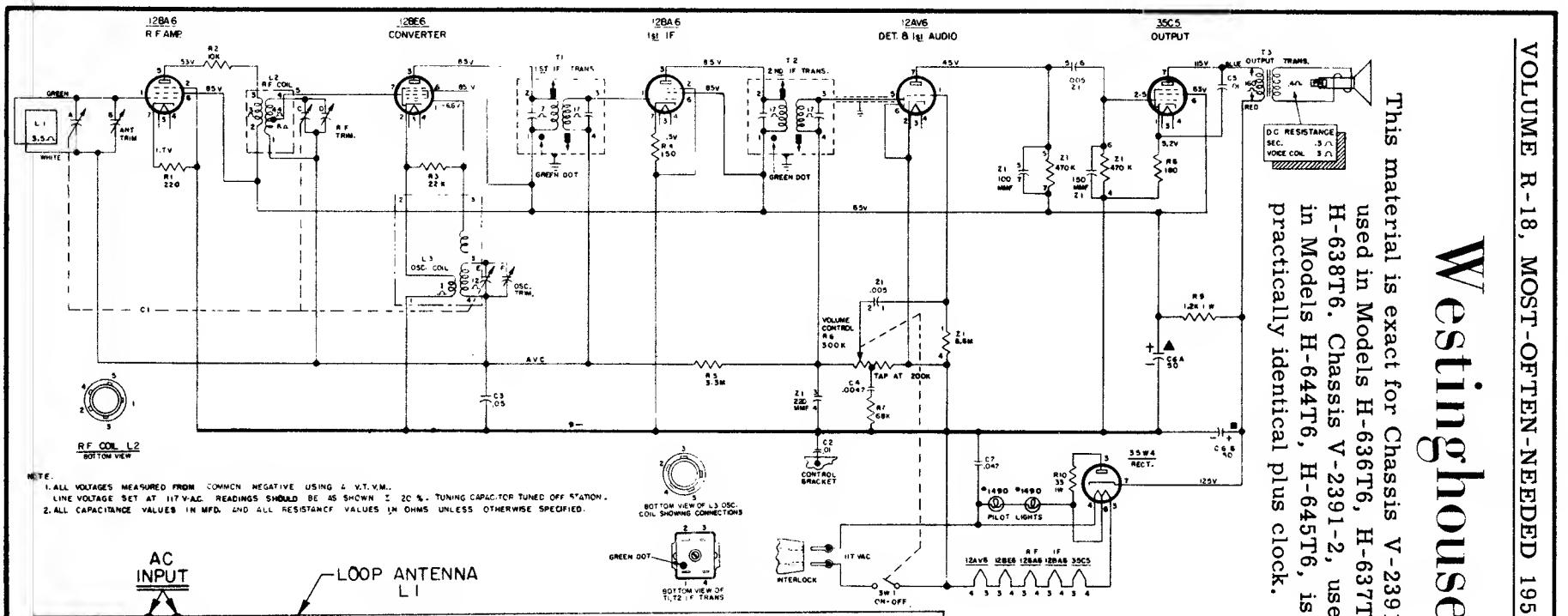


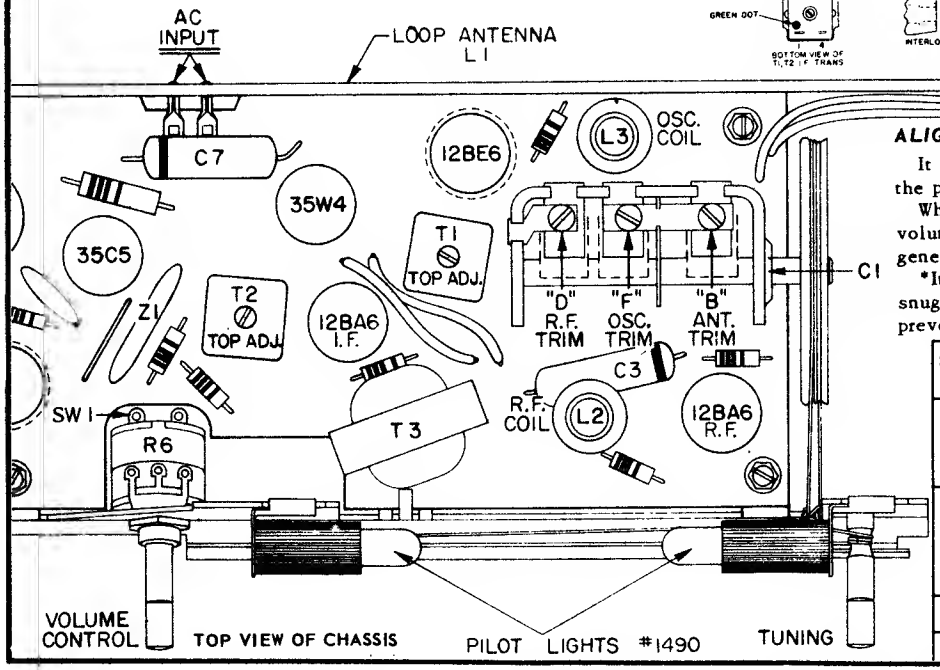
PRINTED BOARD REMOVAL

1. Remove the knobs from front of cabinet.
2. Remove the three screws from the back cover. Remove the back cover, being careful not to strain the antenna leads.
3. Remove the two screws from bottom of cabinet.
4. From the inside of the cabinet remove the two screws securing the speaker bracket assembly to the cabinet front. One screw is located beside the tuning shaft. The other screw is next to the volume control.
5. From inside the cabinet remove the screw securing the retaining bracket to the cabinet front (located between the two speakers).
6. Carefully slide the printed circuit board out from the cabinet. Use a conventional TV AC interlock line cord to power the radio while servicing. *It is recommended that the chassis be isolated from the power line by an isolation transformer during all servicing.*

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.



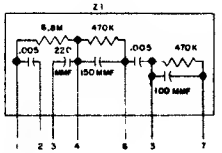


ALIGNMENT PROCEDURE

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 AB_1.

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

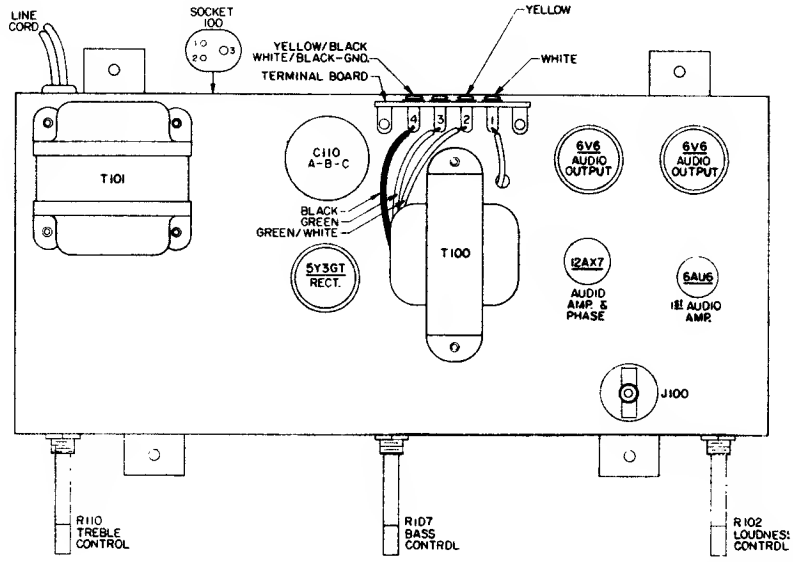
A 2.7 ohm resister is used in series with the 6AU6 heater to reduce hum.

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.

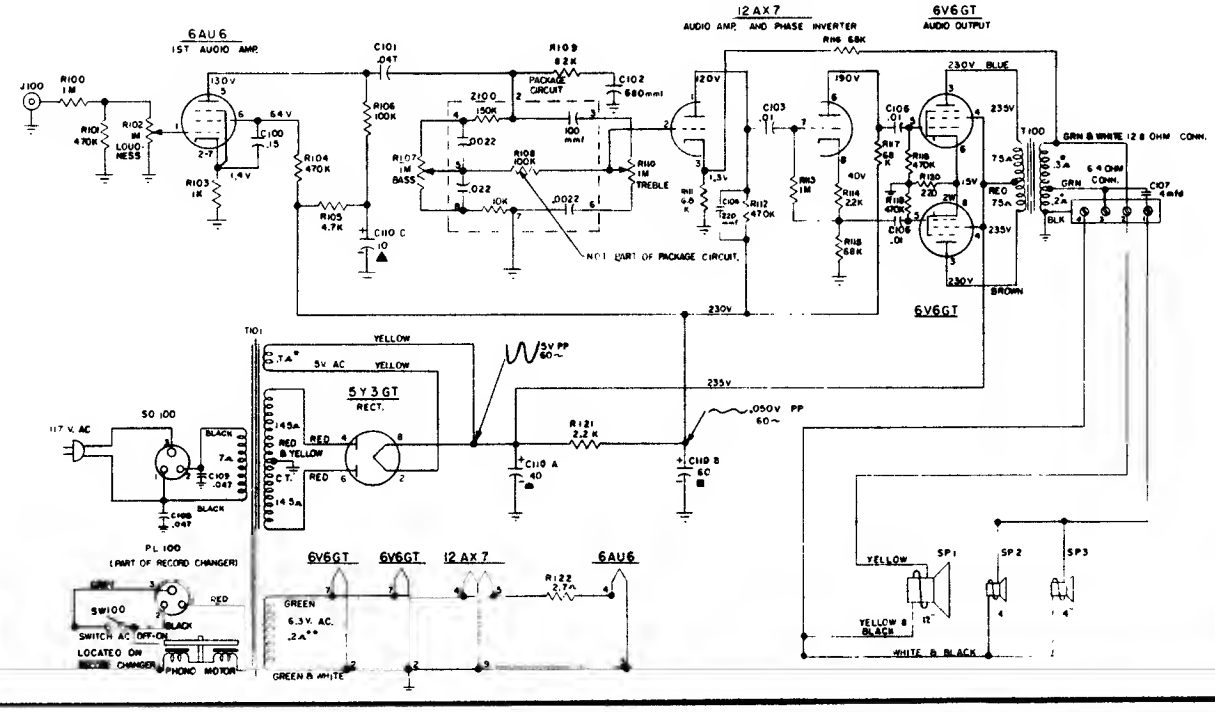
The function of C107 is to pass only high frequencies to the parallel high frequency speakers.

