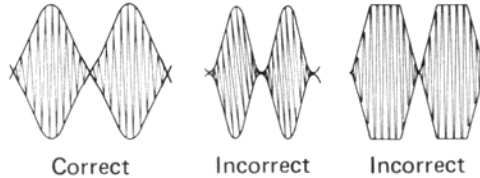


### STEP 3 : Final Stage Alignment

1. Place the Mode switch in USB and the channel selector to CH20.
2. Apply single tone (2400 Hz 10 mVrms) signal to the microphone input circuit.
3. Adjust T209 to obtain maximum amplitude of oscilloscope display and then turn T209 core 1/2-downward.
4. Adjust L209 and L212 to obtain maximum amplitude of scope display.
5. Turn L209 core downward to indicate 14 watts on the wattmeter.

### STEP 4 : SSB Power Stage Alignment

1. Place the Mode switch in USB and the channel selector to a desired channel.
2. Apply 2400 Hz 10 mVrms single tone to the microphone input circuit.
3. Next, apply 500 Hz audio signal to the microphone input circuit and increase or decrease 500 Hz audio signal level to observe cross over display on the oscilloscope.
4. Verify that the scope display of output wave shape shown below is obtained.



5. Feed two tone (500 Hz and 2400 Hz) signals to the microphone input circuit and adjust RV201 to obtain 68 V<sub>p-p</sub> on the RF VTVM.
6. Also, adjust RV3 to obtain 65 V<sub>p-p</sub> on the RF VTVM.
7. In this condition, verify that the RF VTVM reading at each channel is within 64 – 67 V<sub>p-p</sub>.
8. Place the Mode switch in LSB and verify that the above alignments are not upset and the similar resultants are obtained in this mode of operation.
9. If these alignments have a major difference at each channel, readjust T204 and T205 to obtain similar level.

### STEP 5 : AM RF Power Stage Alignment

1. Place the Mode switch in AM and the channel selector in CH19.
2. Adjust VR1 for RF power output of 3.75 watts on the wattmeter. Verify that the RF Power output at each channel is within 3.6 – 3.9 watts in this condition.

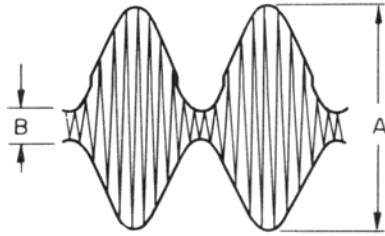
### STEP 6 : RF Power Meter Alignment

1. Adjust RV202 so that the P/RF meter provided on the front panel indicates the same wattage as obtained on the wattmeter.

### STEP 7 : Modulation Alignment (AM)

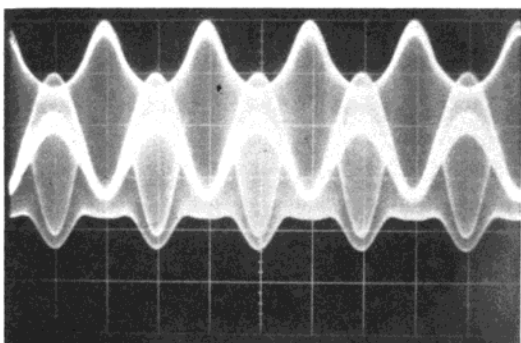
1. Apply 2400 Hz, 30 mVrms audio input signal to the microphone input circuit.
2. Adjust RV9 so that the modulation depth of 100% is obtained.

3. Next, decrease the signal input to 2.4 mVrms and verify that the modulation depth is within 85 – 90%.



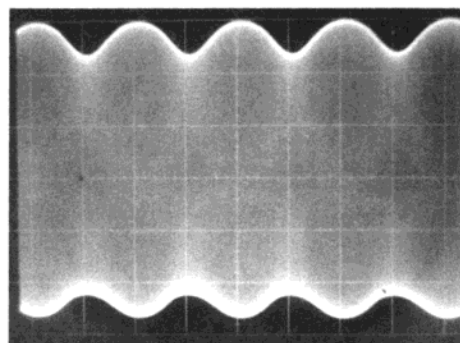
$$\text{Modulation ratio} = \frac{A - B}{A + B} \times 100 [\%]$$

