



## SPECIFICATIONS

### Frequency Range

550 — 1600 kc  
1.6 — 4.8 Mc  
4.8 — 14.5 Mc  
10.5 — 30 Mc  
48 — 54 Mc

### Band Spread

(Direct reading calibration on Ham. Bands)

3.5 Mc	3.5 — 4.0 Mc
7 Mc	7.0 — 7.35 Mc
14 Mc	14.0 — 14.4 Mc
21 Mc	21.0 — 21.5 Mc
28 Mc	28.0 — 30 Mc

(Markings every 5 kc on 80 and 40 meter bands)

### Sensitivity

3.0 microvolts for 10 db S/N ratio at 10 Mc

### Selectivity

Without Q Multiplier: over 65 db at 10 kc  
With Q Multiplier: Variable from -74 db to -95 db at  $\pm 10$  kc.

### Output

1.5 watts

### Power Source

220 volt, 50 to 60 cps AC

### Power Consumption

65 watts

### Tubes

6AQ8 VHF amplifier  
6AU6 VHF Mixer  
6AQ8 VHF Oscillator  
6BA6 RF Amplifier  
6BE6 Mixer  
6AQ8 Local Oscillator  
6BA6 ( $\times 2$ ) IF Amplifier  
6AL5 AM detector, Automatic Noise Limiter  
6BE6 Product Detector  
Gated Beam Detector  
6AQ8 Audio Amplifier, BFO  
6AQ5 Audio output  
6AQ8 Q Multiplier, Marker Oscillator  
6CA4 Rectifier  
OA2/VR-150MT — Voltage Regulator tube  
1N60 —

### Speaker

PM dynamic, 8 ohm voice coil, without output transformer

### Dimensions

Width 17", Height 7 $\frac{3}{8}$ ", Depth 10 $\frac{1}{8}$ "  
(inches)

### Weight

23.5 lbs.

### Auxiliary Circuits

Band Spread Tuning  
Q Multiplier for Variable Selectivity  
ANL Automatic Noise Limiter  
AVC-MVC (Automatic and Manual Volume Control)  
Product Detector (for SSB — CW)  
Gated Beam Detector (for FM)  
Marker Oscillator  
S-Meter  
BFO  
Recording tap circuit terminals  
Phone Jack Plug

## CHASSIS REMOVAL

To withdraw the chassis from the cabinet, remove six screws on the underside, two screws on the upper front, and slide the chassis out from the front of the cabinet.

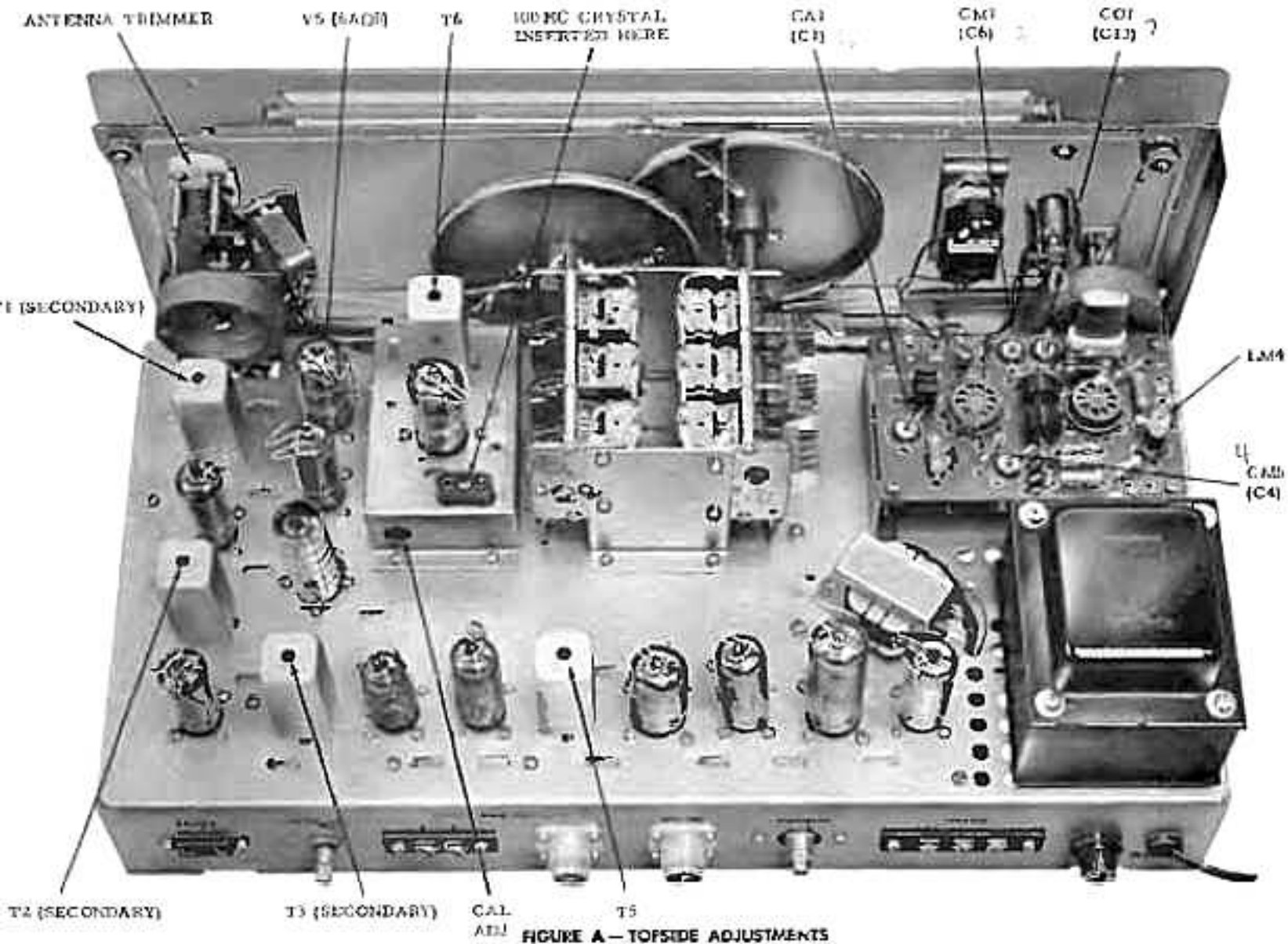
**EQUIPMENT REQUIRED:** AC Voltmeter, Calibrated RF Signal Generator, Alignment Tools, GC8282 (IF) and GC8276 (RF).

