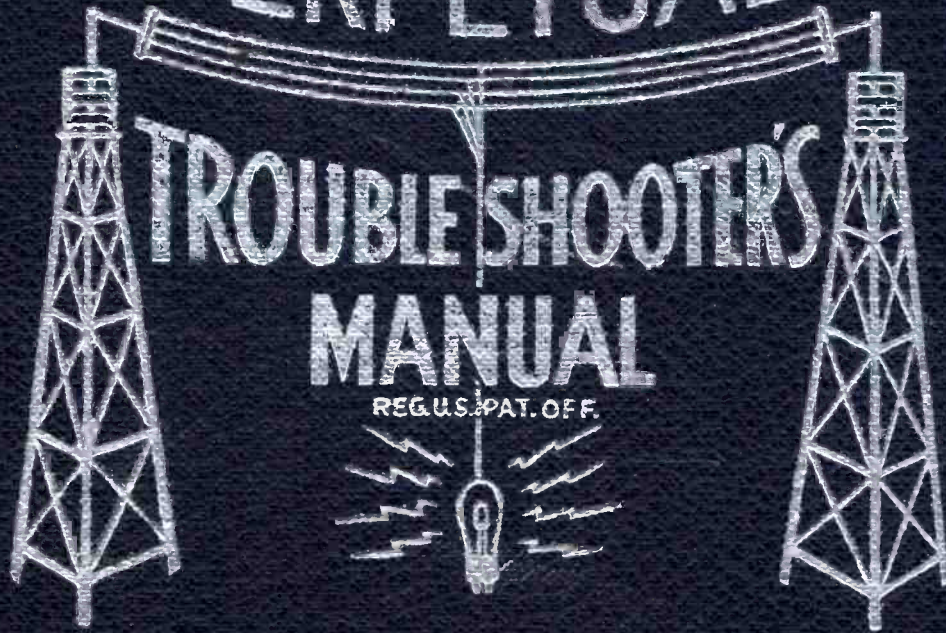


**VOLUME XVII**

**PERPETUAL**



**TROUBLE SHOOTER'S  
MANUAL**

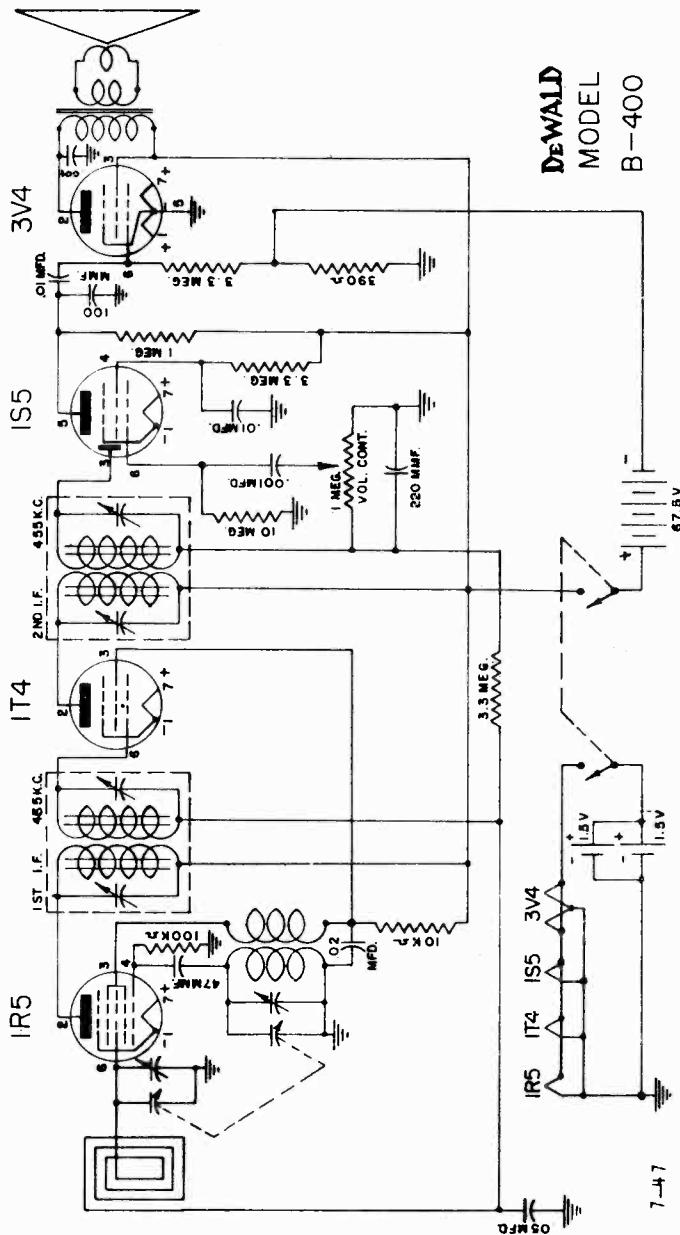
REG. U.S. PAT. OFF.

**JOHN F. RIDER**

DEWALD RADIO

LIST OF REPLACEMENT PARTS

- 2-Gang Var. Cond. 2015C
- Electrolytic Cond. 2018-1
- Volume Control 3006B-2
- Cabinet 4052
- Battery Cable 5004
- Dial Scale 6008
- Speaker 7000A
- Drive Drum 9039A
- 1st I. F. 1027-1
- 2nd I. F. 1027-2
- Osc. Coil 1020
- Ant. Loop. 1025A

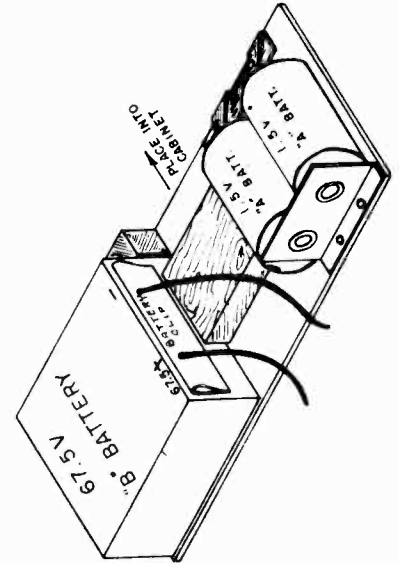


The model B-400 is a portable battery receiver. This receiver uses the latest type tubes for best performance. The circuit used is designed for excellent reception and long battery life. The receiver uses an "A" supply of two 1½ volt flashlight batteries and a 67½ volt battery for a "B" supply. For good reception the life of the "B" battery is from 60 to 70 hours when the receiver is used about two hours per day. Approximately three changes of "A" batteries will be required for every change of "B" battery. The following or similar batteries may be used with this receiver:

"A" BATTERY--TWO REQUIRED	"B" BATTERY--ONE REQUIRED
Eveready # 950 . . . . .	# 467
General # "D" . . . . .	# W45A
Ray O Vac # 2 . . . . .	# P4367
Burgess # 2 . . . . .	# YX45

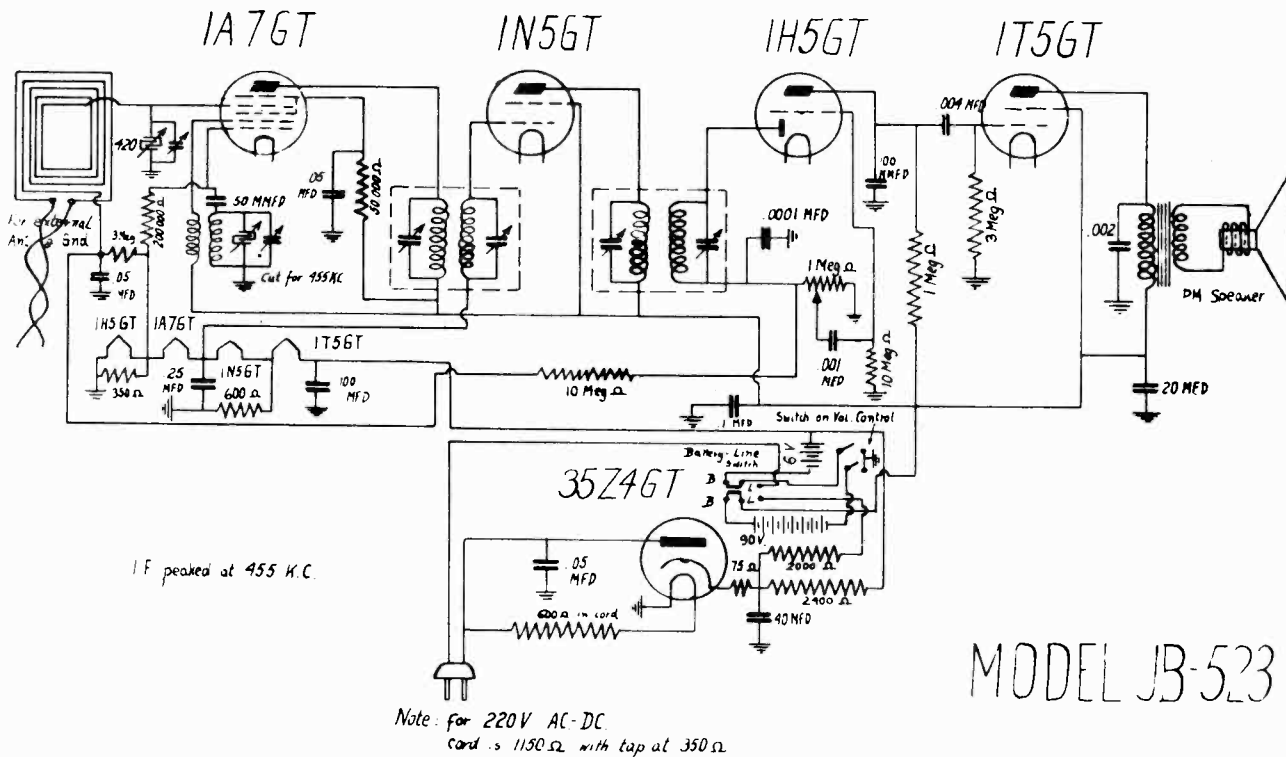
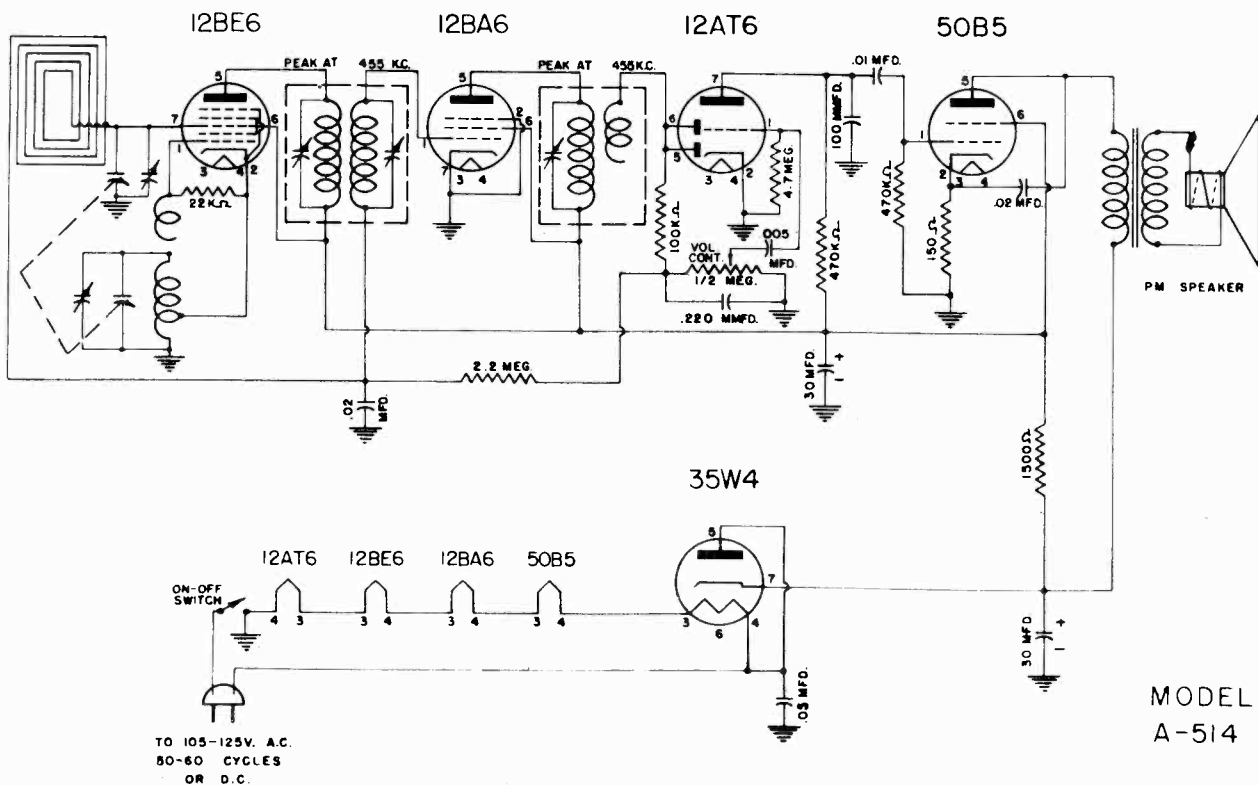
To install the batteries in the receiver, proceed as follows:

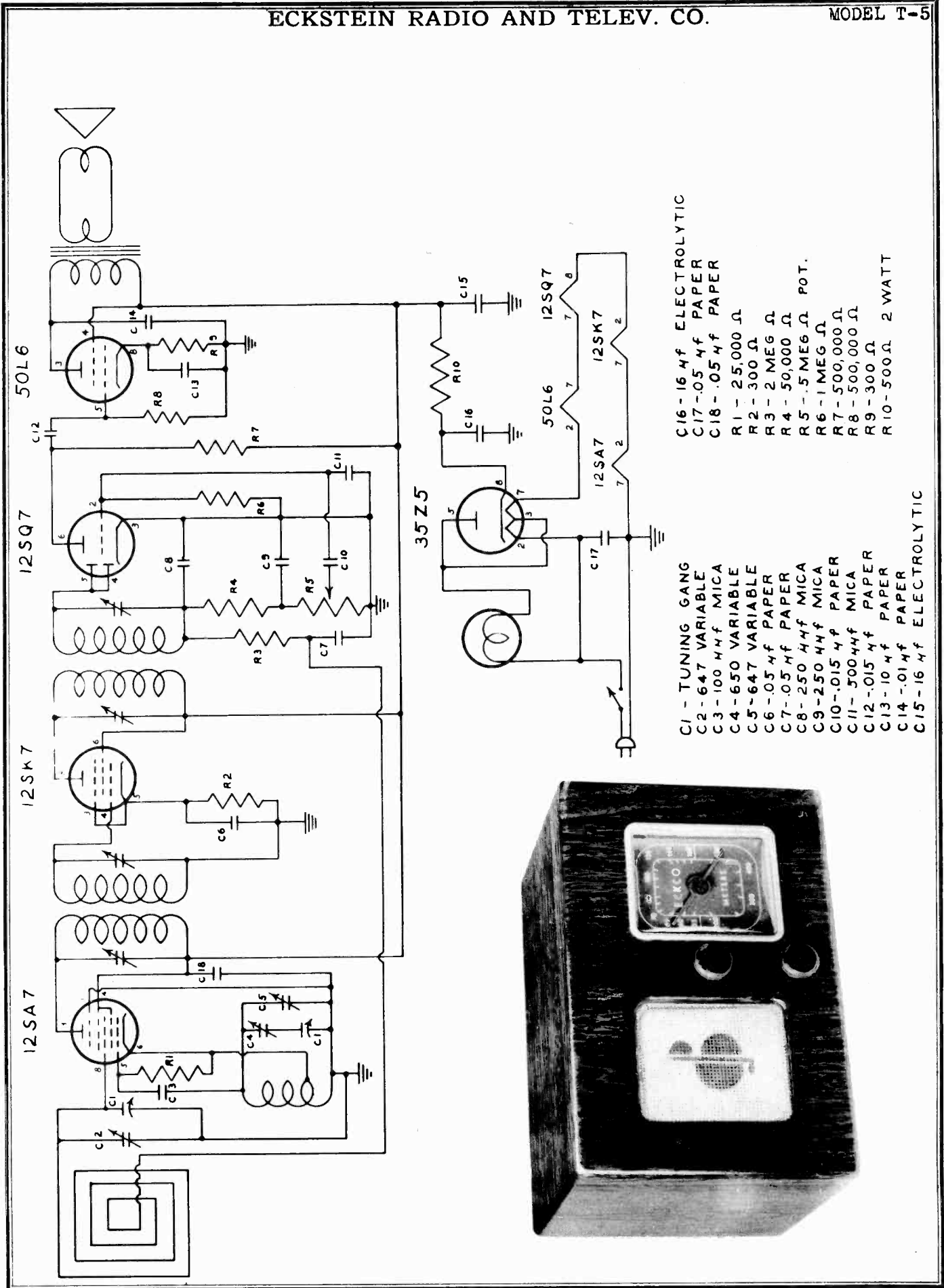
1. Open back by pulling leather tab.
2. Remove battery shelf by pulling straight back.
3. Place "A" batteries on shelf as shown in sketch. BE CAREFUL NOT TO REVERSE THESE BATTERIES, THE POSITION IS IMPORTANT.
4. Connect battery clip firmly on "B" battery and place battery on shelf as shown in sketch.
5. Replace battery shelf and close back.



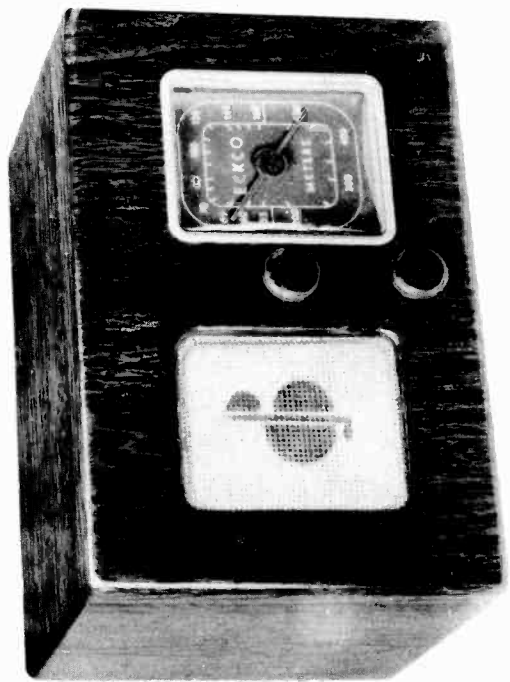
DEWALD RADIO

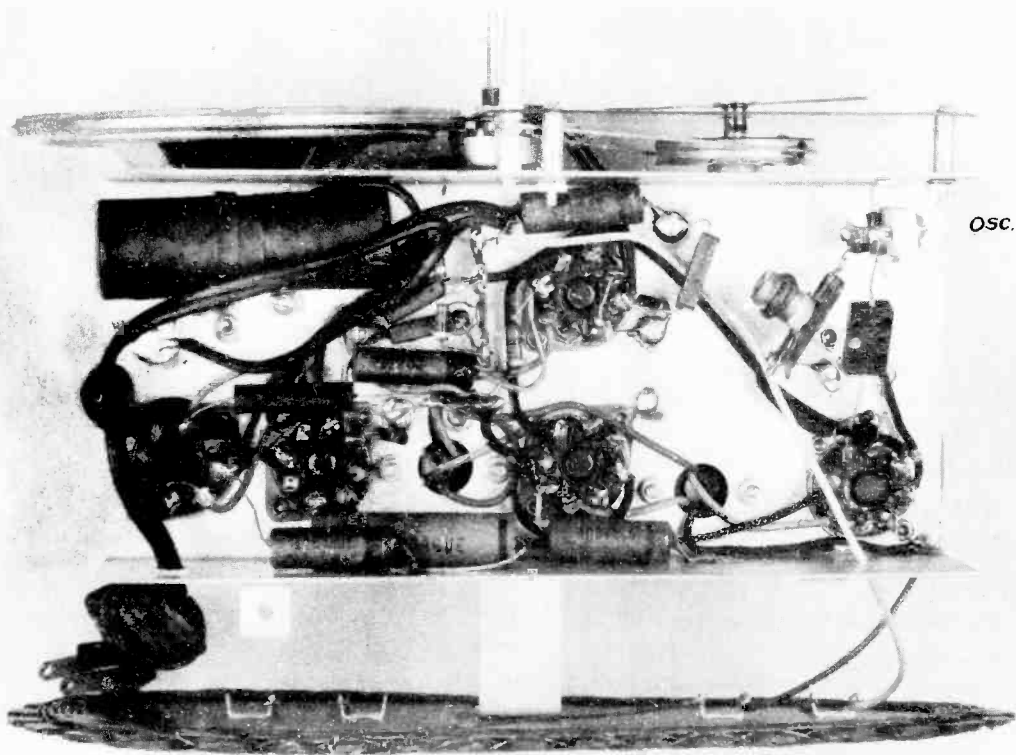
MODEL A-514  
MODEL JB-523



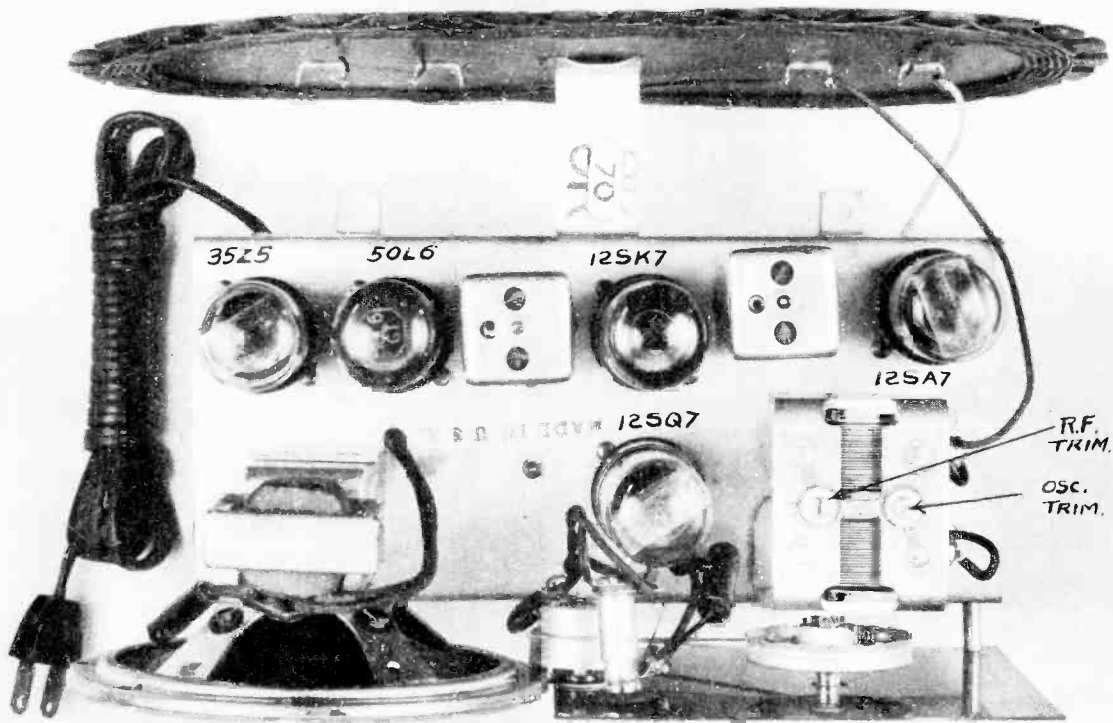


- C1 - TUNING GANG
- C2 - 647 VARIABLE
- C3 - 100 MMf MICA
- C4 - 650 VARIABLE
- C5 - 647 VARIABLE
- C6 - .05 mf PAPER
- C7 - .05 mf PAPER
- C8 - 250 MMf MICA
- C9 - 250 MMf MICA
- C10 - .015 mf PAPER
- C11 - 500 MMf MICA
- C12 - .015 mf PAPER
- C13 - 10 mf PAPER
- C14 - .01 mf PAPER
- C15 - 16 mf ELECTROLYTIC
- C16 - 16 mf ELECTROLYTIC
- C17 - .05 mf PAPER
- C18 - .05 mf PAPER
- R1 - 25,000 Ω
- R2 - 300 Ω
- R3 - 2 MEG Ω
- R4 - 50,000 Ω
- R5 - .5 MEG Ω POT.
- R6 - 1 MEG Ω
- R7 - 500,000 Ω
- R8 - 500,000 Ω
- R9 - 300 Ω
- R10 - 500 Ω 2 WATT



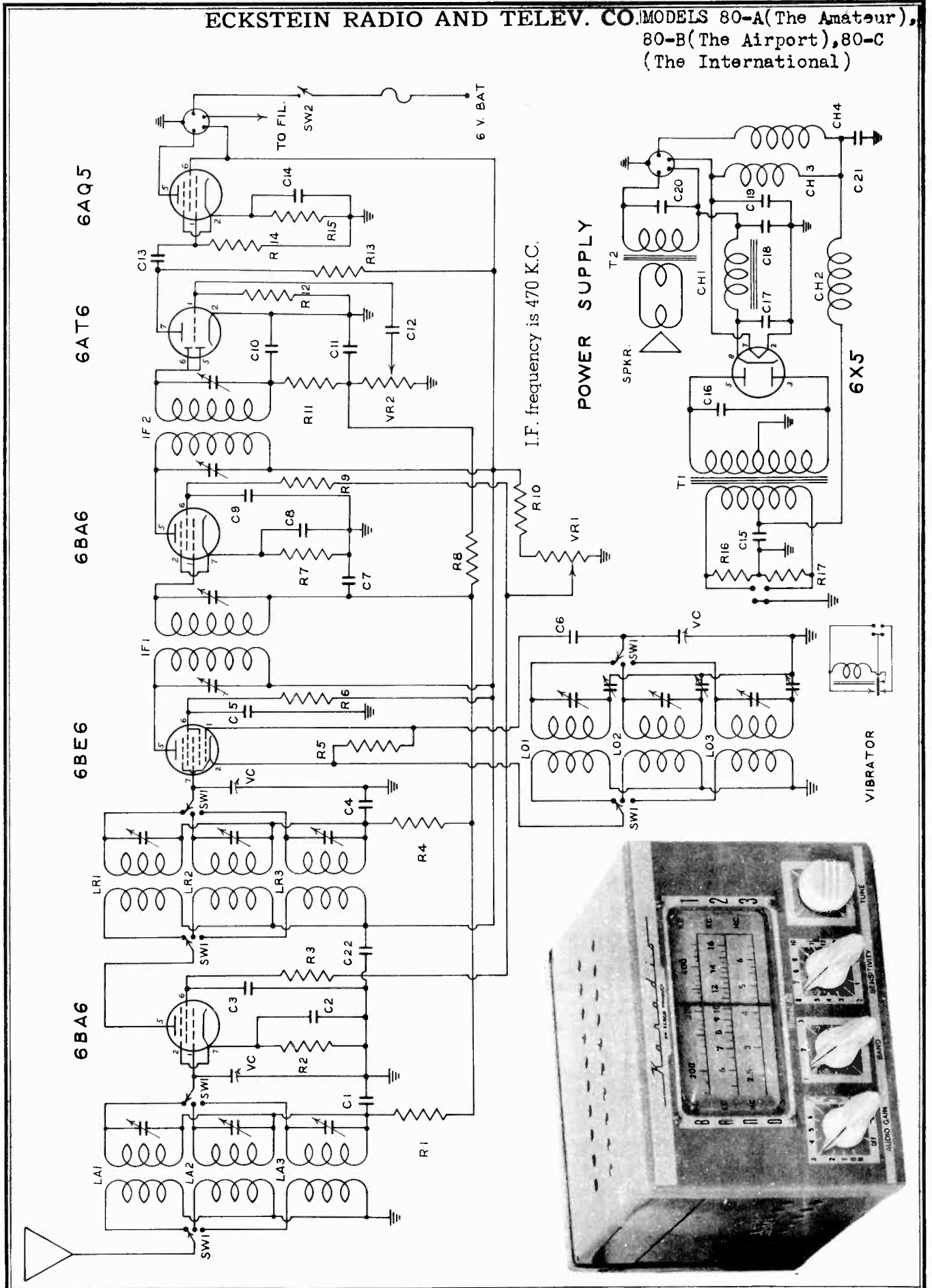


OSC. PAD.



R.F. TRIM.  
OSC. TRIM.

ECKSTEIN RADIO AND TELEV. CO. MODELS 80-A (The Amateur), 80-B (The Airport), 80-C (The International)

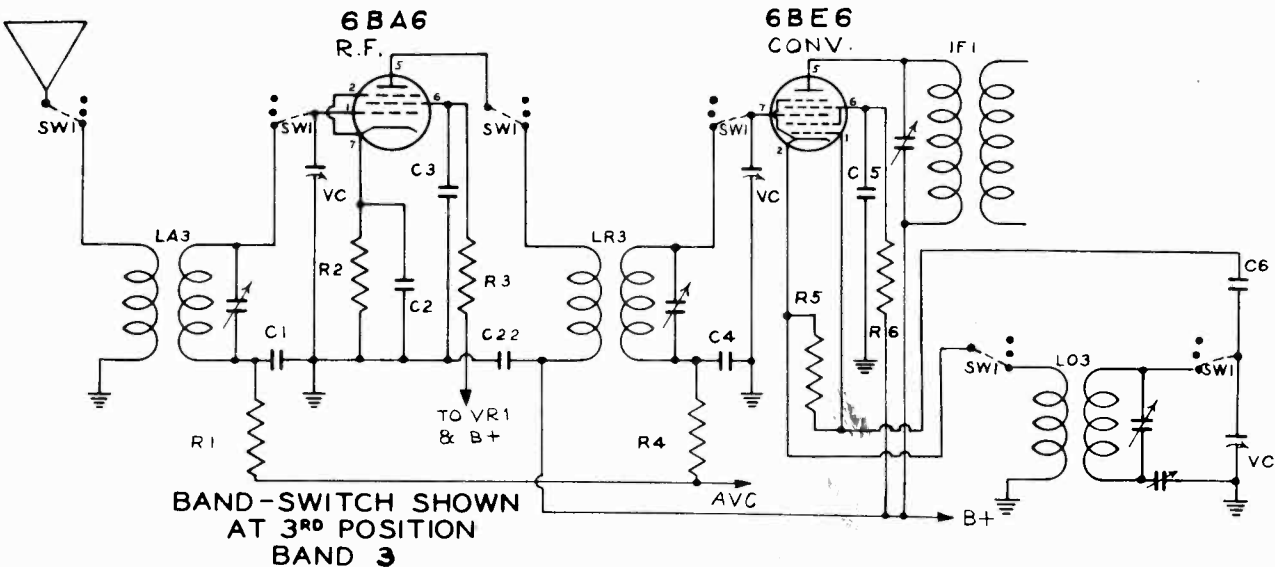
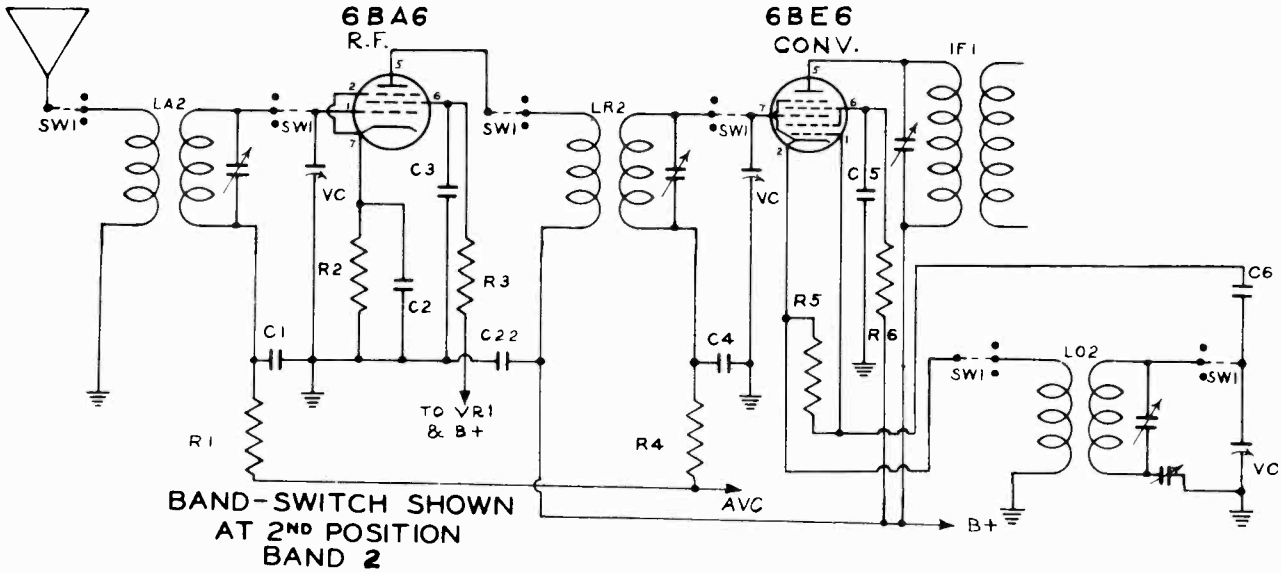
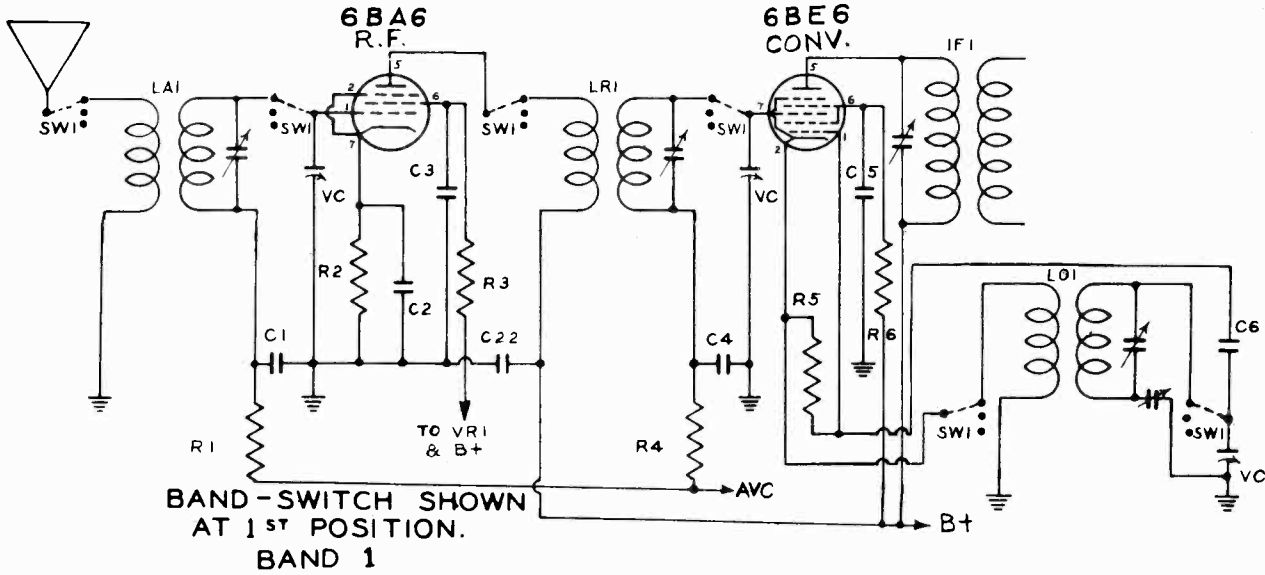


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# "clarified schematics"

MODELS 80-A,  
80-B, 80-C

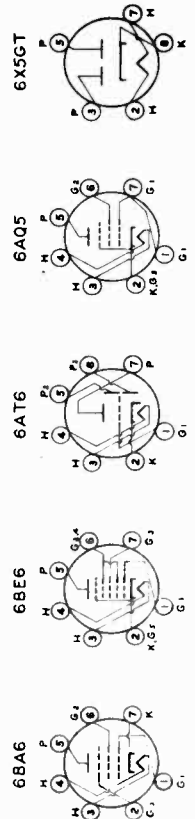
ECKSTEIN RADIO AND TELEV. CO.



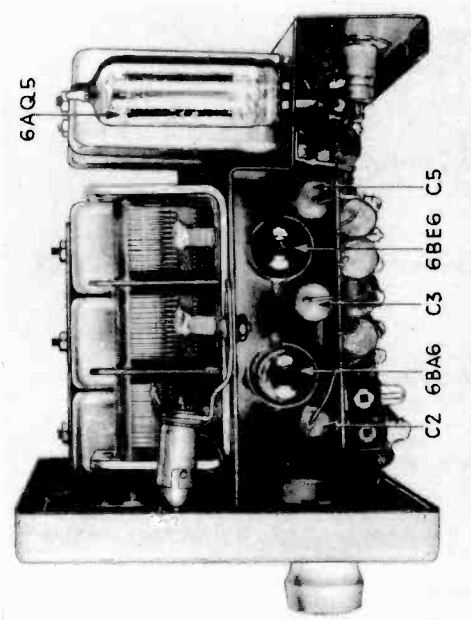
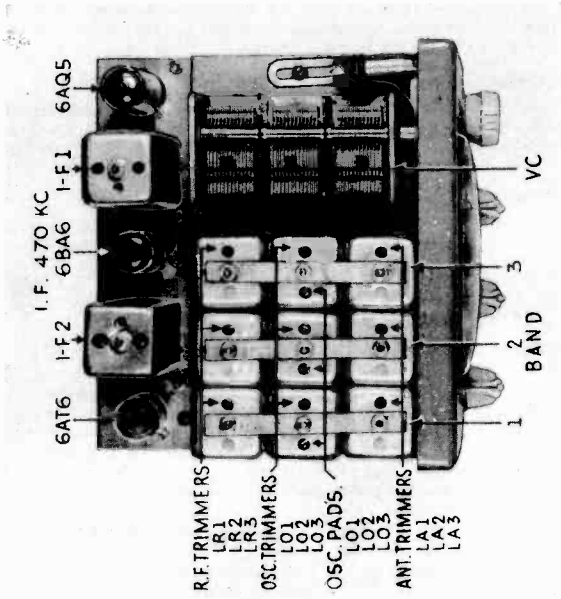
**TUBE VOLTAGE CHART**

Designation	Type	Function	OPERATING VOLTAGES D.C.		
			Plate	Screen	Cathode Fil.
6BA6	Pentode Amplifier	R.F. Amplifier	No. 5 200	No. 6 100	No. 2-7 1.4 6.3
6BE6	Pentagrid Converter	Oscillator Mixer	No. 5 200	No. 6 100	No. 2 0 6.3
6BA6	Pentode Amplifier	I.F. Amplifier	No. 5 200	No. 6 100	No. 2-7 1.2 6.3
6AT6	Duplex-Diode High Mu Triode	Demodulator 1st Audio A.V.C.	No. 7 66	None	No. 2 0 6.3
6AQ5	Beam-Power Amplifier	Power Output	No. 5 190	No. 6 200	No. 2 11 6.3
6X5GT	Full Wave Rectifier	Rectifier	Cathode (No. 8) To Ground		225 6.3

Source Voltage 7.0  
All voltages as indicated on RCA voltohmyst



Tube Base Connections—Bottom View





MODELS 80-A,  
80-B, 80-C

## ECKSTEIN RADIO AND TELEV. CO.

## GENERAL DESCRIPTION

## PURPOSE:

KARADIO model 80 is a 3-Band mobile communications radio receiver for installation in cars, trucks, buses and other vehicles for reception of radio telephone signals.

## FREQUENCY RANGE:

KARADIO MODEL 80-A (THE AMATEUR)		
BAND 1		540 - 1650 K.C.
2		2.8 - 7.5 M.C.
3		11.5 - 31.5 M.C.

KARADIO MODEL 80-B (THE AIRPORT)		
BAND 1		190 - 420 K.C.
2		540 - 1650 K.C.
3		2.5 - 6.8 K.C.

KARADIO MODEL 80-C (THE INTERNATIONAL)		
BAND 1		540 - 1650 K.C.
2		2.8 - 7.5 M.C.
3		5.8 - 17.5 M.C.

## RECEIVER CIRCUIT:

KARADIO MODEL 80 is a superheterodyne receiver designed to operate from the 6-volt battery supply of any vehicle. The circuit employed in ALL ranges consists of one stage of tuned R.F., mixer and H.F. oscillator, one stage of I.F., second detector, one stage of resistance coupled A.F. and Beam Power output. Automatic volume control is also provided on all ranges. The 6" permanent magnet dynamic speaker is specially designed for communications use and is equipped with a transformer to correctly load the beam power output stage at 5500 ohms.

## SENSITIVITY:

Sensitivity is such that 5 microvolts or less input signal at antenna plug will produce 5 watt audio output with a signal to noise ratio of 4:1 or higher.

## POWER OUTPUT:

At least 2 watts of audio power is available with 10% or less distortion.

## FREQUENCY RESPONSE:

While the KARADIO MODEL 80 is designed to emphasize the voice frequencies for communications work it is also pleasing to the ear on music.

## TUBE REQUIREMENTS:

KARADIO MODEL 80 is supplied complete with set of matched tubes which are tested in the receiver at the time of alignment. The tubes are:

R.F. PRESELECTOR	- 6BA6
OSCILLATOR - MIXER	- 6BE6
I.F. AMPLIFIER	- 6BA6
DEMODULATOR - 1st AUDIO	- 6AT6
POWER AMPLIFIER	- 6AQ5
RECTIFIER	- 6X5GT

## POWER REQUIREMENTS:

KARADIO MODEL 80 is designed to operate on a D.C. voltage source of 5 to 7.3 volts. It is standard practice of most car manufacturers to set the voltage control of cars and trucks at about 7.2 volts. All operating data on KARADIOS are taken with a source voltage of 7 at which voltage the current is 6 amperes. By the use of a non-synchronous vibrator and 6X5GT rectifier tube, no polarity consideration need be given in the installation of your KARADIO.

## INSTALLATION INSTRUCTIONS

## MOUNTING:

The radio unit may be mounted to and directly below the instrument panel at any convenient location. Two holes must be drilled in the stiffening lip of the instrument panel about  $\frac{3}{4}$ " back from the front of the instrument panel. These holes must be large enough to pass the two No. 8 mounting screws protruding from the top of the radio unit. After the holes are drilled, insert mounting screws of radio in holes, place lock washers and nuts on screws. These nuts must be fastened real tight. It is also very important that the paint be removed from instrument panel lip directly under nuts so that a good ground connection is made.

Drill a hole to pass a No. 10 machine screw in the fire wall or other convenient place and bolt strap with series of holes to this support and fasten other end to protruding machine screw on back of radio. This is the back support for radio unit and good ground connections must also be considered in this assembly.

The speaker power supply unit is mounted at any convenient location on the fire wall. This is accomplished by drilling a 5/16-inch hole at desired location in fire wall and mounted with threaded stud nuts and washers provided. Care is to be taken that this mounting bolt also forms a perfect ground. This can be assured by scraping the paint from the spot under the mounting nut and washer on the reverse side of the bulk head.

## CONNECTIONS:

Insert the four-prong plug in lead from speaker into the socket on back side of radio. Connect fused power lead from radio to the ammeter or circuit breaker of the vehicle. A 10-ampere FUSE is provided in this cable. Never replace this fuse with one of any other size.

## ANTENNA:

The antenna of the cowl type is recommended and should be 96 to 108 inches maximum length. The model 80 KARADIO is designed for an antenna of this length and a low capacity shielded lead-in of 30 inches. IT IS IMPORTANT THAT THE ANTENNA LEAD NOT BE CHANGED AS THIS LENGTH IS CORRECT TO MATCH THE ANTENNA INPUT CIRCUIT.

INSTRUCTIONS FOR ELIMINATING MOTOR  
IGNITION INTERFERENCE:

Cut the high tension lead that runs from the center terminal of the distributor to the coil, as close as possible to the distributor end. Screw the distributor suppressor into the lead and reconnect to the distributor. Mount the generator condenser on the generator frame under the ground lead screw. Connect the spade tip on the condenser wire under the battery terminal of the generator. Do not connect it to the field terminal of generator.

When checking the car for motor interference, clamp the hood down tight with the hood clamps.

In some installations it may be necessary to bond the muffler or the transmission housing to the frame of the car. If necessary, bond the motor block securely to the front and rear supports. For bonding, use  $\frac{1}{2}$ -inch copper braid. Further interference may be eliminated by bonding all metal control cables or pipes feeding from the motor side of the firewall into the car. These bonds should be made from the pipes or control cables and soldered to the firewall immediately adjacent to the motor side.

In case of tire static, collector springs should be inserted under the hub caps of the front wheels. In some cases it may be necessary to install such collectors in the rear wheels as well.

Interference from electric gas gauges may be cured by inserting a "dome light filter" in series with the lead near as possible to the gas tank.

In some instances it is beneficial to attach a by-pass condenser from one side of the ammeter to the grounded part of the instrument panel. If the dome light is feeding interference to the antenna, the lead should be cut where it comes from the post under the dash and a switch be inserted in the instrument panel to turn the dome light off and on. A by-pass condenser connected to the dome light lead and grounded at the post would serve in lieu of a switch.

## ALIGNMENT:

The I.F. frequency is 470 K.C.; alignment of each band should be made as follows:

First, oscillator trimmers should be adjusted for correct dial calibration at the high frequency end of each band. Then, oscillator padder condensers should be aligned near the low frequency end of each band after adjustment of the oscillator trimmers. Next, antenna and RF trimmers of all bands should be aligned near the high frequency end of each band. This alignment should be made at a point approximately 15% or  $\frac{1}{2}$  turn of the knob down from the high frequency end of each band.

In aligning a receiver, especially the antenna trimmers, it is extremely important that the correct load, which is equal to the antenna, be used. Shielded leads from signal generators or oscillators have a definite capacity and should be considered when testing or aligning is done.

It is preferable to use an indirect connection or a condenser of approximately 100 MMF in series with the signal generator lead and the antenna lead. The reason that this procedure is important is that on all three bands, the primaries of the antenna coils are of high impedance and are designed for the best impedance match at the low frequency end of each band. By using a greater capacity, a loss in accuracy would result.

Individual tubes of the same type will vary slightly in their characteristics and it is well to remember this fact when replacements become necessary. Even though the circuit is designed so as to reduce the effect of such variations to a minimum. The high frequency oscillator-first detector tubes should be selected with some care. The tolerance of the inter-electrode capacities is enough in case of some tubes to slightly alter the tuning. This change would be, however, most noticeable at the high frequency end of each band.

ECKSTEIN RADIO AND TELEV. CO. MODELS 80-A, 80-B, 80-C

**PARTS LIST**  
for  
**MODEL 80 KARADIO**

Schematic Number	Description	Description
C 1.....	.05 mfd.	200 V.
C 2.....	.05 mfd.	200 V.
C 3.....	.05 mfd.	400 V.
C 4.....	.05 mfd.	200 V.
C 5.....	.05 mfd.	400 V.
C 6.....	100 mmfd.	Mica
C 7.....	.05 mfd.	200 V.
C 8.....	.05 mfd.	200 V.
C 9.....	.05 mfd.	400 V.
C 10.....	250 mmfd.	Mica
C 11.....	250 mmfd.	Mica
C 12.....	.006 mfd.	600 V.
C 13.....	.015 mfd.	600 V.
C 14.....	10 mfd.	25 V. Electrolytic
C 15.....	.5 mfd.	100 V.
C 16.....	.006 mfd.	1600 V. (Oil)
C 17.....	30 mfd.	350 V. Electrolytic
C 18.....	30 mfd.	350 V. Electrolytic
C 19.....	500 mmfd.	Mica
C 20.....	.01 mfd.	600 V.
C 21.....	.5 mfd.	100 V.
C 22.....	.05 mfd.	400 V.
R 1.....	1 Megohm	1/2 Watt
R 2.....	150 Ohm	1/2 Watt
R 3.....	12 K Ohm	1/2 Watt
R 4.....	1 Megohm	1/2 Watt
R 5.....	25 K Ohm	1/2 Watt
R 6.....	15 K Ohm	1 Watt
R 7.....	150 Ohm	1/2 Watt
R 8.....	1 Megohm	1/2 Watt
R 9.....	12 K Ohm	1/2 Watt
R 10.....	15 K Ohm	1 Watt
R 11.....	50 K Ohm	1/2 Watt
R 12.....	10 Megohm	1/2 Watt
R 13.....	470 K Ohm	1/2 Watt
R 14.....	470 K Ohm	1/2 Watt
R 15.....	450 Ohm	2 Watt
R 16.....	150 Ohm	1/2 Watt
R 17.....	150 Ohm	1/2 Watt
VR 1.....	500 K Ohm	
VR 2.....	500 K Ohm	
VC.....	3 Gang Tuning Cap.	
CH-1.....	CH 1 S41 CHOKE	
CH-2.....	No. 16 CHOKE	
CH-3.....	No. 16 CHOKE	
CH-4.....	No. 14 CHOKE	
T-1.....	POWER TRANSFORMER	
T-2.....	OUTPUT TRANSFORMER	
IF-1.....	I. F. TRANSFORMER (108)	
IF-2.....	I. F. TRANSFORMER (109)	
1A-1.....	ANTENNAE COIL BAND 1	
1A-2.....	ANTENNAE COIL BAND 2	
1A-3.....	ANTENNAE COIL BAND 3	
1R-1.....	R. F. COIL BAND 1	
1R-2.....	R. F. COIL BAND 2	
1R-3.....	R. F. COIL BAND 3	
1O-1.....	OSCILLATOR COIL BAND 1	
1O-2.....	OSCILLATOR COIL BAND 2	
1O-3.....	OSCILLATOR COIL BAND 3	
SW-1.....	3 POS. 3 SEC. 6 CIR. SWITCH	
SW-2.....	S.P.S.T. SWITCH (on V-2)	
VIB.....	NON SYN. VIBRATOR	
SPK.....	6" P.M. SPEAKER	

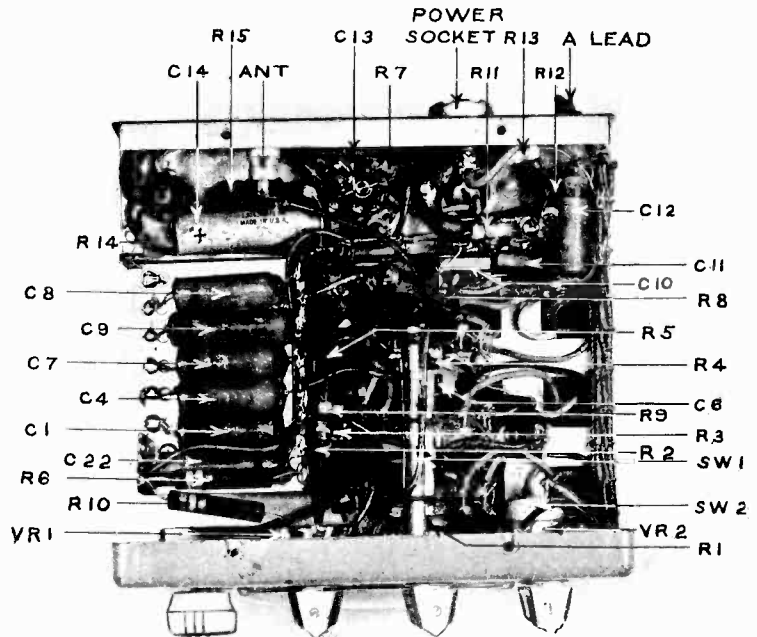
**TABULATION OF PROBABLE TROUBLES, CAUSES, AND CORRECTIVE MEASURES:**

Even though all component parts of the receiver have an ample factor of safety, failure may occur in certain individual cases. Of these failures, the most common will probably be due to some defect in one of the tubes. To find this defect, check tubes on a reliable tube checker, or by substituting spare tubes. If the failure is a short in either the plate or screen circuits, the filter resistors and condensers associated with the circuit in question should be checked with a reliable volt-ohmmeter. To check these circuits it is preferable to use the point to point system, in which the chassis is always negative, except the hot side of the filament circuit, which will be negative if the positive automobile battery terminal is grounded to the frame of the car. Then by applying the positive lead of the volt-ohmmeter directly to the tube socket contacts and the negative lead to the chassis, it will show which of the component circuits are at fault, by a total absence of voltage or a large difference from the correct voltage from those given in the chart of voltages. If a by-pass condenser is found to be at fault replace with new condenser. Also, check the resistors associated with the faulty condenser. If they have been found to have been hot due to the shorted condenser, it is best to replace it also to forestall future trouble.

Other possible failures, such as open circuits caused by poor connections can be likewise located by the above point to point system in accordance with the chart of voltages. Open by-pass condensers are apt to cause either a loss of sensitivity or oscillation in some portion of the circuit. In such cases the fault can be easily located by temporarily connecting a condenser of known quality in parallel with each unit that is under suspicion.

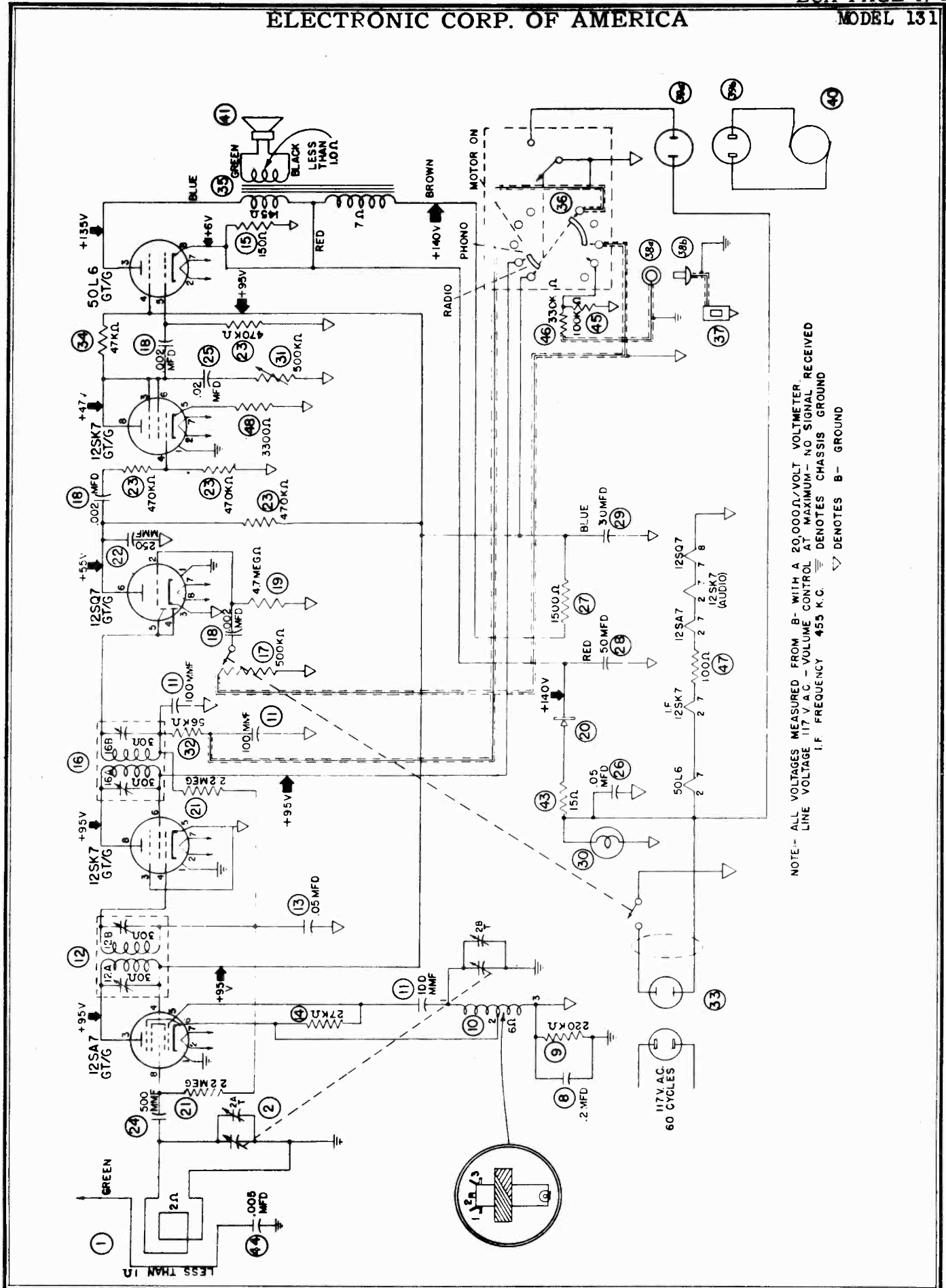
Intermittent or noisy reception is almost always caused by a poor connection, a by-pass condenser intermittently opening up, or a bad tube. Such faults are often rather difficult to find, but usually can be located by lightly tapping each circuit element or component part with a light rubber hammer or insulated rod.

In case of failure, it is advisable to check the vibrator, the fuse and the "A" lead connections as the first probable causes. If the set blows fuses repeatedly, the most likely cause will be sticking vibrator; in which case the vibrator should be replaced. If the set upon test shows to be drawing excessive current immediately upon turning the set on with a good vibrator and 6X5GT in place, the most likely trouble will be shorted buffer condenser, part No. C-16. If the drain gradually builds up, the trouble most likely will be one of the filter condensers, or one of the by-pass condensers.

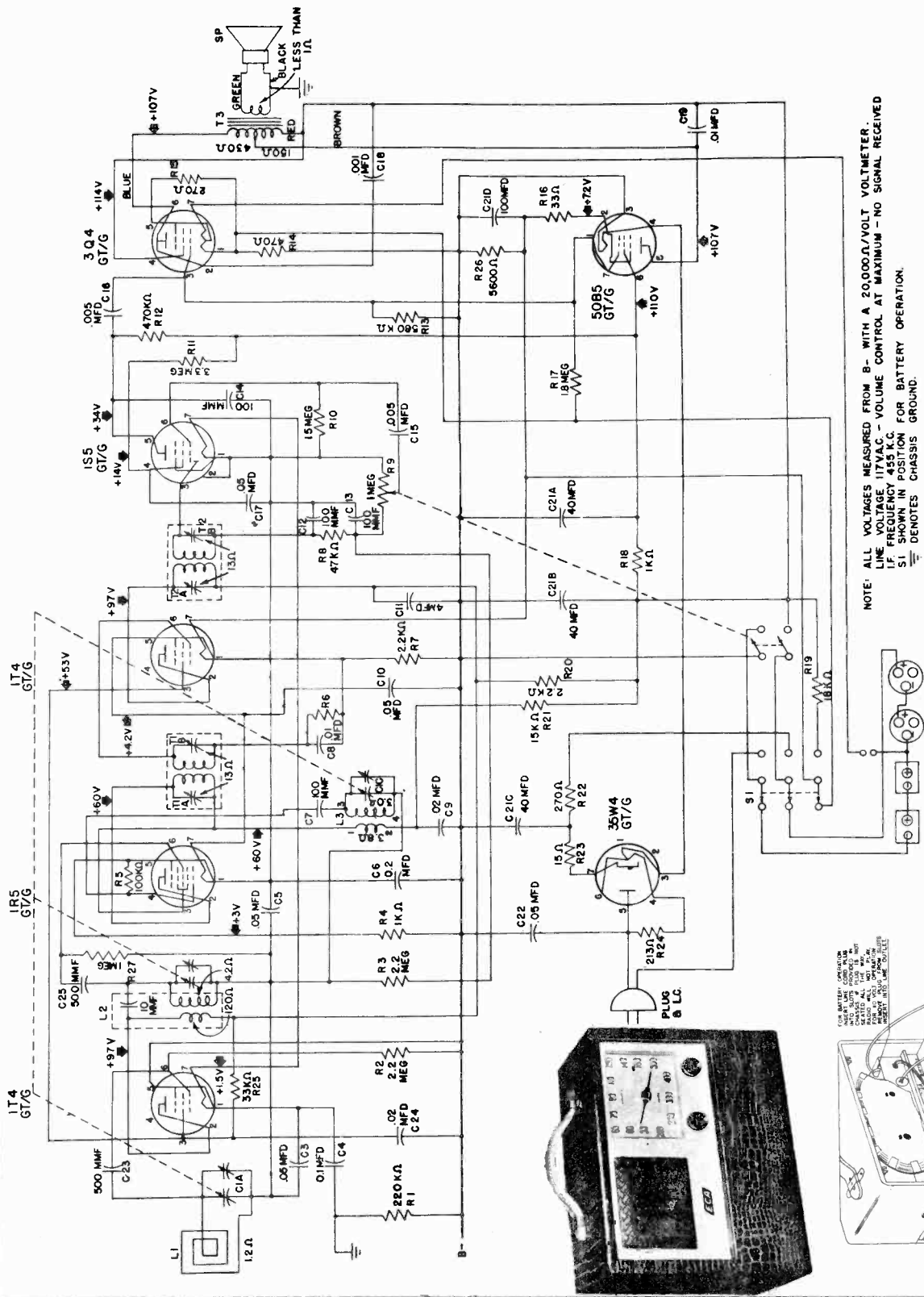




ELECTRONIC CORP. OF AMERICA



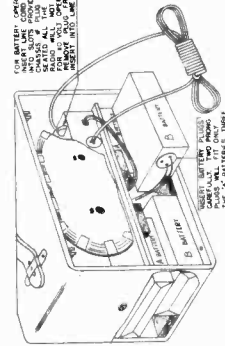
NOTE - ALL VOLTAGES MEASURED FROM B - WITH A 20,000.Ω/VOLT VOLTMETER.  
 LINE VOLTAGE 117 V A.C. - VOLUME CONTROL AT MAXIMUM - NO SIGNAL RECEIVED  
 I.F. FREQUENCY 455 K.C. ⏚ DENOTES CHASSIS GROUND ∇ DENOTES B - GROUND



NOTE: ALL VOLTAGES MEASURED FROM B- WITH A 20,000Ω/VOLT VOLTMETER.  
 LINE VOLTAGE 117V.A.C. - VOLUME CONTROL AT MAXIMUM - NO SIGNAL RECEIVED  
 I.F. FREQUENCY 455 K.C.  
 S1 SHOWN IN POSITION FOR BATTERY OPERATION.  
 ⊕ DENOTES CHASSIS GROUND.

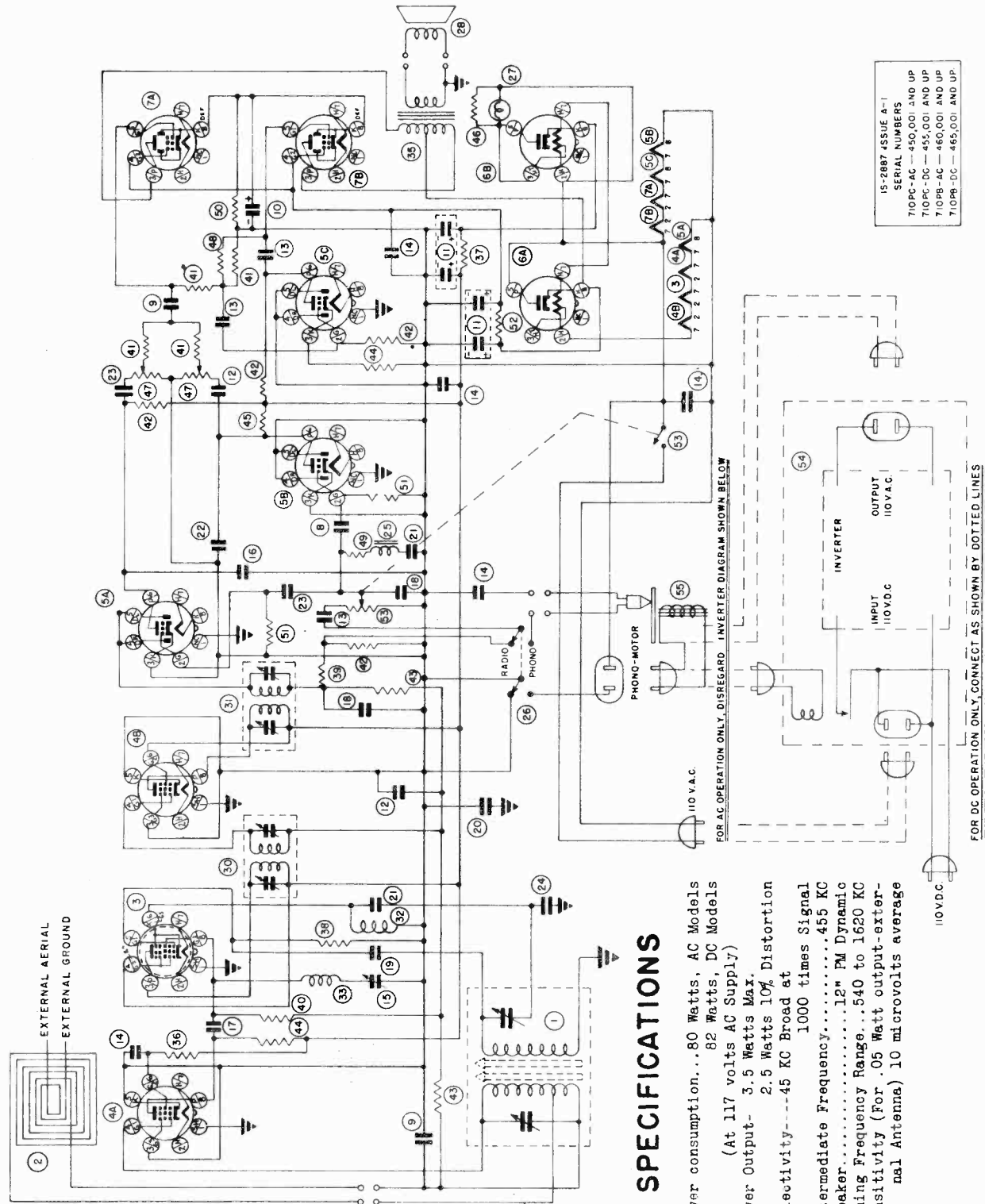
The following battery types may be used with this receiver:

"A" Battery	G3	Ray-O-Vac	P 83 A
"B" Battery	M30	Eveready	746
			P 7830
			482



ELECTRONIC LABS, INC.

MODELS 710PC-AC, 710PB-AC,  
710PC-DC, 710PB-DC, Chassis  
2887



IS-2887 4SSUE A-1  
SERIAL NUMBERS  
710PC-AC — 450,001 AND UP  
710PC-DC — 455,001 AND UP  
710PB-AC — 460,001 AND UP  
710PB-DC — 465,001 AND UP

**SPECIFICATIONS**

- Power consumption... 80 Watts, AC Models  
82 Watts, DC Models  
(At 117 volts AC Supply)
- Power Output- 3.5 Watts Max.
- Selectivity----45 KC Broad at  
1000 times Signal
- Intermediate Frequency.....455 KC
- Speaker.....12" PM Dynamic
- Tuning Frequency Range...540 to 1620 KC
- Sensitivity (For .05 Watt output-external Antenna) 10 microvolts average

FOR AC OPERATION ONLY, DISREGARD. INVERTER DIAGRAM SHOWN BELOW

FOR DC OPERATION ONLY, CONNECT AS SHOWN BY DOTTED LINES

# ALIGNMENT PROCEDURE

Volume Control-Maximum All Adjustments. Signal Generator which will provide an accurately calibrated signal at test frequencies as listed.  
 Output Indicating Meter; Non-Metallic Screwdriver.  
 Dummy Antennas-.01 mf., and 400 ohms.

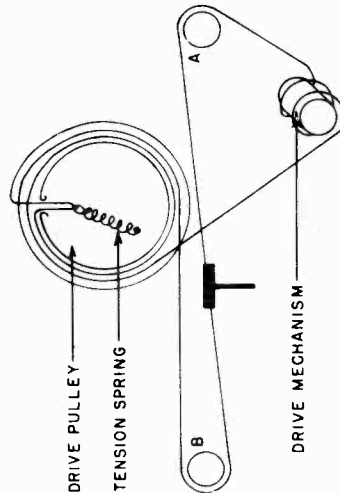
Allow Chassis and Signal Generator to "Heat Up" for several minutes.

The equipment in column at right is required for Aligning:

SIGNAL GENERATOR		DUMMY ANTENNA	TUNER SETTING	TRIMMER ADJUSTMENT (SEE DIAGRAM)	NOTES
FREQUENCY SETTING	CONNECTION				
I.F. 455 KC	Grid of RF tube 12SK7 GTG	0.01 mfd	Out	Adjust for Max. 1, 2, 3 and 4	No signal will be heard unless trimmer condenser under ohassis is unscrewed and reduced from original setting
I.F. 455 KC	Grid of RF tube 12SK7 GT/G	0.01 mfd	Out	Trim condenser under chassis for Min. output.	If it is found that regeneration prevails when the loop antenna is put in its normal position close to the tubes, then the under ohassis trimmer is incorectly set, and should be adjusted to prevent the regenerative condition.
1620 KC	Inductive Coupling to Loop	400 ohms in series with Antenna & Gnd. leads	Out	Adjust Osc. #5 for Max. signal	
1400 KC	Inductive Coupling to Loop	400 ohms in series with Antenna & Gnd. leads	Dial set for 1400KC	Adjust RF trimmer #6 for Max. Signal.	
700 KC	Inductive Coupling to Loop	400 ohms in series with Antenna & Gnd. leads	Dial set for 700KC	Adjust RF tuning core #7 for Max. Signal (care should be taken not to disturb carriage position of tuner)	Alternately adjust R.F. trimmer and R.F. slug until Maximum output is reached at both 1400 KC and 700 KC as instructed above.

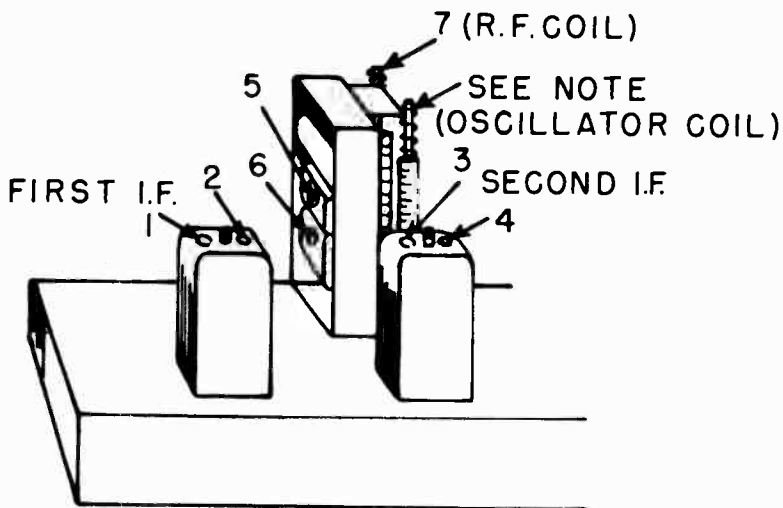
## DRIVE CORD REPLACEMENT

Turn the tuner so that slot in large drive pulley is at the top. Use a new cord 50" long and tie one end to the tension spring. Fasten the other end of the tension spring to the drive pulley. Pass cord through slot in pulley; wind one and one-half turns counter clockwise, progressing from center of pulley toward front. Pass cord around drive mechanism, two complete turns progressing from front to rear. Pass cord counter clockwise around idler pulley A. Pass cord in front of cord between drive pulley and drive mechanism; then clockwise around idler pulley B. Pass cord back of cord between drive pulley and drive mechanism; then counter clockwise around drive pulley for one and one-half turns, progressing from rear to center. Pass cord through slot and tie to string. Cut off excess spring. Attach dial pointer to cord between idler pulley A and B.



A. **MECHANICAL ALIGNMENT:-** The following mechanical adjustments should be made before alignment:

1. Rotate shaft of tuning unit until carriage is against top stop position.
2. Space oscillator coil slug  $1-5/32$ " out from top of oscillator coil form.
3. Space R.F. coil slug  $1-29/64$ " out from top end of R.F. coil winding.  
(Note:-The distance 1 and 2 should be measured from mounted end of the slug)
4. Adjust screw on trimmer of wave trap towards open position so that condenser plates are open at least  $1/32$ ".



B. **I.F. ALIGNMENT PROCEDURE**

1. Feed I.F. frequency from the signal generator through a 0.01 mfd condenser to the control grid of the R. F. tube.
2. No signal will be heard unless trimmer condenser under chassis is unscrewed and reduced from original setting.
3. Turn volume control full on.
4. Make preliminary I.F. adjustment with signal level approximately 50 Mv.
5. Tune I.F. trimmers for maximum signal, reducing I.F. signal input to coupling loop to keep output voltage less than 0.5 V across the voice coil or a dummy 3 ohm resistor.
6. When maximum output has been secured, adjust trimmer condenser in the I.F. trap by turning clockwise to the minimum signal.

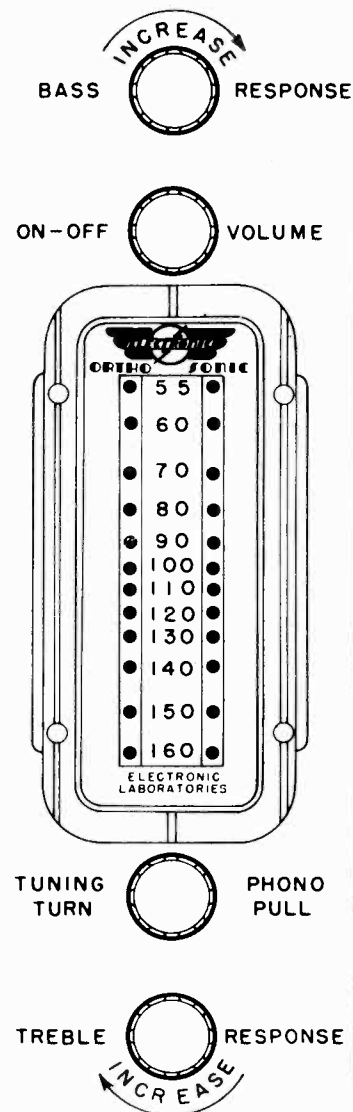
C. **R.F. ALIGNMENT PROCEDURE**

1. Volume control full on.
2. Adjust tuning unit to top stop position.
3. Feed 1620 kc signal into external loop. Hold audio output below 0.5 V. Adjust the oscillator trimmer condenser to maximum output.

4. Move slugs in by means of tuning dial so that pointer is approximately 1" from the stop end, and a signal received from the external loop on a frequency of 1400 kc. Adjust lower trimmer (R.F. trimmer) to maximum output. Reduce R.F. input to keep signal output voltage below 0.5 V across the voice coil or a dummy 3 ohm resistor.
5. Rotate tuning shaft until pointer is approximately 1" from the other end of the scale. Feed to the external loop a test signal at 700 kc. Adjust the R.F. coil slug by rotation in the Tinnerman nut to maximum output.

NOTE: Alternately adjust R.F. trimmer and R.F. slug until maximum output is reached at both 1400 kc. and 700 kc. as instructed in paragraphs C4 and C5.

CAUTION: Extreme care should be taken in the 700 kc. position to make sure that the tuner carriage is not moved by the adjusting tools or hand pressure on the slug screw. Carriage should not be held against the frame, but should be allowed to assume its normal position when adjusting the R.F. coil slug.



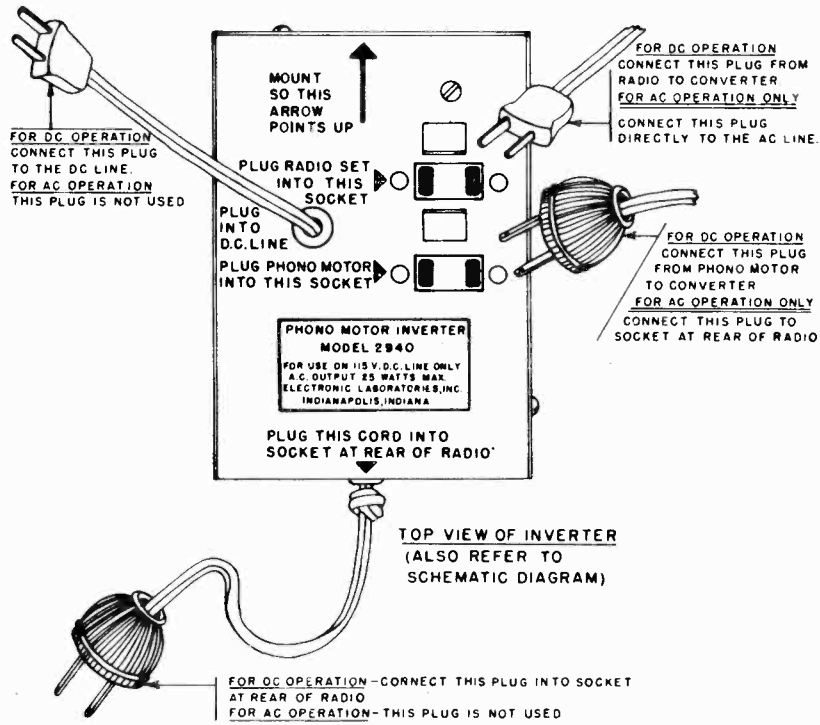


MODELS 710PC-AC, 710PB-AC, ELECTRONIC LABS, INC.

710PC-DC, 710PB-DC, Chassis

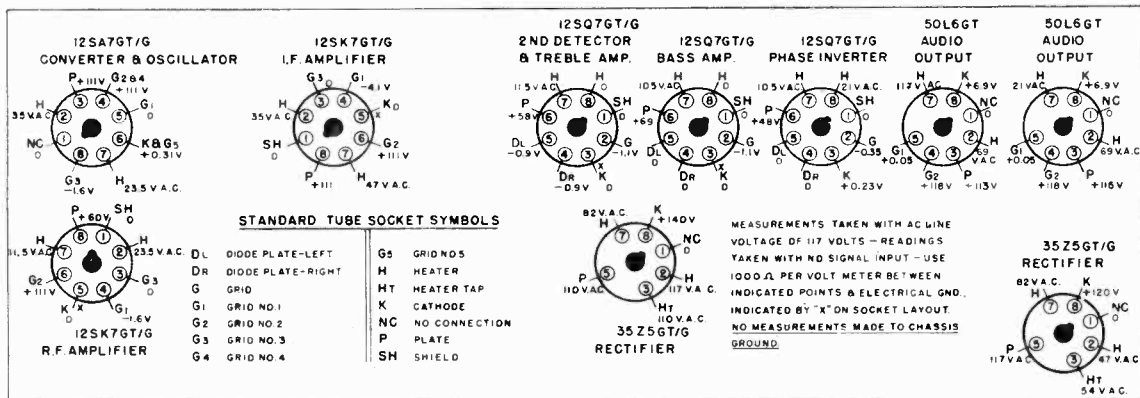
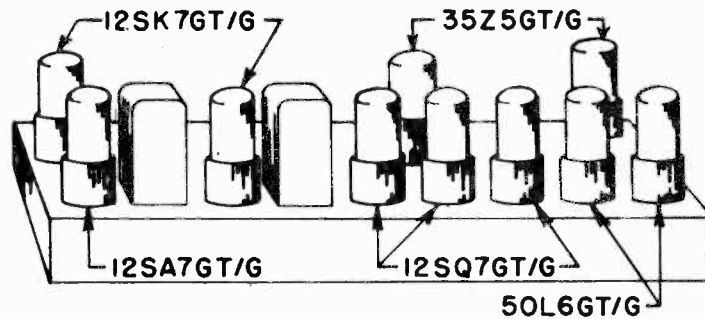
2887

LIST OF PARTS			
ITEM	PART NO	DESCRIPTION	REQ'D
1	A-2220	TUNER ASSEMBLY	1
2	A-2272A	LOOP ASSEMBLY	1
3	12SA7GT/G	TUBE - HEPTODE	1
4	12SK7GT/G	TUBE - PENTODE	2
5	12SQ7GT/G	TUBE - DUO-DIODE - TRIODE	3
6	35Z5GT/G	TUBE - RECTIFIER	2
7	50L6GT	TUBE - POWER PENTODE	2
8	C-418A	CONDENSER 0.05 MFD 400VDC	1
9	C-460A	CONDENSER 0.1MFD 200VDC	2
10	C-462A	CONDENSER 25 MFD 25VDC	1
11	C-466A	CONDENSER 40-40MFD 150 VDC	2
12	C-467A	CONDENSER 0.05MFD 200 VDC	2
13	C-468A	CONDENSER 0.01 MFD 200 VDC	3
14	C-471A	CONDENSER 0.1MFD 400 VDC	5
15	C-483 B	CONDENSER 10-160 MMF (TRIMMER)	1
16	C-492A	CONDENSER 100 MMF 500 VDC	1
17	C-493A	CONDENSER 1000 MMF 350 VDC	1
18	C-494A	CONDENSER 250 MMF 350 VDC	2
19	C-495A	CONDENSER 50 MMF 500 VDC	1
20	C-497A	CONDENSER 0.2 MFD 400 VDC	1
21	C-500A	CONDENSER 10,000 MMF 600 VDC	2
22	C-523A	CONDENSER 0.003 MFD 400 VDC	1
23	C-524A	CONDENSER 0.001 MFD 400 VDC	2
24	C-531A	CONDENSER 2000 MMF 350 VDC	1
25	T-1380A	AUDIO CHOKE 5H	1
26	E-170A	SWITCH DPDT SLIDE	1
27	H-241A	PILOT LAMP	1
28	H-256A	SPEAKER 12" P.M. 3.2 Ω	1
29			
30	T-1361A	I.F. TRANSFORMER	1
31	T-1362A	I.F. TRANSFORMER	1
32	T-1365A	R.F. CHOKE COIL 1.4 MH	1
33	T-1372A	R.F. CHOKE COIL 3.0 MH	1
35	T-1384A	OUTPUT TRANSFORMER $\frac{115-0000}{250-0000}$	1
36	W-490A	RESISTOR 15000 Ω 1/4 WATT	1
37	W-433A	RESISTOR 1000 Ω 1 WATT	1
38	W-437A	RESISTOR 22,000 Ω 1/4 WATT	1
39	W-438A	RESISTOR 47,000 Ω 1/4 WATT	1
40	W-439A	RESISTOR 100,000 Ω 1/4 WATT	1
41	W-440A	RESISTOR 220,000 Ω 1/4 WATT	4
42	W-441A	RESISTOR 470,000 Ω 1/4 WATT	4
43	W-442A	RESISTOR 2.2 MEG Ω 1/4 WATT	2
44	W-452A	RESISTOR 4700 Ω 1/2 WATT	2
45	W-468A	RESISTOR 330,000 Ω 1/4 WATT	1
46	W-473A	RESISTOR 470 Ω 1/4 WATT	1
47	W-476A	POTENTIOMETER 1 MEG Ω	2
48	W-477A	RESISTOR 270,000 Ω 1/4 WATT	1
49	W-478A	RESISTOR 33,000 Ω 1/4 WATT	1
50	W-479A	RESISTOR 75 Ω 1 WATT	1
51	W-480A	RESISTOR 4.7 MEG 1/4 WATT	2
52	W-405A	RESISTOR 220 Ω 1/2 WATT	1
53	W-489A	POTENTIOMETER & SWITCH 300,000 Ω	1
54	2940	INVERTER	1
55	A-2246	AUTOMATIC RECORD CHANGER	1



**CAUTION:-** If a dial lamp burns out, it should be replaced at once. A hole in the bottom of the chassis mounting board provides access to the dial lamp so that it may be replaced without removing chassis from the cabinet

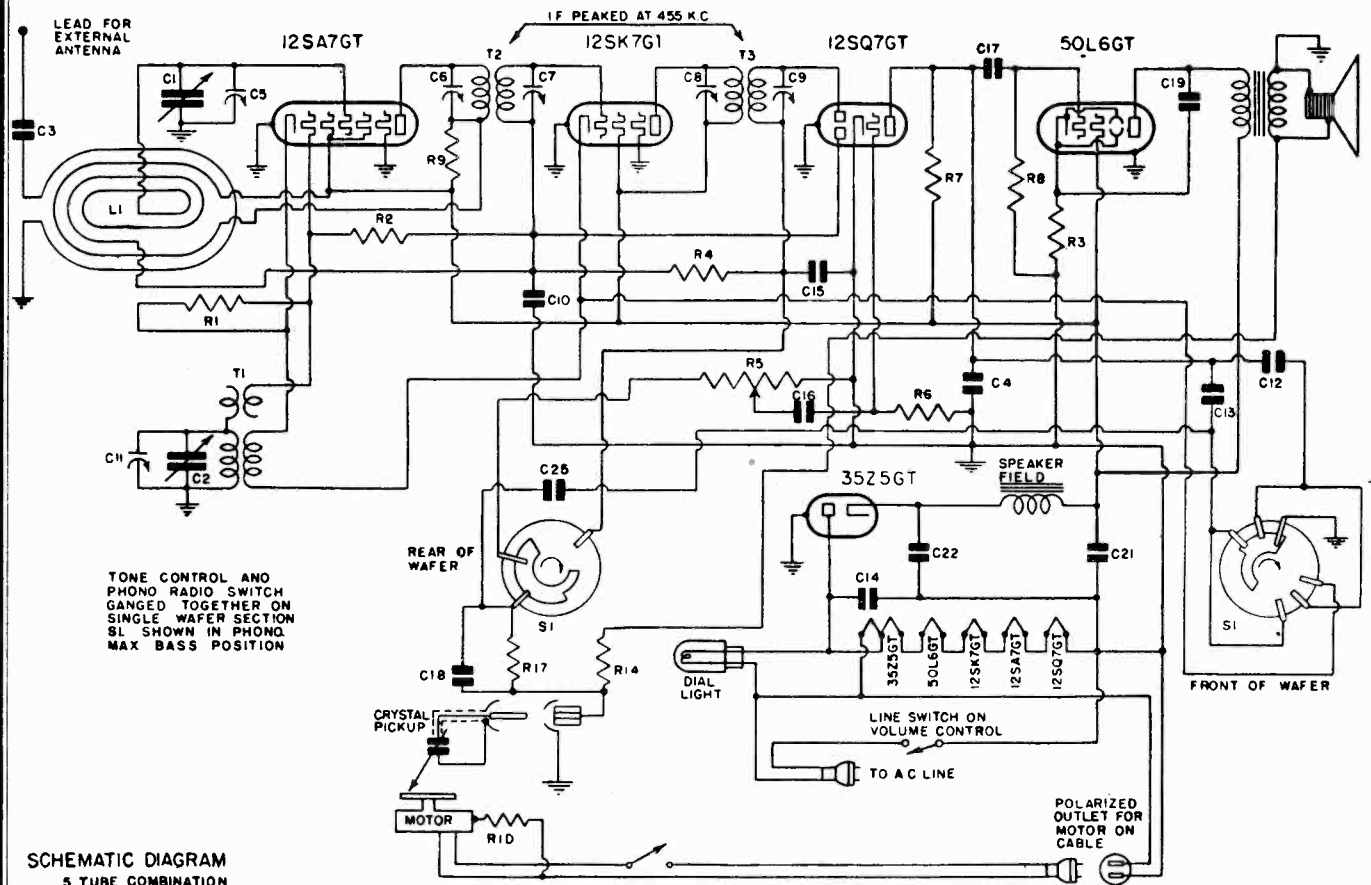
Use only a No. 47 dial lamp.



EMERSON RADIO AND PHONO. CORP.

MODEL FS-423,

Chassis FS



SCHEMATIC DIAGRAM  
5 TUBE COMBINATION

TYPE: Single-band superheterodyne and phonograph.

NUMBER OF TUBES: Five.

FREQUENCY RANGE: 540-1600 kc.

TYPE OF TUBES:

POWER SUPPLY: A.C.

1—12SA7, pentagrid oscillator-modulator

VOLTAGE RATING: 105-125 volts.

1—12SK7, first i-f amplifier

POWER CONSUMPTION: 30 watts for the receiver,  
20 watts for the phono motor.

1—12SQ7, diode detector, a-f amplifier, a.v.c.

1—50L6, beam power output

1—35Z5GT, half-wave rectifier.

VOLTAGE ANALYSIS

Readings should be taken with a 1000 ohms-per-volt meter. Voltages listed below are from point indicated to B minus (line switch) with the volume control turned on full and no signal. Line voltage for these readings was 117.5 volts, 60 cycles, a.c. All readings except heaters and cathodes were taken on 250 volt scale.

Tube	Plate	Screen	Cathode	Fil.
12SA7	88	88	0	12
12SK7	88	88	0	12
12SQ7	30	—	0	12
50L6	82	88	5.6	50

Voltage at 35Z5 cathode—120 volts.

Voltage across speaker field—32 volts.

Voltage across pilot light—4.5 volts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. The color coding of the i-f transformer leads is as follows:  
Grid—green      Plate—blue  
Grid return—black      B plus—red
3. The receiver has a self-contained antenna and does not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna should be used. For this purpose a lead has been brought out of the rear near the line cord.
4. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.

ADJUSTMENTS

An oscillator with frequencies of 455 and 1400 kc is required.

An output meter should be used across the voice coil or output transformer for observing maximum response.

Always use as weak a test signal as possible when aligning the receiver.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the 12SA7 tube. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is mounted on top of the chassis next to the 12SK7 tube. The trimmers are accessible through holes in the top of the can.

The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front section is for the oscillator coil.

The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

I-f Alignment

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 tube through a .01 mf condenser and adjust the four i-f trimmers for maximum response.

Note: The grid of the 12SA7 tube is connected to the lower stator lug of the rear variable condenser section. Connection may be made with a test clip to the upper stator lug.

R-f Alignment

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

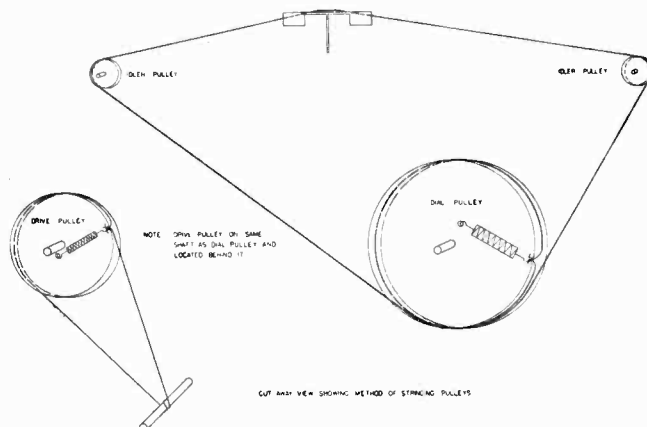
If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows: Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Realign at 140.