FIG. 5-8 TRANSMITTER ALIGNMENT WAVEFORMS



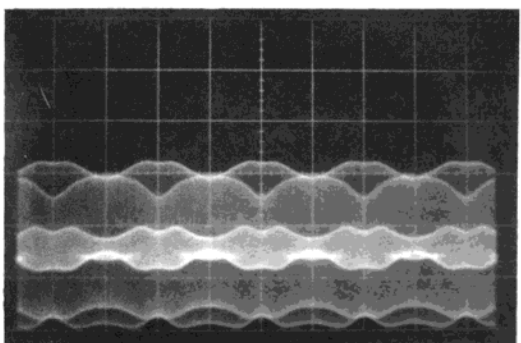
100 mV  
0.5 ms

[A] TX PRE DRIVER BASE



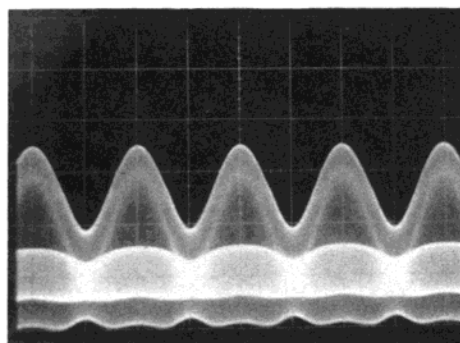
2V  
0.5 ms

[B] PRE DRIVER COLECTOR



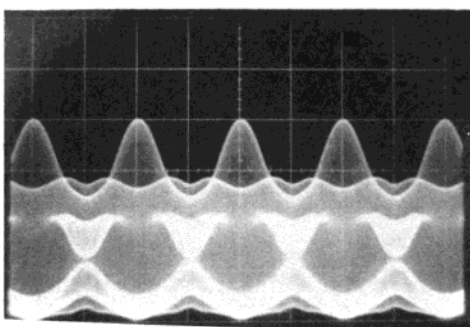
1V  
0.5 ms

[C] RF DRIVER BASE



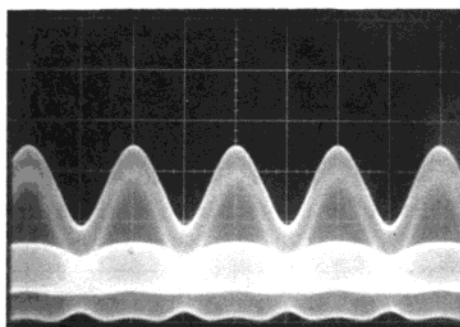
10V  
0.5 ms

[D] RF DRIVER COLECTOR



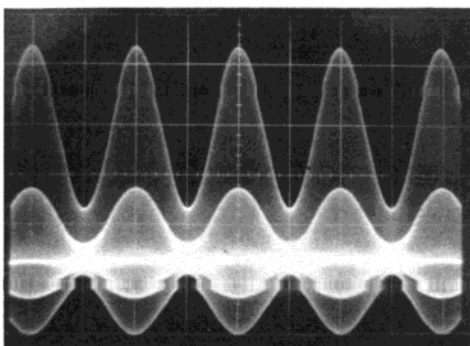
2V  
0.5 ms

[E] TX FINAL COLECTOR