## IF ALIGNMENT

1. Connect a loudspeaker and AC voltmeter across the output terminals on the receiver.
2. Remove the high frequency oscillator V5 (6AQ8) from its socket and then set all controls as follows:
  - REC-SEND switch to REC
  - BAND to 0.55 - 1.6
  - FUNCTION to AM
  - AF GAIN to Maximum
  - SELECTIVITY to OFF
  - MVC-AVC to MVC
  - RF GAIN to 3/4 full position
  - Main and Bandsread tuning pointers to extreme right of dial
3. Connect the generator between pin 7 of V4 socket (6BE6 Mixer tube) and chassis.
4. Set generator at 455 Kc, modulated with 400 or 1000 cycles (30%).
5. For location of adjustment points, refer to Figures A and B. When carrying out alignment, keep generator output as low as possible at all times, and lower progressively as circuits come into line.
6. Adjust the secondary and primary of IF transformers T3, T2 and T1. Follow the order given, secondary first, then primary in each case. Repeat until no further improvement is noted.

## BFO ALIGNMENT

7. All receiver controls should be set as for the IF alignment, with the exception of the following:
  - FUNCTION to SSB-CW
  - BFO to mid-position (dot)
8. Set the generator to 455 Kc, unmodulated RF.
9. Adjust the BFO coil T5 (see Fig. A) to produce a "zero beat" in the output.
10. Return Function switch to AM.



T1 (PRIMARY)

V4 (6BE6)

T2 (PRIMARY)

T3 (PRIMARY)