REPLACEMENT PARTS LIST

*Item	Part No.	DESCRIPTION
L1	8PW-324A	Antenna loop assembly.....
T1	9JT-617A	Oscillator coil.....
T2	8PT-586A	Double-tuned 455 kc first i-f transformer.....
T3	8PT-587	Double-tuned 455 kc second i-f transformer.....
R1	LR-60	20,000 ohm 1/4 watt carbon resistor.....
R2, R6	4XR-327	15 megohm 1/4 watt carbon resistor.....
R3	3FR-293	140 ohm 1/2 watt wire-wound resistor.....
R4, R17	NNR-220	3 megohm 1/4 watt carbon resistor.....
R5	9SR-452	Volume control, .5 megohm with line switch.....
R7, R8, R14	KR-56	500,000 ohm 1/4 watt carbon resistor.....
R9	KR-50	500 ohm 1/4 watt carbon resistor.....
R10	KR-55	250,000 ohm 1/4 watt carbon resistor.....
C1, C2	9SC-544	Two-gang variable condenser.....
C3, C16	3HC-274	0.002 mf, 600 volt tubular condenser.....
C4	3RC-373	0.0004 mf, 600 volt tubular condenser.....
†C5, C11		Trimmers, part of variable condenser.....
†C6, C7, C8, C9		Trimmers, part of i-f transformers.....
C10	AC-6	0.1 mf, 200 volt tubular condenser.....
C12	9JC-541	0.0006 mf, 600 volt tubular condenser.....
C13	9JC-542	0.0015 mf, 600 volt tubular condenser.....
C14	LC-64	0.05 mf, 400 volt tubular condenser.....
C15	5AC-384	0.0002 mf, 600 volt tubular condenser.....
C17	LC-65	0.02 mf, 400 volt tubular condenser.....
C18	IC-47	0.0005 mf, mica condenser.....
C19	KC-58	0.01 mf, 400 volt tubular condenser.....
C21, C22	6JC-426S	Dual 20 mf, 150 volt dry electrolytic condenser.....
C25	4HC-395A	0.000026 mf, mica condenser.....
	9SS-560	5" dynamic speaker (450 ohm field).....
	8CPM-64H	117 volt, a.c., phono motor.....
	8CC-486C	Crystal pickup.....
	9JS-545A	Phono-radio and tone control switch.....
	7BB-77C	Pilot light socket.....
	6JL-104	Pilot light, 6.3 volt, .15 amp., Mazda No. 47.....
	9JD-132	Dial face.....
	9JD-133	Dial pointer.....
	9JH-85	Drive shaft.....
	6RZ-870	Drive cord.....
	6QZ-863	Dial cord.....

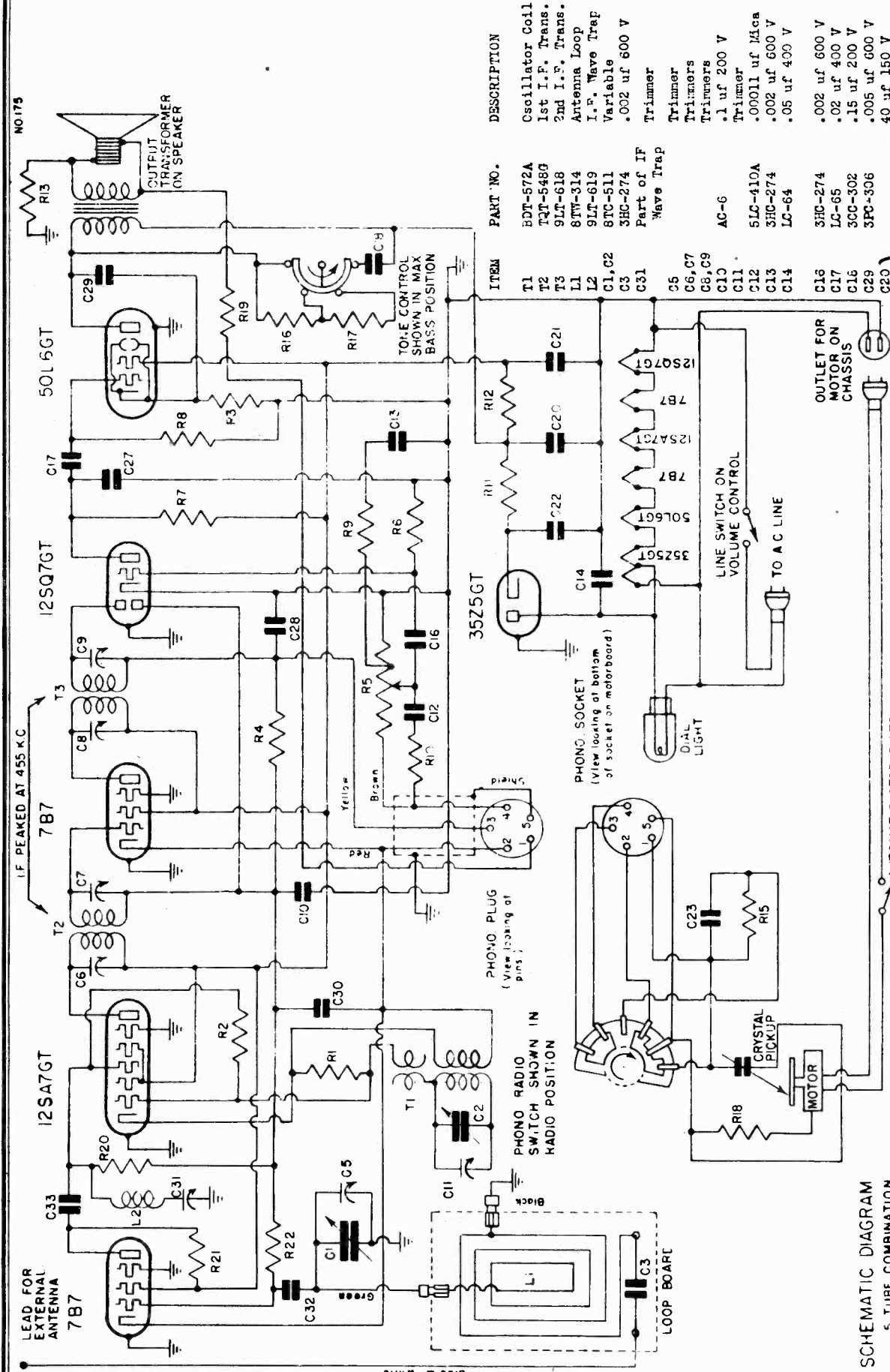
DIAL PARTS

\*Item number locates the article on the schematic diagram. †Not supplied separately.



EMERSON RADIO AND PHONO. CORP.

MODEL FT

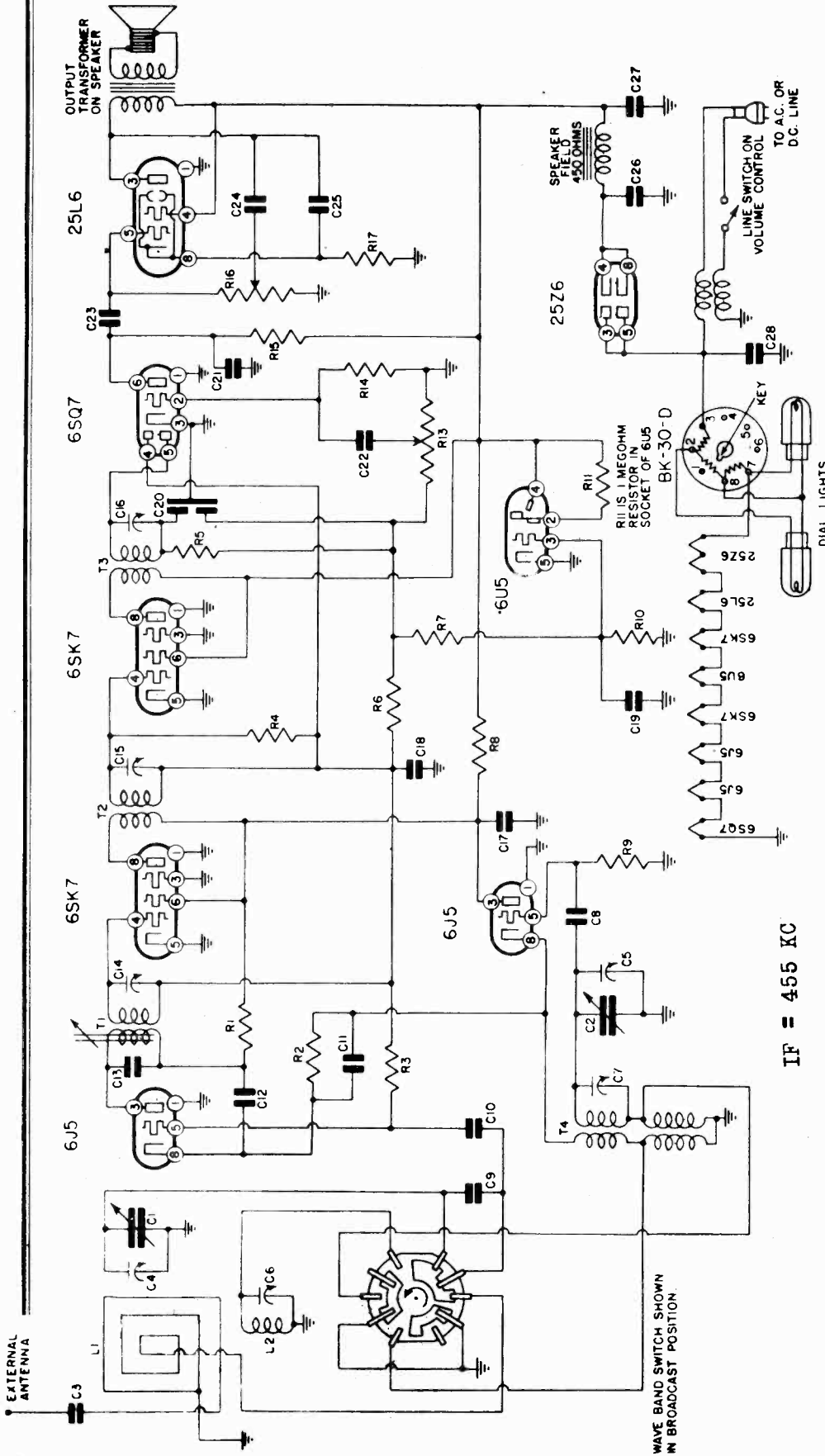


ITEM	PART NO.	DESCRIPTION
T1	BDT-572A	Oscillator Coil
T2	T3T-548G	1st I.F. Trans.
T3	9LT-618	2nd I.F. Trans.
L1	8TW-314	Antenna Loop
L2	9LT-619	I.F. Wave Trap
C1, C2	8TC-511	Variable
C3	3HC-274	.002 uf 600 V
C31	Part of IF Wave Trap	Trimmer
C5	Trimmers	Trimmers
C6, C7	Trimmers	Trimmers
C8, C9	Trimmers	Trimmers
C10	AC-6	.1 uf 200 V
C11	5LC-410A	.00011 uf Mica
C12	3HC-274	.002 uf 600 V
C13	LC-64	.05 uf 400 V
C14	3HC-274	.002 uf 600 V
C15	LC-65	.02 uf 400 V
C16	3CC-302	.15 uf 200 V
C17	3PC-306	.005 uf 600 V
C18	40 uf 150 V	40 uf 150 V
C19	20 uf 150 V	20 uf 150 V
C20	8JC-513	20 uf 150 V
C21	4XC-393A	.00006 uf Mica
C22	FC-29	.02 uf 200 V
C23	5LC-410A	.00011 uf Mica
C24	5LC-410A	.00011 uf Mica
C25	4C-394A	.00022 uf Mica
C26	5LC-410A	.00011 uf Mica
C27	5LC-410A	.00011 uf Mica
C28	5LC-410A	.00011 uf Mica
C29	5LC-410A	.00011 uf Mica
C30	5LC-410A	.00011 uf Mica
C31	5LC-410A	.00011 uf Mica
C32	5LC-410A	.00011 uf Mica
C33	5LC-410A	.00011 uf Mica

ITEM	PART NO.	DESCRIPTION
R1	IR-43	1000- $\frac{1}{2}$ W
R2	7UR-394	2200- $\frac{1}{2}$ W
R3	XR-55	250000- $\frac{1}{2}$ W
R4	XR-56	500000- $\frac{1}{2}$ W
R5	KR-50	250000- $\frac{1}{2}$ W
R6	OR-73	10000- $\frac{1}{2}$ W
R7	LR-65	10000- $\frac{1}{2}$ W
R8	KR-57	1 meg
R9	IR-43	1000- $\frac{1}{2}$ W
R10	7UR-394	2200- $\frac{1}{2}$ W
R11	XR-55	250000- $\frac{1}{2}$ W
R12	XR-56	500000- $\frac{1}{2}$ W
R13	KR-50	250000- $\frac{1}{2}$ W
R14	OR-73	10000- $\frac{1}{2}$ W
R15	LR-65	10000- $\frac{1}{2}$ W
R16	KR-56	500000- $\frac{1}{2}$ W
R17	9UR-450	175- $\frac{1}{2}$ W
R18	8UR-424	750- $\frac{1}{2}$ W
R19	3BR-247	40000- $\frac{1}{2}$ W
R20	KR-55	250000- $\frac{1}{2}$ W
R21	FR-79	15 meg
R22	HR-42	2 meg

SCHEMATIC DIAGRAM 5 TUBE COMBINATION

MODEL 456, Chassis GP EMERSON RADIO AND PHONO. CORP.

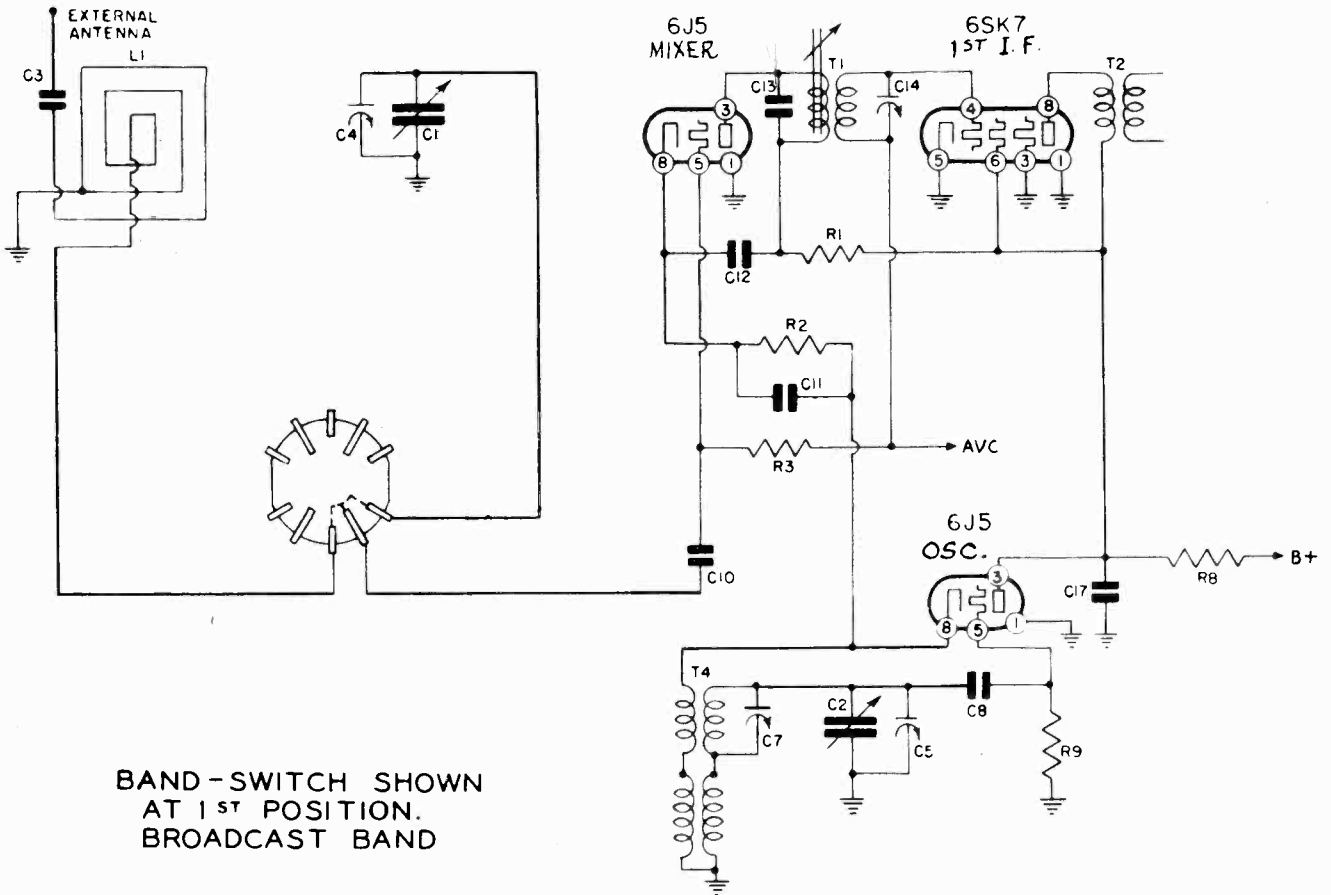


IF = 455 KC

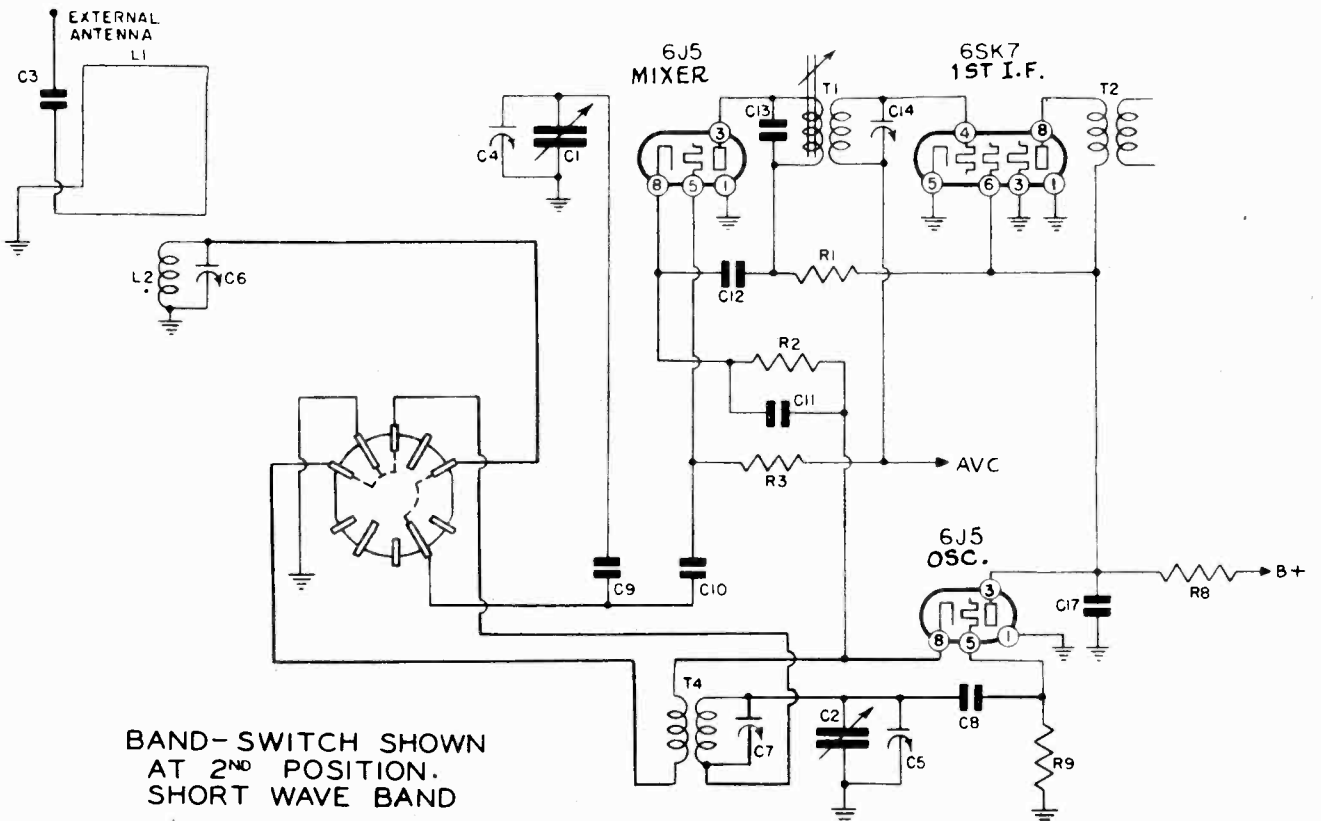
ITEM	PART NO.	DESCRIPTION	ITEM	PART NO.	DESCRIPTION
L1	10FW-390	LOOP ANTENNA COIL	R6	92B-480	3.3 MEG. W.
L2	10PT-649	S.W. ANTENNA COIL	R7	92B-480	3.3 MEG. W.
T1	10PT-651	1st I.F. TRANS.	R8	PR-79	1000 A. W.
T2	10PT-652	2nd I.F. TRANS.	R9	10TR-486	47,000 A. W.
T3	10PT-653	3rd I.F. TRANS.	R10	33R-275	10 MEG. W.
T4	10PT-650	OSC. COIL	R11	PART OF 6U5	
C1, C2	10PC-579	VARIABLE	R12	SOCKET	1 MEG
C3	3HC-274	.002 MF 600V.	R13	10NR-471	VOLUME CONTROL
C4	PART OF C1,2	TRIMMER	R14	4XR-327	15 MEG. W.
C5	PART OF C1,2	TRIMMER	R15	92B-478	470,000 A. W.
C6	PART OF L2	TRIMMER	R16	10TR-472	TONE CONTROL
C7	PART OF TA	TRIMMER	R17	3F-257	140 A. W.
C8	5LC-410A	.00011 MF MICA	R18	5AC-394	.002 MF 600V
C9	10PC-589	.00053 MF MICA	R19	LC-65	.02 MF 400V
C10	5LC-410A	.00011 MF MICA	R20	5AC-394	.0002 MF 600V
C11	BC-12	.05 MF 200V	R21	KC-58	.01 MF 400V
C12	EC-12	.05 MF 200V	R22	6JC-437S	20 MF 150V DIAL
C13	EC-12	.05 MF 200V	R23	LC-64	.05 MF 400V
C14	PART OF T1	OSC. COIL	R24	IR-65	10,000 A. W.
C15	PART OF T2	OSC. COIL	R25	79R-394	2,200 A. W.
C16	PART OF T3	OSC. COIL	R26	92B-490	3.3 MEG. W.
C17	BC-12	.05 MF 200V	R27	10TR-485	220,000 A. W.
C18	BC-12	.05 MF 200V	R28	PART OF T3	
C19	5C-12	.05 MF 200V			
C20	PART OF C-16	TRIMMER			
C21	5AC-394	.002 MF 600V			
C22	3HC-274	.002 MF 600V			
C23	LC-65	.02 MF 400V			
C24	5AC-394	.0002 MF 600V			
C25	KC-58	.01 MF 400V			
C26	6JC-437S	20 MF 150V DIAL			
C27	LC-64	.05 MF 400V			
C28	IR-65	10,000 A. W.			
C29	79R-394	2,200 A. W.			
C30	92B-490	3.3 MEG. W.			
C31	10TR-485	220,000 A. W.			
C32	PART OF T3				
C33	5AC-394	.002 MF 600V			
C34	3HC-274	.002 MF 600V			
C35	LC-65	.02 MF 400V			
C36	5AC-394	.0002 MF 600V			
C37	KC-58	.01 MF 400V			
C38	6JC-437S	20 MF 150V DIAL			
C39	LC-64	.05 MF 400V			
C40	IR-65	10,000 A. W.			
C41	79R-394	2,200 A. W.			
C42	92B-490	3.3 MEG. W.			
C43	10TR-485	220,000 A. W.			
C44	PART OF T3				
C45	5AC-394	.002 MF 600V			
C46	3HC-274	.002 MF 600V			
C47	LC-65	.02 MF 400V			
C48	5AC-394	.0002 MF 600V			
C49	KC-58	.01 MF 400V			
C50	6JC-437S	20 MF 150V DIAL			
C51	LC-64	.05 MF 400V			
C52	IR-65	10,000 A. W.			
C53	79R-394	2,200 A. W.			
C54	92B-490	3.3 MEG. W.			
C55	10TR-485	220,000 A. W.			
C56	PART OF T3				
C57	5AC-394	.002 MF 600V			
C58	3HC-274	.002 MF 600V			
C59	LC-65	.02 MF 400V			
C60	5AC-394	.0002 MF 600V			
C61	KC-58	.01 MF 400V			
C62	6JC-437S	20 MF 150V DIAL			
C63	LC-64	.05 MF 400V			
C64	IR-65	10,000 A. W.			
C65	79R-394	2,200 A. W.			
C66	92B-490	3.3 MEG. W.			
C67	10TR-485	220,000 A. W.			
C68	PART OF T3				
C69	5AC-394	.002 MF 600V			
C70	3HC-274	.002 MF 600V			
C71	LC-65	.02 MF 400V			
C72	5AC-394	.0002 MF 600V			
C73	KC-58	.01 MF 400V			
C74	6JC-437S	20 MF 150V DIAL			
C75	LC-64	.05 MF 400V			
C76	IR-65	10,000 A. W.			
C77	79R-394	2,200 A. W.			
C78	92B-490	3.3 MEG. W.			
C79	10TR-485	220,000 A. W.			
C80	PART OF T3				

# "clarified schematics"

## EMERSON RADIO AND PHONO. CORP. MODEL 456, Chassis GP



BAND-SWITCH SHOWN AT 1<sup>ST</sup> POSITION. BROADCAST BAND

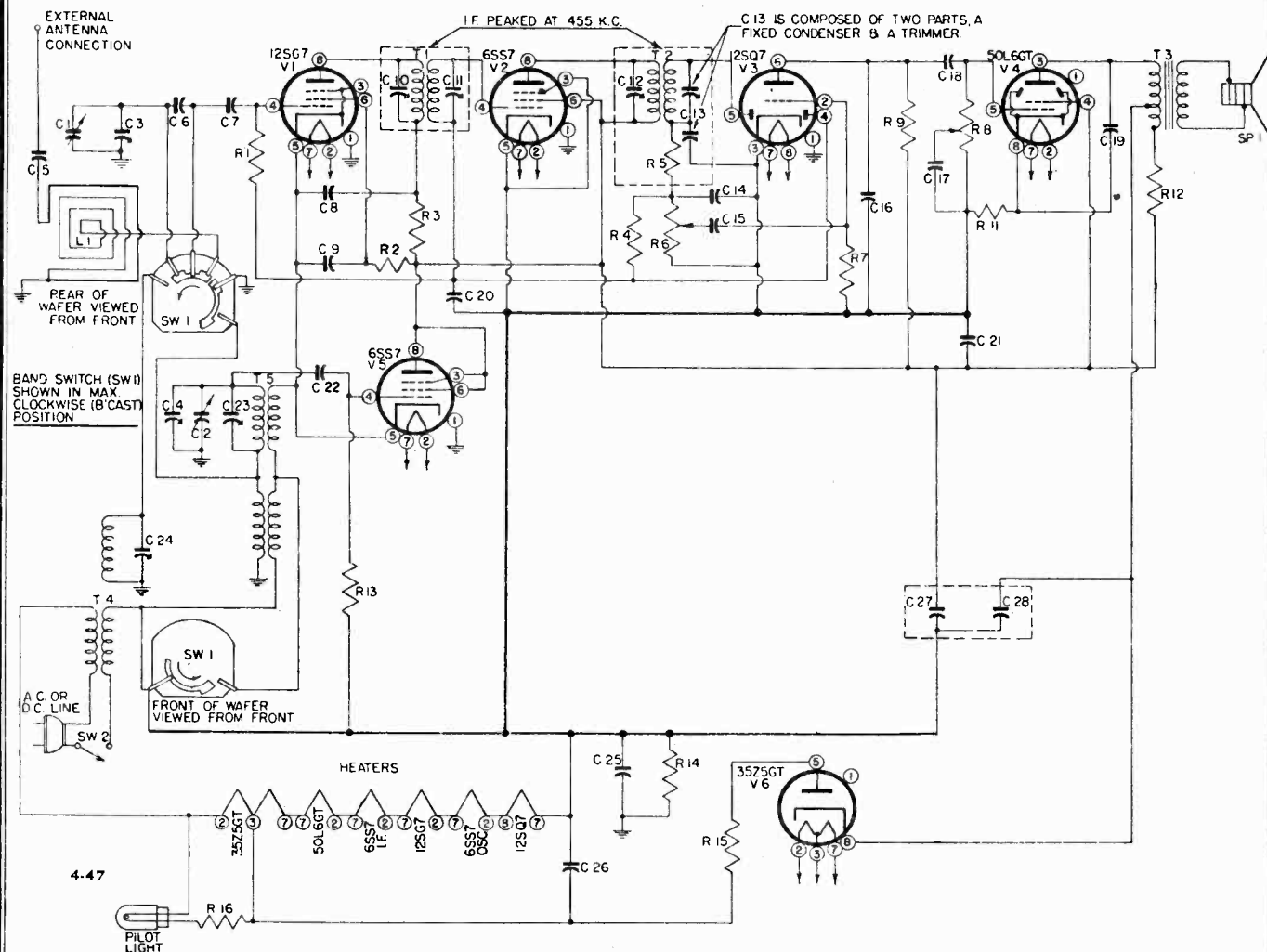


BAND-SWITCH SHOWN AT 2<sup>ND</sup> POSITION. SHORT WAVE BAND

EMERSON RADIO AND PHONO. CORP.

MODELS 513, 514, 534

Chassis 120007



DESCRIPTION

TYPE: Two-band superheterodyne.

FREQUENCY RANGE:

540-1620 kc. (555-185 meters)

8.8-12.2 mc. (16.3-24.5 meters)

TYPE OF TUBES:

- 1—12SG7, mixer
- 1—6SS7, oscillator
- 1—6SS7 or 7B7, i-f amplifier
- 1—12SQ7, diode detector, a-f amplifier, a.v.c.
- 1—50L6GT, beam power output
- 1—35Z5GT, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

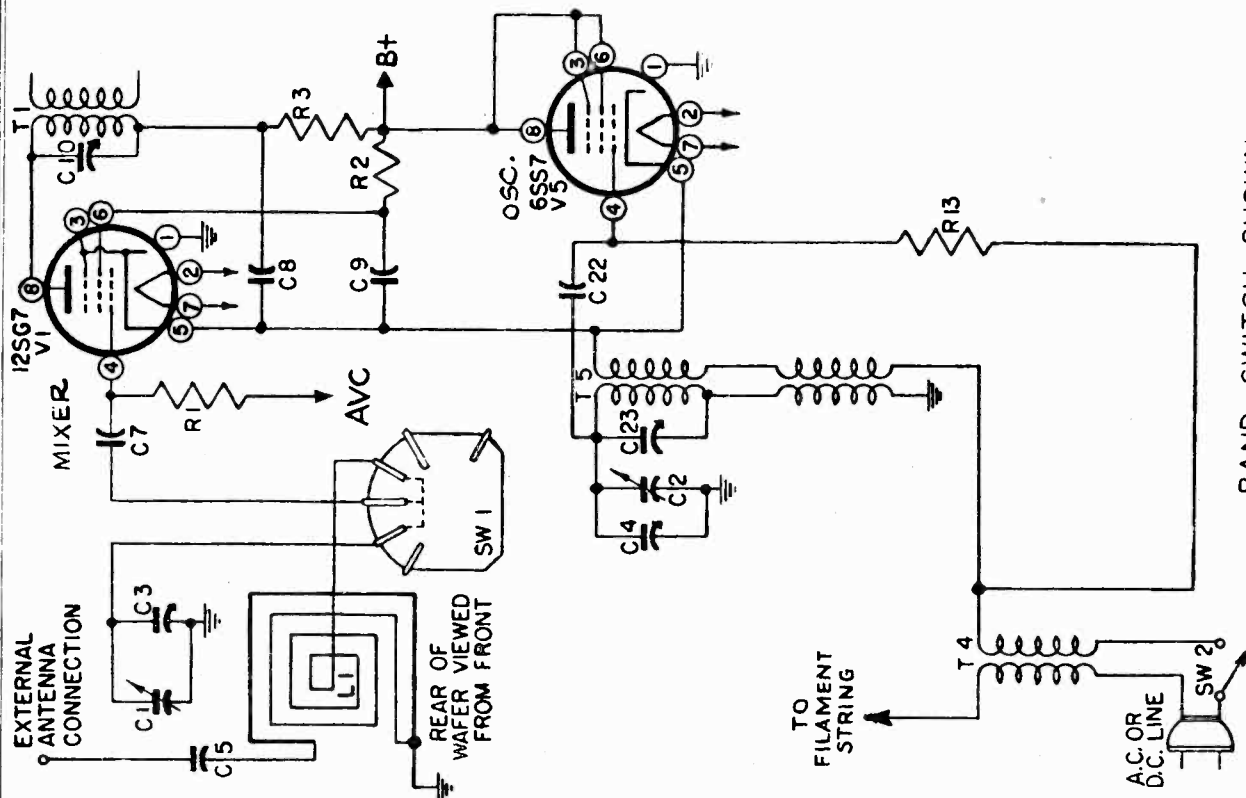
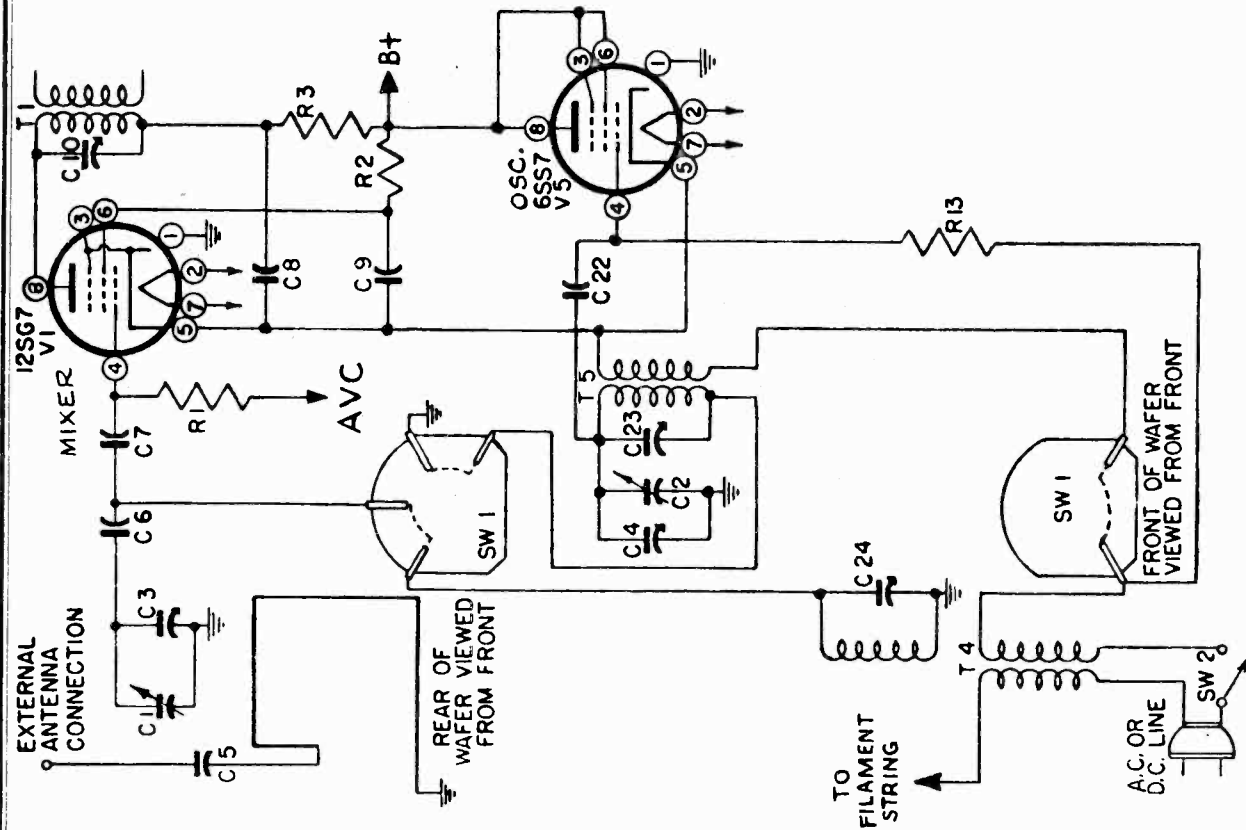
VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:  
Grid—green                      Plate—blue  
Grid return—black              B+—red
4. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.
5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
6. Where 7B7 octal tube is used in place of 6SS7 i-f amplifier, tube types are not interchangeable. Use same voltage data for both types.

# "clarified schematics"





MODELS 513, 514, 534  
Chassis 120007

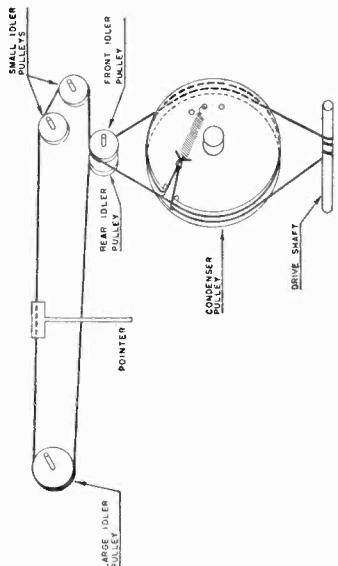
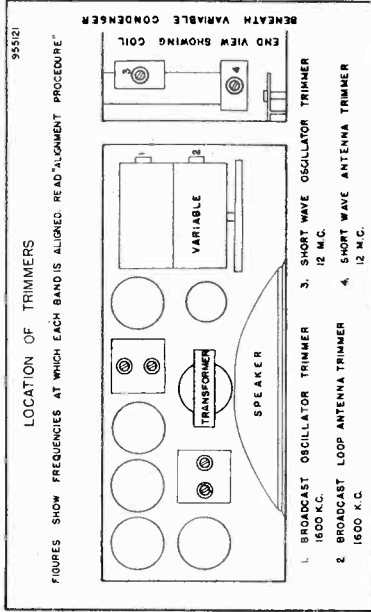
**ADJUSTMENTS**

An oscillator with frequencies of 455, 600, 1600 and 12,000 kc is required.  
An output meter should be used across the voice coil or output transformer for observing maximum response.  
Always use as weak a test signal as possible when aligning the receiver.

**i-f Alignment**  
Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12S57 tube through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.  
Note: The grid of the 12S57 tube is the No. 4 pin.

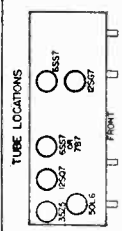
**R-f Alignment**  
Rotate the wave-band switch counter-clockwise to the short-wave position. Set the dial pointer at 12 megacycles and using a 400 ohm carbon resistor as a dummy antenna align at 1600.

If the loop has been replaced it may be necessary to adjust the loop inductance as follows: Align at 1600. Set the pointer at 60 and feed 600 kc into the radiating loop. A position of the outside turn of the loop may then be swung to either side of the center to give maximum response. Re-align at 1600.



CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

Schematic Symbol	DESCRIPTION	Schematic Symbol	DESCRIPTION	Part No.
C1, C2	Two-gang variable condenser	R2	47,000 ohms, 1/4 watt resistor	310890
*C3, C4	Trimmers, part of variable condenser	R3	47,000 ohms, 1/4 watt resistor	310650
C5, C15, C17	0.002 mfd., 600 volt condenser	R4	3.3 meg., 1/4 watt resistor	321330
C6	0.00046 mfd. mica condenser	*R5	47,000 ohms, 1/4 watt resistor, part of second i-f transformer	390190
C7, C16	0.00022 mfd. mica condenser	R6	500,000 ohms volume control	397000
C8	0.05 mfd., 200 volt condenser	R7	15 meg., 1/4 watt resistor	397000
C9, C18, C19	0.02 mfd., 400 volt condenser	R8	400,000 ohms tone control	390280
*C10, C11, C12	Trimmers, part of i-f transformers	R11	150 ohms, 1/4 watt resistor	340290
*C13	Trimmer and fixed condenser, part of second i-f transformer	R12	1,000 ohms, 1 watt resistor	370490
C14	0.00011 mfd. mica condenser	R13	310810 22,000 ohms, 1/4 watt resistor	310810
C20	0.1 mfd., 200 volt condenser	R14	220,000 ohms, 1/4 watt resistor	321050
C21	0.03 mfd., 400 volt condenser	R15	15 ohms, 1/4 watt resistor	340030
*C22	0.00036 mfd. mica condenser	R16	10 ohms, 1/2 watt resistor	340010
*C23	Trimmer, part of oscillator coil	*P1	P.M. speaker	180008
*C24	Trimmer, part of short wave antenna coil	*JW1	Band switch	510330
C25	0.2 mfd., 200 volt condenser	*SW2	Line switch on volume control	720400
C26	0.05 mfd., 400 volt condenser	T1	First i-f transformer	720390
C27, C28	50-50 mfd., 150 volt dual electrolytic condenser	T2	Second i-f transformer	734100
L1	Loop antenna	T3	Output transformer	710010
R1, R9, R10	470,000 ohms, 1/4 watt resistor	T4	Short wave antenna coil	716100
		T5	Oscillator coil	583160
			Line cord	807000
			Pilot light, Mazda No. 47	507215
			Pilot light socket	



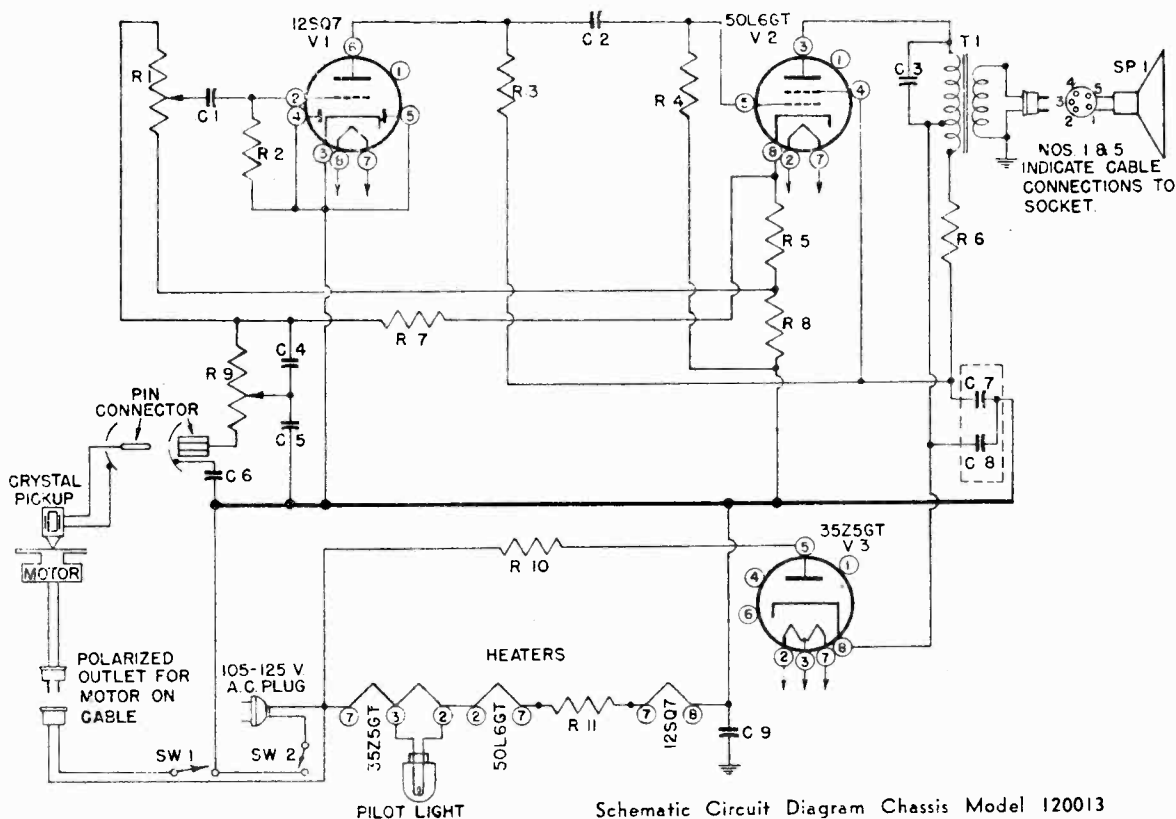
**VOLTAGE ANALYSIS**

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohm-per-volt meter should be used for all readings except those indicated by an asterisk (\*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at maximum and the variable condenser open and band switch in B.C. position. When the band switch is in the S.W. position, voltages marked (+) apply.

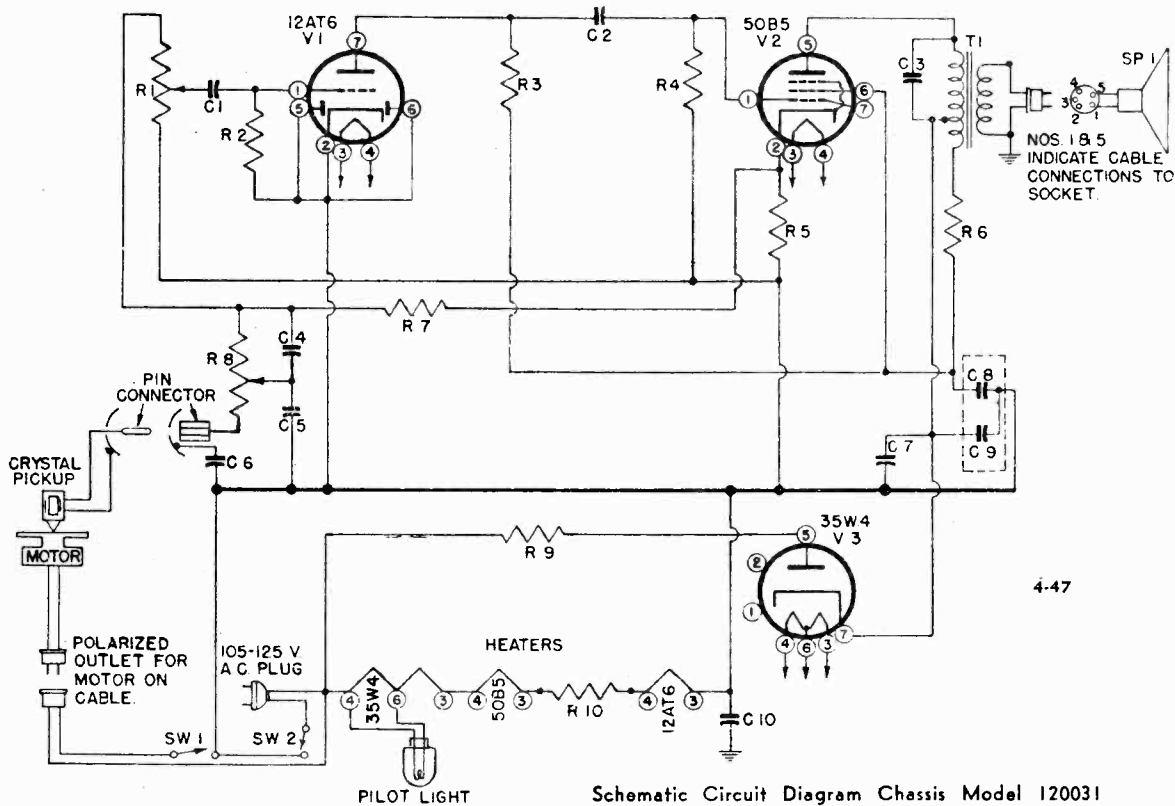
TUBE	1	2	3	4	5	6	7	8
6SS7 (V1)			95	-12*	95	95	95	95
6SS7 (V3)			95+	-5.6+	95+	65	85	85
12SK7				-3.0+	95	95	95	95
12SQ7				-3.3*	95+	52*		
50L6GT				-0.6*	-0.57*	52+		
35W4GT				-0.6+	-0.5+	52+		
								5.35
								5.35+
								119
								119+

EMERSON RADIO AND PHONO. CORP.

MODEL 521,  
Chassis 120013  
MODEL 542,  
Chassis 120031



IF = 455 KC



4-47

MODEL 521  
MODEL 542

Schematic Symbol	Part No.	DESCRIPTION	Schematic Symbol	Part No.	DESCRIPTION	DESCRIPTION
C1	920170	0.001 mfd., 600 volt condenser	SP1	180011	P.M. Speaker (Model 521), or	<p>TYPE: Portable record player.</p> <p>TYPE OF TUBES:</p> <p>1—12SQ7 or 12AT6, first audio</p> <p>1—50L6 or 50B5, beam power output</p> <p>1—35Z5 or 35W4, half wave rectifier</p> <p>POWER SUPPLY: A.C., 60 cycles.</p> <p>VOLTAGE RATING: 105-125 volts.</p> <p>POWER CONSUMPTION: 50 watts.</p> <p><b>GENERAL NOTES</b></p> <p>1. To replace tubes, remove the motor board by removing the knobs and then the screws, holding the lid support and the motorboard. Lift the motorboard out and set it aside.</p> <p>2. Chassis model 120013 uses tube types 12SQ7, 50L6, 35Z5. Chassis model 120031 uses tube types 12AT6, 50B5, 35W4.</p>
C2, C3	920020	0.02 mfd., 400 volt condenser	SP1	180004	P.M. Speaker (Model 521)	
C4	910010	0.00011 mfd. mica condenser	SP1	180000	P.M. Speaker (Model 542)	
C5	910000	0.00022 mfd. mica condenser	*SW1		Motor switch on volume control	
C6	920030	0.05 mfd., 400 volt condenser	*SW2		Master switch on tone control	
C7	925003	16 mfd., 150 volt electrolytic condenser (Chassis 120031)	T1	734000	Output transformer	
C7, C8	925000	50-30 mfd., 150 volt dual electrolytic condenser (Chassis 120013)		807000	Incandescent light	
C8, C9	925012	50-50 mfd., 150 volt dual electrolytic condenser (Chassis 120031)		505010	Speaker plug	
C9	920420	0.15 mfd., 200 volt condenser (Chassis 120013)		583180	Line cord	
C10	920420	0.15 mfd., 200 volt condenser (Chassis 120031)		508010	Pickup socket	
R1	390000	0.5 meg. volume control		413279	Phono arm rest	
R2	397000	15 meg., 1/2 watt resistor		819024	Turntable	
R3, R4	321130	470,000 ohms, 1/4 watt resistor		140037	Cabinet (Model 521)	
R5	340290	150 ohms, 1/2 watt resistor		140073	Cabinet (Model 542)	
R6	340430	560 ohms, 1/2 watt resistor (Chassis 120031)		450280	Handle	
R6	310470	820 ohms, 1/4 watt resistor (Chassis 120013)		460470	Knob	
R7	321350	3.3 meg., 1/4 watt resistor (Chassis 120031)		820030	Crystal pickup arm, or	
R7	321450	10 meg., 1/4 watt resistor (Chassis 120013)		820010	Crystal pickup arm	
R8	390370	2 meg. tone control (Chassis 120031)		819004	Phono motor	
R8	340050	15 ohms, 1/2 watt resistor (Chassis 120013)				
R9	340050	15 ohms, 1/2 watt resistor (Chassis 120031)				
R9	390370	2 meg. tone control (Chassis 120013)				
R10	394160	133 ohms, 5 watt resistor (Chassis 120031)				
R10	340050	15 ohms, 1/2 watt resistor (Chassis 120013)				
R11	394160	133 ohms, 5 watt resistor (Chassis 120013)				

**VOLTAGE ANALYSIS**

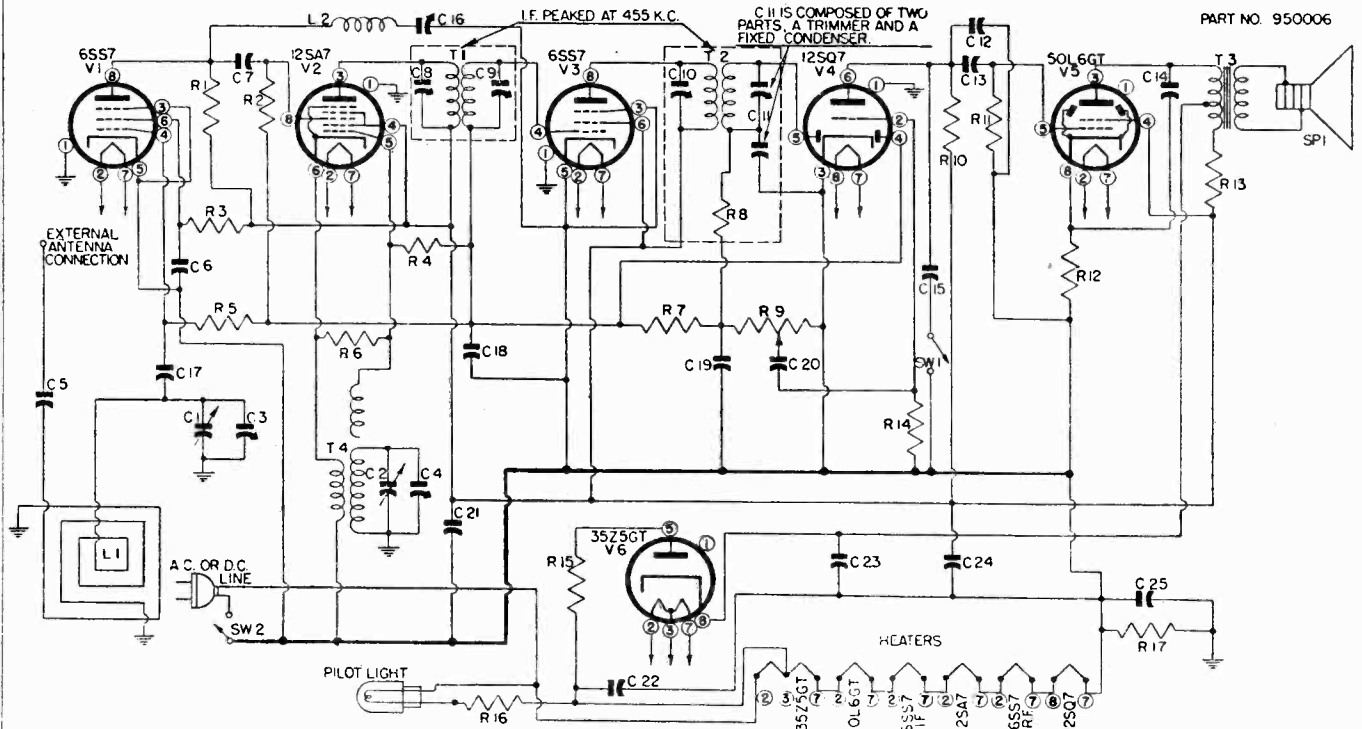
The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (\*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Take readings with the volume control set at maximum, no signal.

TUBE	1	2	3	4	5	6	7	8
12SQ7		*-0.7				45		
50L6			118	123				7.5
35Z5								129
12AT6		*-0.7					45	
50B5					118	123		
35W4	128						128	

EMERSON RADIO AND PHONO. CORP.

MODEL 530, Chassis 120006,  
120056

PART NO. 950006



4-47

Schematic circuit diagram for chassis 120006. Substitute proper pin connections for octal tubes on chassis 120056.

DESCRIPTION

TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- 1—6SS7 or 7B7, r-f amplifier
- 1—12SA7 or 14Q7, pentagrid oscillator-modulator
- 1—6SS7 or 7B7, first i-f amplifier
- 1—12SQ7 or 14B6, diode detector, a-f amplifier, a.v.c.
- 1—50L6 or 50A5, beam power output
- 1—35Z5 or 35Y4, half-wave rectifier

POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

GENERAL NOTES

1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. The color coding of the i-f transformer leads is as follows:
 

Grid—green	Plate—blue
Grid return—black	B+—red
4. All models have self-contained antennas and do not require additional antenna connections. For permanent installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out of the rear near the line cord.

5. The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
6. Chassis 120006 uses octal tubes. Chassis 120056 uses loctal tubes. The circuit diagram and voltage readings are the same except for the base pin numbers. The octal pins are as indicated on the circuit diagram. The loctal pins are as follows:

7B7

- pin 1—heater
- pin 2—plate
- pin 3—screen grid
- pin 4—suppressor grid
- pin 5—internal shield
- pin 6—control grid
- pin 7—cathode
- pin 8—heater

14Q7

- pin 1—heater
- pin 2—plate
- pin 3—screen grid
- pin 4—oscillator grid
- pin 5—suppressor grid
- pin 6—grid
- pin 7—cathode
- pin 8—heater

50A5

- pin 1—heater
- pin 2—plate
- pin 3—screen grid
- pin 4—no connection
- pin 5—no connection
- pin 6—grid
- pin 7—cathode and beam plates
- pin 8—heater

14B6

- pin 1—heater
- pin 2—triode plate
- pin 3—triode grid
- pin 4—connection to 7
- pin 5—diode plate No. 2
- pin 6—diode plate No. 1
- pin 7—cathode and internal shield
- pin 8—heater

35Y4

- pin 1—heater
- pin 2—plate
- pin 3—no connection
- pin 4—heater tap
- pin 5—no connection
- pin 6—no connection
- pin 7—cathode
- pin 8—heater

EMERSON RADIO AND PHONO. CORP.

MODEL 530, Chassis 120006,  
Chassis, 120056

ADJUSTMENTS

I-f and Wave-trap Alignment

An oscillator with frequency of 455, 600 and 1400 kc is required.  
An output meter should be used across the voice coil or output transformer for obtaining maximum response.  
Always use as weak a test signal as possible when aligning the receiver.

Swing the variable condenser to the minimum capacity position. Feed 455 kc to the grid of the 12SA7 or 14Q7 tube through a 0.1 mfd. condenser and adjust the four i-f trimmers for maximum response.  
Feed 455 kc to the external antenna lead and adjust the wave-trap for minimum response.

R-f Alignment

Set the dial pointer at 140. Set the signal generator at 1400 kc and feed its output into a loop of wire about 12 inches in diameter. Hold this radiating loop about 12 inches from and parallel to the receiver loop antenna. Advance the output of the signal generator until deflection is obtained on the output meter. Adjust first the oscillator trimmer (on front section of variable condenser) then the antenna trimmer (on rear section of variable condenser) for maximum response.

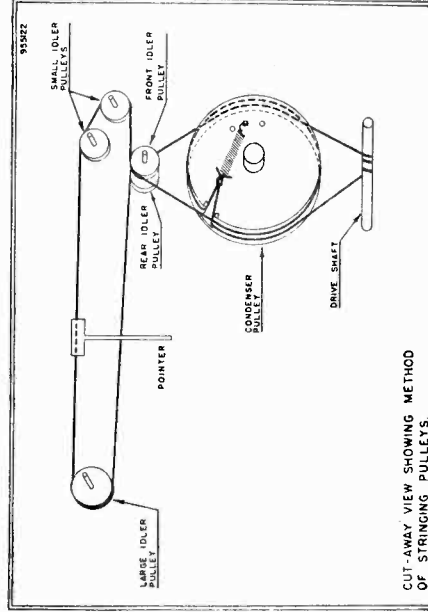
If the loop antenna has been replaced it may be necessary to adjust the loop inductance as follows. Align at 140. Set the pointer at 60 and feed 600 kc to the antenna lead. A portion of the outside turn of the loop may be swung to either side of the center to give maximum response. Re-align at 140.

Location of Coils and Trimmer Adjustments

The first i-f transformer is mounted on top of the chassis deck next to the loop antenna. The trimmers are accessible through holes in the top of the can.  
The second i-f transformer is mounted on top of the chassis between the 50L6 or 50A5 tube and the speaker. The trimmers are accessible through holes in the top of the can.  
The 455 kc wave-trap is located below the chassis deck.  
The trimmers for the antenna and oscillator coils are located on the variable condenser. The trimmer on the front section is for the oscillator coil.  
The oscillator coil is located underneath the chassis. The loop antenna acts as the antenna coil.

DIAL AND CABINET PARTS

280313	Drive Shaft	320450	Dial glass
320360	Dial backplate	140104	Cabinet
525012	Dial pointer	460140	Knob



CUT-AWAY VIEW SHOWING METHOD OF STRINGING PULLEYS.

REPLACEMENT PARTS LIST

Schematic Symbol	Part No.	DESCRIPTION	Schematic Symbol	Part No.	DESCRIPTION
C1, C2	900070	Two-gang variable condenser	R4, R14	397000	15 meg., 1/4 watt resistor
*C3, C4	920010	Trimmers, part of variable condenser	R5, R10	321130	470,000 ohms, 1/2 watt trimmer
C5, C15	920060	0.002 mfd., 600 volt condenser	R7	321330	3.3 meg., 1/2 watt resistor
C6, C18	920060	0.005 mfd., 200 volt condenser	*R8	47,000 ohms resistor, part of i-f transformer	
C7, C19	910010	0.00011 mfd. mica condenser	R9	390180	0.5 meg. volume control
*C8, C9		Trimmers, part of i-f transformers	R10	340290	150 ohms, 1/2 watt resistor
C10		Trimmer and fixed condenser, part of i-f transformer	R11	370490	1,000 ohms, 1 watt resistor
C11		0.00022 mfd. mica condenser	R12	340050	15 ohms, 1/2 watt resistor
C12, C17	920020	0.02 mfd., 400 volt condenser	R13	340010	10 ohms, 1/2 watt resistor
C13, C14	920020	Trimmer, part of wave-trap condenser (chassis 120006), or 30-50 mfd., 150 volt dual electrolytic condenser (chassis 120056)	R14	321050	220,000 ohms, 1/4 watt resistor
*C16	920030	0.05 mfd., 400 volt condenser	P.M. speaker	180008	
C21, C22	925110	30-50 mfd., 150 volt dual electrolytic condenser (chassis 120056), or 50-50 mfd., 150 volt dual electrolytic condenser (chassis 120056)	Tense control switch	510120	
C23, C24	925011	0.2 mfd., 200 volt condenser	Rotary line switch	510200	
C25	920030	Loop antenna	First i-f transformer	720380	
L1	709060	455 kc wave-trap	Second i-f transformer	720390	
L2	310730	10,000 ohms, 1/4 watt resistor	Output transformer	734080	
R1	310810	22,000 ohms, 1/4 watt resistor	Oscillator coil (chassis 120006)	583150	
R2, R6	310870	39,000 ohms, 1/4 watt resistor	Oscillator coil (chassis 120056)	716070	
R3			Line cord	716005	
			Pilot light, Mazda No. 47	807000	
			Pilot light socket	507215	

\* Not supplied separately.  
† Specify part numbers when ordering. When in doubt of chassis or model also include complete serial number.

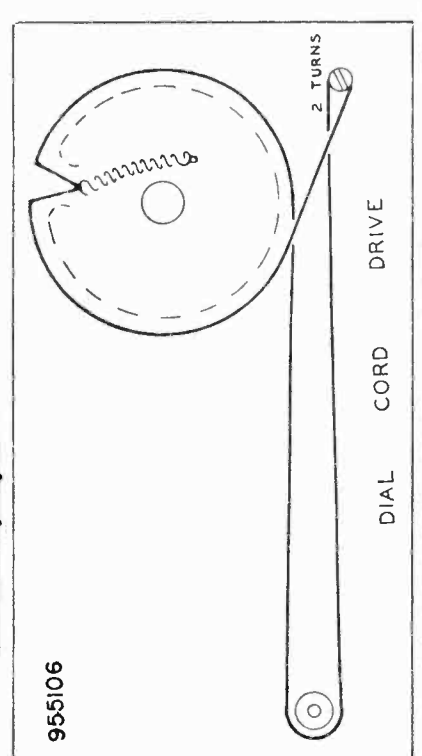
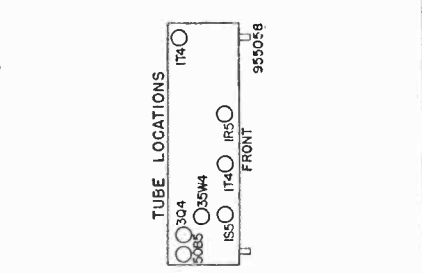
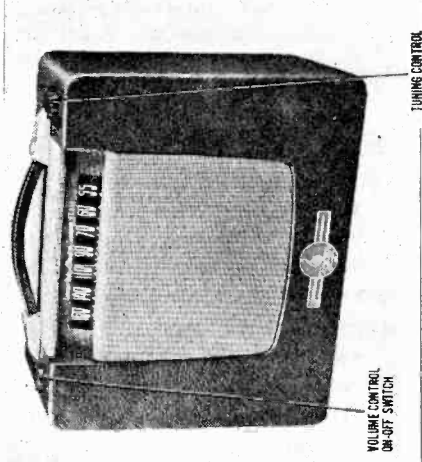
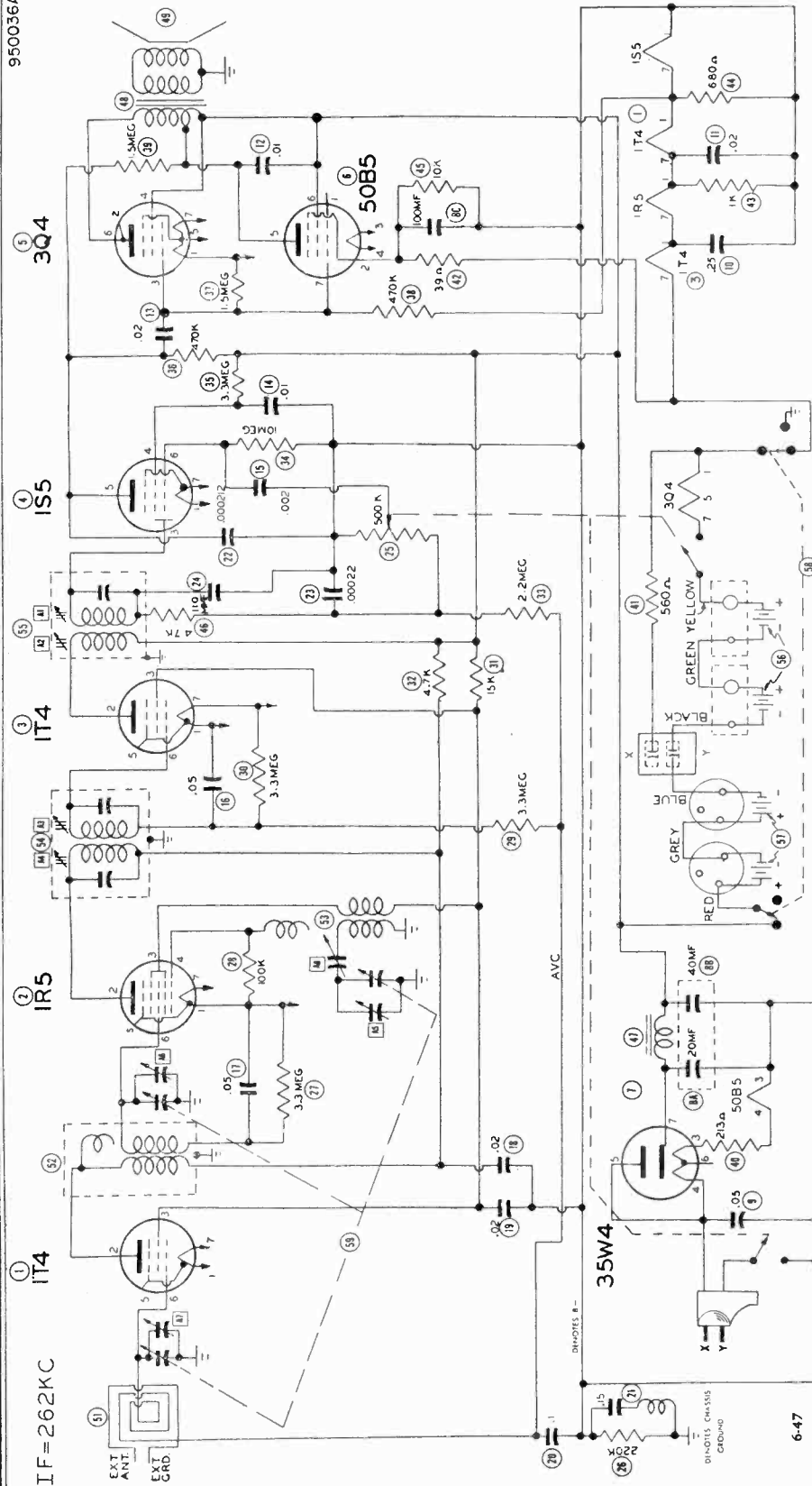
VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (line switch) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (\*), which should be taken with a d-c vacuum-tube voltmeter. Line voltage for these readings was 117 volts, 60 cycles, a.c. Measurements made with 117 volts d.c. will be lower than those given below. Take readings with the volume control set at maximum and the variable condenser open. Convert pin number for octal tube readings.

TUBE	1	2	3	4	5	6	7	8
6SS7				*1.5		*5.0		*5.5
12SA7			90	90	-10.5			*1.5
6SS7				*1.5		90		90
12SQ7		*1.0		*1.5	*0.4	*6.1		5.9
50L6			109	90				
35W4				116				

EMERSON RADIO AND PHONO. CORP. MODEL 536, Chassis 120036

950036A



955106

EMERSON RADIO AND PHONO. CORP.

MODEL 536, Chassis 120036

TYPE: Three-way (battery, a.c.-d.c.) portable superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- 1—1R5, oscillator-modulator
- 2—1T4, r-f and i-f amplifiers
- 1—1S5, 2nd detector, a.v.c., a-f amplifier
- 1—3Q4, beam power output (battery operation)
- 1—50B5, beam power output (line operation)
- 1—35W4, half-wave rectifier (line operation)

POWER SUPPLY: Battery, a.c. or d.c.

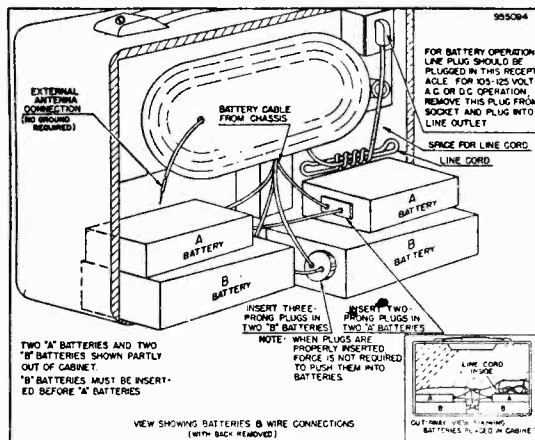
VOLTAGE RATING:

- 105-125 volts (line operation)
- 9 volts "A" supply (battery operation)
- 90 volts "B" supply (battery operation)

POWER CONSUMPTION: 30 watts (line operation)

CURRENT DRAIN:

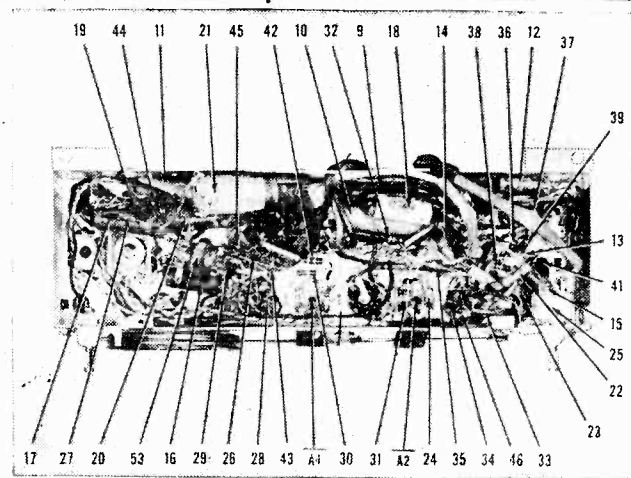
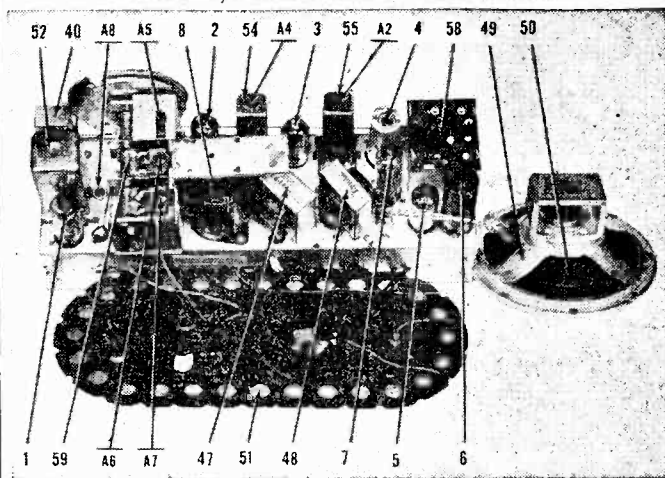
- "A" battery—0.053 amp.
- "B" battery—0.013 amp.
- 117 volts a.c.—0.24 amp.



ALIGNMENT

Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Use battery power when available. If a-c power is used, use an isolation transformer when available. If not, connect a 0.1 mfd. condenser in series with low side of the signal generator and B—. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 6 (grid) of 1R5. Low side to B—.	262 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If a-c power is used without an isolation transformer, reduce dummy antenna to 200 mmfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6, A7	Adjust for maximum output.
4	200 mmfd.	High side to external antenna lead. Low side to ground lead.	600 kc	Tune for maximum output.	Across voice coil.	A8	Rock variable condenser and adjust for maximum output. Repeat steps 2, 3 & 4 until no further improvement can be made.



EMERSON RADIO AND PHONO. CORP.

MODEL 536, Chassis 120036

GENERAL NOTES

- A.C.-D.C. Operation: Remove the rear cover; it is held in place by two spring latches. Take out the line cord, removing the plug from its receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d.c. and the receiver does not operate at first, remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.
- Battery Operation: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.
- Battery Completion: Replace two 45 volt "B" batteries with Eveready No. 482 Minimax. Replace two 4 1/2 volt "A" batteries with Eveready No. 746, Rayovac No. P83A or No. EM83, or Burgess No. 3G.
- The color coding of the battery cable is as follows:  
Red—B+, 90 volts  
Yellow—A+, 9 volts  
Black—A—  
Blue—B—
- The color coding of the i-f transformer leads is as follows:  
Grid—green  
Plate—blue  
Grid return—black  
B+—red
- If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	1.2 DC	96 DC	55 DC	0	1.2 DC	0.2 DC	2.5 DC
2	1R5	2.5 DC	98 DC	55 DC	1.4 DC	2.5 DC	0.2 DC	3.8 DC
3	1T4	3.8 DC	110 DC	55 DC	0	3.8 DC	0.6 DC	4.9 DC
4	1S5	0	0	0	26 DC	60 DC	0	1.2 DC
5	3Q4	6.3 DC	92 DC	1 DC	93 DC	7.8 DC	92 DC	9.2 DC
6	50B5	0.4 DC	6.6 DC	50 AC	0	100 DC	110 DC	—
7	35W4	60 DC	0	85 AC	117 AC	117 AC	110 AC	140 DC

Voltage Readings of Tube 5 (3Q4) Taken in Battery Position.

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	*	95,000	105,000	inf.	*	1.8 meg.	*
2	1R5	*	95,000	105,000	100,000	*	3.3 meg.	*
3	1T4	*	90,000	100,000	inf.	*	3.3 meg.	*
4	1S5	0	inf.	500,000	3.4 meg.	560,000	10 meg.	*
5	3Q4	1*	90,000	320,000	90,000	*	90,000	*
6	50B5	320,000	70	45	0	90,000	90,000	320,000
7	35W4	420,000	inf.	240	270	270	260	90,000

\* Do Not Use Ohmmeter to Measure Filament Resistance.

- Voltage and resistance readings taken in ac-dc position.
- Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
- D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1000 ohms per volt.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common negative.
- Line voltage maintained at 117 volts for voltage readings.
- Nominal tolerance on component values makes possible a variation of  $\pm 15\%$  in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.

Symbol	Part No.	DESCRIPTION
42	340150	39 ohms, 1/2 watt resistor (filament string)
43	340490	1000 ohms, 1/2 watt resistor (filament string)
44	340450	680 ohms, 1/2 watt resistor (filament string)
45	340730	10,000 ohms, 1/2 watt resistor (output cathode)
*46		47,000 ohms, 1/2 watt resistor (diode r-f filter), part of 55.
47	737001	Filter choke, 560 ohms d-c resistance
48	734002	Output transformer
49	180021	Speaker, 5" P.M.
*50		Speaker cone, part of 49
51	700001	Loop antenna
52	713001	R.F. coil (alternate part 713006)
53	716006	Oscillator coil
54	720001	First i-f transformer (alternate part 720006)
55	720002	Second i-f transformer (alternate part 720007)
56		4 1/2 volt "A" battery, 2 used
57		45 volt "B" battery, 2 used
58	510270	Power change-over switch
59	900006	3-gang variable condenser (22-416 mmfd. per section)
	585006	Battery cable
	505046	Speaker plug (alternate part 505048)

† Specify part numbers when ordering.

\* Not supplied separately.

CABINET AND DIAL PARTS

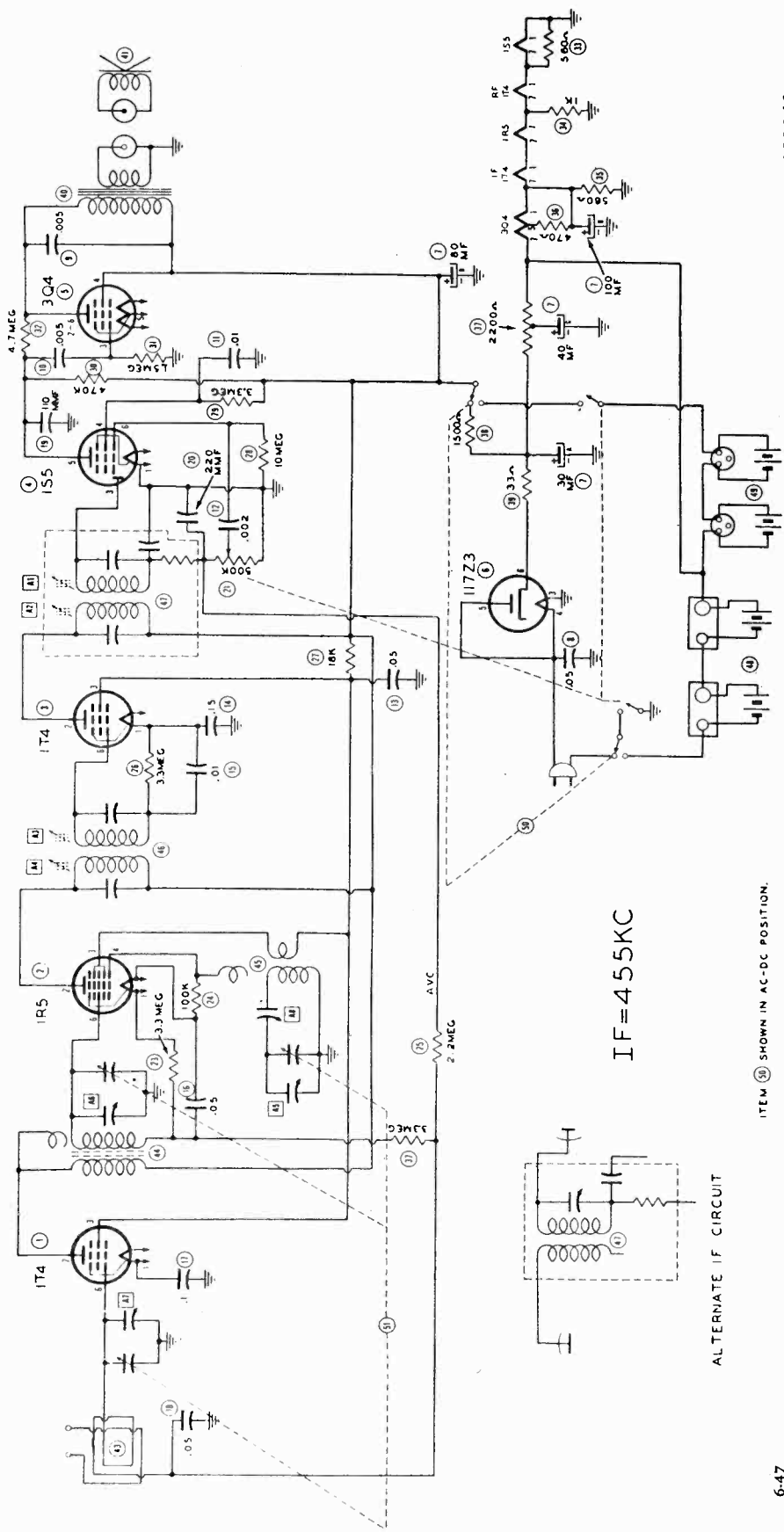
14C004	Cabinet
595010	Handle (alternate part 450012)
280001	Drive shaft, tuning
583006	Line cord (alternate part 583002)
520000	Dial glass
525001	Dial pointer
410011	Dial backplate
450112	Knob, volume and tuning

Symbol	Part No.	DESCRIPTION
1	1T4	Tube, r-f amplifier
2	1R5	Tube, converter
3	1T4	Tube, i-f amplifier
4	1S5	Tube, detector, a-f amplifier, a.v.c.
5	3Q4	Tube, power output (battery)
6	50B5	Tube, power output (line)
7	35W4	Tube, rectifier
8A, 8B, 1	925004	20-40-100 mfd., 150-150-25 volt electrolytic condenser (filter)
8C	920030	0.05 mfd., 400 volt condenser (line bypass)
9	920110	0.25 mfd., 100 volt condenser (filament bypass)
10	920020	0.02 mfd., 400 volt condenser (filament bypass)
11	020090	0.01 mfd., 400 volt condenser (output plate bypass)
12	920020	0.02 mfd., 400 volt condenser (audio coupling)
13	920090	0.01 mfd., 400 volt condenser (audio screen bypass)
14	920015	0.002 mfd., 400 volt condenser (audio coupling)
15	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
16	920060	0.05 mfd., 200 volt condenser (converter grid filter)
17	920060	0.05 mfd., 200 volt condenser (plate decoupling)
18	920020	0.02 mfd., 400 volt condenser (screen bypass)
19	020040	0.1 mfd., 200 volt condenser (a.v.c. filter)
20	920420	0.15 mfd., 200 volt condenser (line isolation)
21	910000	220 mfd., 300 volt mica condenser (audio plate bypass)
22	910000	220 mfd., 500 volt mica condenser (diode filter)
23	390003	110 mfd., 500 volt mica condenser (diode filter), part of 55
24	351050	Volume control and switch, 500,000 ohms
25	351050	20,000 ohms, 1/2 watt resistor (line insulation)
26	351330	3.3 meg., 1/2 watt resistor (converter grid)
27	350970	100,000 ohms, 1/2 watt resistor (oscillator grid)
28	351330	3.3 meg., 1/2 watt resistor (a.v.c. network)
29	351330	3.3 meg., 1/2 watt resistor (a.v.c. network)
30	351330	3.3 meg., 1/2 watt resistor (a.v.c. network)
31	340770	15,000 ohms, 1/2 watt resistor (screen drooping)
32	340620	4700 ohms, 1/2 watt resistor (plate decoupling)
33	351290	2.2 meg., 1/2 watt resistor (a.v.c. network)
34	351450	10 meg., 1/2 watt resistor (a-f grid)
35	351330	3.3 meg., 1/2 watt resistor (a-f screen drooping)
36	351130	470,000 ohms, 1/2 watt resistor (plate load)
37	351250	1.5 meg., 1/2 watt resistor (output grid)
38	351130	470,000 ohms, 1/2 watt resistor (output grid)
39	351250	1.5 meg., 1/2 watt resistor (feedback)
40	394003	213 ohms, 6 watt resistor (series filament)
41	340430	560 ohms, 1/2 watt resistor (filament string)



EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A,  
Chassis 120053A

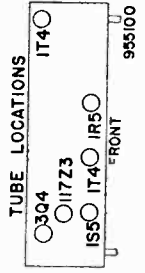


IF = 455 KC

ALTERNATE IF CIRCUIT

ITEM ⑩ SHOWN IN AC-DC POSITION.

950046



**DESCRIPTION**

- TYPE: Three-way (battery, a.c.-d.c.) portable superheterodyne. VOLTAGE RATING: 105-125 volts a.c.-d.c. (line operation)
- FREQUENCY RANGE: 540-1620 kc. 9 volts "A" supply (battery operation)
- TYPE OF TUBES: 90 volts "B" supply (battery operation)

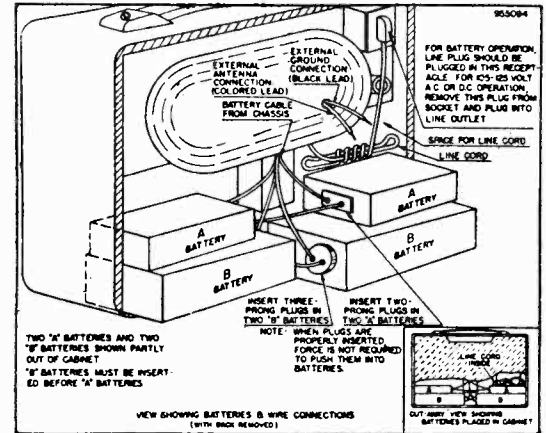
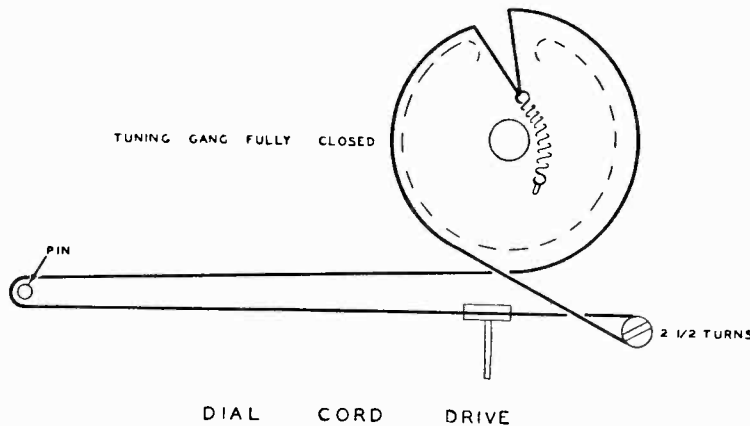
  - 1—1R5, oscillator-modulator
  - 2—1T4, r-f and i-f amplifiers
  - 1—1S5, 2nd detector, a.v.c., a-f amplifier
  - 1—3Q4, beam power output
  - 1—117Z3, rectifier

- POWER SUPPLY: Battery, a.c. or d.c.
- POWER CONSUMPTION: 30 watts (line operation)
- CURRENT DRAIN: "A" battery—0.070 amp.  
"B" battery—0.015 amp.  
117 volts a.c.—0.150 amp.

EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A,  
Chassis 120053A

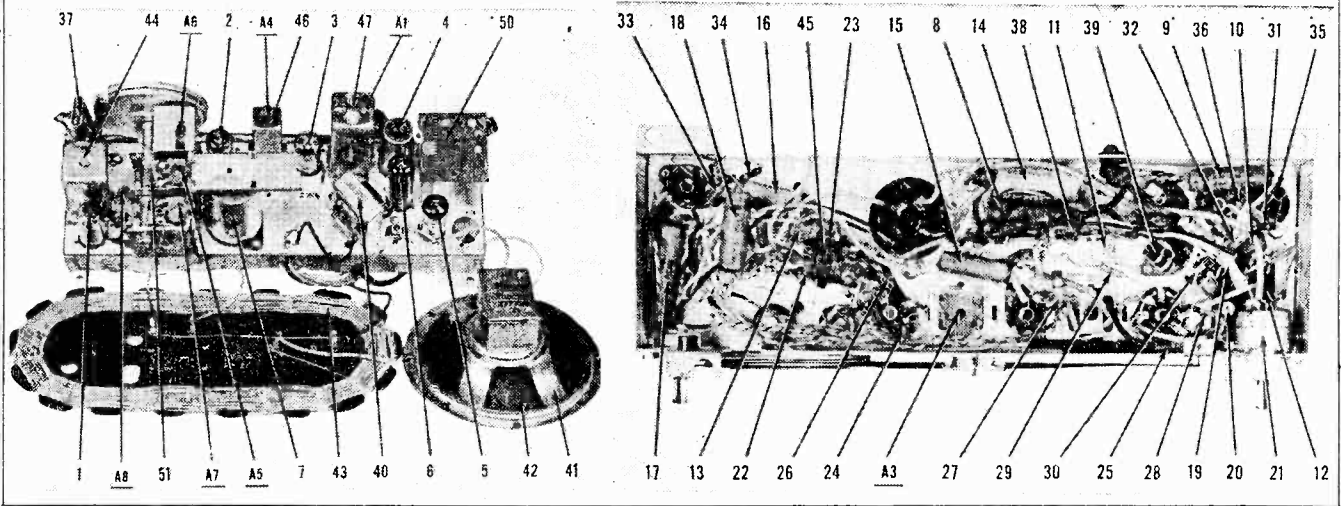
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ALIGNMENT

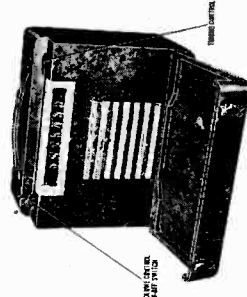
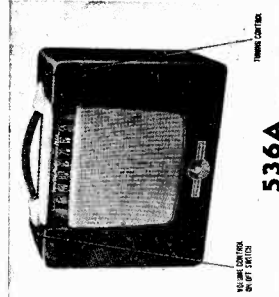
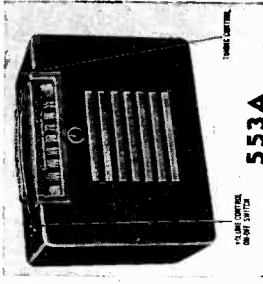
Loop should be maintained in same relative position to chassis as when receiver is in cabinet. Use battery power when available. If a-c power is used, use an isolation transformer when available. If not, connect a 0.1 mfd. condenser in series with the low side of the signal generator and B—. Volume should be at maximum position, output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 6 (grid) of 1R5. Low side to chassis.	262 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If a-c power is used without an isolation transformer, reduce dummy antenna to 200 mmfd. to reduce hum modulation. A2 will not be found on sets using No. 720007 output 1-f transformer.
2	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1600 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6, A7	Adjust for maximum output.
4	200 mmfd.	High side to external antenna lead. Low side to ground lead.	600 kc	Tune for maximum output.	Across voice coil.	A8	Rock variable condenser and adjust for maximum output. Repeat Steps 2, 3 and 4 until no further improvement can be made.



EMERSON RADIO AND PHONO. CORP.

MODELS 536A, 551A, 553A,  
Chassis 120053A



- A.C.-D.C. Operation: Remove the rear cover of models 536A and 553A or open the door on the rear cover of model 551A. Take out the line cord, removing the plug from its receptacle at the rear of the chassis. Insert the plug in the wall outlet. If the power supply is d.c. and the receiver does not operate at first remove the plug from the wall outlet, turn it half way around and re-insert it in the outlet, thus obtaining the proper polarity.
- Battery Operation: Remove the line plug from the electrical outlet. Insert the plug into the receptacle at the rear of the receiver. This is important since the receiver will not operate from batteries with the plug out of the receptacle. The loose portion of the cord can then be coiled and placed in the cabinet.
- Battery Complement: Replace two 45 volt "B" batteries with Eveready No. 482 Minimax or equivalent. Replace two 4 1/2 volt "A" batteries with Eveready No. 746 or equivalent.
- The color coding of the battery cable is as follows:  
Red—B+, 90 volts  
Blue—B—  
Yellow—A+, 9 volts  
Black—A—
- The color coding of the I-F transformer leads is as follows:  
Grid—green  
Plate—blue  
B+—red  
B—
- If replacements are made in the I-F section of the circuit, the receiver should be carefully realigned.

**VOLTAGE AND RESISTANCE READING INSTRUCTIONS**

- Voltage and resistance readings taken in a-c position.
- Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
- D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common negative.
- Line voltage maintained at 117 volts for voltage readings.
- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.
- Resistance readings in the B+ circuits may vary widely according to the condition of the filter capacitors.