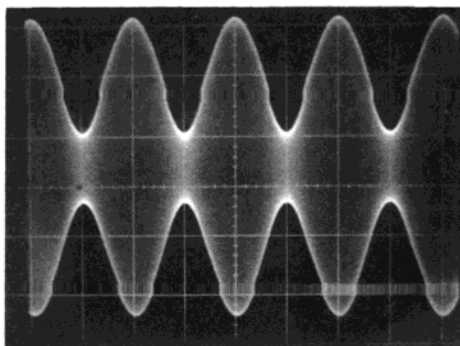


10V  
0.5 ms

[F] ANT DUMMY LOAD



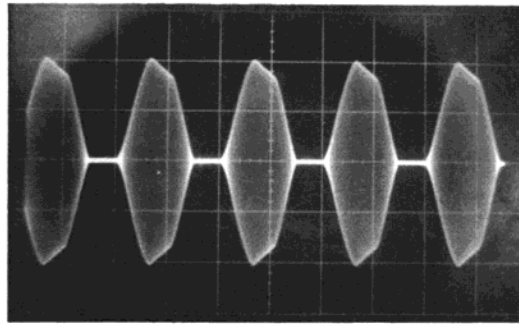
10V  
0.5 ms



50% mod.  
10V, 0.5ms

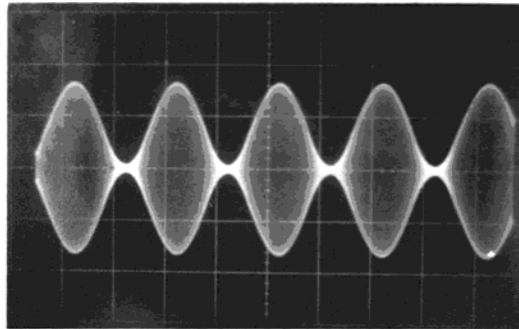
FIG. 5-9 MODULATION WAVEFORMS

[1] OVERMODULATION



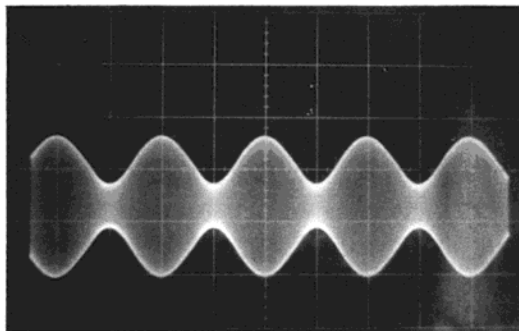
20V  
0.5 ms

[2] 100% MODULATION



20V  
0.5 ms

[3] 50% MODULATION



20V  
0.5 ms

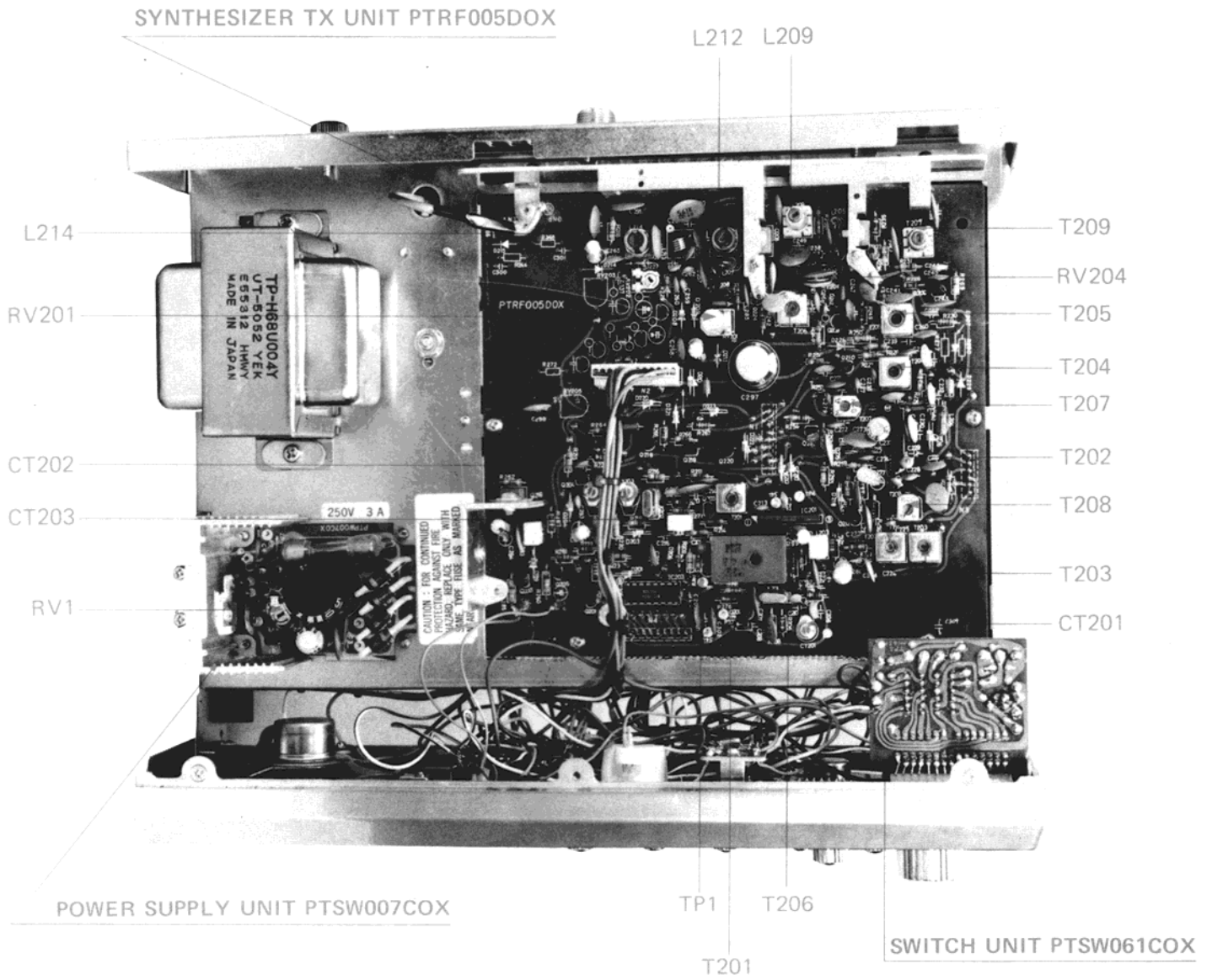
**FIG. 5-10 RECEIVER ALIGNMENT PROCEDURE**