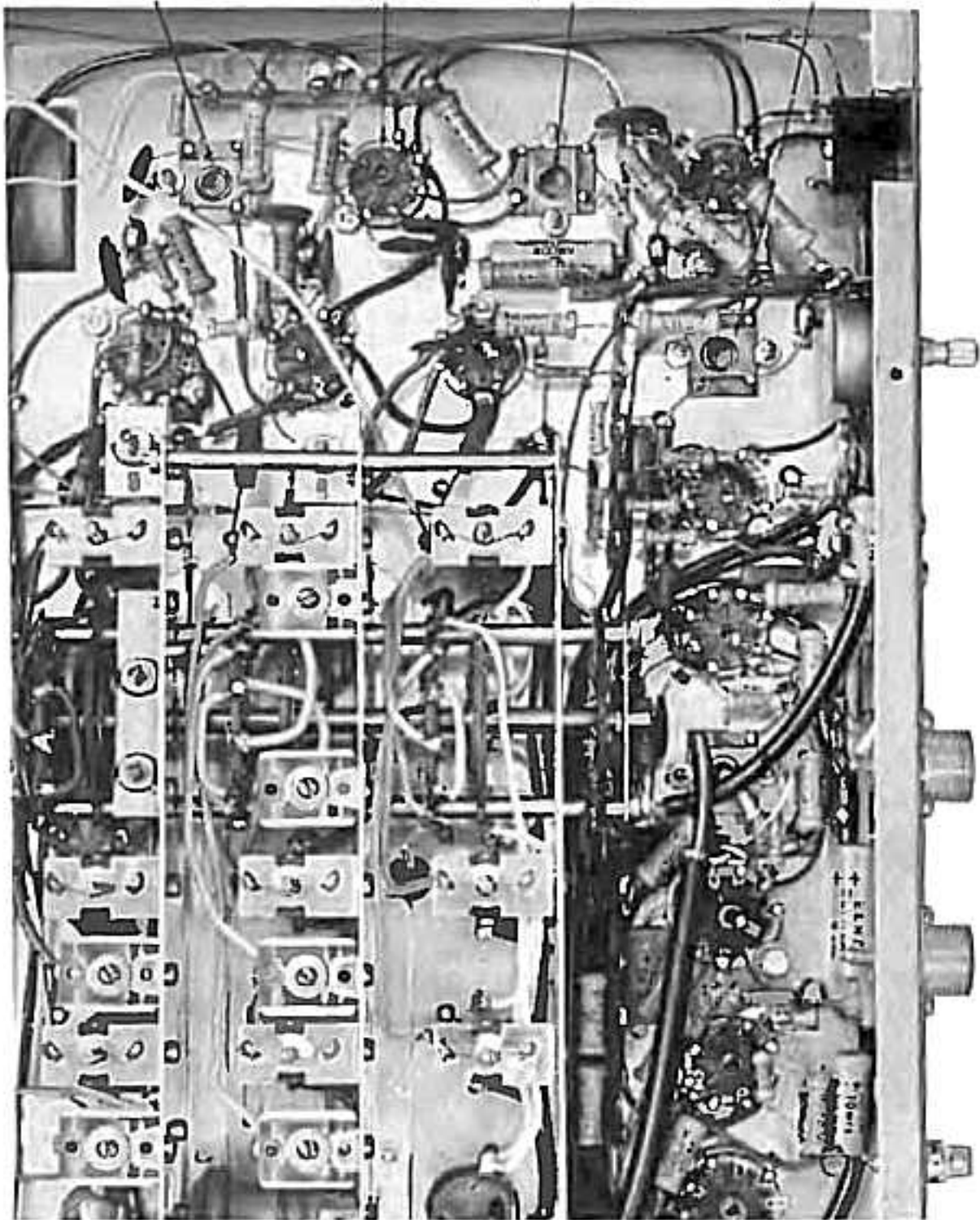


FIGURE B — UNDERSIDE ADJUSTMENTS

## Q-MULTIPLIER ALIGNMENT

11. Set SELECTIVITY control to the 12 o'clock position to switch Q-Multiplier on. Make sure FREQUENCY control is set exactly at the 12 o'clock position.
12. Adjust T6 for maximum output indication.
13. Disconnect Signal generator and all test equipment connected to the receiver. Switch off and replace V5 (6AQ8).
14. Reinsert the chassis into the cabinet and proceed as indicated for RF alignment.

## RF ALIGNMENT

The receiver should be in its cabinet and warmed up for at least 15 minutes before making any adjustments.

1. Connect loudspeaker and AC voltmeter across receiver output.
2. Connect the modulated output of the RF generator to the MAIN ANT input terminals or to the coaxial connector marked MAIN ANT.
3. Viewing the plates of the antenna trimmer (from the rear of the receiver), rotate the control knob until the plates are half-meshed. If the indicator dot on the control knob is not at the 12 o'clock position, loosen set screw, set the knob to this position and tighten screw again (without disturbing the position of the plates). Do not change the control from this position until alignment is completed.
4. Set receiver controls as for IF Alignment, but set BANDSPREAD pointer exactly on 100 on the Logging Scale. Main tuning pointer is set as indicated in the chart.
5. Follow the procedure outlined in the RF alignment chart. Keep RF generator output as low as possible and lower progressively as circuits come into line.

NOTE. Disregard the chart on the underside of the receiver. Use Figure C on page 7 for identification of adjustment points.

## RF ALIGNMENT CHART

STEP	BAND SWITCH	SIGNAL GENERATOR	MAIN TUNING	ADJUST	REMARKS	VIEW