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

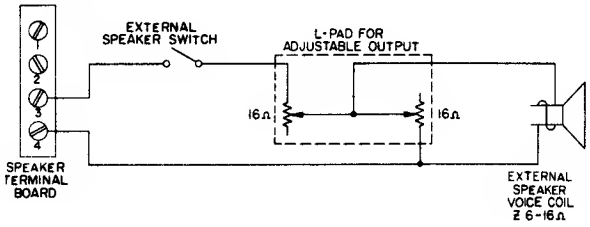
A 12AX7 is used as audio amplifier and phase inverter. Inverse feedback voltage is fed to the cathode of the audio amplifier (pin 3) to provide additional improvement in fidelity and stability. Grid drive to one 6L6 output tube is fed from the plate (pin 6); grid drive to the other 6L6 is fed from the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

Audio output stage

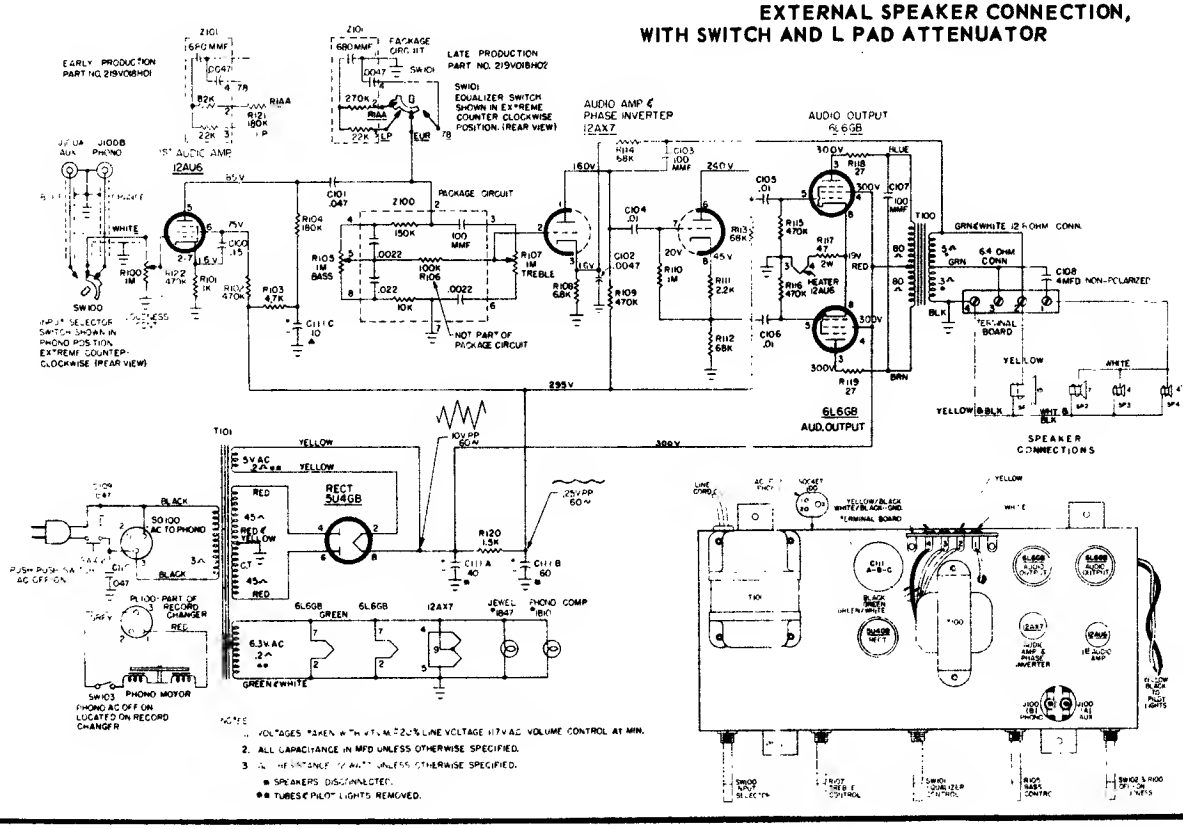
The 6L6 push-pull audio output tubes operate class AB_1. R118 and R119 prevent oscillation (ringing). The 12AU6 heater serves as part of the common cathode resistor for the 6L6 tubes. (This circuit arrangement provides DC for the 12AU6 heater).

Output circuit

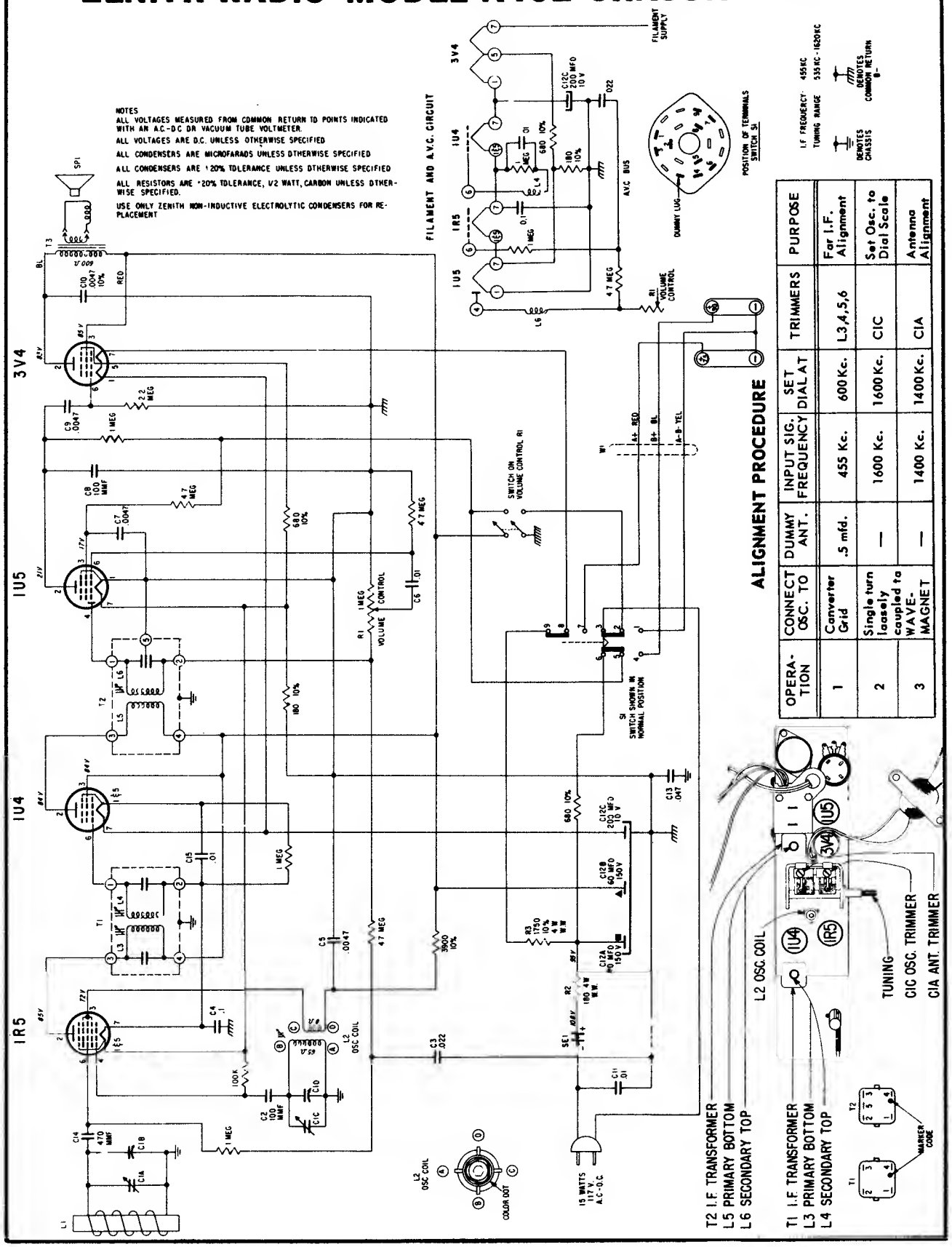
Normal DC resistance across the primary and secondary of T100 is shown in figure 1. Output impedance, between terminals 2 and 4 is 12.8 ohms; impedance between terminals 3 and 4 is 6.4 ohms. C108 is the cross-over capacitor which passes the high frequencies to the paralleled high frequency speakers.



EXTERNAL SPEAKER CONNECTION, WITH SWITCH AND L PAD ATTENUATOR



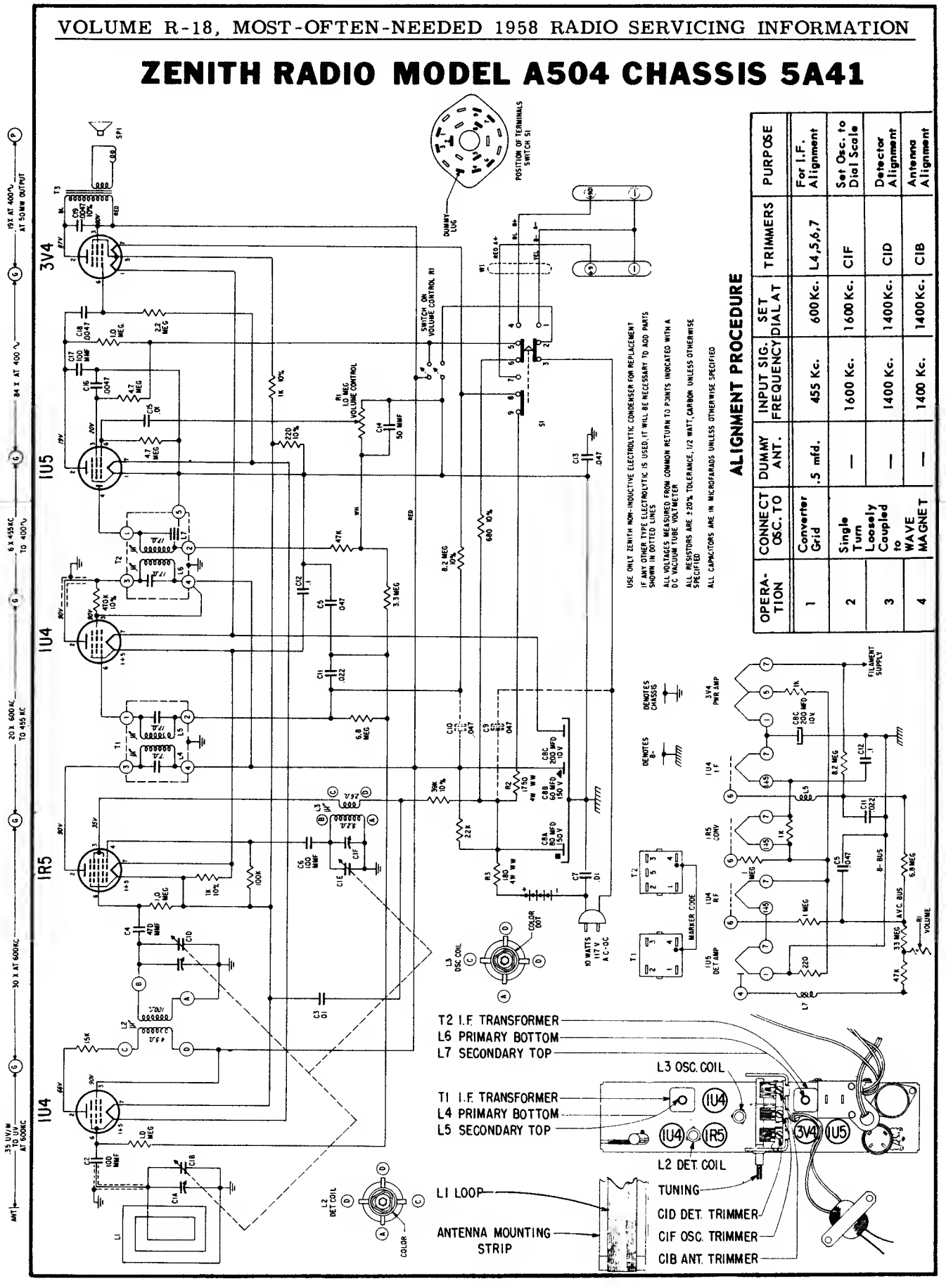
ZENITH RADIO MODEL A402 CHASSIS 4A41



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.	CIC	Set Osc. to Dial Scale
3		—	1400 Kc.	1400 Kc.	CIA	Antenna Alignment