<b>INITIAL SET-UP</b>
<p>Unless otherwise noted, place the CB-PA switch in the CB position, the NB switch in OFF, the NL switch in NL, the Tone Control in maximum, AF Volume in maximum (fully clockwise), the Squelch Control in minimum (counterclockwise), the Clarifier Control in 12 o'clock and the channel selector in CH19 position. Insert the microphone to the MIC jack on the front panel.</p>
<p><b>STEP 1 : AGC Alignment</b></p> <ol style="list-style-type: none"><li>1. Place the Mode switch to USB.</li><li>2. Connect circuit tester to the No. 8 terminal on PC Board PTBM085COX and chassis ground.</li><li>3. Adjust RV6 to obtain the reading of 2.1V.</li></ol>
<p><b>STEP 2 : Receiver Alignment [SSB]</b></p> <ol style="list-style-type: none"><li>1. Set the signal generator frequency to 27.185 MHz + 1 kHz with no modulation. Also set the unit to 19 channel.</li><li>2. Increase or decrease signal generator level so that the AF audio output is not saturated.</li><li>3. Rotate the Clarifier control to obtain 1 kHz AF output.</li><li>4. Adjust T206, T207, T208 and T4 for maximum audio output. NOTE: Since the adjustments of T206 and T4 influence signal distortion, this alignment should be performed cautiously so that the maximum audio output is obtained with minimum distortion.</li></ol>
<p><b>STEP 3 : Receiver Alignment [AM]</b></p> <ol style="list-style-type: none"><li>1. Set the signal generator, 27.185 MHz, 1 kHz 30% modulation.</li><li>2. Also, set the unit to 19 channel.</li><li>3. Increase or decrease signal generator level so that the AF audio output is not saturated.</li><li>4. Adjust T1 for maximum audio output.</li><li>5. Increase the signal generator level to maximum and adjust T2 to obtain maximum AF audio output.</li></ol>
<p><b>STEP 4 : Squelch Circuit Alignment</b></p> <ol style="list-style-type: none"><li>1. Place the Mode switch to AM.</li><li>2. Set the signal generator to provide RF input signal of 54 dB (1 kHz, 30% mod.) and rotate the squelch control in fully clockwise position.</li><li>3. Adjust RV7 so that the audio output just appears on the output terminal (scope-display).</li><li>4. Next, place the Mode switch to USB and set the signal generator to provide RF input signal of 54 dB (1 kHz shift up, no mod.).</li><li>5. Adjust RV8 in the similar way.</li></ol> <p style="text-align: center;">(continued)</p>