1	0.55-1.6	.6 Mc (600 Kc)	.6 Mc	CO5 (Osc)*	Adjust for peak reading on voltmeter	Figure C
2	0.55-1.6	1.4 Mc (1400 Kc)	1.4 Mc	CO4 (Osc)		
Repeat steps 1 & 2 until calibration is correct at both ends of scale (.6 and 1.4 Mc)						
3	0.55-1.6	1.4 Mc (1400 Kc)	1.4 Mc	CM4 (RF)	Adjust for peak reading on voltmeter	Figure C
4	1.6-4.8	2.0 Mc	2.0 Mc	LO3 (Osc)		
5	1.6-4.8	4.0 Mc	4.0 Mc	CO3 (Osc)	Repeat steps 4 & 5 until calibration is correct at both ends of the scale (2.0 and 4.0 Mc)	
6	1.6-4.8	2.0 Mc	2.0 Mc	LM3 (RF)	Adjust for peak reading on voltmeter	Figure C
7	1.6-4.8	4.0 Mc	4.0 Mc	CM3 (RF)		
Repeat steps 6 & 7 until calibration is correct at both ends of the scale (2.0 and 4.0 Mc)						
8	1.6-4.8	2.0 Mc	2.0 Mc	LA3 (Ant)	Adjust for peak reading on voltmeter	Figure C
9	4.8-14.5	5.0 Mc	5.0 Mc	LO2 (Osc)		
10	4.8-14.5	14.0 Mc	14.0 Mc	CO2 (Osc)	Repeat steps 9 & 10 until calibration is correct at both ends of the scale (5.0 and 14.0 Mc)	
11	4.8-14.5	5.0 Mc	5.0 Mc	LM2 (RF)	Adjust for peak reading on voltmeter	Figure C
12	4.8-14.5	14.0 Mc	14.0 Mc	CM2 (RF)		
Repeat steps 11 & 12 until calibration is correct at both ends of the scale (5.0 and 14.0 Mc)						
13	4.8-14.5	5.0 Mc	5.0 Mc	LA2 (Ant)	Adjust for peak reading on voltmeter	Figure C
14	10.5-30	12.0 Mc	12.0 Mc	LO1 (Osc)		
15	10.5-30	26.0 Mc	26.0 Mc	CO1 (Osc)	Repeat steps 14 & 15 until calibration is correct at both ends of scale (12.0 and 26.0 Mc)	
16	10.5-30	12.0 Mc	12.0 Mc	LM1 (RF)	Adjust for peak reading on voltmeter	Figure C
17	10.5-30	26.0 Mc	26.0 Mc	CM1 (RF)		
Repeat steps 16 & 17 until calibration is correct at both ends of scale (12.0 and 26.0 Mc)						
18	10.5-30	12.0 Mc	12.0 Mc	LA1 (Ant)	Adjust for peak reading on voltmeter	Figure C