**VOLTAGE READINGS**

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	1.3 DC	92 DC	47 DC	0	1.3 DC	0.1 DC	2.6 DC
2	1R5	2.6 DC	92 DC	47 DC	-10 DC§	2.3 DC	0.2 DC	3.9 DC
3	1T4	3.9 DC	92 DC	47 DC	9 DC	38 DC	0.2 DC	5.2 DC
4	1S5	0	-0.1 DC	0	9 DC	60 DC	0	1.3 DC
5	3Q4	1.3 DC	89 DC	0	34 DC	61 DC	89 DC	7.8 DC
6	117Z3	117 AC	0	0	117 AC	117 AC	113 DC	0

§ Taken with Vacuum Tube Voltmeter.

**RESISTANCE READINGS**

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1T4	*	3,800	21,000	inf.	*	2 meg.	*
2	1R5	*	3,800	21,000	100,000	*	2.3 meg.	*
3	1T4	*	3,800	21,000	inf.	*	3.5 meg.	*
4	1S5	0	490,000	540,000	3.5 meg.	470,000	10 meg.	*
5	3Q4	*	4,000	0	3,800	4,000	4,000	*
6	117Z3	405	inf.	0	405	405	2,200	inf.

\* Do not use Ohmmeter to Measure Filament Resistance.

Symbol	† Part No.	Description	Symbol	† Part No.	Description
1	1T4	Tube, r-f amplifier	44	713007	R-F coil (alternate part no. 713001)
2	1R5	Tube, converter	45	716006	Oscillator coil
3	1T4	Tube, detector, a-f amplifier, a.v.c.	46	720001	Fixed I-F coil (alternate part no. 720006)
4	1S5	Tube, detector, a-f amplifier, a.v.c.	47	720007	Second I-F coil (alternate part no. 720002)
5	3Q4	Tube, rectifier, output	48	510270	Battery, 4 1/2 volt "A" (2 used)
6	117Z3	50-80-40-100 mfd., 150-150-150-25 volt electrolytic condenser (filter)	49	900006	Battery, 45 volt "B" (2 used)
7	922030	0.05 mfd., 400 volt condenser (line bypass)	50	910006	Power changeover switch
8	920180	0.005 mfd., 400 volt condenser (output plate bypass)	51	140092	3-gang variable condenser
9	920180	0.005 mfd., 400 volt condenser (audio coupling)		140112	Cabinet, Model 536A
10	920090	0.01 mfd., 400 volt condenser (a-f screen bypass)		140107	Cabinet, Model 551A
11	920515	0.002 mfd., 400 volt condenser (audio coupling)		450112	Cabinet, Model 553A
12	920060	0.05 mfd., 200 volt condenser (screen bypass)		595002	Knob
13	920420	0.15 mfd., 200 volt condenser (filament bypass)		470264	Handle, Model 536A
14	920090	0.01 mfd., 400 volt condenser (I-F grid filter)		460019	Handle, Models 551A, 553A
15	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)		525001	Escutcheon, Models 551A, 553A
16	920040	0.1 mfd., 200 volt condenser (filament bypass)		410011	Dial pointer
17	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)		520000	Dial backplate
18	910010	0.00011 mfd., 500 volt mica condenser (a-f plate bypass)		580001	Dial glass
19	910000	0.00027 mfd., 500 volt mica condenser (a-f plate bypass)		587040	Drive shaft
20	390003	500,000 ohm and switch, sec. (diode filter)		585005	Line cord spring
21	341330	3.3 meg., 1/2 watt resistor (a.v.c. network)		505040	Line cord (alternate part no. 505048)
22	341330	3.3 meg., 1/2 watt resistor (a.v.c. network)			Speaker plug (alternate part no. 305048)
23	350970	100,000 ohms, 1/2 watt resistor (oscillator grid)			
24	341290	2.2 meg., 1/2 watt resistor (a.v.c. network)			
25	351330	3.3 meg., 1/2 watt resistor (I-F grid)			
26	340790	18,000 ohms, 1/2 watt resistor (voltage dropping)			
27	351450	10 meg., 1/2 watt resistor (a-f grid)			
28	351330	3.3 meg., 1/2 watt resistor (a-f screen dropping)			
29	351130	470,000 ohms, 1/2 watt resistor (a-f plate load)			
30	351250	1.5 meg., 1/2 watt resistor (output grid)			
31	351370	4.7 meg., 1/2 watt resistor (feedback)			
32	340430	560 ohms, 1/2 watt resistor (filament network)			
33	340490	1000 ohms, 1/2 watt resistor (filament network)			
34	370430	560 ohms, 1 watt resistor (filament network)			
35	370410	470 ohms, 1 watt resistor (filament network)			
36	394008	2200 ohms, B watt resistor, center tapped (filter)			
37	340510	1500 ohms, 1/2 watt resistor (filter)			
38	370130	35 ohms, 1 watt resistor (surge limiter)			
39	734008	Output transformer			
40	180021	Speaker, 5-inch P.M.			
*42	700001	Speaker cone (part of 180021)			
43		Loop antenna			

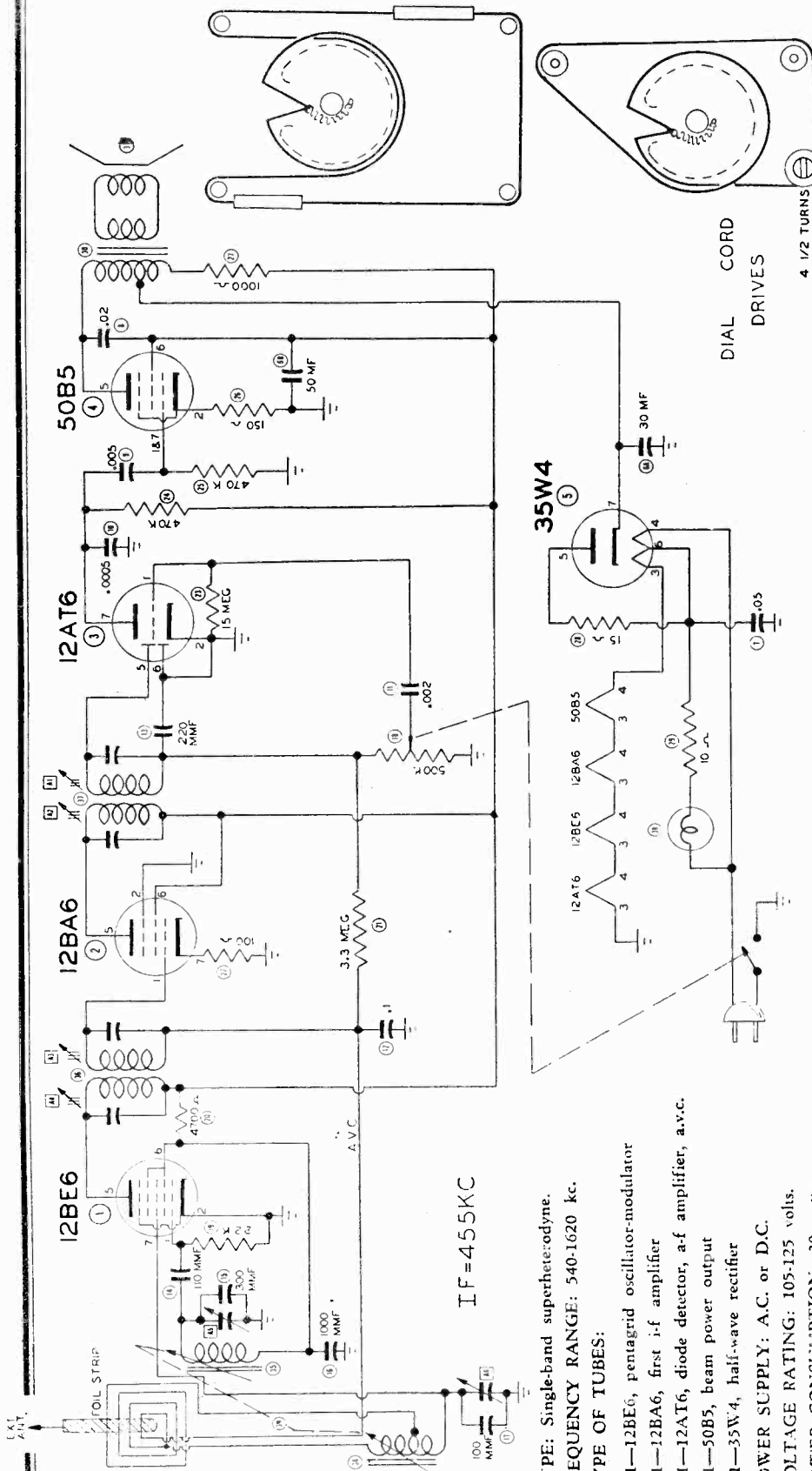
\* Not supplied separately.

† Specify part numbers when ordering.

- Voltage and resistance readings taken in a-c position.
- Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
- D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common negative.
- Line voltage maintained at 117 volts for voltage readings.
- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.
- Resistance readings in the B+ circuits may vary widely according to the condition of the filter capacitors.

EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Chassis 120042A



IF = 455 KC

TYPE: Single-band superheterodyne.  
 FREQUENCY RANGE: 540-1620 kc.  
 TYPE OF TUBES:  
 1-12BE6, pentagrid oscillator-modulator  
 1-12BA6, first if amplifier  
 1-12AT6, diode detector, a-f amplifier, a.v.c.  
 1-50B5, beam power output  
 1-35W4, half-wave rectifier  
 POWER SUPPLY: A.C. or D.C.  
 VOLTAGE RATING: 105-125 volts.  
 POWER CONSUMPTION: 30 watts.  
 CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	-4.3 DC	0	12 AC	24 AC	100 DC	77 DC	-0.1 DC
2	12BA6	-0.1 DC	0	24 AC	35 AC	100 DC	100 DC	1.3 DC
3	12AT6	-0.7 DC	0	0	12 AC	-0.5 DC	0	57 DC
4	50B5	0	6.2 DC	35 AC	85 AC	115 DC	100 DC	0
5	35W4	122 DC	115 AC	85 AC	117 AC	110 DC	110 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	20,000	0	11	22	40,000	45,000	3.5 meg.
2	12BA6	3.5 meg.	0	22	32	40,000	40,000	100
3	12AT6	15 meg.	0	0	11	500,000	0	500,000
4	50B5	450,000	125,000	32	75	40,000	40,000	450,000
5	35W4	40,000	100,000	75	102	110	97	40,000

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltages measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 10% in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

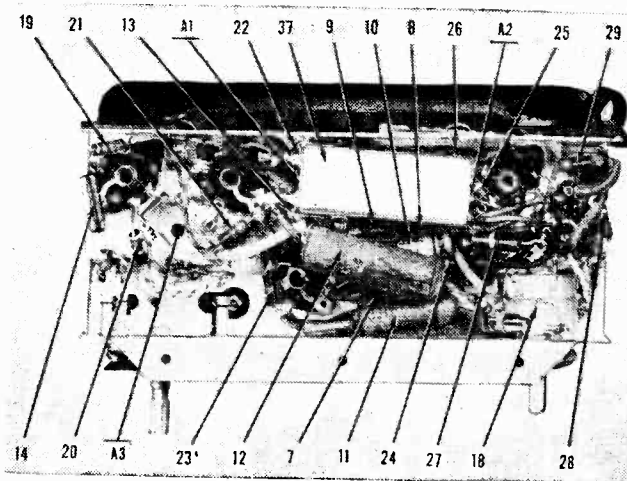
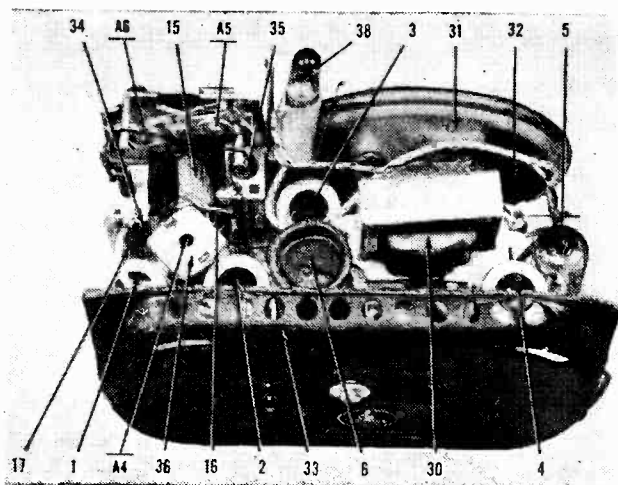
## EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Chassis 120042A

## ALIGNMENT

To set pointer turn tuning slugs completely in and set pointer to top reference dot on right side of dial backplate. Use isolation transformer if available. If not, connect a condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Tuning slugs completely out.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to chassis.	1600 kc	Bottom reference dot at right side of dial backplate.	Across voice coil.	A5, A6	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to chassis.	1400 kc	Tune for maximum output.	Across voice coil.	Antenna coil (34)	Loosen screws on bracket of antenna coil (34). Adjust position of coil for maximum output. Tighten screws.



## GENERAL NOTES

- If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
- In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
- The color coding of the i-f transformer leads is as follows:
 

Grid—green	Plate—blue
Grid return—black	B+—red
- All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.
- The self-contained loop antenna operates at maximum efficiency when its position is at right angles to the broadcasting source. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
- Operate receiver on its base. Locate it away from walls and other obstructions to proper ventilation of the set.

## EMERSON RADIO AND PHONO. CORP.

MODEL 540A, Chassis 120042A

## REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter	20	340650	4,700 ohms, ½ watt resistor (converter screen dropping)
2	12BA6	Tube, i-f amplifier	21	351330	3.3 meg., ½ watt resistor (a.v.c. network)
3	12AT6	Tube, detector, a-f amplifier, a.v.c.	22	340250	100 ohms, ½ watt resistor (i-f cathode bias)
4	50B5	Tube, power output	23	397000	15 meg., ½ watt resistor (a-f grid load)
5	35W4	Tube, rectifier	24	351130	470,000 ohms, ½ watt resistor (a-f plate load)
6A, 6B	925008	30-50 mfd., 150 volt electrolytic condenser (filter)	25	351130	470,000 ohms, ½ watt resistor (output grid load)
7	920030	0.05 mfd., 400 volt condenser (line bypass)	26	340290	150 ohms, ½ watt resistor (output cathode bias)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass)	27	370490	1000 ohms, 1 watt resistor (filter)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)	28	340050	15 ohms, ½ watt resistor (rectifier ballast)
10	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)	29	340010	10 ohms, ½ watt resistor (series pilot light)
11	920010	0.002 mfd., 600 volt condenser (audio coupling)	30	734006	Output transformer
12	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)	31	180018	Speaker, 4" P.M.
13	910000	220 mmfd., 500 volt mica condenser (diode filter)	*32		Speaker cone, part of 180018
14	910010	110 mmfd., 500 volt mica condenser (oscillator grid coupling)	33	700235	Loop antenna
15	910007	300 mmfd., 500 volt mica condenser (fixed trimmer)	*34		Antenna coil, part of tuner assembly
16	910180	1000 mmfd., 300 volt mica condenser (oscillator feedback)	*35		Oscillator coil, part of tuner assembly
17	910008	80 mmfd., 500 volt mica condenser (fixed trimmer)	36	720527	First i-f transformer (455 kc)
18	390381	Volume control and line switch, 0.5 meg.	37	720527	Second i-f transformer (455 kc)
19	340810	22,000 ohms, ½ watt resistor (oscillator grid)	38	807000	Dial light, type 47
			39	708147	Complete tuner assembly, includes items 34 and 35

† Specify part numbers when ordering.

\* Not supplied separately.

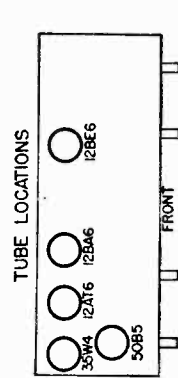
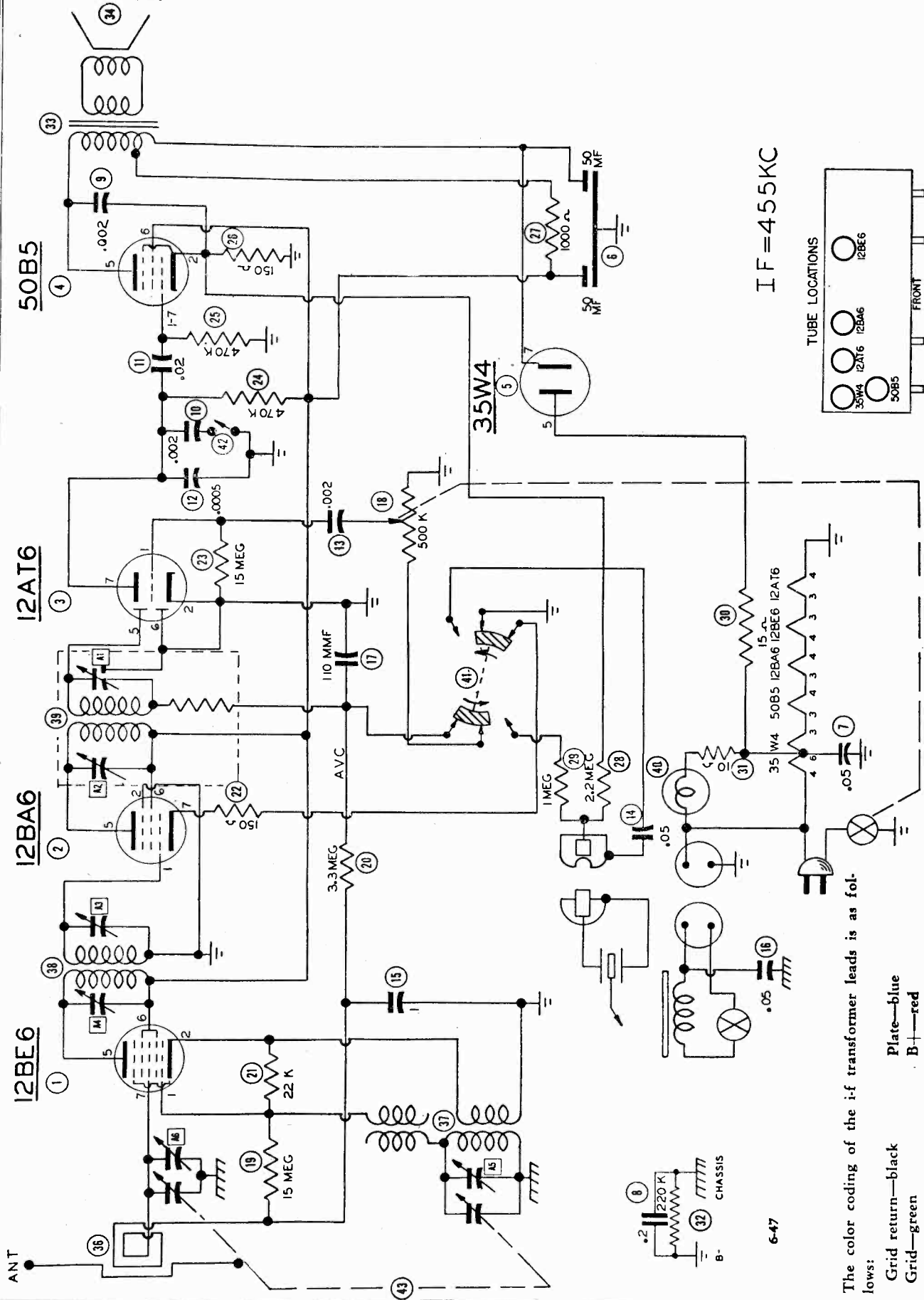
## CABINET AND DIAL PARTS

140078	Cabinet, walnut
140075	Cabinet, ivory
140076	Cabinet, red
140077	Cabinet, green
520004	Dial crystal
525207	Dial pointer
520511	Dial backplate
460001	Knob (black)
583090	Line cord
280509	Drive shaft



MODEL 546,  
Chassis 120049

EMERSON RADIO AND PHONO. CORP.



IF = 455KC

The color coding of the i-f transformer leads is as follows:  
 Grid return—black  
 Grid—green  
 Plate—blue  
 B—red

EMERSON RADIO AND PHONO. CORP.

MODEL 546, Chassis 120049

DESCRIPTION

TYPE: Single-band superheterodyne and automatic record changer.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- 1—12BE6, pentagrid oscillator-modulator
- 1—12BA6, first i-f amplifier
- 1—12AT6, diode detector, a-f amplifier, a.v.c.
- 1—50B5, beam power output
- 1—35W4, half-wave rectifier

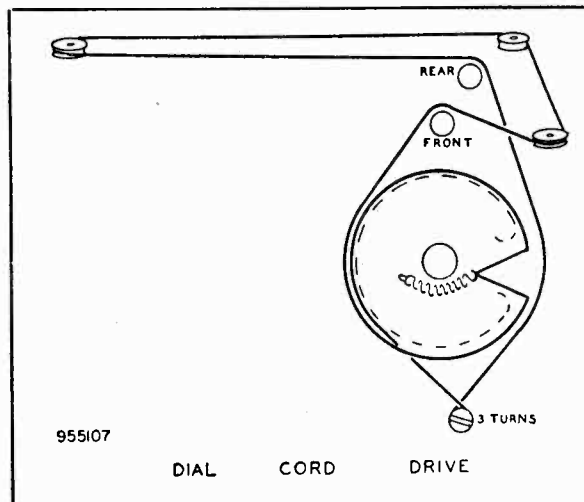
POWER SUPPLY: A.C. only, 60 cycles.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION:

- 30 watts for the receiver.
- 20 watts for the phono motor.

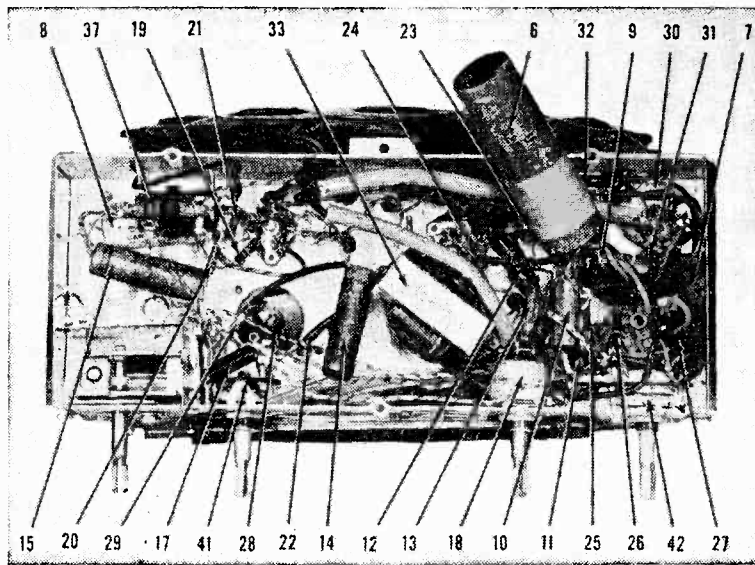
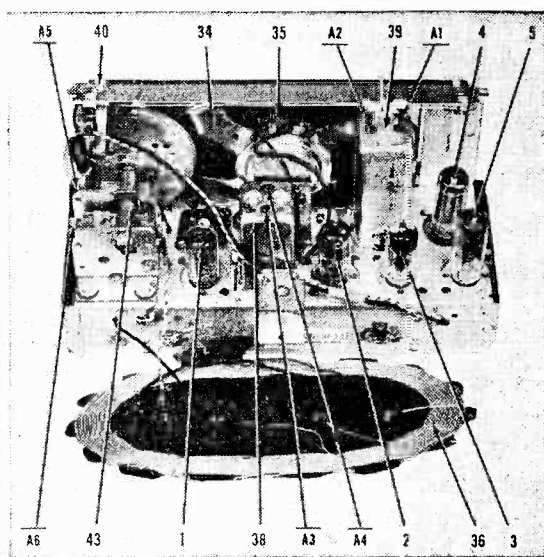
CURRENT DRAIN: 0.24 amp. at 117 volts a.c.



ALIGNMENT.

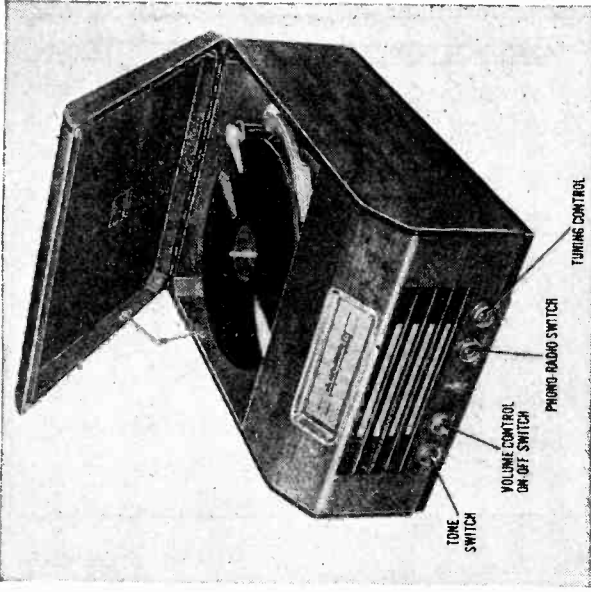
Use an isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and B—. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to pin 7 (grid) of 12BE6. Low side to B—.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.





MODEL 546, Chassis 120049 EMERSON RADIO AND PHONO. CORP.



Symbol	Part No.	Description	Symbol	Part No.	Description
31	340010	10 ohms, 1/2 watt resistor (series pilot light)	31	340010	10 ohms, 1/2 watt resistor (series pilot light)
32	351050	220,000 ohms, 1/2 watt resistor (line isolation)	32	351050	220,000 ohms, 1/2 watt resistor (line isolation)
33	734080	Output transformer	33	734080	Output transformer
34	180008	Speaker, 4" x 6" oval P.M.	34	180008	Speaker, 4" x 6" oval P.M.
35	700000	Speaker cone, part of 180008	35	700000	Speaker cone, part of 180008
36	716010	Loop antenna	36	716010	Loop antenna
37	720380	Oscillator coil	37	720380	Oscillator coil
38	720019	First i-f transformer	38	720019	First i-f transformer
39	807000	Second i-f transformer	39	807000	Second i-f transformer
40	510391	Dial light	40	510391	Dial light
41	510120	Radio-phono switch	41	510120	Radio-phono switch
42	900270	Tone control switch	42	900270	Tone control switch
43	507215	2-gang variable condenser, 25-382 mmfd., 27-193 mmfd.	43	507215	2-gang variable condenser, 25-382 mmfd., 27-193 mmfd.
	583004	Pilot light socket		583004	Pilot light socket
	505040	Line cord		505040	Line cord
	508010	Plug for phono pickup leads		508010	Plug for phono pickup leads
	585072	Socket for phono pickup leads		585072	Socket for phono pickup leads
	819019	Phono motor plug and cable		819019	Phono motor plug and cable
	820034	Record changer		820034	Record changer
		Phono crystal cartridge			Phono crystal cartridge

† Specify part numbers when ordering.  
\* Not supplied separately.

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	-7 DC	0	13 AC	25 AC	97 DC	97 DC	-0.2 DC
2	12BA6	0	0	36 AC	25 AC	97 DC	97 DC	1.6 DC
3	12AT6	-0.6 DC	0	13 AC	0	-0.5 DC	0	39 DC
4	50B5	0	6 DC	87 AC	36 AC	115 DC	97 DC	0
5	35W4	117 AC	116 AC	87 AC	117 AC	111 AC	112 AC	122 DC

RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	21,000	0.3	12	22	80,000	80,000	2.5 meg.
2	12BA6	18	0	33	22	80,000	80,000	140
3	12AT6	15 meg.	0	12	0	500,000	0	550,000
4	50B5	450,000	140	78	33	80,000	80,000	450,000
5	35W4	103	102	78	103	110	99	80,000

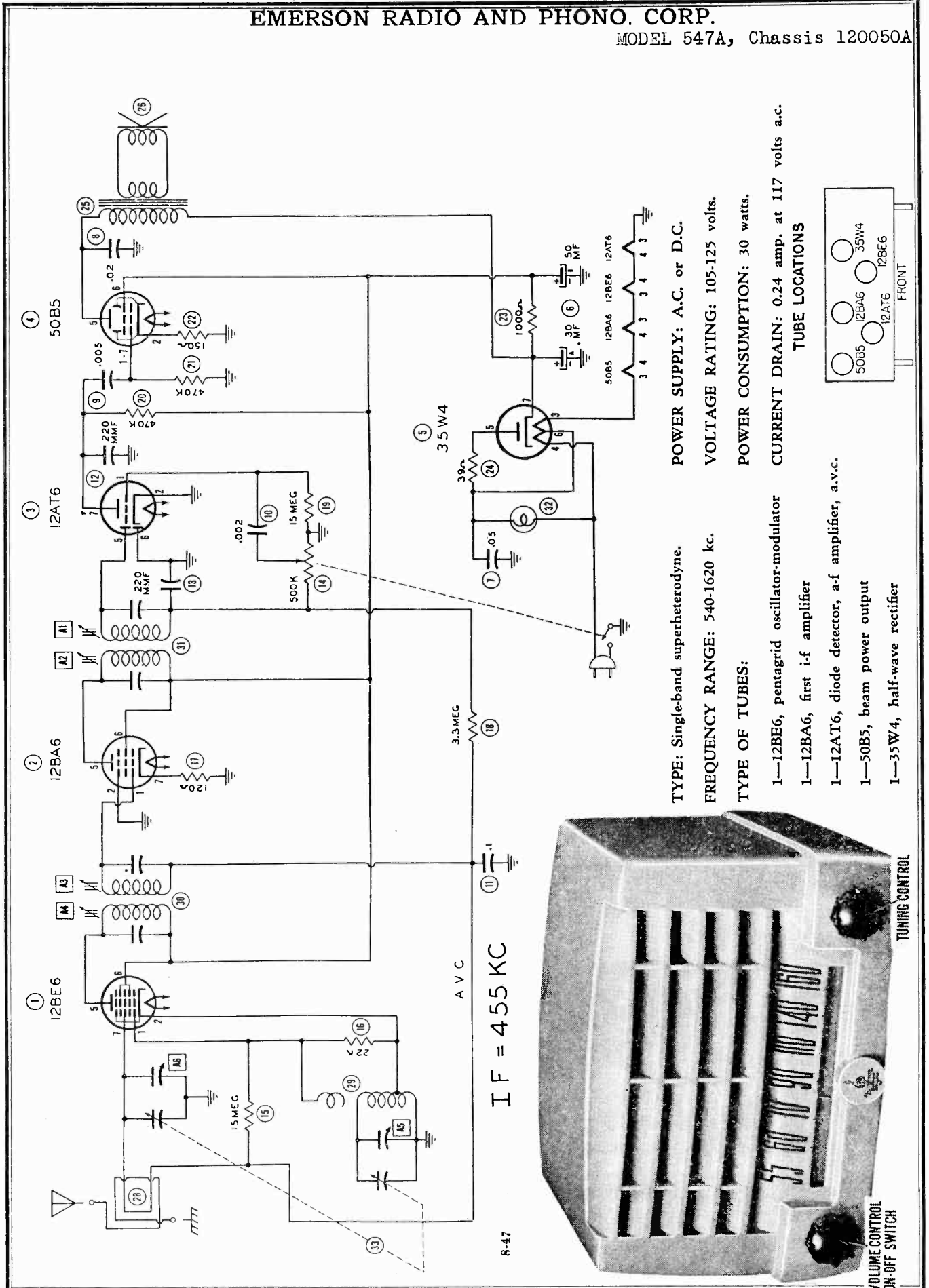
VOLTAGE AND RESISTANCE READING INSTRUCTIONS

- 1—Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
- 2—D-C voltage measurements are at 200,000 ohms per volt; a-c voltages measured at 1000 ohms per volt.
- 3—Socket connections are shown as bottom views.
- 4—Measured values are from socket pin to common negative.
- 5—Line voltage maintained at 117 volts for voltage readings.
- 6—Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
- 7—Volume control at maximum, no signal applied for voltage measurements.

Symbol	Part No.	Description
1	12BE6	Tube, converter
2	12BA6	Tube, i-f amplifier
3	12A16	Tube, detector, a-f amplifier, a.v.c.
4	50B5	Tube, power output
5	35W4	Tube, rectifier
6A, 6B	925011	50-50 mfd., 150 volt electrolytic condenser (filter)
7	920030	0.05 mfd., 400 volt condenser (line bypass)
8	920050	0.2 mfd., 200 volt condenser (line isolation)
9	920020	0.02 mfd., 400 volt condenser (output plate bypass)
10	920010	6002 mfd., 600 volt condenser (tone compensation)
11	920020	0.02 mfd., 400 volt condenser (audio coupling)
12	920240	0.0005 mfd., 600 volt condenser (audio plate bypass)
13	920010	0.002 mfd., 600 volt condenser (audio coupling)
14	920030	0.05 mfd., 400 volt condenser (phono isolation)
15	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)
16	922101	0.05 mfd., 400 volt condenser (phono motor isolation)
17	910010	110 mmfd., 500 volt mica condenser (diode filter)
18	390190	Volume control and switch, 500,000 ohms.
19	397000	15 meg., 1/2 watt resistor (a.v.c. net-work)
20	351330	3.3 meg., 1/2 watt resistor (a.v.c. net-work)
21	340810	22,000 ohms, 1/2 watt resistor (oscillator grid)
22	340290	150 ohms, 1/2 watt resistor (i-f amplifier cathode)
23	397000	15 meg., 1/2 watt resistor (a-f grid)
24	351130	470,000 ohms, 1/2 watt resistor (a-f plate load)
25	351130	470,000 ohms, 1/2 watt resistor (output grid)
26	340290	150 ohms, 1/2 watt resistor (output cathode)
27	370490	1000 ohms, 1 watt resistor (filter)
28	351290	2.2 meg., 1/2 watt resistor (phono shunt)
29	351210	1 meg., 1/2 watt resistor (series phono)
30	340050	15 ohms, 1/2 watt resistor (rectifier ballast)

EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A



TYPE: Single-band superheterodyne.

FREQUENCY RANGE: 540-1620 kc.

TYPE OF TUBES:

- 1—12BE6, pentagrid oscillator-modulator
- 1—12BA6, first i-f amplifier
- 1—12AT6, diode detector, a-f amplifier, a.v.c.
- 1—50B5, beam power output
- 1—35W4, half-wave rectifier

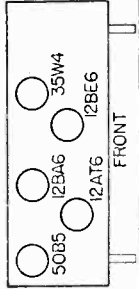
POWER SUPPLY: A.C. or D.C.

VOLTAGE RATING: 105-125 volts.

POWER CONSUMPTION: 30 watts.

CURRENT DRAIN: 0.24 amp. at 117 volts a.c.

TUBE LOCATIONS

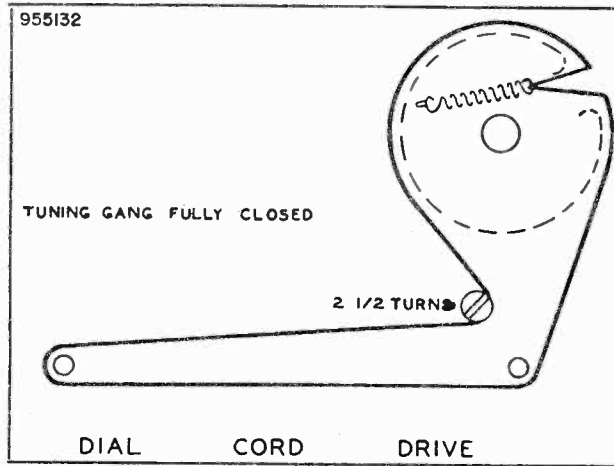


EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A

GENERAL NOTES

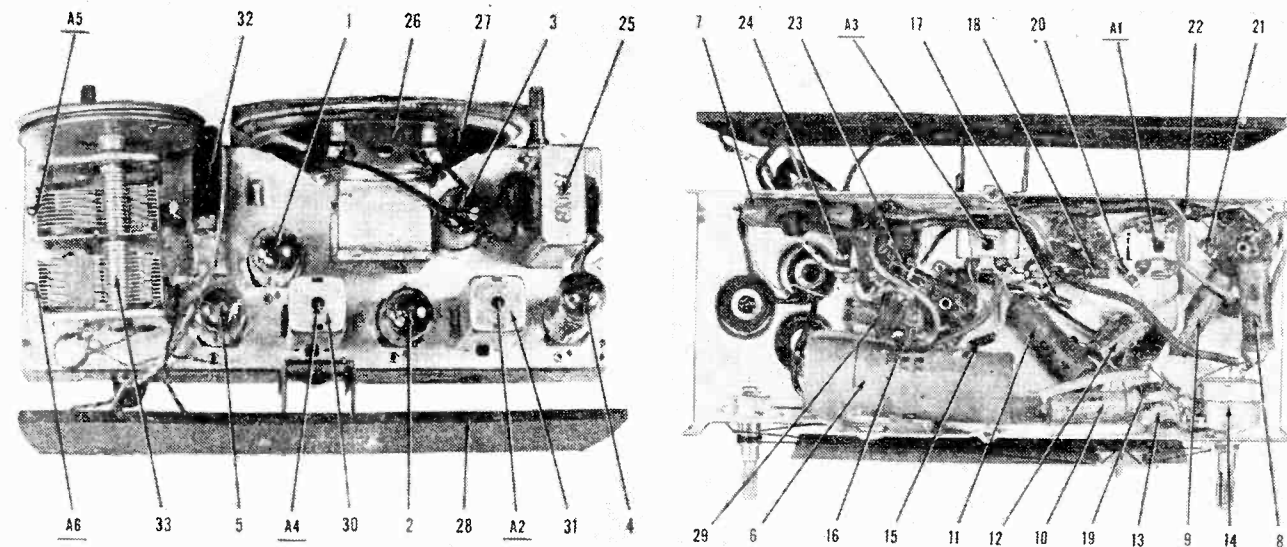
1. If replacements are made or the wiring disturbed in the r-f section of the circuit, the receiver should be carefully realigned.
2. In operating the receiver on d.c., it may be necessary to reverse the line plug for correct polarity.
3. All models have self-contained antennas and do not require additional antenna connections. For permanent home installations, however, if it is desired to improve reception of weak stations, an additional outdoor antenna may be used. For this purpose a lead has been brought out in the rear near the line cord. Use no ground connection.



ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Use isolation transformer if available. If not, connect a 0.1 mfd. condenser in series with low side of signal generator and chassis. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	METER OUTPUT	ADJUST	REMARKS
1	0.1 mfd.	High side to stator of rear section of tuning condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to 0.001 mfd. to reduce hum modulation.
2	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3	200 mmfd.	High side to external antenna lead. Low side to external ground lead.	1400 kc	Tune for maximum output.	Across voice coil.	A6	Adjust for maximum output.



EMERSON RADIO AND PHONO. CORP.

MODEL 547A, Chassis 120050A

REPLACEMENT PARTS LIST

Symbol	†Part No.	DESCRIPTION	Symbol	†Part No.	DESCRIPTION
1	12BE6	Tube, converter	17	340270	120 ohms, 1/2 watt resistor (i-f cathode)
2	12BA6	Tube, i-f amplifier	18	351330	3.3 meg., 1/2 watt resistor (a.v.c. network)
3	12AT6	Tube, detector, a-f amplifier, a.v.c.	19	397000	15 meg., 1/2 watt resistor (a-f grid)
4	50B5	Tube, power output	20	351130	470,000 ohms, 1/2 watt resistor (a-f plate)
5	35W4	Tube, rectifier	21	351130	470,000 ohms, 1/2 watt resistor (output grid)
6A, 6B	925061	30-50 mfd., 150 volt electrolytic condenser (filter)	22	340290	150 ohms, 1/2 watt resistor (output cathode)
7	920030	0.05 mfd., 400 volt condenser (line bypass)	23	370490	1000 ohms, 1 watt resistor (filter)
8	920020	0.02 mfd., 400 volt condenser (output plate bypass)	24	370150	39 ohms, 1 watt resistor (rectifier ballast)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)	25	734009	Output transformer
10	920515	0.002 mfd., 400 volt condenser (audio coupling)	26	180028	Speaker, 4 inch P.M. (alternate speaker 180032)
11	920040	0.1 mfd., 200 volt condenser (a.v.c. filter)	27	700006	Speaker cone, part of 180028
12	910000	220 mmfd., 500 volt condenser (a-f plate bypass)	28	716007	Loop antenna
13	910000	220 mmfd., 500 volt condenser (diode filter)	29	720021	Oscillator coil
		(200 mmfd. ceramic condenser 928011 alternate part for 12 and 13.)	30	720021	First i-f transformer (alternate part 720000A)
14	390024	Volume control and switch, 500,000 ohms	31	720021	Second i-f transformer (alternate part 720100A)
15	397000	15 meg., 1/2 watt resistor (a.v.c. network)	32	807000	Dial light, type 47
*16		22,000 ohms, 1/2 watt resistor, part of 716007 (oscillator grid)	33	900015	Two-gang variable condenser
				507003	Dial light socket
				583005	Line cord

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

† When ordering, state part numbers.  
\* Not supplied separately.

1. Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
2. D-C voltage measurements are at 20,000 ohms per volt; a-c voltage measured at 1,000 ohms per volt.
3. Socket connections are shown as bottom views.
4. Measured values are from socket pin to common negative.
5. Line voltage maintained at 117 volts for voltage readings.
6. Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
7. Volume control at maximum, no signal applied for voltage measurements.

CABINET AND DIAL PARTS

140100	Cabinet, ivory
450112	Knob, brown
410124	Dial backplate, gold
525001	Dial pointer, red
280035	Drive shaft
587040	Dial cord spring

VOLTAGE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	*-6.7 DC	0	25 AC	12 AC	92 DC	92 DC	-0.1 DC
2	12BA6	-0.1 DC	0	25 AC	38 AC	92 DC	92 DC	0.8 DC
3	12AT6	-0.65 DC	0	0	12 AC	-0.3 DC	0	42 DC
4	50B5	0	5.7 DC	85 AC	38 AC	107 DC	92 DC	0
5	35W4	0	0	85 AC	117 AC	110 AC	112 AC	112 DC

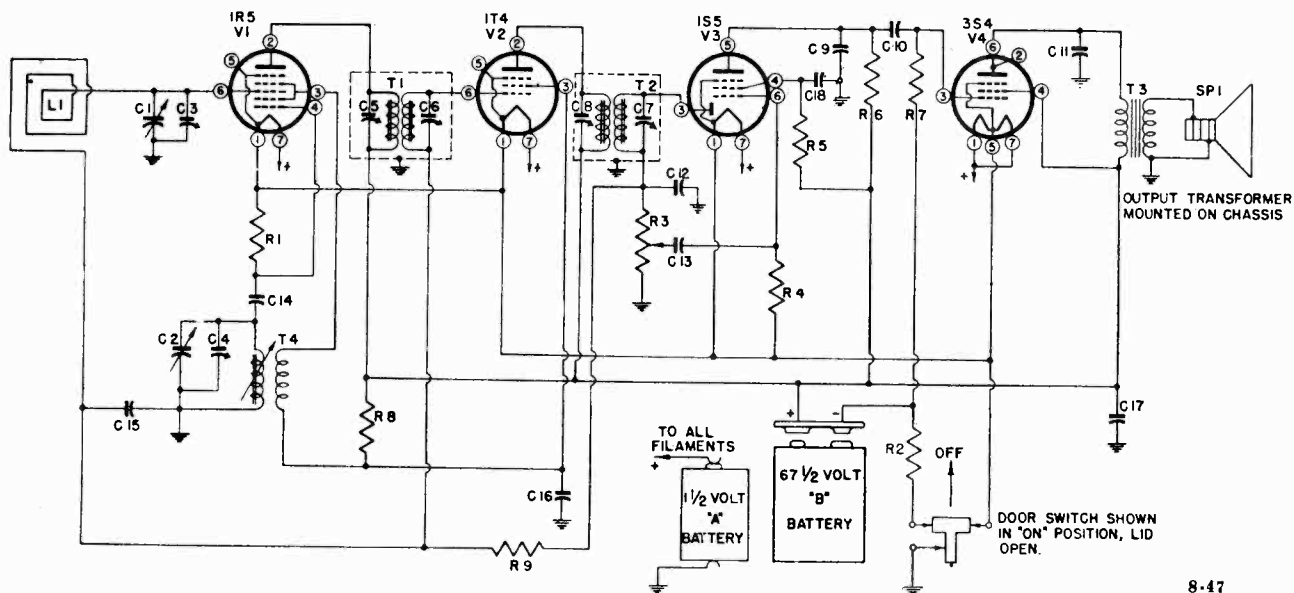
\* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

RESISTANCE READINGS

Symbol	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	12BE6	24,000	0.6	26	13	700,000	700,000	3.5 meg.
2	12BA6	3.5 meg.	0	26	38	700,000	700,000	118
3	12AT6	15 meg.	0	0	13	500,000	0	1.2 meg.
4	50B5	480,000	150	90	38	700,000	700,000	480,000
5	35W4	inf.	inf.	90	120	150	118	700,000

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058



8-47

DESCRIPTION

TYPE: Pocket portable (battery operated) superheterodyne.  
 FREQUENCY RANGE: 540-1600 kc.

TYPE OF TUBES:  
 1—1R5, oscillator-modulator  
 1—1T4, i-f amplifier  
 1—1S5, 2nd detector, a.v.c., a-f amplifier  
 1—3S4, pentode output

POWER SUPPLY: "A" and "B" batteries.

VOLTAGE RATING:  
 "A" Battery—1.5 volts  
 "B" Battery—67.5 volts

CURRENT DRAIN:  
 "A" Battery—0.25 amp.  
 "B" Battery—0.0075 amp.

REPLACEMENT PARTS LIST

Schematic Symbol	†Part No.	DESCRIPTION	Schematic Symbol	†Part No.	DESCRIPTION
C1, C2	900022	Two-gang variable condenser	R2	340470	820 ohms, 1/2 watt resistor
*C3, C4		Trimmers, part of variable condenser	R3	390025	1 meg., volume control
*C5, C6		Trimmers, part of first i-f transformer	R4	351450	10 meg., 1/2 watt resistor
*C7, C8		Trimmers, part of second i-f transformer	R5, R9	351330	3.3 meg., 1/2 watt resistor
C9, C14	928013	100 mmfd., ceramic condenser	R6	351130	470,000 ohms, 1/2 watt resistor
C10, C13	920495	0.001 mfd., 200 volt condenser	R7	351250	1.5 meg., 1/2 watt resistor
C11	920496	0.005 mfd., 200 volt condenser	R8	340730	10,000 ohms, 1/2 watt resistor
C12	928104	212 mmfd., ceramic condenser	SP1	180029	Speaker, 3-inch P.M.
C15	920494	0.05 mfd., 200 volt condenser	T1	720028	First i-f transformer, or
C16	920120	0.02 mfd., 100 volt condenser	T2	720034	First i-f transformer
C17	925063	16 mfd., 100 volt electrolytic condenser	T2	720028	Second i-f transformer, or
C18	920485	0.01 mfd., 100 volt condenser	T2	720035	Second i-f transformer
L1	700008	Loop antenna	T3	734011	Output transformer
R1	350970	100,000 ohms, 1/2 watt resistor	T4	716011	Oscillator coil
				510040	On-off lid switch
				540260	Rivet, lid switch
				585007	"B" battery cable

† Specify part numbers when ordering.

\* Not supplied separately.

EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058

CABINET AND DIAL PARTS

460029	Plastic bottom shell, black	540160	Rivet, female catch, cover to metal front
460039	Plastic bottom shell, ivory	540160	Rivet, male catch, shell to metal front
460069	Plastic bottom shell, green	540360	Rivet, female catch, shell to metal front
460028	Plastic lid, black	410143	Lid hinge, spring loaded
460038	Plastic lid, ivory	410144	Lid hinge stop
460068	Plastic loop cover, black	540370	Rivet, lid hinge to lid
630058	Metal front	540160	Rivet, lid hinge to metal front
410140	Knob, black	540470	Rivet, lid hinge to hinge stop
460031	Knob, ivory	470259	Hinge assembly, shell to metal front
460037	Knob, green	540160	Rivet, hinge to metal front
541170	Knob retaining clip	540370	Rivet, hinge to shell
460061	Handle, extruded plastic	520036	Dial crystal
460009	Handle ring	520041	Dial pointer
410519	Release catch, male	520016	Dial bracket
410959	Release catch, female	280036	Drive shaft
411055	Reinforcing plate, cover release catch	587326	Dial drive spring
540460	Rivet, male catch, cover to metal front		

VOLTAGE ANALYSIS

The following voltage readings are d-c measurements taken from B— (chassis) to the indicated tube-socket pin. A 1000 ohms-per-volt meter should be used for all readings except those indicated by an asterisk (\*), which should be taken with a d-c vacuum-tube voltmeter. Take readings with the volume control set at minimum and the variable condenser closed. Use fresh batteries.

TUBE	1	2	3	4	5	6	7
1R5		60	35	0-8		*0.2	1.5
1T4		60	35			*0.2	1.5
1S5				*0.2	*17	*0.1	1.5
3S4	1.5	59	*6.5	60		59	1.5

BATTERY REPLACEMENT

1. Slide the button on the release catch near the handle in the direction of the arrow. This loosens the bottom shell and permits it to be swung open on the hinge, making the batteries accessible.

2. Insert the batteries as shown in the above diagram.

3. To reassemble, hold the chassis face down with the batteries in place. Close the bottom shell over the chassis and press the handle end of the shell so that it snaps into place.

ADJUSTMENTS

An oscillator with frequencies of 455, 600, 1420, and 1620 kc is required.

An output meter should be connected across the primary or secondary of the output transformer for observing maximum response.

Always use as weak a test signal as possible, turning down the output of the test oscillator as the alignment of the receiver progresses.

Turn the volume control on full.

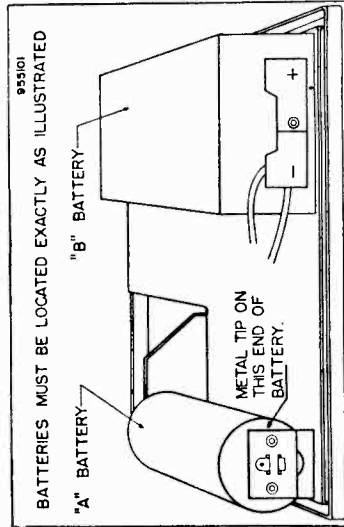
Location of Coils and Trimmer Adjustments

The first i-f transformer is located next to the 1R5 tube. The trimmers are accessible through holes in the top of the can.

The second i-f transformer is located between the 1T4 and 1S5 tubes. The single trimming core screw extends from the end of the can. Trimmers are accessible through holes in the top of the can.

The oscillator coil is located behind the on-off switch. The trimmer for the oscillator is located on the smaller variable condenser section. The 600 kc oscillator core adjustment is the brass screw protruding from the end of the oscillator coil.

The loop antenna acts as the antenna coil. The trimmer for the loop is located on the larger section of the variable condenser.

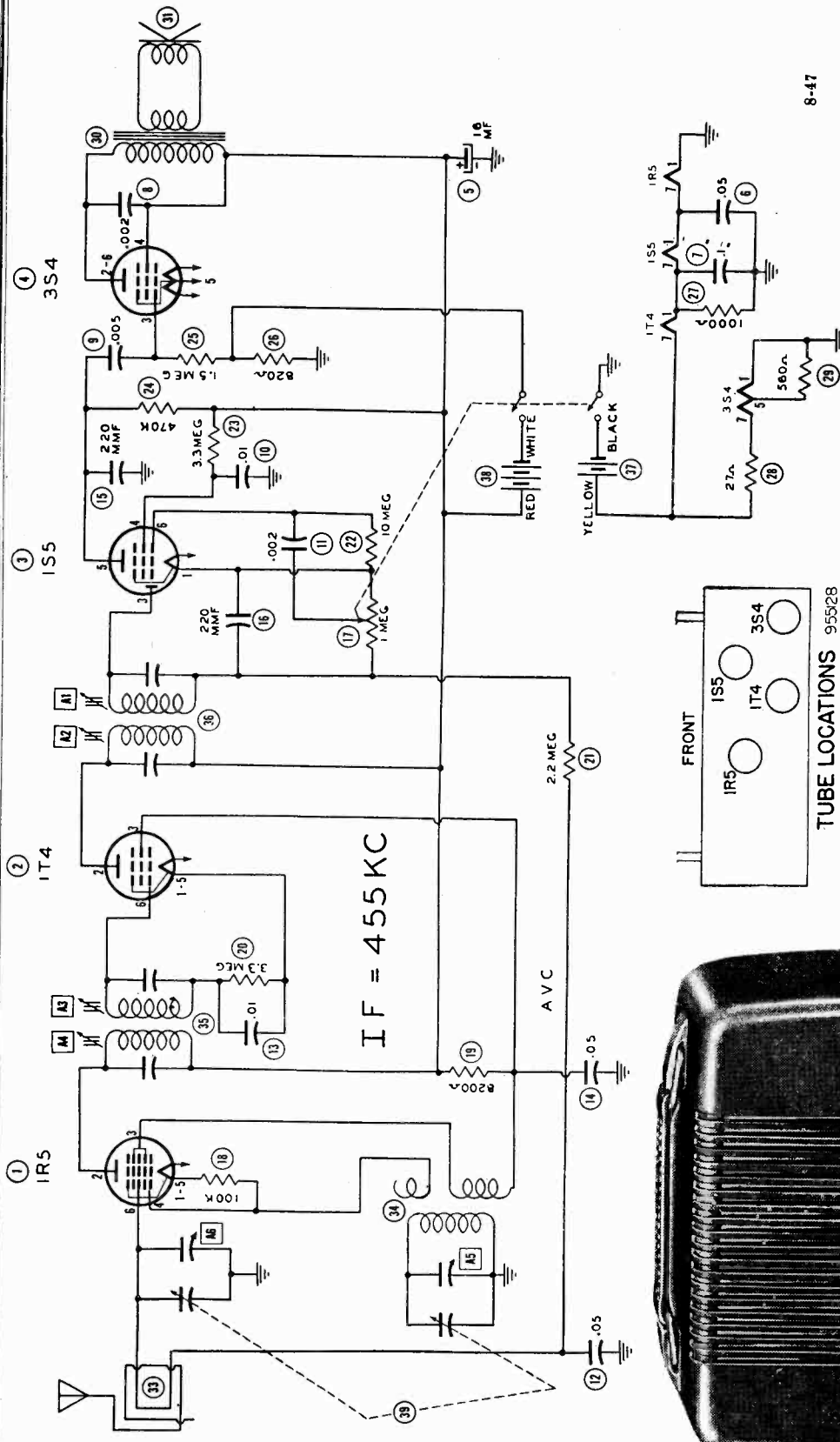


GENERAL NOTES

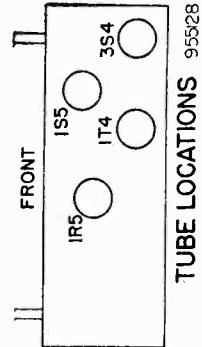
1. If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
2. The receiver has a self-contained antenna and does not require additional antenna or ground connections.
3. The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, to rotate the cabinet back and forth through a quarter of a circle (90 degrees), leaving it at the position where the station is received with maximum volume.
4. The receiver is turned on when the lid is open and turned off when the lid is closed. Always close the lid when the set is not in use.
5. Remove batteries as soon as they are exhausted. The "A" battery will require more frequent replacement than the "B" battery.
6. Replace the 1.5 volt "A" battery with a standard D-size flashlight cell (1-5/16" dia.). Replace the 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent.

# EMERSON RADIO AND PHONO. CORP.

MODEL 558, Chassis 120058

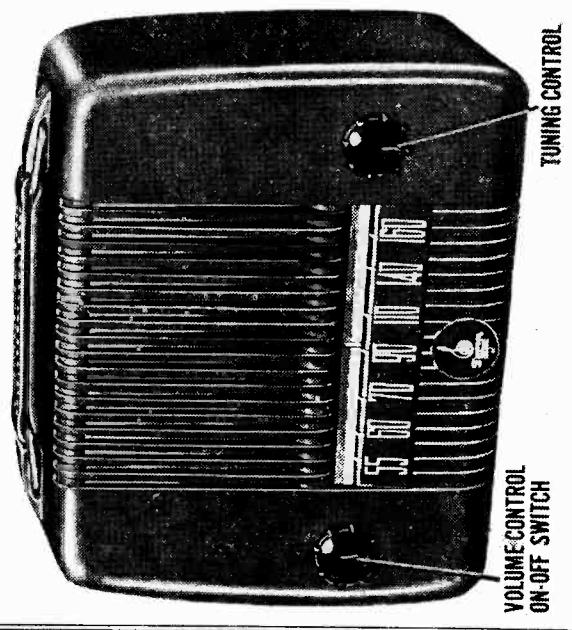


8-47



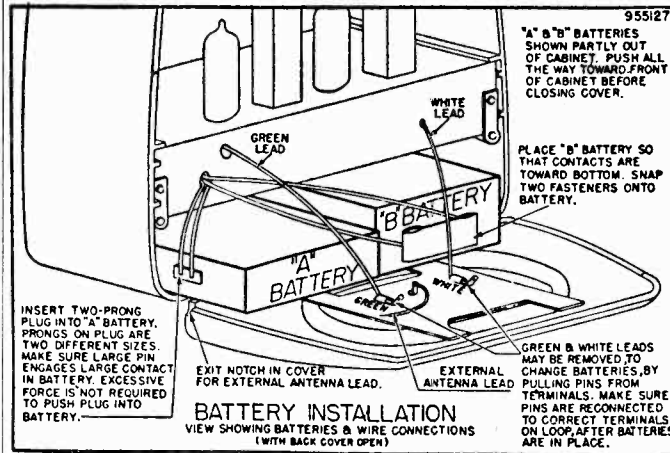
**TYPE:** Battery operated portable superheterodyne.  
**FREQUENCY RANGE:** 540-1620 kc.  
**TYPE OF TUBES:**  
 1—1R5, converter  
 1—1T4, i-f amplifier  
 1—1S5, detector, a-f amplifier, a.v.c.  
 1—3S4 or 3Q4, power output

**POWER SUPPLY:** "A" and "B" batteries.  
**VOLTAGE RATING:**  
 "A" Battery—4.5 volts  
 "B" Battery—67.5 volts  
**CURRENT DRAIN:**  
 "A" Battery—104 ma.  
 "B" Battery—7.5 ma.

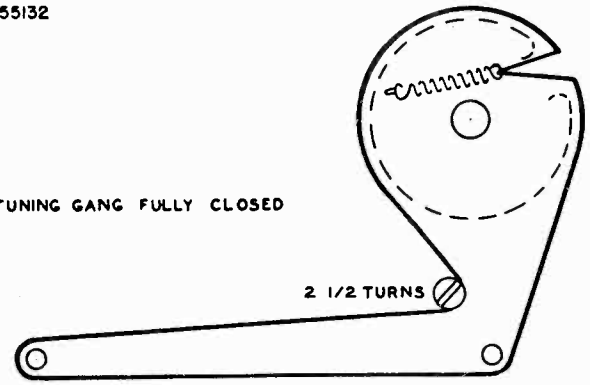


EMERSON RADIO AND PHONO. CORP.

MODEL 560, Chassis 120016



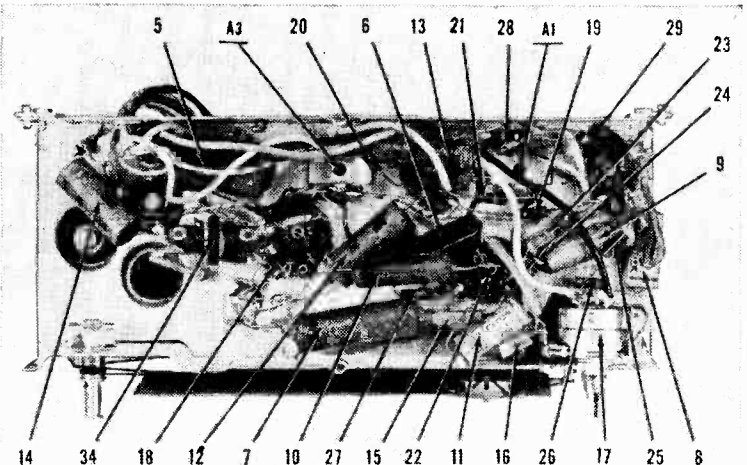
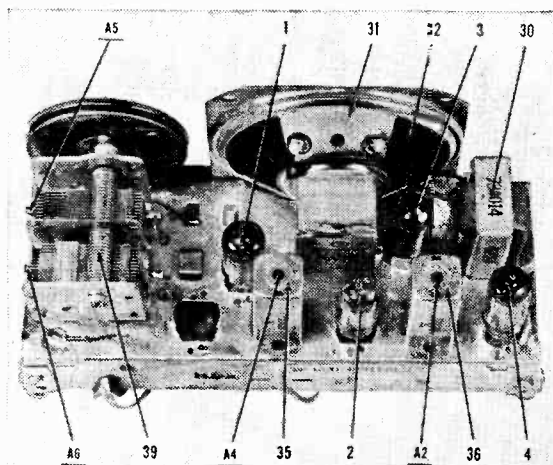
955132



ALIGNMENT

To set pointer, turn variable condenser fully closed and set pointer at mark near left end of dial backplate. Connect a 100,000 ohm resistor across the loop leads during Steps 1 and 2. Volume control should be at maximum position; output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	455 kc	Variable condenser fully open.	Across voice coil.	A1, A2, A3, A4	Adjust for maximum output.
2.	0.1 mfd.	High side to rear stator of variable condenser. Low side to chassis.	1620 kc	Variable condenser fully open.	Across voice coil.	A5	Adjust for maximum output.
3.		Loop	1400 kc	Tune for maximum output.	Across voice coil.	A6	Disconnect 100,000 ohm resistor from loop leads. Connect loop leads to loop. Hold chassis in same relative position to loop as when chassis is mounted and rear door is closed. Radiate signal into loop. Adjust A6 for maximum output.





REPLACEMENT PARTS LIST

Symbol	† Part No.	DESCRIPTION
1	1R5	Tube, converter
2	1T4	Tube, i-f amplifier
3	1S5	Tube, detector, a-f amplifier, a.v.c.
4	3S4 or 3Q4	Tube, power output
5	925066	16 mfd., 100 volt electrolytic condenser (power supply bypass)
6	920060	0.05 mfd., 200 volt condenser (filament bypass)
7	920040	0.1 mfd., 200 volt condenser (filament bypass)
8	920515	0.002 mfd., 400 volt condenser (output plate bypass)
9	920180	0.005 mfd., 400 volt condenser (audio coupling)
10	920092	0.01 mfd., 400 volt condenser (a-f screen bypass)
11	920515	0.002 mfd., 400 volt condenser (audio coupling)
12	920060	0.05 mfd., 200 volt condenser (a.v.c. filter)
13	920092	0.01 mfd., 400 volt condenser (i-f grid filter)
14	920060	0.05 mfd., 200 volt condenser (decoupling filter)
15	910000	220 mmfd., 500 volt condenser (a-f plate bypass)
16	910000	220 mmfd., 500 volt condenser (diode filter)
17	390026	(Ceramic condenser 928011 alternate part for 15 and 16.)
18	340970	Volume control and switch, 1 meg., 100,000 ohms, 1/2 watt resistor (oscillator grid)
19	340710	8200 ohms, 1/2 watt resistor (decoupling)
20	351330	3.3 meg., 1/2 watt resistor (i-f grid)
21	351290	2.2 meg., 1/2 watt resistor (a.v.c. network)
22	351450	10 meg., 1/2 watt resistor (a-f grid)
23	351330	3.3 meg., 1/2 watt resistor (a-f screen)
24	351130	470,000 ohms, 1/2 watt resistor (a-f plate)
25	351250	1.5 meg., 1/2 watt resistor (output grid)
26	340470	820 ohms, 1/2 watt resistor (bias, used with 3S4 output, or
26	340370	330 ohms, 1/2 watt resistor (bias; used with 3Q4 output
27	340490	1000 ohms, 1/2 watt resistor (filament network)
28	340110	27 ohms, 1/2 watt resistor (filament network)
29	340430	560 ohms, 1/2 watt resistor (filament network)
30	734014	Output transformer
31	180030	Speaker, 4-inch P.M.
32	* 180030	Speaker cone, part of 180030
33	700009	Loop antenna
34	716017	Oscillator coil
35	720525	First i-f transformer

GENERAL NOTES

- If replacements are made in the r-f section of the circuit, the receiver should be carefully realigned.
- The receiver has a self-contained antenna and normally does not require additional antenna or ground connection. For permanent home installations, however, in a location far removed from broadcasting stations, an additional outside antenna may be used. The outside antenna connection should be made to the colored lead at the rear of the cabinet. Use no ground connection.
- The self-contained loop antenna has directional properties. It is important, therefore, once the station is tuned in, that the cabinet be rotated on its base back and forth through a quarter of a circle (90 degrees), and left at the position where the station is received with maximum volume.
- Battery complement: Replace 4.5 volt "A" battery with Eveready No. 746 or equivalent. Replace 67.5 volt "B" battery with Eveready Minimax No. 467 or equivalent. Refer to battery installation diagram.

DESCRIPTION

Symbol	† Part No.	DESCRIPTION
36	720525	Second i-f transformer
37		"A" battery, 4.5 volts, Eveready 746 or equivalent
38		"B" battery, 67.5 volts, Eveready 467 or equivalent
39	900023	2-gang variable condenser
	585011	"B" battery cable
	585008	"A" battery cable
	580038	Pin terminal lead, a.v.c.
	580039	Pin terminal lead, grid

† Specify part numbers when ordering. \* Not supplied separately.

140110	Cabinet, maroon
140111	Cabinet back
595003	Handle, with rings, black
450115	Knob, black
280037	Tuning drive shaft
530002	Drive cord
587040	Drive cord spring
410124	Dial backplate, gold
525001	Dial pointer, red

CABINET AND

DIAL PARTS

VOLTAGE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	57	44	*5.2	0	0	1.45
2	1T4	2.8	57	44	0	2.8	0	4.4
3	1S5	1.45	0	0	12	27	0	2.8
4	3S4 (or 3Q4)	0	55	-1.3	57	1.5	55	3

\* Oscillator Grid Voltages Are Measured By Vacuum-Tube Voltmeter.

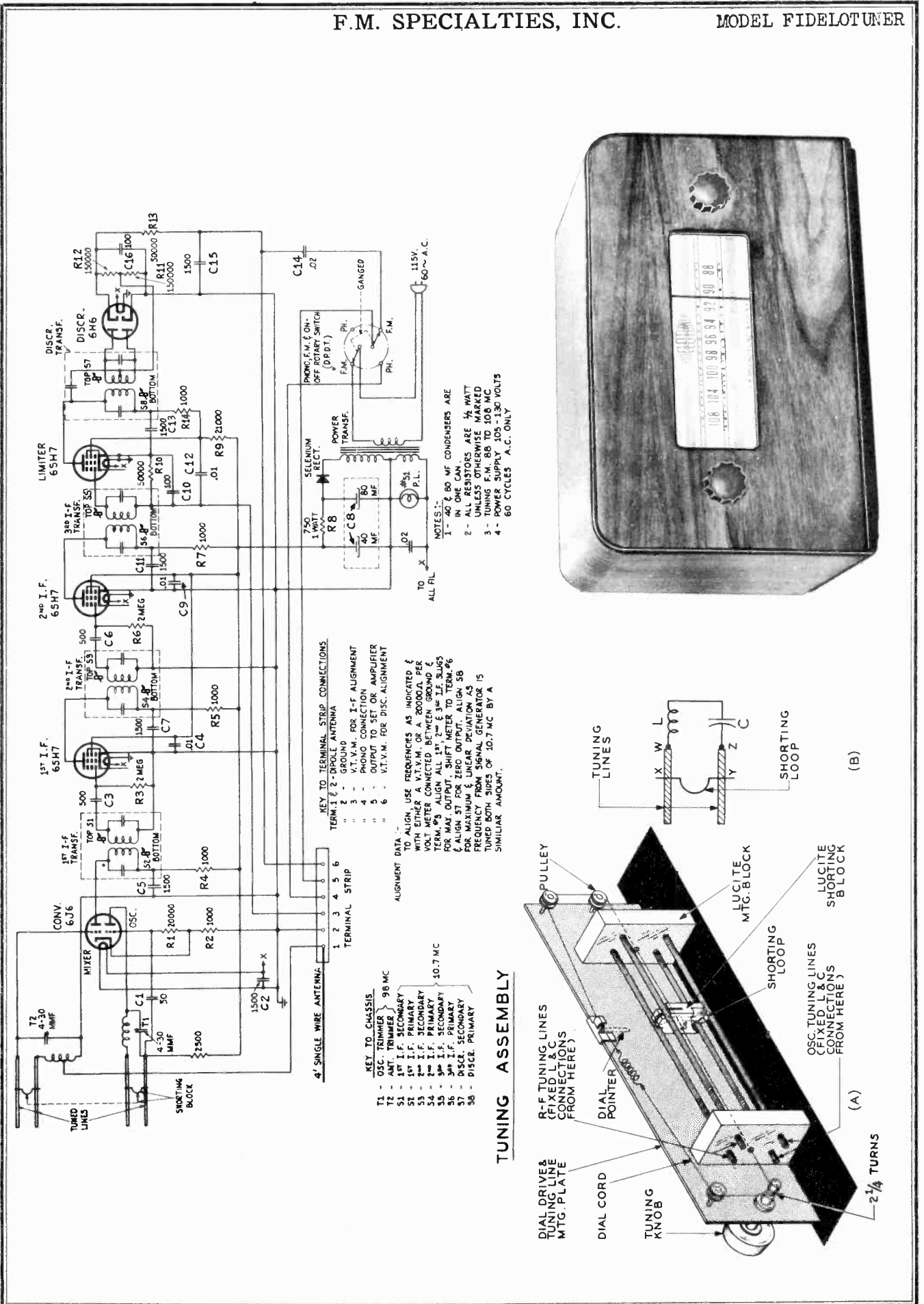
RESISTANCE READINGS

SYMBOL	TUBE	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7
1	1R5	0	120,000	130,000	100,000	0	3.5 meg.	*
2	1T4	*	120,000	130,000	3.5 meg.	*	3.5 meg.	*
3	1S5	*	inf.	1.1 meg.	3.4 meg.	600,000	10 meg.	*
4	3S4 (or 3Q4)	0	120,000	1.5 meg.	120,000	*	120,000	*

\* Do Not Use Ohmmeter To Measure Filament Resistances.

VOLTAGE AND RESISTANCE READING INSTRUCTIONS

- Voltage readings are in volts and resistance readings in ohms unless otherwise specified.
- Voltage measurements are d-c at 20,000 ohms per volt.
- Socket connections are shown as bottom views.
- Measured values are from socket pin to common negative.
- Nominal tolerance on component values makes possible a variation of  $\pm 15\%$  in voltage and resistance readings.
- Volume control at maximum, no signal applied for voltage measurements.



## MODEL FIDELOTUNER

## F.M. SPECIALTIES, INC.

TUBE	PIN	VTVM	20,000 $\sim$ P.V.	1,000 $\sim$ P.V.	RESISTANCE
6J6	1	110	110	110	Over 75 K
Conv	2	92	92	92	Over 75 K
Mixer	3	0	0	0	0
	4	AC	AC	AC	0.2 $\sim$
	5	-2.5	1	1	22 $\sim$
	6	0	0	0	0
	7	6.2	4	4	1 $\sim$
6SH7	1	0	0	0	0
IF Ampl	2	0	0	0	0
	3	0	0	0	0
	4	-4	-0.4	-0.2	2 megs
	5	-	-	-	-
	6	120	120	120	Over 75 K
	7	AC	AC	AC	0.2 $\sim$
	8	115	115	115	Over 75 K
6SH7	1	0	0	0	0
IF Ampl	2	0	0	0	0
	3	0	0	0	0
	4	-8	-0.6	-0.3	2 megs
	5	0	0	0	0
	6	120	120	120	Over 75 K
	7	AC	AC	AC	0.2
	8	115	115	115	Over 75 K
6SH7	1	0	0	0	0
Limitter	2	0	0	0	0
	3	0	0	0	0
	4	-1.5	-0.4	-0.2	50 K
	5	0	0	0	0
	6	60	60	56	Over 75 K
	7	AC	AC	AC	0.2 $\sim$
	8	58	58	54	Over 75 K
6H6	1	0	0	0	0
Discr	2	0	0	0	0
	3	-22	-20	16	150 K
	4	-16	-15	8	300 K
	5	-16	-1	-0.4	150 K
	6	-16	-15	-8	350 K
	7	AC	AC	AC	0.2 $\sim$
	8	0	0	0	0

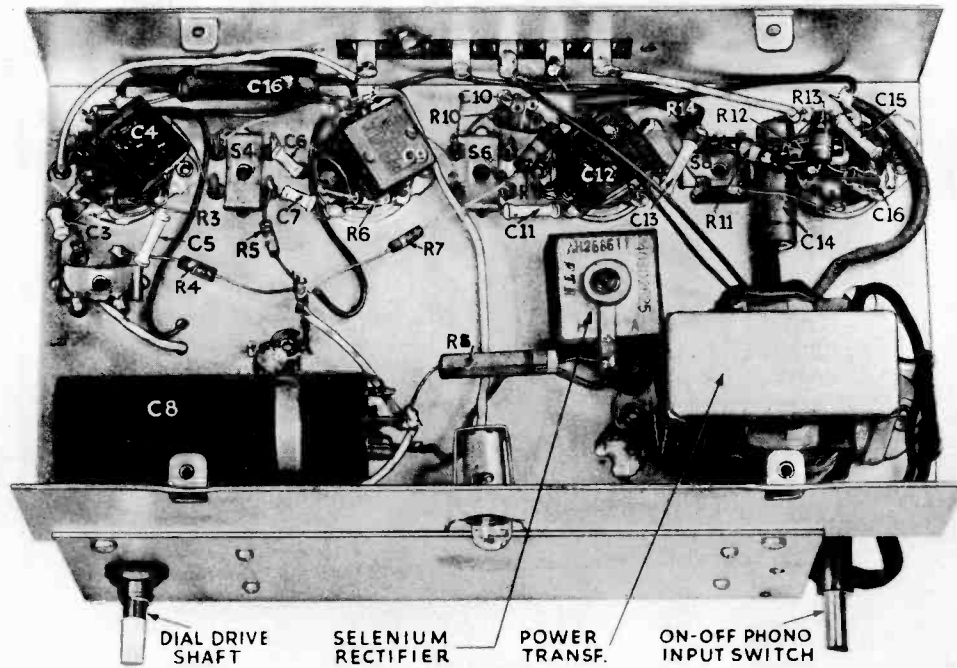
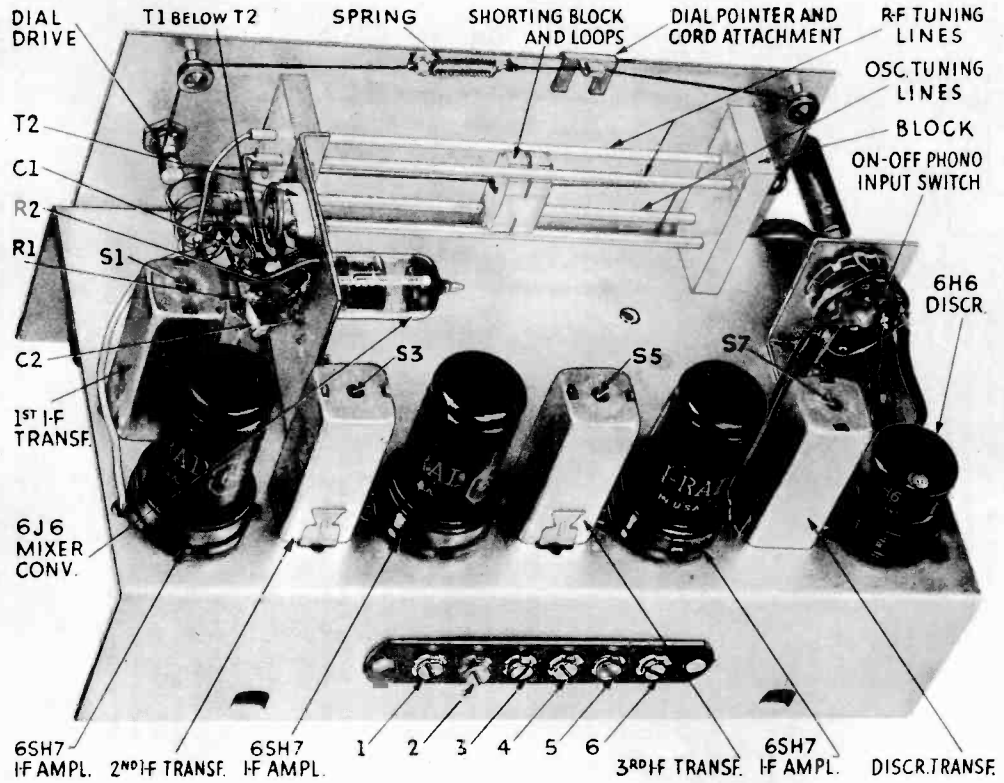
Selenium rectifier output is 130 V.D.C.

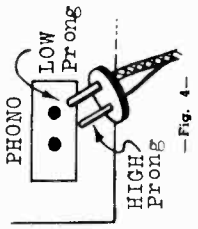
NOTE: All voltage and measurements made with respect to chassis ground and with a line voltage of 116 V.A.C.

NOTE: All measurements were made with the tuned lines shorting bars in the lowest frequency position.

F.M. SPECIALTIES, INC.

MODEL FIDELOTUNER





—Fig. 4—

3. **Two-hole Plug Type Phono Terminal (Fig. 4)**

Pull out phono terminal plug, and disconnect wires attached to the plug. Mark wires for later use. Solder, or otherwise securely connect center wire of cable leading from Fidelotuner, into one prong of the plug (making it the *high* side). Next, solder, or securely connect the outside shielded wire of the cable into the other prong (*low* side) of the plug. Then replace the plug into the phono terminal.

**B. RADIO RECEIVER WITH PHONO OUTLET (without phonograph)**

Follow the same directions as in A. (Connection to radio receiver with phonograph) except that there will be no phonograph leads to disconnect.

**C. RADIO RECEIVER WITHOUT PHONO OUTLET OR PHONOGRAPH**

In order to make this connection, the Fidelotuner has to be wired directly into your radio receiver circuit. A radio service man is needed for this installation.

**CONNECTIONS FROM THE FIDELOTUNER TO A SEPARATE PHONOGRAPH, RECORD PLAYER, OR AMPLIFIER SYSTEM**

If there is a phono terminal, the Fidelotuner can be connected by following the directions for connecting the Fidelotuner to a radio receiver. (See A. 1, 2, 3, above).

If there is no phono terminal, the connection will involve an installation which must be done by a radio service man.

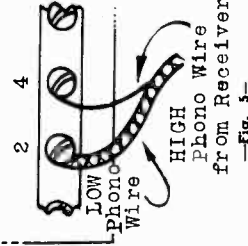
**CONNECTIONS FROM RADIO RECEIVER PHONOGRAPH TO FIDELOTUNER (Fig. 5)**

Wires disconnected from the phonograph terminal of your radio receiver (the wires you marked for later use) are to be connected to the Fidelotuner.

To terminal #4 of the Fidelotuner, connect the *high* side of the phonograph wire.

To terminal #2 of the Fidelotuner, connect the *low* side of the phonograph wire.

For normal operation of the phonograph in your combination radio-phonograph set, switch the Fidelotuner to OFF position.



—Fig. 5—

**ANTENNA CONNECTIONS**

The Fidelotuner is supplied with a 4 ft. indoor antenna which is already connected to the #1 post on the terminal strip. Stretch this wire to its full length. For most city locations where F-M signals are fairly strong, this will suffice. If, however, your location is out of the primary service area, it will be necessary to use an outdoor F-M dipole equipped with a 300 ohm flat line lead-in. This antenna and lead-in is standard, and is easily obtainable from most radio supply stores. The outdoor connections should be made to terminals #1 and #2, after the 4 ft. indoor connection has been disconnected.

Insulated alignment tools must be used for Fidelotuner alignment. Use a DC output meter with at least a 20 volt range, or a 20,000 ohm per volt meter. Use a signal generator covering frequencies of 10.7, 90 and 106 mc.

Before making any adjustments, let the Fidelotuner warm up for at least a half hour.

In order to operate, the following are necessary:

1. Antenna. (In most cases of local reception, the 4 ft. indoor antenna supplied will be sufficient.)
2. 105-130 volt 60 cycle A.C. power line.
3. A radio receiver, or separate phonograph, record player, or amplifier system.

All connections to and from the Fidelotuner are made to the terminal strip on the rear of the chassis.

**CONNECTIONS FROM THE FIDELOTUNER TO THE RECEIVER**

A shielded cable is supplied with the Fidelotuner for a simple connection from the Fidelotuner to your radio receiver, or separate phonograph, record player, or amplifier system.

You will find this cable already connected to the proper terminals on the Fidelotuner, these terminals being numbers 2 and 5.

The method of connecting the cable to the radio receiver will be determined by whether the receiver is (A) a combination radio phonograph set, (B) a radio with a phonograph outlet only, (C) a radio without a phonograph or phonograph outlet.

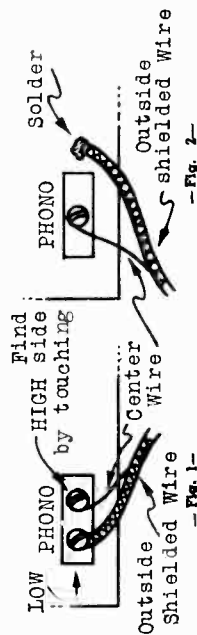
**A. COMBINATION RADIO RECEIVER-PHONOGRAPH**

Look at the back of your radio receiver chassis for the phonograph terminal. (It will probably be marked PHONO or TELEVISION.) There are three different general types of phonograph terminals on standard radio receivers:

1. **Screw-type Phono Terminal**

In this type, disconnect any wires attached to the phono terminal. Mark the wires for later use.

Locate the *high* side of the phono terminal. Do this by turning the selector switch to phono position while the radio receiver is operating, and touching each of the phono terminal screws. The *high* side will produce speaker hum. (See Fig. 1.) Now, to this *high* side, connect the center wire of the cable leading from the Fidelotuner. Next, connect the outside shielded wire of the cable to the other side (the *low* or grounded side) of the phono terminal.



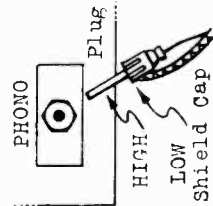
—Fig. 1—

In the event that the phono terminal has only *one screw*, this will be the *high* side, and the center wire of the cable is to be connected to it. The outside shielded wire of the cable connects to the radio receiver chassis; it is best to solder this wire to the chassis. (Fig. 2)

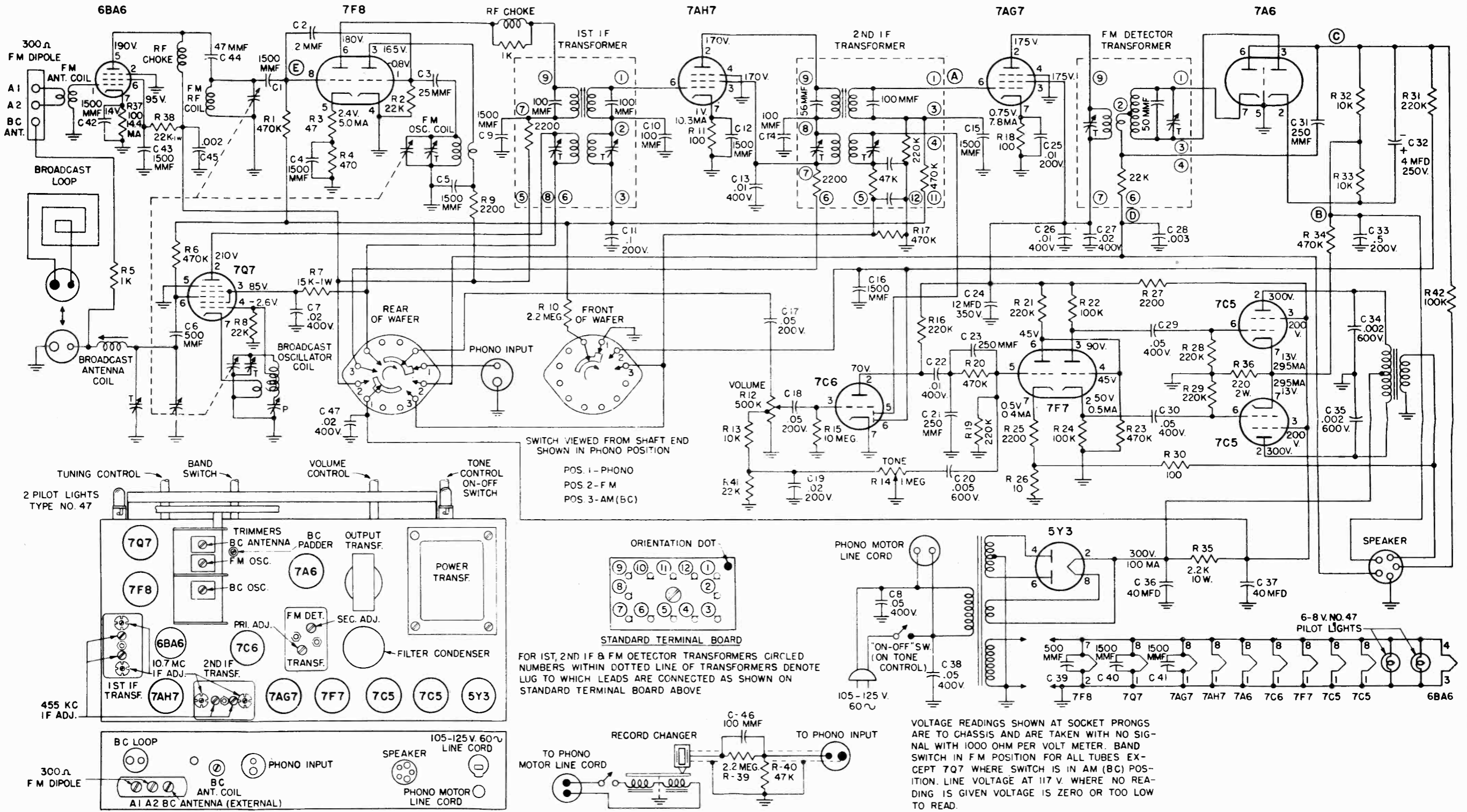
2. **One-hole Plug Type Phono Terminal (Fig. 3)**

Pull out phono terminal plug, and disconnect the wires attached to the plug. Mark wires for later use.

Solder, or otherwise connect the center wire of the cable leading from the Fidelotuner, into the center prong (*high* side) of the plug. Next, connect the outside shielded wire of the cable to the outside shield cap (*low* side) of the plug. Then replace the plug into the single-hole phono terminal.