**STEP 5 : Signal Meter Alignment**

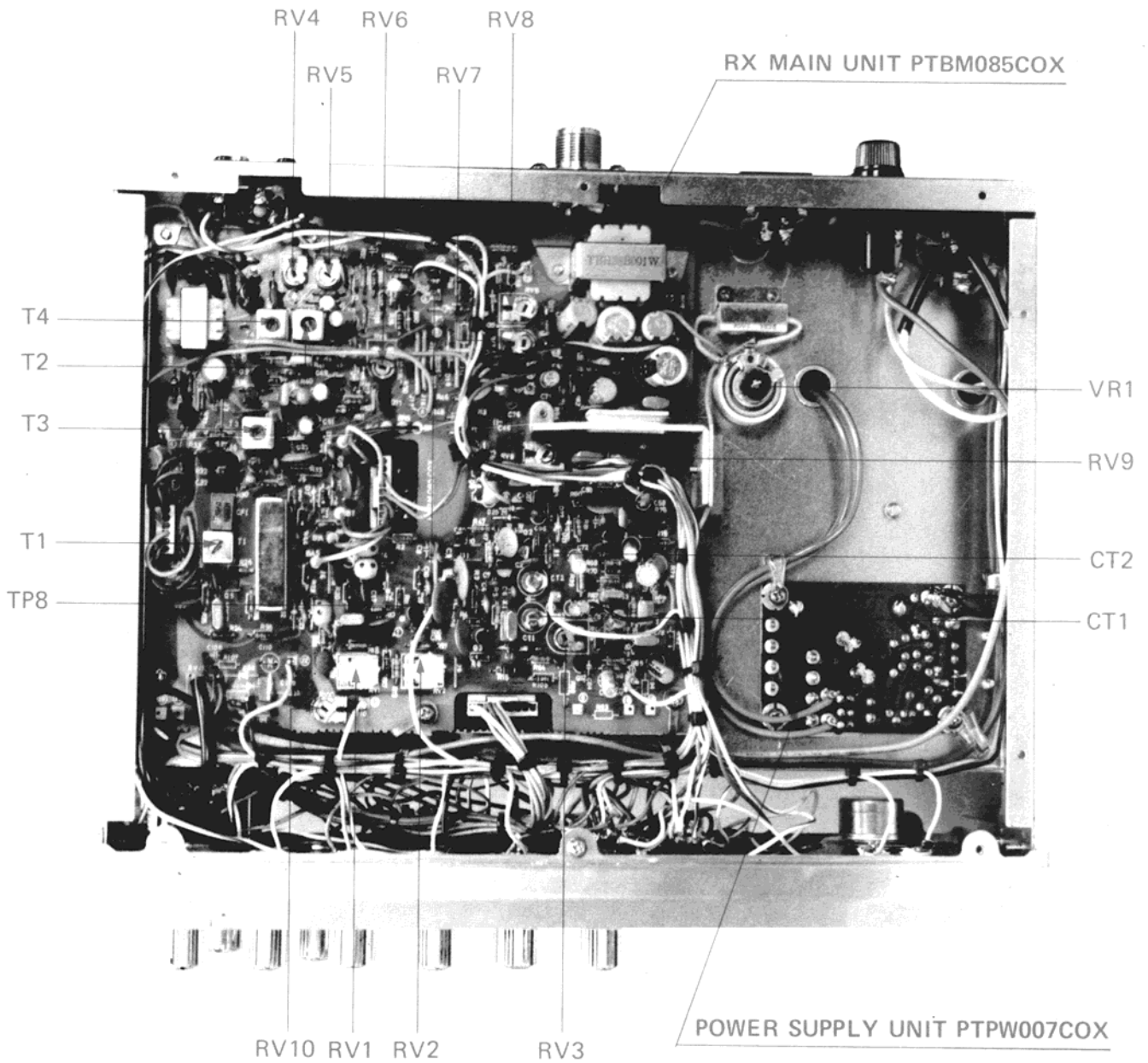
1. Set the signal generator to provide 40 dB output ( $100\ \mu\text{V}$ ) and place the Mode switch to AM.
2. Adjust RV5 so that the S-meter pointer should read "9".
3. Next, place the Mode switch to USB and retune the signal generator slightly to obtain 1 kHz shift up signal.
4. Adjust RV4 so that the S-meter pointer should read "9".