\*NOTE: On all bands, the oscillator is set on the high frequency side of the incoming signal.

## 6 METER PRE-CONVERTER ALIGNMENT

For the two following adjustments, leave the RF generator connected to the Main antenna input, but increase its output level considerably.

STEP	BAND SWITCH	SIGNAL GENERATOR	MAIN TUNING	ADJUST	REMARKS	VIEW
19	48-54	11 Mc	54 Mc	CO6	Adjust for peak reading on voltmeter	Figure C
20	48-5	11 Mc	54 Mc	CM6	Adjust for peak reading on voltmeter	Figure C

21. Disconnect all test equipment, switch receiver off and withdraw the chassis from the cabinet.
22. Switch receiver on again and reconnect test equipment, with the Signal generator connected across a 75 ohm resistor to the "6M ANT" connector. To prevent possible frequency shift (due to the uncovering of trimmers and coils on the underside), it is recommended that the receiver be placed on a steel metal plate so that the underside is shielded.
23. Allow at least 10 minutes warm-up time before making the next adjustments.
24. Set generator to 25.5 Mc and tune the receiver to 51 Mc (to receive the second harmonic).
25. Viewing Figure A, adjust the following for maximum output indication:

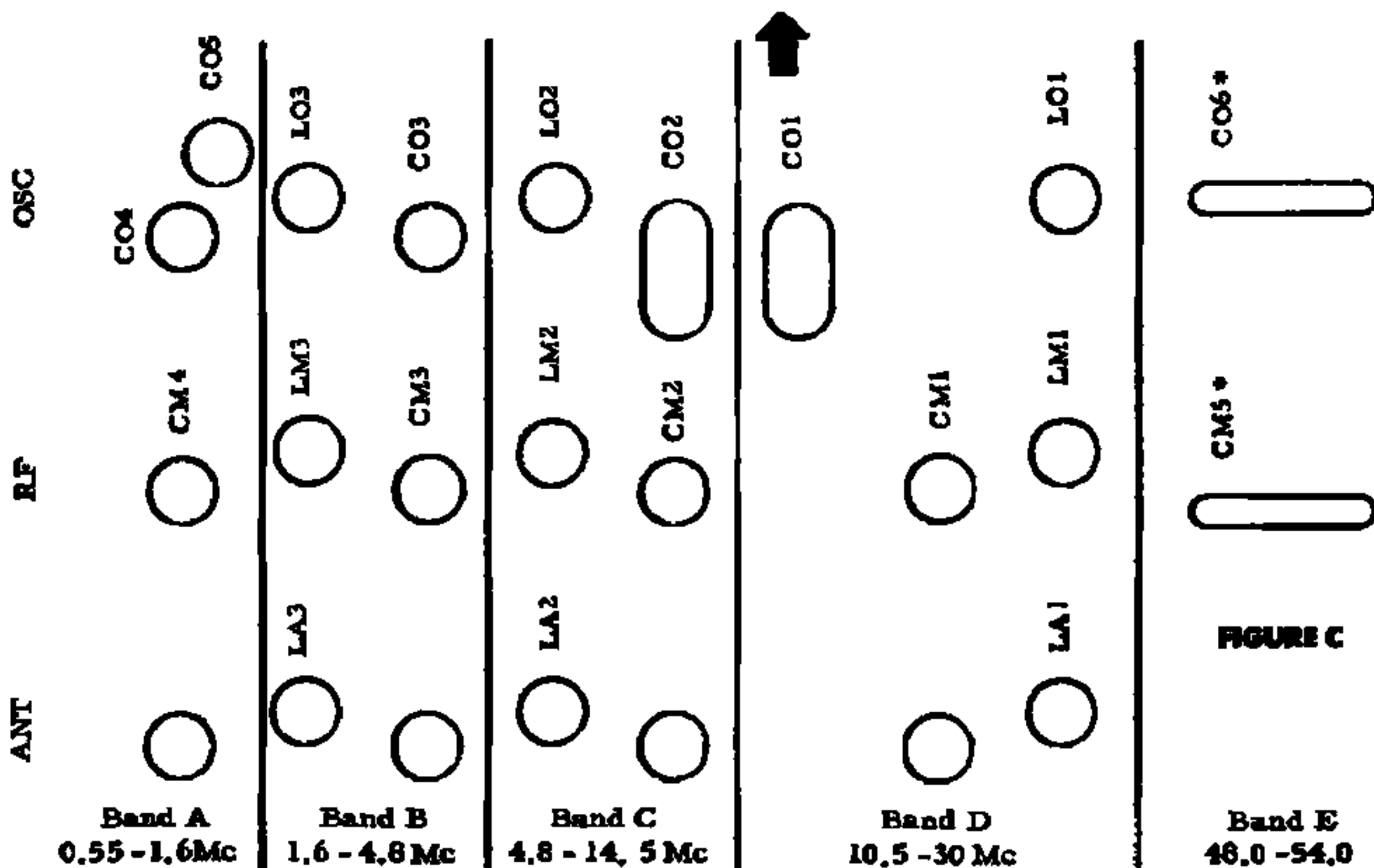
**LM4, CO7, CM7, CM6, CA1**

Use the sequence shown. Lower Signal generator output progressively to prevent overloading.

**NOTE:** For purposes of clarity, Figure A shows the tubes in the pre-converter section removed. During alignment these tubes are not removed, of course.

This completes the IF and RF alignment of the receiver. Disconnect AC voltmeter and RF generator and attach an antenna to the Main Antenna input.

FRONT OF RECEIVER



**FIGURE C**

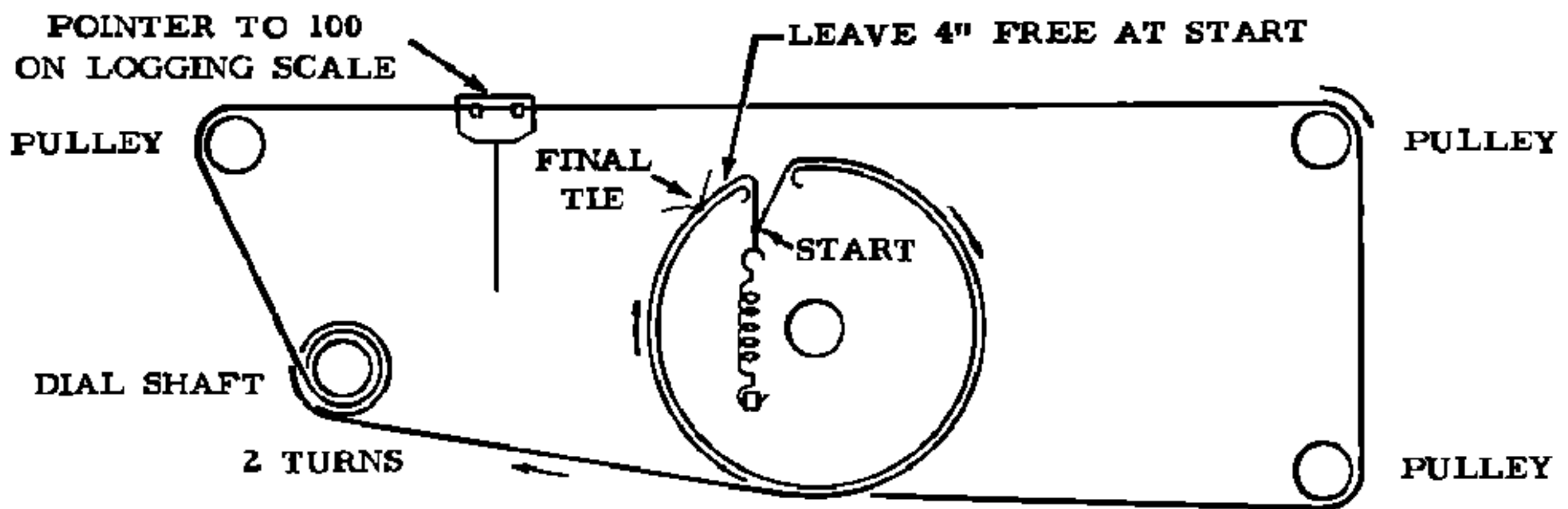
\*These adjustments are reached by inserting a thin blade screwdriver through the ventilation slots in the bottom case.