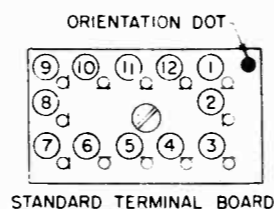


—Fig. 3—



SWITCH VIEWED FROM SHAFT END SHOWN IN PHONO POSITION

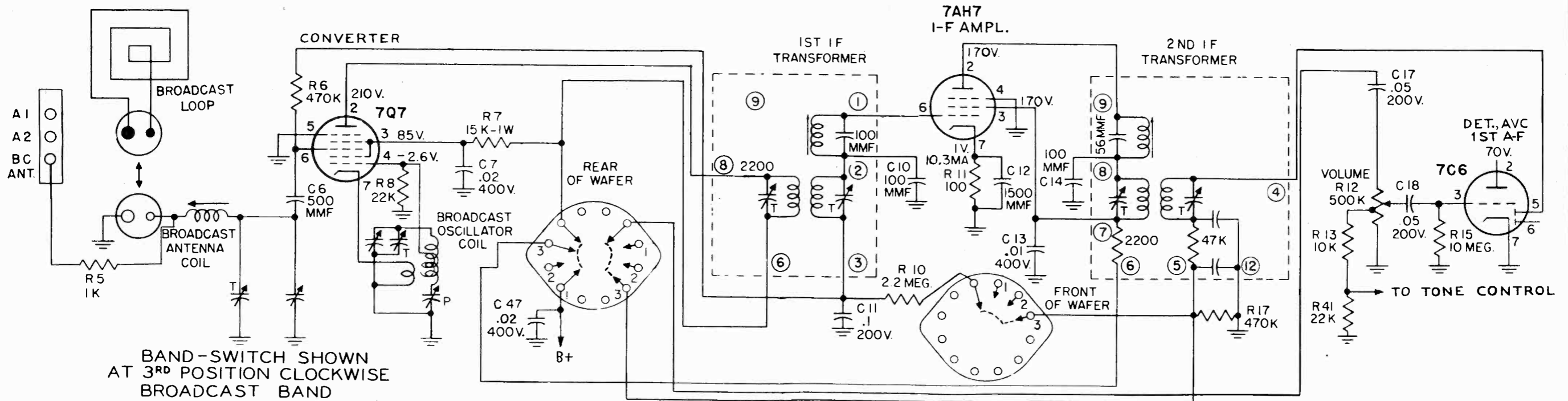
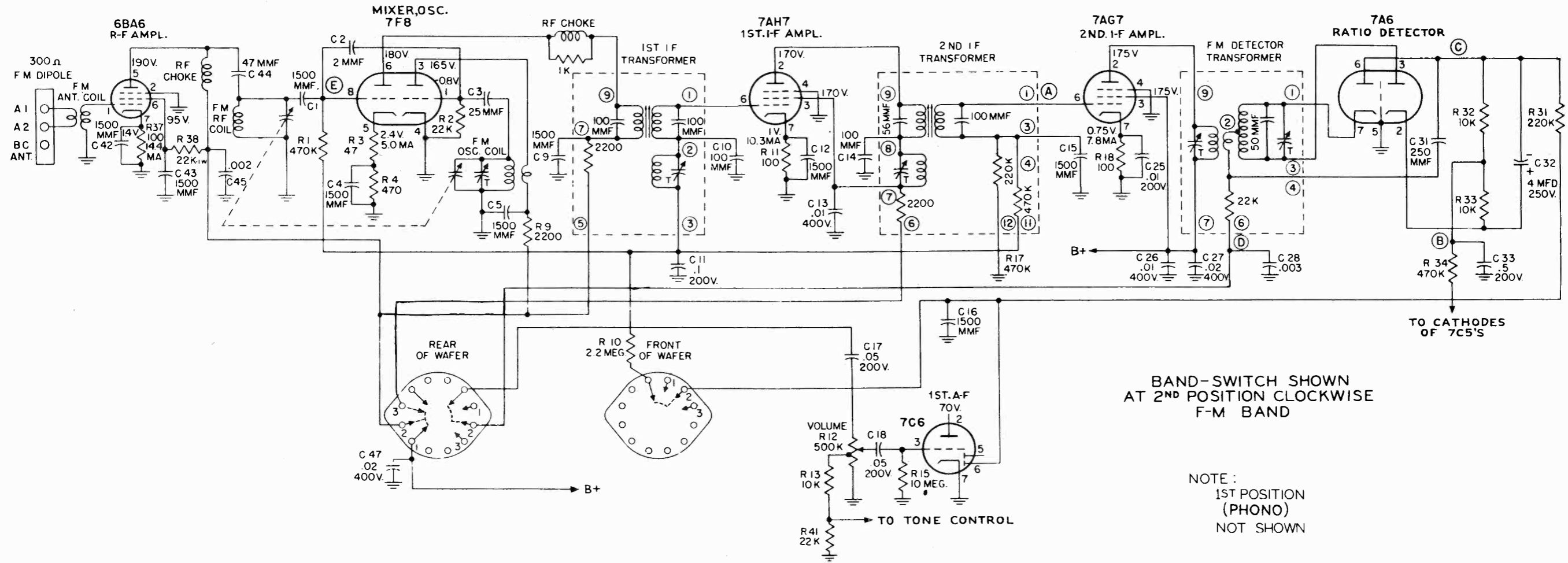
POS. 1 - PHONO  
 POS. 2 - F-M  
 POS. 3 - AM (BC)

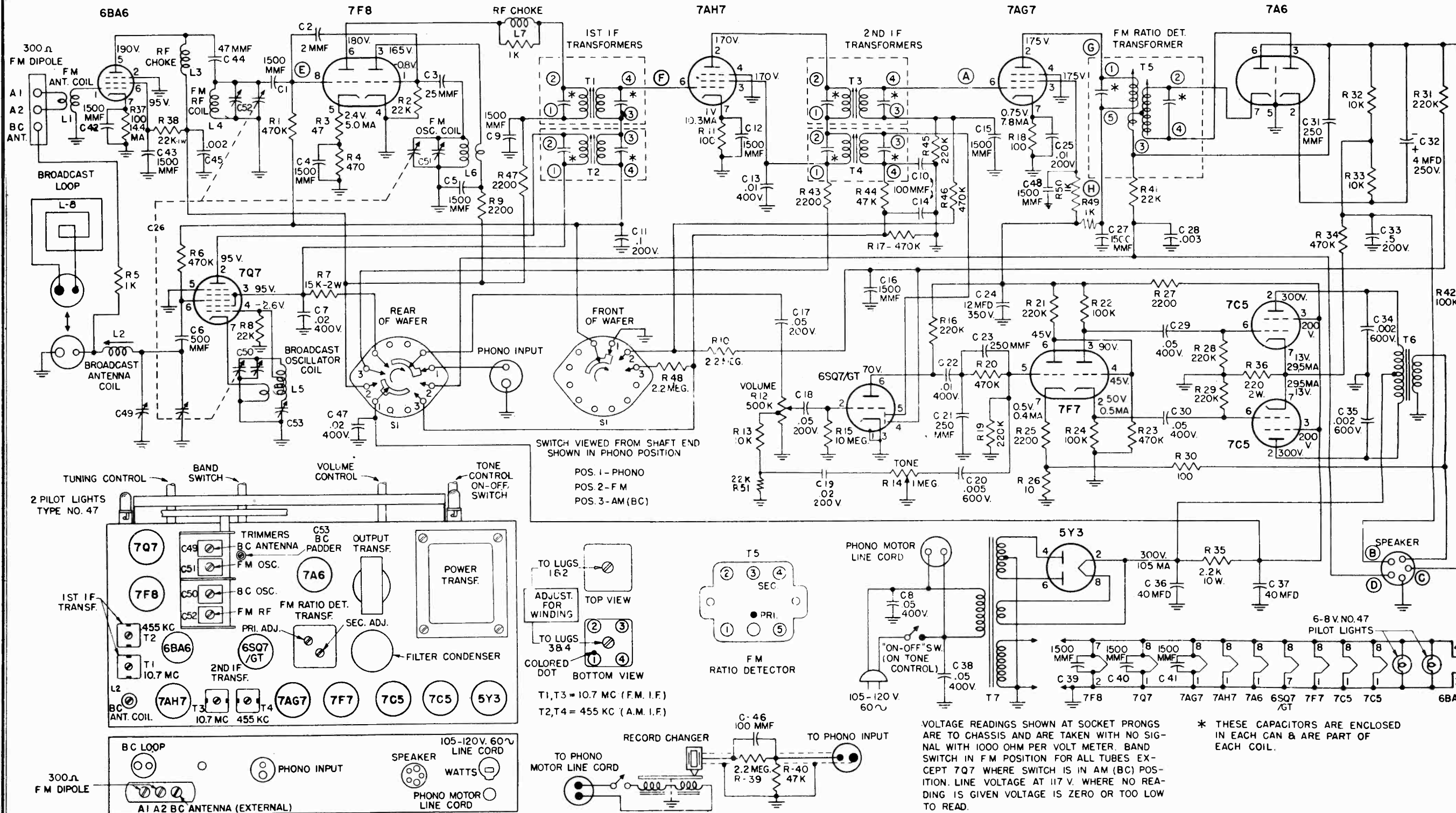


FOR 1ST, 2ND IF & FM DETECTOR TRANSFORMERS CIRCLED NUMBERS WITHIN DOTTED LINE OF TRANSFORMERS DENOTE LUG TO WHICH LEADS ARE CONNECTED AS SHOWN ON STANDARD TERMINAL BOARD ABOVE

VOLTAGE READINGS SHOWN AT SOCKET PRONGS ARE TO CHASSIS AND ARE TAKEN WITH NO SIGNAL WITH 1000 OHM PER VOLT METER. BAND SWITCH IN F-M POSITION FOR ALL TUBES EXCEPT 7Q7 WHERE SWITCH IS IN AM (BC) POSITION. LINE VOLTAGE AT 117 V. WHERE NO READING IS GIVEN VOLTAGE IS ZERO OR TOO LOW TO READ.

"clarified schematics"  
ESPEY MFG. COMPANY, INC.

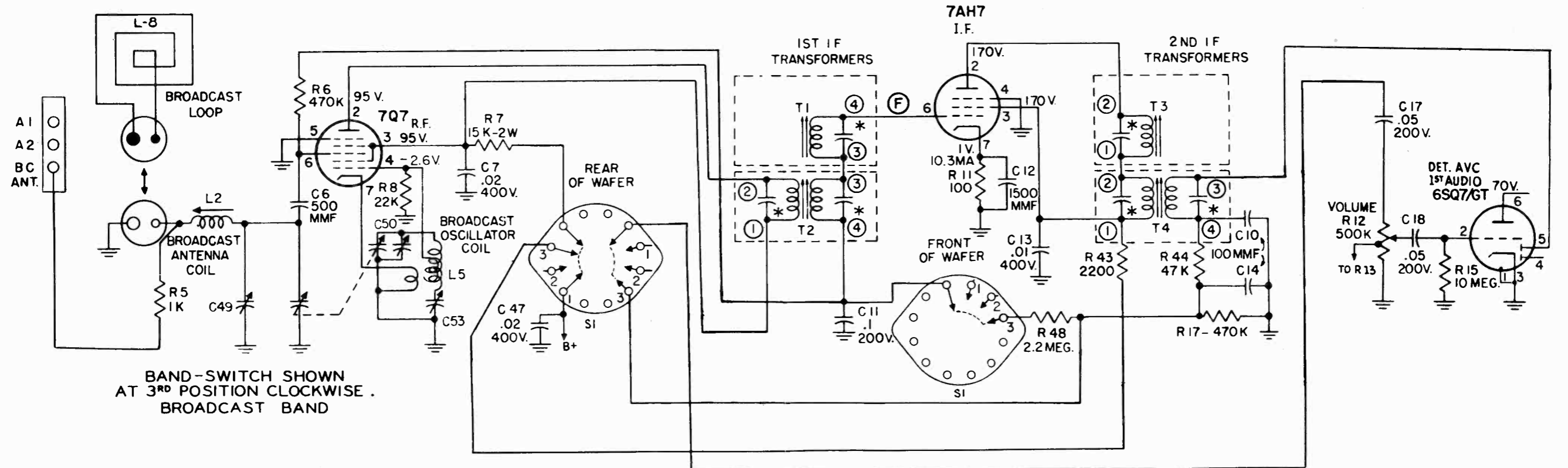
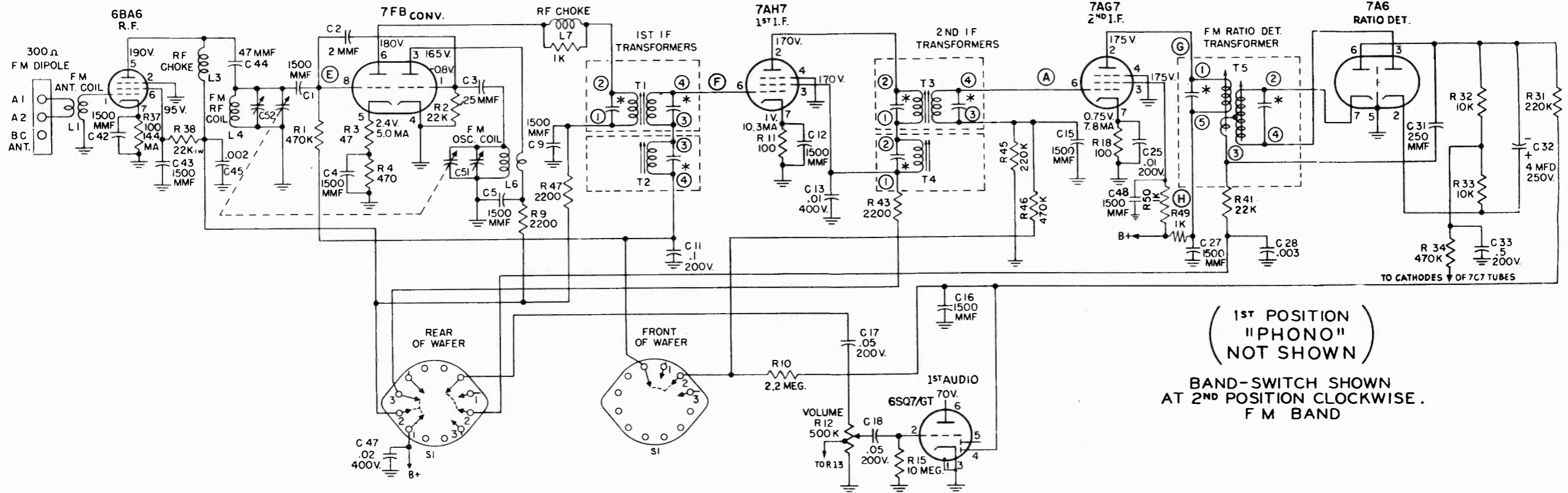




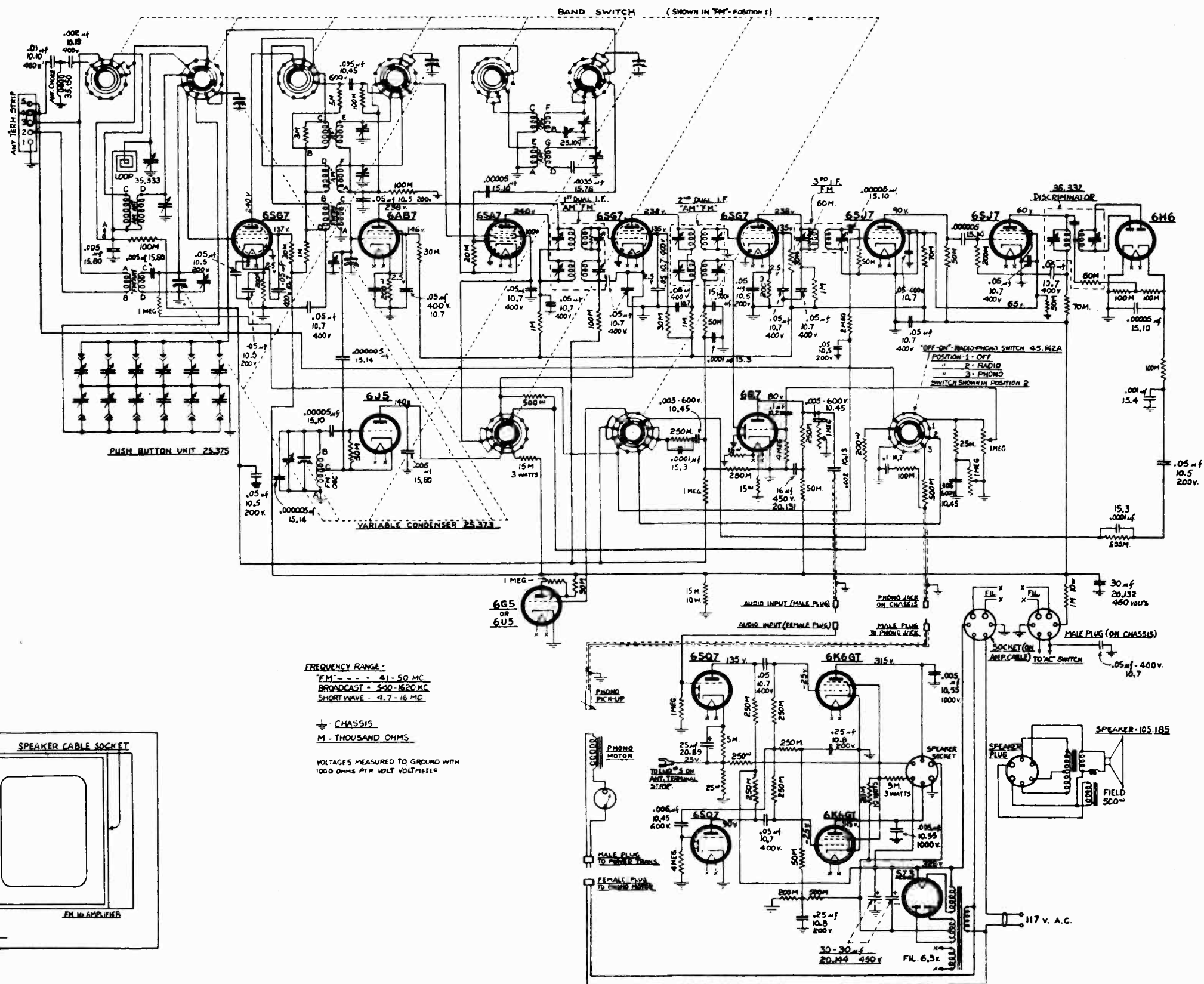


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ESPEY MFG. COMPANY, INC.



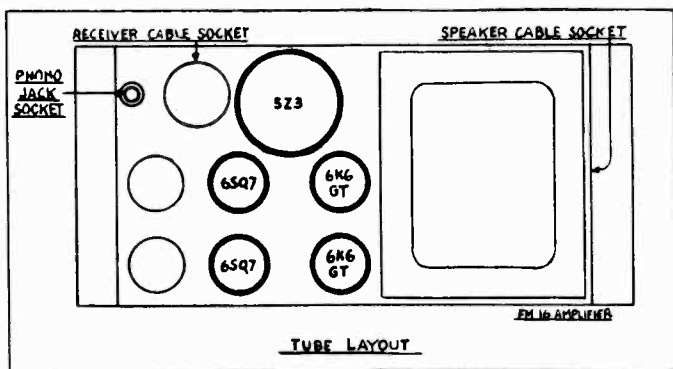
FADA RADIO AND ELECTRIC CO., INC.



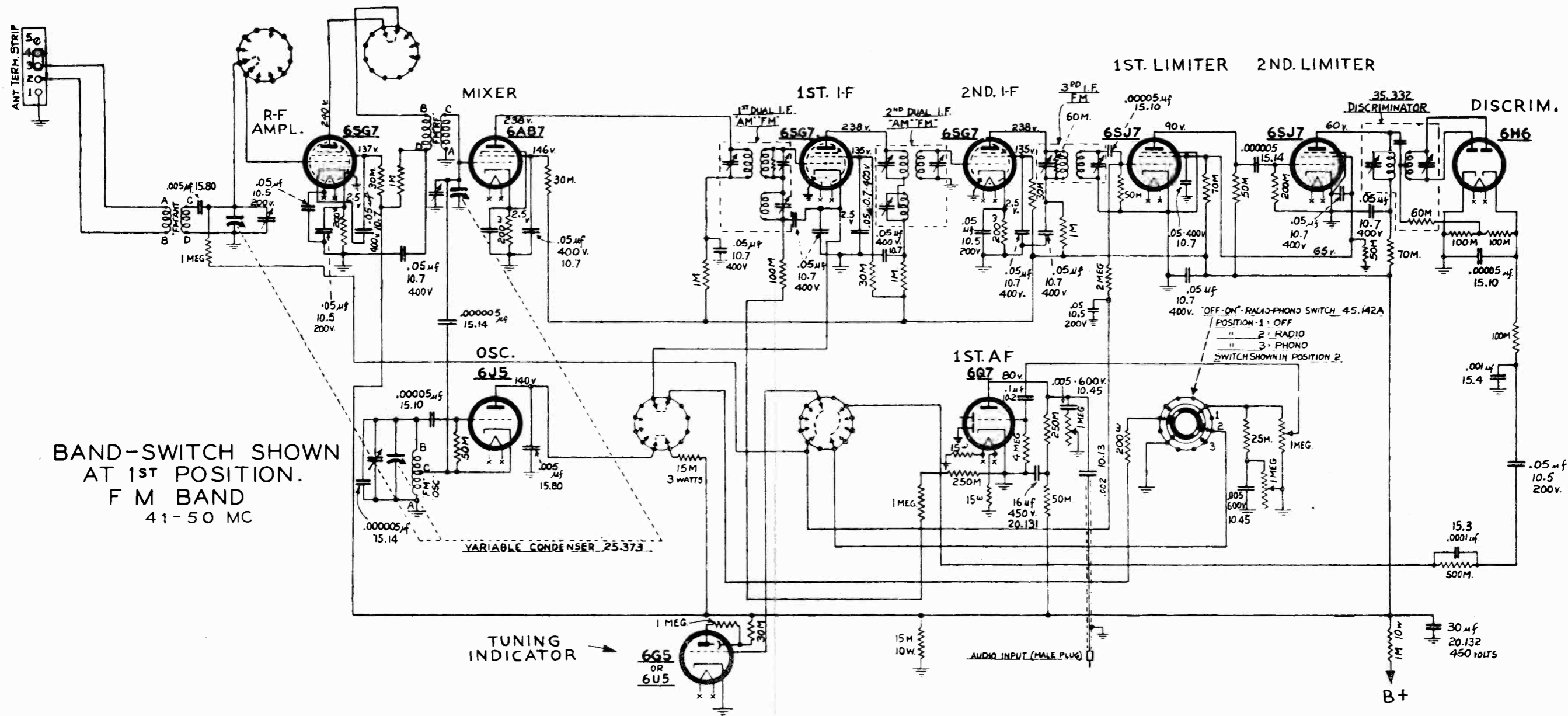
FREQUENCY RANGE -  
 FM - - - - - 41 - 50 MC.  
 BROADCAST - 550 - 1620 KC.  
 SHORT WAVE - 4.7 - 16 MC.

$\perp$  CHASSIS  
 M - THOUSAND OHMS

VOLTAGES MEASURED TO GROUND WITH  
 1000 OHMS PER VOLT VOLTMETER



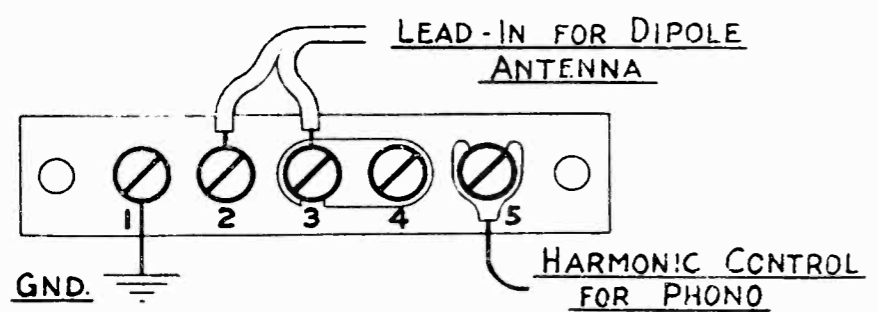
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BAND-SWITCH SHOWN AT 1ST POSITION. F M BAND 41-50 MC

TUNING INDICATOR

OFF-ON RADIO-PHONO SWITCH 45.142A  
POSITION 1: OFF  
POSITION 2: RADIO  
POSITION 3: PHONO  
SWITCH SHOWN IN POSITION 2.



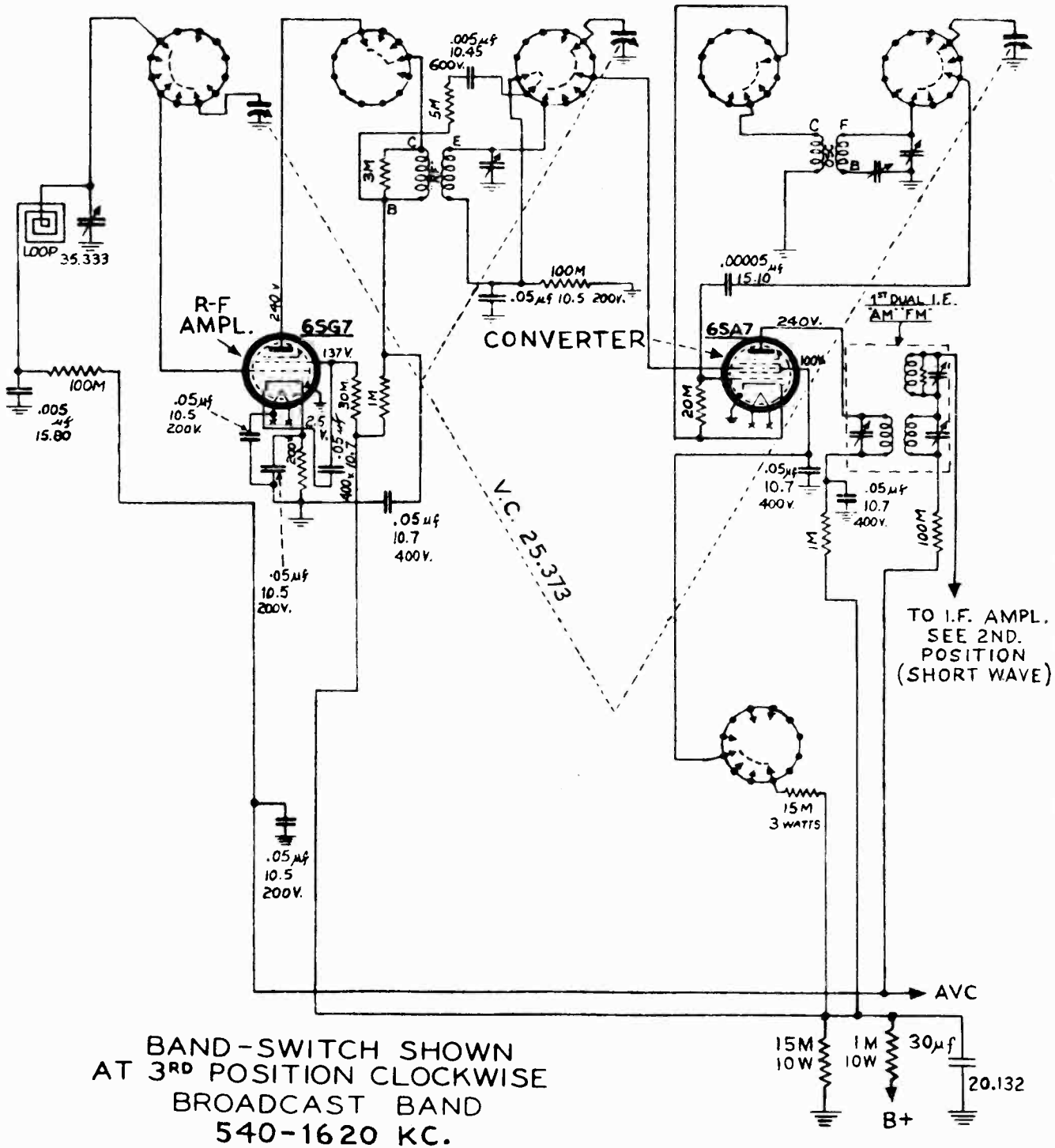


"clarified schematics"

FADA RADIO AND ELECTRIC CO., INC.

FADA PAGE 17-7

MODEL FM16

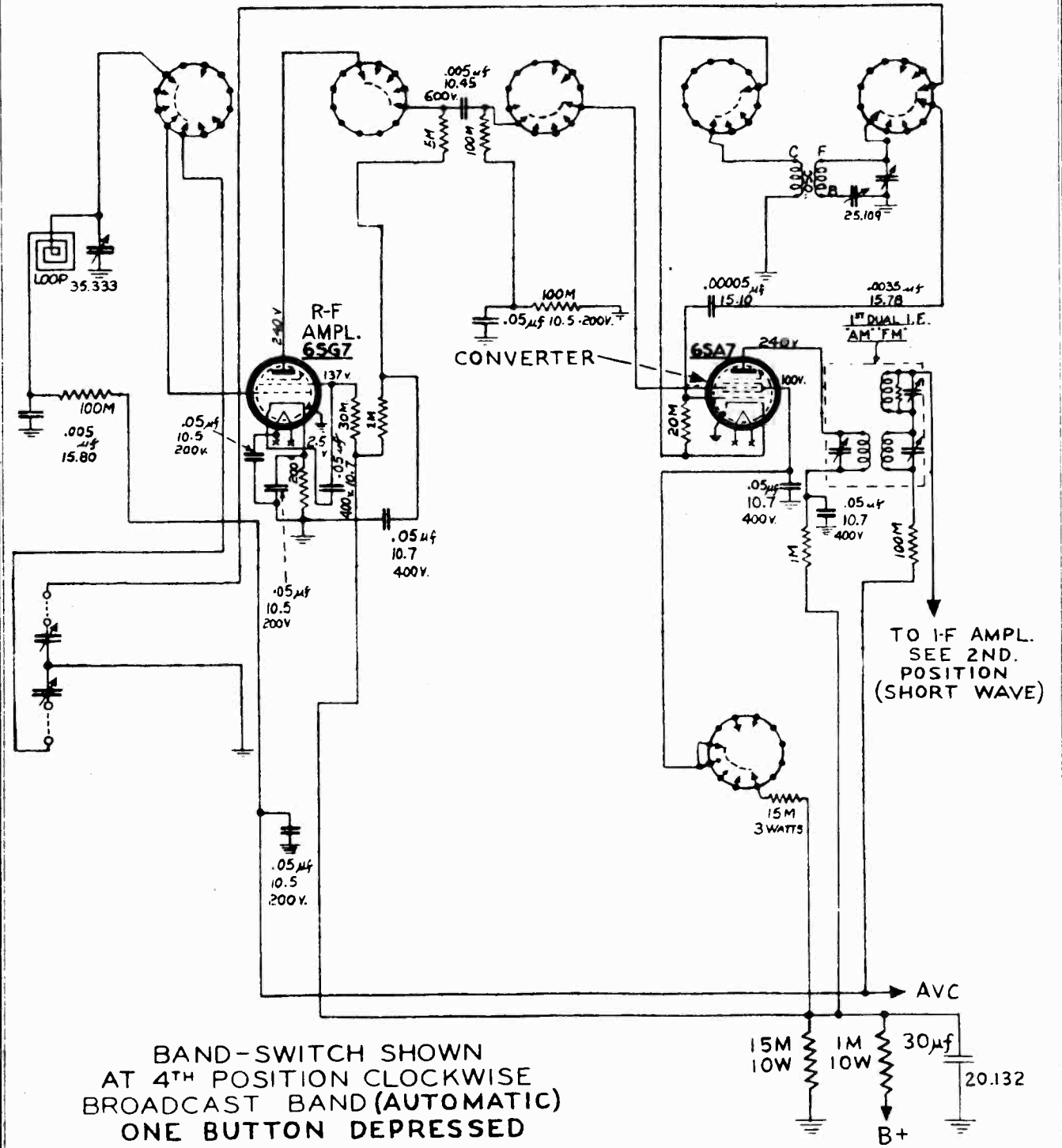


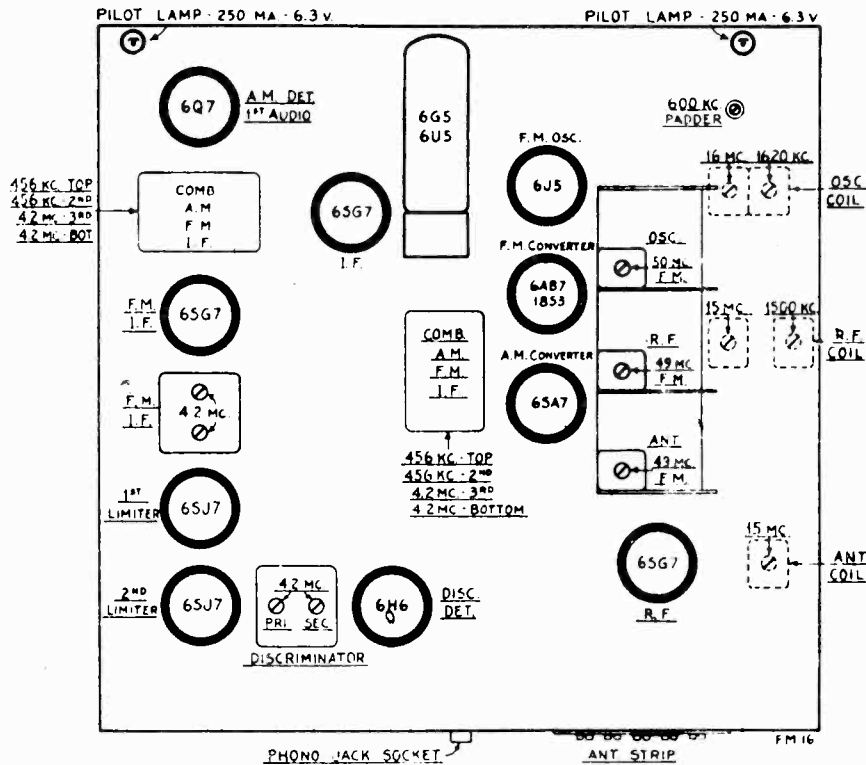
"clarified schematics"

FADA RADIO AND ELECTRIC CO., INC.

PAGE 17-8 FADA

MODEL FM16





FREQ. RANGE  
 B.C. - 540 TO 1620 KC.  
 S.W. - 4.7 TO 16 MC.  
 F.M. - 41 TO 50 MC.

TUBE LAYOUT  
 AND  
TRIMMER LOCATIONS

MODEL FM 16

**SPECIAL INSTRUCTIONS FOR SETTING AUTOMATIC PUSH-BUTTON STATION SELECTORS**

Set Wave Band Switch to BROADCAST (Third position from left) and tune in the LOWEST FREQUENCY STATION desired. Next turn the switch to the extreme RIGHT and push down the button on the extreme right until a "click" is heard indicating that the Automatic Tuning is engaged. A small screw driver is inserted through "station indicator" slot directly above push-button and the LARGE SCREW visible is turned until desired station is "tuned-in". Adjustment must be very carefully made. Use the Magic Eye which will be closed to minimum position when the station has been properly "tuned in".

Further adjustment is then made by turning the SMALL SCREW next to the Large Screw. Watch the MAGIC EYE as this screw is being turned until the minimum opening is observed.

The push-button has now been properly adjusted to the first station desired. Remove the station call letters from the sheet supplied and insert in indicator slot. Cover with celluloid tab for protection.

Return Wave Band Switch to BROADCAST position and tune in next higher frequency station desired. Then turn the switch to the extreme right and "engage" the next push-button. Tune in as instructed above and follow same procedure for the balance of the stations desired.

For AM alignment see page 17-10  
 For FM alignment see page 17-11

## ALIGNMENT PROCEDURE FOR A.M.

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows: Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output. Keep signal generator attenuated so as to maintain  $\frac{1}{2}$  scale reading on output meter.

Make certain that dial pointer covers entire dial scale and is balanced on both ends of the dial.

RECEIVER DIAL AT	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
A.M. I.F.	Exactly 456 KC	.1 mfd	Control grid of 6SA7 tube	Adjust for maximum output all A.M. IF. Trimmers (see tube layout sheet)
Full Open	Exactly 1620 KC	.1 mfd	Control grid of 6SA7 tube	Adjust for maximum output BROADCAST Osc. Trimmer
Approx. 1500 KC	Approx. 1500 KC	-	Lay Generator lead near Loop Antenna	Adjust for maximum output (R.F. Trimmers)
Approx. 600 KC	Approx. 600 KC	-	Lay Generator lead near Loop Antenna	Adjust padder condenser for maximum output while rocking Variable Condenser
Exactly 16 MC	Exactly 16 MC	400 ohms	Terminal strip on rear of chassis #3 screw with shorting bar in place	Adjust Oscillator Trimmer
Approx. 15 MC	Approx. 15 MC	400 ohms	Terminal strip on rear of chassis #3 screw with shorting bar in place	Adjust R.F. and Antenna trimmers for maximum output while rocking Variable Condenser. Check Image frequency (Image should be below the fundamental frequency)

For trimmer locations see page 17-9

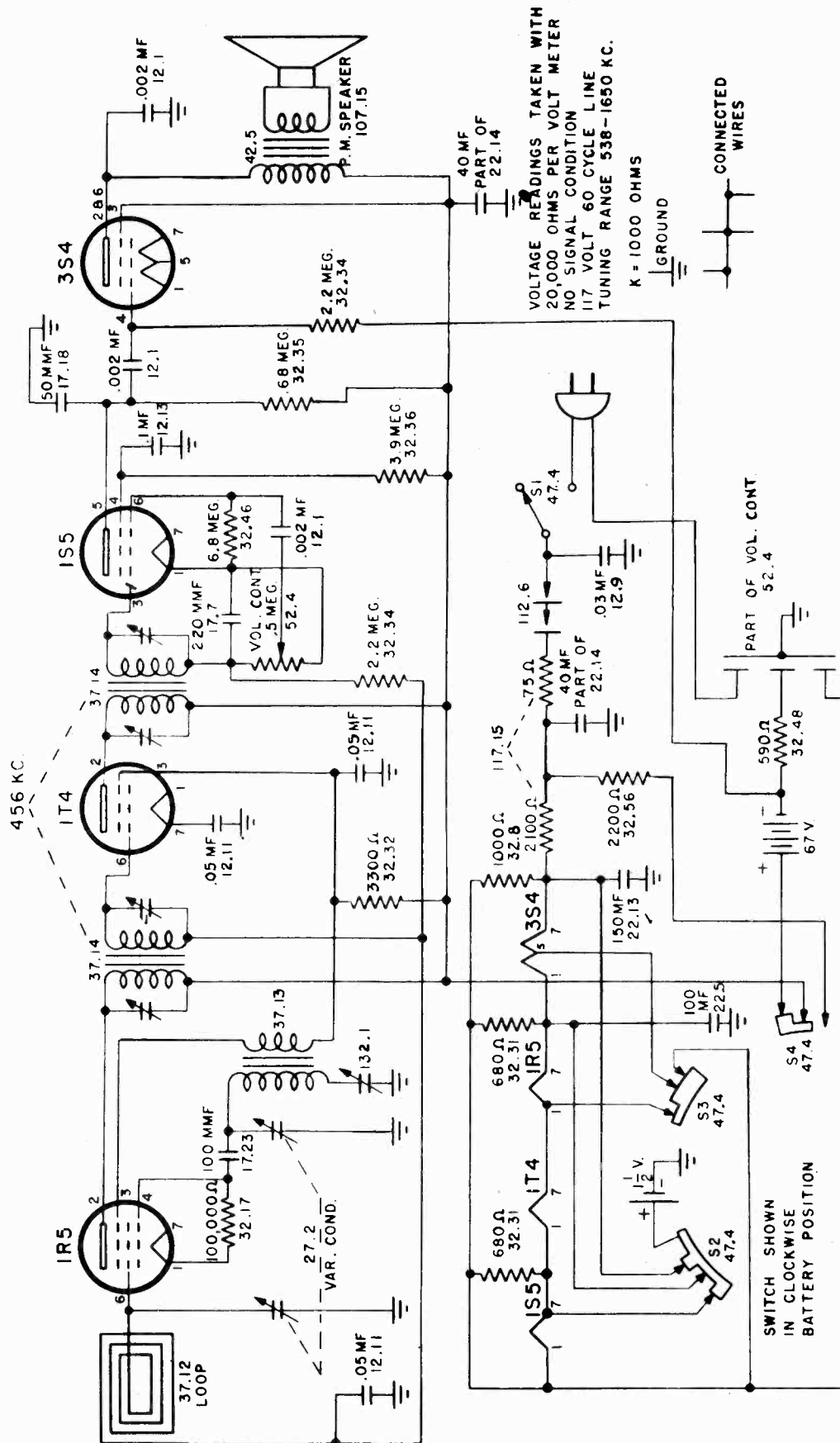
**ALIGNMENT PROCEDURE (F.M. SECTION)**  
(Using Standard AM Signal Generator and Vacuum  
Tube Volt Meter method)

(Dummy Antenna- 400 ohms and .1 mfd paper condenser)

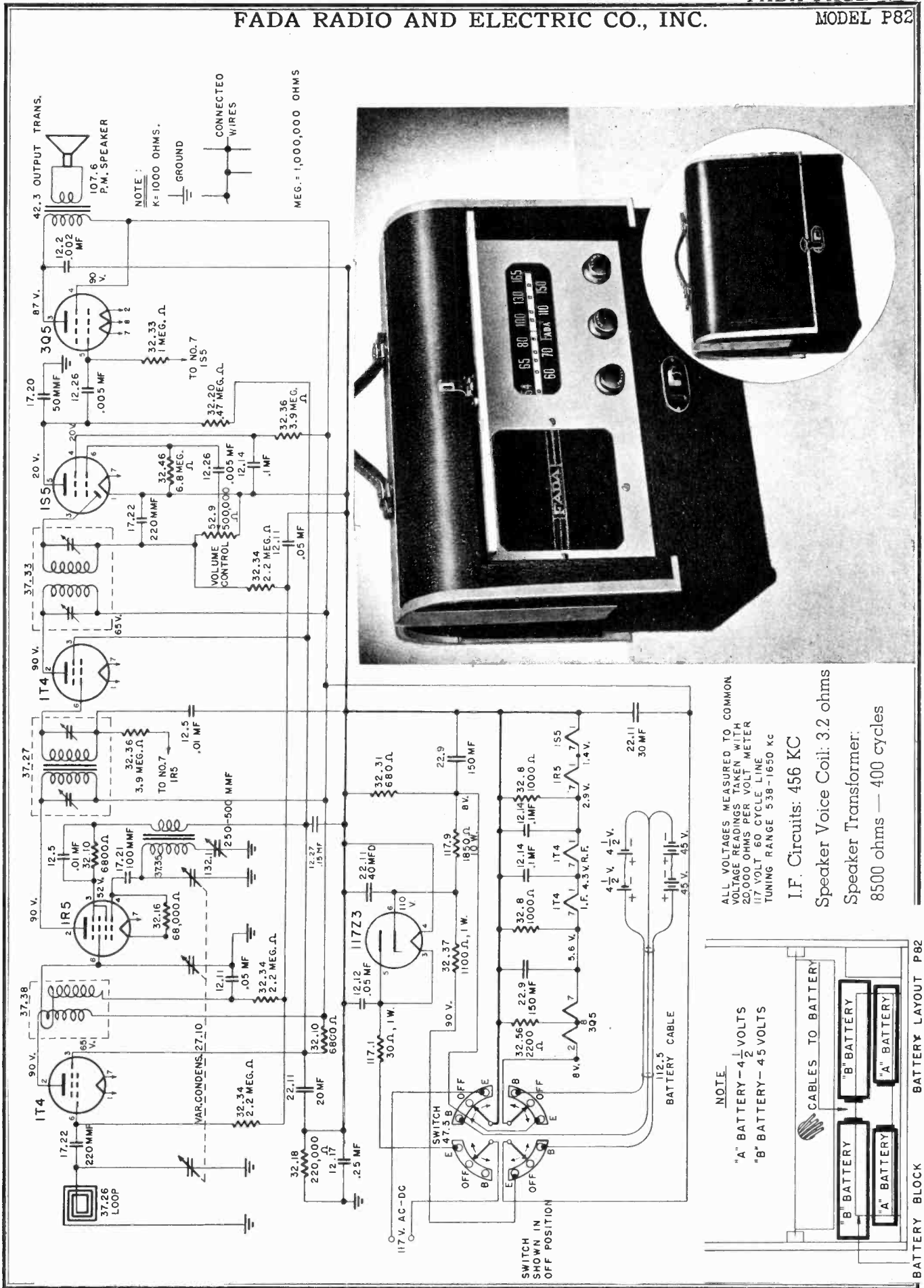
1. Align AM section first.
2. Set band switch to F.M. position and set Receiver dial to highest frequency (Variable condenser fully open).
3. F.M. Discriminator and I.F. alignment:  
Feed into last I.F. grid (last 6SG7 Tube) exactly 4.2 MC (unmodulated). Align last I.F. for maximum signal. (Use V.T. meter as a visual output meter, by connecting V.T. meter across 1st 6SJ7 grid load resistor).
4. Aligning Discriminator coil:  
With signal generator on last 6SG7 grid, detune secondary section of Discriminator coil completely. Align primary section of Discriminator coil for maximum output. (Use V.T. meter as a visual indicator - meter set to lowest range and connected across 6H6 tube diode load resistors and ground).
5. Increase signal generator output until Magic Eye tube shows maximum opening. Do not change output of generator during entire Discriminator alignment.
6. With V.T. meter in same position as above align secondary section of Discriminator coil for zero output. This point can be located easily, as a slight rotation of the trimmer will change the polarity of the voltage being measured at the diode load resistors.
7. After secondary section is aligned to zero output increase and then decrease the signal generator frequency in steps of 25 KC and note voltage reading and polarity. The voltage output at 4.225 MC and 4.175 MC should be exactly the same only different in polarity. Repeat the above procedure with the signal set to 50 KC above and then 50 KC below 4.2 MC. Repeat again with signal generator set to 75 KC, 100 KC, and 125 KC above and below the I.F. frequency (4.2 MC).
8. Retouch Primary if necessary in order to balance voltages on either side of resonance (4.2 MC). Reset secondary for zero if necessary and repeat procedures #6 and #7 until output is balanced. (A graph of voltage vs frequency will show a straight line characteristic from + 125 KC to - 125 KC.
9. F.M. - I.F., R.F. Alignments:  
Set signal generator to exactly 4.2 MC. Feed signal into converter tube to control grid (6AB7 - 1853). Connect V.T. meter across grid load resistor of first limiter tube (1st 6SJ7) using V.T. meter as an output indicator, feed in enough signal so that V.T. meter will show less than half scale deflection on lowest range and align all I.F. trimmers for maximum output.
10. Set Receiver to exactly 49 MC.  
Connect signal generator to #3 terminal of Antenna strip with shorting bar in place. Adjust oscillator trimmer on F.M. section of Variable condenser for maximum output (using V.T. meter as a visual indicator). Set R.F. and antenna trimmers (also located on Variable condenser) for maximum output.
11. Connect antenna to antenna mounting strip. (on rear of chassis).  
Check calibration of Receiver against a known station. If station frequency does not correspond with dial setting then the Receiver oscillator section is not correctly calibrated and procedure #10 should be repeated.

For transformer locations see page 17-9





For alignment see Procedure (A), How It Works

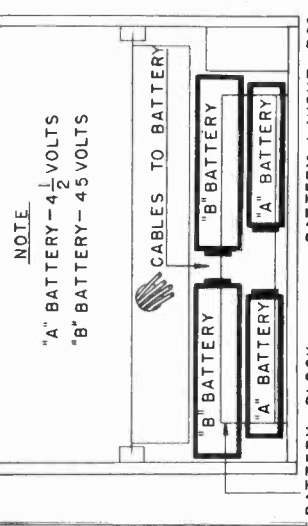


NOTE:  
K=1000 OHMS.  
GROUND  
CONNECTED WIRES

MEG. = 1,000,000 OHMS

ALL VOLTAGES MEASURED TO COMMON  
VOLTAGE READINGS TAKEN WITH  
20,000 OHMS PER VOLT METER  
117 VOLT 60 CYCLE LINE  
TUNING RANGE 538-1650 KC

I.F. Circuits: 456 KC  
Speaker Voice Coil: 3.2 ohms  
Speaker Transformer:  
8500 ohms — 400 cycles



NOTE:  
"A" BATTERY — 4 1/2 VOLTS  
"B" BATTERY — 45 VOLTS

MODEL P82  
MODEL P100

FADA RADIO AND ELECTRIC CO., INC.

Alignment Procedure for Model P82

**ALIGNMENT PROCEDURE**

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary.

Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

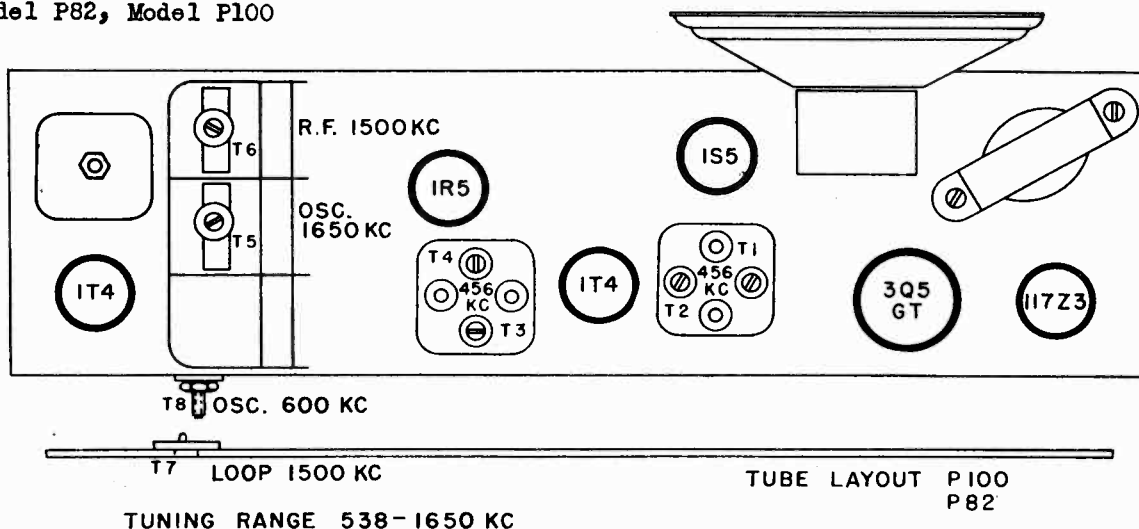
Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

**REMOVE CHASSIS BOTTOM PLATE**

RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1 Fully closed	Exactly 456 KC	1. MF	Common Ground and Control Grid 1R5 top front section vari. cond.	Adjust for maximum output T1, T2, T3, and T4
2 Fully closed	Approx. 538 KC	1. MF	Control Grid 1T4 top rear section vari. condenser	Adjust for maximum output T8
3 Fully open	Exactly 1650 KC	1. MF	Control Grid 1T4 top rear section vari. cond.	Adjust for maximum output T5
REPEAT OPERATIONS 2 and 3.				
4 Approx. 1500 KC	Approx. 1500 KC	1. MF	Control Grid 1T4 same as N. 3	Adjust for maximum output T6
The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed				
5 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop 20" from receiver	Adjust T7 for maximum output
6 Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from receiver	Adjust T8 for maximum while rocking variable condenser

Model P82, Model P100



**Model P 82 Model P 100**

Power Supply: 105-125V., 40-60 cycles AC  
Same Voltage DC: 15 Watts Power Consumption  
Battery Operation: 9 V.A. — 90 V.B  
Frequency Range: 1650 — 540 KC  
I.F. Circuits: 456 KC  
Tubes: 1T4 R.F. Amplifier 1SS Det. Avc. A.F.  
1R5 Osc. Converter 3Q5 Power Output  
1T4 I.F. Amplifier 117z3 Rectifier  
Speaker: 5" P.M., 1.47 oz. Alnico V Magnet  
Speaker Transformer: 8500 ohms - 400 cycles  
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.2	Tubular Condenser, .002 mf, 600 V
12.5	Tubular Condenser, .01 mf, 200 V
12.11	Tubular Condenser, .05 mf, 200 V
12.12	Tubular Condenser, .05 mf, 400 V
12.14	Tubular Condenser, .1 mf, 200 V
12.17	Tubular Condenser, .25 mf, 400 V
12.26	Tubular Condenser, .005 mf, 400 V
12.27	Tubular Condenser, .15 mf, 200 V
17.20	Mica Condenser, 50 mmf. ±10%
17.21	Mica Condenser, 100 mmf. ±10%
22.9	Electrolytic Condenser, 150-150mf — 15 W.V
22.11	Electrolytic Condenser, 40-30-20 mf — 150 W.V
27.10	3 Section Variable Condenser, 397 mmf
37.26	Loop Antenna w Trimmer
37.27	Input I.F. Transformer
37.33	Diode I.F. Transformer
37.35	Oscillator Coil
37.30	R. F. Coil
52.9	Volume Control
47.5	Battery Electric Changeover Switch
77.34	Dial Pointer
77.50	Dial Scale (Calibrated)
97.92	Cabinet
42.3	Output Transformer
107.6	5" P. M. Speaker
117.9	1850 ohm 10-W.W. Resistor
142.30	Padder Condenser
132.1	Tuning Knob
142.29	Volume Knob
142.28	Battery-Off-Electric Knob

The following apply to Model P82 only.

97.51	Cabinet
117.1	30 ohm 1 W — W.W. Resistor
142.12	Tuning Knob (wood)
142.13	Volume Knob (wood)
142.14	Battery-Off-Electric Knob (wood)

**Models 711 and 740**

Power supply: 40-60 cycles, 105-125V AC  
Same Voltage DC  
Power consumption: 30 Watts  
Frequency Range: 530-1680 KC  
I.F. Circuits: 456 KC  
Tubes: Osc. Converter 12BE6  
I.F. Amplifier 12BA6  
Det. Avc. A.F. 12A16  
Power Output 50B5  
Rectifier 35W4  
Speaker: 4" P.M. 1 oz. "Alnico V" Magnet  
Speaker Transformer: 2500 ohms—400 cycles  
Speaker Voice Coil: 3.2 ohms

Part No.	Description
12.4	Tubular Condenser, .005 mf, 600 V
12.6	Tubular Condenser, .01 mf, 400 V
12.9	Tubular Condenser, .03 mf, 400 V
12.11	Tubular Condenser, .05 mf, 200 V
12.12	Tubular Condenser, .05 mf, 400 V
17.5	Mica Condenser, 100 mmf. ±10%
17.8	Mica Condenser, 250 mmf. ±20%
22.16	3 Section Electrolytic Condenser 30-40-20 mf, 150 W.V
27.17	Variable Condenser
37.57	Oscillator Coil
37.56	Loop Antenna
37.62	Input I.F. Transformer, complete
37.62	Output I.F. Transformer, complete
52.15	Volume Control with Switch
72.1	Power Cord (Approved)
77.86	Dial Scale (Calibrated)
77.87	Dial Pointer
77.85	Dial Crystal
97.73W	Cabinet, Bakelite-Walnut
97.73V	Cabinet, Bakelite-Ivory
142.27W	Cabinet Knobs—Walnut
142.27V	Cabinet Knobs—Ivory
107.16T	4" P.M. Speaker with Transformer
107.16	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for above
117.1	30 ohm 1 W. Resistor

**Models 711 and 740**

**ALIGNMENT PROCEDURE**

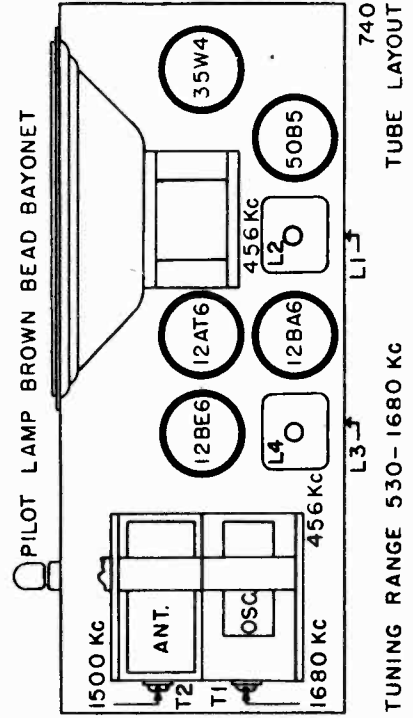
No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

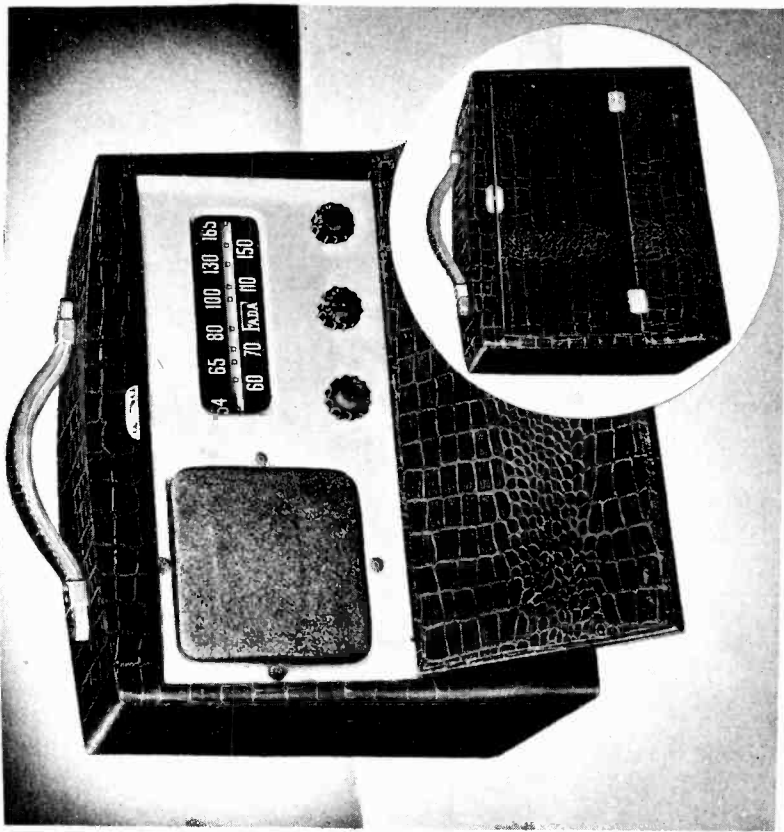
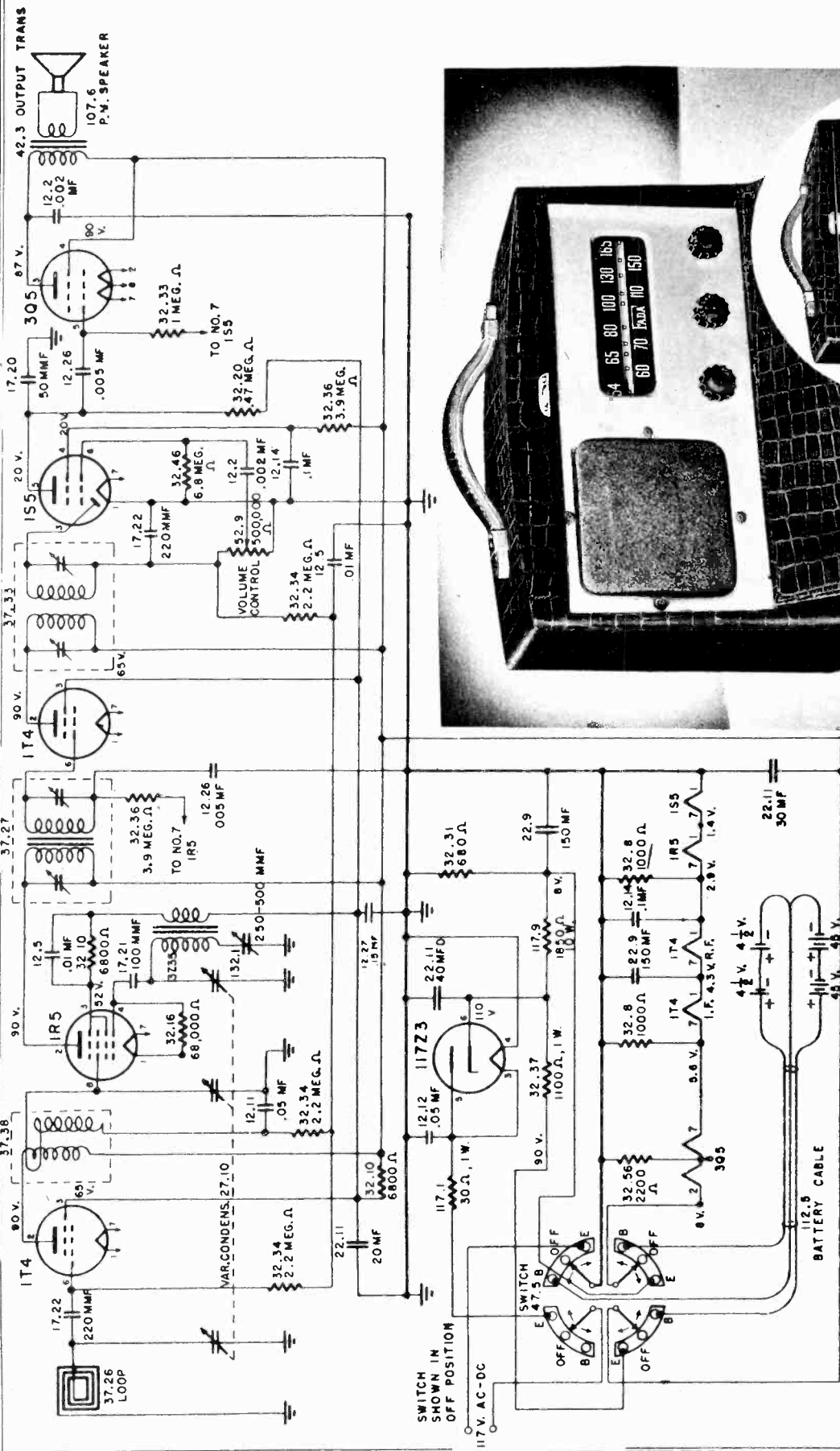
Volume Control full on.  
Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly horizontal when variable condenser is fully meshed.

Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1 Full Open	Exactly 456 KC	.1 MF	Control Grid 12BE6 Tube (Top) Front Section Variable Condenser	Adjust for Maximum Output L1, L2, L3 & L4
2 Full Open	Exactly 1680 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Adjust for Maximum Output T1
3 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Adjust for Maximum Output T2
4 Approx. 600 KC	Approx. 600 KC		Radiating Loop (1/2 meter) 20" from Receiver Loop	Check tracking and bend slotted end plate (front section) of variable, if necessary
5				





I.F. Circuits: 456 KC

ALL VOLTAGES MEASURED TO CHASSIS  
 VOLTAGE READINGS TAKEN WITH  
 20,000 OHMS PER VOLT METER  
 117 VOLT, 60 CYCLE LINE  
 TUNING RANGE 538 - 1650 KC

NOTE:  
 K = 1000 OHMS. MEG = 1,000,000 OHMS



## ALIGNMENT PROCEDURE Model P 100

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

### REMOVE CHASSIS BOTTOM PLATE

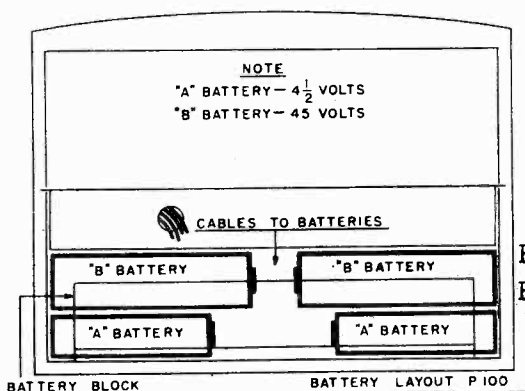
RECEIVER DIAL AT:	SIGNAL GENERATOR	DUMMY ANTENNA	CONNECT SIGNAL GENERATOR TO:	REFER TO CHASSIS LAYOUT FOR LOCATION OF TRIMMERS
1 Fully closed	Exactly 456 KC	.1 MF	Common Ground and Control Grid 1R5 top front section var. cond.	Adjust for maximum output T1, T2, T3, and T4.
2 Fully closed	Approx. 538 KC	.1 MF	Control Grid 1T4 top rear section var. condenser	Adjust for maximum output T8
3 Fully open	Exactly 1650 KC	.1 MF	Control Grid 1T4 top rear section var. cond.	Adjust for maximum output T5

REPEAT OPERATIONS 2 and 3.

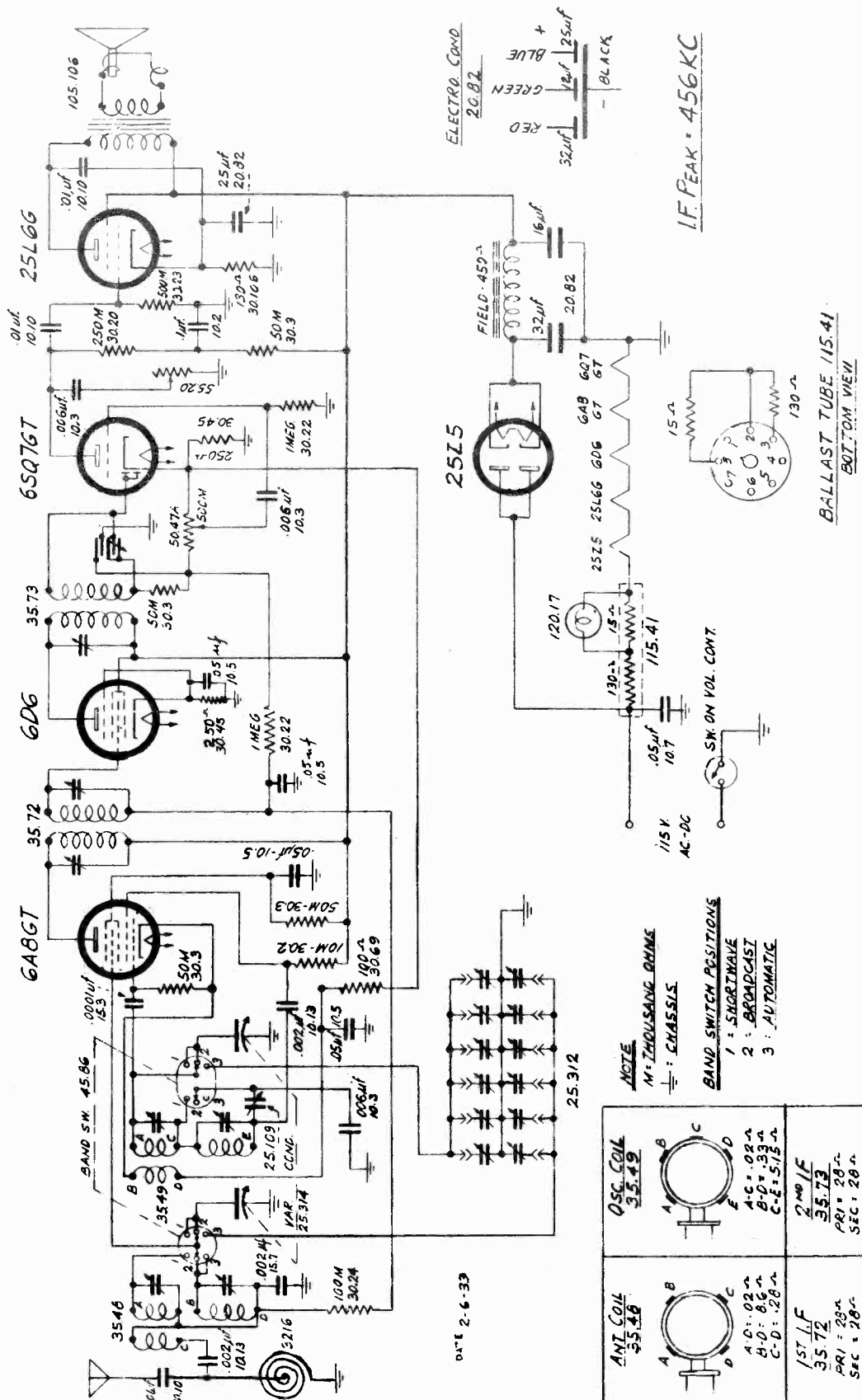
4 Approx. 1500 KC	Approx. 1500 KC	.1 MF	Control Grid 1T4 same as No. 3	Adjust for maximum output T6
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The next two operations are performed with the bottom plate on and the chassis in the cabinet — with lid closed

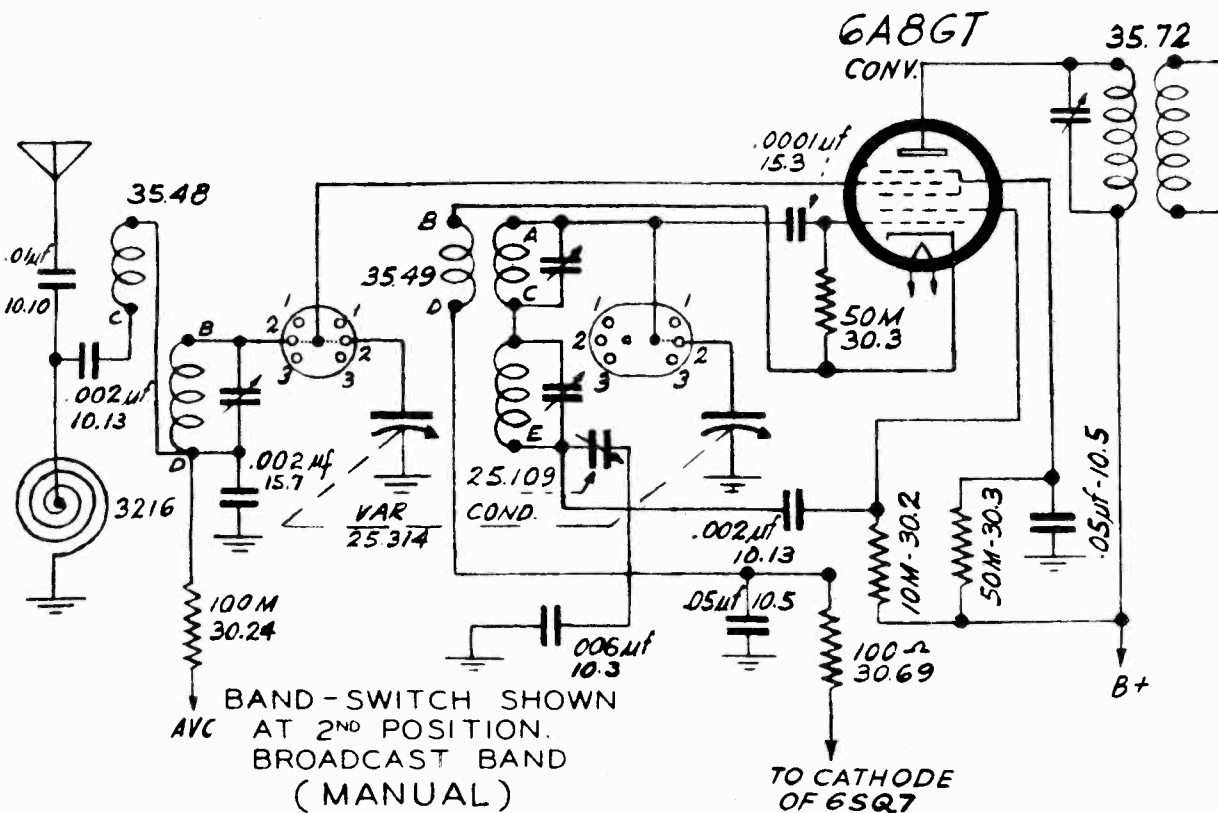
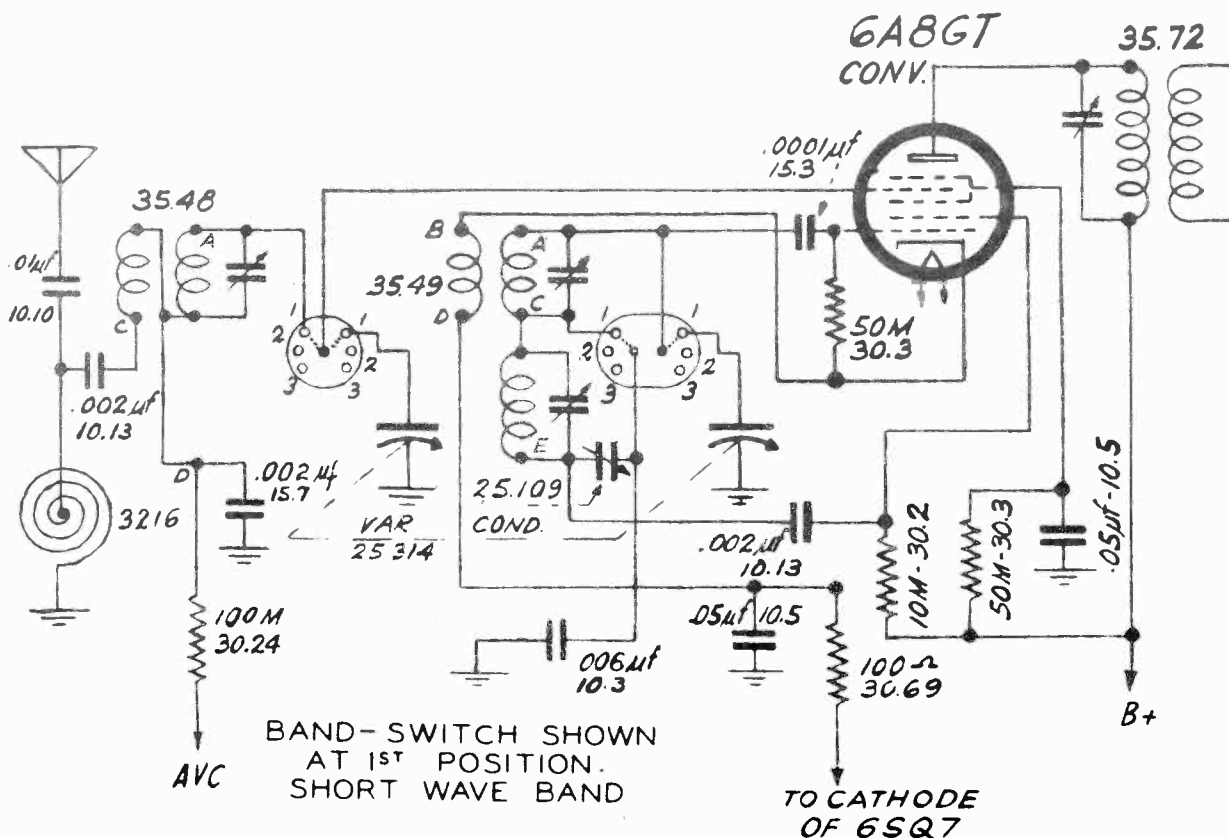
5 Approx. 1500 KC	Approx. 1500 KC	.1 MF	Radiating Loop 20" from Receiver	Adjust T7 for maximum output
6 Approx. 600 KC	Approx. 600 KC		Radiating Loop 20" from Receiver	Adjust T8 for maximum while rocking variable condenser



For trimmer locations for Model P100 see page 17-14  
 For parts list for Model P100 see page 17-15

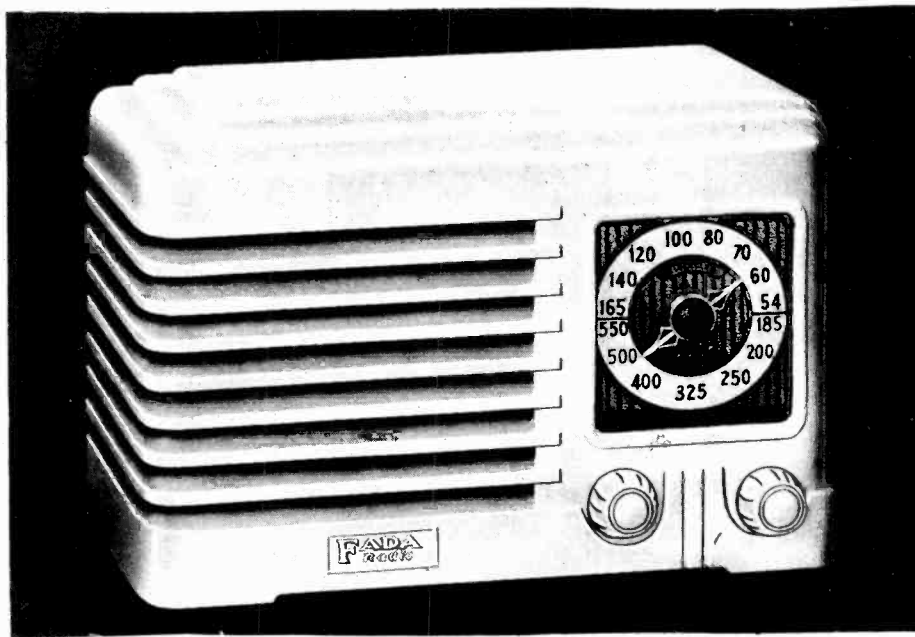
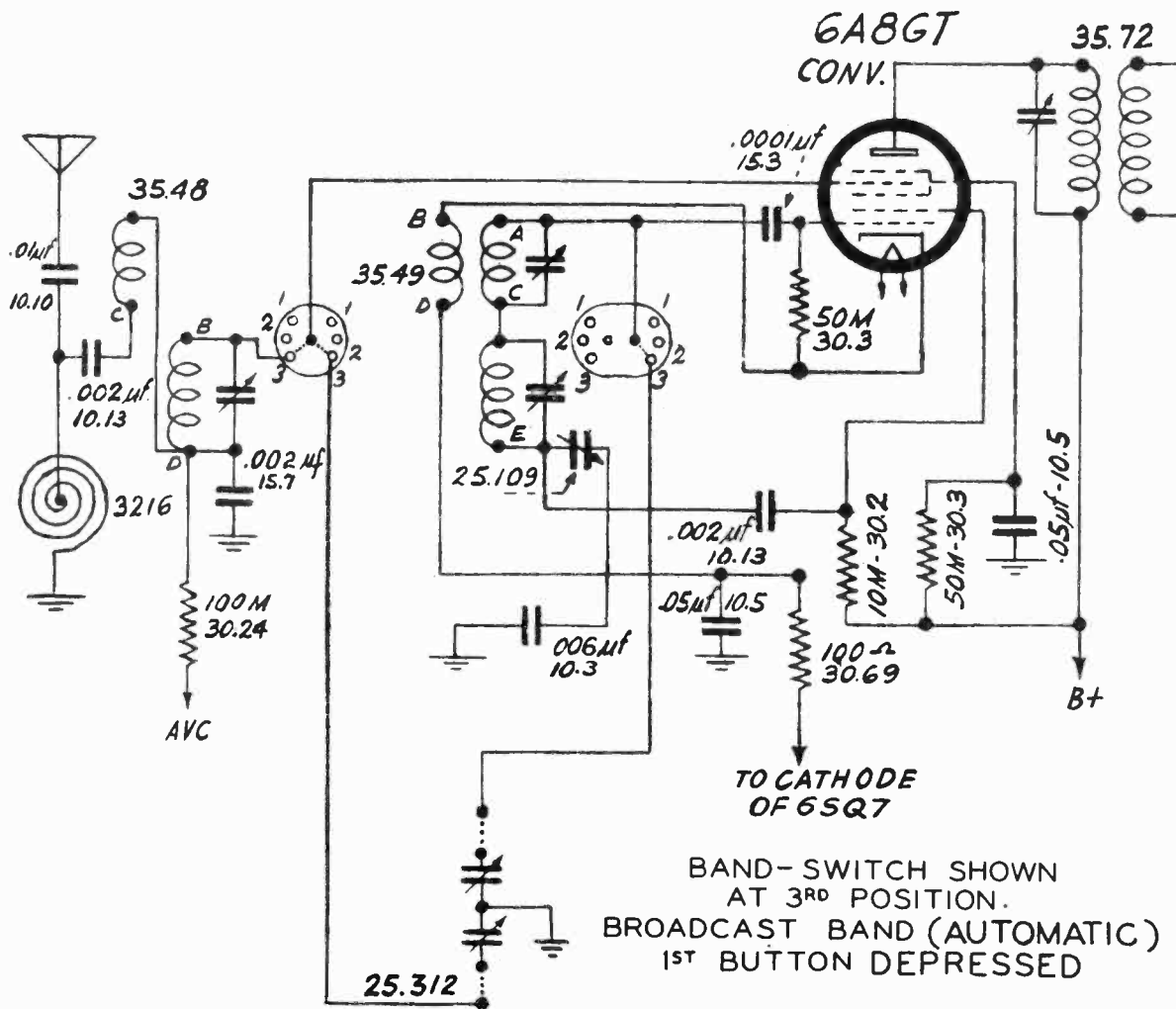


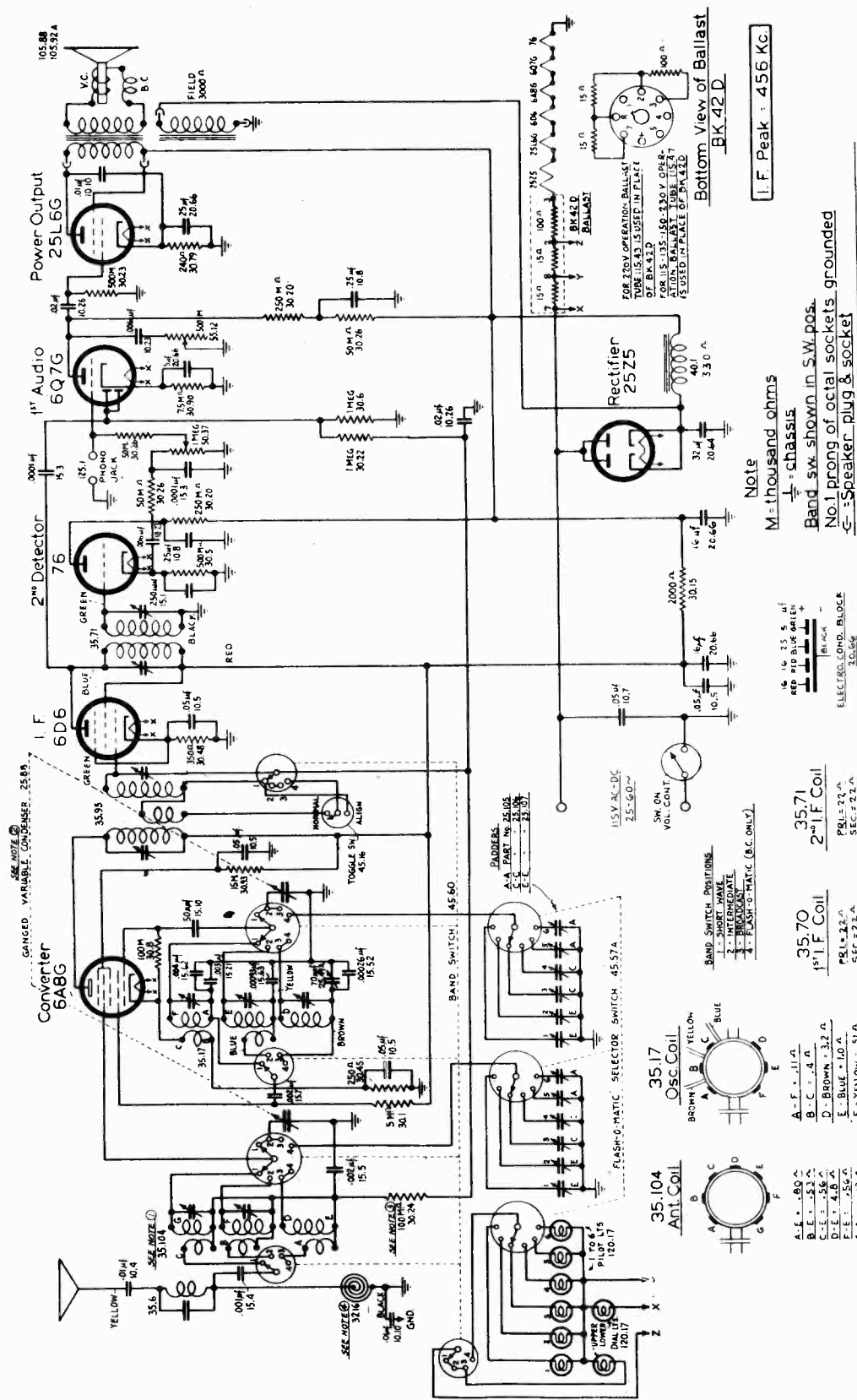
For alignment see Procedure (E), How It Works





# "clarified schematics"





I. F. Peak : 456 Kc.

Note  
M = thousand ohms  
= chassis

Band sw. shown in S.W. pos.  
No. 1 prong of octal sockets grounded  
C = Speaker plug & socket

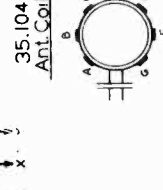
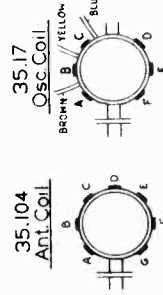
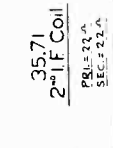


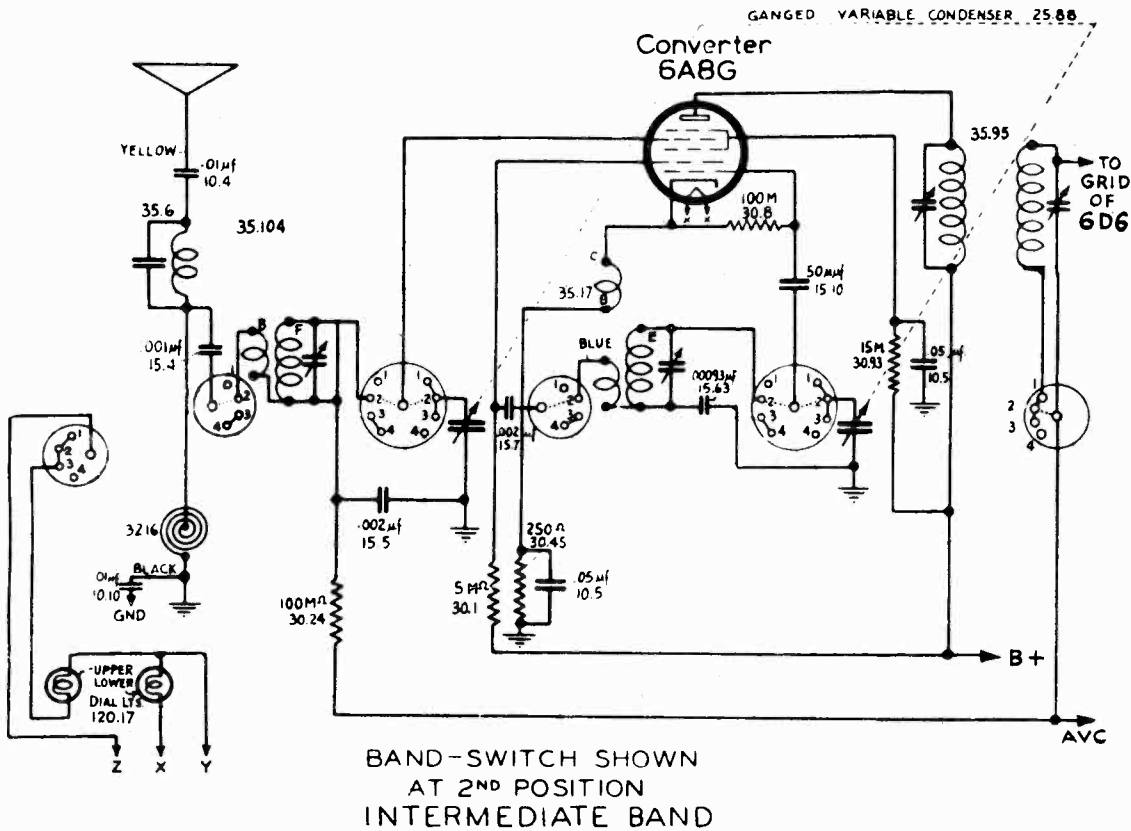
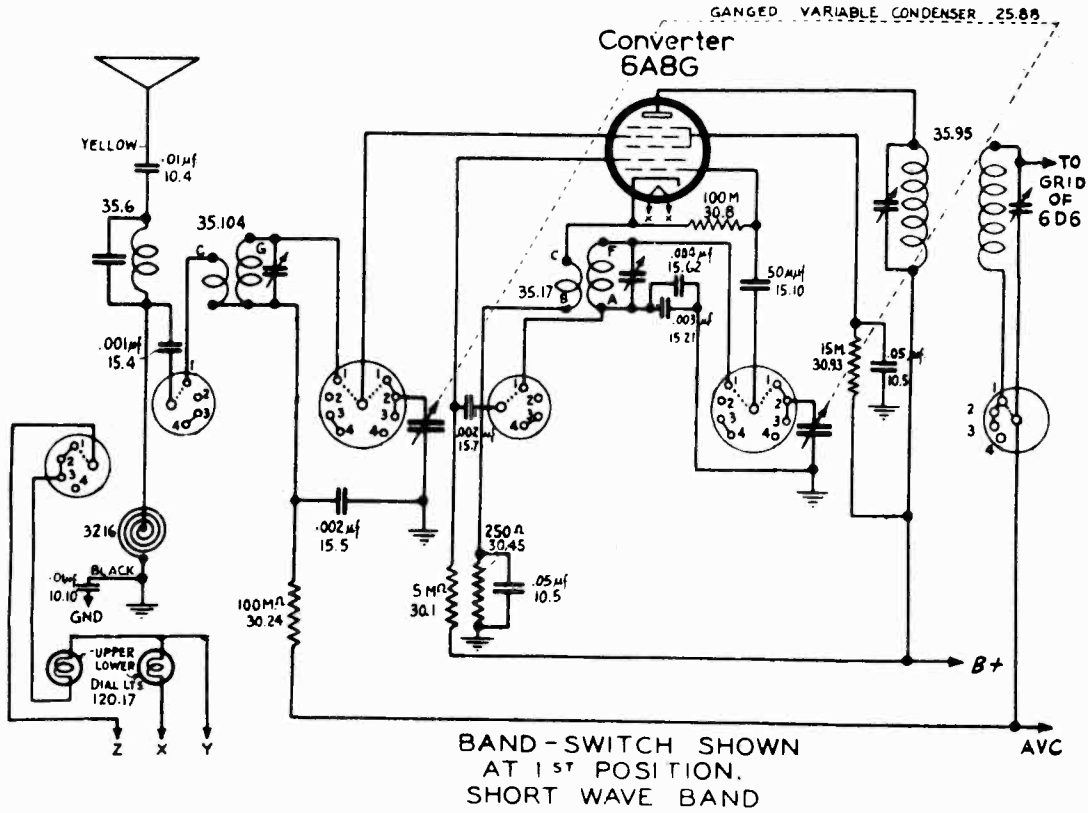
FIG. 2-37

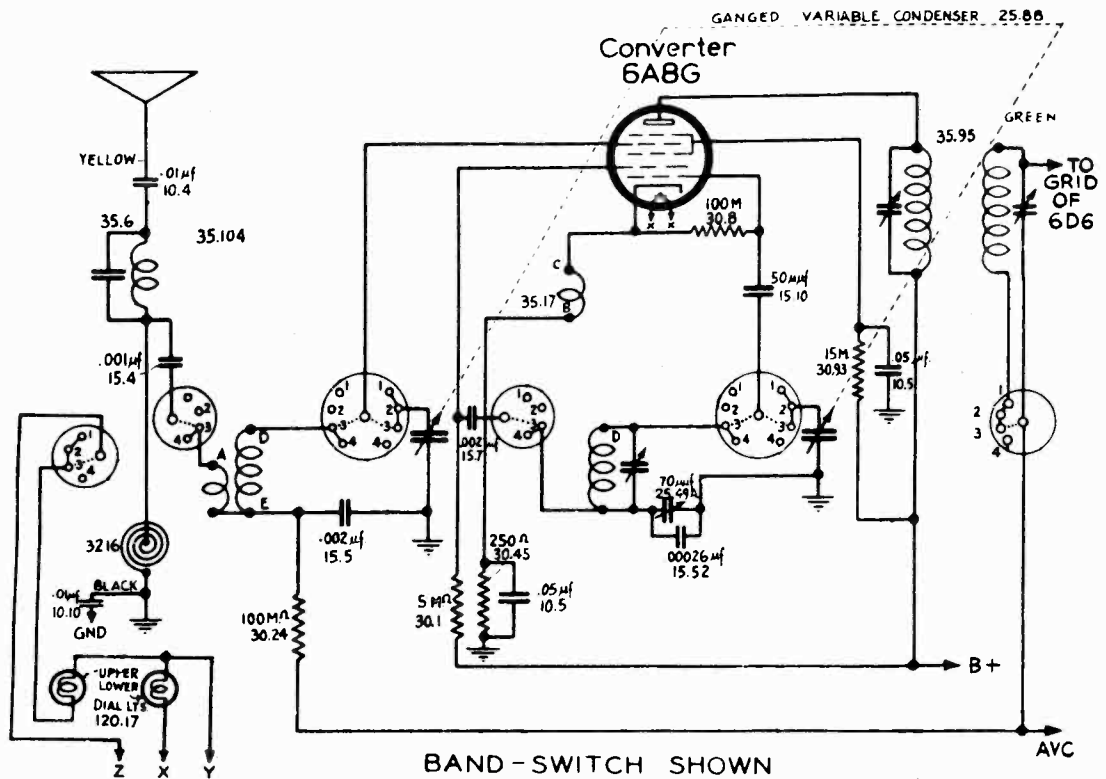
Short wave 6--18 MC  
Intermediate 1.8--5.6 MC  
Broadcast 550--1700KC

For alignment see Procedure (B), How It Works  
To set pushbuttons, throw Normal-Align switch to Align

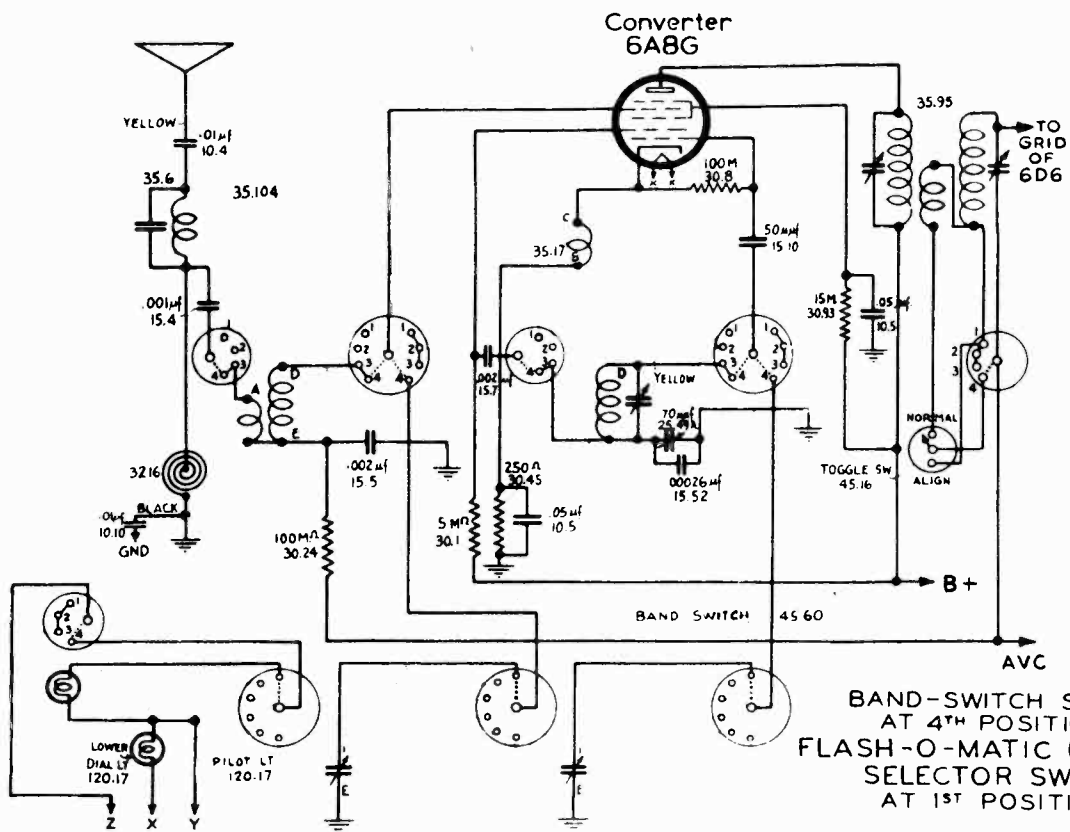
NOTE: ON EARLY MODELS, PART NO. 35.17 IS USED IN PLACE OF 35.104  
35.104  
35.17  
35.104  
35.17

# "clarified schematics"



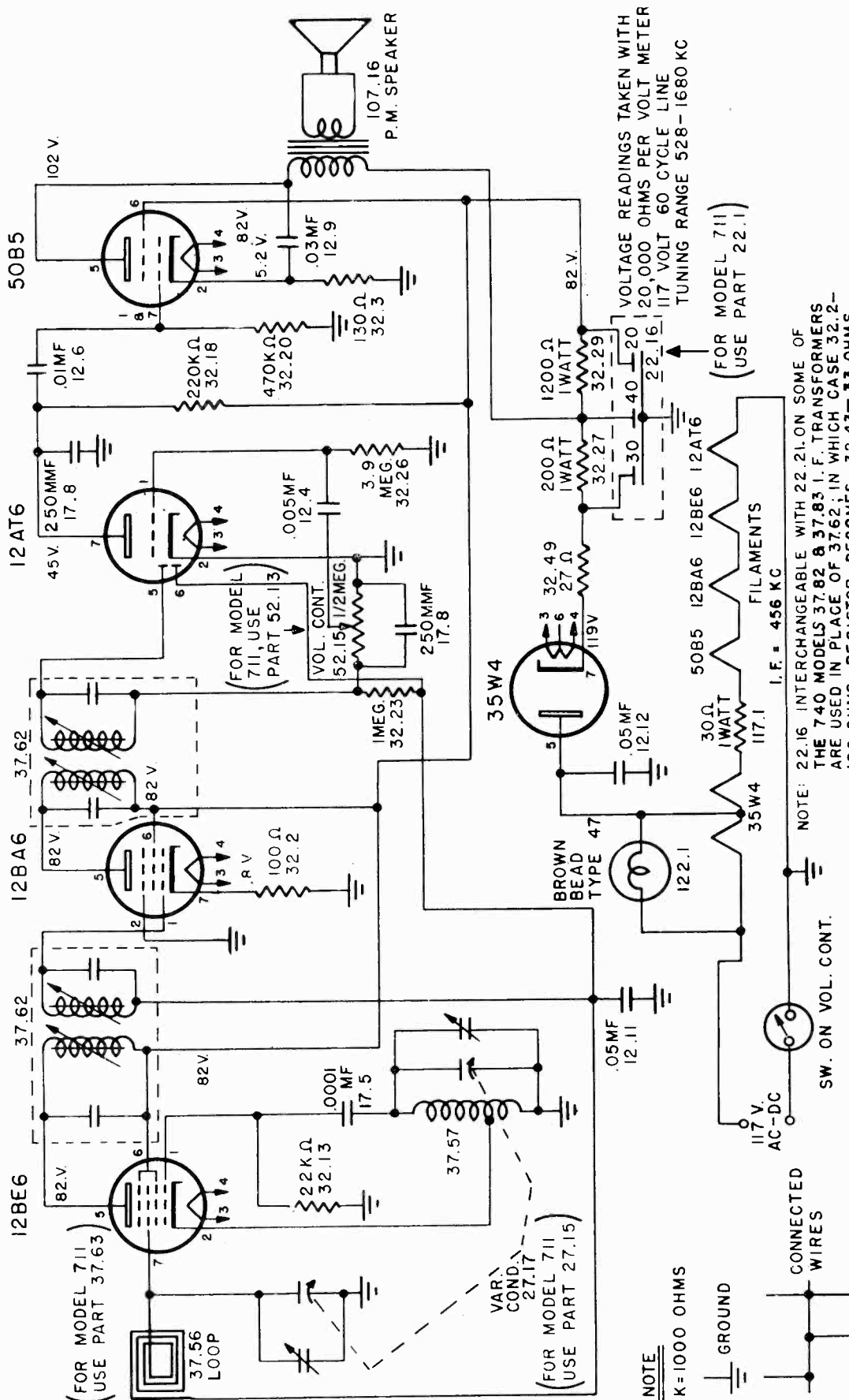


BAND-SWITCH SHOWN AT 3<sup>RD</sup> POSITION. BROADCAST BAND

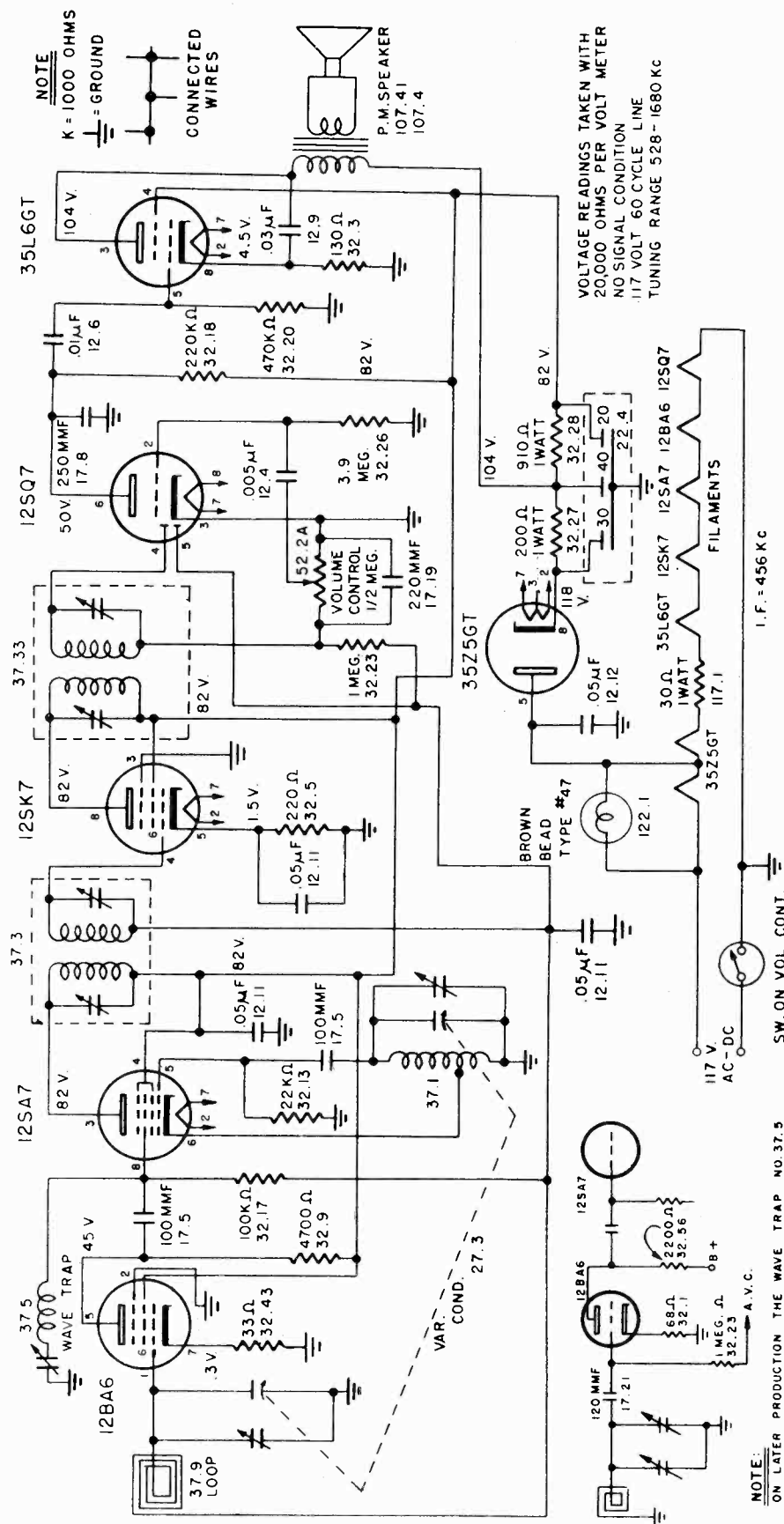


BAND-SWITCH SHOWN AT 4<sup>TH</sup> POSITION. FLASH-O-MATIC (BC ONLY) SELECTOR SWITCH AT 1<sup>ST</sup> POSITION.