ZENITH RADIO MODEL A504 CHASSIS 5A41



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 D.C. VACUUM TUBE VOLTMETER

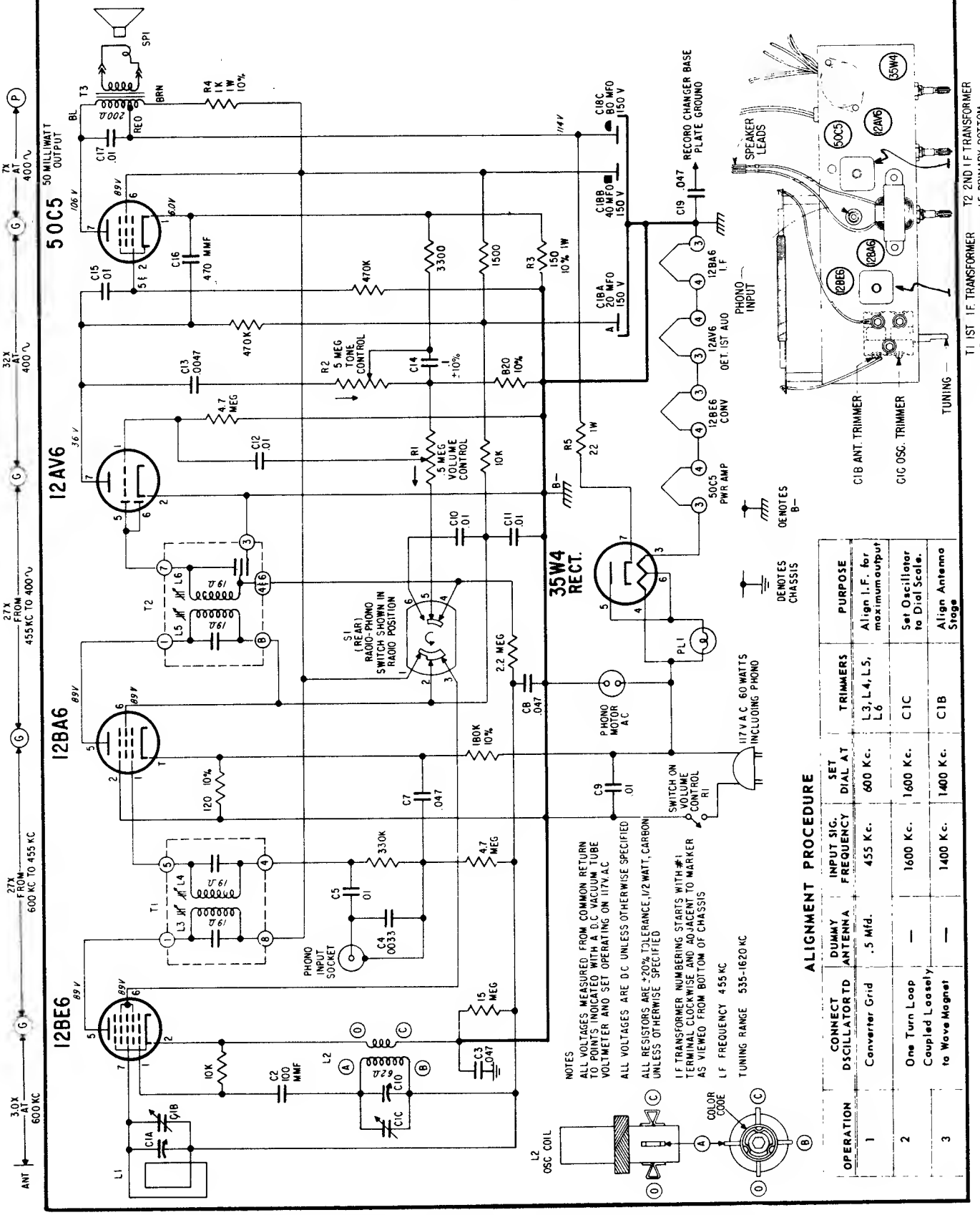
ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED

ALL CAPACITORS ARE IN MICROFARADS UNLESS OTHERWISE SPECIFIED

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.	L4,5,6,7	For I.F. Alignment
2	Single Turn Loosely Coupled to WAVE MAGNET	—	1600 Kc.	1600 Kc.	CIF	Set Osc. to Dial Scale
3		—	1400 Kc.	1400 Kc.	CID	Detector Alignment
4		—	1400 Kc.	1400 Kc.	CIB	Antenna Alignment