## CALIBRATING THE 100 KC OSCILLATOR

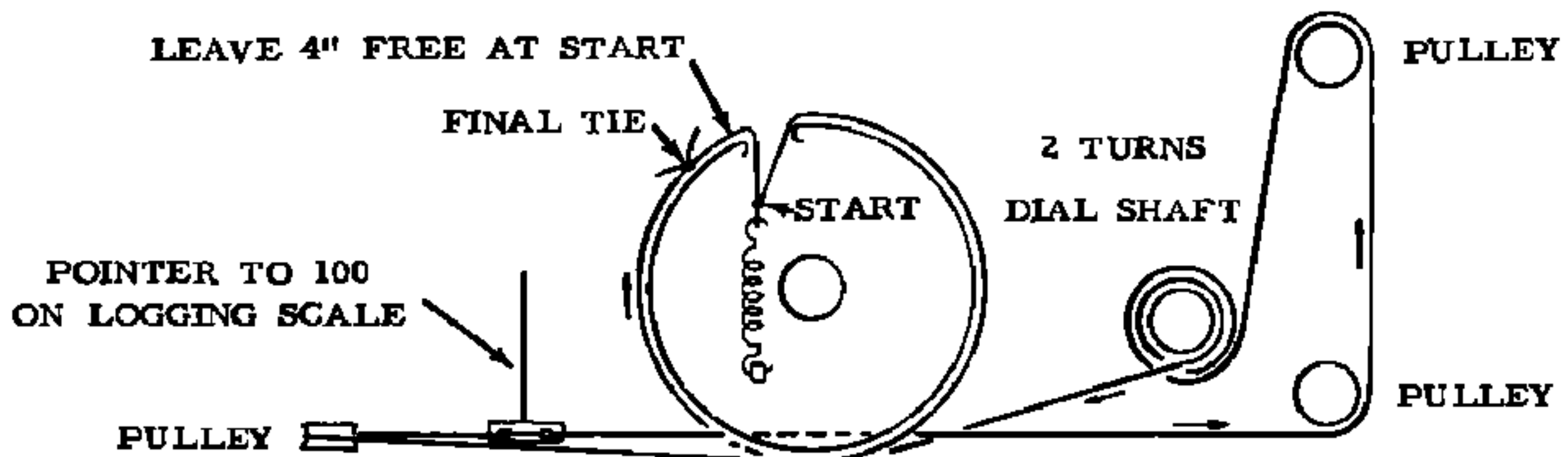
Set all controls on the receiver for normal AM reception and make sure the 100 Kc crystal is inserted into its socket on the receiver (see Fig. A). Tune in Standard Frequency Stations WWV on 2.5, 5, 10, 15, 20, 25 Mc, or WWVH on 5, 10 or 15 Mc, whichever provides a good signal at your location. Wait for the period when the modulation is absent, then set FUNCTION switch to CAL. Using a non-metallic screwdriver, slowly adjust the CAL ADJ trimmer within the receiver (see Fig. A) until the calibrator harmonic is in zero beat with WWV/WWVH. Adjust in the direction which causes the heterodyne tone to drop in pitch. As the zero beat is approached, a slow flutter will be heard which will disappear or occur at a very slow rate when the two frequencies coincide. Do not attempt this calibration during the periods when the WWV/WWVH signal is tone modulated -- you may inadvertently adjust the harmonic signal to zero beat with a sideband instead of the carrier.

### DIAL CORD STRINGING

Set main or bandspread tuning capacitor as indicated. In both cases, tie dial cord to spring at the START point, leaving approximately 4 inches of cord free at this point. Restring in the direction indicated, keeping a moderate amount of tension on the cord. Make final tie to free end of cord from spring after cutting off any excess cord.