FLASH-O-MATIC SELECTOR SWITCH 45.57A



For alignment, socket, trimmers see page 17-15  
 For cabinet see page 17-20



Specker 4" P.M. 1 oz. Alnico V Magnet  
 Specker Transformer 2500 ohms—400 cycles  
 Specker Voice Coil 3.2 ohms

### ALIGNMENT PROCEDURE

No attempt should be made to realign the various circuits until all other causes have been checked, unless the condition is so obvious as to indicate that realignment is necessary. Then proceed as follows:

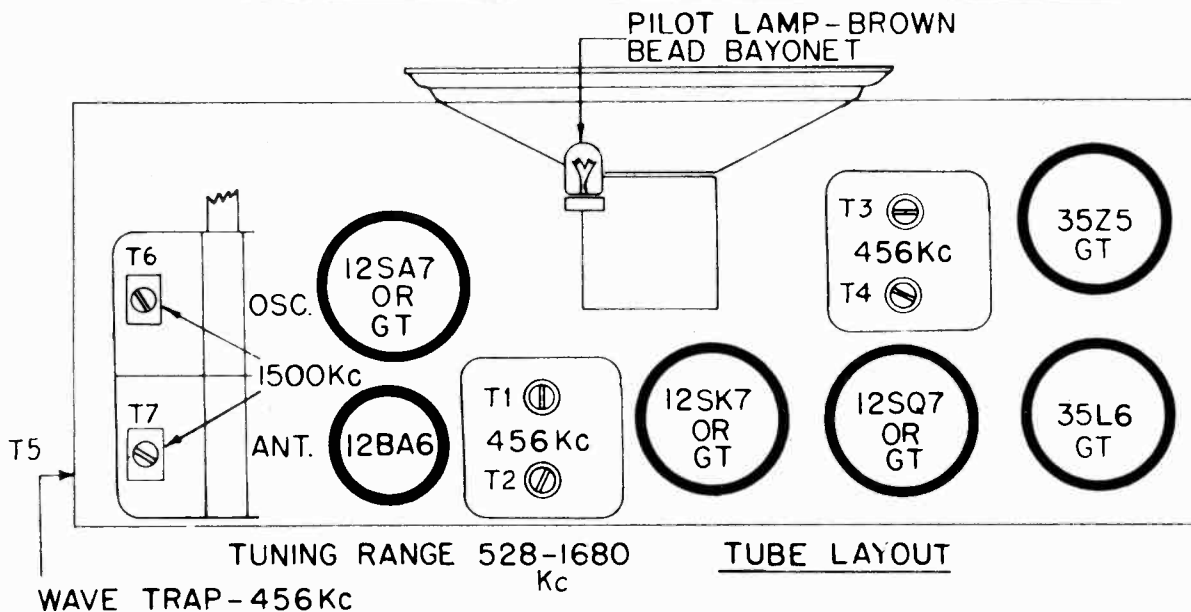
Volume Control full on.

Low range A.C. meter connected across voice coil to indicate output.

Keep signal generator attenuated so as to maintain 1/2 scale reading on output meter.

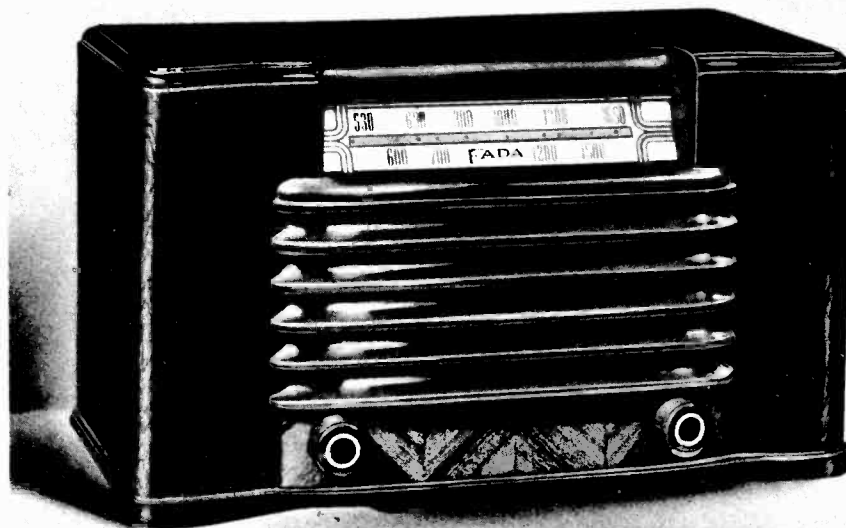
Make certain that dial pointer is exactly on index line (top left side of dial plate) when variable condenser is fully meshed.

Receiver Dial at:	Signal Generator	Dummy Antenna	Connect Signal Generator to:	Refer to Chassis Layout for Location of Trimmers
1 Full Open	Exactly 456 KC	.1 MF	Control Grid 12SA7 Tube Pin No. 8 on 12SA7 Socket	Adjust for Maximum Output T1, T2, T3 & T4
2 Full Open	Exactly 456 KC	.1 MF	Control Grid 12BA6 Tube (R.F.) (Top) Rear Section Variable Condenser	Adjust for Minimum Output T5 Note: On later production this trimmer is eliminated.
3 Full Open	Exactly 1680 KC		Radiating Loop (1/2 meter) 20" from Receiver	Adjust for Maximum Output T6
4 Approx. 1500 KC	Approx. 1500 KC		Radiating Loop (1/2 meter) 20" from Receiver	Adjust for Maximum Output T7
5 Approx. 600 KC	Approx. 600 KC		Radiating Loop (1/2 meter) 20" from Receiver	Check tracking and bend slotted end plate (rear section) of variable if necessary.



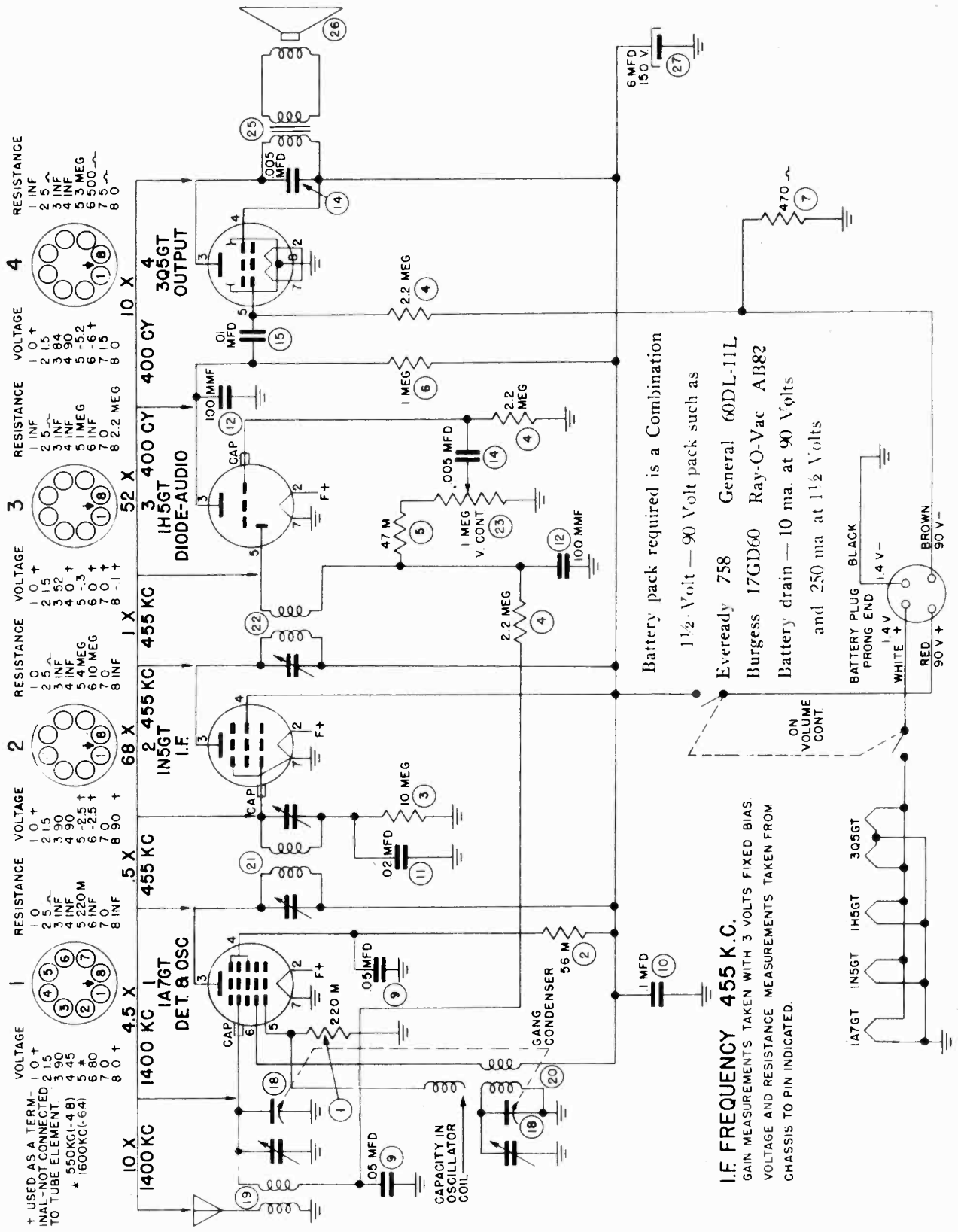
**PARTS LIST**

<b>Part No.</b>	<b>Description</b>
12.4	Tubular Condenser .005 mf 600 V
12.6	Tubular Condenser .01 mf 400 V
12.9	Tubular Condenser .03 mf 400 V
12.11	Tubular Condenser .05 mf 200 V
12.12	Tubular Condenser .05 mf 400 V
17.5	Mica Condenser 100 mmf $\pm$ 10%
17.8	Mica Condenser 250 mmf $\pm$ 20%
22.4	3 Section Electrolytic Condenser 30-40-20 mf 150 W.V.
27.3	Variable Condenser
37.1	Oscillator Coil
37.9	Loop Antenna
37.3	Input I.F. Transformer complete
37.33	Output I.F. Transformer complete
52.2A	Volume Control w/switch
72.1	Power Cord (Approved)
77.16	Dial Pointer
77.18	Dial Scale (Calibrated)
97.18	Cabinet — Wood
142.2	Cabinet Knobs — Wood
97.19	Cabinet Back — Wood
107.4	4" P.M. Speaker with Transformer
107.41	4" P.M. Speaker less Transformer
42.1	Speaker Transformer for Above
117.1	30 ohm 1 W. Resistor
37.5	Wave trap









MODEL EF-451,  
Chassis C-196

FARNSWORTH TELEV. & RADIO CORP.

**ALIGNMENT**

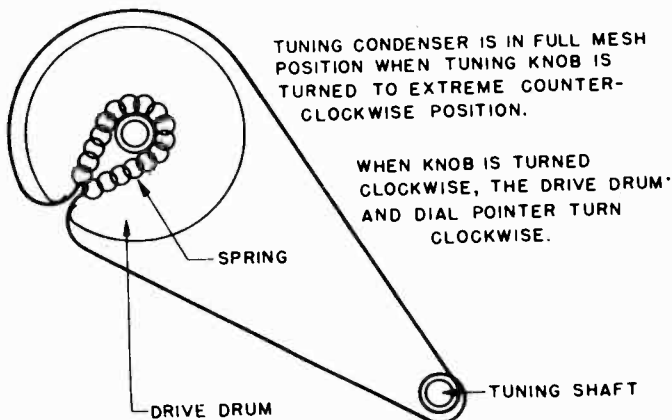
To properly align this receiver, an output meter and a signal generator are required. The generator must be calibrated at the following frequencies: 455 Kc., 600 Kc., 1400 Kc., and 1625 Kc. The volume control must be set at maximum and the signal generator at the lowest value that will give an accurate reading on the output meter. The high side of the generator is connected as given below and the low side is connected to the black lead.

**TABULATION FOR ALIGNMENT**

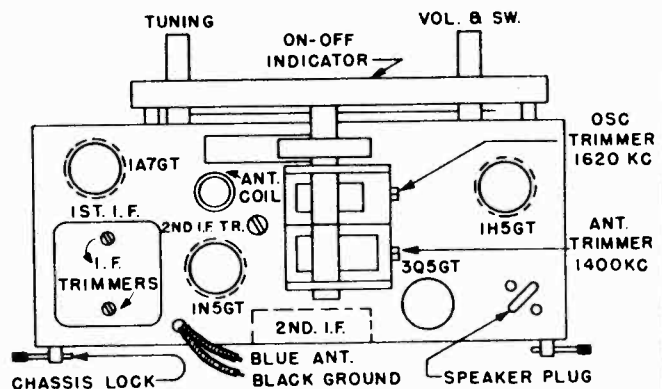
STEPS	HIGH SIDE OF GEN. TO	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1.	SET VOLUME CONTROL AT MAXIMUM					
2.	Grid of 1A7GT	455 Kc.	Minimum	2nd I.F. Trimmer	Top of Chassis *	MAXIMUM OUTPUT
3.				1st. I.F. Trimmers	Top of I.F. Trans.	
4.	200 MMF in series with ant.	1625 Kc.	1625 Kc.	Oscillator Trimmer	On Gang *	
5.		1400 Kc.	1400 Kc.	Antenna Trimmer	On Gang *	
6.		600 Kc.	Check Pointer Calibration			

\* See Chassis Layout.

**DIAL STRINGING**

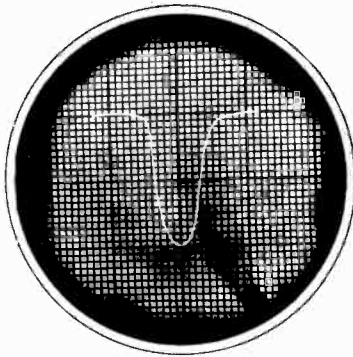


**CHASSIS LAYOUT**

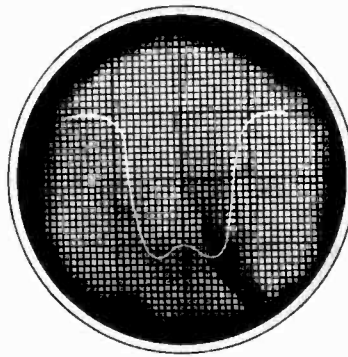


FARNSWORTH TELEV. & RADIO CORP.

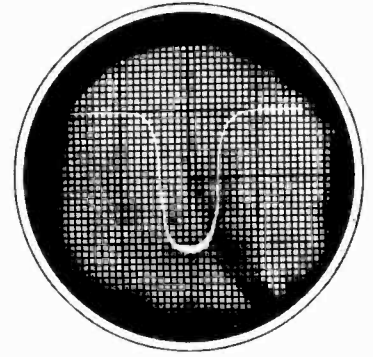
MODEL EF-451,  
Chassis C-196



A



B



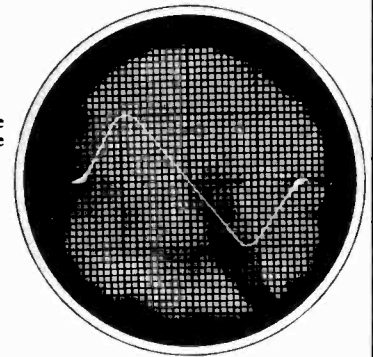
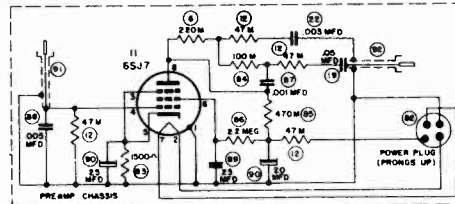
C

Oscilloscope patterns for FM alignment  
of Models GK-100, 102, 103, 104,  
111, 112, 113, 114

The Farnsworth models GK-111, 112, 114 and 115 combination instruments are identical to the GK-100, 102, 103 and 104 except that the former employ the type P56MP record changer, the latter, the type P56.

Parts list and preamplifier circuit for  
Models GK-111, 112, 113, 114

Part No.	Description
78057	Volume Control, 3 Megohms
94204	Power Transformer
94239	Output Transformer
13772	Speaker
38696	Loop Antenna for GK-102 and GK-103, GK-111, 112
38859	Loop Antenna for GK-114
26032	Loop Antenna Trimmer GK-114
22169	Pickup Cable
22170	Output Cable
22171	Power Adapter Cable
25431	Elec. Capacitor, 20 mfd, 450 v., 25 mfd, 25 v.
25432	.001 mfd, 200 V. Condenser
25433	.25 mfd, 600 V. Condenser
H-273	Cabinet for GK-114
H-291	Cabinet for GK-11 Mah.
H-292-1	Cabinet for GK-112 C.
H-292-2	Cabinet for GK-112 Bl.



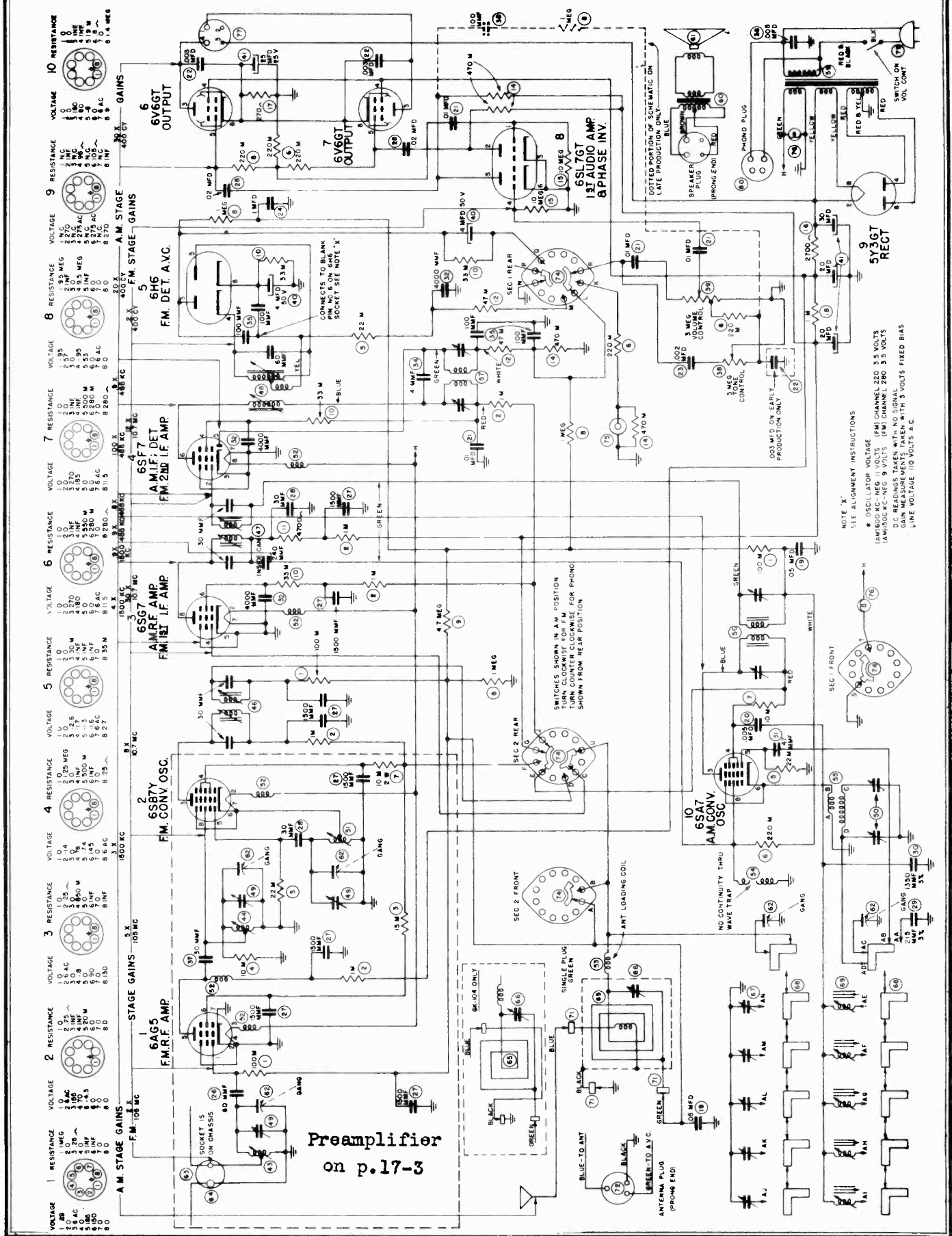
D

VOLTAGE	RESISTANCE
1 0	1 0
2 0	2 00
3 0	3 00
4 0	4 00
5 0	5 00
6 0	6 00
7 0	7 00
8 0	8 00
9 0	9 00
10 0	10 00

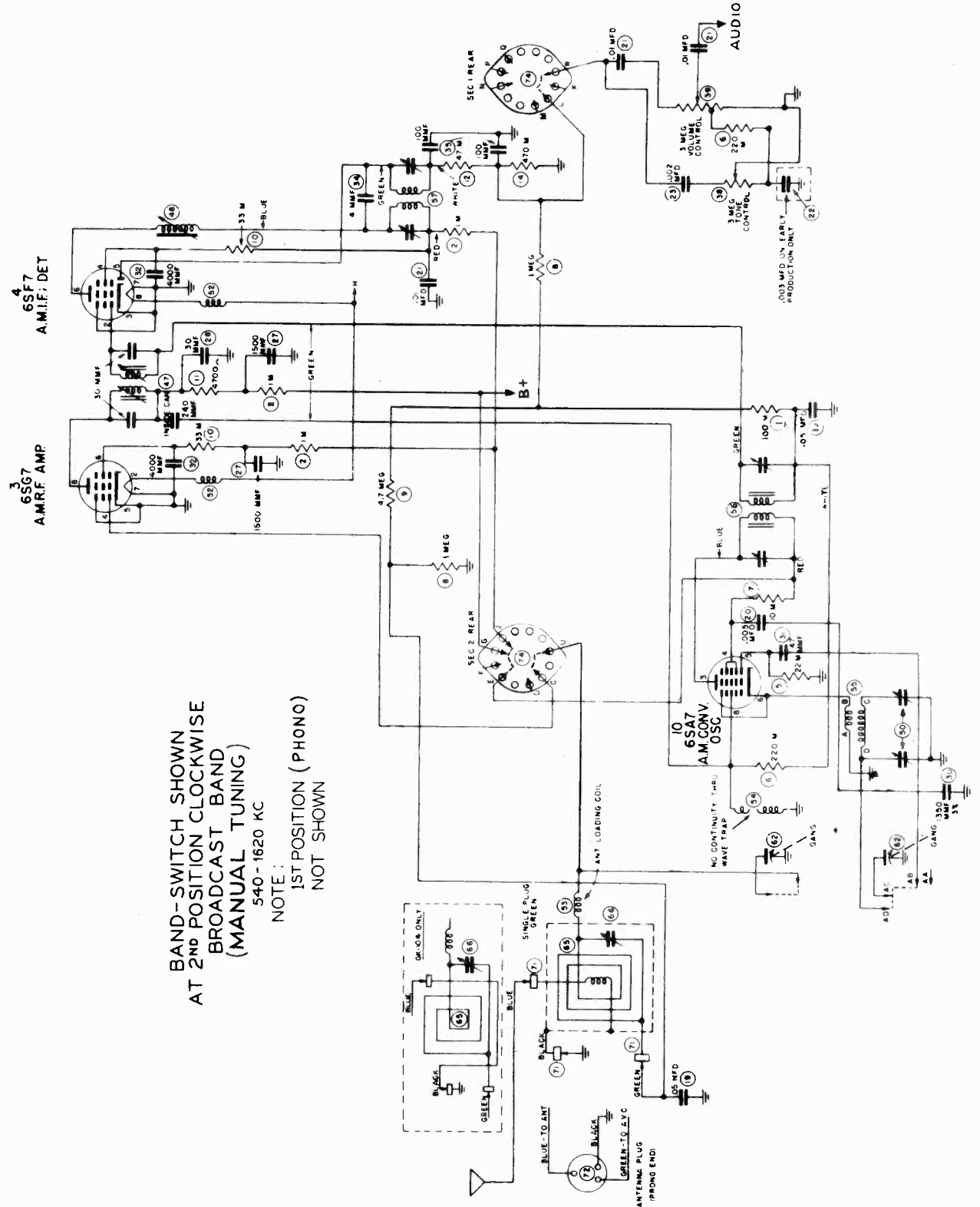
Ref. No.	Part No.	Description
1	77216	220 M ohm resistor
2	77439	56 M ohm resistor
3	77274	10 megohm resistor
4	77270	2.2 megohm resistor
5	77213	47 ohm resistor
6	77218	1 megohm resistor
7	77261	470 ohm resistor
9	25196	.05 mfd. capacitor
10	25215	.1 mfd. capacitor
11	25195	.02 mfd. capacitor
12	25188	100 mmf mica capacitor
14	25183	.005 mfd. capacitor
15	25194	.01 mfd. capacitor
18	26259	Gang capacitor
19	38854	Antenna coil
20	38855	Oscillator coil
21	38856	1st. I.F. transformer
22	38857	2nd. I.F. transformer
23	78145	1 megohm volume control
25	94250	Output transformer
26	81172	6" PM speaker
27	25422	6 Mfd. 150 volt electrolytic capacitor
	31395	Dial scale
	31396	Dial window
	58775	Dial Pointer
	22163	Battery cable
	59447	Knob (Bakelite)
	H-272	Cabinet and packing

Parts list for Model EF-451,  
Chassis C-196

MODELS GK-100, GK-102 FARNSWORTH TELEV. & RADIO CORP.  
 GK-103, GK-104, GK-111  
 GK-112, GK-113, GK-114

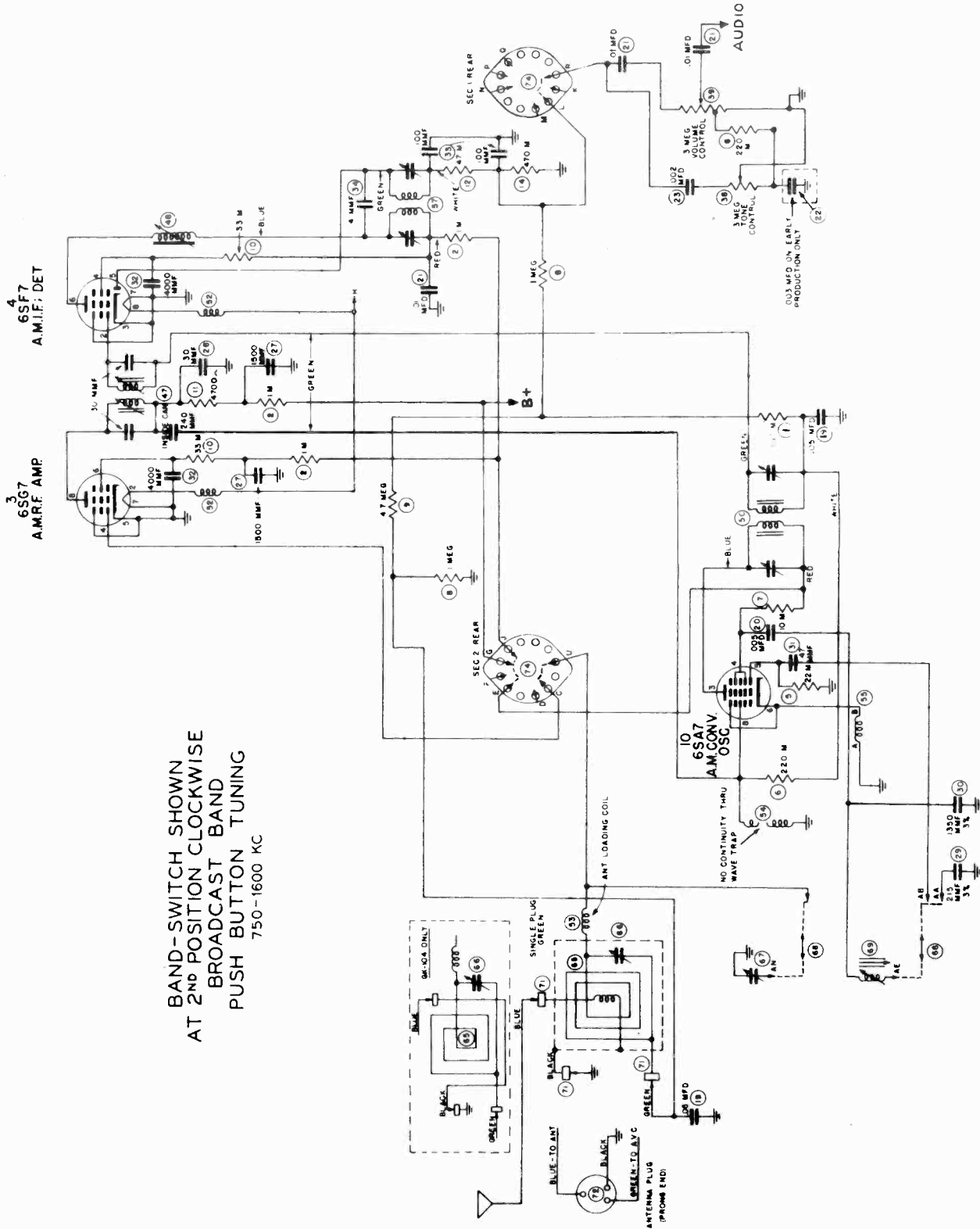


Preamplifier  
 on p.17-3



# "clarified schematics"

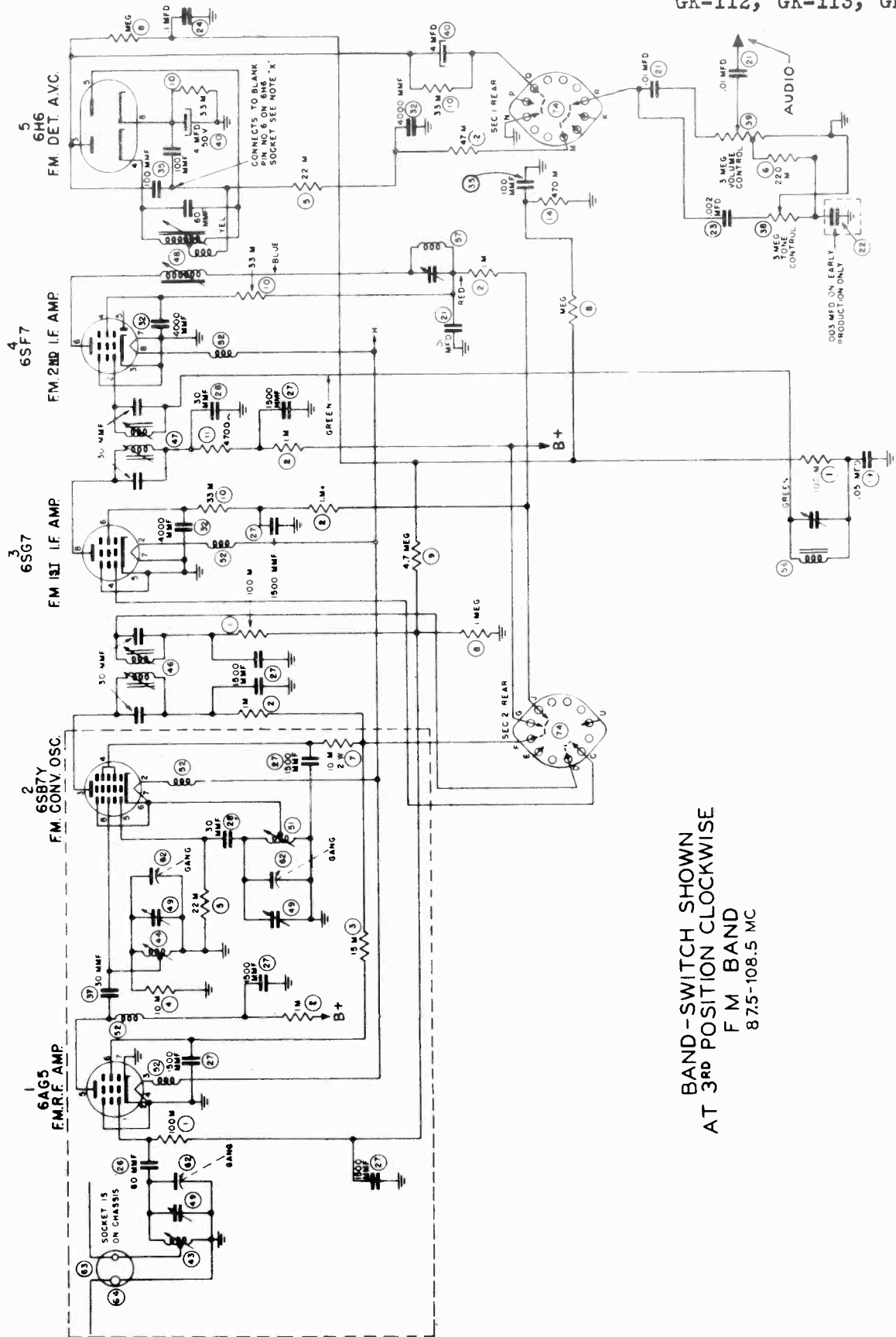
MODELS GK-100, GK-102, FARNSWORTH TELEV. & RADIO CORP.  
 GK-103, GK-104, GK-111,  
 GK-112, GK-113, GK-114



BAND-SWITCH SHOWN  
 AT 2<sup>ND</sup> POSITION CLOCKWISE  
 BROADCAST BAND  
 PUSH BUTTON TUNING  
 750-1600 KC

FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-100, GK-102,  
GK-103, GK-104, GK-111,  
GK-112, GK-113, GK-114



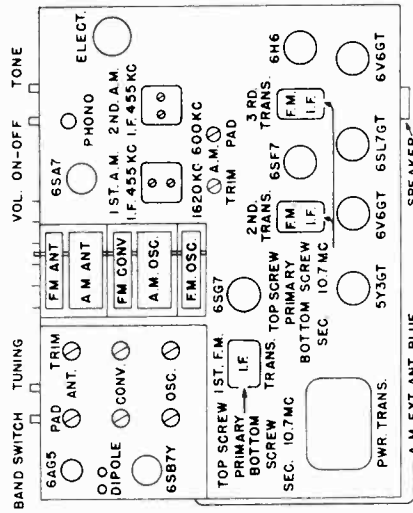
BAND-SWITCH SHOWN  
AT 3<sup>RD</sup> POSITION CLOCKWISE  
F M BAND  
87.5-108.5 MC



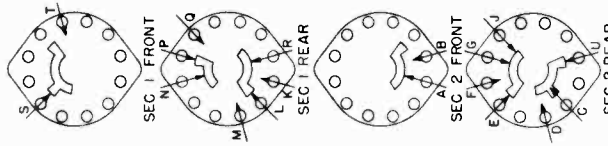
FARNSWORTH TELEV. & RADIO CORP.

MODELS GK-100, GK-102,  
GK-103, GK-104, GK-111,  
GK-112, GK-113, GK-114

CHASSIS LAYOUT

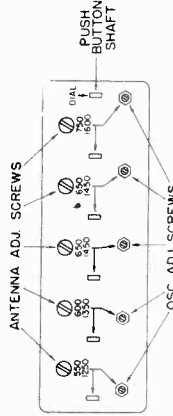


BAND SWITCH DECKS

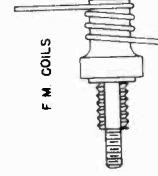


Letters on terminals of switches and coils shown on this page correspond to similarly lettered terminals on the switches and coils shown in the circuit diagram.

PUSH BUTTON LAYOUT



F M COILS



TAP AT  
TOTAL TURNS  
ANT. COIL 2 1/2  
CONV. COIL 2 1/2  
TAP OSC. COIL 3 1/4  
FROM GROUND  
END

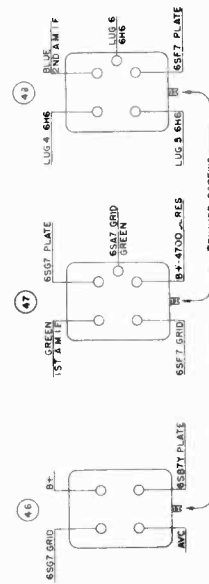
ALIGNMENT INSTRUCTIONS AM BAND

An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the black wire.

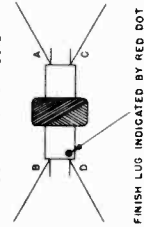
STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED
1					MAXIMUM OUTPUT
SET VOLUME AND TONE CONTROLS AT MAXIMUM					
2		455 Kc.	Minimum	2nd. I.F. Trimmers* 1st. I.F. Trimmers*	Top of I.F. Transformers
3					
4	200 MMF.	1600 Kc.	1600 Kc.	B. C. Osc. Trimmer	See Chassis Layout
5		1500 Kc.	1500 Kc.	B. C. R. F. Trimmer	On Loop
6		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Chassis Layout
7				Recheck 1500 Kc.	

\* Recheck after FM alignment.

BOTTOM VIEW FM I.F. TRANS.



B.C. OSCILLATOR COIL



## FARNSWORTH TELEV. &amp; RADIO CORP.

MODELS GK-100, GK-102,  
GK-103, GK-104, GK-111,  
GK-112, GK-113, GK-114

## Oscilloscope Alignment of FM Band

- Equipment required will be an oscilloscope, a frequency modulated signal generator covering the range 87.5 to 108.5 mc on fundamentals, a sweep generator producing a signal of 107 mc and sweeping at least 150 kc each side of 107 mc, and an output meter.
- The vertical or "Y" axis terminals of the oscilloscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or "X" axis terminals of the oscilloscope. The 107 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 Mmfd.
- Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tune control and the volume control all the way to the right. Detune the secondary of the third FM I.F. transformer by turning the bottom slug screw out as far as possible. Adjust the primary, top slug screw, until pattern (A) appears on the oscilloscope. Adjust the secondary, bottom slug screw, until pattern (B) is obtained on the oscilloscope and until both sides of this pattern are symmetrical.
- Remove the 107 mc output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM I.F. transformer as in paragraph 3.
- Connect the 107 mc output of the sweep generator to the signal grid of the 6SH7Y. (pin 8). Detune secondary of the first FM I.F. transformer and tune primary as before for pattern (A). Tune secondary for pattern (C) and make both sides of pattern as symmetrical as possible. This completes alignment of the FM I.F. transformers.
- Reconnect the negative lead of the 4 mfd. electrolytic to pin #3 of the 6H6 socket and move the oscilloscope leads to pin #6 of the 6H6 socket and ground. With the sweep generator connected to the 6SH7Y signal grid as before, the discriminator

### PUSH BUTTON SETUP

- A Signal Generator should be used to prevent buttons being set up on wrong stations. Allow set to warm up for one-half hour.
- Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See PUSH BUTTON LAYOUT.)

## Alternate FM Alignment Procedure

Necessary Equipment:  
Signal Generator  
Voltohmmyst (Vacuum Tube Voltmeter)

Connect voltohmmyst from ground to pin #6 of 6H6 (audio-marked X on schematic). Connect generator tuned to 107 mc, to pin #4 on 6SG7. Turn secondary slug of 3rd. FM I.F. (closest to chassis) out as far as it will turn. Tune primary of 3rd IF for maximum positive voltage. Tune primary and secondary of the 2nd. FM I.F. for maximum output. Move generator to pin #8 of 6SH7Y and turn primary and secondary of 1st. FM I.F. for maximum output. Next tune secondary of 3rd. FM I.F. for zero voltage on voltohmmyst. The I.F. is now aligned.

### RF ALIGNMENT

With Voltohmmyst connected between ground and pin #3 on 6H6 socket, connect generator between ground and small pin of dipole antenna socket. Use very short leads on generator and a 300 ohm resistor as a dummy antenna. Set generator at 87.5 mc and gang closed. Adjust oscillator slug for maximum voltage. Adjust generator to 108.5 mc and gang to minimum and adjust oscillator trimmer for maximum voltage. Go back and check low frequency end. Next set generator at 92 mc, tune in signal on receiver, approximately 220 on dial. Adjust converter and antenna slug for maximum voltage output. Set generator at 105 mc. Tune in signal on receiver, approximately 280 on dial. Tune converter and antenna trimmer for maximum voltage output. Check adjustment of antenna and converter slugs at 92 mc.

For oscilloscope patterns for FM alignment, see page 17-3

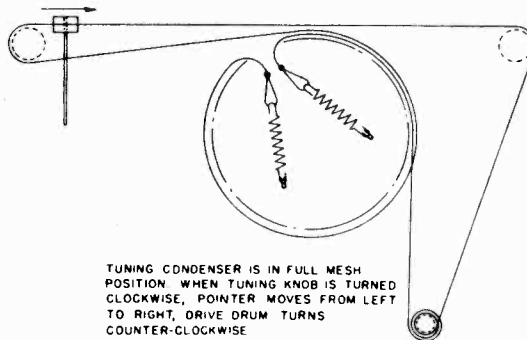
- Select the pair of adjustment screws covering the frequency of a wanted station.
- Press the "Dial" button and manually tune in the desired station frequency or signal from generator.
- Press the button selected for this frequency.
- Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.
- Adjust the upper screw of the same pair until maximum volume is secured.
- Press dial button, making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button, until all are set up.
- Recheck settings and correct any drift due to interaction between adjacent coils.

MODELS GK-100, GK-102, FARNSWORTH TELEV. & RADIO CORP.

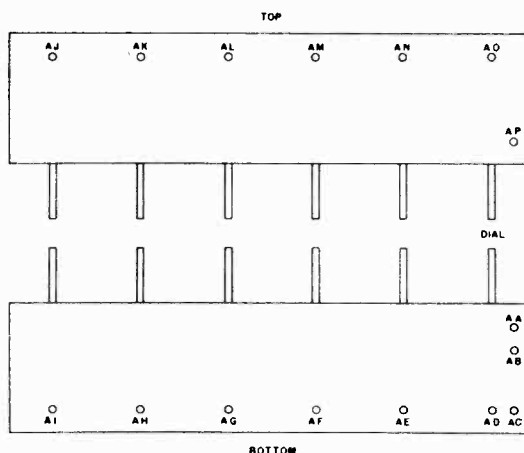
GK-103, GK-104, GK-111,  
GK-112, GK-113, GK-114

Ref. No.	Part No.	Description	Part No.	Description
1	77214	100 M Ohms	31338	Glass Dial
2	77262	1000 Ohms	07373	Dial Pointer
3	77265	15 M Ohms	561397	Dial Escutcheon
4	77212	10 M Ohms	13529	Dial Lamp Spring Lead Assembly
5	77266	22 M Ohms	59134	Knob for GK102 WA
6	77216	220 M Ohms	59450	Knob for GK102 BL
7	77013	10 M Ohms, 2 Watt	59451	Knob for GK103 and GK104
8	77218	1 Megohm	17019	Drive Drum
9	77272	4.7 Megohms	41106	Drive Cord (42 inches) and Springs
10	77267	33 M Ohms	59249	Push Button Escutcheon
11	77211	4700 Ohms	59030	Push Button for GK102 WA, GK103 and GK104
12	77213	47 M Ohms		
14	77217	470 M Ohms		
15	77274	10 Megohms	59441	Push Button for GK102 BL
16	77243	2700 Ohm Molded Resistor 4.7 Watt	41101	Station Call Letter Kit
17	77189	270 Ohm, 2 Watt	80325	Mica Filled Socket for 6SB7Y
18	77304	1000 Ohms, 2 Watt	80139	Molded Octal Socket
19	25196	.05 Mfd. 600 Volt	80239	Molded Octal Socket for Rectifier
20	25183	.005 Mfd. 600 Volt	80319	Miniature Tube Socket
21	25194	.01 Mfd. 600 Volt	80362	2-Prong FM Antenna Plug
22	25184	.003 Mfd. 600 Volt	22146	Pickup Cable GK102
23	25185	.002 Mfd. 600 Volt	22147	Pickup Cable GK103 and GK104
24	25215	.1 Mfd. 600 Volt	71223	Phono Needle
25	25195	.02 Mfd. 600 Volt	11326	Compartment Light Socket Assembly
26	25333	60Mmf. Ceramic Capacitor, N-470		GK102 and GK103
27	25273	1500 Mmf. Ceramic Capacitor	H-270-1	Cabinet for GK102 WA
28	25329	30 Mmf. Ceramic Capacitor, N-750	H-270-2	Cabinet for GK102 BL
29	25212	215 Mmf. Silver Mica Capacitor	H-273	Cabinet for GK104
30	25213	1350 Mmf. Silver Mica Capacitor		
31	25193	47 Mmf. Mica Capacitor		
32	25271	4000 Mmf. Ceramic Capacitor		
33	25187	240 Mmf. Molded Mica Capacitor		
34	25327	4 Mmf. Ceramic Capacitor		
35	25188	100 Mmf. Mica Capacitor		
36	25031	.005 Buffer Capacitor 600 V		
37	25332	30 Mmf. Ceramic Capacitor, N-150		
38	78072	Tone Control, 3 Megohms		
39	78057	Volume Control, 3 Megohms		
40	25316	4 Mfd., 50 V Electrolytic		
41	25214	Electrolytic Capacitor 20 Mfd., 20 Mfd., 30 Mfd., 450 Volt, 20 Mfd., 25 Volt		
43	38690	FM Antenna Coil		
44	38691	FM Converter Coil		
46	38683	1st. FM I.F. Transformer		
47	38684	2nd. FM I.F. Transformer		
48	38685	3rd. FM I.F. Transformer		
49	26231	5-20 Mmf. Ceramic Trimmer, N-300		
50	26240	BC Oscillator Trimmer Strip		
51	38692	FM Oscillator Coil		
52	38661	FM RF Choke		
53	38845	Antenna Loading Coil		
54	38484	Wave Trap Coil		
55	38694	BC Oscillator Coil		
56	38681	1st. AM I.F. Transformer		
57	38682	2nd. AM I.F. Transformer		
59	94204	Power Transformer		
60	94195	Output Transformer		
61	13772	Speaker		
62	26237	Gang Capacitor		
63	11325	FM Dipole and Plug		
64	80361	FM Dipole Socket		
65	38696	Loop Antenna for GK102 and GK103		
65	38859	Loop Antenna for GK104		
66	26031	Loop Antenna Trimmer GK102		
66	26032	Loop Antenna Trimmer GK104		
67	26175	Push Button Trimmer Strip		
68	90118	Push Button Switch		
69	38405	Push Button Coil Strip		
71	80439	Loop Antenna Socket		
72	80440	Antenna 3-Prong Plug		
74	90214	Band Switch		
75	80030	Phono Input Socket		
76	42185	Dial Lamp, 250 Ma		
77	80385	Speaker Socket		
79	27118	Line Cord for GK102		
80	11210	Phono AC Socket and Cord		

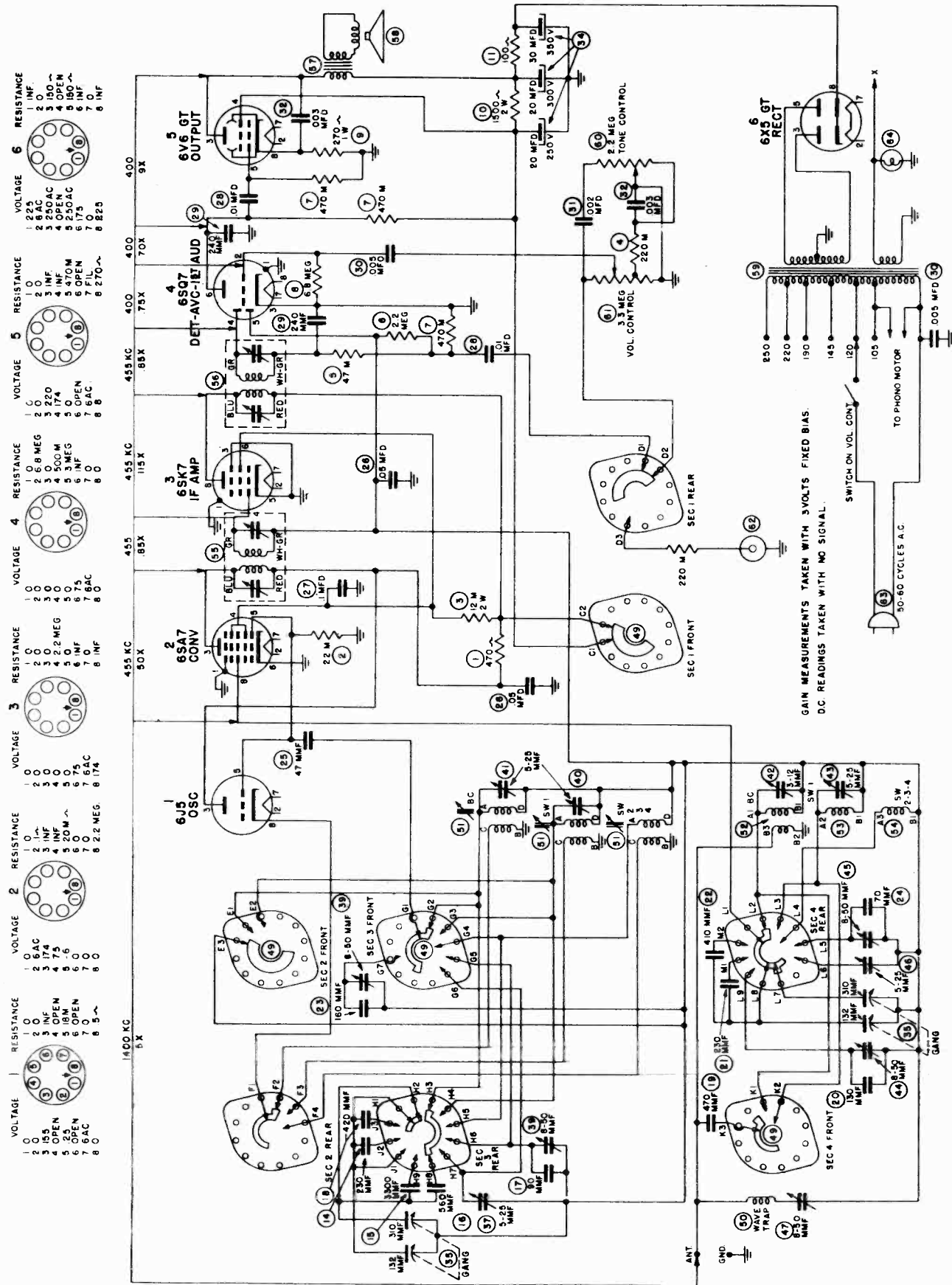
DIAL STRINGING



PUSH BUTTON TUNER SWITCH

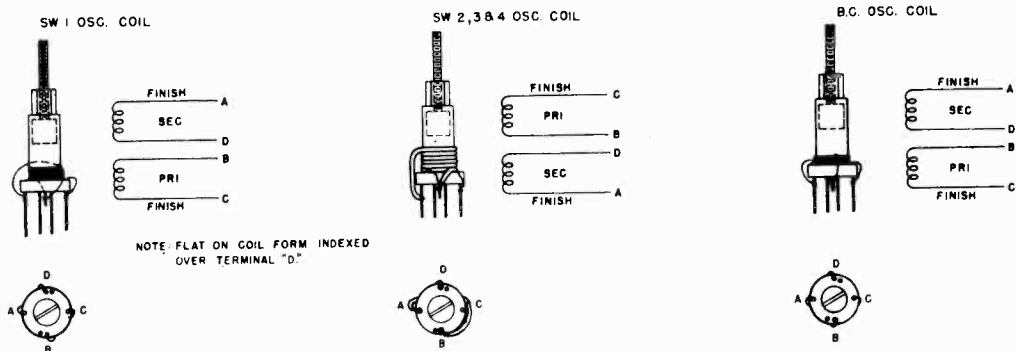


For additional parts list on Models GK-111-114, see page 17-3

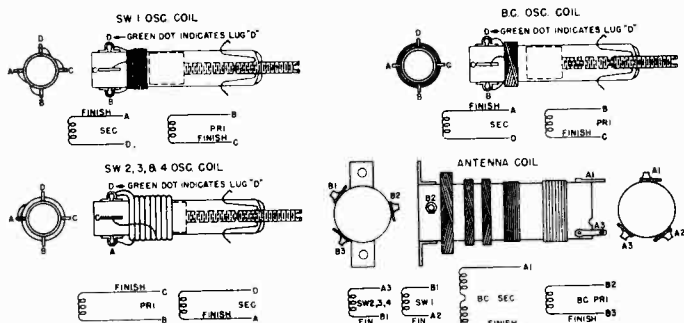


VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1 0	1 0	1 0	1 0	1 0	1 0	1 225	1 INF
2 0	2 1~	2 0	1 0 MEG	2 0	2 0	2 6AC	2 0
3 15B	3 INF	3 0	3 0	3 0	3 0	3 250AC	3 150 ~
4 25	4 174	4 0	4 500 M	4 0	4 174	4 OPEN	4 OPEN
5 25	5 18M	5 0	5 2.2 MEG	5 0	5 0	5 250AC	5 180 ~
6 OPEN	6 0	6 0	6 0	6 0	6 0	6 OPEN	6 0
7 6AC	7 0	7 0	7 0	7 0	7 0	7 0	7 0
8 0	8 5 ~	8 0	8 INF	8 0	8 0	8 25	8 100 ~
						9 10	9 100 ~
						10 10	10 100 ~
						11 10	11 100 ~
						12 10	12 100 ~
						13 10	13 100 ~
						14 10	14 100 ~
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						80 10	80 100 ~

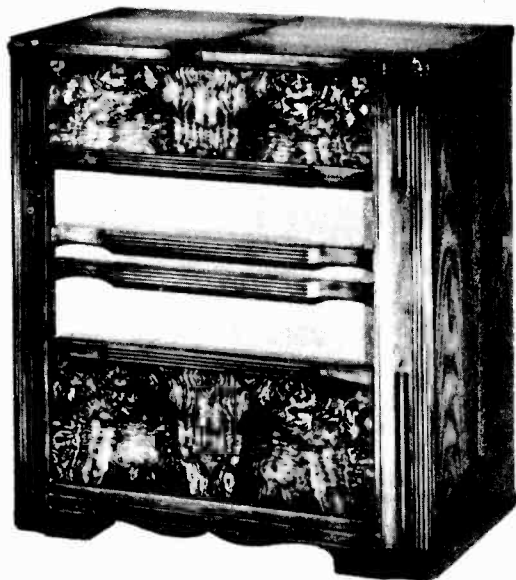
GAIN MEASUREMENTS TAKEN WITH 3 VOLTS FIXED BIAS.  
D.C. READINGS TAKEN WITH NO SIGNAL.



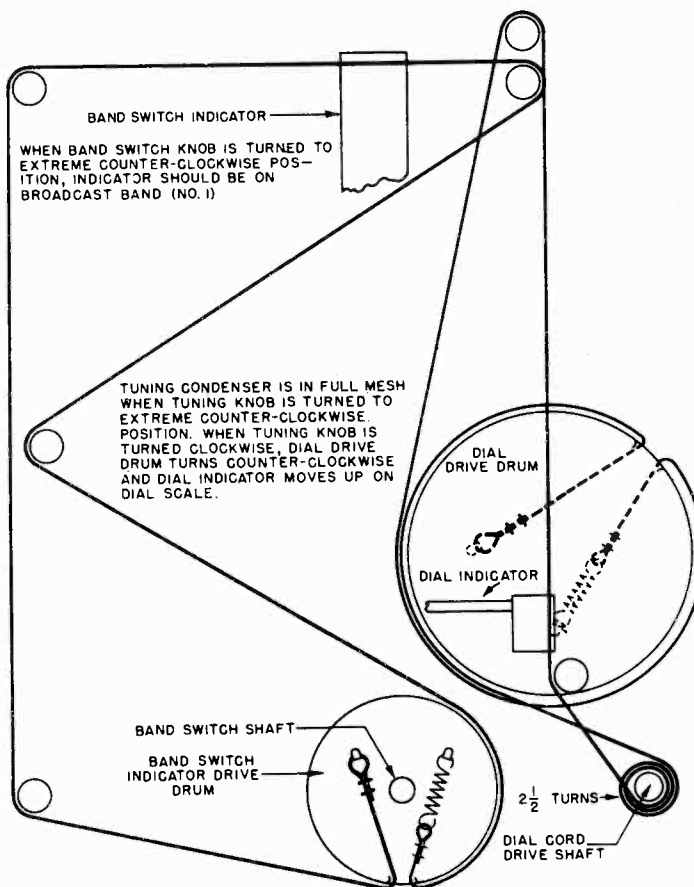
COILS USED IN EARLY PRODUCTION (ANTENNA COIL SAME AS BELOW)

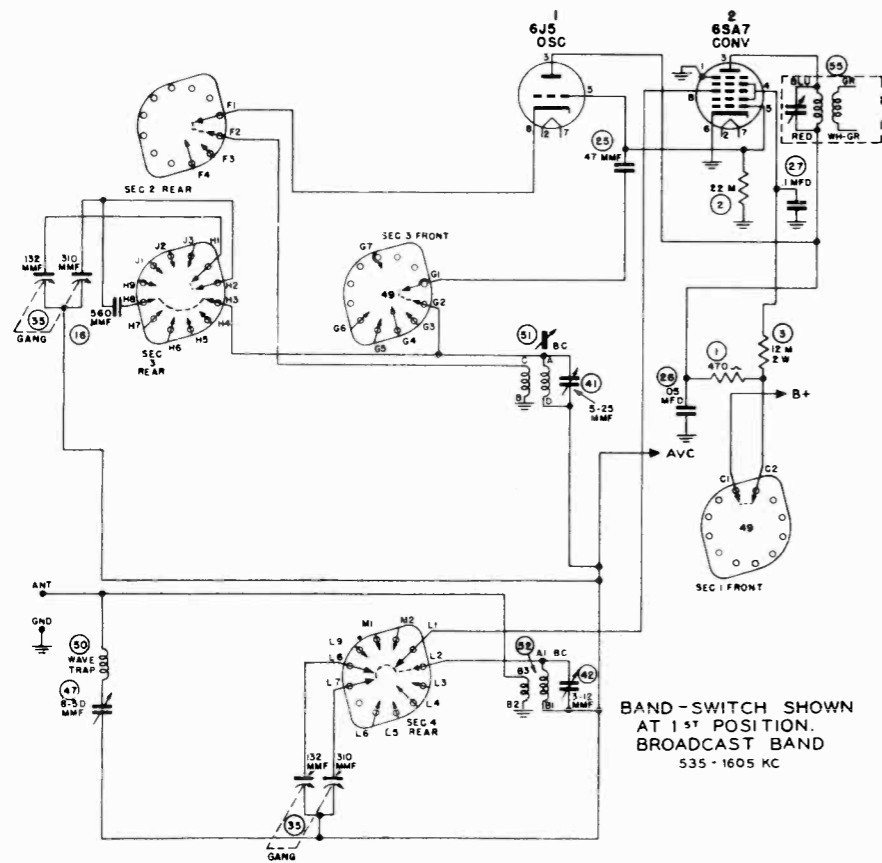


COILS USED IN LATE PRODUCTION

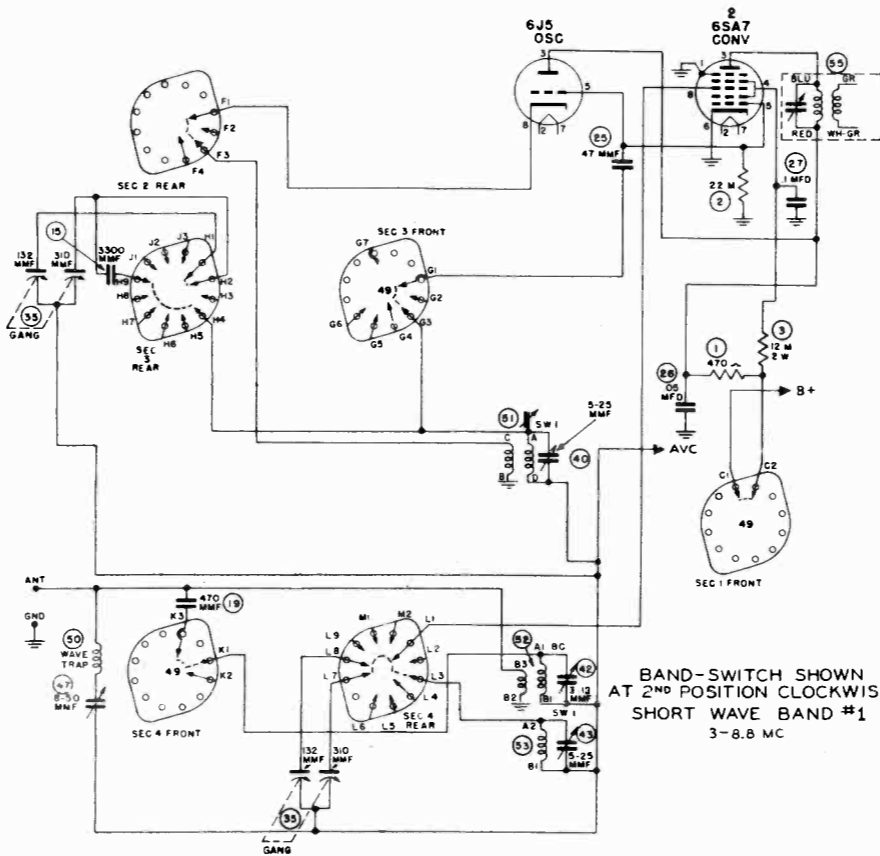


GK-699

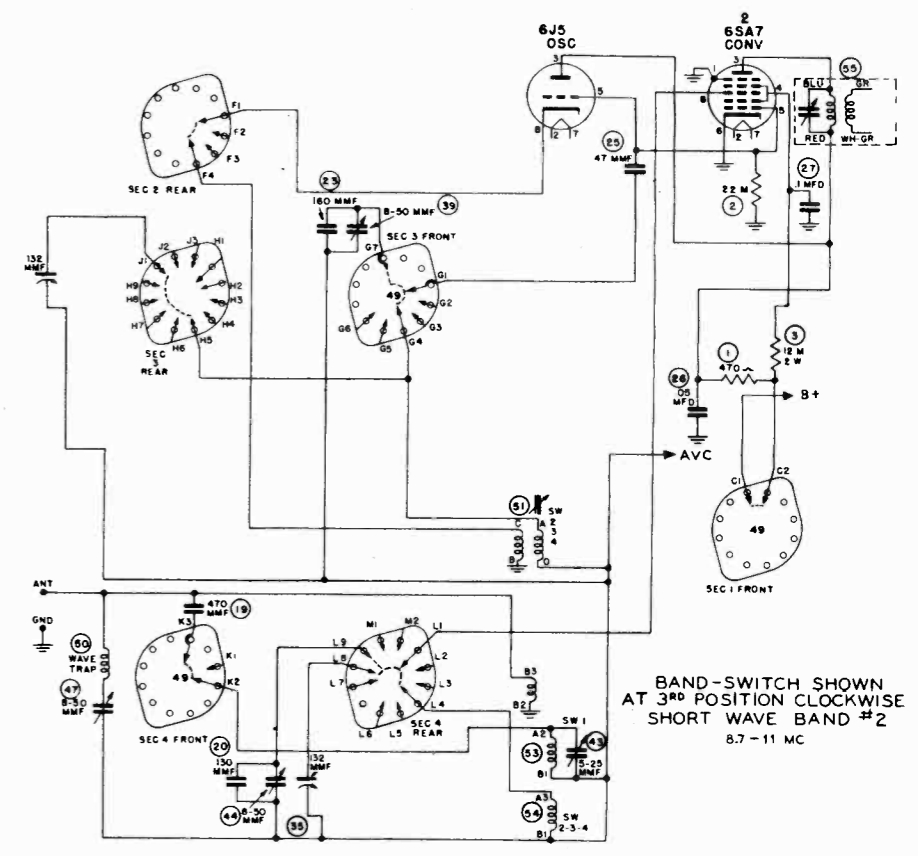




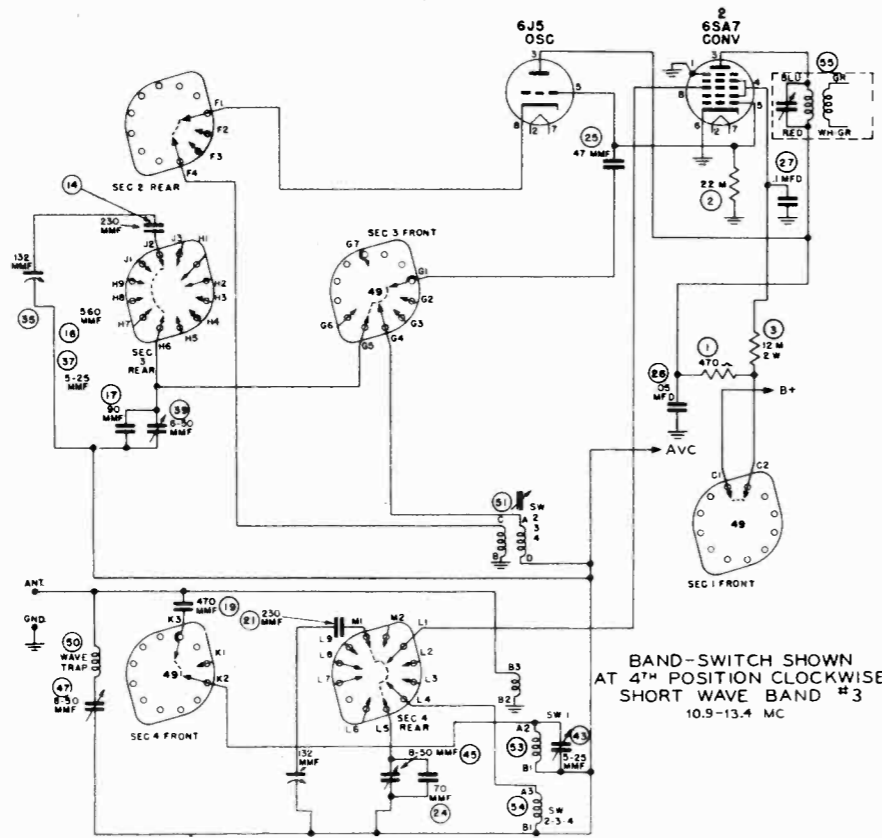
BAND-SWITCH SHOWN AT 1<sup>ST</sup> POSITION. BROADCAST BAND 535 - 1605 KC



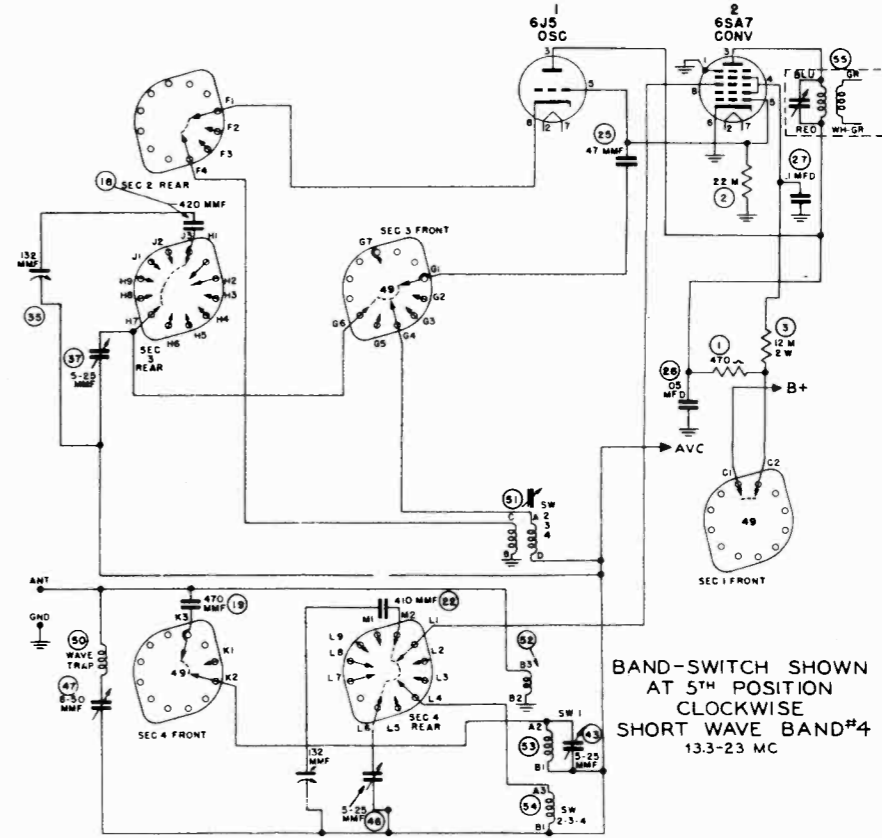
BAND-SWITCH SHOWN AT 2<sup>ND</sup> POSITION CLOCKWISE SHORT WAVE BAND #1 3-8.8 MC



BAND-SWITCH SHOWN AT 3<sup>RD</sup> POSITION CLOCKWISE SHORT WAVE BAND #2 8.7-11 MC



BAND-SWITCH SHOWN AT 4<sup>TH</sup> POSITION CLOCKWISE SHORT WAVE BAND #3 10.9-13.4 MC



BAND-SWITCH SHOWN AT 5<sup>TH</sup> POSITION CLOCKWISE SHORT WAVE BAND #4 13.3-23 MC

**EQUIPMENT REQUIRED:**

An output meter and signal generator are required for proper alignment of the receiver.

The signal generator must cover a range of 450 kilocycles to 23 megacycles.

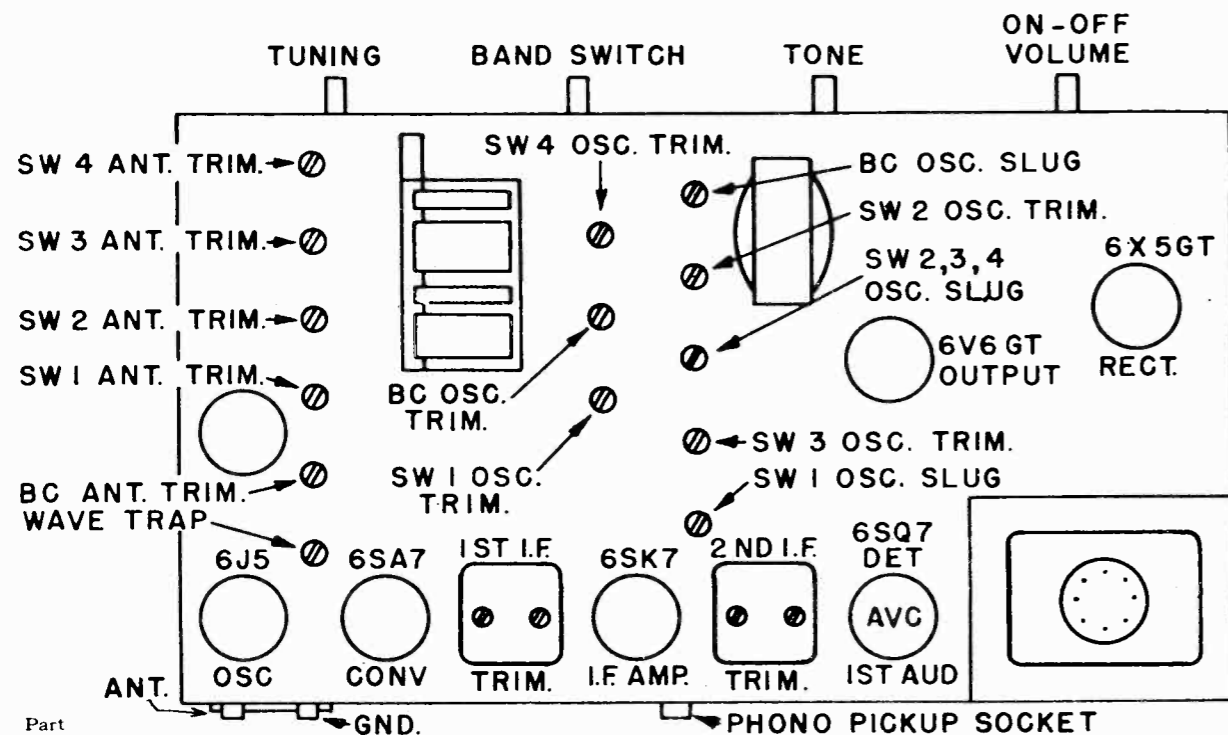
**SETTING UP FOR ALIGNMENT:**

1. Keep the output of the generator as low as possible to reduce A.V.C. action and consequent false settings.

2. In adjusting the wave trap trimmer, it may be necessary to increase signal generator output to obtain a workable reading on the output meter.

3. Connect the low (ground) side of the generator to the ground terminal screw. The high side of the generator output cable is to be connected as designated in the alignment table.

4. The band switch on the receiver must be set for the band being aligned.



Part Ref. No.	Description	Part No.	Description	Part No.	Description
1	470 ohm resistor	34	25180	30 mfd 350 volt, 20 mfd 300 volt, 20 mfd 250 volt electrolytic capacitor	
2	22M ohm resistor	35	26245	Gang capacitor	59 94253 Power trans. GT-662 WAY & GT-669 WAY
3	12M ohm 2 watt resistor	37	26228	S.W. 4 oscillator trimmer	60 78125 Tone control
4	220M ohm resistor	38	26229	S.W. 3 oscillator trimmer	61 78124 Volume control
5	47M resistor	39	26228	S.W. 2 oscillator trimmer	62 80030 Phono input
6	2.2 megohm resistor	40	26228	S.W. 1 oscillator trimmer	63 27118 Line cord
7	470M ohms resistor	41	26228	Broadcast oscillator trimmer	64 42185 Dial lamp, 250 ma
8	6.8 megohms resistor	42	26228	Broadcast ant. trimmer	58550 Gang capacitor drive drum
9	270 ohms resistor 1 watt	43	26228	S.W. 1 antenna trimmer	59383 Knob
10	1500 ohms 2 watt resistor	44	26229	S.W. 2 antenna trimmer	31386 Dial glass
11	100 ohms resistor	45	26229	S.W. 3 antenna trimmer	31414 Dial glass (back)
14	25338 230 mmf silver mica capacitor	46	26228	S.W. 4 antenna trimmer	11398 Dial pointer
15	25336 3300 mmf mica capacitor	47	26229	Wave trap trimmer	05120 Pointer cord and springs
16	25337 560 mmf silver mica capacitor	49	90224	Band switch	05121 Band indicator drive cord and spring
17	25408 90 mmf silver mica	50	38650	Wave trap coil	15175 Band indicator drive drum and hub
18	25348 420 mmf silver mica	51	38723	Antenna coil assembly	04082 Band indicator
19	25437 470 mmf mica capacitor	52	38873	BC. osc. coil (late production)	80139 Molded octal socket
20	25373 130 mmf silver mica capacitor	38724	BC. osc. coil (early production)	80384 Amphenol shielded socket	80236 Phono motor cable and plug assy. GK 669 WAZ
21	25339 230 mmf silver mica capacitor	53	38874	S.W. 1 osc. coil (late production)	22146 Phono pick-up cable
22	25338 410 mmf silver mica capacitor	38725	S.W. 1 osc. coil (early production)	71223 Phono needle	H-297 Cabinet and carton for GT-669 WAZ
23	25340 160 mmf silver mica capacitor	54	38875	S.W. 2, 3, 4 osc. coil (late production)	H-280 Cabinet and carton for GK-669 WAZ
24	25374 70 mmf silver mica capacitor	38726	S.W. 2, 3, 4 osc. coil (early production)		
25	25350 47 mmf mica capacitor	55	38721	1st IF transformer	
26	25413 .05 mfd molded oil paper capacitor	56	38722	2nd IF transformer	
27	25361 .1 mfd molded oil paper capacitor	57	94216	Output transformer	
28	25364 .01 mfd molded oil paper capacitor	58	81171	Speaker	
29	25427 240 mmf mica capacitor	58	81169	Speaker	
30	25411 .005 mfd molded oil paper capacitor	59	94217	Power transformer	
31	25410 .002 mfd molded oil paper capacitor				
32	25409 .003 mfd molded oil paper capacitor				

**TABULATION FOR AM ALIGNMENT**

STEPS	CONNECT SIGNAL GENERATOR TO	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1						Set volume control at maximum and tone control at treble.

**INTERMEDIATE FREQUENCY**

2	Stator or rear section of gang through .1 mfd.	455Kc.	Minimum	2nd IF trimmers	Top of IF trimmers	Maximum Output
3				1st IF trimmers		

**BROADCAST BAND (1605 Kc to 535 Kc)**

4	Antenna terminal through 200 mmf Capacitor	455Kc.	1000Kc.	Wave trap trimmer	See Chassis Layout	Minimum Output
5		600Kc.	600Kc.	B.C. Osc. slug		Maximum Output
6		1400Kc.	1400Kc.	B.C. Osc. trimmer		
7		1400Kc.	1400Kc.	B.C. Ant. trimmer		
8	Alternate steps 6 and 7 while "rocking in" 600Kc with B.C. Osc. Slug*					
9	Check calibration at 1000Kc.					

**SHORT WAVE No. 1 (3.0 Mc to 8.8 Mc)**

10	Antenna terminal through 400 ohm. non-inductive res.	3.5 Mc	3.5 Mc	S W 1 Osc. Slug	See Chassis Layout	Maximum Output
11		8.0 Mc	8.0 Mc	S W 1 Osc. trimmer		
12		8.0 Mc	8.0 Mc	S W 1 Ant. trimmer		
13	Alternate steps 11 and 12 while "rocking in" 3.5 Mc with S W 1 Osc. Slug*					
14	Check calibration at 5.0 Mc.					

**SHORT WAVE No. 2 (8.7 Mc to 11.0 Mc)**

15	Antenna terminal through 400 ohm non-inductive res.	9.0 Mc	9.0 Mc	S W 2 Osc. Slug**	See Chassis Layout	Maximum Output
16		10.9 Mc	10.9 Mc	S W 2 Osc. trimmer		
17		10.9 Mc	10.9 Mc	S W 2 Ant. trimmer		
18	Alternate steps 16 and 17 while "rocking in" 9.0 Mc with S W 2 Osc. Slug*					
19	Check calibration at 10 Mc.					

**SHORT WAVE No. 3 (10.9 Mc to 13.4 Mc)**

20	Antenna terminal through 400 ohm. non-inductive res.	13.3 Mc	13.3 Mc	S W 3 Osc. trimmer	See Chassis Layout	Maximum Output
21		13.3 Mc	13.3 Mc	S W 3 Ant. trimmer		
22	Check calibration at 11.0 Mc and 12 Mc.					

**SHORT WAVE No. 4 (13.3 Mc to 23.0 Mc)**

23	Antenna terminal through 400 ohm. non-inductive res.	22.0 Mc	22.0 Mc	S W 4 Osc. trimmer	See Chassis Layout	Maximum Output
24		22.0 Mc	22.0 Mc	S W 4 Ant. trimmer		
25	Check calibration at 14.0 Mc and 18 Mc.					

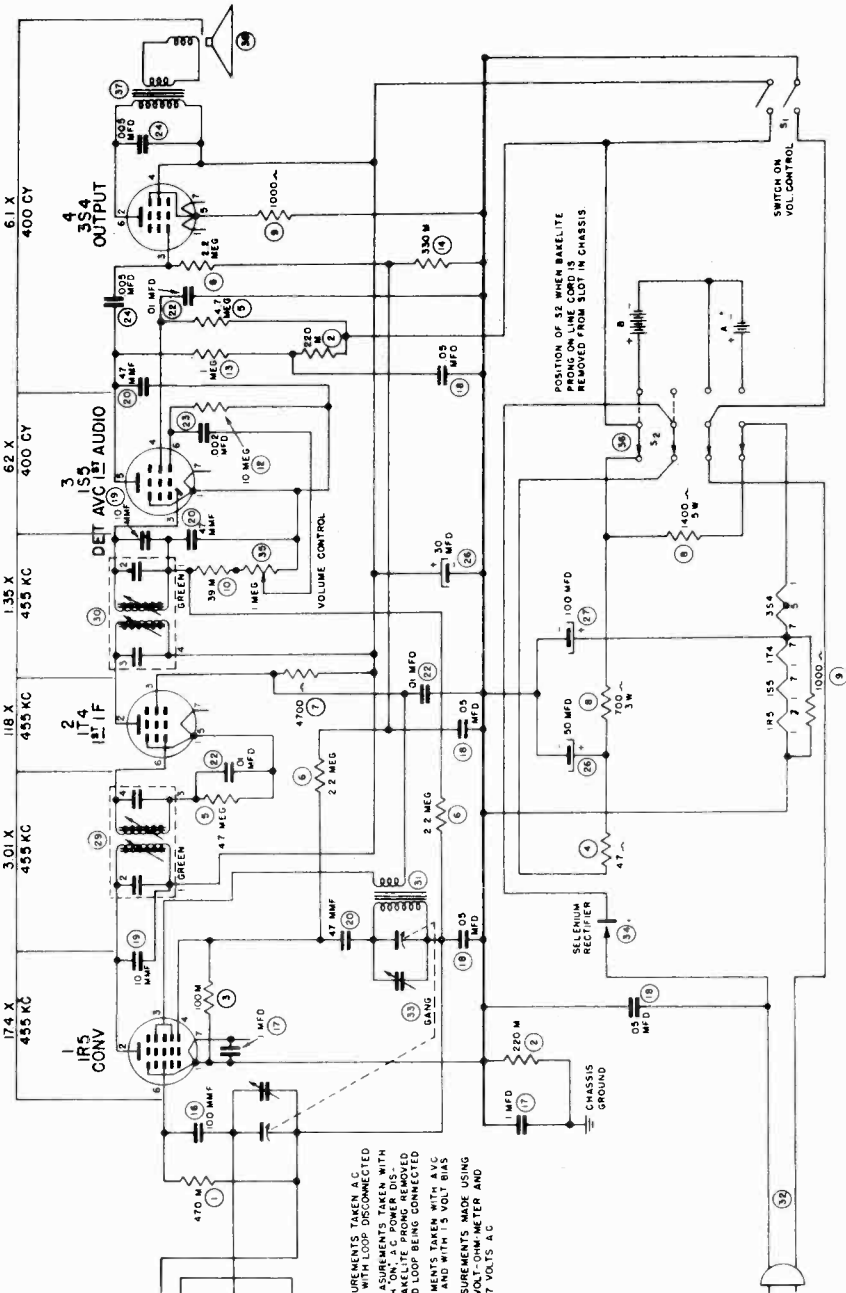
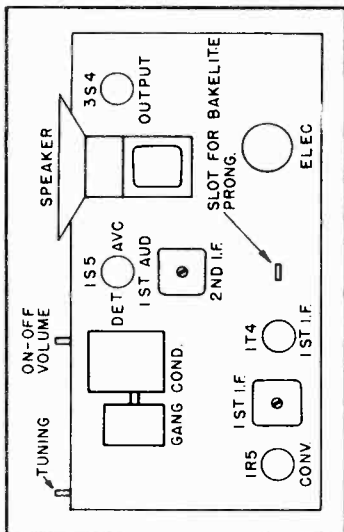
\*Rock tuning gang while adjusting oscillator coil slug until maximum output is obtained. Return to oscillator and antenna trimmer and adjust them for maximum output. Repeat this procedure until output cannot be increased.