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

I.F. TRANSFORMER NUMBERING STARTS WITH #1 TERMINAL CLOCKWISE AND ADJACENT TO MARKER AS VIEWED FROM BOTTOM OF CHASSIS

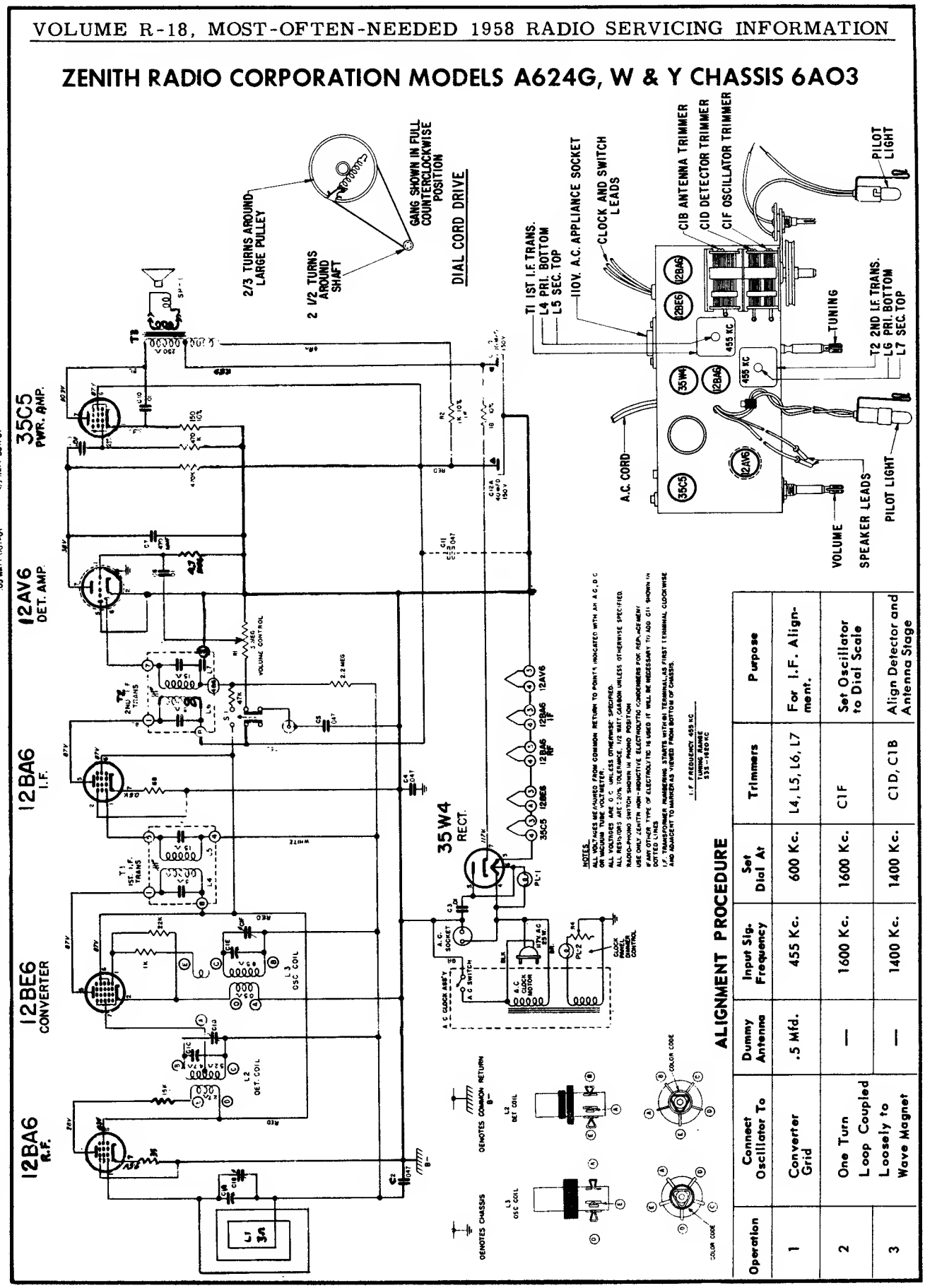
I.F FREQUENCY 455 KC

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

ZENITH RADIO CORPORATION MODELS A624G, W & Y CHASSIS 6AO3

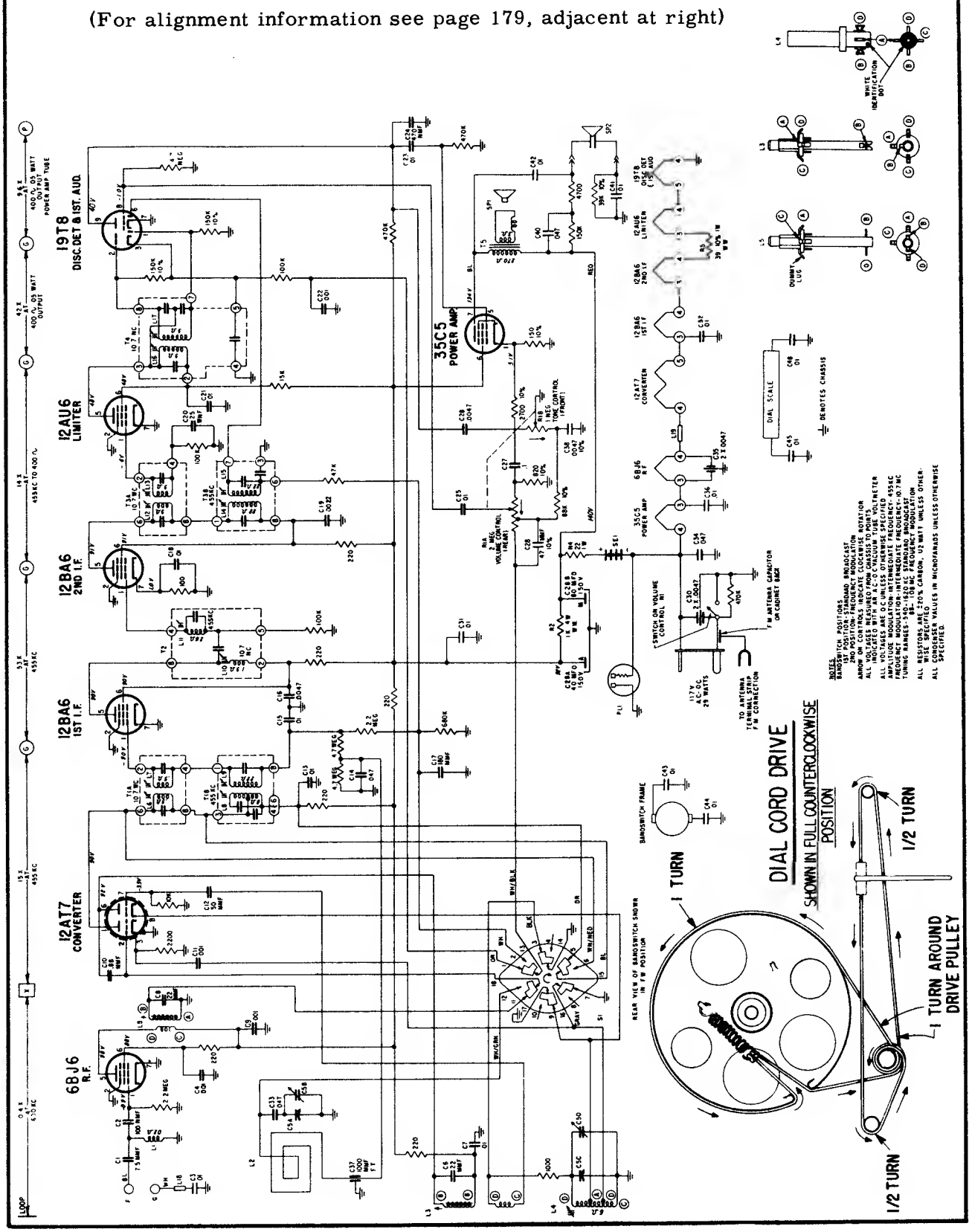


ALIGNMENT PROCEDURE

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

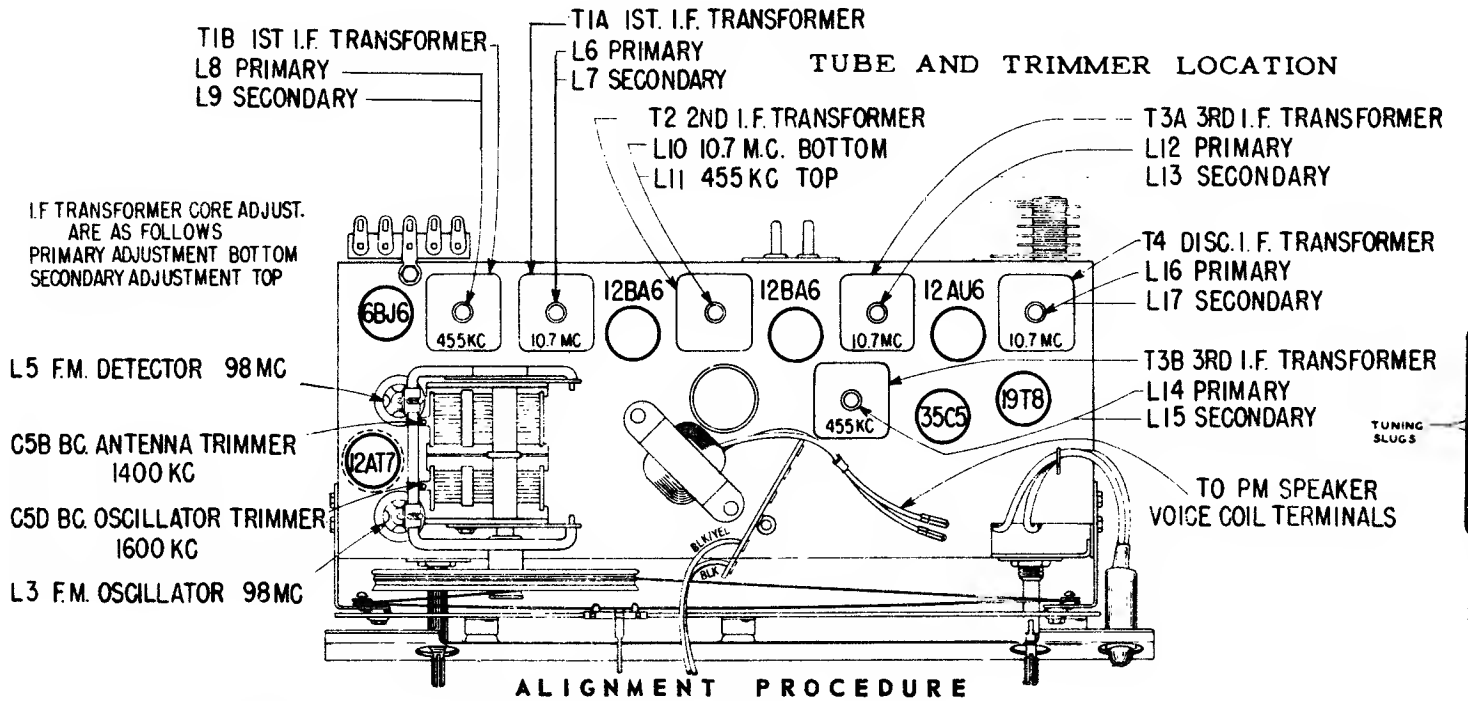
ZENITH RADIO MODEL A730R,E CHASSIS 7A05

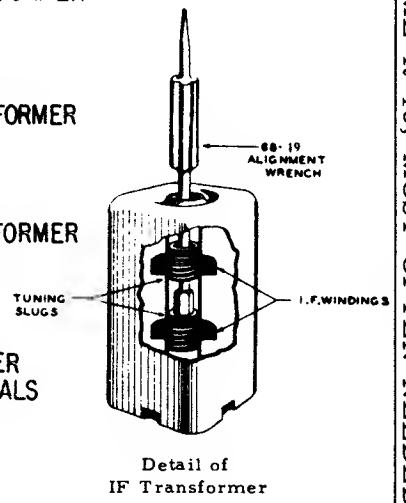
(For alignment information see page 179, adjacent at right)



(Continued from page 178, at left)

TUBE AND TRIMMER LOCATION



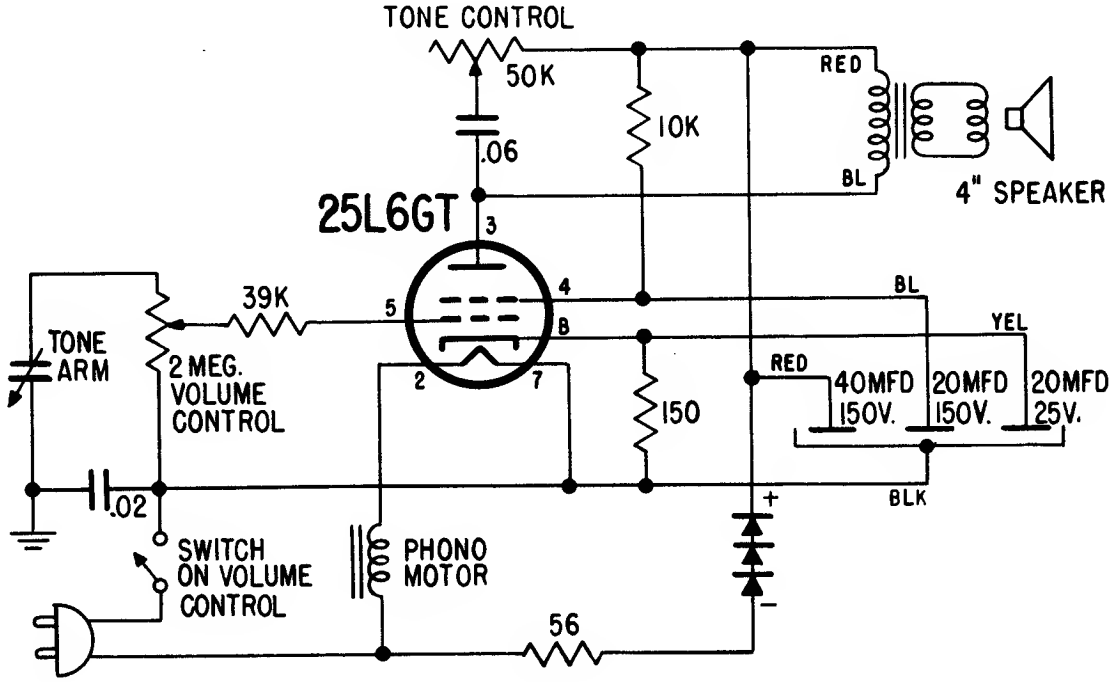


Detail of
IF Transformer

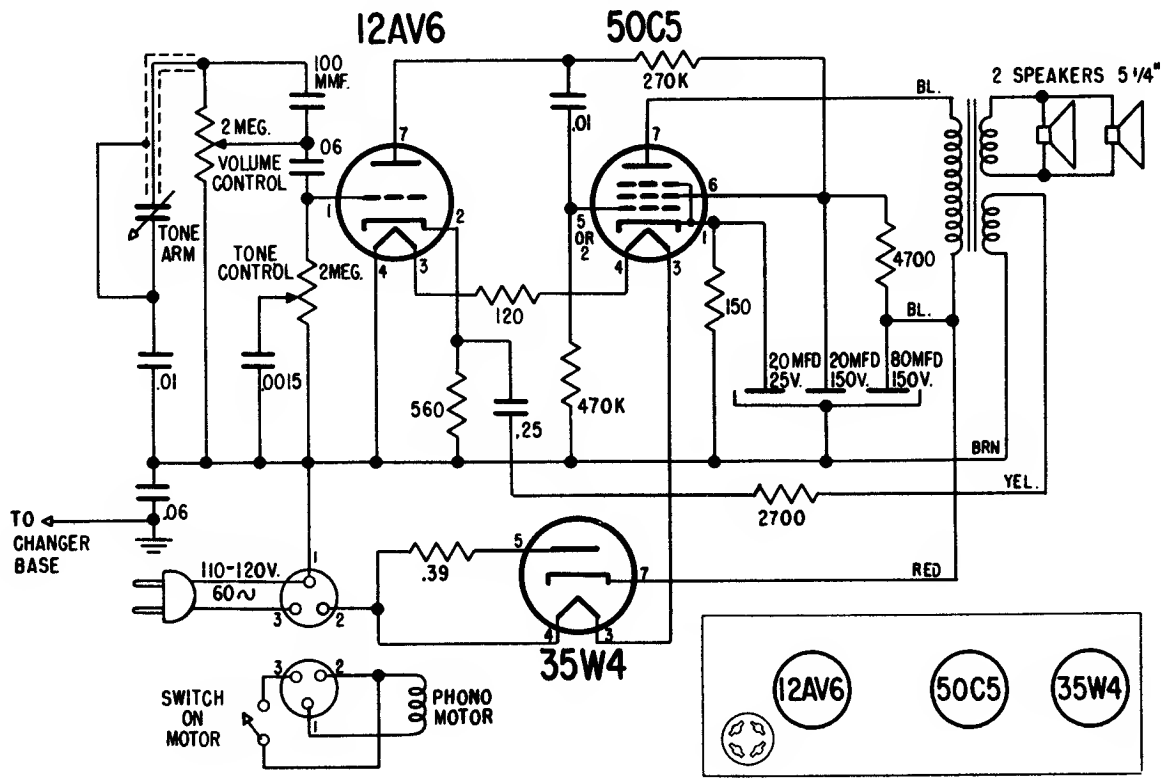
ALIGNMENT PROCEDURE

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 3td 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 tronsformer for maximum reading.
9 (c)	Antenna Post FM	270 ohms	98 Mc. Unmodulated.	FM	98 Mc.	L3 Osc. Coil Slug	Set Oscillator to dial scale.
10 (c) (d)	(Remove line ant.)	270 ohms	98 Mc. Unmodulated	FM	98 Mc.	L5 Det. Coil Slug	Align det. stage to maximum reading.