MAIN TUNING PULLEY FULLY COUNTER-CLOCKWISE.  
CAPACITOR PLATES FULLY OPEN



BANDSPREAD PULLEY FULLY COUNTER-CLOCKWISE.  
CAPACITOR PLATES FULLY OPEN

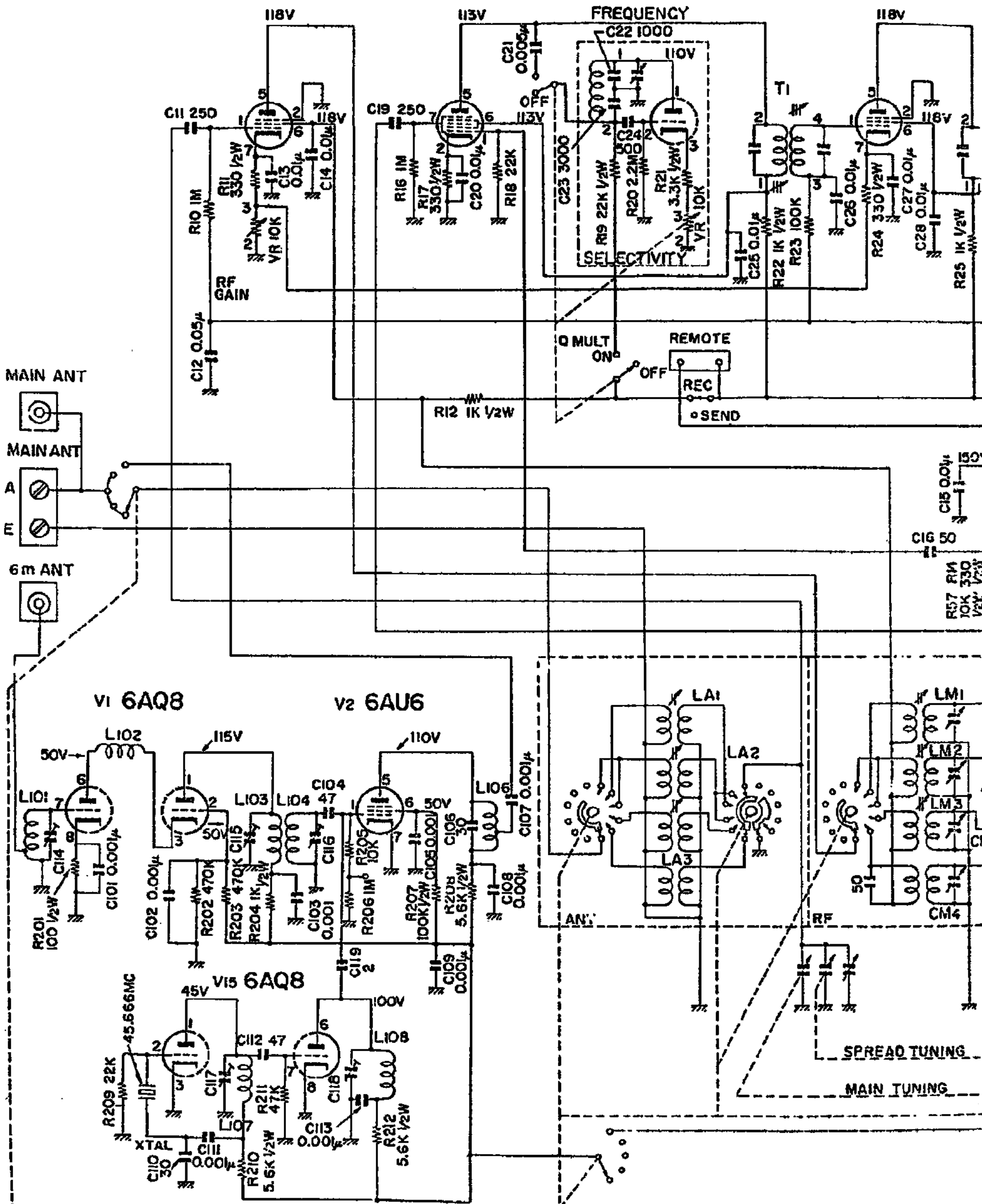


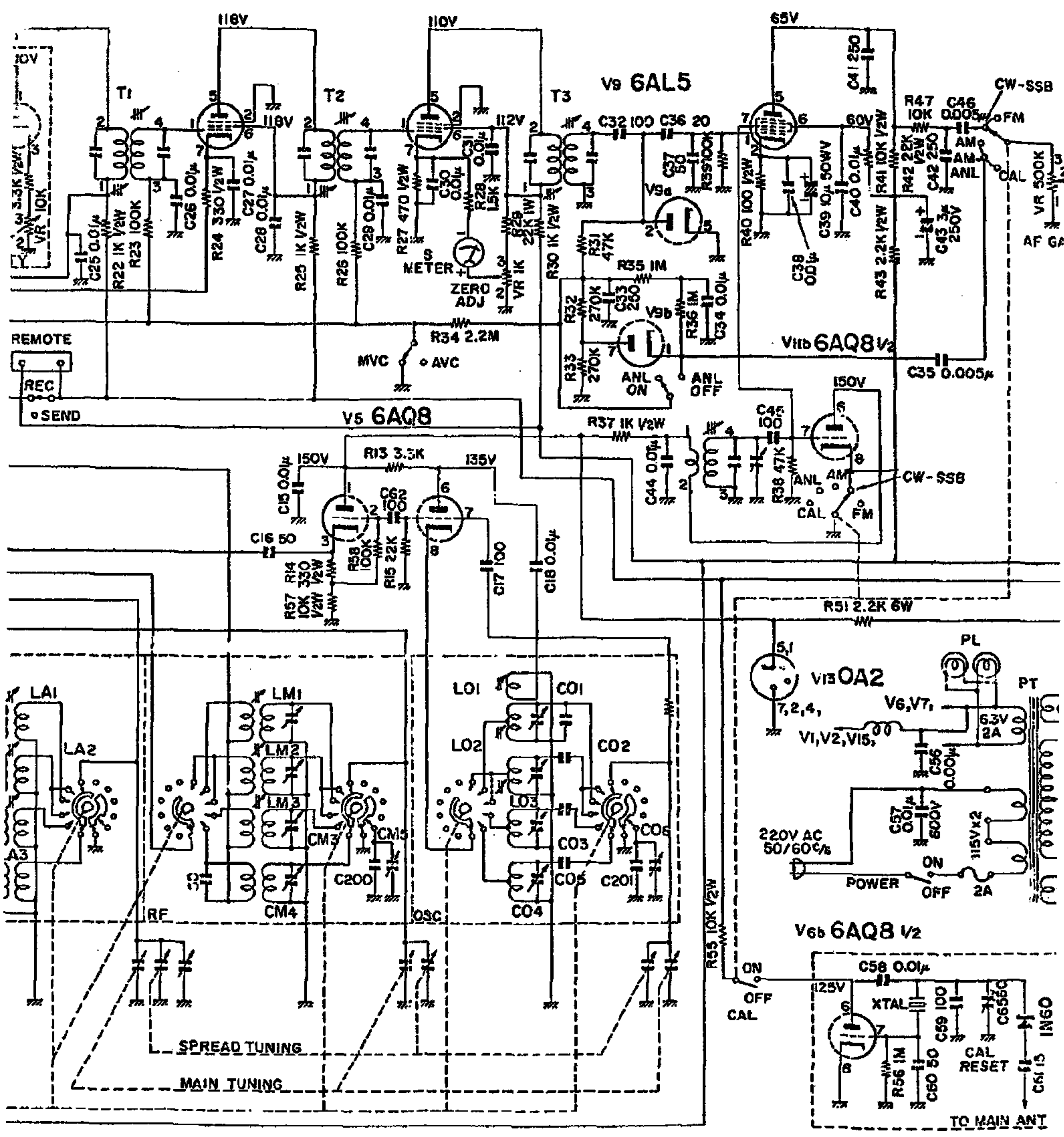
V3 6BA6

V4 6BE6

V6 6AQ8 1/2

V7 6BA6