\*\*If S W 2 oscillator slug is properly adjusted, no further adjustment is required for S W Bands No. 3 and 4.

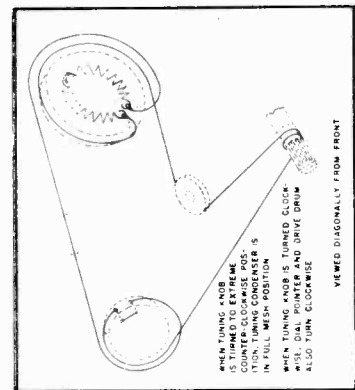
SUGGESTED BATTERIES

"B": Eveready 467, Burgess XX45, or equivalent.  
 "A": Eveready 950, Burgess #2, Ray-O-Vac 2 I.P., or equivalent.

1		2		3		4	
VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
0	1500	1.28	50	1.4	30	1.75	100
2.78	3000	2.78	2000	2 NC	2 NC	2.72	2000
3.64	6000	3.64	3000	3 NC	3 NC	3.19	2000
4.50	10000	4 NC	4 NC	4.25	4.77	4.76	2.5 MEG
5.36	15000	5.36	4 NC	5.25	4.77	4.76	4.8500
6.22	20000	6.22	4.77	6.10	6.10	6.72	6.8200
7.08	25000	7.08	6.4	7.29	7.50	7.48	7.70
			7.50				



VOLTAGE MEASUREMENTS TAKEN A.C. POWER ON AND WITH LOOP DISCONNECTED  
 RESISTANCE MEASUREMENTS TAKEN WITH LOOP DISCONNECTED AND BAKELITE PRONG CONNECTED  
 GAIN MEASUREMENTS TAKEN WITH AVC DISCONNECTED AND WITH 1.5 VOLT BIAS  
 VOLTAGE MEASUREMENTS MADE USING ELECTRONIC VOLT-OHM-METER AND SET USING 117 VOLTS A.C.



WHEN TUNING KNOB IS TURNED TO EXTREME COUNTER-CLOCKWISE POSITION, PRONG IS IN FULL MESH POSITION  
 WHEN TUNING KNOB IS TURNED CLOCKWISE, DIAL POINTER AND DRIVE DRUM ALSO TURN CLOCKWISE  
 VIEWED DIAGONALLY FROM FRONT



**ALIGNMENT OF THE RECEIVER**

A signal generator calibrated at 455 Kc., 1400 Kc., and 1625 Kc., is necessary to properly align this receiver. After aligning the I. F. stages, replace receiver in cabinet and connect loop before aligning the R.F. The oscillator trimmer is on the oscillator section of the gang and the loop trimmer is on the R.F. section of the gang. When aligning this receiver it should be operated on the self contained batteries.

STEPS	USE IN SERIES WITH GENERATOR	SET GEN. AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	.02 Mfd. in each Lead Connect High side of gen. to grid of 1R5 tube.	455 Kc	Minimum Capacity	2nd I.F. Slugs 1st. I.F. Slugs	Top and Bottom of I.F. Transformer	Maximum Output
2	Loop**	1625 Kc.	Minimum Capacity	Oscillator Trimmer	On Gang Capacitor	Maximum Output
3	Loop**	1400 Kc.	Tune in to 1400 Kc. and rock gang	Loop Trimmer	On Gang Capacitor	Maximum Output

\*\*Loop to consist of five to ten turns of insulated wire wound on a three or four inch form to be closely coupled to the loop antenna in the door of the receiver.

**PROTECTION AND CARE OF LEATHERETTE COVERING**

Covering a portion of the cabinet to produce a two tone effect and enclosing within the front door a high "Q" Polyethylene loop antenna, is a simulated fine-grain leather. Cabinets of this nature are subject, due to climatic conditions or handling, to loosening of the covering at edges or corners.

In re-gluing the cover, an adhesive having acetone or similar paint-solvent should not be used. Most household adhesives fall into this category. It is recommended that either an animal glue such as Le Page's or a rubber cement be employed, weighting the covering until thoroughly dried. It is to be noted that the animal glues are solvent in water and may not hold if the case is subjected to water or excessive moisture. Glue splashed upon the lacquer finish may be wiped off with a dampened cloth; excessive rubber cement may be rubbed off when dry.

59395	Volume control knob
59398	Tuning knob
05103	Drive cord
59385	Dial Pointer
31343	Dial Scale
80380	Miniature Tube Socket for 1S5 Tube.
80350	Miniature Tube Socket
13615	Polarized terminal strip
59453	Strain relief grommet (bakelite)
54286	A.C. Bat. Switching prong
H-280	Cabinet and Carton
13785	Handle Assembly
13729	Door and Loop Assembly
58513	Catch (for door and loop antenna)
59397	Pyrexlin Window
62141	Rubber feet

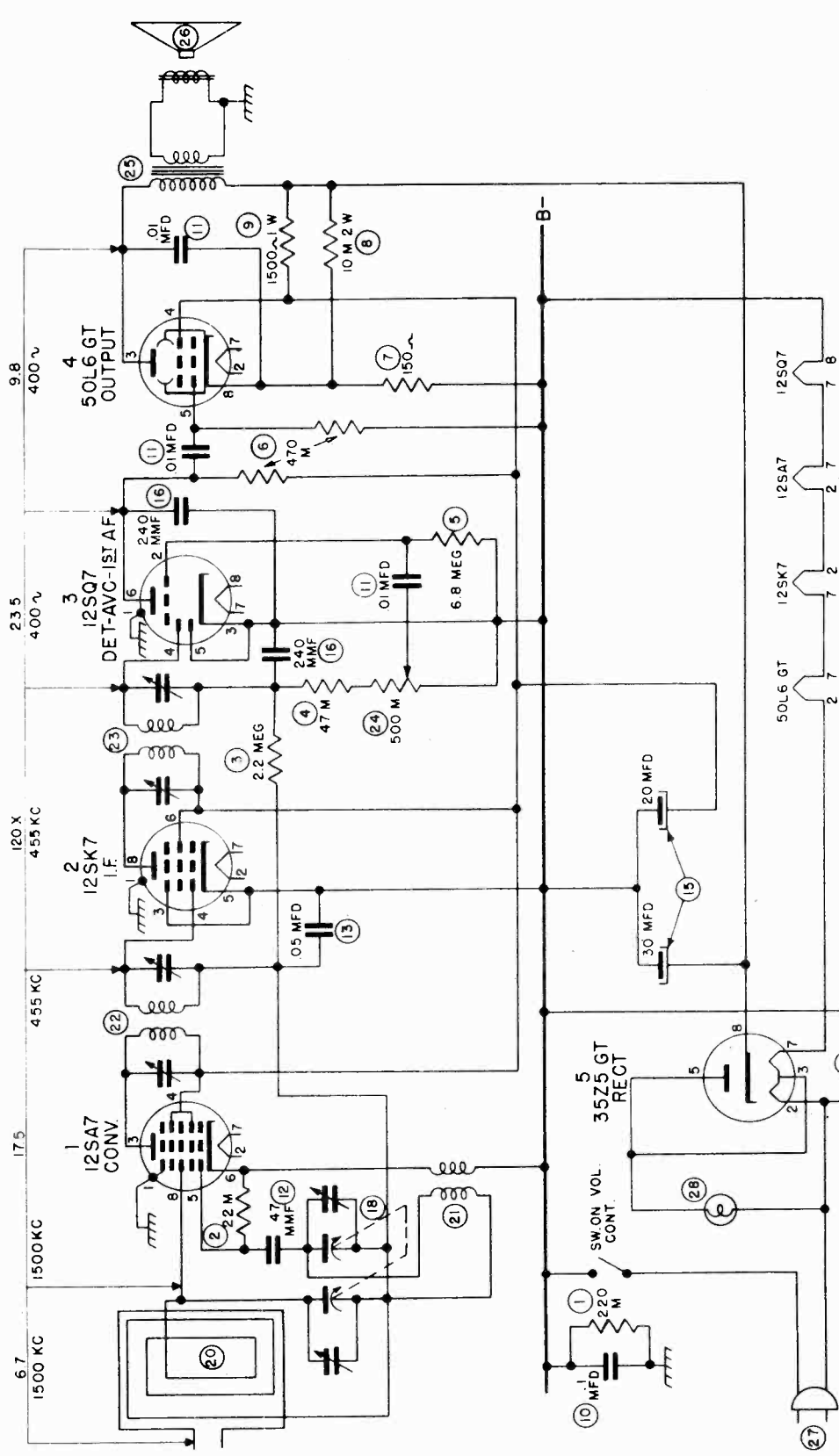
**SPEAKER RESPONSE**

If a receiver is encountered with exhibits "flat" tonal quality, the back cover should be removed and the speaker observed for clearance from the cabinet front. It should be tight against the cabinet. Should a recessed condition be found, remove the chassis and place a suitable number of washers between the speaker frame and mounting bracket.

**DESCRIPTION**

Ref. No.	Part No.	DESCRIPTION
1	77217	470 M ohm resistor
2	77216	220 M ohm resistor
3	77214	100 M ohm resistor
4	77059	47 ohm wire wound resistor
5	77272	4.7 megohm resistor
6	77270	2.2 megohm resistor
7	77211	4700 ohm resistor
8	77048	Resistor, 700 ohm 3 watt, 1400 ohm 5 watt
9	77262	3000 ohm resistor
10	77355	39 M ohm resistor
11	77214	10 megohm resistor
12	77214	10 megohm resistor
13	77568	330 M ohm resistor
14	25188	100 mfd mica capacitor
15	25182	1 mfd 200 volt capacitor
16	25196	05 mfd 600 volt capacitor
17	25425	10 mfd ceramic capacitor
18	25193	47 mmf mica capacitor
19	25194	47 mmf mica capacitor
20	25193	47 mmf mica capacitor
21	25194	47 mmf mica capacitor
22	25193	47 mmf mica capacitor
23	25185	002 mfd. 600 volt tubular
24	25183	005 mfd. 600 volt tubular
25	25334	50 mfd. 30 mfd. electrolytic capacitor 150 volt
26	25335	100 mfd. electrolytic capacitor 50 volt
27	38710	1st. I.F. Transformer
28	38710	2nd I.F. Transformer
29	38710	Oscillator coil
30	38713	Line cord
31	27415	Gang capacitor and drive drum
32	11843	Selenium rectifier
33	78121	1 megohm volume control
34	78121	A.C. battery switch
35	90222	Output transformer
36	94211	Speaker
37	81159	
38		

1		2		3		4		5	
VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE	VOLTAGE	RESISTANCE
1 0	1 220M	1 0	1 220M	1 0	1 220M	1 0	1 220M	1 0	1 220M
2 24AC	2 24~	2 24AC	2 68MEG	2 24AC	2 68MEG	2 84AC	2 100~	2 17.5AC	2 120~
3 84DC	3 13M	3 0	3 0	3 0	3 0	3 114DC	3 10M	3 106AC	3 120~
4 84DC	4 13M	4 45DC	4 550M	4 45DC	4 550M	4 83DC	4 13M	4 0	4 120~
5 7	5 22M	5 0	5 0	5 0	5 0	5 11DC	5 470M	5 106AC	5 120~
6 0	6 0.7~	6 13M	6 500M	6 50DC	6 500M	6 118DC	6 10M	6 0	6 120~
7 11AC	7 15~	7 40~	7 15~	7 11AC	7 15~	7 34AC	7 40~	7 84AC	7 90~
8 .94DC	8 3MEG	8 13M	8 0	8 0	8 0	8 +6DC	8 150~	8 120DC	8 10M



NOTE: RESISTANCE READINGS IN THE FILAMENT AND B+ CIRCUITS MAY VARY ACCORDING TO THE CONDITION OF THE FILTER CAPACITORS.  
ALL RESISTANCE READINGS MEASURED FROM INDICATED PIN TO B-.

1 ELECTRONIC DESIGN MODEL 100 VOLT-OHM METER USED TO MEASURE ALL VOLTAGE AND RESISTANCE.  
2 SOCKET CONNECTIONS SHOWN ARE BOTTOM VIEWS.  
3 LINE VOLTAGE 117.5 FOR VOLTAGE MEASUREMENTS.  
4 VOLUME CONTROL AT MAX NO SIGNAL APPLIED FOR VOLTAGE MEASUREMENTS.

STAGE GAINS MEASURED WITH AVC MADE INOPERATIVE AND 3 VOLT BATTERY BIAS SUBSTITUTED.  
LOW SIDE OF LOOP PRIMARY RUN TO B-

## ALIGNMENT OF THE RECEIVER

### EQUIPMENT REQUIRED

- Signal generator, calibrated at 455 Kc, 600 Kc, 1500 Kc, and 1625 Kc.
- Output Indicator.
- Isolation Transformer.
- Insulated Screw Driver.

amplitude to provide a readable output on output meter. The use of an excessively strong signal is almost certain to produce misalignment.

An isolation transformer is necessary to avoid any possibility of a short circuit.

Connect the high side of the signal generator to one side of the loop primary through a 200 mmf capacitor. After connecting the other side of the primary to the B-lead, the low side of the generator is applied to the B-lead.

### PRELIMINARY INSTRUCTIONS

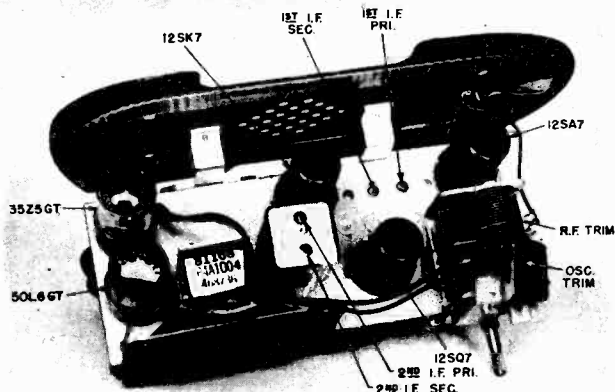
Volume control is set to maximum. All alignment should be done with only sufficient signal

### TABULATION FOR ALIGNMENT

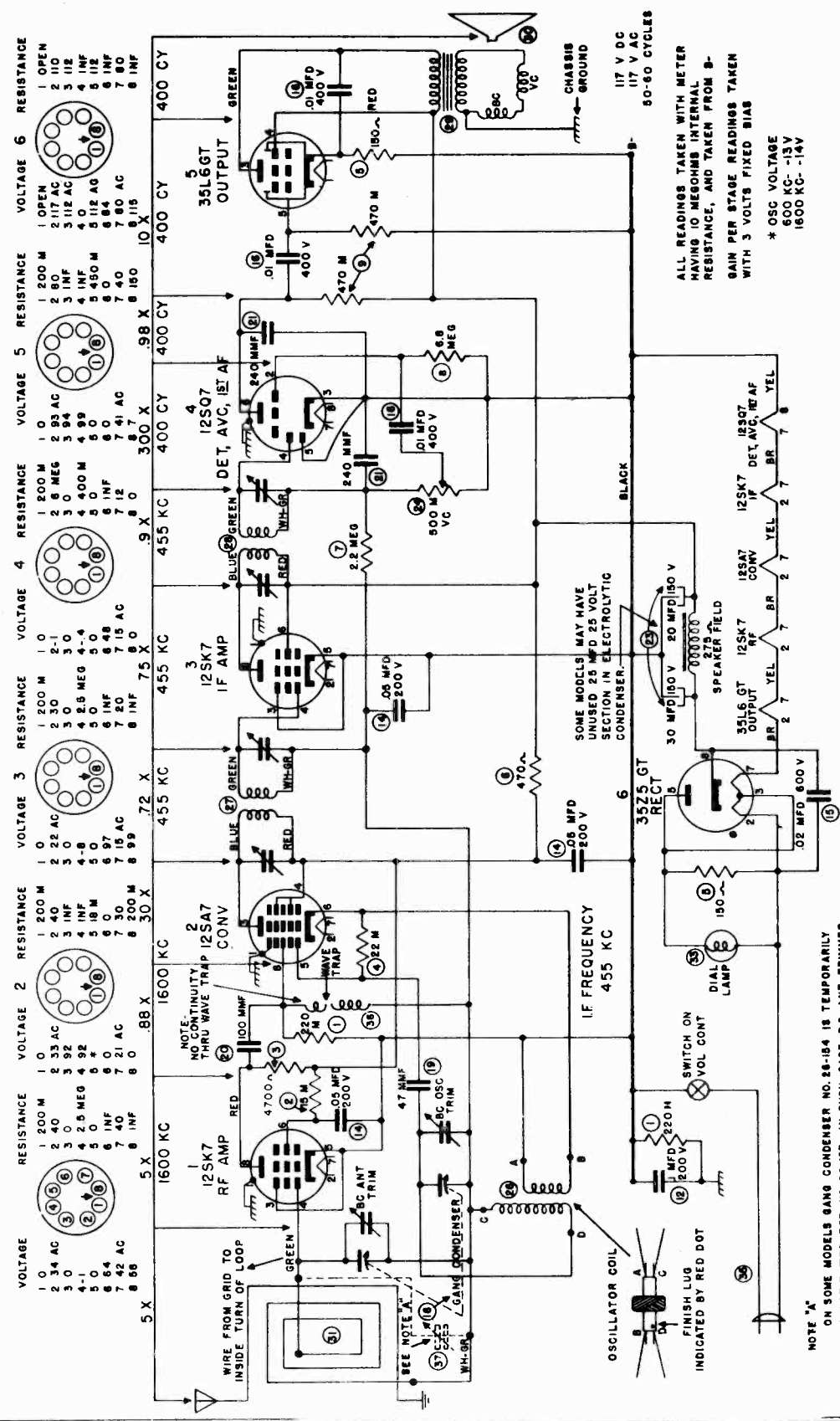
STEPS	CONNECT SIGNAL GENERATOR*	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1		Set Volume Control for Maximum				
2	To Loop Primary through 200 MMF	455 Kc	Minimum Capacity	2nd IF Trimmers	Top of IF Transformer	Maximum Output
3				1st IF Trimmers	See Trimmer Layout	
4		1625 Kc	Minimum Capacity	Oscillator Trimmer	On Tuning Condenser	
5	1500 Kc	1500 Kc	Antenna Trimmer	On Tuning Condenser		

\*See preliminary instructions.

Ref. No.	Part Number	Description	Ref. No.	Part Number	Description
1	77216	220M Ohm Resistor	21	38706	Oscillator Coil
2	77266	22M Ohm Resistor	22	38844	1st IF Transformer
3	77270	2.2 Megohm Resistor	23	38840	2nd IF Transformer
4	77213	47M Ohm Resistor	24	78143	Volume Control
5	77273	6.8 Megohm Resistor	25	94247	Output Transformer
6	77217	470M Ohm Resistor	26	81168	Speaker
7	77259	150 Ohm Resistor	27	27118	Line Cord
8	77427	10M Ohm Resistor, 2 Watt	28	42186	Pilot Lamp (Mazda 47)
9	77342	1500 Ohm Resistor, 1 Watt	13721-1		Tuning Knob Assy. GT-050, GT-052
10	25182	.1 Mfd Paper Capacitor	13721-2		Tuning Knob Assy. GT-051
11	25194	.01 Mfd. Tubular Capacitor, 600 Volts	59499		Volume Control Knob for GT-050, GT-052
12	25426	47 Mmf Ceramic Capacitor	59465		Volume Control Knob GT-051
13	25196	.05 Mfd Tubular Capacitor	31426		Dial Scale
14	25195	.02 Tubular Capacitor, 600 Volts	60594		Dial Background
15	25022	30 Mfd, 20 Mfd, 150 Volt Electrolytic	H-298		Cabinet and Carton GT-050
16	25427	240 Mmf Ceramic Capacitor	H-299		Cabinet and Carton GT-051
18	26239	Gang Tuning Capacitor	H-300		Cabinet and Carton GT-052
20	38866	Loop Antenna and Back Cover			



FARNSWORTH TELEV. & RADIO CORP. MODEL GT-060, GT-061, GT-064, GT-065



VOLTAGE	RESISTANCE	VOLTAGE 2	RESISTANCE	VOLTAGE 3	RESISTANCE	VOLTAGE 4	RESISTANCE	VOLTAGE 5	RESISTANCE	VOLTAGE 6	RESISTANCE
1 0	1 200 M	1 0	1 200 M	1 0	1 200 M	1 0	1 200 M	1 0	1 200 M	1 0	1 200 M
2 34 AC	2 40	2 33 AC	2 40	2 22 AC	2 30	2 25 AC	2 30	2 83 AC	2 80	2 117 AC	2 110
3 0	3 0	3 92	3 0	3 0	3 0	3 0	3 0	3 94	3 180	3 112 AC	3 112
4-1	4 2.5 MEG	4 92	4 2.5 MEG	4-4	4 8	4 8	4 8	4 99	4 450 M	4 0	4 0
5 0	5 0	5 *	5 0	5 0	5 0	5 0	5 0	5 0	5 450 M	5 112 AC	5 112
6 64	6 0	6 21 AC	6 0	6 97	6 0	6 15 AC	6 0	6 48	6 0	6 84	6 112
7 42 AC	7 0	7 21 AC	7 30	7 15 AC	7 20	7 15 AC	7 12	7 40	7 40	7 80	7 80
8 56	8 0	8 0	8 200 M	8 99	8 0	8 99	8 0	8 180	8 180	8 115	8 115
	5 X		1600 KC		72 X		455 KC		300 X		400 CY
			1600 KC		455 KC		455 KC		400 CY		400 CY
			1600 KC		455 KC		455 KC		400 CY		400 CY

ALL READINGS TAKEN WITH METER HAVING 10 MEGOHMS INTERNAL RESISTANCE, AND TAKEN FROM B-GAIN PER STAGE READINGS TAKEN WITH 5 VOLTS FIXED BIAS

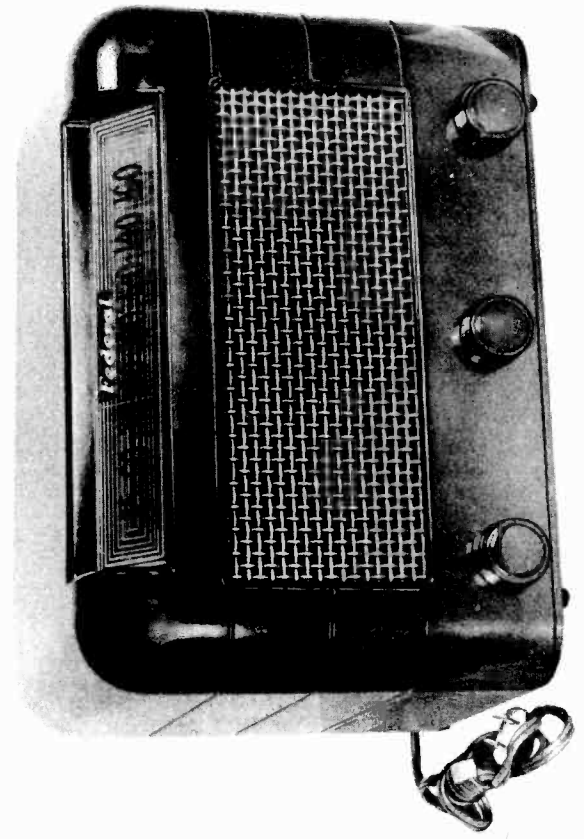
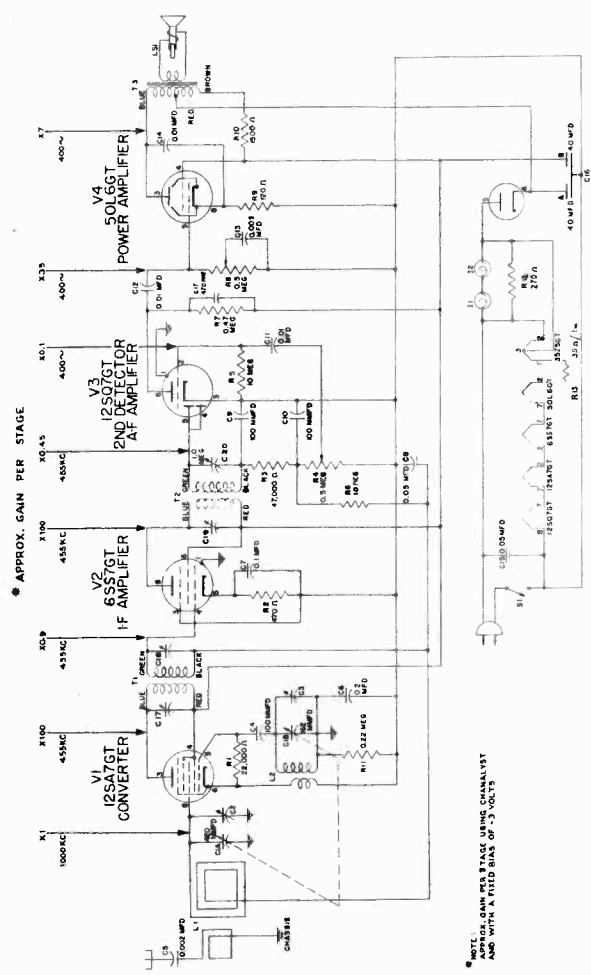
\* OSC VOLTAGE  
800 KC - -13V  
1600 KC - -14V

SOME MODELS MAY HAVE UNUSED 25 MFD 25 VOLT SECTION IN ELECTROLYTIC CONDENSER.

NOTE 1\*  
ON SOME MODELS GANG CONDENSER NO. 28-184 IS TEMPORARILY SUBSTITUTED FOR NO. 28-183. IN SUCH CASE B.C. ANT. TRIMMER WILL BE FOUND ON LOOP.

For alignment and additional data, see Model ET-064 on pages 15-5, 15-6, and 15-7 of Rider's Volume XV.



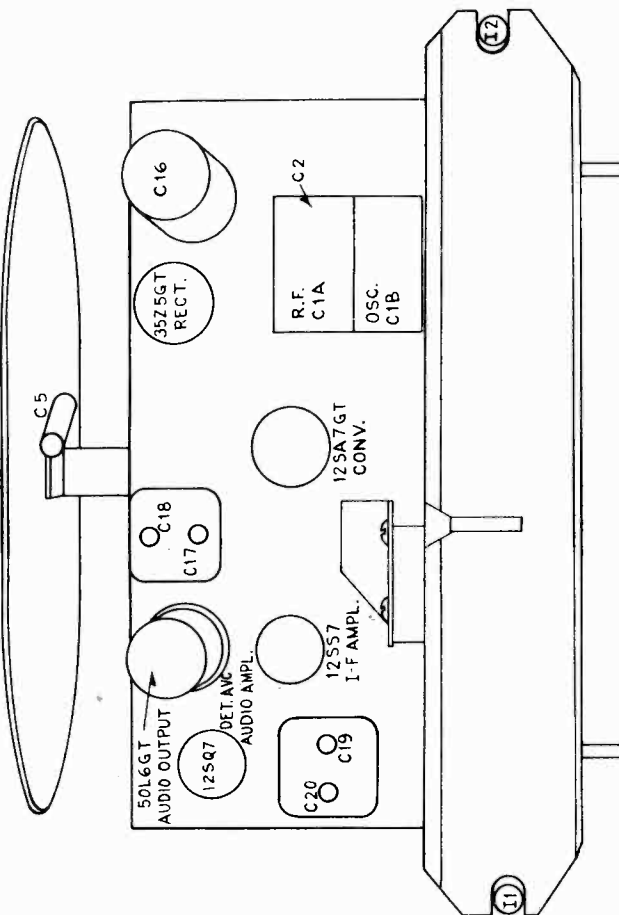


ALIGNMENT

The chassis is removed from the cabinet in order to align this receiver.

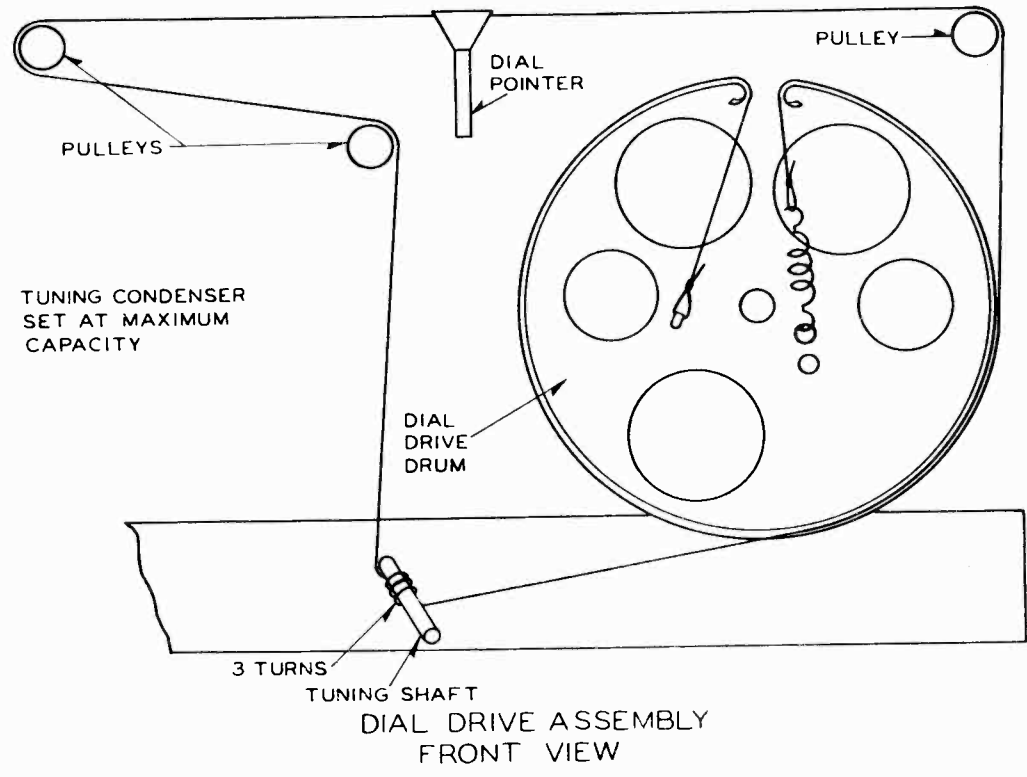
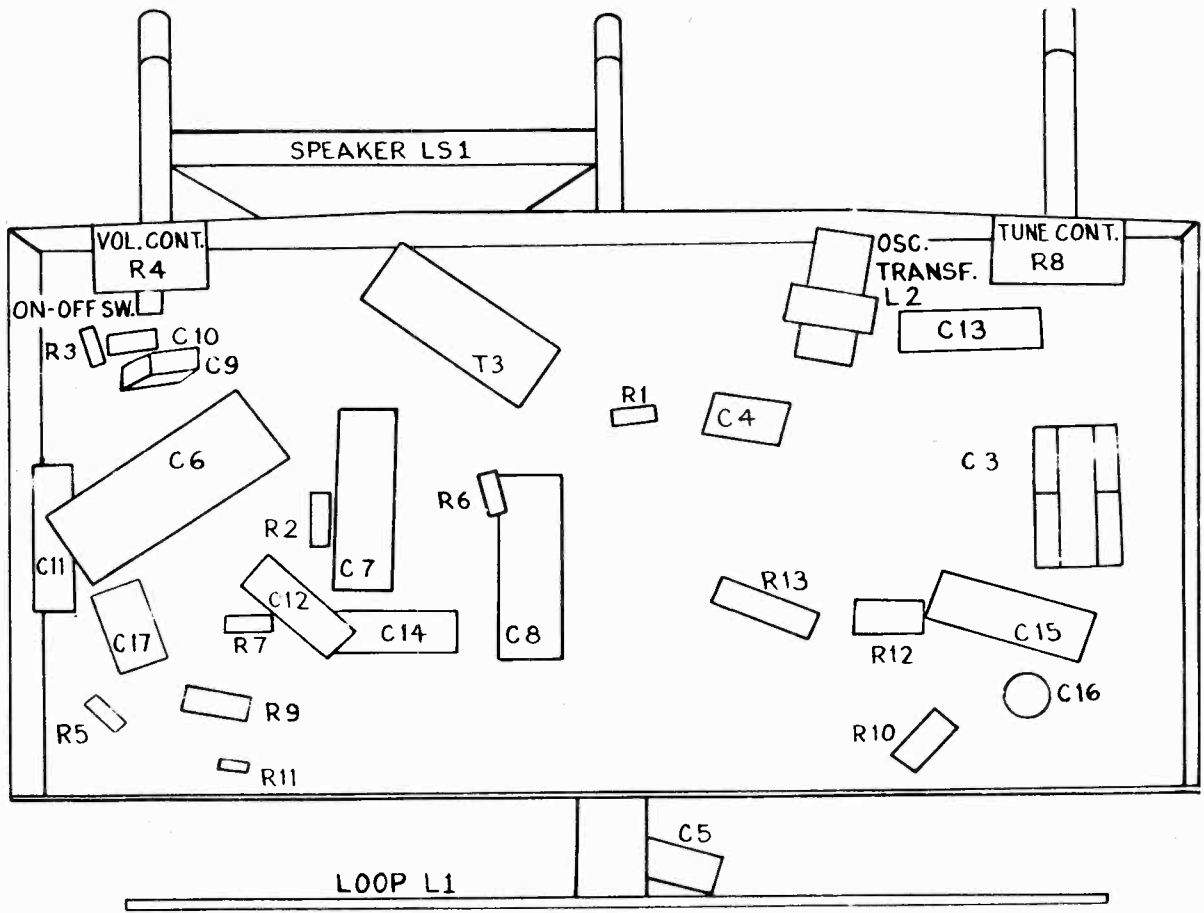
Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltime loop, Model 1150, and couple loosely to the receiver loop. Set the receiver volume control to maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should be sufficient to give a readable deflection on the output meter.

Set the signal generator to 455 kc. Adjust the i.f. trimmers, C20, C19, C18, and C17, for maximum output on the output meter. Set the signal generator and receiver to 1600 kc and adjust oscillator trimmer C3 (underneath the chassis) for maximum output. Set the signal generator and receiver to 1400 kc and adjust r.f. trimmer C2 for maximum output.

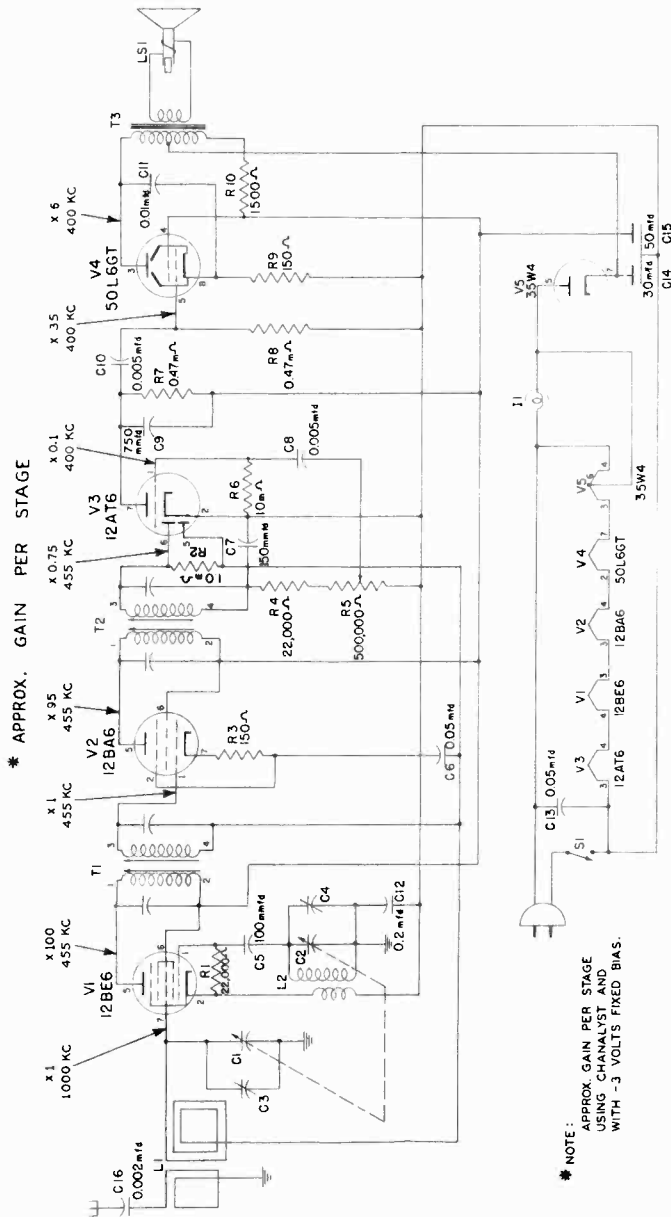


TUBE	PIN	VTVM	20,000-Ω P.V.	1,000-Ω P.V.	RESISTANCE
12SA7GT Conv	1	0	0	0	220 K
	2	AC	AC	AC	34 Ω
	3	88	88	88	Over 5 megs
	4	88	88	88	Over 5 megs
	5	-6	-6	-2	24 K
	6	0	0	0	0.4 Ω
	7	AC	AC	AC	14 Ω
	8	-0.3	-0.2	0	1.4 Ω
6SS7GT IF Ampl	1	0	0	0	220 K
	2	AC	AC	AC	28 Ω
	3	0	0	0	0
	4	-0.3	-0.2	0	1.4 megs
	5	2.7	2.7	2.7	440 Ω
	6	88	88	88	Over 5 megs
	7	AC	AC	AC	32 Ω
	8	88	88	88	Over 5 megs
12SQ7GT Det. A.V.C. Audio Ampl	1	0	0	0	220 K
	2	-0.7	-0.5	-0.2	10 megs
	3	0	0	0	0
	4	-0.3	-0.3	-0.2	550 K
	5	-0.3	-0.3	-0.2	550 K
	6	48	48	16	Over 5 megs
	7	AC	AC	AC	14 Ω
	8	0	0	0	220 K
50L6GT Audio Output	1	-	-	-	-
	2	AC	AC	AC	32 Ω
	3	120	120	120	Over 5 megs
	4	88	88	88	Over 5 megs
	5	0	0	0	400 K
	6	0	0	0	0
	7	AC	AC	AC	90 Ω
	8	4.7	4.7	4.7	125 Ω
35Z5GT	1	-	-	-	-
	2	AC	AC	AC	150 Ω
	3	AC	AC	AC	146 Ω
	4	88	88	88	Over 5 megs
	5	AC	AC	AC	146 Ω
	6	125	125	125	Over 5 megs
	7	AC	AC	AC	130 Ω
	8	125	125	125	Over 5 megs

NOTE: All voltage and resistance measurements made with respect to B- and with a line voltage of 116 V.A.C.

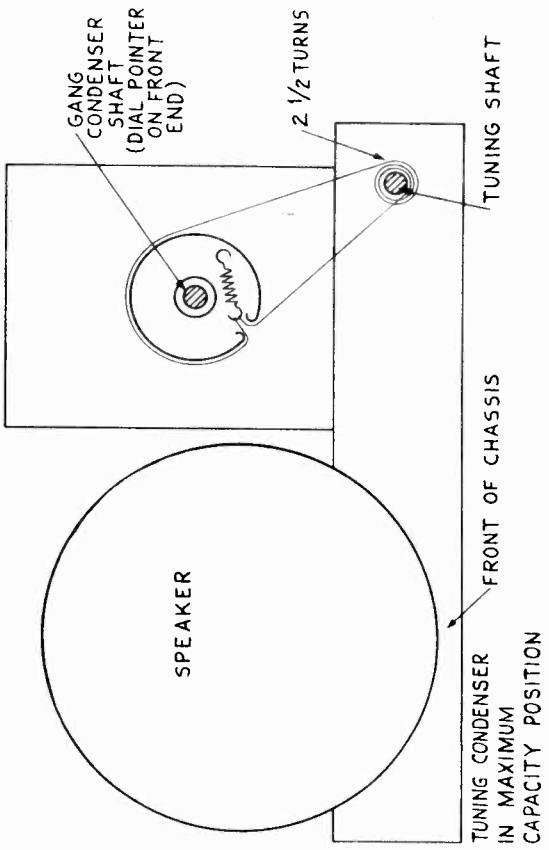
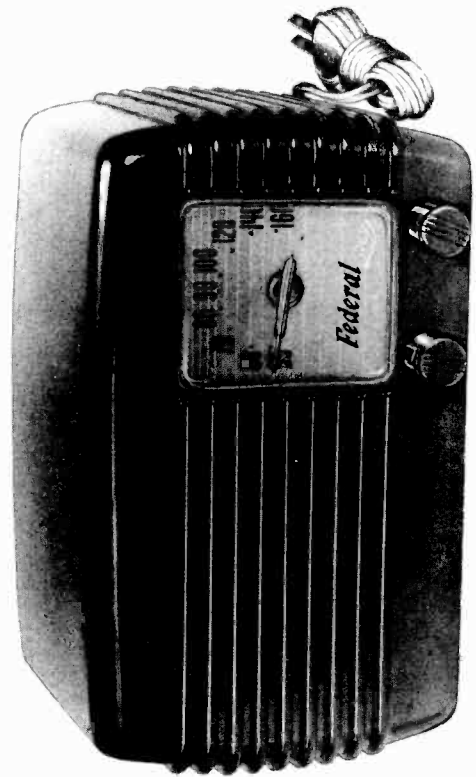






\* APPROX. GAIN PER STAGE

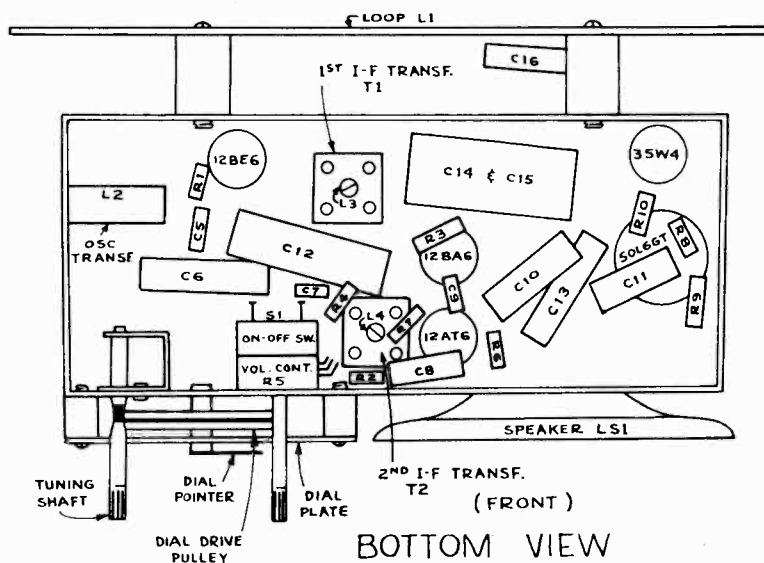
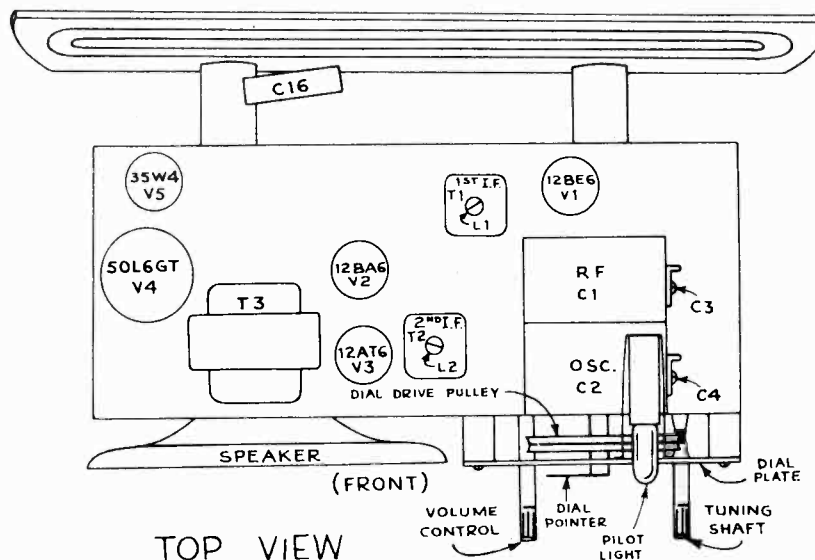
\* NOTE: APPROX. GAIN PER STAGE USING CHANNELYST AND WITH -3 VOLTS FIXED BIAS.



## FEDERAL TELEPHONE AND RADIO CORP. MODEL 1040TB

TUBE	PIN	VTVM	20,000 $\Omega$ P.V.	1,000 $\Omega$ P.V.	RESISTANCE
12BE6 Conv	1	-7	-7	-3.5	25 K
	2	0	0	0	0.5
	3	AC	AC	AC	34 $\Omega$
	4	AC	AC	AC	18 $\Omega$
	5	92	92	92	Over 5 megs
	6	92	92	92	Over 5 megs
	7	-0.6	-0.4	-0.1	1.5 megs
12BA6 I.F. Ampl	1	-0.6	-0.4	-0.1	1.5 megs
	2	0	0	0	0
	3	AC	AC	AC	24 $\Omega$
	4	AC	AC	AC	36 $\Omega$
	5	92	92	92	Over 5 megs
	6	92	92	92	Over 5 megs
	7	1.3	1.3	1.3	160 $\Omega$
12AT6 Det. AVC Audio Ampl	1	-1.4	-0.6	-0.4	10 megs
	2	0	0	0	0
	3	0	0	0	0
	4	AC	AC	AC	12 $\Omega$
	5	-0.6	-0.4	-0.1	1.5 megs
	6	-0.5	-0.4	-0.1	500 K
	7	44	42	16	Over 5 megs
50L6GT Audio Output	1	0	0	0	0
	2	AC	AC	AC	34 $\Omega$
	3	110	110	110	Over 5 megs
	4	92	92	92	Over 5 megs
	5	0	0	0	400 K
	6	120	120	120	Over 5 megs
	7	AC	AC	AC	85 $\Omega$
	8	5.5	5.5	5.5	150 $\Omega$
35W4 Rect	1	-	-	-	-
	2	-	-	-	-
	3	AC	AC	AC	85 $\Omega$
	4	AC	AC	AC	112 $\Omega$
	5	AC	AC	AC	110 $\Omega$
	6	AC	AC	AC	110 $\Omega$
	7	120	120	120	Over 5 megs

NOTE: All voltage and resistance measurements made with respect to B- and with a line voltage of 116 V.A.C.



## ALIGNMENT

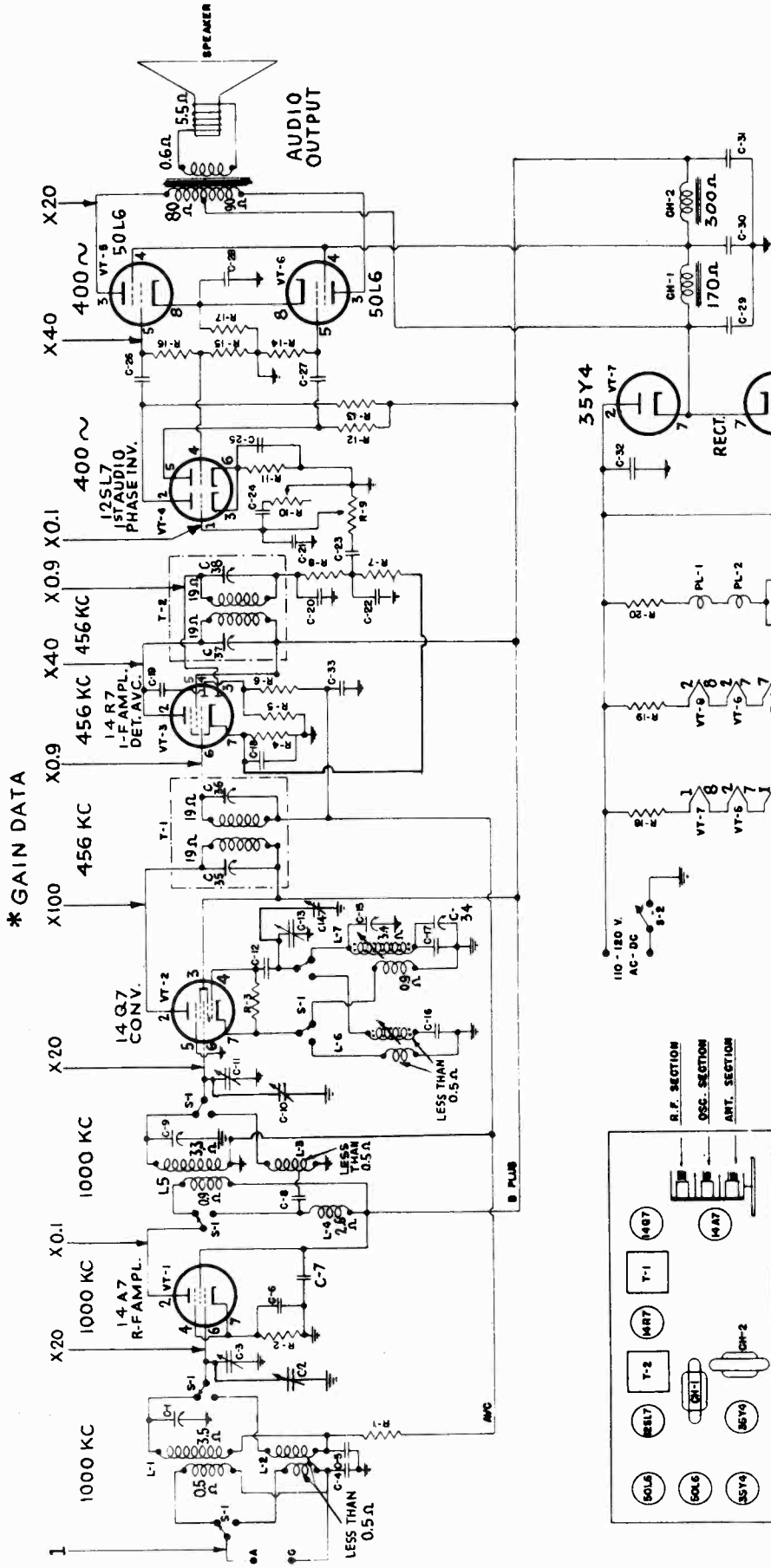
The chassis is removed from the cabinet in order to align this receiver.

Connect the output meter across the voice coil. Connect the signal generator to the standard Hazeltine loop, Model 1150, and couple loosely to the receiver loop. Set the receiver volume control to maximum. The tuning condenser plates should be fully meshed when the dial pointer is at the index mark at the low frequency end of the dial. The signal generator output should be sufficient to give a readable deflection on the output meter.

Set the signal generator to 455 kc. Adjust the I.F. tuning slugs, L4, L3, L2, L1, for maximum output on the output meter. Set the signal generator and receiver to 1600 kc and adjust the oscillator trimmer C4 for maximum output. Set the signal generator and receiver to 1400 kc and adjust R.F. trimmer C3 for maximum output.

FERRAR RADIO AND TELEV. CORP.

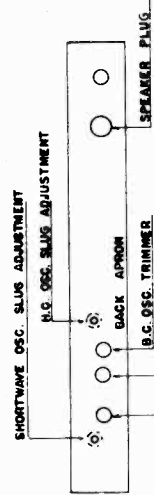
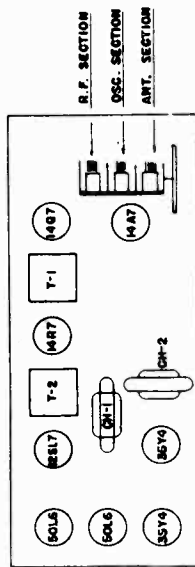
MODEL C81B



\* GAIN DATA

1000 KC X20  
 1000 KC X0.1  
 456 KC X0.9  
 456 KC X40  
 400 ~ X40  
 400 ~ X20

\* NOTE: APPROX. GAIN PER STAGE USING CHANNELYST AND WITH A FIXED BIAS OF -3V.



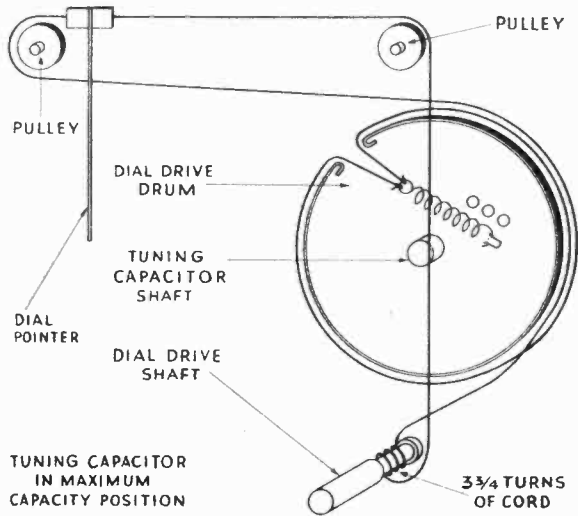
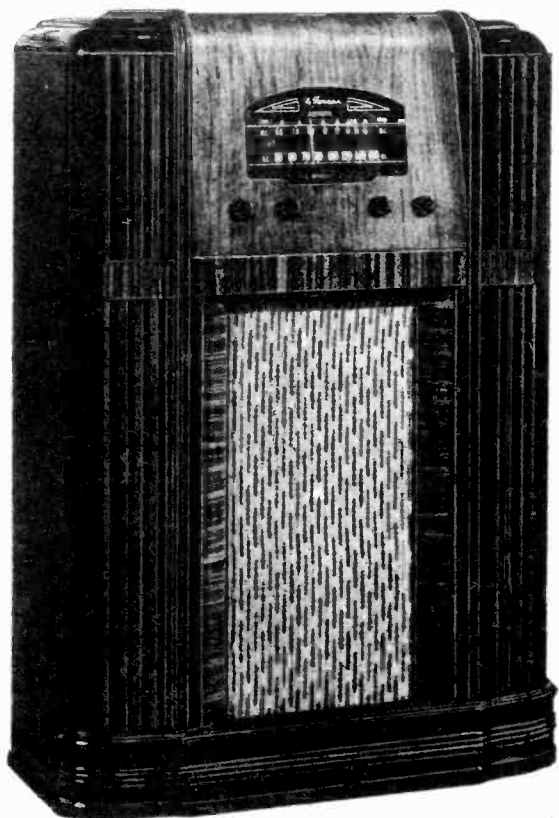
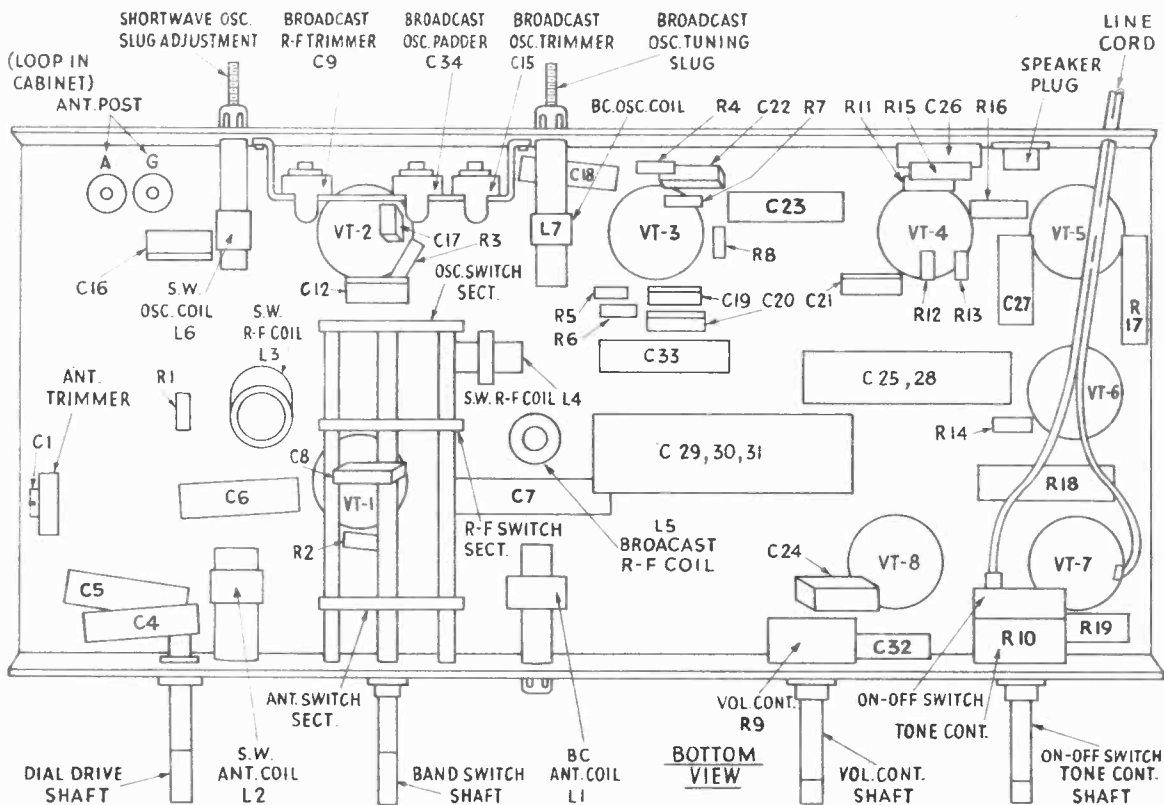
NOTE - SHORTWAVE TRIMMERS LOCATED ON VARIABLE CONDENSER ALIGNMENT OF S.W. BAND MUST BE COMPLETED BEFORE LIVING UP B.C. BAND

ALIGNMENT PROCEDURE

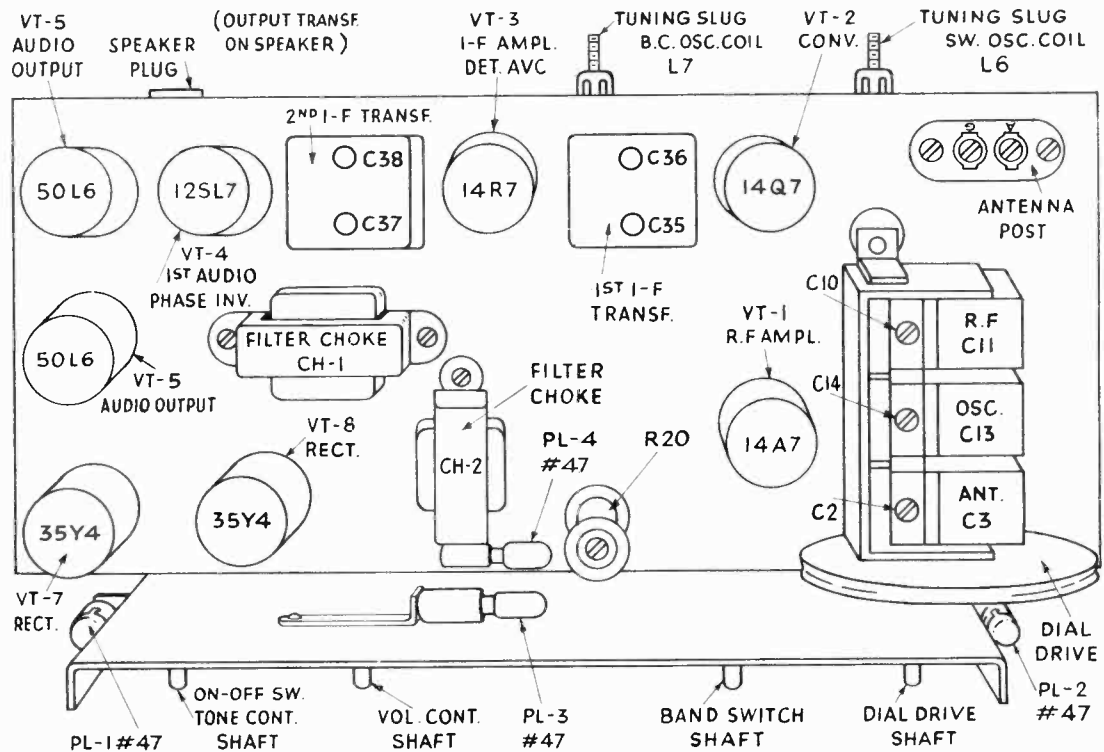
- I.F. - 456 KC.
- SHORTWAVE BAND - SET OSCILLATOR TRIMMER AND TRIM AT 16.0 MC. ADJUST CENTER OF BAND WITH SLUG FIXED PADDER TAKES CARE OF LOW FREQUENCY END.
- BROADCAST BAND - SET OSCILLATOR AT 1600 KC, TRIM AT 1450 KC ADJUST CENTER OF BAND WITH SLUG PADDER ADJUSTED AT 600 KC

MODEL C81B

FERRAR RADIO AND TELEV. CORP.



FERRAR RADIO AND TELEV. CORP.



TOP VIEW OF CHASSIS

- |                        |                         |
|------------------------|-------------------------|
| R1 - 100 K             | C10 - RF Trimmer (SW)   |
| R2 - 300 OHM           | C11 - RF Var. Cap.      |
| R3 - 20 K              | C12 - 50 uuf            |
| R4 - 510 OHM           | C13 - Osc. Var. Cap.    |
| R5 - 1 MEG             | C14 - Osc. Trimmer (SW) |
| R6 - 1 MEG             | C15 - Osc. Trimmer (BC) |
| R7 - 500 K             | C16 - .005 uf           |
| R8 - 50 K              | C17 - 450 uuf           |
| R9 - 500 K VOL. CONT.  | C18 - 0.1 uf            |
| R10 - 500 K TONE CONT. | C19 - 100 uuf           |
| R11 - 12 K             | C20 - 50 uuf            |
| R12 - 250 K            | C21 - 500 uuf           |
| R13 - 250 K            | C22 - 100 uuf           |
| R14 - 500 K            | C23 - .05 uf            |
| R15 - 15 K             | C24 - .006 uf           |
| R16 - 470 K            | C25 - 25 uf             |
| R17 - 100 OHM          | C26 - .006 uf           |
| R18 - 47 OHM           | C27 - .006 uf           |
| R19 - 47 OHM           | C28 - 25 uf             |
| R20 - 80 OHM           | C29 - 30 uf             |
| C1 - Ant. Trimmer (BC) | C30 - 40 uf             |
| C2 - Ant. Trimmer (SW) | C31 - 40 uf             |
| C3 - Ant. Var. Cap.    | C32 - 0.1 uf            |
| C4 - 0.01 uf           | C33 - 0.1 uf            |
| C5 - 0.1 uf            | C34 - Osc. Padder (BC)  |
| C6 - 0.1 uf            | 35 - IF Trimmer         |
| C7 - 0.25 uf           | 36 - IF TRImmer         |
| C8 - 100 uuf           | 37 - IF Trimmer         |
| C9 - RF Trimmer (BC)   | 38 - IF Trimmer         |

MODEL C81B

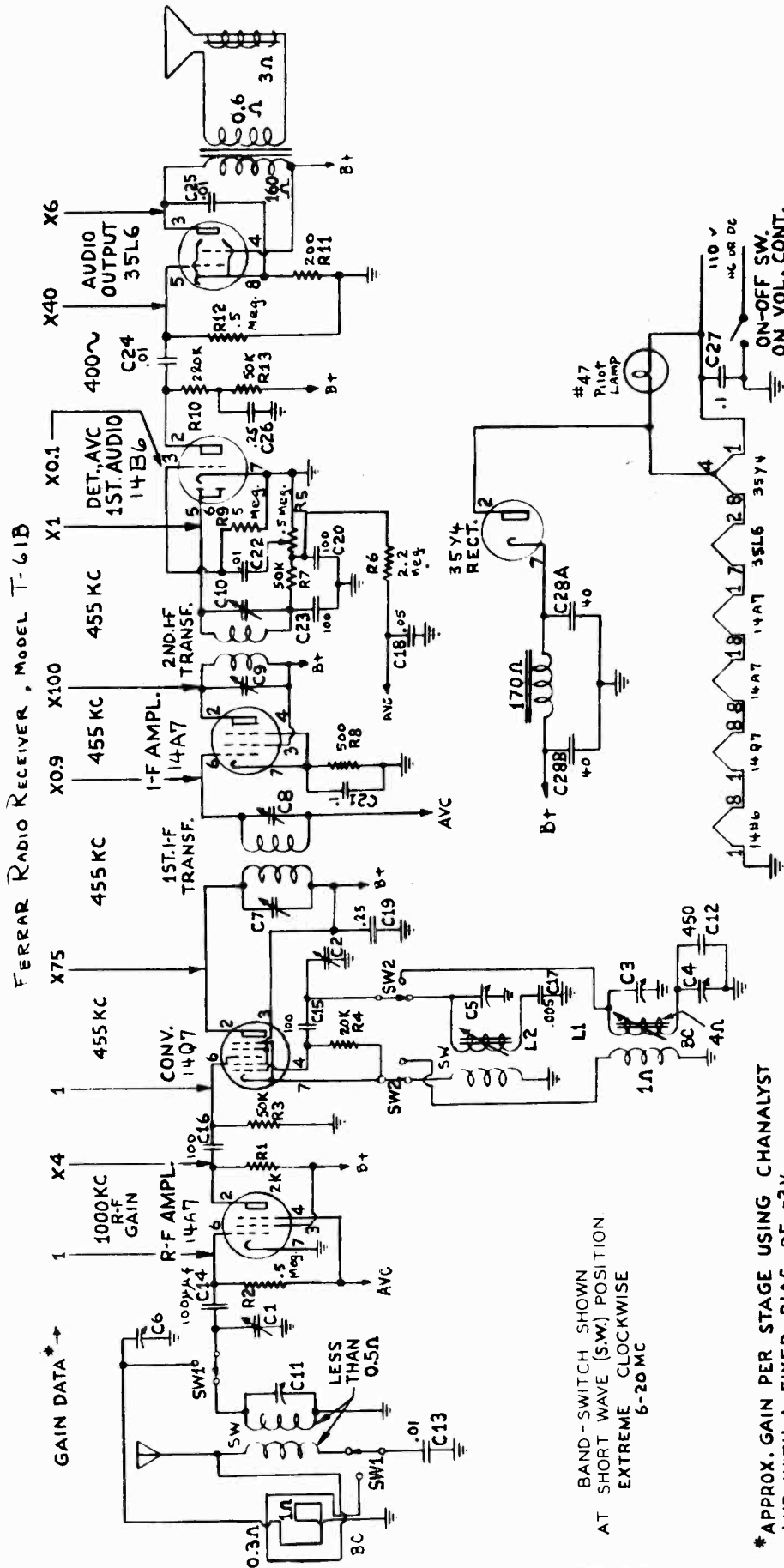
FERRAR RADIO AND TELEV. CORP.

TUBE	PIN	VTVM	20,000 V	1,000 V	RESISTANCE	TUBE	PIN	VTVM	20,000 V	1,000 V	RESISTANCE
VT-1 14A7 RF AMPF.	1	AC	AC	AC	43 OHM	VT-6	1	0	0	0	0
	2	+105	+105	+105	OVER 500 K	50L6	2	AC	AC	AC	+55 OHM
	3	+105	+105	+105	OVER 500 K	AUDIO OUTPUT	3	+117	+117	+117	OVER 500 K
	4	+3.5	+3.5	+3.5	300 OHM	(Push-Pull)	4	+115	+115	+115	OVER 500 K
	5	0	0	0	0		5	0	0	0	560 K
	6	0	0	0	2 MEG		6	--	--	--	--
	7	+3.5	+3.5	+3.5	300 OHM		7	AC	AC	AC	24 OHM
	8	AC	AC	AC	16 OHM		8	+9	+9	+9	110 OHM
VT-2 14Q7 CONV.	1	AC	AC	AC	16 OHM	VT7	1	AC	AC	AC	68 OHM
	2	+105	+105	+105	OVER 500 K	35Y4	2	AC	AC	AC	70 OHM
	3	+105	+105	+105	OVER 500 K	RECT.	3	--	--	--	--
	4						4	--	--	--	--
	5	550 KC	-6.5	-3.7	2.2 MEG		5	--	--	--	0
	6	1600 KC	-10	-9.3	2.2 MEG		6	--	--	--	0
	7	6 MC	-5.5	-1.2	2.2 MEG		7	+120	+120	+120	OVER 500 K
	8	20 MC	-12.5	-0.2	2.2 MEG		8	AC	AC	AC	55 OHM
OSC. VOLT. BC SW	1	AC	AC	AC	1 OHM	VT-8	1	AC	AC	AC	68 OHM
	2				2 MEG	35Y4	2	AC	AC	AC	70 OHM
	3				1 OHM	RECT.	3	--	--	--	--
	4				0		4	--	--	--	--
	5		0	0	13 OHM		5	0	0	0	0
	6		-0.7	-0.3	OVER 500 K		6	--	--	--	0
	7		0	0	600 K		7	+120	+120	+120	OVER 500 K
	8		)	0	1 MEG		8	AC	AC	AC	55 OHM
VT-3 14R7 IF AMP. DET. AVC	1	AC	AC	AC	OVER 500 K	VT-5	1	0	0	0	0
	2	+105	+105	+105	OVER 500 K	12SL7	2	AC	AC	AC	57 OHM
	3	+1.1	+0.3	0	600 K	1st AUDIO	3	+110	+110	+110	OVER 500 K
	4	-0.3	-0.3	0	1 MEG	(PUSH-PULL)	4	+105	+105	+105	OVER 500 K
	5	+105	+105	+105	OVER 500 K		5	0	0	0	500 K
	6	0.2	0	0	2 MEG		6	--	--	--	--
	7	+1.6	+1.6	+1.4	530 OHM		7	AC	AC	AC	24 OHM
	8	0	0	0	0		8	+9	+9	+9	110 OHM
VT-4 12SL7 1st AUDIO PHASE INV.	1	0	0	0	48 OHM		1	0	0	0	0
	2	+88	+86	+32	OVER 500 K		2	--	--	--	--
	3	+1.6	+1.6	+1.3	110 K		3	AC	AC	AC	24 OHM
	4	0	0	0	150 K		4	+9	+9	+9	110 OHM
	5	+88	+86	+33	OVER 500 K		5	--	--	--	--
	6	+1.6	+1.6	+1.3	110 K		6	AC	AC	AC	24 OHM
	7	AC	AC	AC	24 OHM		7	--	--	--	--
	8	AC	AC	AC	12 OHM		8	+9	+9	+9	110 OHM

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C. BAND SWITCH IN BROADCAST POSITION.

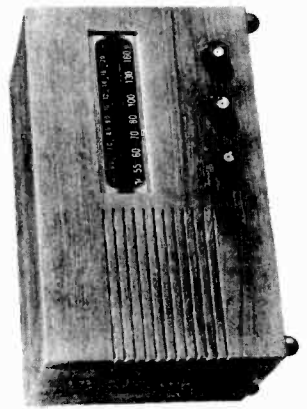
FERRAR RADIO AND TELEV. CORP.

MODEL T61B



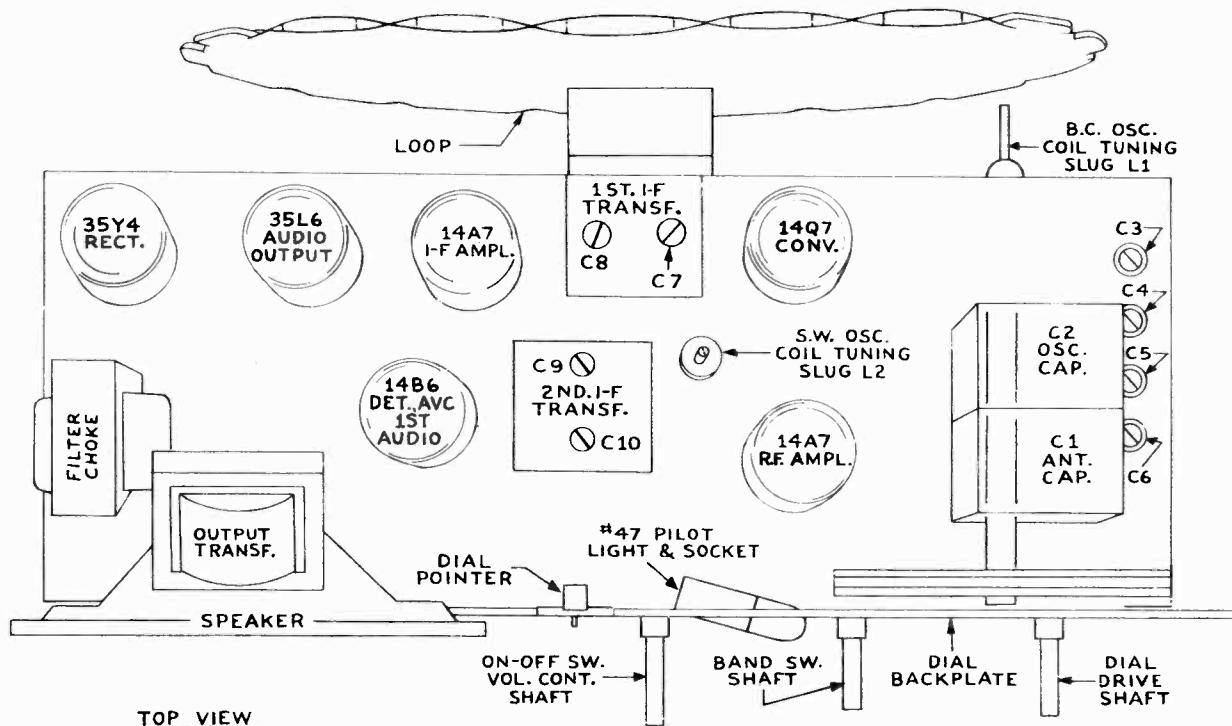
BAND-SWITCH SHOWN AT SHORT WAVE (SW) POSITION EXTREME CLOCKWISE 6-20 MC

\* APPROX. GAIN PER STAGE USING CHANALYST AND WITH A FIXED BIAS OF -3V.





## FERRAR RADIO AND TELEV. CORP.

IF ALIGNMENT

CONNECT OUTPUT METER ACROSS THE VOICE COIL. CONNECT SIGNAL GENERATOR TO STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO RECEIVER LOOP. SET THE SIGNAL GENERATOR TO 456 KC AND FULLY MESH RECEIVER TUNING CAPACITOR. KEEP OUTPUT OF SIGNAL GENERATOR SUFFICIENT TO GIVE READABLE DEFLECTION ON OUTPUT. KEEP RECEIVER VOLUME CONTROL AT MAXIMUM. ADJUST FOR MAXIMUM OUTPUT IF TRIMMERS C10, C9, C8, C7.

RF OSC. ALIGNMENT (BC BAND)

KEEPING SAME SETUP AS USUAL FOR IF ALIGNMENT TUNE SIGNAL GENERATOR AND RECEIVER TO 1600 KC. ADJUST OSC. TRIMMER C3 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 1000 KC AND ADJUST TUNING SLUG L1 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST LOW FREQUENCY PADDER C4 FOR MAXIMUM WHILE ROCKING MAIN TUNING CAPACITOR. TUNE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANT. TRIMMER C6 FOR MAXIMUM OUTPUT.

RF OSC. ALIGNMENT (SW BAND)

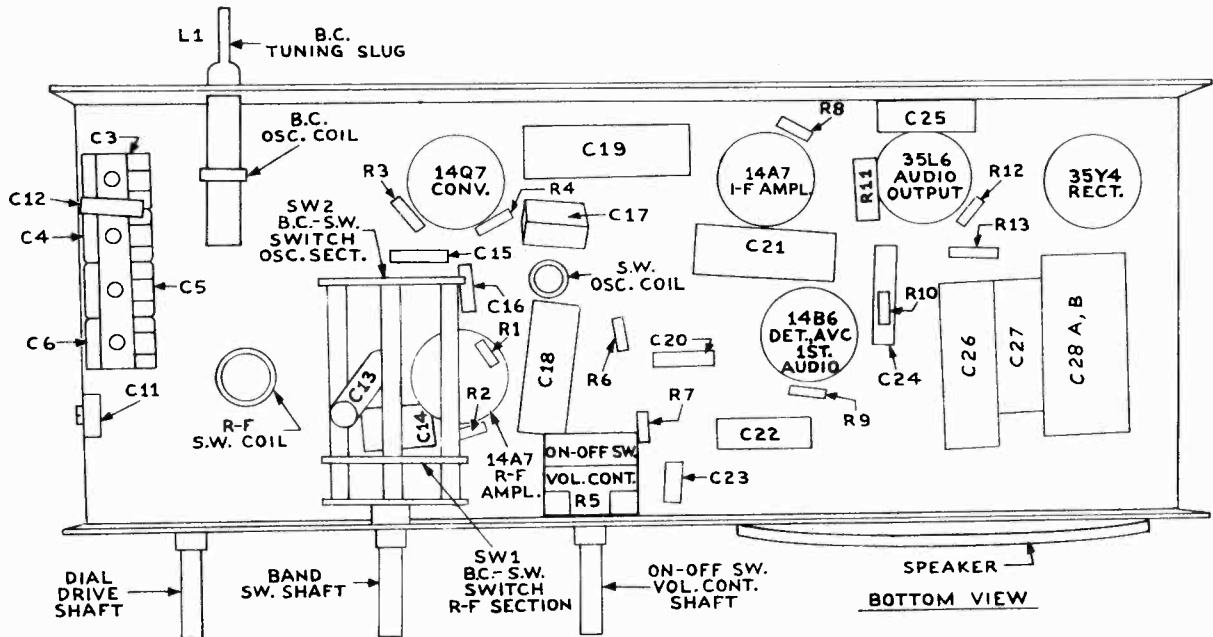
KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 18 MC. ADJUST SW OSC. TRIMMER C5 FOR MAXIMUM OUTPUT. TUNE SIGNAL GENERATOR AND RECEIVER TO 10 MC. ADJUST TUNING SLUG L2 FOR MAXIMUM OUTPUT. SET SIGNAL GENERATOR AND RECEIVER TO 16 MC. AND ADJUST ANT. TRIMMER C11 FOR MAXIMUM OUTPUT.

FERRAR RADIO AND TELEV. CORP.

FERRAR MODEL T-61B

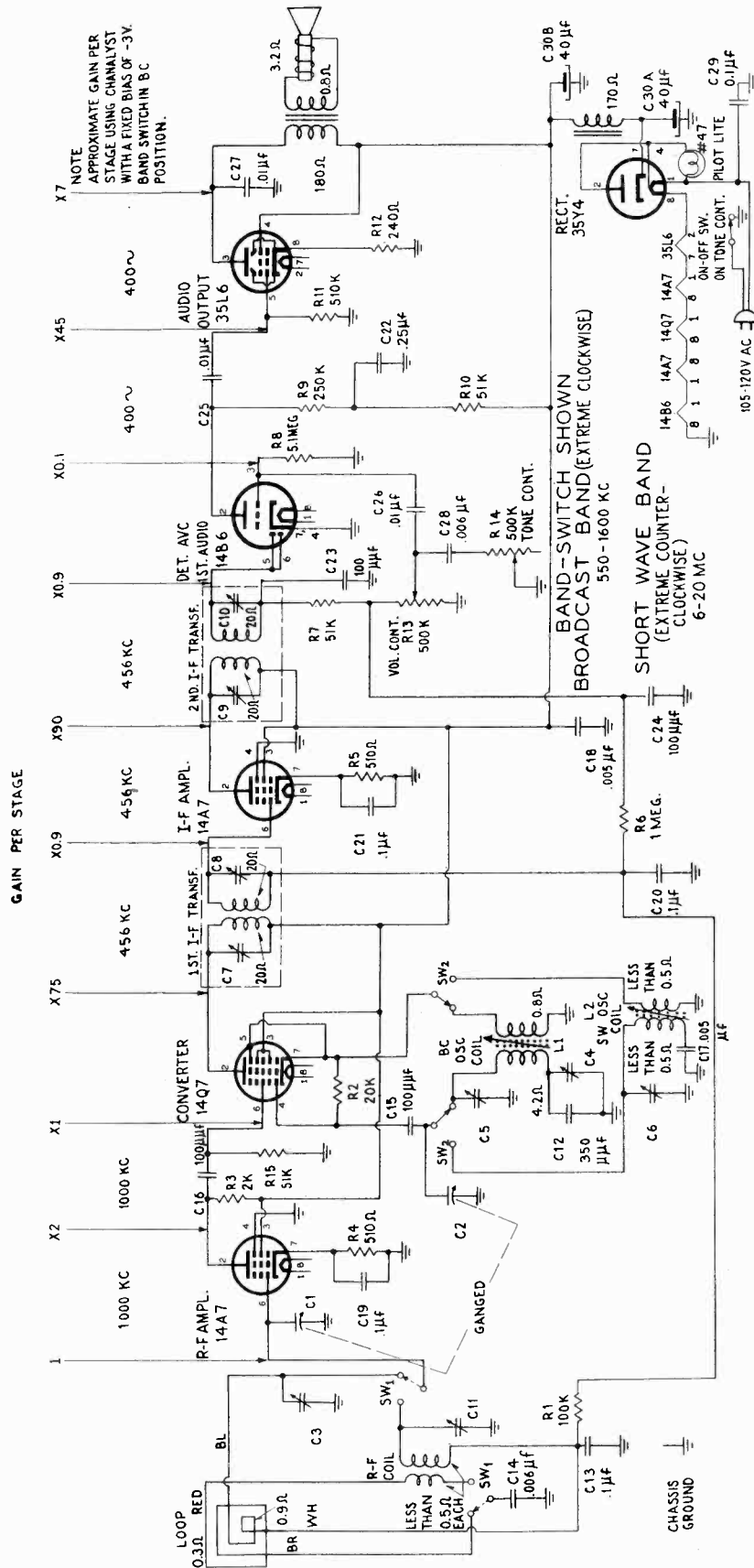
TUBE	PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE	TUBE	PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE	
14A7 RF. AMP.	1	AC	AC	AC	46 OHM	35L6 AUDIO OUTPUT	1	0	0	0	0	
	2	+78V	+78V	+78V	OVER 500 K		2	AC	AC	AC	AC	85 OHM
	3	+100	+100	+100	OVER 500 K		3	+85	+85	+85	+85	OVER 500 K
	4	-0.7	-0.2	0	2.8 MEG		4	+90	+90	+90	+90	OVER 500 K
	5	0	0	0	0		5	--	--	--	--	500 K
	6	-0.7	-0.2	0	3.3 MEG		6	--	--	--	--	52 OHM
	7	0	0	0	0		7	AC	AC	AC	AC	200 OHM
	8	AC	AC	AC	AC		8	+6.5	+6.5	+6.5	+6.5	200 OHM
14Q7 CONV.	1	AC	AC	AC	14 OHM	35Y4 RECT.	1	AC	AC	AC	AC	115 OHM
	2	+100	+100	+100	OVER 500 K		2	AC	AC	AC	AC	112 OHM
	3	+100	+100	+100	OVER 500 K		3	--	--	--	--	--
	4						4	AC	AC	AC	AC	112 OHM
OSC. VOLT	AC	550 KC	-6.0	-4.6	-2.8	20 K	5	--	--	--	--	
		1600 KC	-8.5	-6.0	-4.5	20 K	6	AC	AC	AC	AC	Infinite
	SA	6 KC	-6.0	-1.8	-1.0	20 K	7	+110	+110	+110	+110	OVER 500 K
		20 MC	-12.0	-1.0	-0.1	20 K	8	AC	AC	AC	AC	85 OHM
			0	0	0	1.4 OHM						
			0	0	0	50 K						
			-1	-0.3	-0.1	1.4 OHM						
			0	0	0	25 OHM						
14A7 IF AMP.	1	AC	AC	AC	52 OHM	14B6 DET. AVC 1ST. AUDIO	1	AC	AC	AC	AC	115 OHM
	2	+100	+100	+100	OVER 500 K		2	AC	AC	AC	AC	112 OHM
	3	+100	+100	+100	OVER 500 K		3	--	--	--	--	--
	4	+3.3	+3.3	+3.3	500 OHM		4	AC	AC	AC	AC	112 OHM
	5	0	0	0	0		5	--	--	--	--	--
	6	-0.7	-0.2	0	2.8 MEG		6	AC	AC	AC	AC	Infinite
	7	+3.3	+3.3	+3.3	500 OHM		7	+110	+110	+110	+110	OVER 500 K
	8	AC	AC	AC	46 OHM		8	AC	AC	AC	AC	85 OHM
14B6 DET. AVC. 1st AUDIO	1	0	0	0	0	35Y4 RECT.	1	AC	AC	AC	AC	115 OHM
	2	+54	+54	+28	OVER 500 K		2	AC	AC	AC	AC	112 OHM
	3	-0.9	-0.6	-0.3	5 MEG		3	--	--	--	--	--
	4	0	0	0	0		4	AC	AC	AC	AC	112 OHM
	5	-0.85	-0.7	-0.4	400 K		5	--	--	--	--	--
	6	-0.85	-0.7	-0.4	400 K		6	AC	AC	AC	AC	Infinite
	7	0	0	0	0		7	+110	+110	+110	+110	OVER 500 K
	8	AC	AC	AC	14 OHM		8	AC	AC	AC	AC	85 OHM

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE SUPPLY VOLTAGE OF 116 V.A.C. BAND SWITCH IN BROADCAST BAND POSITION

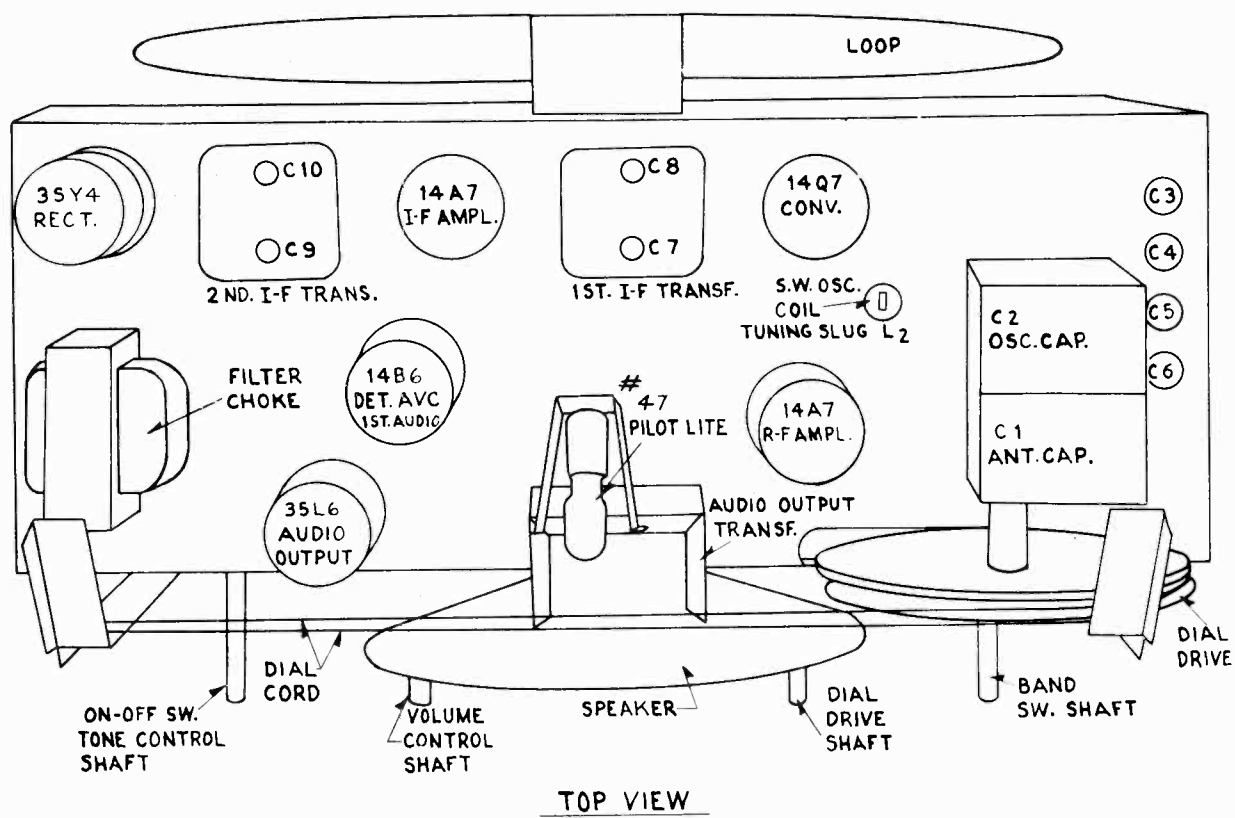


MODEL TA618

FERRAR RADIO AND TELEV. CORP.



FERRAR RADIO AND TELEV. CORP.



TOP VIEW

IF ALIGNMENT

CONNECT OUTPUT METER ACROSS THE VOICE COIL. CONNECT SIGNAL GENERATOR TO STANDARD HAZELTINE LOOP MODEL 1150 AND COUPLE IT LOOSELY TO RECEIVER LOOP. SET SIGNAL GENERATOR TO 456 KC AND FULLY MESH RECEIVER TUNING CAPACITOR. KEEP OUTPUT OF SIGNAL GENERATOR SUFFICIENT TO GIVE READABLE DEFLECTION ON OUTPUT METER. KEEP RECEIVER VOLUME CONTROL AT MAXIMUM. ADJUST FOR MAXIMUM I.F. TRIMMERS C10, C9, C8, C7.