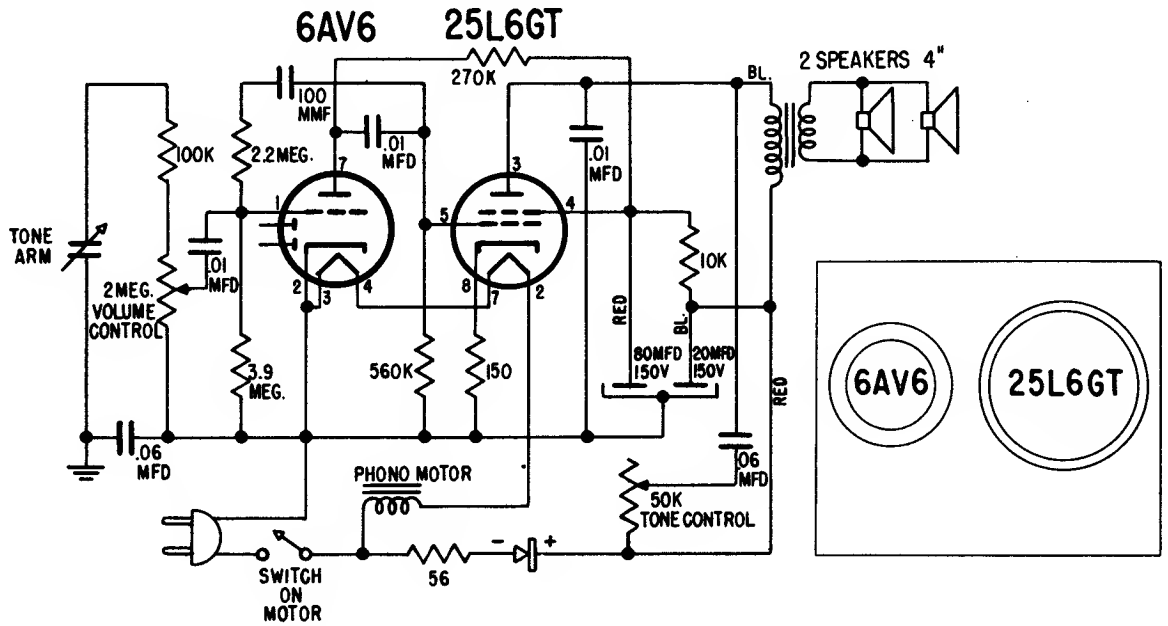
ZENITH RADIO CORPORATION MODELS AP6B,J,V



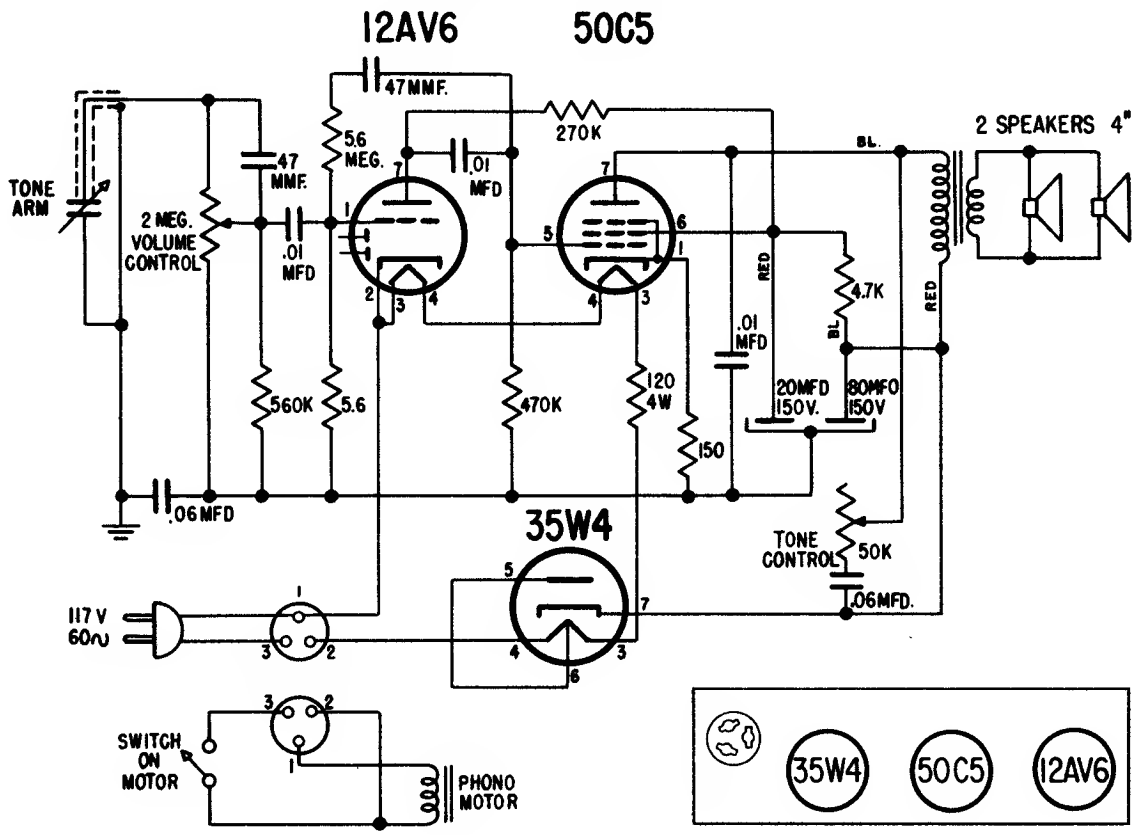
MODEL AP9B



ZENITH RADIO MODEL AP7F



MODEL AP8J



ZENITH RADIO Chassis 7AT42 & 7AT42Z1

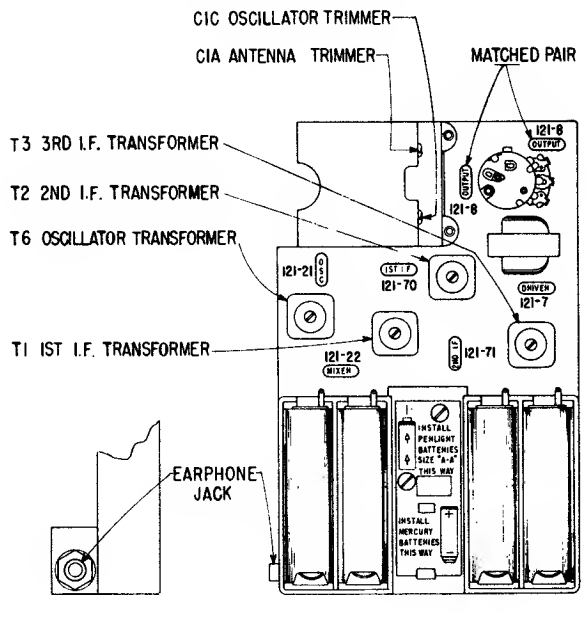
Model "Royal 300" (Continued on page 183)

CHASSIS IDENTIFICATION

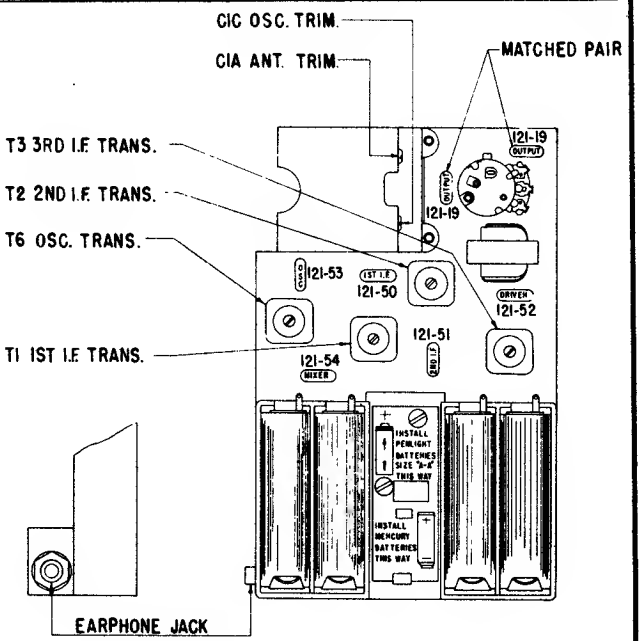
The "Royal 300" seven transistor portable has been produced with two basic chassis. This expedient was necessary to enable us to produce sufficient quantities by using transistors from several sources. Both chassis have the chassis number stamped on them as well as a color identifying code on the battery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