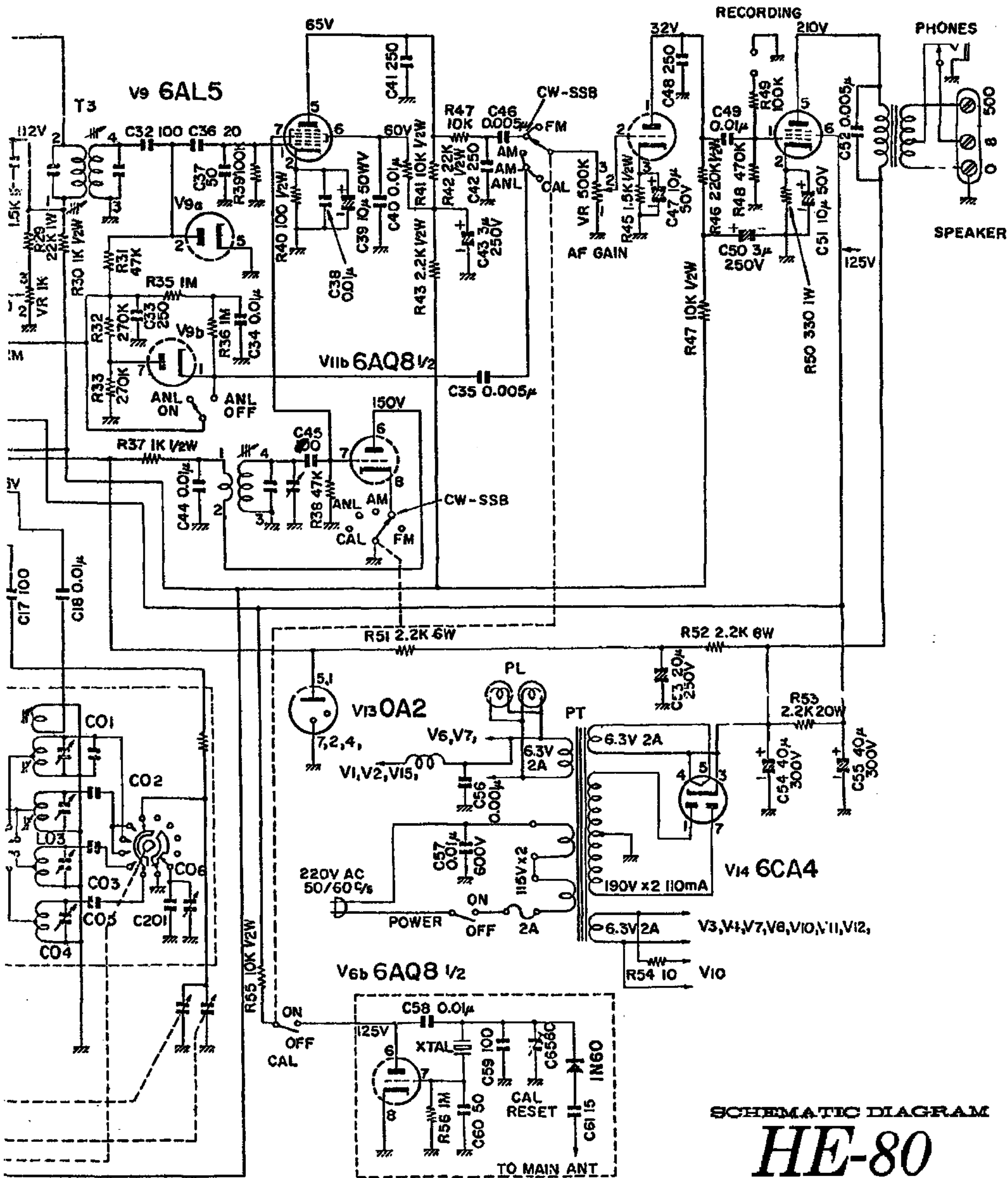
Note

capacitor values = pF except as noted  
 resistor values = Ohm  
                   K = 1000  
                   M = 1000000  
 voltage valves = measurement with VTVM

V10 6BE6

V11 6AQ8 1/2

V12 6AQ5



SCHEMATIC DIAGRAM

HE-80