RF OSC. ALIGNMENT (BC BAND)

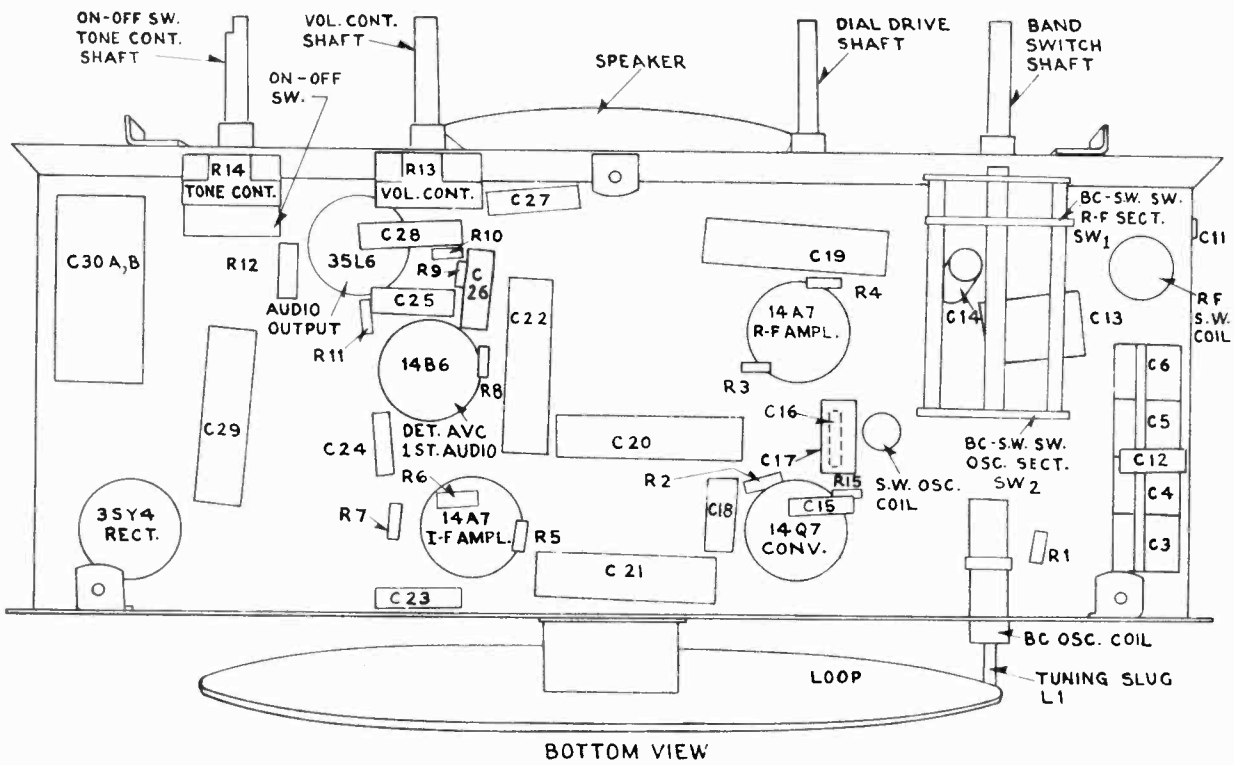
KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 1600 KC. ADJUST OSC. TRIMMER C5 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 1000 KC AND ADJUST TUNING SLUG L1 FOR MAXIMUM. TUNE SIGNAL GENERATOR AND RECEIVER TO 600 KC AND ADJUST FREQUENCY PADDER C4 TO MAXIMUM WHILE ROCKING MAIN TUNING CAPACITOR. TUNE SIGNAL GENERATOR AND RECEIVER TO 1400 KC AND ADJUST ANTENNA TRIMMER C3 FOR MAXIMUM OUTPUT.

RF OSC. ALIGNMENT (SW BAND)

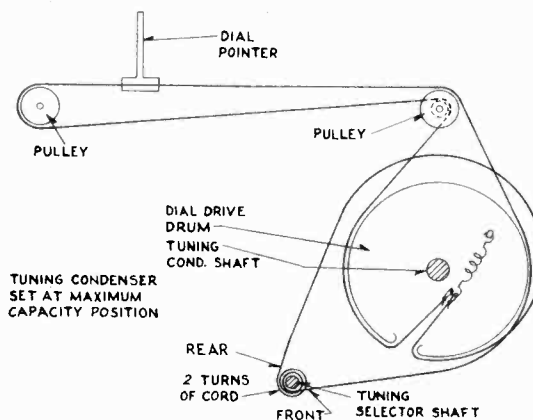
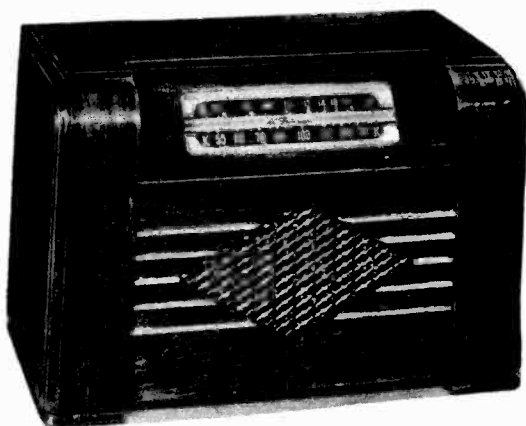
KEEPING SAME SETUP AS USED FOR IF ALIGNMENT, TUNE SIGNAL GENERATOR AND RECEIVER TO 18 MC. ADJUST S.W. OSC. TRIMMER C6 FOR MAXIMUM OUTPUT. TUNE SIGNAL GENERATOR AND RECEIVER TO 10 MC AND ADJUST TUNING SLUG L2 FOR MAXIMUM OUTPUT. SET SIGNAL GENERATOR AND RECEIVER TO 16 MC AND ADJUST ANT. TRIMMER C11 FOR MAXIMUM OUTPUT.

MODEL TA61B

FERRAR RADIO AND TELEV. CORP.



BOTTOM VIEW



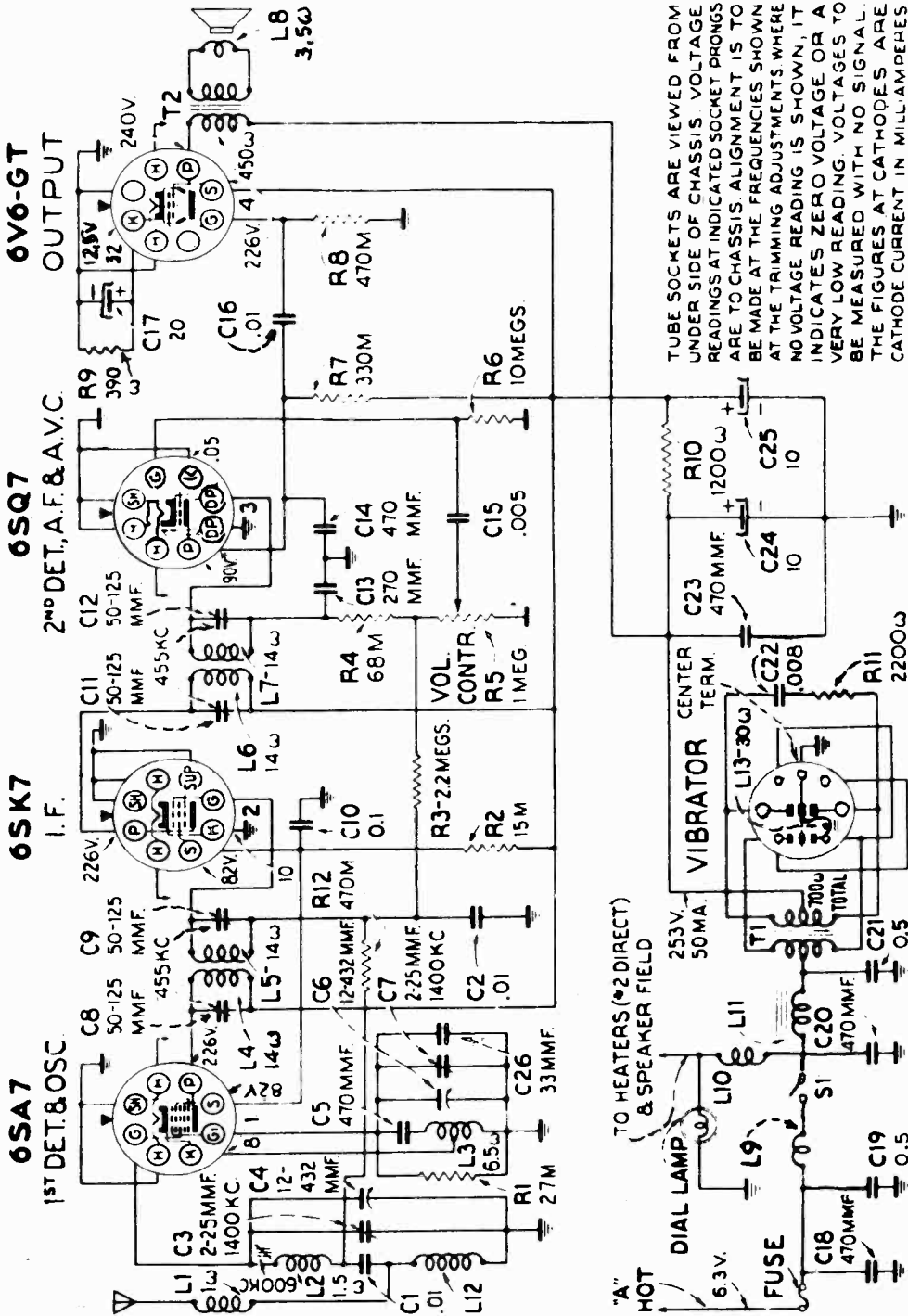
FERRAR RADIO AND TELEV. CORP.

TUBE	PIN	VTVM	20,000 OHM V	1,000 OHM V	RESISTANCE	
14A7 RF AMPL.	1	AC	AC	AC	20 OHM	
	2	+94	+94	+94	OVER 500 K	
	3	+105	+105	+10	OVER 500 K	
	4	0	0	0	0	
	5	0	0	0	0	
	6	-0.5	0.1	+3.5	1.5 MEG	
	7	+3.5	+3.5	+3.5	500 OHM	
	8	AC	AC	AC	40 OHM	
14Q7 CONV.	1	AC	AC	AC	56 OHM	
	2	+105	+105	+105	OVER 500 K	
	3	+105	+105	+105	OVER 500 K	
	4					
OSC. VOLT.	BC	550 KC	-8	-6	-4	20 K
		1600 KC	-9	-9	-4.5	20 K
	SW	6 MC	-6	-3.5	-2	20 K
		20 MC	-11	-3	-0.8	20 K
		7	0	0	0	0
		6	-0.3	-0.1	0	50 K
		7	0	0	0	0.8 OHM
		8	AC	AC	AC	40 OHM
14A7 IF AMPL.	1	AC	AC	AC	56 OHM	
	2	+105	+105	+105	OVER 500 K	
	3	+105	+105	+105	OVER 500 K	
	4	0	0	0	0	
	5	0	0	0	0	
	6	-0.5	-0.1	0	1.4 MEG	
	7	+3.5	+3.5	+3.5	500 OHM	
	8	AC	AC	AC	48 OHM	
14B6 Det. AVC 1st AUDIO	1	AC	AC	AC	20 OHM	
	2	+58	+58	+26	OVER 500 K	
	3	-0.6	-0.5	-0.3	5 MEG	
	4	0	0	0	0	
	5	-0.6	-0.6	-0.3	550 K	
	6	-0.6	-0.6	-0.3	550 K	
	7	0	0	0	0	
	8	0	0	0	0	
35L6 AUDIO OUTPUT	1	0	0	0	0	
	2	AC	AC	AC	100 OHM	
	3	+96	+96	+96	OVER 500 K	
	4	+105	+105	+105	OVER 500 K	
	5	0	0	0	0	
	6	--	--	--	--	
	7	AC	AC	AC	56 OHM	
	8	+7.5	+7.5	+7.5	220 OHM	
35Y4 RECT.	1	AC	AC	AC	130 OHM	
	2	AC	AC	AC	128 OHM	
	3	--	--	--	--	
	4	AC	AC	AC	128 OHM	
	5	0	0	0	0	
	6	--	--	--	--	
	7	+105	+105	+105	OVER 500 K	
	8	AC	AC	AC	100 OHM	

ALL VOLTAGE AND RESISTANCE MEASUREMENTS MADE WITH RESPECT TO CHASSIS GROUND AND WITH A LINE VOLTAGE OF 116 V.A.C. BAND SWITCH AT BROADCAST POSITION.



WIRING DIAGRAM FOR ROAMER CHASSIS MODEL S7407-9



TUBE SOCKETS ARE VIEWED FROM UNDER SIDE OF CHASSIS. VOLTAGE READINGS AT INDICATED SOCKET PRONGS ARE TO CHASSIS. ALIGNMENT IS TO BE MADE AT THE FREQUENCIES SHOWN AT THE TRIMMING ADJUSTMENTS WHERE NO VOLTAGE READING IS SHOWN, IT INDICATES ZERO VOLTAGE OR A VERY LOW READING. VOLTAGES TO BE MEASURED WITH NO SIGNAL. THE FIGURES AT CATHODES ARE CATHODE CURRENT IN MILLIAMPERES

VIBRATOR POLARITY

This radio contains a vibrator which may require change of position to accommodate it to the polarity of the grounded terminal of the car storage battery. It is installed at the factory for use on automobiles with the positive (+) terminal of the battery grounded to the frame of the car, and a "+" shows in the "vibrator polarity" hole in the bottom of the receiver. See Figure 1, Bottom view. If the negative (-) terminal of the battery is grounded to the frame of the car, as on most General Motors' automobiles, remove the bottom cover from the receiver, pull out the plug-in vibrator (see Figure 1), turn it a half revolution, and replace in socket. When the bottom cover is replaced on the receiver, the "-" sign will show through the "vibrator polarity" hole.



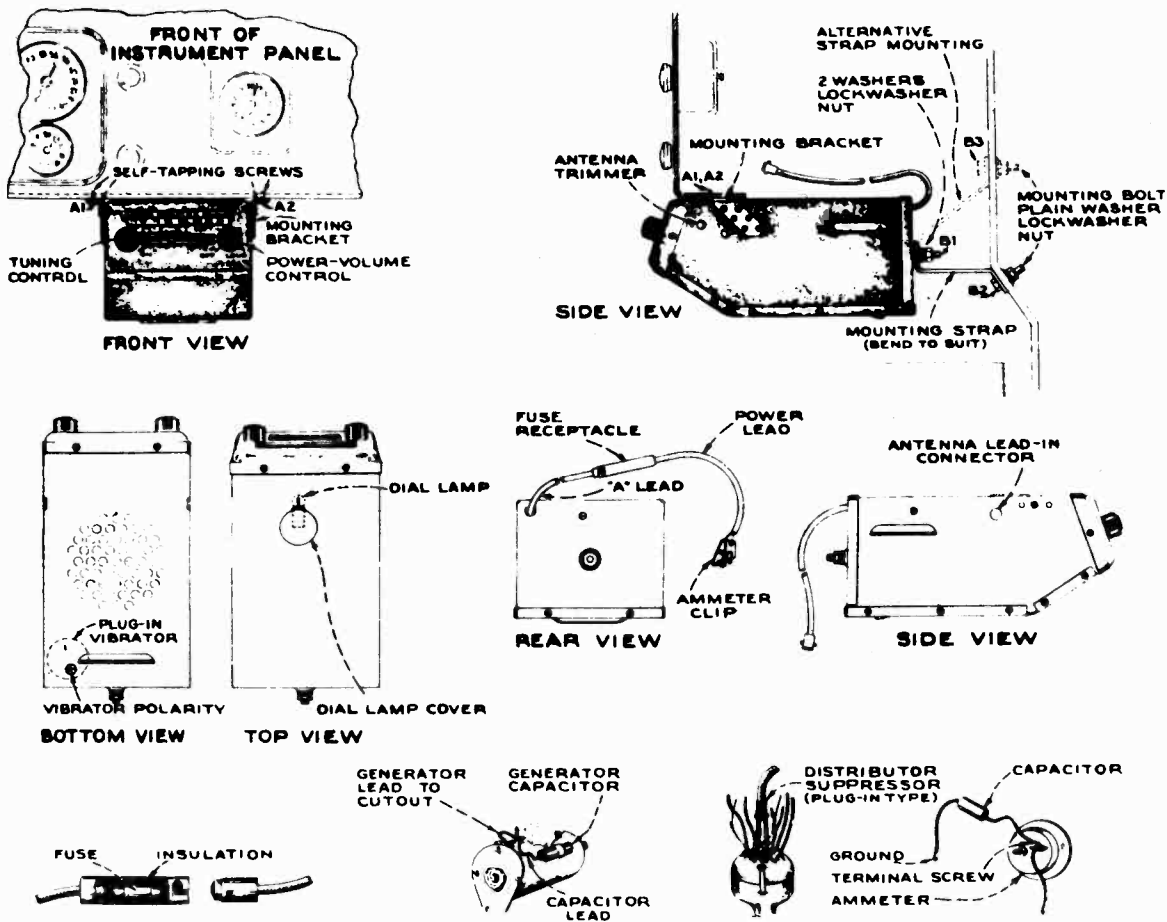


Figure 1

### MOUNTING

1. The receiver is shipped with a bracket attachment screw in the center one of the three mounting holes on each side of the case. Remove these two screws and hold the receiver in the chosen location below the instrument panel. Decide on the mounting holes to be used in both brackets and in the receiver case.
2. Attach the two mounting brackets to the receiver by means of four of the self-tapping screws provided, using the holes decided upon.
3. Hold the receiver in place again, mark for drilling of instrument panel flange, and drill the two holes (A1 and A2, Figure 1) with preferably a No. 34 drill. THESE HOLES MUST NOT BE TOO LARGE AS THEY SERVE TO HOLD THE RECEIVER BY MEANS OF THE TWO SELF-TAPPING SCREWS.
4. Attach the receiver securely to the instrument panel by means of two self-tapping screws - A1 and A2, Figure 1.
5. Mark the position on the bulkhead and prepare the hole for the mounting strap. This may be an existing hole, or a new hole may have to be drilled - B2 or B3, Figure 1, Side View.
6. Bend the mounting strap to shape so that it fits over bolt protruding from rear of receiver (B1 - Figure 1) and matches up with the hole in the bulkhead (B2 or B3).
7. Attach the mounting strap to the bulkhead with the 1/4-inch bolt, lockwasher and nut provided; and to the rear of the receiver with lockwasher and nut.

## EQUIPMENT

This Roamer auto radio receiver is supplied with the following installation equipment:

- 1 - Mounting strap with bolt, nuts, and washers for attachment to the bulkhead.
- 2 - Mounting brackets with self-tapping screws, 3/8 inch long, for attachment to the instrument panel.
- 1 - Power lead with use socket and ammeter clip.
- 1 - Fuse and insulating sleeve for power lead.
- 1 - Suppressor for distributor.
- 1 - Capacitor for generator.
- 1 - Capacitor for ammeter.

## ANTENNA REQUIREMENTS

Good radio reception is dependent upon the correct antenna installation. This receiver should be used only with a vertical rod-type antenna, such as the Cowl (S-7000-5 or S-7000-4) or Wings whip (S-7000-3) aerial.

These antennas are equipped with a shielded lead and connector. Instructions for installing these types are included with the antenna.

Your Roamer receiver has been wired at the factory for operation with a low capacity antenna, such as one of the more popular rod types. Do not use an antenna having a capacity appreciably greater than 100 mmfd.

**IMPORTANT** - For best reception adjust your automobile radio receiver to your particular antenna. Pry off the plug button on the right-hand side near the front of the receiver case. This gives access to a trimmer screw on the gang condenser about an inch and a half back from the case. After the receiver is operating, tune to a very weak station of about 1,400 kilocycles (140 on the dial) and adjust the trimmer for maximum output, turning carefully with a screw driver until the best position is found. Replace the cover button.

## MAKING THE ELECTRICAL CONNECTIONS

First attach the antenna lead-in to the receiver. Antenna lead-ins are equipped with a plug which fits into the socket on the left-hand side of the receiver, located as shown in the lower one of the two "Side Views" - Figure 1. Assemble the ammeter lead. The fuse receptacle is of the single spring terminal bayonet type consisting of a male and female section. Insert the sleeve in the socket and the fuse in the sleeve as shown in the "Fuse Socket Assembly" Figure 1, and then attach to the plug on the single wire lead from the back of the receiver. The other end of the Power lead terminates in a spring clip for connection to one of the ammeter binding posts. The correct terminal is decided after the radio receiver is in operation, by the ammeter registering current when the receiver is turned on.

## MAINTENANCE

If the dial illumination falls, the dial lamp may be replaced by loosening the self-tapping mounting screws holding the mounting brackets to the instrument panel, allowing the receiver to hang by the back mounting strap and giving access to the top of the receiver. Pry off the dial light cap shown in Figure 1, Top View, insert thumb and finger in hole and slide the dial lamp assembly towards the back of the receiver. The lamp, socket and clip are freed and may be lifted out of the hole to the length of the leads. Remove the lamp from the bayonet socket, replace with a new one and assemble back in place by means of the clip. Replace the dial light cap in its correct position so that the flattened lugs are over the lamp socket and mount receiver back in position on instrument panel.

In case the receiver fails to function after carefully following the installation instructions, it is advisable to remove the bottom cover which is secured by self-tapping screws, and check the tubes to see that they are properly seated in their respective sockets as indicated in Figure 2, and the vibrator for correct polarity. If they are in place and satisfactory reception is not obtained, the tubes should be removed and tested by a competent serviceman.

To make a complete check on tubes, remove the chassis from the case and loosen the speaker. One tube is behind the speaker cone.

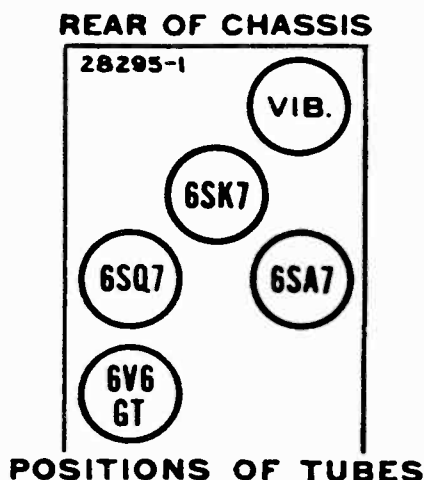


Figure 2

## REDUCING IGNITION INTERFERENCE

Satisfactory reception in automobile radio receivers is largely dependent upon eliminating or reducing interference noises set up by the automobile ignition system. These noises resemble static interference. Noise of this nature can usually be eliminated or reduced to a minimum by carefully following a procedure of suppression and bypassing. No fixed rule can be outlined which will be applicable to all makes of cars. Each installation may present a different problem requiring a systematic process of elimination. There are, however, a few locations which require attention in practically all installations.

The condition of your automobile will have a great deal to do with quiet reception. Do not operate your car with fouled spark plugs or burned distributor breaker points. These parts should be cleaned and adjusted periodically. Frame and body bolts should be tightened in order to reduce the resistance of the system. Bonding the motor to the bulkhead will often result in a decided reduction of interference. When bonding parts of the car, do not use ordinary solid copper wire, but copper braid or a strap of copper at least a half inch wide. The bond should not be more than three or four inches long and bolted securely to clean metal.

The generator charging rate should be advanced to compensate for the additional current drain which the radio places on the car storage battery.

The two most important points at which precaution should be taken to reduce interference is at the distributor and at the generator. A distributor suppressor is furnished with the equipment, which should be plugged into the center terminal of the distributor and the ignition wire in turn plugged into the end of the suppressor as illustrated in Figure 1.

The second point at which ignition interference should be suppressed is at the generator cut out. Various manufacturers place the cut out in different locations. Some mount it upon the generator while others locate it on the bulkhead. The bypass condenser should be mounted with the case making good electrical contact with the metal car frame while the flexible lead is attached to the same terminal of the cut out as the lead from the generator. See Figure 1. Most cut outs have four terminals which are marked. The Generator terminal is marked "GEN."

A third point, often of considerable importance is the ammeter. The ammeter bypass capacitor (the one without metal case), should be connected by one lead to the screw on the ammeter clip and by the other lead to any convenient grounded point on instrument panel or dash board. See Figure 1.

In some cases it will be found necessary to bypass the oil gauge and in some the gas gauge, while in others both gauges will require bypass condensers. When mounting the condenser or using a ground strap, paint and dirt should be carefully scraped from the metal so that a clean metal to metal contact is obtained. If generator interference is present when the generator bypass condenser has been installed it can usually be eliminated by cleaning the commutator and reseating the brushes of the generator.

The position of the antenna lead-in is sometimes of great importance. This lead should be carefully placed in the position causing least interference after the installation is complete.

If the general practice for interference elimination already outlined is not entirely successful it will be necessary to secure the services of an expert.

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-1,  
Mercury

**TUNING RANGE** 535 to 1720 KC

**INTERMEDIATE FREQ** 455 KC

**LOUD SPEAKER**

**VOICE COIL IMPEDANCE 3.2 OHM at 400 Cycles**

**POWER OUTPUT**  
Undistorted - 0.8 Watts  
Maximum - 1.4 Watts

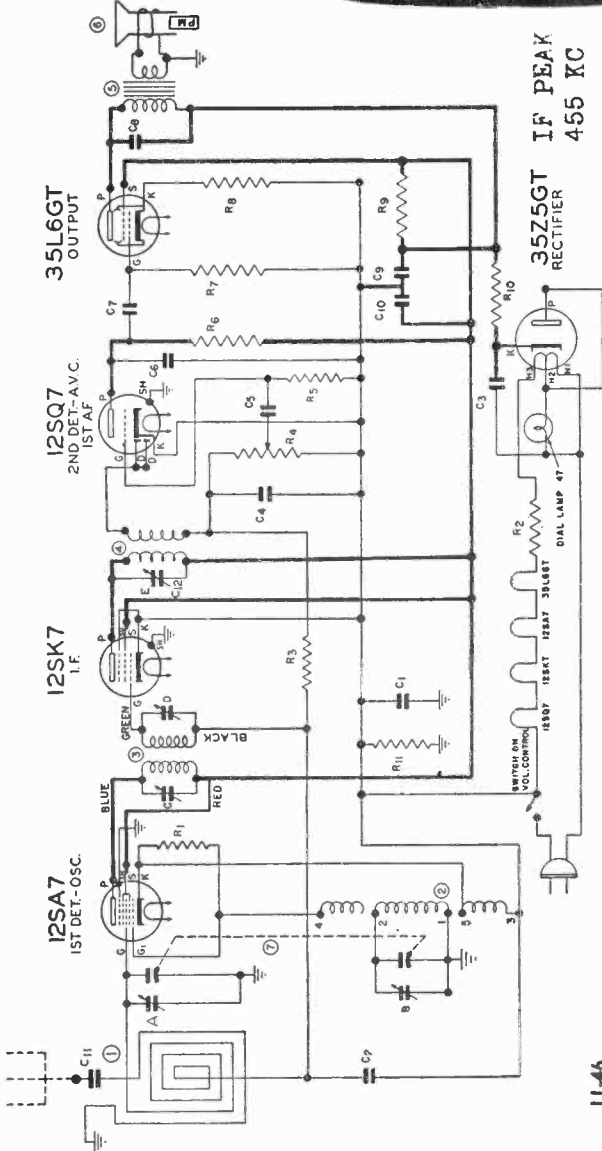
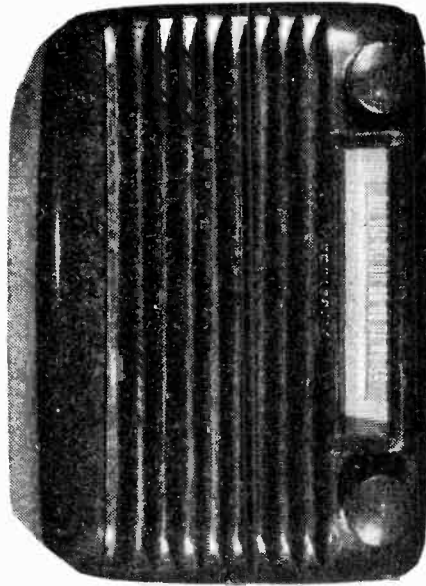
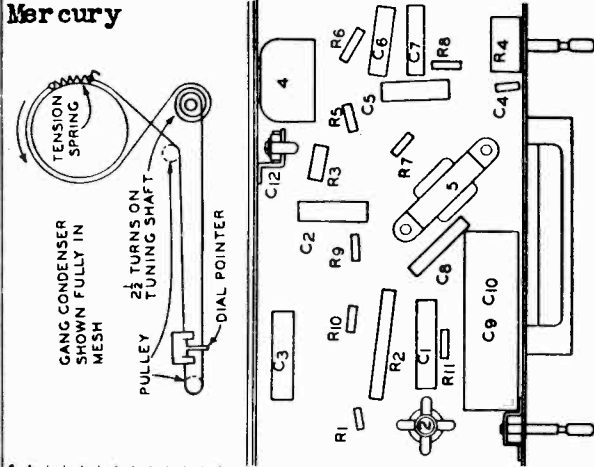


Diagram Number	Part No.	Part Name	Description	Price
1	N-5870	Antenna	Loop	\$2.55
2	N-3298	Coil	Oscillator	1.05
3	N-4013	Coil	1st I. F.	2.10
4	N-4977	Coil	2nd I. F.	1.16
5	N-4011	Transformer	Output	2.25
6	N-4010	Speaker	4" P. M. Dynamic	3.44
7	N-4998	Condenser	Variable, 2 Gang & Pulley Assm.	4.15
C1	N-5160	Condenser	Paper .2 Mfd. 200 Volt	.32
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt	.19
C3	N-1346	Condenser	Paper .05 Mfd. 400 Volt	.20
C4	N-1374	Condenser	Mica .0001 Mfd. 500 Volt	.28
C5	N-4894	Condenser	Paper .005 Mfd. 600 Volt	.17
C6	N-4890	Condenser	Paper .0005 Mfd. 600 Volt	.26
C7	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C8	N-1376	Condenser	Paper .02 Mfd. 400 Volt	.18
C9-C10	N-4015	Condenser	Electrolytic C9 35 Mfd. 150 Volt. .... C10 30 Mfd. 150 Volt. ....	1.50
C11	N-1344	Condenser	Paper .01 Mfd. 400 Volt	.17
C12	N-4048	Condenser	Adjustable Trimmer	.45
R1	N-4025	Resistor	Carbon 22,000 Ohm 0.5 Watt	.08
R2	N-4023	Resistor	Carbon 82 Ohm 2.0 Watt	.20
R3	N-3175	Resistor	Carbon 1.0 Megohm 0.5 Watt	.08
R4	N-4014	Volume Control with Switch		1.62
			Loop	
			Oscillator	
			1st I. F.	
			2nd I. F.	
			Output	
			4" P. M. Dynamic	
			Variable, 2 Gang & Pulley Assm.	
			Paper .2 Mfd. 200 Volt	
			Paper .05 Mfd. 200 Volt	
			Paper .05 Mfd. 400 Volt	
			Mica .0001 Mfd. 500 Volt	
			Paper .005 Mfd. 600 Volt	
			Paper .0005 Mfd. 600 Volt	
			Paper .01 Mfd. 400 Volt	
			Paper .02 Mfd. 400 Volt	
			Electrolytic	
			C9 35 Mfd. 150 Volt. ....	
			C10 30 Mfd. 150 Volt. ....	
			Paper .01 Mfd. 400 Volt	
			Adjustable Trimmer	
			Carbon 22,000 Ohm 0.5 Watt	
			Carbon 82 Ohm 2.0 Watt	
			Carbon 1.0 Megohm 0.5 Watt	
			Volume Control with Switch	
			Part No.	Part Name
			Diagram Number	Part Name
			R5	N-4028 Resistor
			R6	N-4026 Resistor
			R7	N-4027 Resistor
			R8	N-4024 Resistor
			R9	N-5358 Resistor
			R10	N-4022 Resistor
			R11	N-1779 Resistor
			Part No.	Part Name
			*150	Cabinet
			N-1090	Cord
			N-4016	Dial Plate
			N-2655	Dial Cord
			N-4018	Dial Scale
			N-4020	Dial Shaft
			N-4019	Dial Pointer
			N-3925	Dial Spring
			N-4093	Dial Ring
			N-3923	Knob
			N-4021	Pilot Lamp Socket
			N-1147	Pilot Lamp
			Description	Price
			Carbon 6.8 Megohm 0.5 Watt	.08
			Carbon 220,000 Ohm 0.5 Watt	.08
			Carbon 470,000 Ohm 0.5 Watt	.08
			Carbon 220 Ohm 0.5 Watt	.08
			Carbon 1,000 Ohm 1.0 Watt	.10
			Carbon 33 Ohm 0.5 Watt	.08
			Carbon 150,000 Ohm 0.5 Watt	.08
			Description	Price
			Walnut Plastic	\$2.24
			6 Ft. Rubber Line Cord	.55
			Dial Back Plate Less Scale	.05
			17" of 30 lb. Dial Drive Cord	.11
			Calibrated Scale	.25
			Tuning Shaft	.13
			Dial Indicator	.10
			Tension Spring for Drive Cord	.03
			Ring for Drive Cord	.01
			For Walnut Cabinet	.05
			Pilot Lamp Socket Assembly	.22
			No. 47 Lamp, 6-8 Volts, .150 Amp.	.16

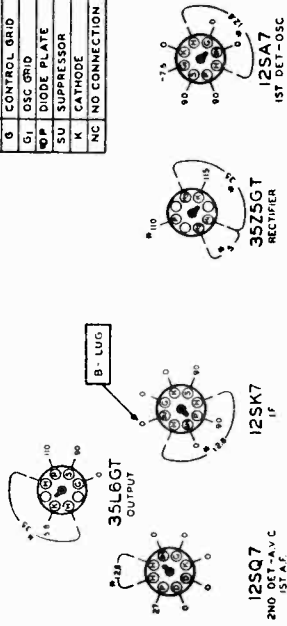
MODEL 4-A-1,  
Mercury

THE FIRESTONE TIRE & RUBBER CO.



SYMBOL	DESCRIPTION
SH	SHELL
H	HEATER
HT	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
GL	OSC GRID
OP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION

VOLTAGE TABLE  
(BOTTOM OF CHASSIS)



REAR OF CHASSIS

All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.  
\*AC except when set is used on DC.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

- Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.
- Use an accurately calibrated test oscillator with some type of output measuring device.
- PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

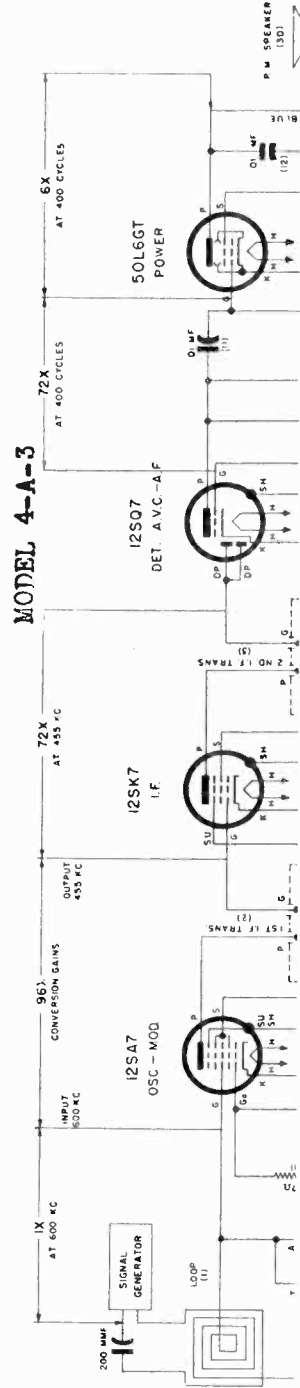
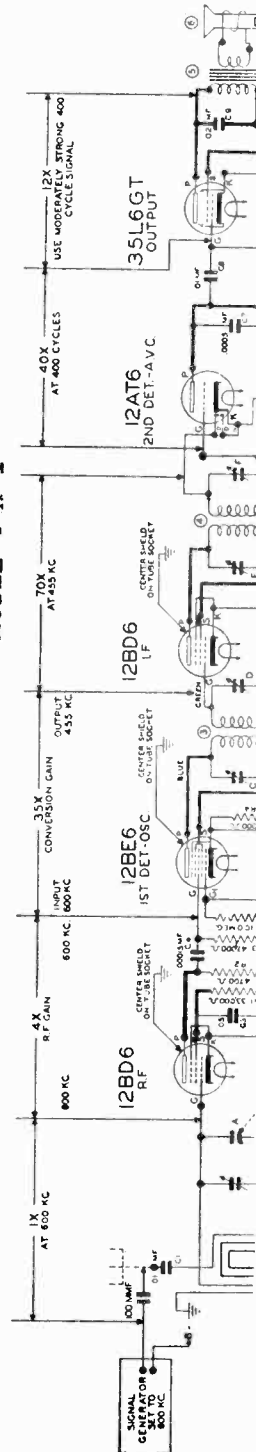
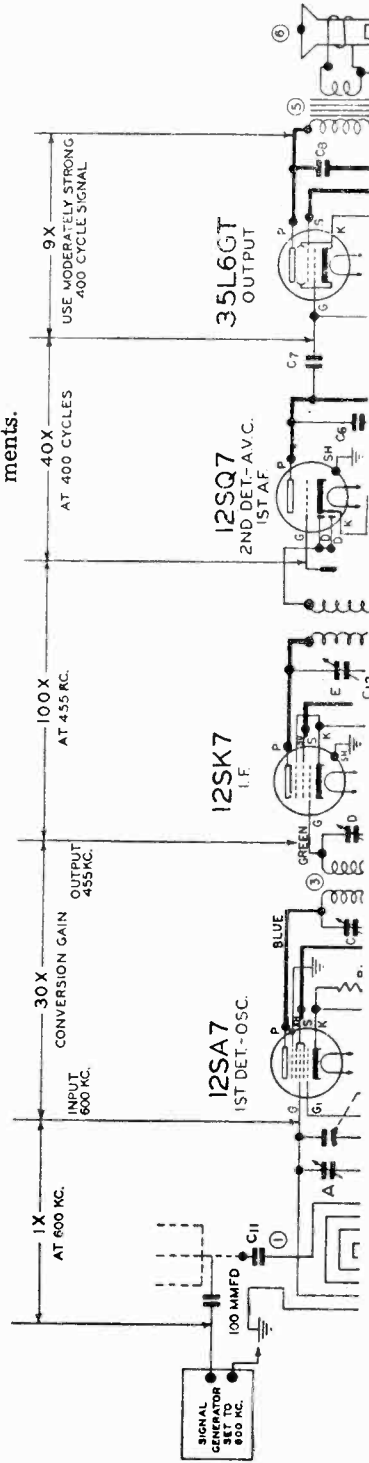
Steps	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
	Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received. 455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I. F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1720 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4-A-1,  
Mercury  
MODEL 4-A-3,  
Diplomat  
MODEL 4-A-41

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



Differences in tube characteristics, tolerance of parts, adjustment of tuned circuits, and variations of line voltage will influence stage gain. Accuracy of measurements is dependent upon careful tuning of receiver to generator signal and experience in using your test equipment. These factors may create considerable variation in gain measurements.

MODEL 4-A-3, THE FIRESTONE TIRE & RUBBER CO.  
Diplomat

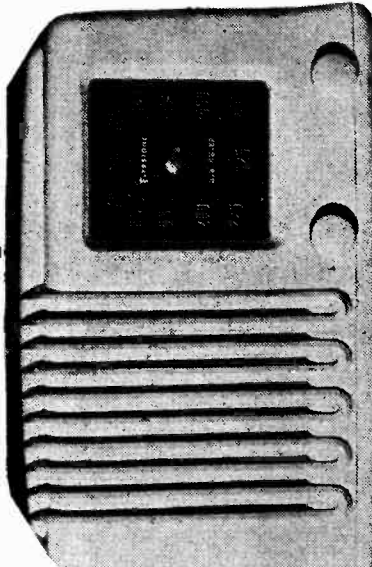
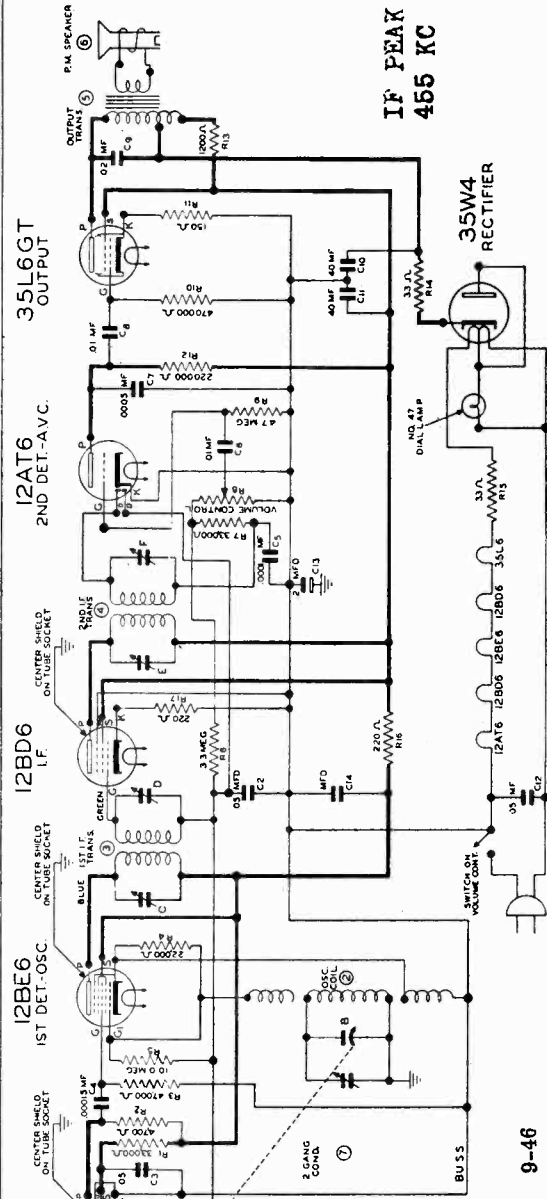
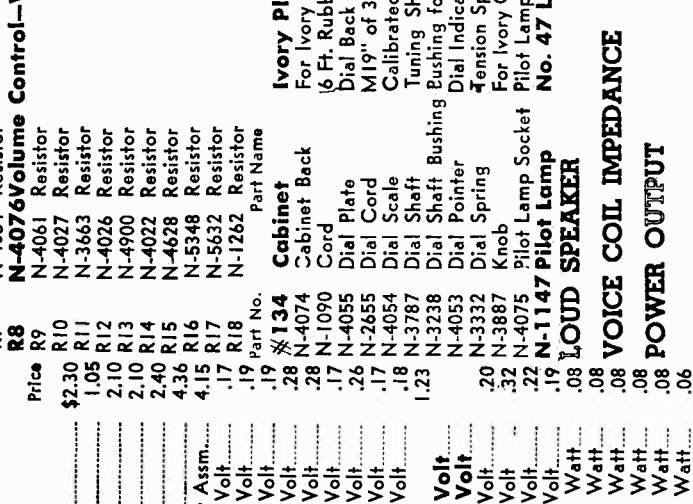
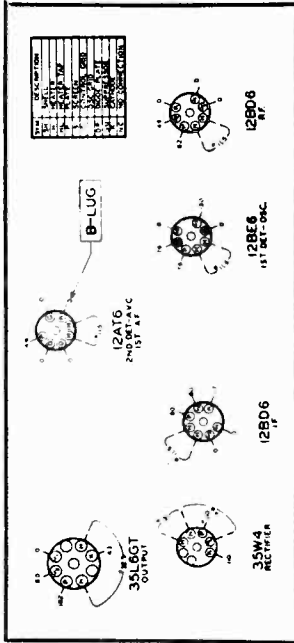


Diagram Number	Part No.	Part Name	Description
1	N-3784	Antenna Loop	Loop
2	N-3298	Oscillator Coil	Oscillator
3	N-3816	1st I. F. Coil	1st I. F.
4	N-3804	2nd I. F. Coil	2nd I. F.
5	N-4875	Transformer	Output
6	N-3781	Speaker	5" P.M. Dynamic
7	N-5081	Condenser	Variable, 2 Gang & Pulley Assm.
C1	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C2	N-1345	Condenser	Paper .05 Mfd. 200 Volt
C3	N-1345	Condenser	Paper .05 Mfd. 200 Volt
C4	N-2383	Condenser	Mica .00015 Mfd. 500 Volt
C5	N-1374	Condenser	Mica .0001 Mfd. 500 Volt
C6	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C7	N-4890	Condenser	Paper .0005 Mfd. 600 Volt
C8	N-1344	Condenser	Paper .01 Mfd. 400 Volt
C9	N-1376	Condenser	Paper .02 Mfd. 400 Volt
C10-C11	N-5051	Condenser	Electrolytic C10-40 Mfd. 150 Volt C11-40 Mfd. 150 Volt
C12	N-1346	Condenser	Paper .05 Mfd. 400 Volt
C13	N-5160	Condenser	Paper .2 Mfd. 200 Volt
C14	N-1351	Condenser	Paper .1 Mfd. 200 Volt
C15	N-1345	Condenser	Paper .05 Mfd. 200 Volt
R1	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt
R2	N-4278	Resistor	Carbon, 4,700 Ohm 0.5 Watt
R3	N-4063	Resistor	Carbon, 47,000 Ohm 0.5 Watt
R4	N-4025	Resistor	Carbon, 22,000 Ohm 0.5 Watt
R5	N-1263	Resistor	Carbon, 10.0 Megohm 0.5 Watt
R6	N-4085	Resistor	Carbon, 3.3 Megohm 0.5 Watt
R7	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt
R8	N-4076	Volume Control	Control-With Switch
R9	N-4061	Resistor	Carbon, 4.7 Megohm 0.5 Watt
R10	N-4027	Resistor	Carbon, 470,000 Ohm 0.5 Watt
R11	N-3663	Resistor	Carbon, 150 Ohm 0.5 Watt
R12	N-4026	Resistor	Carbon, 220,000 Ohm 0.5 Watt
R13	N-4900	Resistor	Carbon, 1,200 Ohm 1.0 Watt
R14	N-4022	Resistor	Carbon, 33 Ohm 0.5 Watt
R15	N-4628	Resistor	Carbon, 33 Ohm 1.0 Watt
R16	N-5348	Resistor	Carbon, 220 Ohm 0.5 Watt
R17	N-5632	Resistor	Carbon, 220 Ohm 0.5 Watt
R18	N-1262	Resistor	Carbon, 1.0 Megohm 0.5 Watt
R19	N-134	Part No.	Part Name
R20	N-4074	Cabinet Back	Cabinet
R21	N-1090	Cord	6 Ft. Rubber Line Cord
R22	N-2655	Dial Plate	Dial Back Plate less Scale
R23	N-4054	Dial Cord	M19" of 30 lb. Dial Drive Cord
R24	N-3787	Dial Scale	Calibrated Scale
R25	N-3238	Dial Shaft	Tuning Shaft
R26	N-4053	Dial Shaft Bushing	Bushing for Tuning Shaft
R27	N-3332	Dial Pointer	Dial Indicator
R28	N-3887	Knob	Tension Spring for Drive Cord
R29	N-4075	Pilot Lamp Socket	For Ivory Cabinet
R30	N-1147	Pilot Lamp	Pilot Lamp Socket Assembly
R31	N-5051	LOUD SPEAKER	No. 47 Lamp, 6-8 Volts, 150 Amp. 5 Inch P.M. Dynamic
R32	N-4063	VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles
R33	N-4063	POWER OUTPUT	Undistorted - 0.8 Watts Maximum - 1.4 Watts

Diagram Number	Part No.	Part Name	Description	Price
R7	N-4064	Resistor	Carbon, 33,000 Ohm 0.5 Watt	\$.08
R8	N-4076	Volume Control	Control-With Switch	1.62
R9	N-4061	Resistor	Carbon, 4.7 Megohm 0.5 Watt	.06
R10	N-4027	Resistor	Carbon, 470,000 Ohm 0.5 Watt	.08
R11	N-3663	Resistor	Carbon, 150 Ohm 0.5 Watt	.08
R12	N-4026	Resistor	Carbon, 220,000 Ohm 0.5 Watt	.08
R13	N-4900	Resistor	Carbon, 1,200 Ohm 1.0 Watt	.10
R14	N-4022	Resistor	Carbon, 33 Ohm 0.5 Watt	.08
R15	N-4628	Resistor	Carbon, 33 Ohm 1.0 Watt	.10
R16	N-5348	Resistor	Carbon, 220 Ohm 0.5 Watt	.10
R17	N-5632	Resistor	Carbon, 220 Ohm 0.5 Watt	.10
R18	N-1262	Resistor	Carbon, 1.0 Megohm 0.5 Watt	.08
R19	N-134	Part No.	Part Name	
R20	N-4074	Cabinet Back	Cabinet	\$5.70
R21	N-1090	Cord	6 Ft. Rubber Line Cord	.20
R22	N-2655	Dial Plate	Dial Back Plate less Scale	.55
R23	N-4054	Dial Cord	M19" of 30 lb. Dial Drive Cord	.08
R24	N-3787	Dial Scale	Calibrated Scale	.11
R25	N-3238	Dial Shaft	Tuning Shaft	.48
R26	N-4053	Dial Shaft Bushing	Bushing for Tuning Shaft	.11
R27	N-3332	Dial Pointer	Dial Indicator	.10
R28	N-3887	Knob	Tension Spring for Drive Cord	.11
R29	N-4075	Pilot Lamp Socket	For Ivory Cabinet	.04
R30	N-1147	Pilot Lamp	Pilot Lamp Socket Assembly	.08
R31	N-5051	LOUD SPEAKER	No. 47 Lamp, 6-8 Volts, 150 Amp. 5 Inch P.M. Dynamic	.45
R32	N-4063	VOICE COIL IMPEDANCE	3.2 OHM at 400 Cycles	.16
R33	N-4063	POWER OUTPUT	Undistorted - 0.8 Watts Maximum - 1.4 Watts	



**VOLTAGE TABLE**  
(Bottom of Chassis)



**REAR OF CHASSIS**

All Voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.  
\*AC except when set is used on DC.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.  
Before starting alignment:

- (a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last dot at the low frequency end of the dial calibration. If dial needle does not point exactly to last dot move to correct position.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

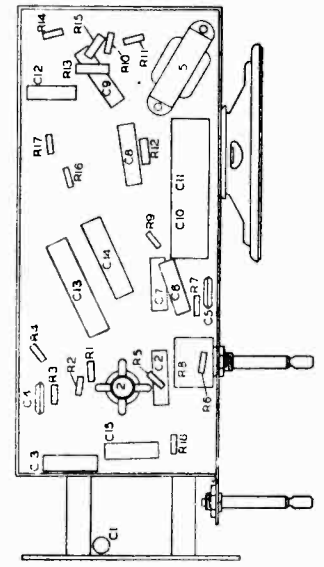
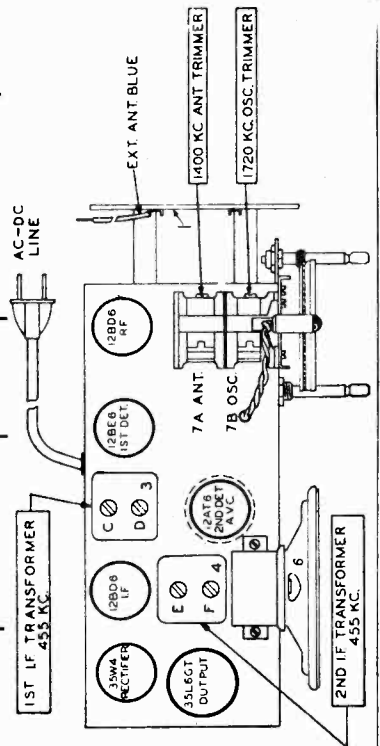
TEST OSCILLATOR			
Step	Set receiver dial to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:
1	Any point where no interfering signal is received.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.
2	Exactly 1720 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss
3	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss

Refer to parts layout diagram for location of trimmers mentioned below:

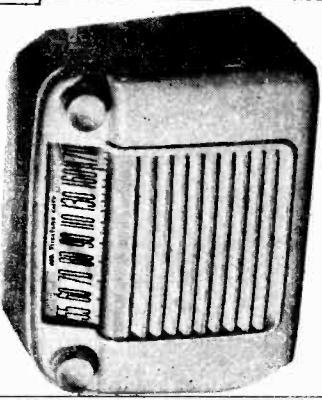
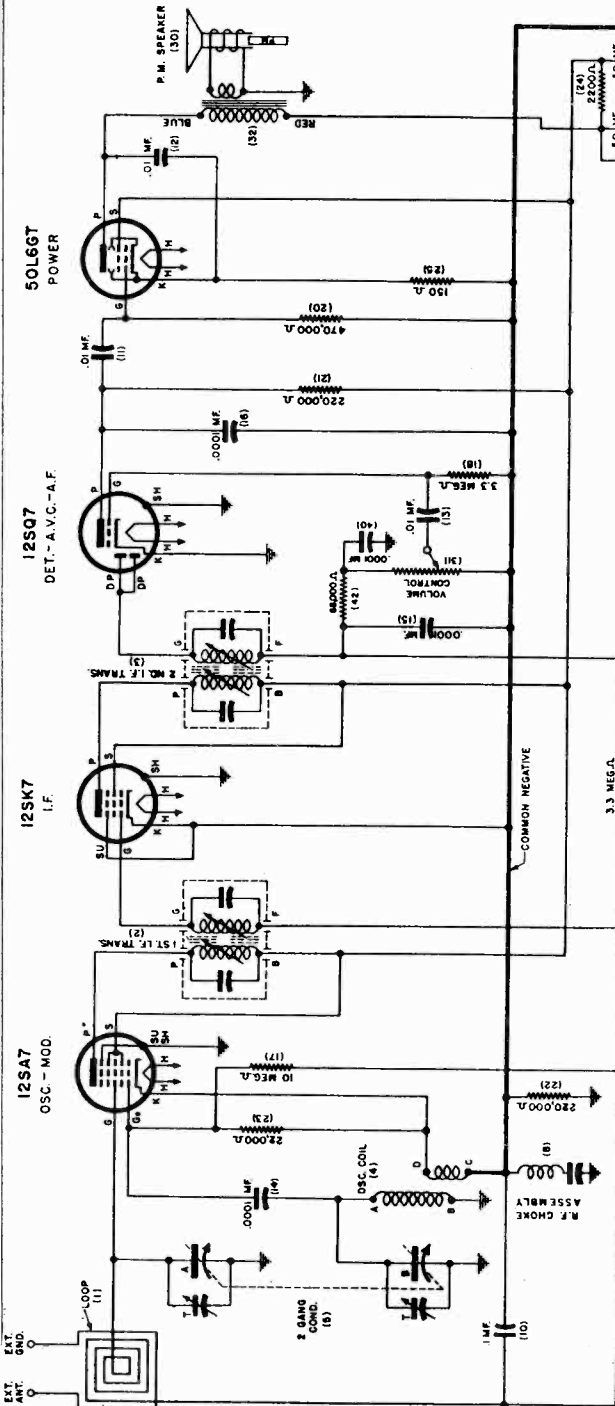
Adjust each of the second I. F. transformer trimmers for maximum output—then adjust each of the first I. F. trimmers for maximum output.

Adjust 1720 K. C. oscillator trimmer for maximum output.

While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.







I.F. - 455 KC.

OCTOBER 10, 1946

- 31 28E1 Vol. Cont.** With S.P.S.T. Switch  
Output for Speaker
- 32 22E2 Transformer**  
Mica, .0001 Mfd.
- 40 23E39 Condenser**  
Carbon 68,000 Ohm 1/3 W.
- 42 27E683 Resistor**

- 7 25E16 Condenser**  
Dry Elec. 50-50 Mfd. 150 V.
- 8 20E75 Choke**  
R.F. Choke Assembly
- 9 23E416 Condenser**  
Tubular, .05 Mfd. 400 V
- 0 23E418 Condenser**  
Tubular, .1 Mfd. 400 V
- 1 23E211 Condenser**  
Tubular, .01 Mfd. 200 V
- 2 23E211 Condenser**  
Tubular, .01 Mfd. 200 V
- 3 23E211 Condenser**  
Tubular, .01 Mfd. 200 V
- 4 23E39 Condenser**  
Mica, .0001 Mfd.
- 5 23E39 Condenser**  
Mica, .0001 Mfd.
- 6 23E39 Condenser**  
Carbon, 10 Megohm 1/3 W.
- 17 27E106 Resistor**  
Carbon, 3.3 Megohm 1/3 W.
- 18 27E335 Resistor**  
Carbon, 3.3 Megohm 1/3 W.
- 19 27E335 Resistor**  
Carbon, 3.3 Megohm 1/3 W.
- 20 27E474 Resistor**  
Carbon, 470,000 Ohm 1/3 W.
- 21 27E224 Resistor**  
Carbon, 220,000 Ohm 1/3 W.
- 22 27E224 Resistor**  
Carbon, 220,000 Ohm 1/3 W.
- 23 27E223 Resistor**  
Carbon, 22,000 Ohm 1/3 W.
- 24 27E222-3 Resistor**  
Carbon, 2,200 Ohm 1 W.
- 25 27E151 Resistor**  
Carbon, 150 Ohm 1/3 W.
- 26 27E101 Resistor**  
100 Ohm 1/3 W., Carbon.
- 27 27E470-2 Resistor**  
Carbon, 47 Ohm 1/2 W.
- 30 1E9 Speaker**  
5" P.M.

Part No. Description

- 7E76-2 Cabinet**  
Ivory Plastic
- 7E83 Cabinet Back**  
For Ivory Plastic Cabinet.
- 41E1 Cord**  
6 Ft. Rubber Line Cord.
- 20E12 Dial Plate Assem.**  
Dial Back Plate Assem. Less Scale
- 4E1 Dial Cord**  
30" of 18 lb. Dial Drive Cord
- 36E23 Dial Scale**  
Calibrated Scale
- 68E1 Dial Shaft**  
Drive Shaft
- 19E3 Dial Shaft Bearing**  
Bearing for Drive Shaft.
- 35E8 Dial Pointer**  
Dial Indicator
- 65E2 Dial Spring**  
Tension Spring For Drive Cord
- 37E27-19 Knob**  
For Ivory Cabinet
- 20E43 Pilot Lamp Socket**  
Pilot Lamp Socket Assembly
- 40E1 Pilot Lamp 6-8 Volt .150 Amp. Type 47 Lamp**  
Pilot Lamp
- VOICE COIL IMPEDANCE**  
3.2 OHM at 400 Cycles
- POWER OUTPUT**  
Undistorted - 0.9 Watts  
Maximum - 1.7 Watts

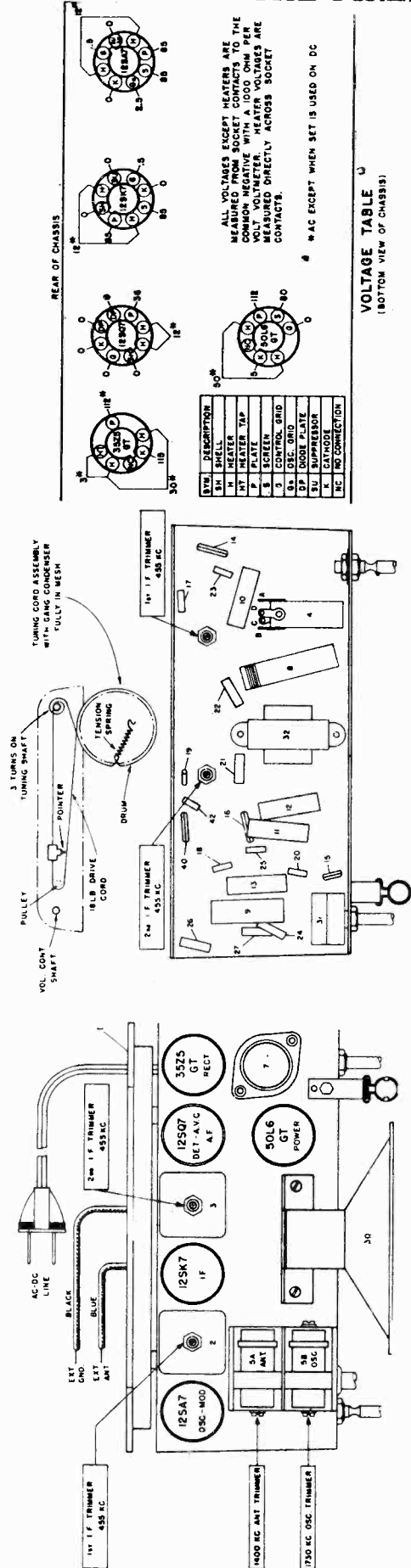
TUNING RANGE 1730 to 530 KC

INTERMEDIATE FREQ 455 KC

LOUD SPEAKER 5 Inch P.M.

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4A-41



ALL VOLTAGES EXCEPT HEATERS ARE MEASURED FROM SOCKET CONTACTS TO THE COMMON NEGATIVE WITH A 1000 OHM PER VOLT VOLTMETER. HEATER VOLTAGES ARE MEASURED DIRECTLY ACROSS SOCKET CONTACTS.

\* AC EXCEPT WHEN SET IS USED ON DC

VOLTAGE TABLE (BOTTOM VIEW OF CHASSIS)

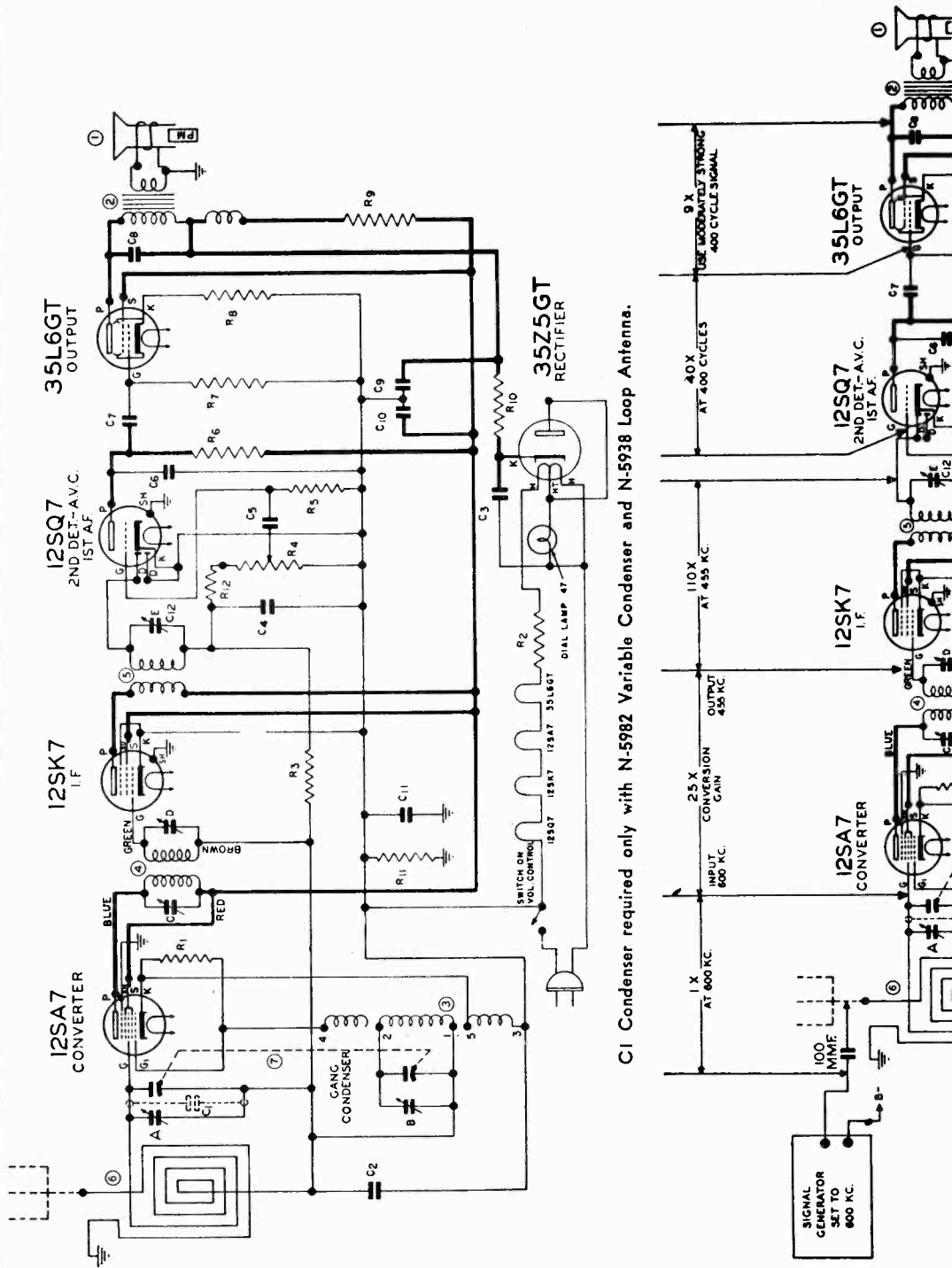
SYM	DESCRIPTION
SH	SHELL
H	HEATER TAP
P	PLATE
S	SCREEN
OS	OSC GRID
SP	SPOKE PLATE
SU	SUPPRESSOR
K	CATHODE
KC	NO CONNECTION

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third.

Before starting alignment:

- (a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial needle must be exactly even with the last line at the low frequency end of the dial calibration. If dial needle does not point exactly to last line move to correct position.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

STEP	TEST OSCILLATOR	TEST OSCILLATOR		Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to front stator plates of tuning condenser. Low side to frame of condenser through a .02 Mfd. blocking condenser.
2	Exactly 1730 K. C.	Exactly 1730 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver black ground lead



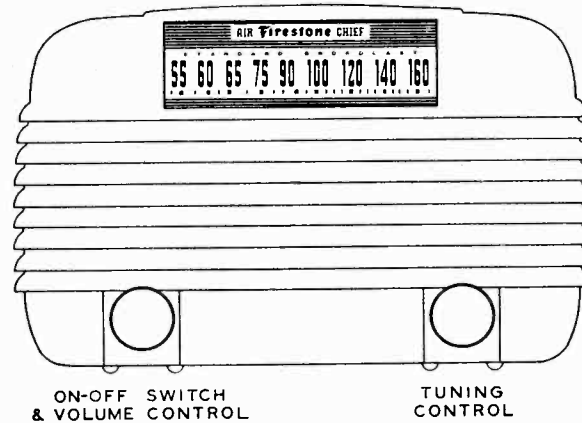
C1 Condenser required only with N-5982 Variable Capacitor and N-5938 Loop Antenna.

Be sure R.F. and I.F. stages are accurately aligned before measuring gain. R.F. gains can be measured with a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe following precautions:

1. For all gain measurements connect signal generator as shown. Use 600 KC. signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.

THE FIRESTONE TIRE & RUBBER CO.

MODEL 4A-10,  
Reporter

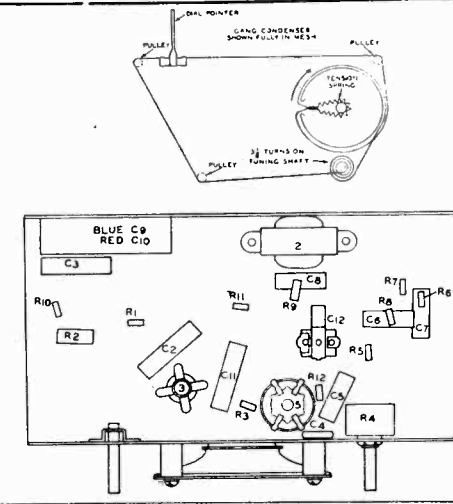
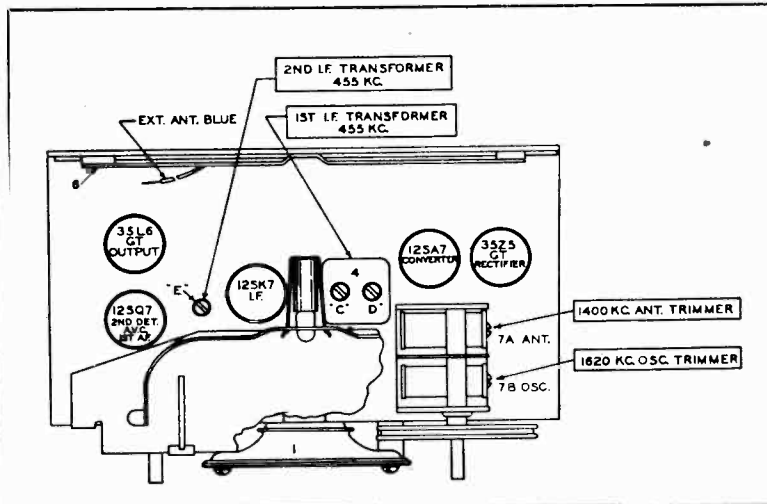


**ALIGNMENT PROCEDURE**

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

- (a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last dot at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR			Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:	Attach output of test oscillator to:	
1	Any point where no interfering signal is received.	455 K. C.	.02 MFD. condenser	High side to grid of tuning condenser. Low side to buss.	Adjust the second I. F. transformer trimmer for maximum output—then adjust each of the first I. F. trimmers for maximum output.
2	Exactly 1620 K. C.	Exactly 1620 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	Adjust 1620 K. C. oscillator trimmer for maximum output.
3	Approx. 1400 K. C.	Approx. 1400 K. C.	.00025 MFD. condenser	Receiver blue antenna lead Receiver buss	While rocking gang condenser adjust 1400 K. C. antenna trimmer for maximum output.



MODEL 4A-10,  
Reporter

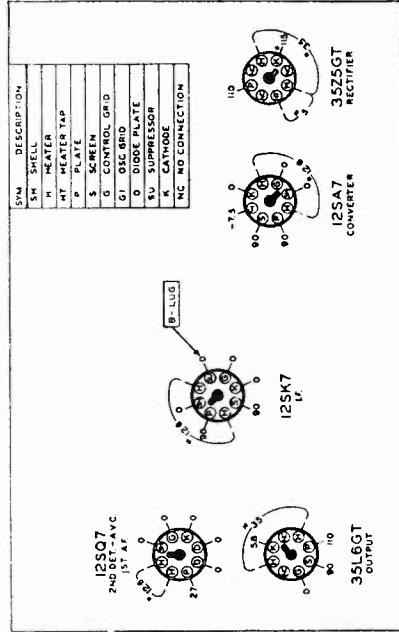
THE FIRESTONE TIRE & RUBBER CO.

**MISCELLANEOUS PARTS**

Part Name	Description
Cabinet	Ivory Plastic
Cord	6 Ft. Rubber Line Cord
Dial Plate	Dial Back Plate less Scale
Dial Cord	3' of 30 lb. Dial Drive Cord
Dial Scale	Calibrated Scale
Dial Shaft	Tuning Shaft
Dial Pointer	Dial Indicator
Dial Spring	Tension Spring for Drive Cord
Knob	For Ivory Cabinet
Pilot Lamp Socket	Pilot Lamp Socket Assembly
Pilot Lamp	No. 47 Lamp, 6-8 Volts .150 AMP.

Part No.	Description
*228	
N-1090	
N-5177	
N-5250	
N-5182	
N-4037	
N-5939	
N-3332	
N-5041	
N-4075	
N-1147	

**VOLTAGE TABLE  
(BOTTOM OF CHASSIS)**



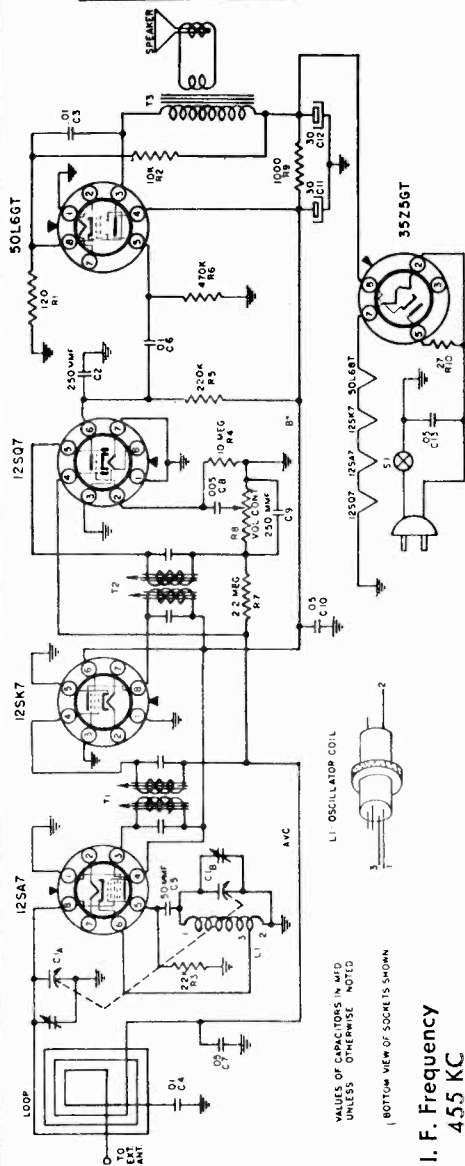
**REAR OF CHASSIS**  
All voltages except heaters are measured from socket contacts to common negative (Buss). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.  
\*AC except when set is used on DC.

**PARTS LIST**

Diagram Number	Part No.	Part Name	Description
1	N-4318	Speaker	4" P.M. Dynamic
2	N-4875	Transformer	Output
3	N-4810	Coil	Oscillator
4	N-4813	Coil	1st I.F.
5	N-4846	Coil	2nd I.F.
6	N-5183	Antenna	Loop
7	N-5181 or	Condenser	Variable, 2 Gang & Pulley Assem. N-5936 Variable Condenser N-4294 Pulley
6	N-5938	Antenna	Loop
7	N-5982	Condenser	Variable, 2 Gang & Pulley Assem N-5286 Variable Condenser N-4294 Pulley
C1	N-1681	Condenser	Mica .00001 MFD 500 V.
C2	N-1345	Condenser	Paper .05 MFD 200 V.
C3	N-1346	Condenser	Paper .05 MFD 400 V.
C4	N-1374	Condenser	Mica .0001 MFD 500 V.
C5	N-4894	Condenser	Paper .005 MFD 600 V.
C6	N-4890	Condenser	Paper .0005 MFD 600 V.
C7	N-1344	Condenser	Paper .01 MFD 400 V.
C8	N-1376	Condenser	Paper .02 MFD 400 V.
C9-C10	N-5193	Condenser	Electrolytic C9 - 35 MFD 150 V. C10 - 30 MFD 150 V.
C11	N-1345	Condenser	Paper .05 MFD 200 V.
C12	N-2649	Condenser	Adjustable Trimmer
R1	N-4025	Resistor	Carbon 22,000 ohm .5 W.
R2	N-4023	Resistor	Carbon 82 ohm 2.0 W.
R3	N-1262	Resistor	Carbon 1.0 Megohm .5 W.
R4	N-5185	Volume Control with Switch	
R5	N-4028	Resistor	Carbon 6.8 Megohm .5 W.
R6	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R7	N-4027	Resistor	Carbon 470,000 ohm .5 W.
R8	N-4067	Resistor	Carbon 180 ohm .5 W.
R9	N-5358	Resistor	Carbon 1,000 ohm 1.0 W.
R10	N-4022	Resistor	Carbon 33 ohm .5 W.
R11	N-4026	Resistor	Carbon 220,000 ohm .5 W.
R12	N-4087	Resistor	Carbon 47,000 ohm .5 W.

**VOLTAGE TABLE**  
(BOTTOM OF CHASSIS)

SYM	DESCRIPTION
SH	SHELL
H	HEATER TAP
P	PLATE
S	SCREEN
G	CONTROL GRID
G1	OSC GRID
DP	DIODE PLATE
SU	SUPPRESSOR
K	CATHODE
NC	NO CONNECTION



VALUES OF CAPACITORS IN MFD UNLESS OTHERWISE NOTED  
BOTTOM VIEW OF SOCKET IS SHOWN

**I. F. Frequency**  
455 KC

**Loud Speaker**  
4 inch P. M.

**Voice Coil Impedance**  
3.2 ohms at 400 cycles

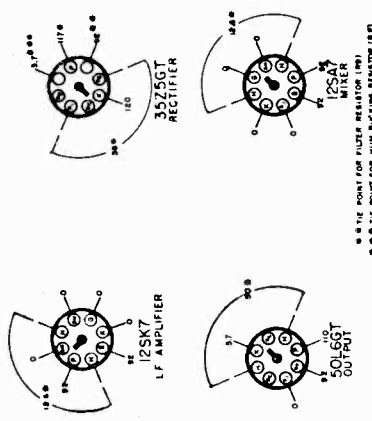
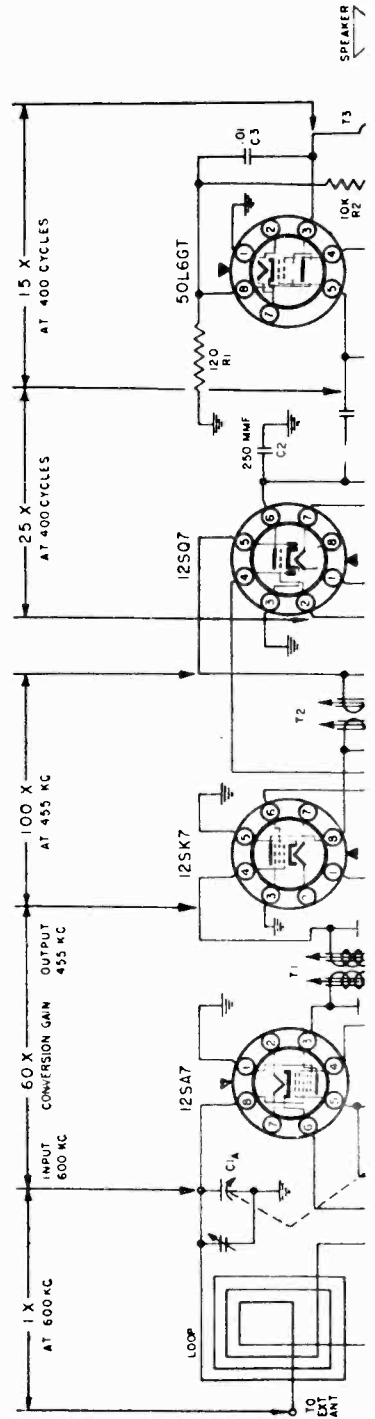
**Power Output**  
Maximum 1.65 watts

**Tube Complement**

- 12SA7 — Oscillator Converter
- 12SK7 — I. F. Amplifier
- 12SQ7 — AVC, Detector, 1st Audio
- 50L6GT — Power Output
- 35Z5GT — Rectifier

Before proceeding with stage measurements be sure the receiver is properly aligned. R.F. gains can be measured by a "channel" type instrument containing a tuned and calibrated R.F. amplifier. A vacuum tube voltmeter may be used for audio gain measurements. Observe the following precautions:

1. For all gain measurements connect the "high" side of a signal generator to the antenna lead through a .00025 mica condenser. The ground side of the signal generator should be connected to the chassis. Use a 600 KC signal with 400 cycle modulation (use nearby frequency if local station interferes.)
2. Be sure radio is carefully tuned to generator signal (use weak signal for sharp tuning.)
3. When using a "channel" type instrument carefully tune it for maximum output at desired frequency before making measurements.



**REAR OF CHASSIS**

All voltages except heaters are measured from socket contacts to ground (chassis). Heater voltages are measured across socket contacts. All voltages measured with a 1000 ohms per volt meter.

\* AC except when used on DC.

MODEL 4-A-27,

THE FIRESTONE TIRE & RUBBER CO.

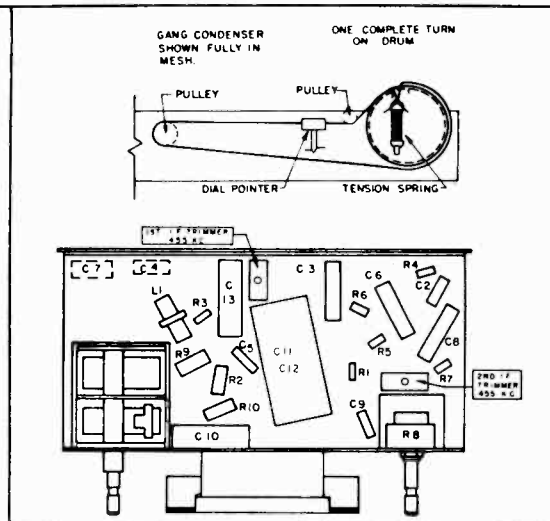
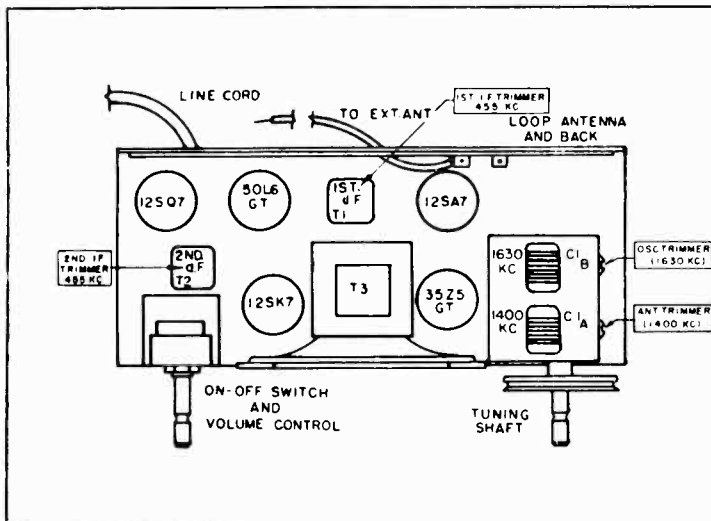
Cameo

The alignment should be made with volume control fully on, and the output from the signal generator as low as possible, to prevent A.V.C. action from interfering with correct alignment.

For alignment procedure read tabulations from left to right, and make the adjustment marked (1) first, (2) next, (3) third. Before starting alignment:

- (a) Check tuning dial adjustment by tuning gang condenser until plates touch maximum capacity stop (completely in mesh) at which point the dial pointer must be exactly even with the last mark at the low frequency end of the dial calibration. If dial pointer is incorrectly set, release pointer clip on dial cord and reposition pointer.
- (b) Use an accurately calibrated test oscillator with some type of output measuring device.
- (c) PLACE LOOP ANTENNA IN THE SAME POSITION IT WILL BE IN WHEN THE SET IS IN THE CABINET.

Steps	Set receiver dial to:	TEST OSCILLATOR		Attach output of test oscillator to:	Refer to parts layout diagram for location of trimmers mentioned below:
		Adjust test oscillator frequency to:	Use dummy antenna in series with output of test oscillator consisting of:		
1	Minimum capacity fully open	455 K.C.	1 MFD condenser	High side to grid of tuning condenser. Low side to chassis through .25 MFD. Cond.	Adjust each trimmer on the second I. F. transformer for maximum output—then adjust each trimmer on the first I. F. transformer for maximum output.
2	Minimum capacity fully open	Exactly 1630 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	Adjust 1630 K.C. oscillator trimmer for maximum output.
3	Approx. 1400 K.C.	Approx. 1400 K.C.	.00025 MFD. condenser	Receiver antenna lead. Chassis.	While rocking gang condenser adjust 1400 K.C. antenna trimmer for maximum output.



C1A, C1B	19-173	Variable condenser	T1
C2, C9	A15-176	250 MMFD mica condenser	T2
C3, C4, C6	A16-156	.01 MFD 400 volt condenser	T3
C5	A15-175	50 MMFD mica condenser	L1
C7, C10	A16-152	.05 MFD 200 volt condenser	
C8	A16-153	.005 MFD 600 volt condenser	
C11, C12	B18-283	30 x 30 MFD 150 volt electrolytic cond	
C13	A16-158	.05 MFD 400 volt condenser	
R1	A60-702	120 ohm 1/2 watt resistor	
R2	A60-698	10K ohm 1 watt resistor	
R3	A60-659	22K ohm 1/2 watt resistor	
R4	A60-663	10 Megohm 1/2 watt resistor	
R5	A60-667	220K ohm 1/2 watt resistor	
R6	A60-662	470K ohm 1/2 watt resistor	
R7	A60-684	2.2 Megohm 1/2 watt resistor	
R8	24-157	Volume control, 1 megohm	
R9	A60-732	1000 ohm 1 watt resistor	
R10	A60-690	27 ohm 1/2 watt resistor	

A10-478	1st I. F. transformer
A10-479	2nd I. F. transformer
A80-233	Output transformer—part of speaker
B10-480	Oscillator coil

### MISCELLANEOUS PARTS

48-34	Dial crystal
58-37	Dial pointer
B67-506	Dial scale
51-105	Dial cord, 15" long
79-316	Speaker, 4 inch P. M. (includes output transformer)
B82-46	Loop antenna
23-07	Line cord
A42-425	Cabinet, molded, white
C83-468	Cabinet back
A52-226	Knob, white

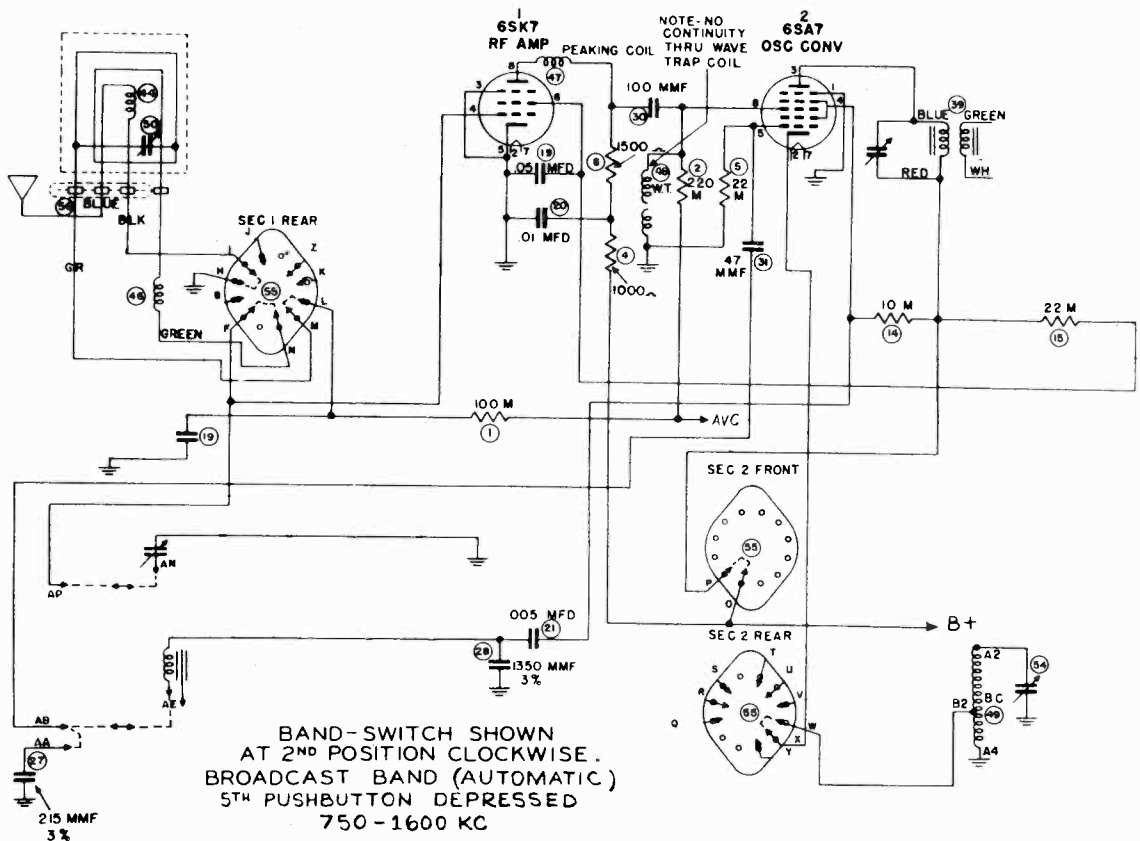
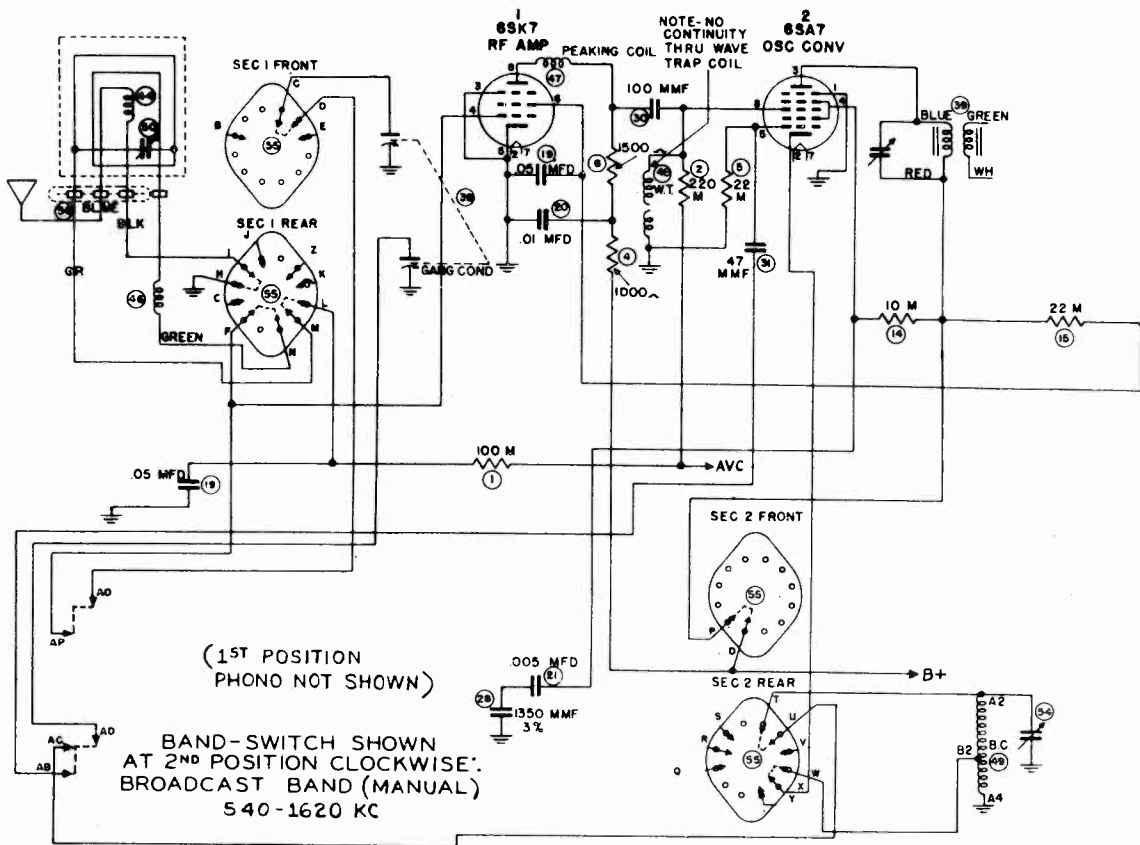


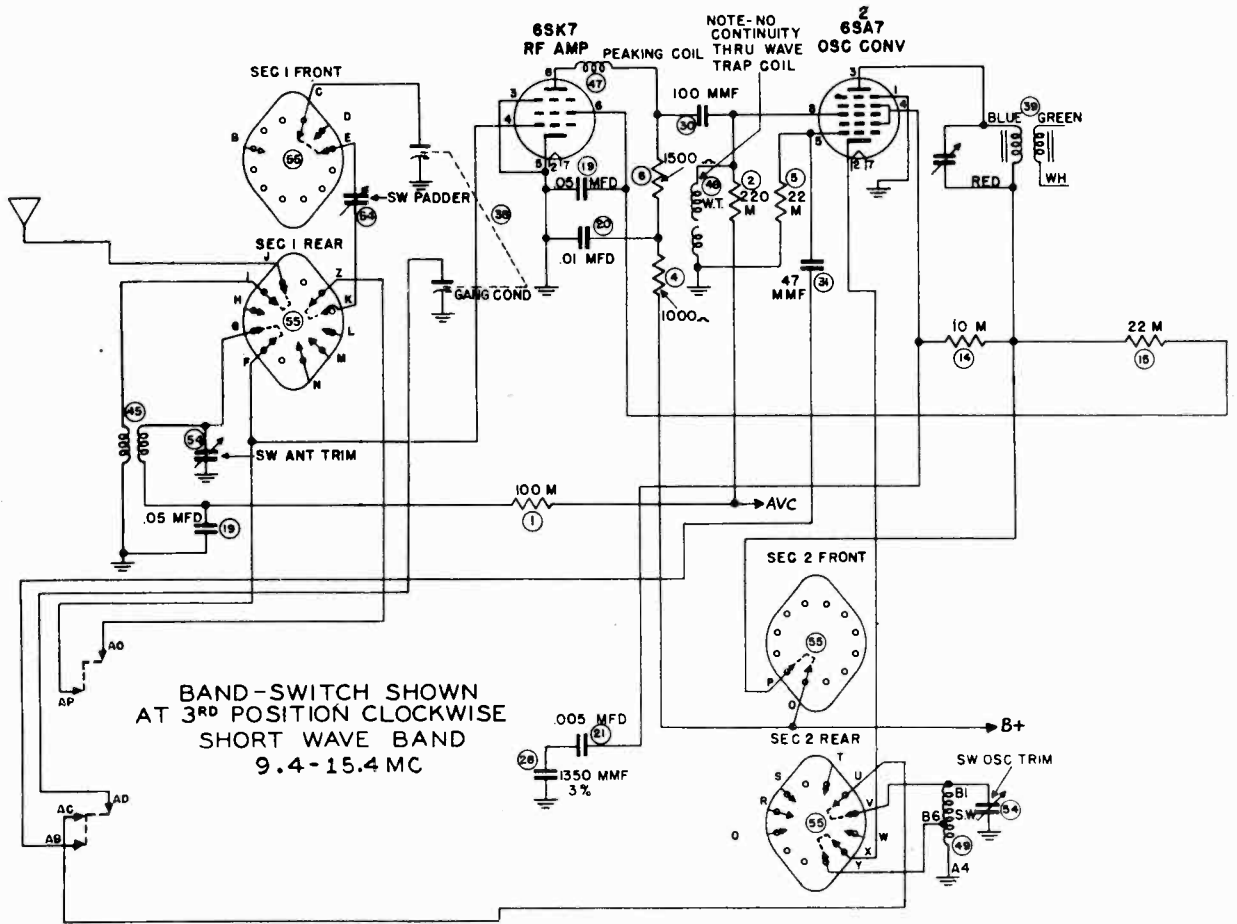


# "clarified schematics"

## THE FIRESTONE TIRE & RUBBER CO.

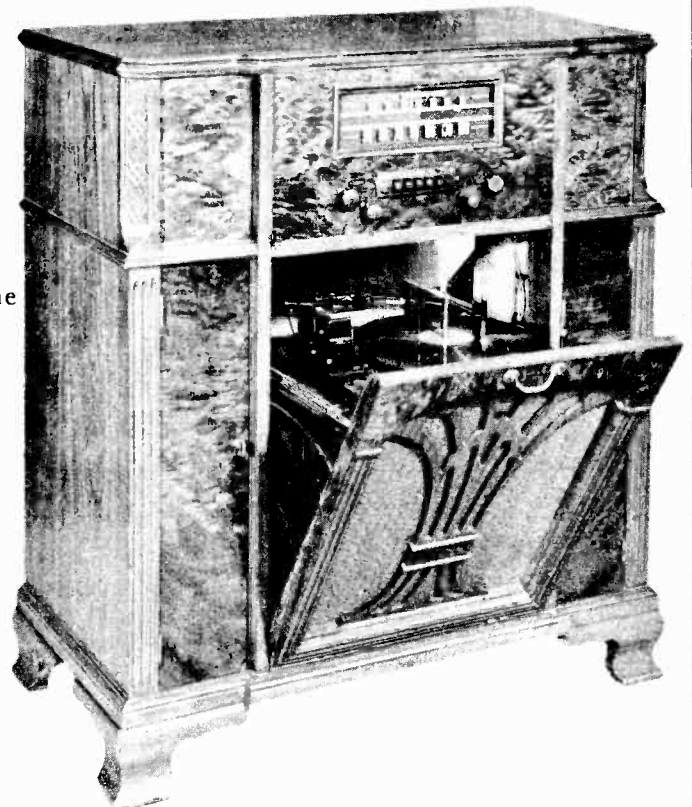
MODEL 4-A-37





**ELECTRICAL SPECIFICATIONS**

Eight Tube A.C. Two Band Superheterodyne  
 Broadcast Band.....540 Kc. — 1620 Kc.  
 Shortwave Band..... 9.4 Mc. — 15.4 Mc.  
 Intermediate Frequency 455 Kc.  
 60 cycle A. C. 105 — 120 Volts  
 90 watts at 117 Volts A. C.