TRANSISTOR & TRIMMER LAYOUT FOR 7AT42



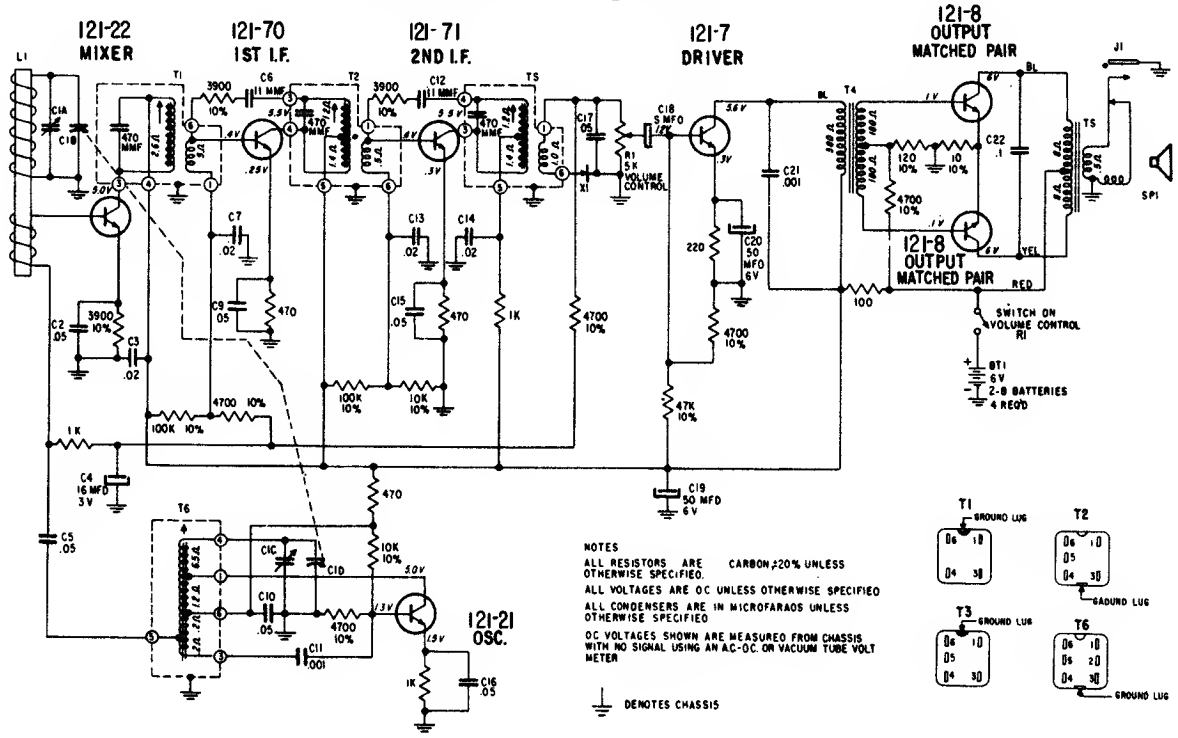
TRANSISTOR & TRIMMER LAYOUT FOR 7AT42Z1

Alignment Procedure

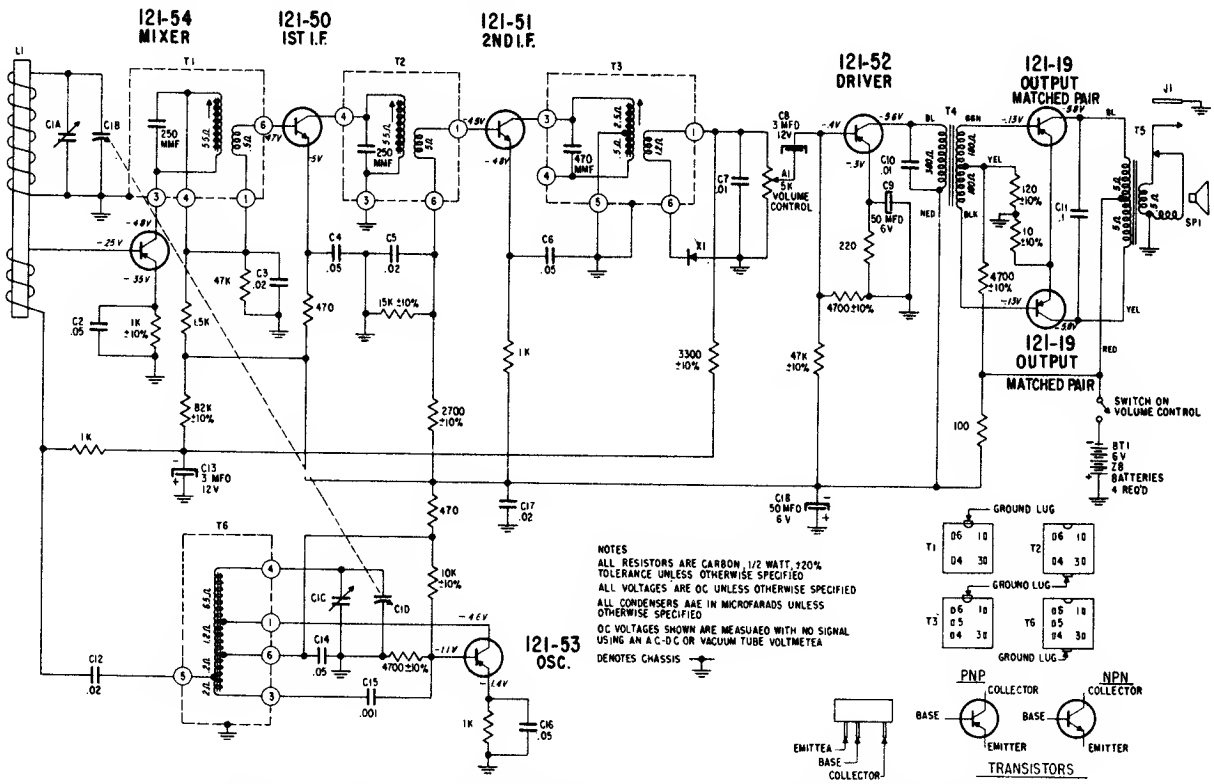
Operation	*Input Signal Frequency*	*Connect Inner Conductor From Oscillator To*	*Connect Outer Shield Conductor From Oscillator To*	*Set Dial At*	*Trimmers*	*Purpose*
1	455 KC	ONE TURN LOOSELY COUPLED TO WAVEMAGNET	Chassis	600 KC	Adj. T1, T2, T3 for maximum output.	For I.F. Alignment
2	1620 KC		—	Gang wide open.	C1C	Set Oscillator to dial scale.
3	535 KC		—	Gang Closed	Adjust slug in T6	Set Oscillator to dial scale.
4	REPEAT STEPS 2 & 3		—	—	—	—
5	1260 KC		—	1260 KC	C1A	Align loop ant.

ZENITH RADIO Chassis 7AT42 & 7AT42Z1, Model "Royal 300"

(Continued from page 182)



SCHEMATIC DIAGRAM FOR 7AT42

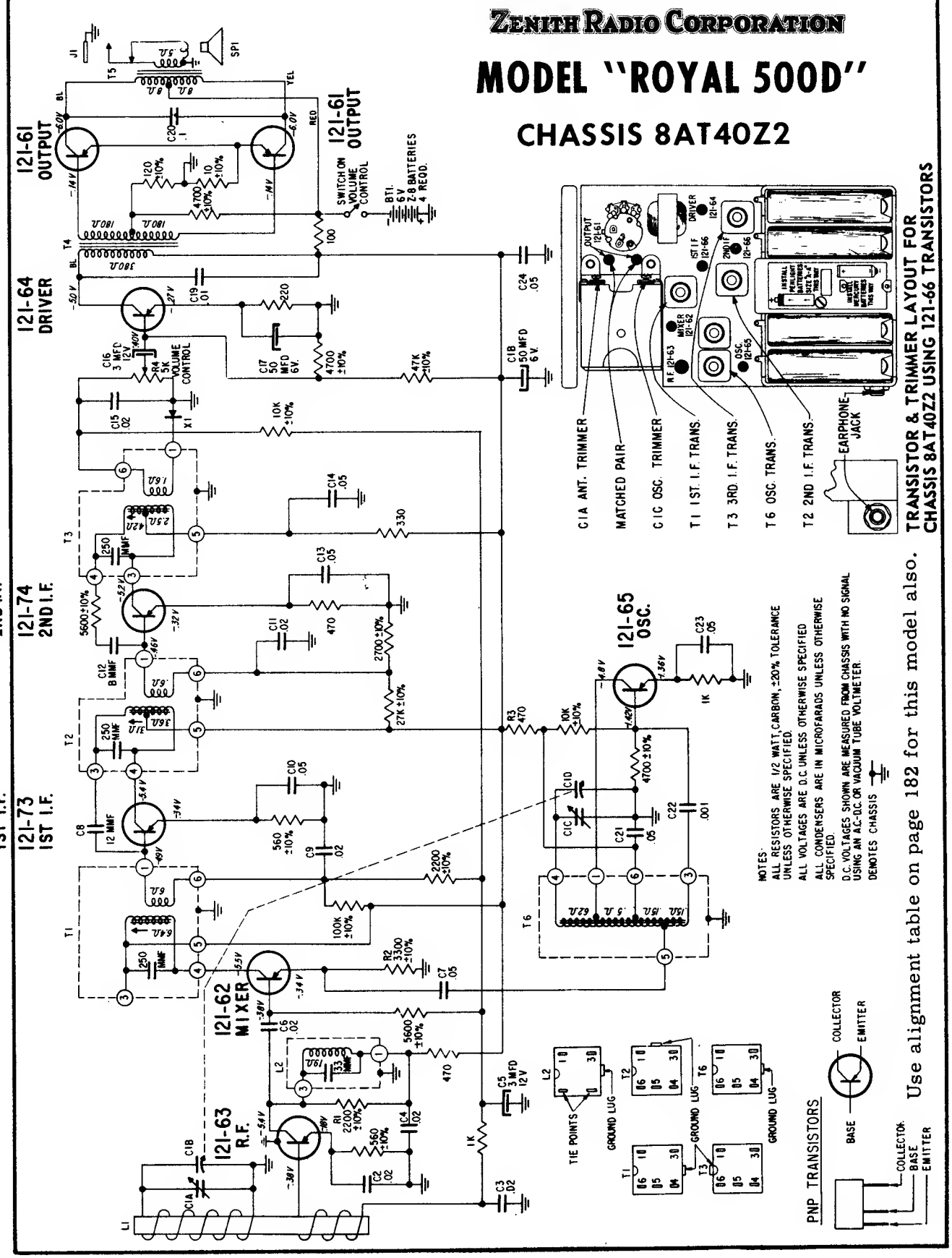


SCHEMATIC DIAGRAM FOR 7AT42Z1

ZENITH RADIO CORPORATION

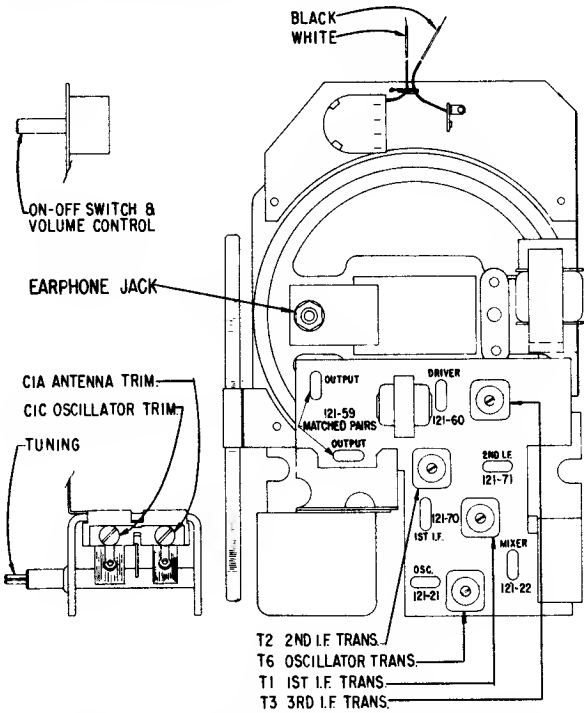
MODEL "ROYAL 500D"

CHASSIS 8AT40Z2



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.

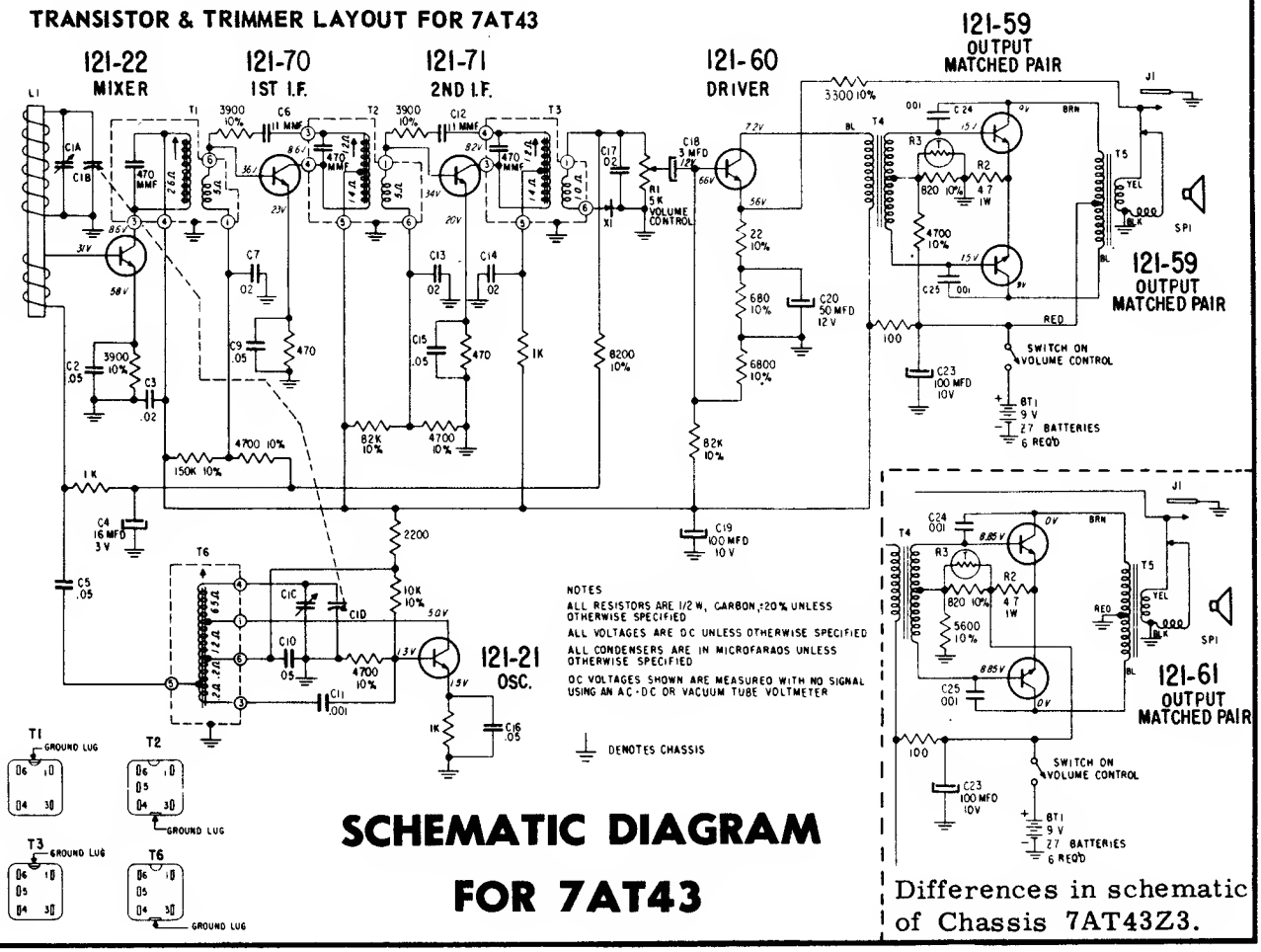
In addition to this, it is important to know the internal battery voltage of the ohm meter as well as battery polarity of the meter leads since incorrectly placing ohm meter leads across an electrolytic condenser with low working voltage may damage the capacitor due to excessive reverse current or excessive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

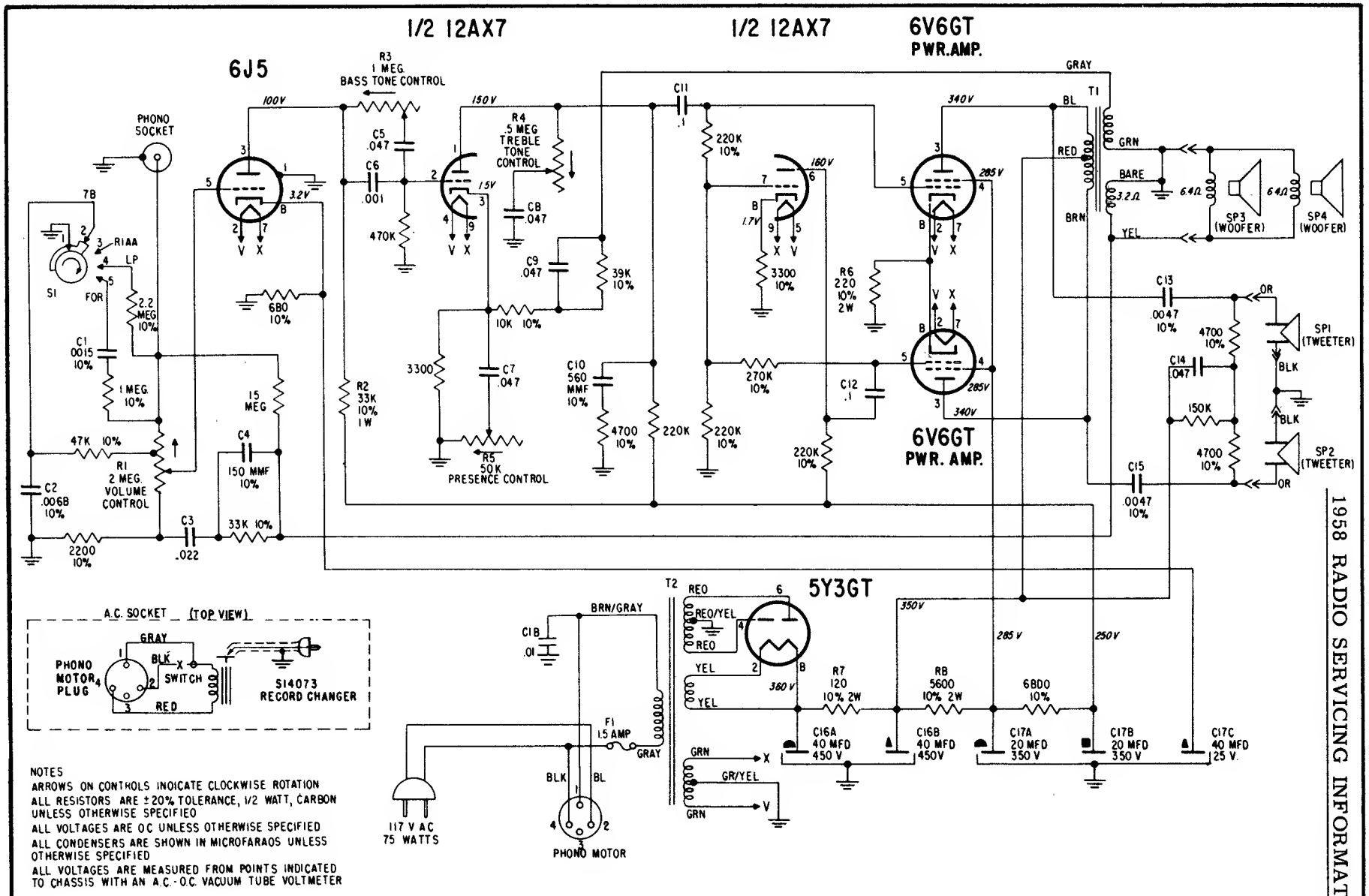
Use alignment table on page 182 for this model also.

TRANSISTOR & TRIMMER LAYOUT FOR 7AT43



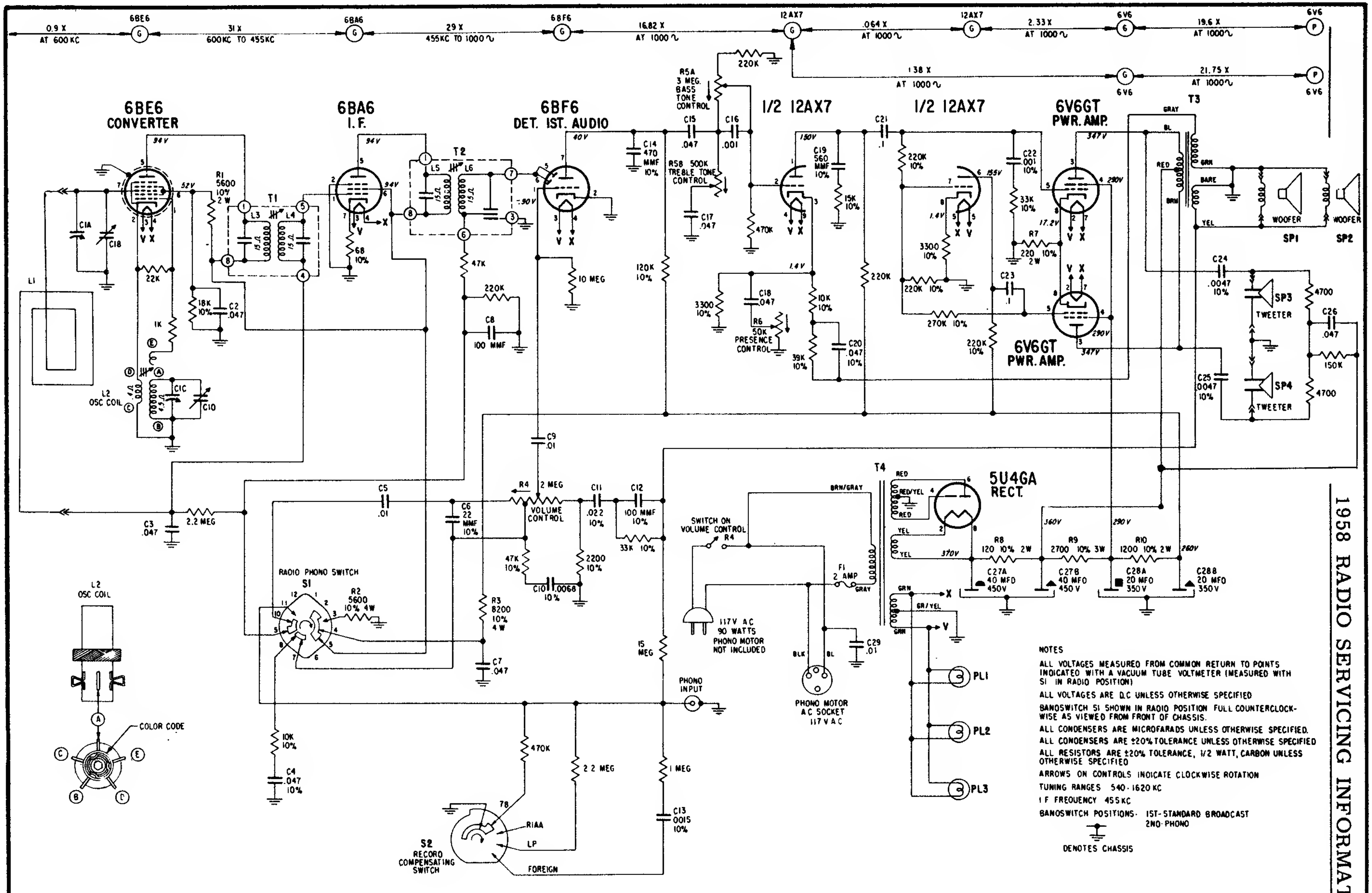
SCHEMATIC DIAGRAM FOR 7AT43

Differences in schematic of Chassis 7AT43Z3.