THE FIRESTONE TIRE & RUBBER CO.

EQUIPMENT AND PROCEDURE FOR ALIGNMENT

To properly align this receiver, a signal generator calibrated at 455 Kc., 1000 Kc., 1500 Kc., 1620 Kc., 9.7 Mc., 15 Mc., and 15.4 Mc., and also an output indicator are required. All adjustments should be made with the volume control set for maximum volume, keeping the generator output as low as possible to prevent A.V.C. action and false readings.

The loop should be placed in the approximate position relative to chassis as when the chassis is installed in the cabinet.

Connect the low side of the generator to the ground (black) wire and the high side of the generator to the antenna (red) wire.

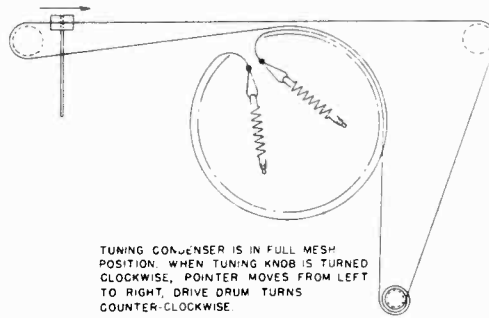
CAUTION—Tighten S.W. oscillator trimmer screw for maximum capacity, then unscrew to second peak. Two peaks are usually found on the S.W. oscillator trimmer—one at 16.3 Mc., and one at 15.4 Mc. The lower frequency (15.4 Mc.) is used.

STEPS	USE IN SERIES WITH ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	TO OBTAIN
1	SET VOLUME CONTROL AT MAXIMUM					
2	250 MMFD. BROAD CAST	455 Kc.	MINIMUM	2nd. I.F. TRIMMERS	TOP 2nd. I.F. TRANS.	MAXIMUM OUTPUT
3				1st. I.F. TRIMMERS		
4		1620 Kc.	1620 Kc.	B.C. OSC. TRIMMER	See Chassis Layout*	
5		1500 Kc.	1500 KC. Rock Gang	ANT. TRIMMER	ON LOOP	
6	SET POINTER AT 1000 Kc. AND CHECK POINTER CALIBRATION					
7	400 Ohms SHORT WAVE	15.4 Mc.	MINIMUM	S.W. OSC. TRIMMER**	See Chassis Layout*	MAXIMUM OUTPUT
8		15 Mc.	15 Mc. Rock Gang	S.W. ANT. TRIMMER		
9		9.7 Mc.	9.7 Mc. Rock Gang	S.W. ANT. PADDER		
10	RECHECK 15.4 Mc. SETTING UP PUSH BUTTONS					

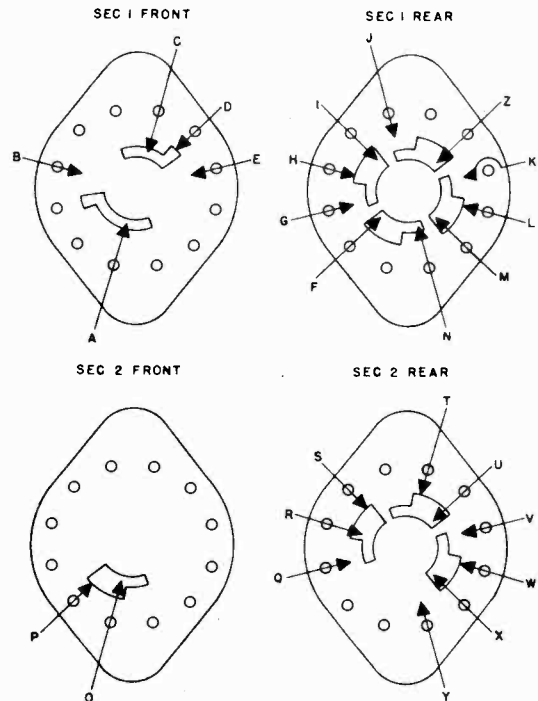
A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Allow the set to warm up for about half an hour before beginning to set up the buttons.
2. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See Push Button Layout.)
3. Select the pair of adjustment screws covering the frequency of a wanted stations.
4. Press the "Dial" Button and manually tune in the desired station frequency.
5. Press the button selected for this frequency.
6. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.
7. Adjust the upper screw in same pair until maximum volume is secured.
8. Press dial button making certain original frequency is still tuned in; check results on button just set up. If it is the same, proceed with the next button until all are set up.
9. Recheck settings and correct any drift due to interaction between adjacent coils.

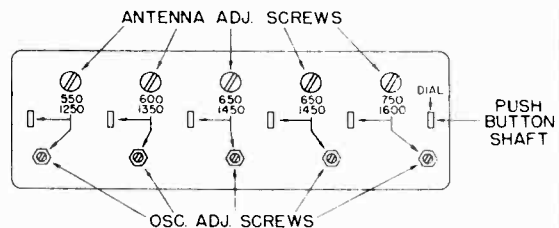
DIAL STRINGING



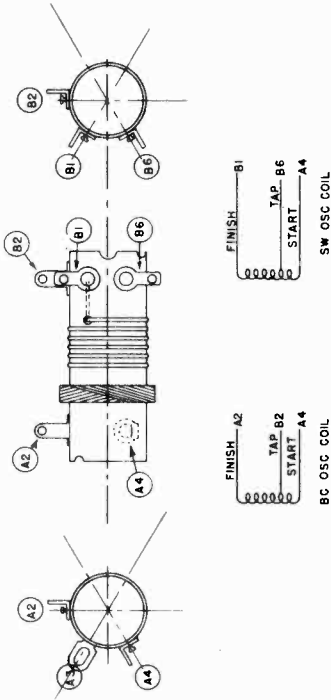
BAND SWITCH DECKS



PUSH BUTTON LAYOUT

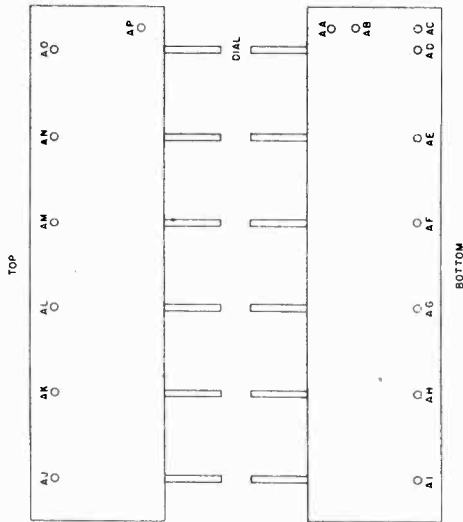


BROADCAST AND S. W. OSC. COILS

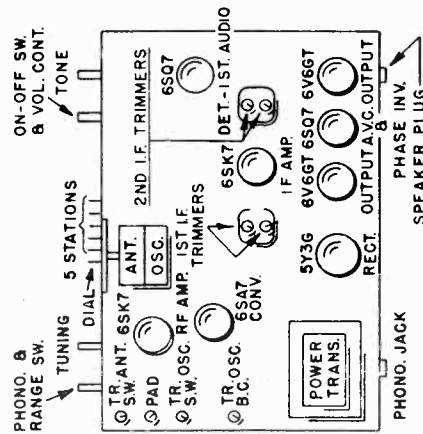


Letters on terminals of switches and coils shown on this page correspond to similarly lettered terminals on the switches and coils shown in the circuit diagram.

PUSH BUTTON TUNER SWITCH



CHASSIS LAYOUT

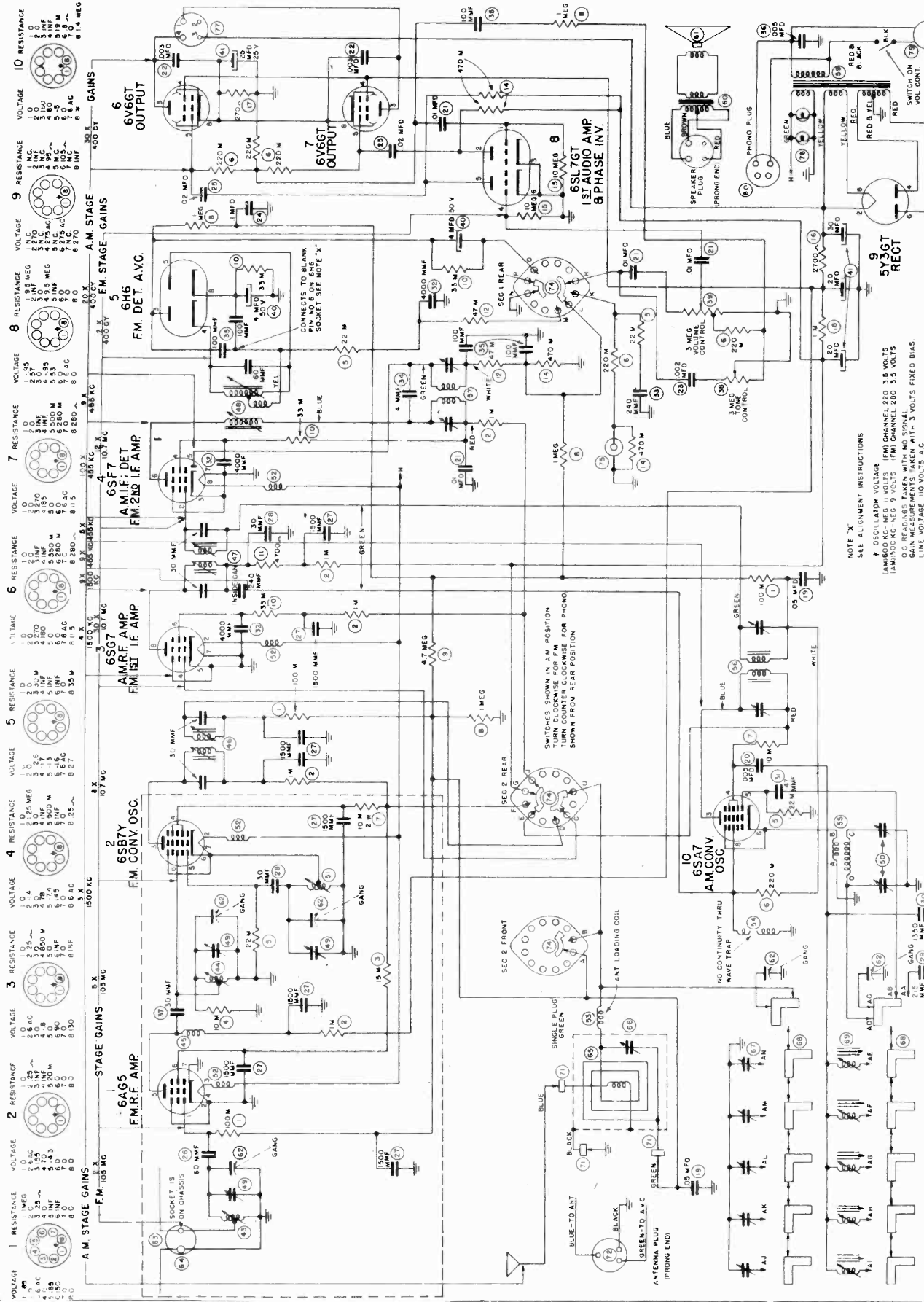


Refer. No.	Part Number	DESCRIPTION
1	77214	100 M Ohms
2	77216	220 M Ohms
4	77262	1000 Ohm
5	77266	22 M Ohms
6	77263	1500 Ohm
7	77217	470 M Ohms
8	77270	47 M Ohm.
9	77274	2.2 Megohm
10	77218	1 Megohm
11	77189	270 Ohm 2 Watt.
12	77013	10 M Ohms 2 Watt
13	77069	22 M Ohms 1 Watt
14	77304	1000 Ohm 2 Watt
15	77243	2700 Ohm 4.7 Watt Molded
16	25196	.05 Mfd. Tubular 600 Volts
17	25194	.01 Mfd. Tubular 600 Volts
19	25183	.005 Mfd. Tubular 600 Volts
20	25215	1 Mfd. Tubular 600 Volts
21	25185	.002 Mfd. Tubular 600 Volts
22	25184	.003 Mfd. Tubular 600 Volts
23	25195	.02 Mfd. Tubular 600 Volts
24	25212	215 Mmf Silver Mica Capacitor
25	25213	1350 Mmf Silver Mica Capacitor
26	25188	100 Mmf. Mica
27	25193	47 Mmf. Mica
28	25192	240 Mmf. Mica
29	25187	.005 Buffer 600 Volts
30	25031	Electrolytic Capacitor -20-30-450 Volts; 25-25 Volts.
31	25214	Volume Control
32	78020	Tone Control
33	78072	Gang Capacitor
34	26194	1st. I. F. Transformer
35	38536	
36		
37		
38		
39		
40		
42		
43		
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60		
38537		2nd. I. F. Transformer
94195		Output Transformer
81126		Speaker
38552		Loop Antenna
38542		Short Wave Antenna Coil
38794		Antenna Loading Coil
38544		Peaking Coil
38484		Wave Trap
38543		S.W. and B.C. Oscillator Coil Ass'y.
26032		Antenna Trimmer
90118		Push Button Switch
26175		P. B. Trimmer Strip
38405		P. B. Coil Strip
26195		Trimmer Strip
90175		Band Switch
80252		Antenna Plug
80256		Antenna Socket
94104		Power Transformer
80030		Phono Imput Socket
11274		Phono A.C. Cord and Socket
27118		Universal Line Cord
22174		Phono Pickup Cable
31274		Dial
11257		Dial Pointer
42185		Dial Lamp (Mazda 44) 6 V. 250 Ma.
59206		Volume Knob
59207		Tuning Knob
59208		Band Switch Knob
59209		Tone Control Knob
41106		Drive Cord Kit
59278		Push Button
59259		Push Button Escutcheon
41105		Station Call Letter Kit
17019		Drive Drum
80139		Molded Octal Socket
71223		Phono Needle

MODEL 4-A-42,  
Georgian

THE FIRESTONE TIRE & RUBBER CO.

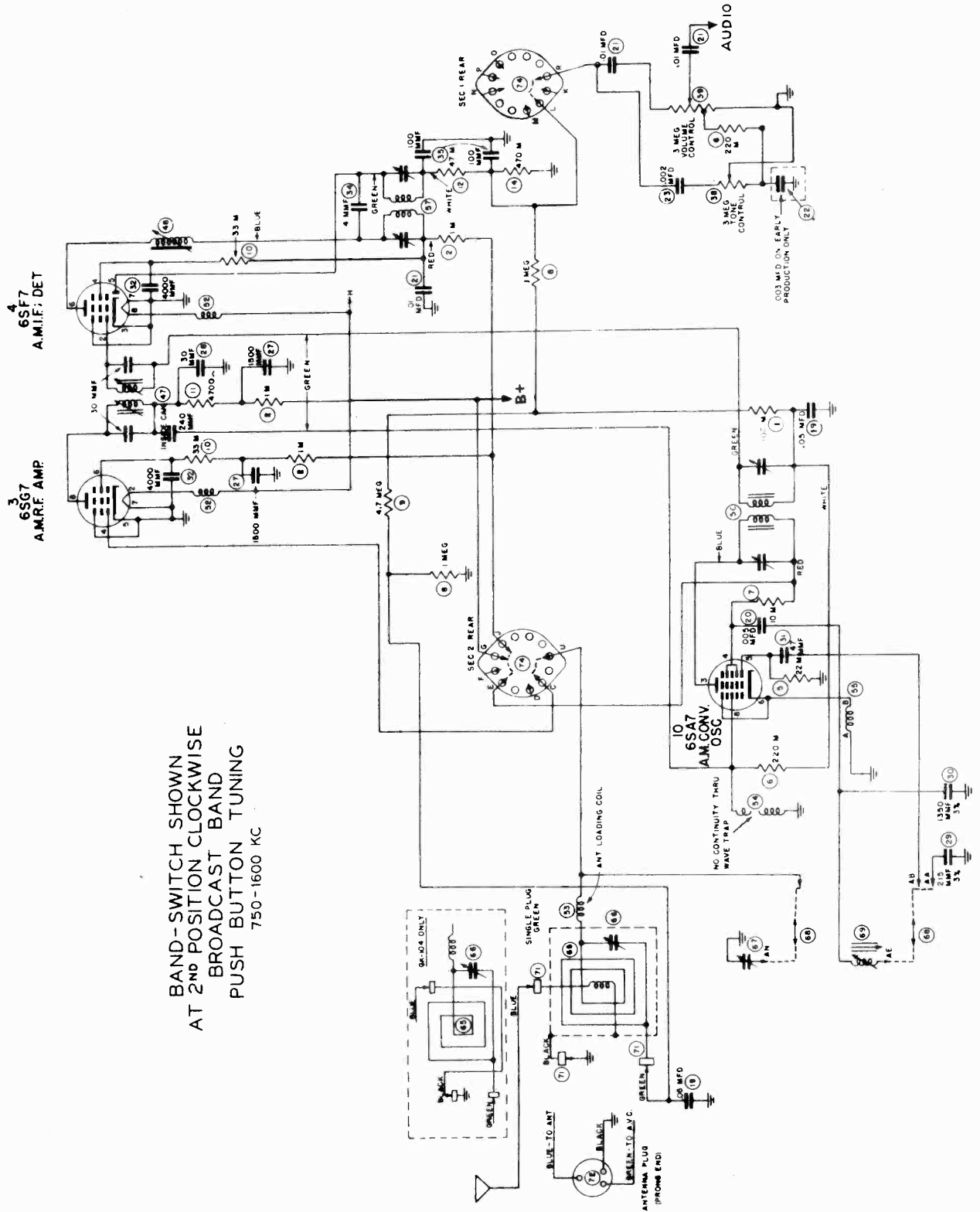
Power output Radio-7 watts Phono-9 watts



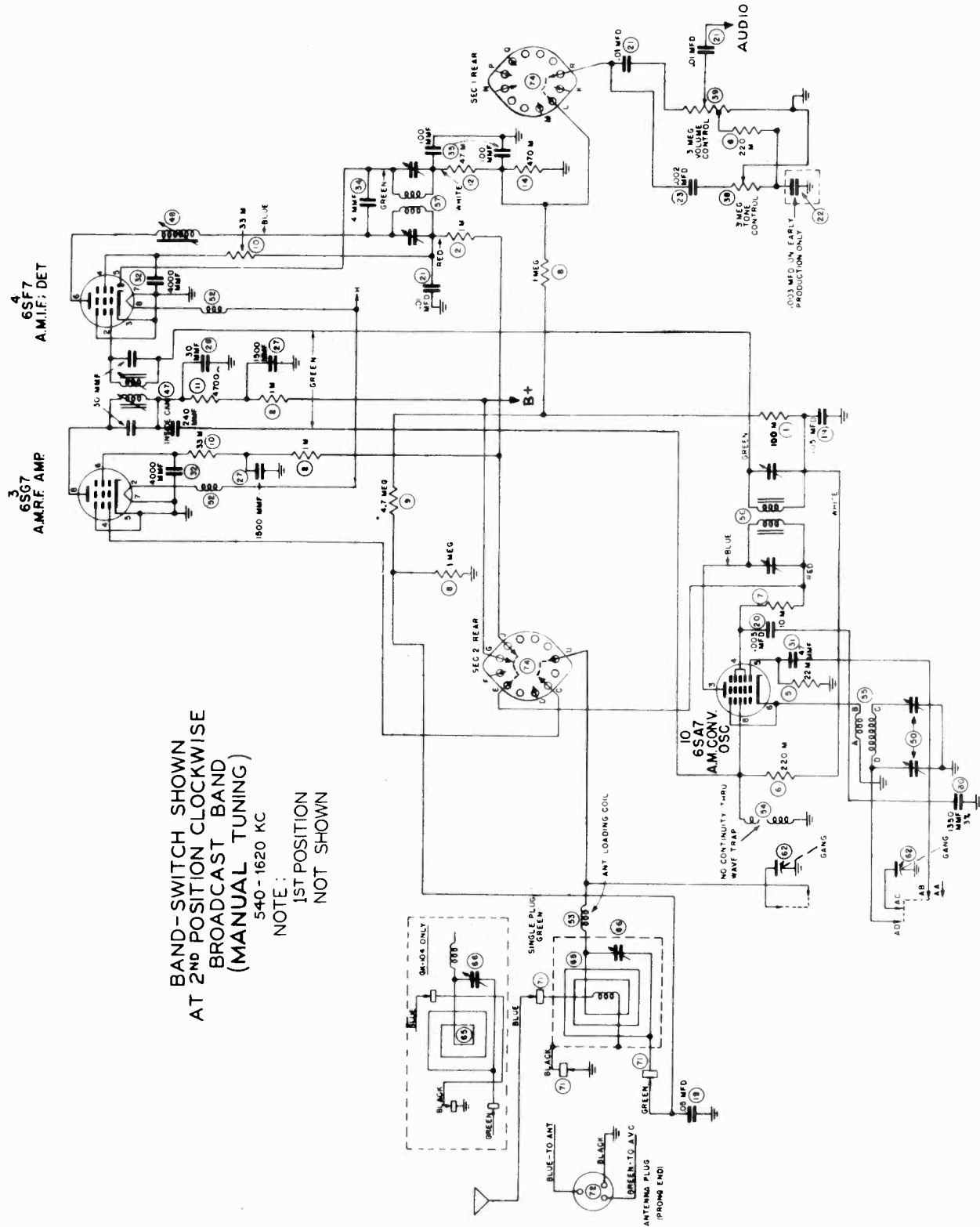
Speaker 12" PM Voice coil impedance 3.5 ohms

NOTE X  
SEE ALIGNMENT INSTRUCTIONS

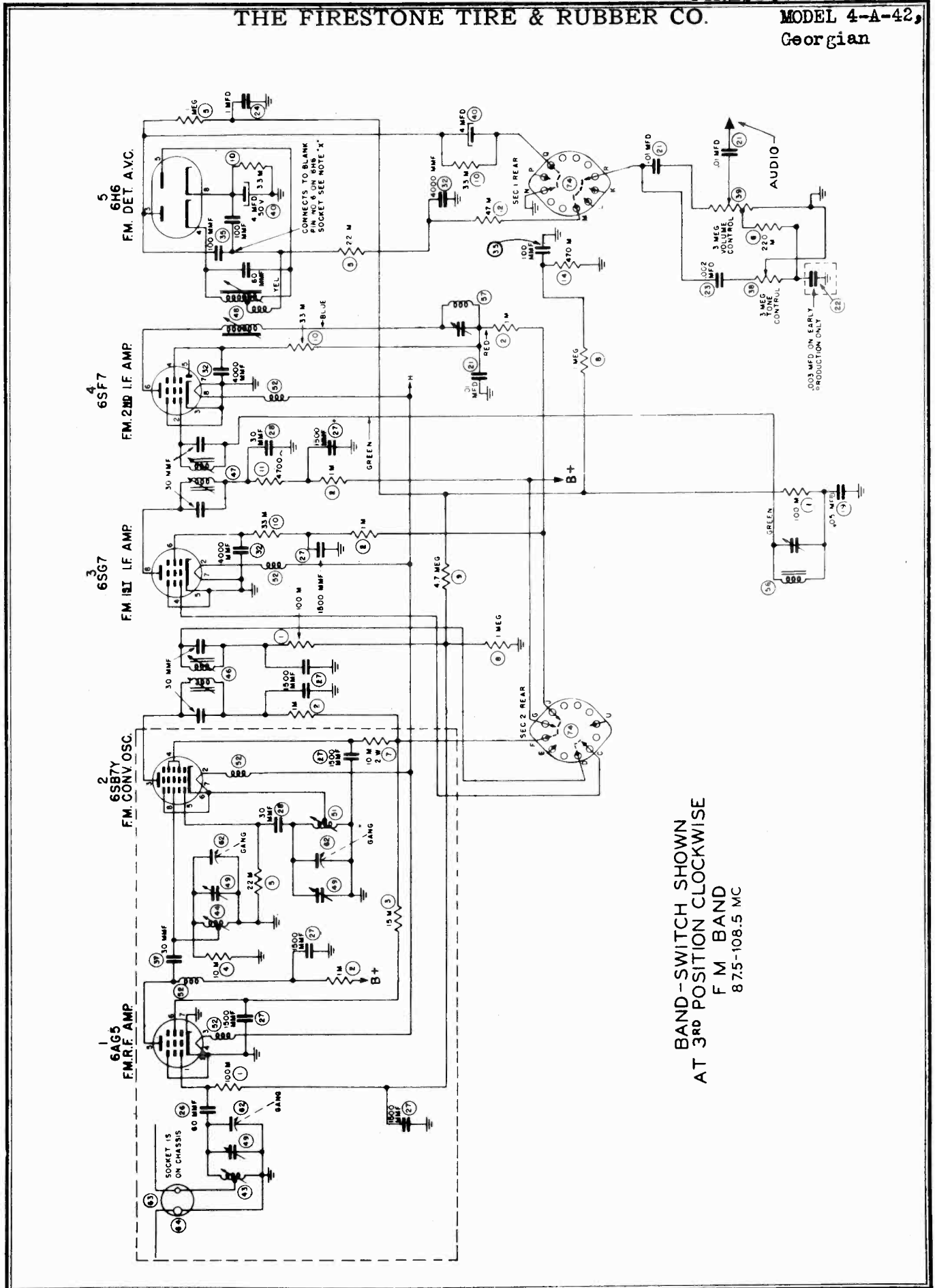
↑ OSCILLATOR VOLTAGE  
1AM500KC-NEG 11 VOLTS FM CHANNEL 200 3.0 VOLTS  
12AM500KC-NEG 11 VOLTS FM CHANNEL 280 3.5 VOLTS  
13AM500KC-NEG 11 VOLTS FM CHANNEL 350 3.5 VOLTS  
GAIN MEASUREMENTS TAKEN WITH 3 VOLTS BIASED BIAS  
LINE VOLTAGE 110 VOLTS A.C.



BAND-SWITCH SHOWN  
 AT 2<sup>ND</sup> POSITION CLOCKWISE  
 BROADCAST BAND  
 PUSH BUTTON TUNING  
 750-1600 KC



BAND-SWITCH SHOWN  
AT 2<sup>ND</sup> POSITION CLOCKWISE  
BROADCAST BAND  
(MANUAL TUNING)  
540 - 1620 KC  
NOTE:  
1ST POSITION  
NOT SHOWN



BAND-SWITCH SHOWN  
AT 3RD POSITION CLOCKWISE  
F M BAND  
87.5-108.5 MC



MODEL 4-A-42,  
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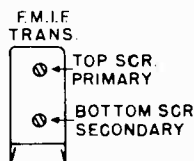
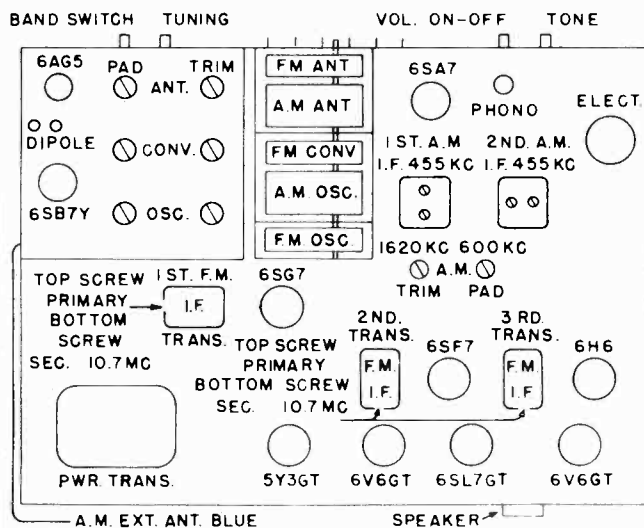
## ALIGNMENT INSTRUCTIONS AM BAND

An output meter and a signal generator calibrated at 455 Kc., 600 Kc., 1500 Kc. and 1600 Kc., are required to properly align these receivers on AM band. Keep the output of the signal generator as low as possible to prevent AVC action and false settings. Connect the high side of the generator to the blue wire found at rear of set and low side to the black wire.

STEPS	DUMMY ANTENNA	SET GENERATOR AT	SET GANG AT	ADJUST	LOCATED	
1	SET VOLUME AND TONE CONTROLS AT MAXIMUM					MAXIMUM OUTPUT
2	200 MMF.	455 Kc.	Minimum	2nd. I.F. Trimmers *	Top of I.F. Transformers	
3				1st. I.F. Trimmers *		
4		1600 Kc.	1600 Kc.	B. C. Osc. Trimmer	See Chassis Layout	
5		1500 Kc.	1500 Kc.	B. C. R. F. Trimmer	On Loop	
6		600 Kc.	600 Kc. Rock Gang	600 Kc. Padder	See Chassis Layout	
7		Recheck 1500 Kc.				

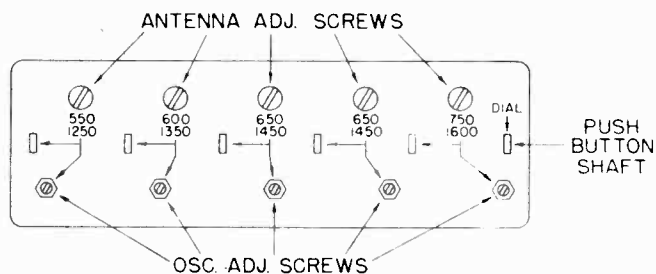
\* Recheck after FM alignment.

### CHASSIS LAYOUT



Letters on terminals of switches and coils shown on this page correspond to similarly lettered terminals on the switches and coils shown in the circuit diagram.

### PUSH BUTTON LAYOUT



## OSCILLISCOPE ALIGNMENT OF FM BAND

A. Equipment required will be an oscilloscope, a frequency modulated signal generator covering the range 87.5 to 108.5 mc on fundamentals, a sweep generator producing a signal of 10.7 mc and sweeping at least 150 kc each side of 10.7 mc, and an output meter.

B. The vertical or 'Y' axis terminals of the oscilloscope should be connected between pin 3 of the 6H6 discriminator and ground. The sweep voltage of the sweep generator should be fed to the horizontal or 'X' axis terminals of the oscilloscope. The 10.7 mc output of the sweep generator should be fed into the grid of the 6SF7 tube through a condenser of approximately 3300 mmfd.

C. Remove the negative lead of the 4 mfd. electrolytic from pin #3 of 6H6 socket. Remove 6SL7 tube from socket. Turn the set on and turn both the tone control and the volume control all the way to the right. Detune the secondary of the third FM I.F. transformer by turning the bottom slug screw out as far as possible. Adjust the primary, top slug screw, until pattern (a) appears on the oscilloscope. Adjust the secondary, bottom slug screw, until pattern "b" is obtained on the oscilloscope and until both sides of this pattern are symmetrical.

D. Remove the 10.7 mc. output of the sweep generator from the grid of the 6SF7 tube and connect to the grid of the 6SG7. Align the second FM I.F. transformer as in paragraph "C".

E. Connect the 10.7 mc output of the sweep generator to the signal grid of the 6SB7Y, (pin 8) Detune secondary of the first FM I.F. transformer and tune primary as before for pattern (a). Tune secondary for pattern "c" and make both sides of pattern as symmetrical as possible. This completes alignment of the FM I.F. transformers.

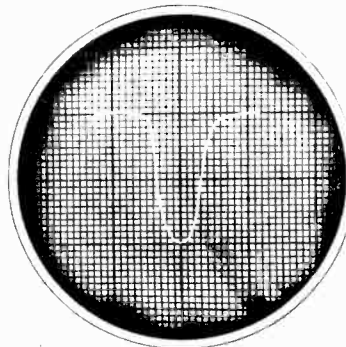
F. Reconnect the negative lead of the 4 mfd. electrolytic to pin #3 of the 6H6 socket and move the oscilloscope leads to pin #6 of the 6H6 socket and ground. With the sweep generator connected to the 6SB7Y signal grid as before, the discriminator pattern (d) should appear on the oscilloscope if the I.F. alignment instructions have been followed carefully. Remove the oscilloscope and sweep generator leads and reinstall 6SL7 tube in socket. Never adjust AM I.F. transformers without rechecking FM I.F. alignment.

G. Connect the 87.5 to 108.5 mc signal generator to the antenna socket of the receiver through a 300 ohm resistor. The generator should be frequency modulated at some frequency in the audible range. Connect output meter across secondary of output transformer. Tune receiver to channel 300 on FM dial. With signal generator set at 107.9 mc adjust

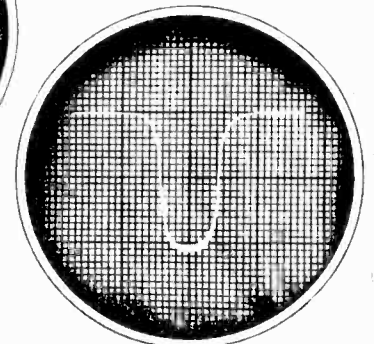
oscillator trimmer condenser, third from front, for maximum reading on output meter. Set signal generator to 87.9 mc and tune receiver to channel 200 on FM dial. Adjust oscillator coil screw, third from front, (see chassis layout) for maximum reading on output meter. Recheck oscillator setting for channel 300.

H. Tune signal generator and receiver to 105 mc (channel 285 approx.). Adjust converter signal grid trimmer condenser, second from front, for maximum reading on output meter. Tune signal generator and receiver to 92 mc, (channel 220 approx.) and adjust converter coil screw, (second from front), to maximum reading on output meter. Recheck converter trimmer setting at 105 mc (channel 285 approx.).

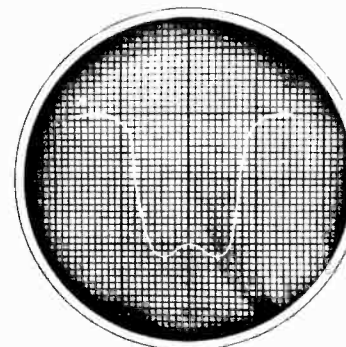
I. Repeat operations of paragraph (G) for antenna trimmer condenser and coil. This completes FM R.F. alignment.



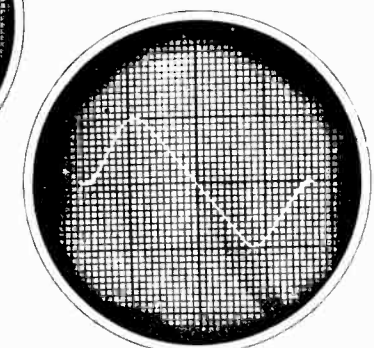
A



C



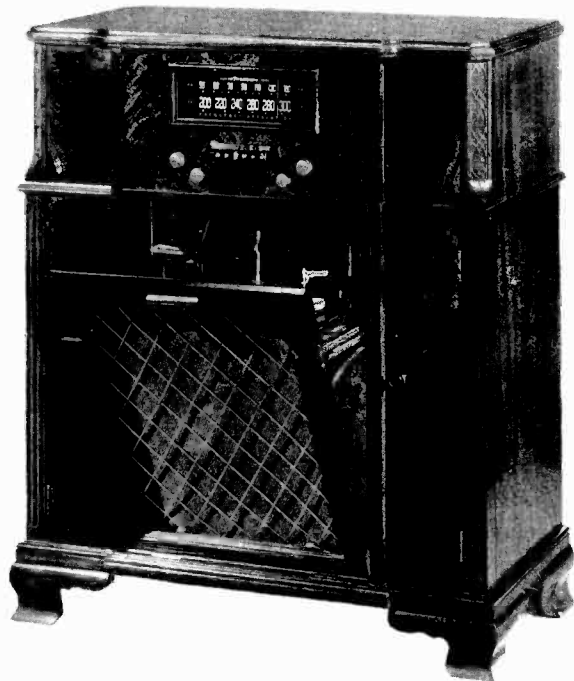
B



D

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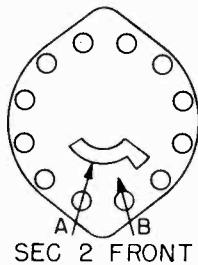
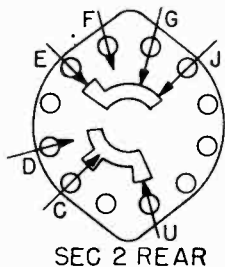
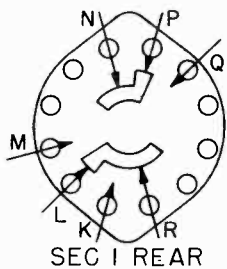


### SETTING UP PUSH BUTTONS

A Signal Generator should be used to prevent buttons being set up on wrong stations.

1. Allow the set to warm up for about half an hour before beginning to set up the buttons.
2. Remove the button escutcheon, exposing five pairs of adjusting screws. The small screw adjusts the oscillator and the large screw adjusts the antenna. (See Push Button Layout).
3. Select the pair of adjustment screws covering the frequency of a wanted station.
4. Press the "Dial" button and manually tune in the desired station frequency, or signal from generator.
5. Press the button selected for this frequency.
6. Adjust the lower screw of the pair selected for this frequency until the signal is heard most clearly.
7. Adjust the upper screw in same pair until maximum volume is secured.
8. Press dial button making certain original frequency is still tuned-in; check results on button just set up. If it is the same, proceed with the next button until all are set up.
9. Recheck settings and correct any drift due to interaction between adjacent coils.

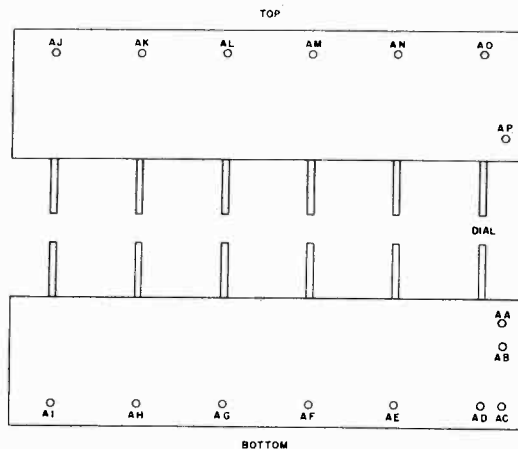
### BAND SWITCH DECKS



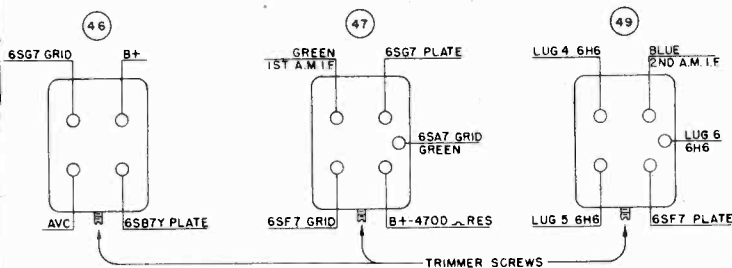
### Electrical Specifications

Ten tube, 60 cycle A.C., 110-120 volt operated super-heterodyne receiver with built-in loop antenna and FM folded dipole. AM Broadcast band tuning range 540 Kc. to 1620 Kc. FM band range 87.5 Mc. to 108 Mc. calibrated in channel numbers from 200 to 300.

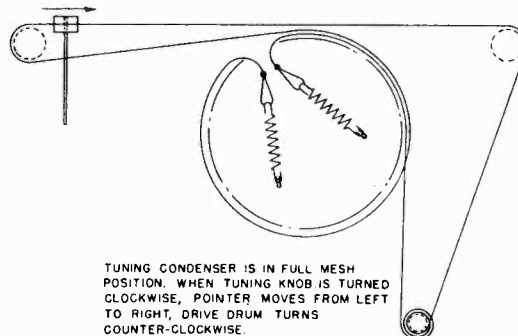
### PUSH BUTTON TUNER SWITCH



### BOTTOM VIEW FM I.F. TRANSFORMERS



### DIAL STRINGING



TUNING CONDENSER IS IN FULL MESH POSITION. WHEN TUNING KNOB IS TURNED CLOCKWISE, POINTER MOVES FROM LEFT TO RIGHT, DRIVE DRUM TURNS COUNTER-CLOCKWISE.

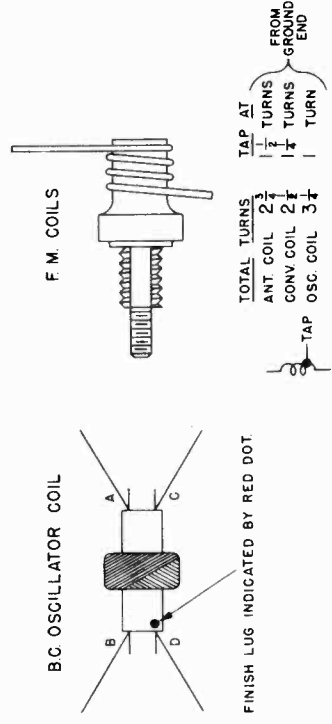
THE FIRESTONE TIRE & RUBBER CO.

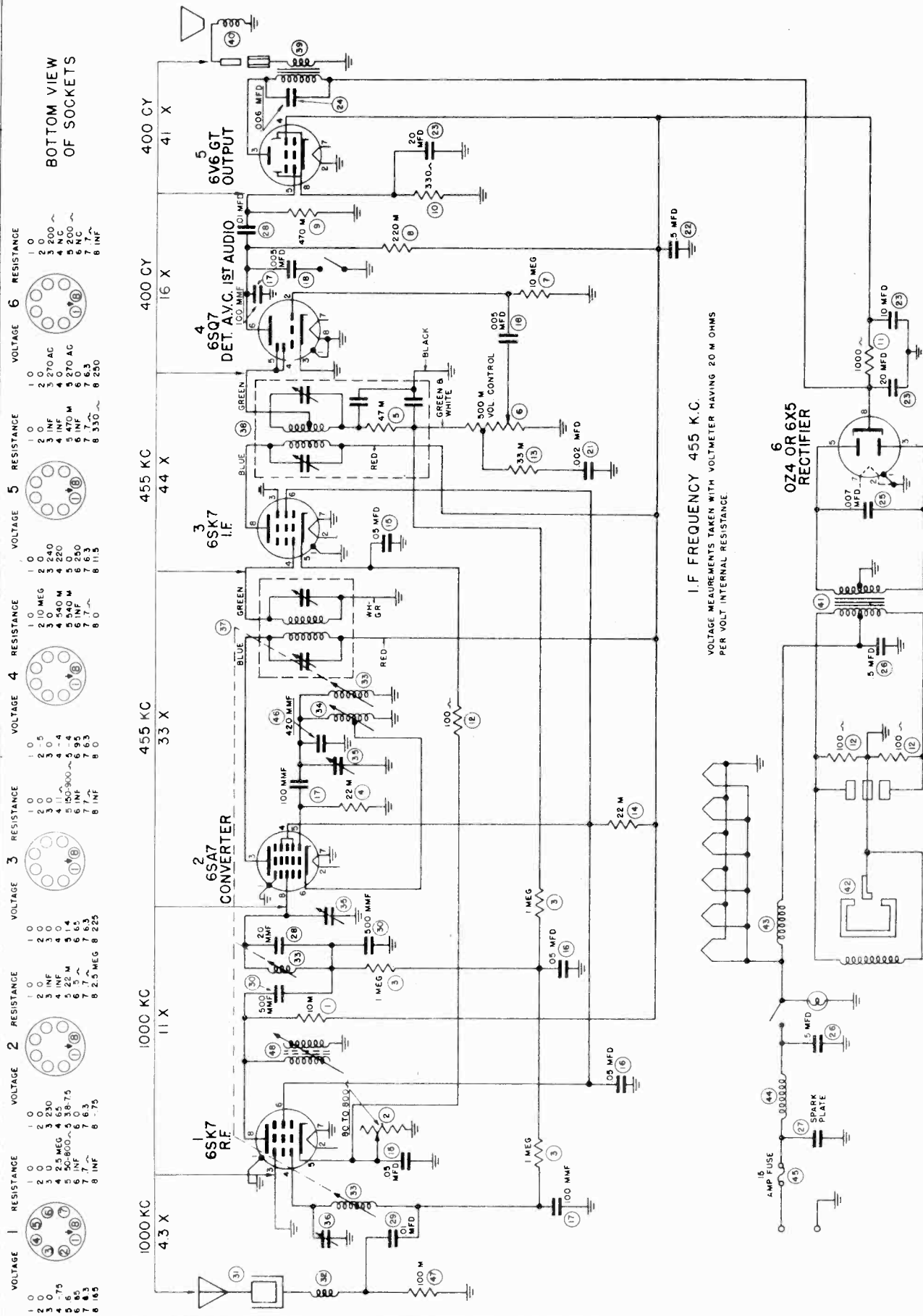
MODEL 4-A-42,  
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PARTS LIST

Ref. No.	Part No.	DESCRIPTION	Ref. No.	Part No.	DESCRIPTION
1	77214	100M Ohms	64	80361	FM Dipole Socket
2	77262	1000 Ohms	65	38701	Loop Antenna
3	77265	15 M Ohms	66	26032	Loop Antenna Trimmer
4	77212	10 M Ohms	67	26175	Push Button Trimmer Strip
5	77266	22 M Ohms	68	90118	Push Button Switch
6	77216	220 M Ohms	69	38405	Push Button Coil Strip
7	77013	10 M Ohms 2 Watt	71	80439	Loop Antenna Socket
8	77218	1 Megohm	72	80440	Antenna 3-Prong Plug
9	77272	4.7 Megohms	74	90214	Band Switch
10	77267	33 M Ohms	75	80030	Phono Input Socket
11	77211	4700 Ohms	76	42186	Dial Lamp, 150 Ma
12	77213	47 M Ohms	77	80385	Speaker Socket
14	77217	470 M Ohms	79	27118	Line Cord
15	77274	10 Megohms	80	11274	Phono AC Socket
16	77243	2700 Ohm Molded Resistor 4.7 Watt			
17	77189	270 Ohms, 2 Watt			
18	77304	1000 Ohms, 2 Watt			
19	25196	.05 Mfd. 600 Volt			
20	25183	005 Mfd. 600 Volt			
21	25194	.01 Mfd. 600 Volt			
22	25185	.002 Mfd. 600 Volt			
23	25215	1 Mfd. 600 Volt			
24	25195	.02 Mfd. Capacitor, 600 Volt			
25	25333	60 MMF. Ceramic Capacitor N-470			
26	25273	1500 MMF. Ceramic Capacitor			
27	25329	30 MMF. Ceramic Capacitor, N-750			
28	25212	215 MMF. Silver Mica Capacitor			
29	25213	1350 MMF. Silver Mica Capacitor			
30	25213	47 MMF. Mica Capacitor			
31	25193	4000 MMF. Ceramic Capacitor			
32	25271	240 MMF. Mica Capacitor			
33	25187	4 MMF. Ceramic Capacitor			
34	25327	100 MMF. Mica Capacitor			
35	25188	005 MFD. Mica Capacitor			
36	25031	005 MFD. Buffer Capacitor, 600 Volt			
37	25332	30 MMF. Ceramic Capacitor, N-150			
38	78072	Tone Control, 3 Megohms			
39	78120	Volume Control, 3 Megohms			
40	25316	4 Mfd., 50 V. Electrolytic Capacitor			
41	25214	Electrolytic Capacitor 20 Mfd. 20 Mfd., 30 Mfd., 450 volt, 25 Mfd., 25 Volt			
43	38690	FM Antenna Coil			
44	38691	FM Converter Coil			
45	38661	FM RF Choke			
46	38683	1st. FM I.F. Transformer			
47	38684	2nd. FM I.F. Transformer			
48	38685	3rd. FM I.F. Transformer			
49	26231	5-20 MMF. Ceramic Trimmer N-300 Temp. Coeff.			
50	26240	B. C. Osc. Trimmer Strip			
51	38692	FM Oscillator Coil			
52	38661	Heater R.F. Choke			
53	38845	Antenna Loading Coil			
54	38484	Wave Trap Coil			
55	38694	BC Oscillator Coil			
56	38681	1st. AM I.F. Transformer			
57	38682	2nd. AM I.F. Transformer			
59	94204	Power Transformer			
60	94195	Output Transformer			
61	81126	Speaker			
62	26237	Gang Capacitor			
63	11235	FM Dipole and Plug			

BROADCAST AND FM COILS





## Manual Tuning Alignment Procedure

A signal generator calibrated at 455 Kc, 540 Kc, 600 Kc and 1600 Kc and an output meter are required to properly align this receiver. Except for Wave Trap adjustment, the signal generator output should be kept as low as possible and still obtain output meter reading. Connect output meter across voice coil of speaker. Connect signal generator ground lead to receiver chassis. Connect signal generator output lead to antenna connector in series with dummy antenna specified below.

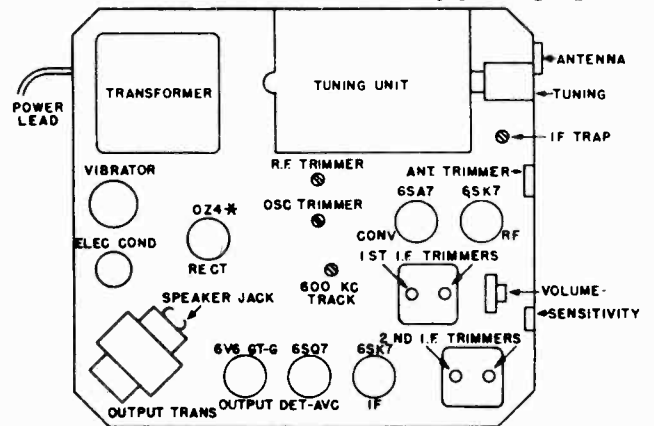
STEPS	IN SERIES WITH GEN.	SET SIGNAL GEN. AT	SET DIAL AT	ADJUST	LOCATED	TO OBTAIN		
1	Set Volume Control at Maximum Volume. Tone control on treble position.							
2	.1 Mfd.	455 Kc	54 Or tuning mechanism fully counter-clock-wise.	2nd. I.F. Trimmers	Top 2nd. I.F. Transformer	MAXIMUM		
3				1st. I.F. Trimmers	Top 1st. I.F. Transformer			
4				Wave Trap Adjusting Screw			MINIMUM	
5	.0001 Mfd.	1600 Kc	160 Or tuning mechanism fully clock-wise.	Osc. Trimmer	Top of Chassis **	MAXIMUM		
6				RF Trimmer				
7				Ant. Trimmer	End of Chassis **			
8				540 Kc	54		600 Kc Tracking	On Chassis **
9				Recheck step 5.				
10		600 Kc	Rock 60	600 Kc Tracking	On Chassis **			

\*\*See Tube and Trimmer layout.

### STATION SELECTOR:

Stations may be tuned in with the station selector (right hand knob) as soon as the tubes become heated which requires less than a minute's wait after the receiver is turned on. Slowly turn this knob to bring the pointer over that portion of the dial where the wanted station is found. If the station frequency is known the desired station may be tuned in very close to its dial markings. The dial is calibrated in kilocycles with the last zero omitted. When the station is heard finish tuning so that the pointer is in the center of the area where the station is received. The station selector should

### TUBE AND TRIMMER LOCATIONS



\* 6X5 can be used if 0Z4 is not available.

## MOUNTING RECEIVER

Careful consideration to the following requirements should be made before selecting a mounting position for the receiver:

1. The radio case must not interfere with the operation of any of the car controls.
2. The mounting bolt should not encounter any obstruction on the engine side of the bulkhead.
3. The control unit flexible cables should run from the control to the receiver with as few bends as possible.
4. The position selected should be such that there is enough room to permit the cover to be removed from the receiver case for making tube replacements.

The proper location for the mounting bolt may be determined from the drilling template included with the receiver. Place the template in the chosen location and center punch the spot for drilling the mounting hole. The hole may then be drilled with a one-half inch drill.

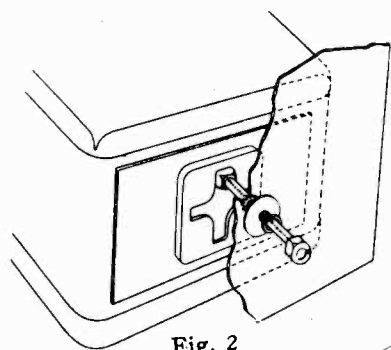
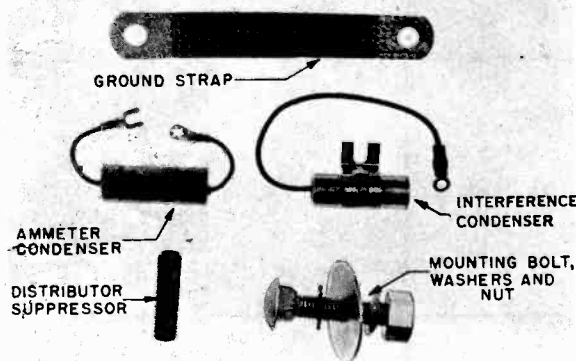


Fig. 2

Figure 2 illustrates the proper mounting of the receiver. All dirt and paint must be removed from around the mounting hole on the engine side of the bulkhead to insure proper grounding of the receiver case. Washers furnished should be placed in the following order. External tooth lockwasher should be placed between the bulkhead and large plain washer. Then the compression lockwasher and nut. This insures a good mechanical and electrical connection between the bulkhead and receiver. Ignition interference may result upon failure to observe this precaution. The mounting nut should be tightened after the car has been driven about 500 miles.



## Connecting the Receiver

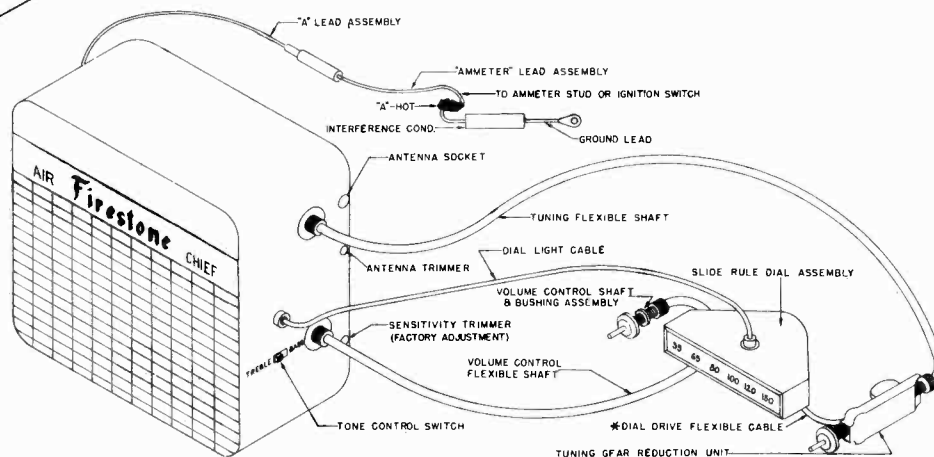


Fig. 3

\* Furnished with control kit.

Plug the antenna shielded lead-in into its receptacle in the side of the receiver case. Be sure the antenna lead-in inside the car is shielded, to avoid ignition interference.

Insert the fibre insulating bushing and fuse in the fuse-holder and couple together the two parts of the fuseholder on the leads. The connector at the end of the lead and one wire of the ammeter condenser (the condenser with the cardboard wrapper) should be fastened to the ammeter stud

at the back of the ammeter. The connection may be made to either stud but the current taken by the radio will register on the ammeter only if the connection is made to the proper stud. If your car does not have an ammeter, the connection should be made to the battery supply lead connection behind the instrument panel. Ground the other wire of the ammeter condenser under a convenient nut or screw behind the instrument panel. Be sure that a tight and clean connection is made.

**NOISE SUPPRESSION EQUIPMENT INSTALLATION**

The center high tension cable is cut near the distributor and the cut ends screwed into the distributor suppressor as shown in figure No. 4.

The interference condenser with metal case is mounted on the generator by using any one of the generator assembly bolts. Any paint or dirt should be removed so bright metal to metal contact is secured. The flexible lead is connected to the generator output terminal. See figure 5. Do not connect to field terminal.

The copper braid ground strap is used to bond the engine to the bulkhead. One end of the braid is fastened to the bulkhead by means of a nut or bolt and the other end to is secured under a cylinder head bolt, leaving enough slack for normal engine movement. A flat washer should be used under the head of the bolt fastening the braid.

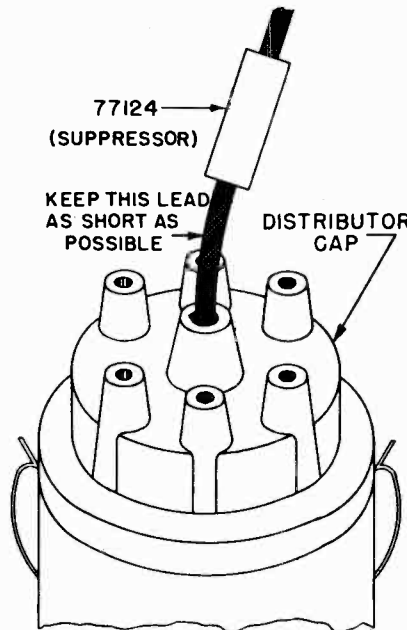


Fig. 4

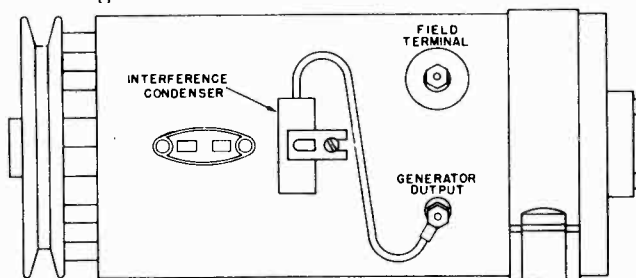


Fig. 5

**FORD MOTOR INTERFERENCE:**

To eliminate motor interference, two additional interference condensers #25120 must be used. One from the oil pressure gauge terminal on the block to ground, the other from the temperature gauge terminal on the motor head which is highest above ground electrically to ground. Sometimes the generator interference condenser will be more effective

when connected to the generator output terminal of the voltage regulator than on the generator.

**REMEDIES FOR UNUSUAL NOISE:**

If ignition noise exists after ordinary precautions are taken, the following procedure is suggested:

1. See that the antenna lead-in shield is well grounded to the car body direct and that no portion of the antenna lead-in is unshielded.
2. An additional capacitor may be tried from various hot wires under panel to ground.
3. Solder a bond from hood to bulkhead near the antenna.
4. If noise persists, reduce the distance of the distributor rotor from the stationary terminals by extending the distributor rotor approximately ten thousandths by peening.

**OPERATION**

**ON-OFF SWITCH AND VOLUME CONTROL:**

The left hand knob is turned all the way to the left to switch off the receiver and eliminate all drain from the car battery.

The receiver is turned on by rotating this knob toward the right until the dial becomes illuminated. The desired volume is obtained by further rotation of this knob after a station has been properly tuned in with the Station Selector Knob.

The Automatic Volume Control circuit, built into the receiver, will tend to maintain the volume constant once it has been adjusted by means of the Volume Control knob. However, due to the very large differences in receiving conditions encountered when driving a car, the volume may change beyond the limits for which compensation is possible.

As the sensitivity of the receiver automatically changes to compensate for variations in station strength, the noise background also may vary. When the station is strong, there will be no noise background. As the station becomes weaker, the noise background will increase. Reception also will be noisy when driving in "electrically noisy" districts. This will be particularly true when driving near trolley lines, high tension power lines, etc.

**THE TONE CONTROL:**

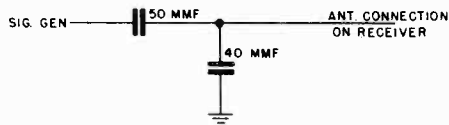
Moving the switch located on the right hand side of the receiver, toward the rear of the receiver will increase the bass response and make the tone mellow. This position is desirable for some types of music and also may be used to minimize static and electrical noises. When this switch is moved toward the front of the receiver, the treble is more predominate and the program more brilliant.



**TRACKING IRON CORES IN MANUAL PERMEABILITY TUNER**

To check or realign the iron cores in the permeability tuner the following procedure may be used:

The values shown in the antenna dummy in this paragraph must be used, otherwise, the antenna coil will not track with the RF and Oscillator coils.



Set tuner to high frequency end of dial (clockwise) and generator at 1600 Kc and adjust Osc., RF and Ant. trimmers for maximum output. Set tuner to low frequency end of dial (counter-clockwise) and generator at 540 Kc and adjust 600 Kc tracking adjustment for maximum output.

Recheck high frequency end after each adjustment of the low frequency end.

Set generator to 1400 Kc and tune manual to maximum output of 1400 Kc signal. Adjust iron cores of only the RF and Ant. coils by turning iron cores in mounting to maximum output. Tuner should be tracked now and low frequency output may be further increased by rocking tuner with generator set at 600 Kc.

Iron cores should be cemented after the above adjustment to eliminate possibility of vibration changing adjustments.

**STAGE GAINS MEASUREMENTS**

Stage gains measurements shown on schematic are approximate practical measurements and can be duplicated with a signal generator, audio oscillator and output meter. These measurements are given to aid the servicemen in approximating the relative condition of stages in the receiver for completely checking a repair or for analyzing the location of trouble.

Connect output meter to voice coil terminals of speaker (Note: A resistor of 4 ohms connected in place of speaker voice coil will give better results). Connect audio generator 400 cycles to grid of the 6V6 tube and increase output of generator until output meter registers 4 volts (standard output of 1 watt across 4 ohm load). Output voltage divided by input voltage equals stage gain.

Substitute generator output to diode of 6SQ7 tube and reduce output of generator to show standard output of 4 volts. The input voltage of the following stage divided by the input voltage of stage being measured equals the stage gain for this tube.

Set signal generator to 455 Kc with modulation and make IF measurements in same manner as audio measurements were made.

Set signal generator to 1000 Kc with modulation and tune receiver on manual position to maximum output and proceed with measurements of 6SA7, 6SK7 and Antenna in similar manner as outlined in above paragraphs.

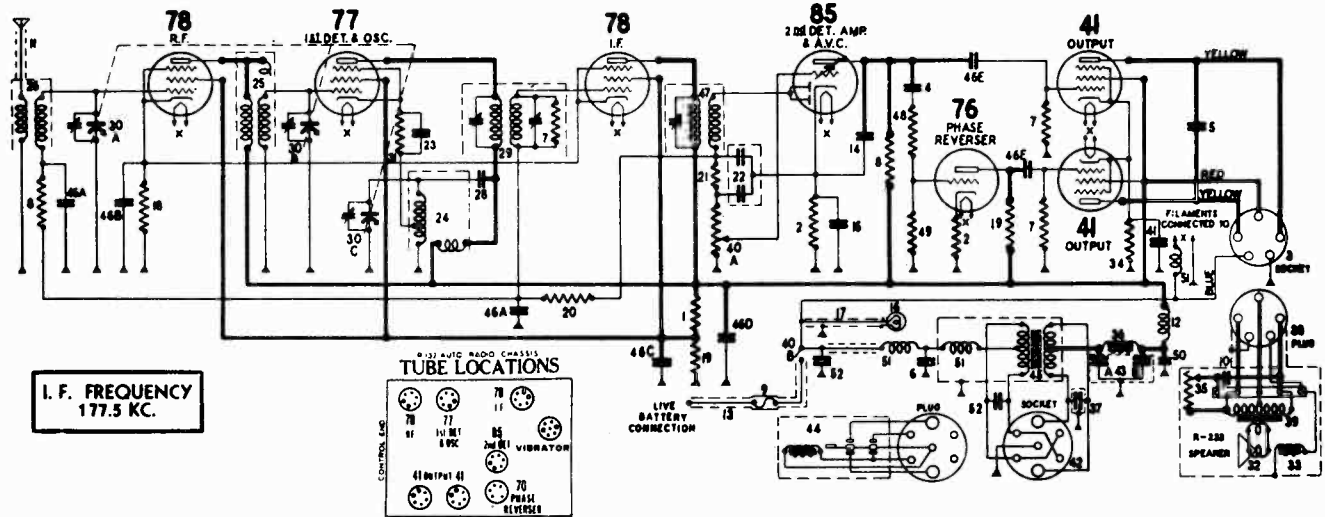
**Parts**

Ref. Part No.	Description	Ref. Part No.	Description
1. 77212	10 M Ohm	34. 38838	Shunt Tracking Coil
2. 78146	Sensitivity Control	35. 26235	Trimmer Assembly
3. 77218	1 Megohm	36. 26236	Antenna Trimmer
4. 77266	22 M Ohm	37. 38889	1st I.F. Assembly
5. 77213	47 M Ohm	38. 38890	2nd I.F. Assembly
6. 78042	.5 Meg. Vol. Control	39. 94229	Output Transformer
7. 77274	10 Megohms	40. 81154	Speaker
8. 77216	220 M Ohm	41. 94078	Power Transformer
9. 77217	470 M Ohm	42. 76001	Vibrator
10. 77260	330 Ohm	43. 38277	Vibrator Choke
11. 77123	1000 Ohm 1 watt	44. 38278	"A" Choke
12. 77258	100 Ohm	45. 48012	Fuse, 15 Amp.
13. 77267	33 M Ohm	46. 25124	420 MMF. Silver Mica Cond.
14. 77069	22 M Ohm, 1 watt	47. 77214	100 M Ohm
15. 25102	.05—200 V. Capacitor	48. 38733	Wave Trap
16. 25102	.05—200 V.	49. 90071	Tone Control Switch
17. 25188	100 MMF Mica	11160	Ammeter Lead Assy.
18. 25104	.005—400 V.	11159	"A" Lead Assembly
20. 25108	.01—400 V.	25120	Condenser, Ammeter
21. 25119	.002—200 V.	15057	Flex. Control Shaft, Tuning or Vol. Cont.
22. 25366	.5—400 V.	15100	Extra long (38") Flex. Control Shaft, Tuning or Vol. Cont.
23. 25099	Electrolytic Capacitor	11172	Pilot Light & Cable Assembly
24. 25110	.006—1200 V.	13428	Slide Rule Dial Assembly
25. 25109	.007—1600 V.	31427	Dial Glass, Horizontal
26. 25118	.5—100 V.	31428	Dial Glass, Vertical
27. 25100	Spark Plate	13538	Tuning Control Worm Reduction
28. 25121	20 MMF Mica	13537	Vol. Control Shaft Bushing
29. 25112	.01—200 V.	41131	Kit of 2 Knobs (Neutral Shade)
30. 25189	500 MMF Mica	55376	Flexible Dial Shaft
31. 561367	Antenna Cable Recep.	77124	Distributor Suppressor
32. 38279	Ant. Spark Choke	25107	Interference Condenser
33. 38281	Permeability Tuner		

Unless otherwise specified, all resistors are 1/2 watt.

**IMPORTANT:** For replacement use only proper type Firestone Air Chief Tubes. DO NOT ATTEMPT TO ADJUST VIBRATOR. Replace with Part No. 76001.

THE FIRESTONE TIRE & RUBBER CO.



Diag. No.	Part No.	DESCRIPTION	List Price
1	66023	60,000 ohm 1 watt carbon resistor...	\$.025
2	67303	2,000 ohm ¼ watt carbon resistor...	.25
3	81951	Speaker socket .....	.10
4	83007	.02 mfd. 600 volt paper condenser...	.35
5	83011	.004 mfd. 600 volt paper condenser...	.30
6	83063	.5 mfd. 100 volt paper condenser...	.45
7	83072	510,000 ohm ¼ watt carbon resistor	.15
8	83082	260,000 ohm ¼ watt carbon resistor	.20
9	83207	15 ampere fuse .....	.05
10	83219	.01 mfd. 600 volt paper condenser...	.30
11	83723	Antenna lead .....	.75
12	83770	"B" supply R. F. choke .....	.40
23	84282	.001 mfd. mica condenser .....	\$.025
24	84814	Oscillator coil .....	1.50
25	84822	R. F. coil .....	1.50
26	84825	Antenna coil .....	1.40
28	84833	.00007 mfd. mica condenser .....	.20
29	84838	1st I. F. transformer .....	2.75
30A } 30B } 30C }	84866	{ Three gang variable condenser { with mounting plate, shaft cplg..	6.00
31	85051	8000 ohm ¼ watt carbon resistor...	.20
32	85058	Diaphragm and shell assembly...	3.50
33	85098	Field coil and bracket assembly...	3.25
34	85114	500 ohm 2 watt resistor .....	.25
35	85179	80,000 ohm tone control .....	.90
36	85183	Filter choke .....	1.50
37	85190	.005 mfd. 1200 volt paper condenser	.85
38	85193	Speaker plug and cable assembly..	1.25
39	85195	Output transformer .....	3.25
40A } 40B } 40C }	85215	{ 250,000 ohm volume control } { On-off switch }	1.20
41	85216	10 mfd. 50 volt dry electrolytic condenser .....	.80
42	85217	Vibrator Socket .....	.15
43	85237	Dual 8 mfd. electrolytic condenser	3.00
44	85243	Vibrator .....	6.50
45	85256	Power transformer .....	5.00
46A } 46B } 46C } 46D } 46E }	85259	{ .05 mfd. 300 volt cond. (green-white lead) .5 mfd. 100 volt cond. (orange lead) .25 mfd. 300 volt cond. (white lead) .1 mfd. 400 volt cond. (red lead) .02 mfd. 600 volt cond. (yellow and green leads)	2.75
47	85262	2nd I. F. transformer .....	2.50
48	85265	600,000 ohm ¼ watt carbon resistor	.20
49	85266	70,000 ohm ¼ watt carbon resistor.	.20
50	85267	.01 mfd. mica condenser .....	.50
51	85391	R. F. choke assembly .....	.30
52	85394	.0005 mfd. mica condenser .....	.25

Diag. No.	Part No.	DESCRIPTION	List Price
13	83777	Shielded battery lead and fuse housing .....	\$.50
14	83784	.0011 mfd. mica condenser .....	.22
15	83803	12 mfd. 25 volt dry electrolytic condenser .....	.80
16	84058	Pilot lamp .....	.15
17	84099	Pilot light cable .....	.35
18	84131	400 ohm ½ watt resistor .....	.20
19	84198	110,000 ohm ¼ watt resistor .....	.20
20	84235	1.1 meg. ¼ watt carbon resistor...	.20
21	84238	11,000 ohm ¼ watt carbon resistor.	.20
22	84281	Dual .00026 mfd. mica condenser..	.35
17166		Mounting Nut .....	\$.05
83144		15,000 Ohm Spark Plug Suppressor....	.35
83145		10,000 Ohm Distributor Suppressor....	.35
83242		Back Cover Self-Tapping Screws.....	.02
83319		Fuse Insulator Tube .....	.02
83737		Special Knurled Nuts .....	.06
84981		Tube Shield Section .....	.08
84982		Tube Shield Section (slotted).....	.08
84983		Tube Shield Spring Ring .....	.02
84990		Mounting Plate .....	.80
85012		Mounting Bolt .....	.06
85022		Receiver Back Cover .....	1.00
85026		Dash Support Washer .....	.05
85191		Grill Cloth .....	.20
85219		Vibrator Shield .....	.15
85232		Speaker Back Cover and Mounting Bolt..	1.25
85239		Receiver Front Cover .....	1.00
85240		Case Assembly (less covers).....	4.00
85249		Tone Control Knob .....	.15
84871		Tuning Shaft, 24 inches long .....	\$.150
84873		Volume Control Shaft, 24 inches long....	1.50
84882		Tuning Shaft, 36 inches long .....	2.00
84883		Volume Control Shaft, 36 inches long....	2.00
84886		Tuning Shaft, 30 inches long .....	2.00
84887		Volume Control Shaft, 30 inches long....	2.00
85381		Tuning Shaft, 18 inches long .....	2.00
85382		Volume Control Shaft, 18 inches long....	2.00
84060		Flexible Shaft Set Screw .....	.02
84067		Steering Post Mtg. Bracket .....	.25
84075		Bezel and Glass Assembly .....	1.50
84076		Dial Light Button and Socket .....	.25
84106		Volume Control Knob .....	.25
85233		Dial Face .....	.25
85246		Complete Accessories for Installation....	5.25
85248		Remote Control Head (less shafts).....	6.00

**CALIBRATION AND ALIGNMENT**

A good modulated oscillator and a sensitive output meter are necessary for proper calibration and alignment of the R.F. and I.F. stages of this receiver. The output of the oscillator must be adjustable to give a very weak signal which will not actuate the A.V.C. of the receiver. The output meter must be sensitive enough to give sufficient reading with such a weak signal.

The output meter should be connected across the 41 plates through a .25 mfd. condenser or across the voice coil, depending upon its sensitivity. A convenient point to connect to the 41 plates is at the two terminals of the speaker socket to which the yellow leads are attached. Be sure the speaker plug is inserted in its socket.

**I. F. ALIGNMENT**

The I.F. trimmers are located on the top of the I.F. transformers which may be reached by removing the front cover. The modulated test oscillator should be set to exactly 177.5 K.C. and connected from the 77 control grid to ground. Adjust the oscillator output to give about half-scale reading of the output meter. Tune in the set to make certain that no station or signal is tuned in since this would affect the output meter reading. Adjust all three I.F. trimmers to give maximum output reading. In adjusting the I.F. transformer trimmers, it is desirable to use a bakelite screw driver or one having only a small metal tip. After the I.F. trimmers have been aligned once, go back and repeat the procedure, since any adjustment of one will affect the others to some extent.

**DIAL CALIBRATION**

The dial of the Auto Radio is calibrated in kilocycles except that the last two zeros have been omitted. Inasmuch as changes in the position of the flexible shafts may cause the calibration to vary, the set should be calibrated when the arrangement of the shafts has been completed. Calibration is accomplished as follows:

Tune in a station of known frequency between 800 and 1100 KC. Insert a screw driver in the slotted end of the dial shaft projecting through the back of the control head. Hold the tuning control knob so that the station remains tuned in properly and by turning the screw driver adjust the dial pointer so that it indicates the exact station frequency.

If the set is badly out of calibration such that it calibrates correctly at one part of the dial but not at another, it is necessary to adjust the oscillator shunt trimmer as explained below.

The gang condenser trimmers can be reached by removing the back cover. Connect a .00025 mfd. mica condenser in series with the output of the test oscillator and the aerial lead of the receiver. This condenser is absolutely necessary to secure proper alignment of the antenna stage.

Set the test oscillator to exactly 600 KC. Tune the radio set to maximum volume. Calibrate the dial at the low frequency end by setting the pointer to exactly 6.0 (600 KC.). Set the test oscillator to exactly 1400 KC. Turn the tuning knob until the dial pointer indicates 14.0 (1400 KC.) and then adjust the oscillator shunt trimmer (third one from shaft end of the variable condenser) until the signal produces maximum output. Then adjust the other two gang condenser trimmers as directed under R.F. alignment.

**R. F. ALIGNMENT**

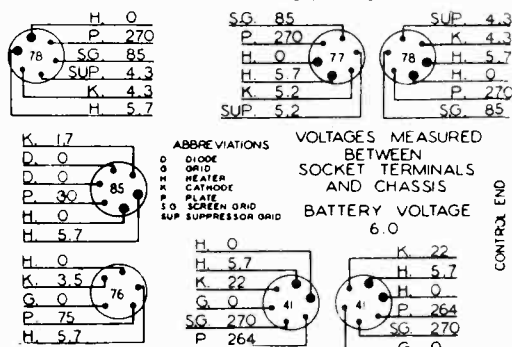
With the test oscillator set to approximately 1400 KC., tune the set very carefully for maximum output.

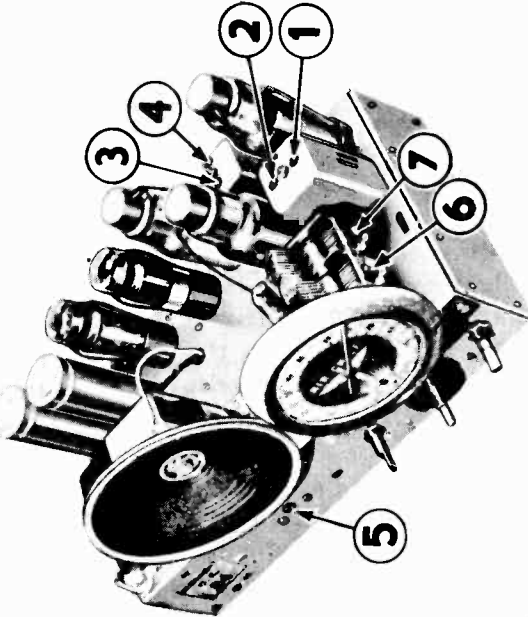
Adjust the output of the test oscillator to the minimum value which will give sufficient output meter deflection. Adjust the two trimmers nearest to the shaft end of the gang condenser to give maximum output meter reading.

**NOTE:** The vibrator may be inserted in the socket in either of two positions. The correct position is dependent upon which car battery terminal is grounded. If the negative (—) terminal is grounded the vibrator should be inserted so that the arrow points away from the adjacent transformer cover. If the positive (+) battery terminal is grounded the vibrator should be inserted so that the arrow points toward the adjacent transformer cover.

Failure to follow these instructions may result in damage to the vibrator or the filter circuit.

**SOCKET VOLTAGES**



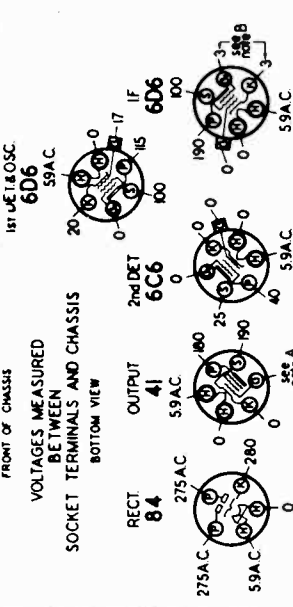


**DIAL CALIBRATION**

If the receiver should require calibration, proceed as follows:

1. Turn the gang condenser to full mesh and check to see that the dial pointer indicates 530 KC. If it does not, remove the dial glass and turn the pointer to 530 KC. when the gang condenser is in full mesh. Replace the dial glass.
2. Adjust the test oscillator to 1400 KC.
3. Turn the condenser gang until the dial pointer indicates 1400 KC.
4. Adjust trimmer No. 6 (oscillator shunt trimmer) for maximum output without changing the setting of the gang condenser.

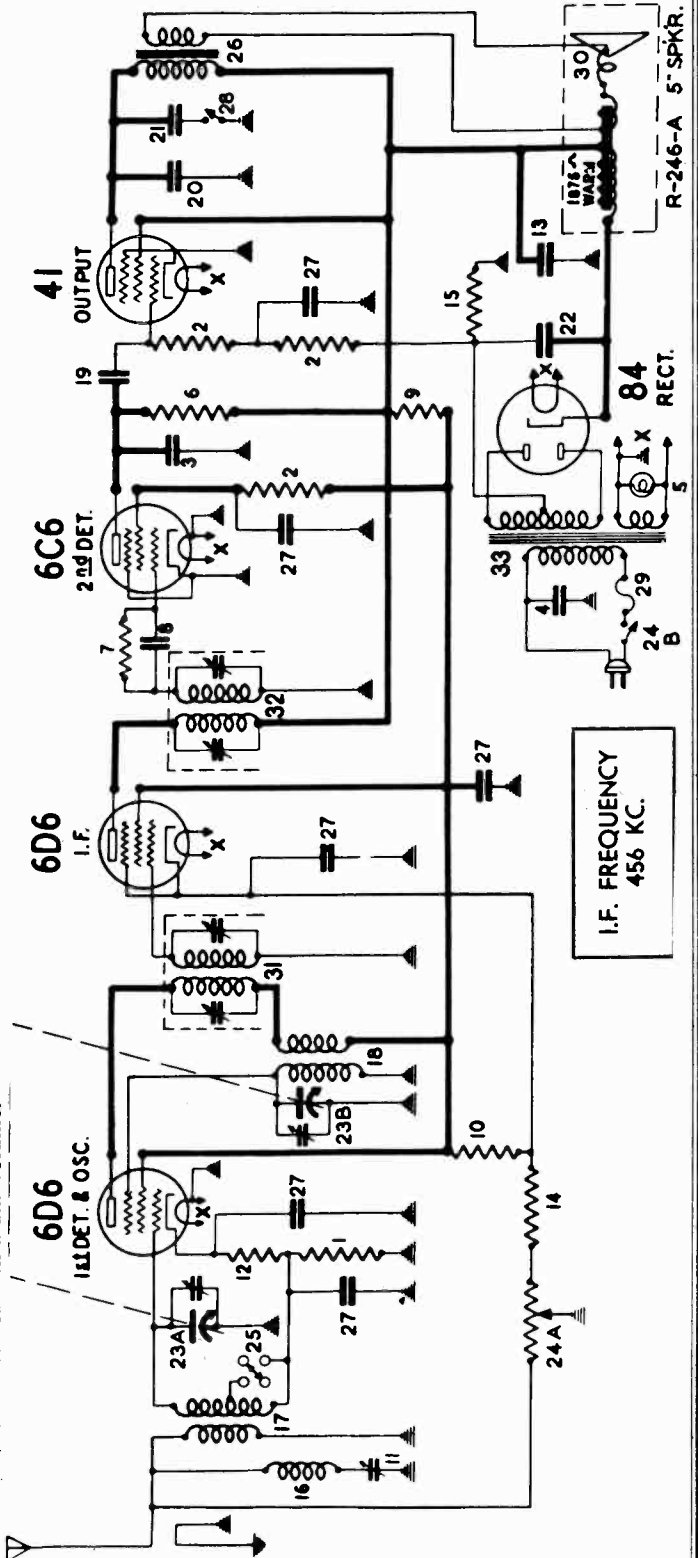
LINE VOLTAGE 115 VOLTS. VOLUME CONTROL ON FULL ANTENNA GROUNDED RANGE SWITCH SET ON BROADCAST POSITION, SET TUNED TO 530 KC.



**IMPORTANT:** Use a high resistance voltmeter of 20,000 ohms per volt. Readings will vary depending upon voltage range of meter, being higher for higher range instruments. This variation is most marked for second detector plate voltage.

**NOTE A:** The bias on the 6F6 output is -14 volts; measured across the flexible wire wound resistor No. 15 in the circuit diagram.

**NOTE B:** The cathode voltage varies with the setting of the volume control, from +3 volts for maximum volume to +30 volts for minimum volume.



Part Number	Description	List Price	
13923	Spring washer (for drive disc)	\$.005	
67590	Flat washer for chassis mounting	.01	
81090	Escutcheon mounting screw No. 1 x 1/4 oval head W.S. per C	.60	
83552	Chassis mounting screw, No. 10 x 3/8	.03	
88056	Fuse mounting	.15	
88057	Fuse cover	.08	
88106	Dial gasket	.01	
88108	Dial escutcheon	.50	
88162	Tube shield	.08	
88164	Tube shield cap	\$.06	
89361	Dial frame and bracket assembly	.25	
89363	Pilot lamp socket and bracket	.16	
89365	Driven disc and bearing assembly	.36	
89374	Dial pointer	.03	
89378	Drive disc and shaft assembly	.30	
89386	Dial glass	.15	
89387	Knob (vol. control and range switch)	.18	
89388	Knob (tuning control)	.18	
89399	Dial scale	.45	
Diag. Part No.	No.	Description	List Price
1	71657	3000 Ohm 1/4 watt Carbon Resistor	\$.25
2	83082	260,000 Ohm 1/4 watt Carbon Resistor	.12
3	83539	260 mfd. Mica Condenser	.20
4	83976	.012 mfd. 1000 volt Paper Condenser	.40
5	83278	Dial lamp 6-8 volts	.15
6	84198	110,000 ohm 1/4 watt Carbon Resistor	.12
7	84235	1.1 megohm 1/4 watt Carbon Resistor	.12
8	85061	51 mfd. Mica Condenser	.15
9	85064	10,000 ohm 1 watt Carbon Resistor	.20
10	85266	70,000 ohm 1/4 watt Carbon Resistor	.20
11	85285	456 KC. Wave Trap Trimmer	.40
12	85691	500 ohm 1/2 watt Wire Wound Resistor	.20
13	88007	8 mfd. 250 volt Electrolytic Condenser	1.00
14	88009	200 ohm 1/2 watt Wire Wound Resistor	.12
15	88010	320 ohm 1 1/2 watt Wire Wound Resistor	.15
16	88014	456 KC. Wave Trap Coil	.50
17	88018	Antenna Coil	1.00
18	88019	Oscillator Coil	.70
19	88026	.02 mfd. 400 volt Paper Cond.	.25
20	89826	.004 mfd. 750 v. Paper Cond.	.24
21	88030	.01 mfd. 400 volt Paper Cond.	.25
22	88033	8 mfd. 350 volt Electrolytic Condenser	1.00
23A&B	89359	2 Gang Variable Condenser	4.00
24 A	88036	{ Vol. Control, 22,000 ohm }	1.25
B		{ Line Switch }	
25	88037	Range Switch	.60
26	88040	Output Transformer	1.50
27	88046	.1 mfd. 150 volt Paper Cond.	.25
28	88054	Tone Control Switch	.30
29	<b>IMPORTANT</b> 1/4 Amp. Fuse (Use This Size Only)		
30	88100	Diaphragm and voice coil	1.50
31	88389	1st I. F. Transformer	2.00
32	88390	2nd I. F. Transformer	2.00
33	88393	Power Transformer, 115 V-60 cycle (used on 165AS)	4.20
23A&B	89359	2 Gang Variable Condenser	4.00
33	89756	Power Transformer, 105 to 250 V.— 50 to 133 cycles (used on 16SWS)	7.00
20	89826	.004 mfd. 750 v. Paper Cond.	.24
	R-246-A	Speaker — 5 inch	4.50

### ALIGNING PROCEDURE

The step by step routine given below should be carefully followed. The trimmer numbers referred to are shown in the illustration.

1. Connect the output meter in series with a .25 mfd. condenser between the plate of the 41 tube and ground, or across the voice coil, depending on the type of meter.
2. Turn the volume control to the maximum volume position. (Note: the volume control should be kept in this position throughout the entire alignment procedure.) Ground the antenna lead to the chassis.
3. Turn the range switch to the right (clockwise) to the broadcast position.
4. Adjust the test oscillator to exactly 456 KC. and connect its output in series with a .1 mfd. condenser to the control grid of the 6D6 first detector tube and the chassis.
5. Align I. F. trimmers No. 1, 2, 3 and 4 for maximum output as indicated on the output meter. No inward or sideward pressure should be applied to the alignment tool, or the condenser may spring back to a different setting as soon as the tool is removed.
6. Repeat all I. F. trimmer adjustments since the changing of each trimmer will affect the others to a certain extent.

### 456 KC. WAVE TRAP ADJUSTMENT

1. Disconnect the antenna lead from ground.
2. Connect the test oscillator output in series with a .00025 mfd. condenser to the antenna lead, and connect the test oscillator ground lead to the receiver chassis. Ground the chassis.
3. Without changing the test oscillator from the frequency setting used in aligning the I. F. stage, adjust trimmer No. 5 for **MINIMUM** output. Increase the test oscillator output as a minimum is reached, in order to obtain a clearly defined setting of the trimmer. **NOTE:** If code interference transmitted on a frequency in the neighborhood of 456 KC. is troublesome, the wave trap should be adjusted for **MINIMUM** output with the test oscillator set to the same frequency as the signal that is causing interference.

### R. F. ALIGNMENT

1. Set the test oscillator to 1400 KC. and apply the signal to the receiver antenna lead through a .00025 mfd. condenser.
2. Tune the receiver to the signal for maximum output.
3. Adjust trimmer No. 7 (detector shunt trimmer) for maximum output.