NOTES
ARROWS ON CONTHOLS INOICATE CLOCKWISE ROTATION
ALL RESISTORS ARE ±20% TOLERANCE, 1/2 WATT, CARBON UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES ARE OC UNLESS OTHERWISE SPECIFIED
ALL CONDENSERS ARE SHOWN IN MICROFARAOS UNLESS OTHERWISE SPECIFIED
ALL VOLTAGES ARE MEASURED FROM POINTS INDICATED TO CHASSIS WITH AN A.C.-O.C. VACUUM TUBE VOLTMETER

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



NOTES

ALL VOLTAGES MEASURED FROM COMMON RETURN TO POINTS 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 CONDENSERS ARE ±20% TOLERANCE 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

I F FREQUENCY 455 KC

BANDSWITCH POSITIONS- 1ST-STANDARD BROADCAST 2ND-PHONO

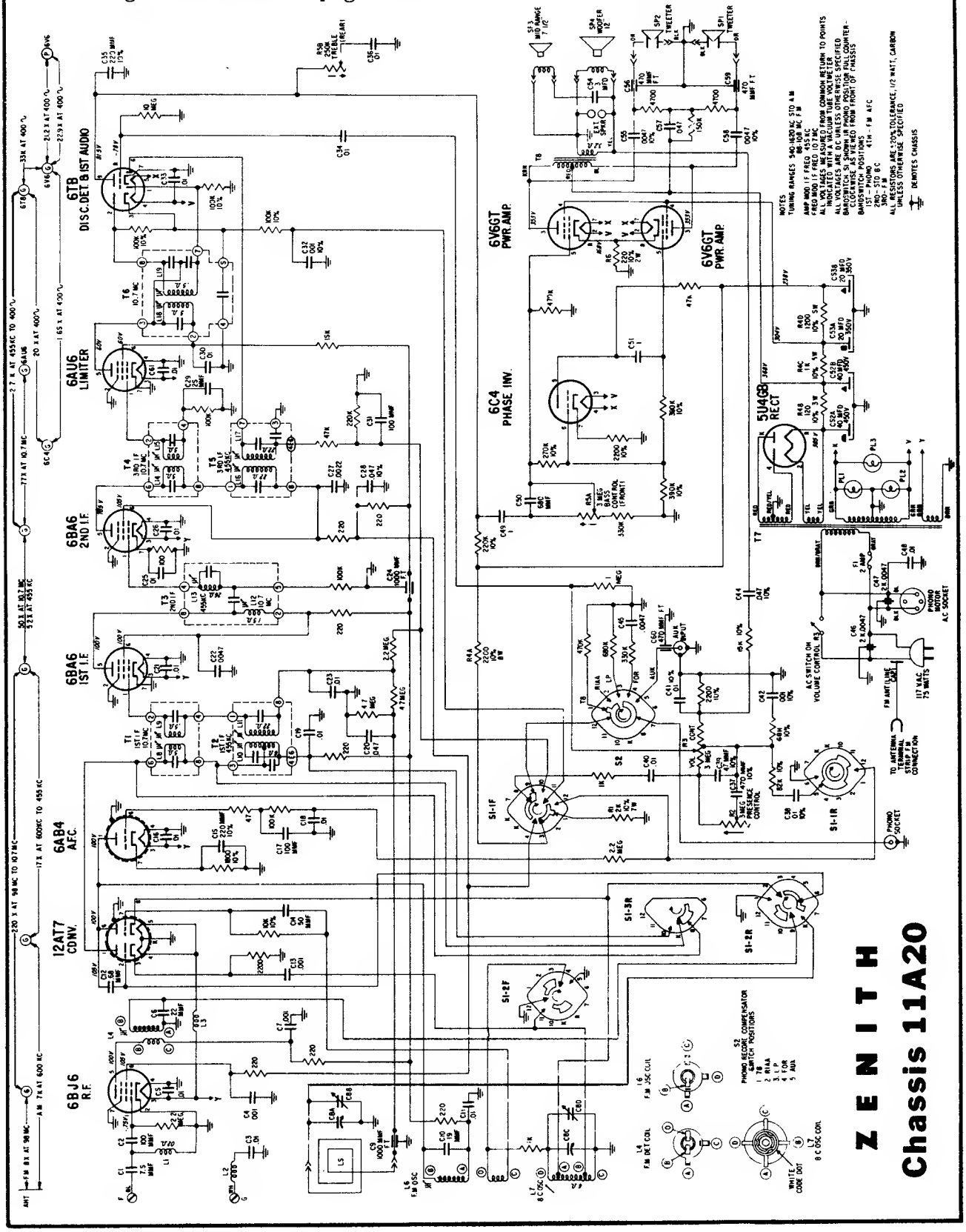
DENOTES CHASSIS

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

ZENITH RADIO CORPORATION

(Alignment data is on page 189)

HF1178RD
MODELS HF1185MD CHASSIS 11A20
HF1185RD



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

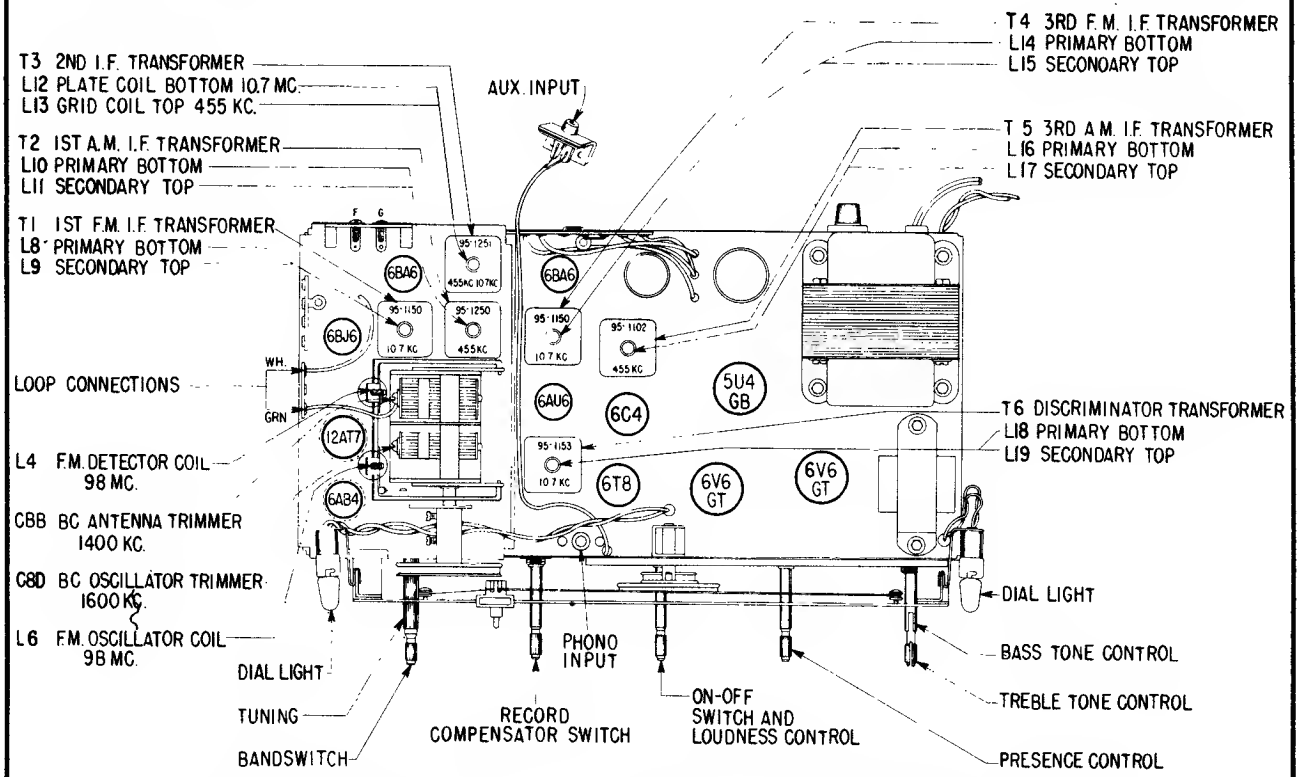
(See page 188 for circuit of 11A20, and page 190 for circuit of 11A21)

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.



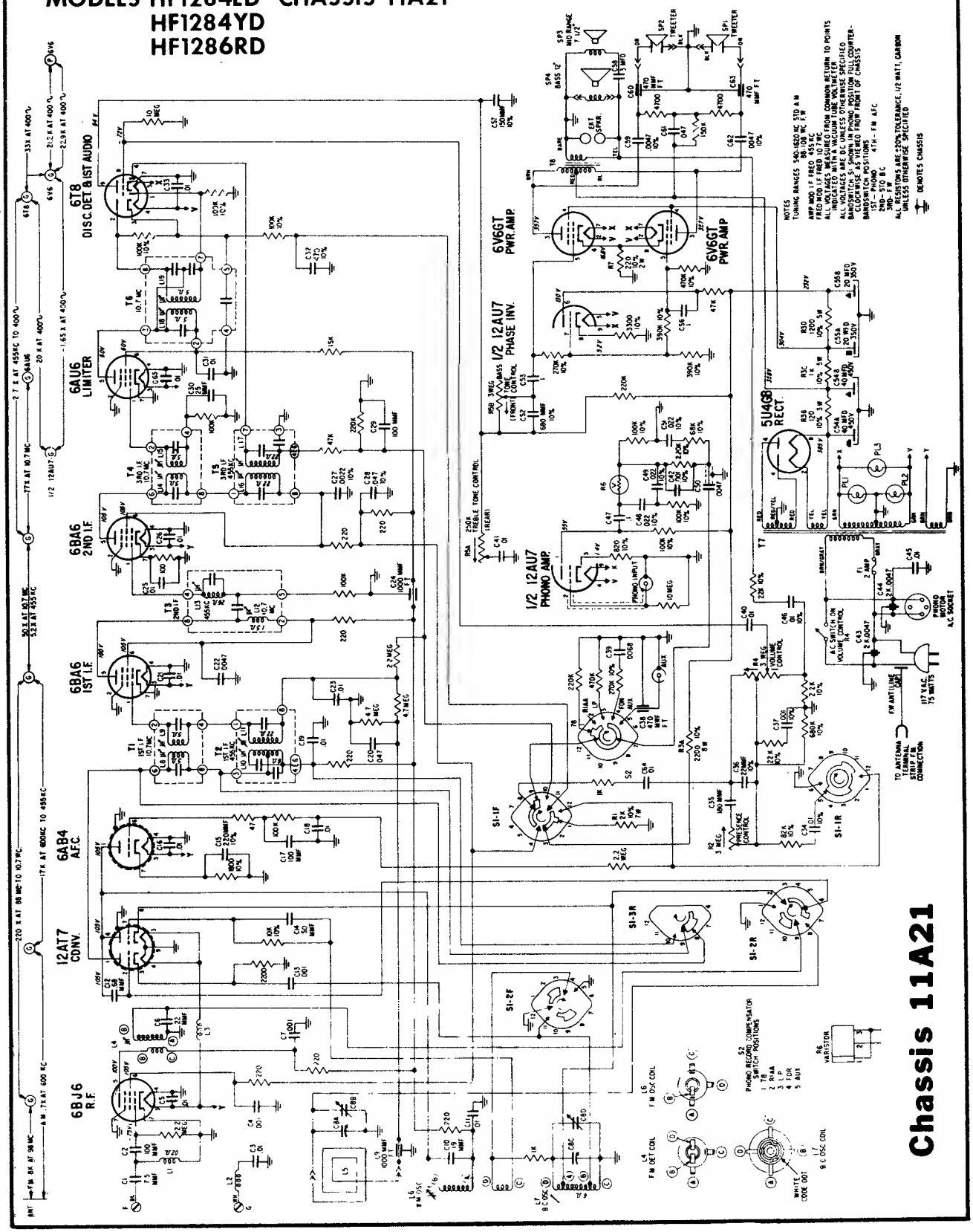
Tube & Trimmer Location Chassis 11A20

(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)



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