FIG. 5-11 ALIGNMENT LAYOUT



— TOP VIEW —

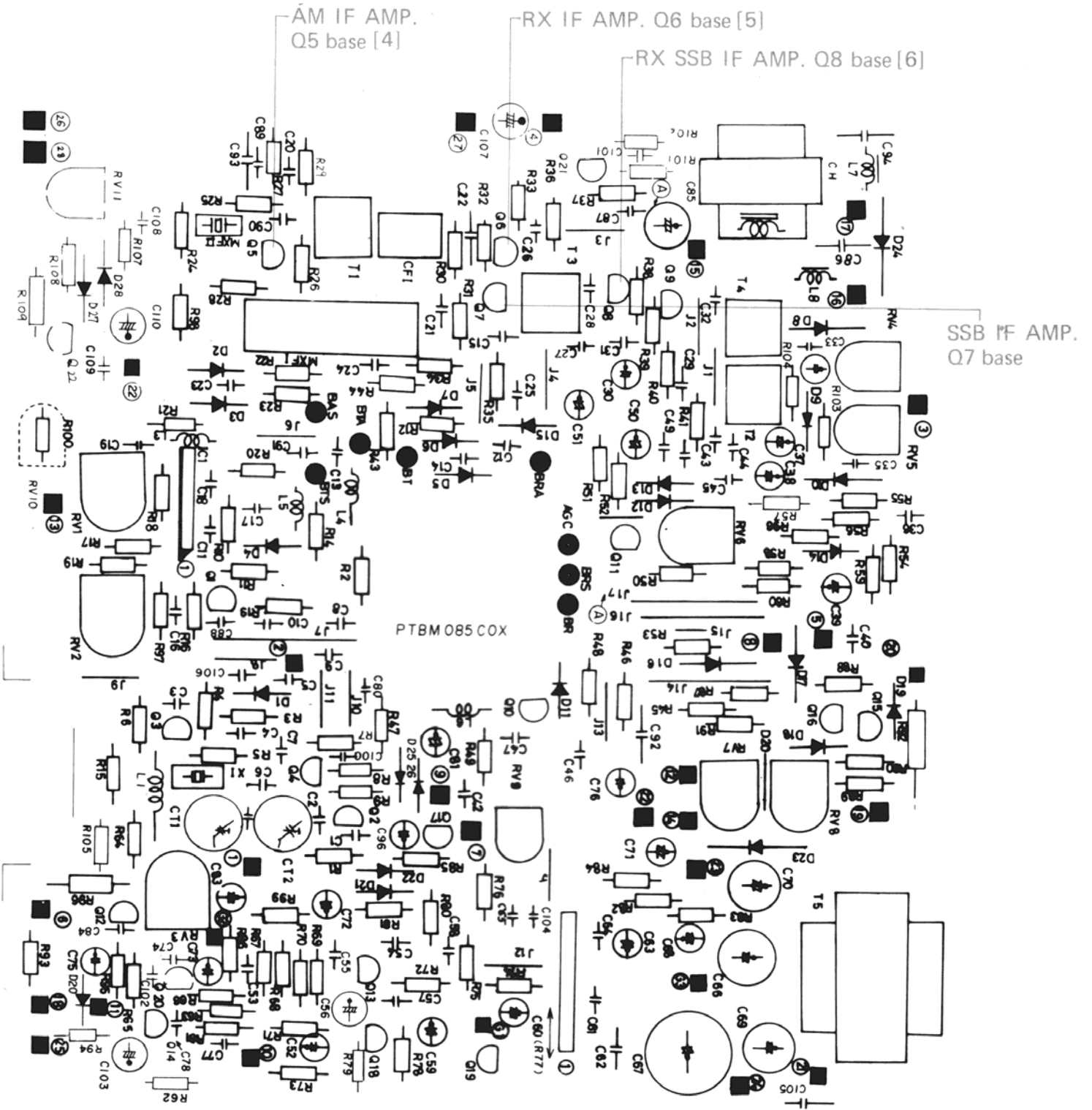
— ALIGNMENT LAYOUT —



— BOTTOM VIEW —

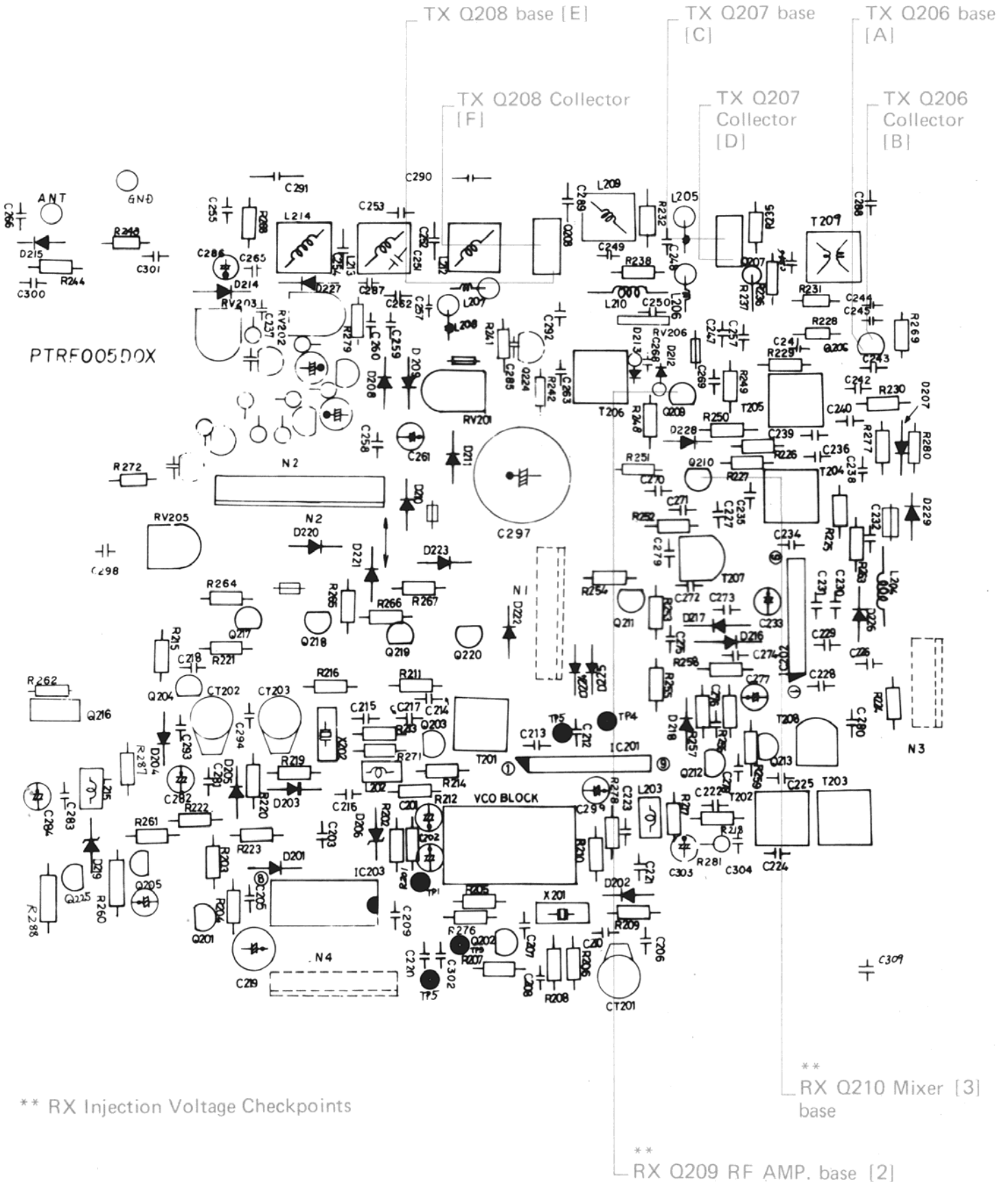


- RECEIVER INJECTION VOLTAGE CHECK POINT -



\*\* Refer to the Next page.

- TRANSMITTER WAVEFORMS CHECK POINTS -



\*\* RX Injection Voltage Checkpoints

\*\* RX Q210 Mixer [3] base

\*\* RX Q209 RF AMP. base [2]

**FIG. 5-12 RECEIVER INJECTION VOLTAGES**

All injection voltage are 30% – 1 kHz modulation at the specified frequency fed through a 0.01  $\mu$ F capacitor, and should produce at least 2V AC audio output measured across the speaker or an 8 ohm load connected at EXT. SP. jack on rear panel. Place the Noise Limiter NL switch in OFF position. Place the Mode switch in AM.

INJECTION POINT	INPUT LEVEL	AUDIO VOLTAGE	FREQUENCY
ANT jack J1	1 $\mu$ V	7.5V	Channel Frequency
Q209 Base	0.5 $\mu$ V	2.0V	Channel Frequency
Q210 Base	100 $\mu$ V	2.0V	Channel Frequency
Q5 Base	4 $\mu$ V	2.0V	455 kHz
Q6 Base	10 $\mu$ V	2.0V	455 kHz
Q8 Base	35 $\mu$ V	2.0V	455 kHz

\*\* At Volume control – maximum.

FIG. 5-13 TROUBLE SHOOTING GUIDE

PLL CIRCUIT

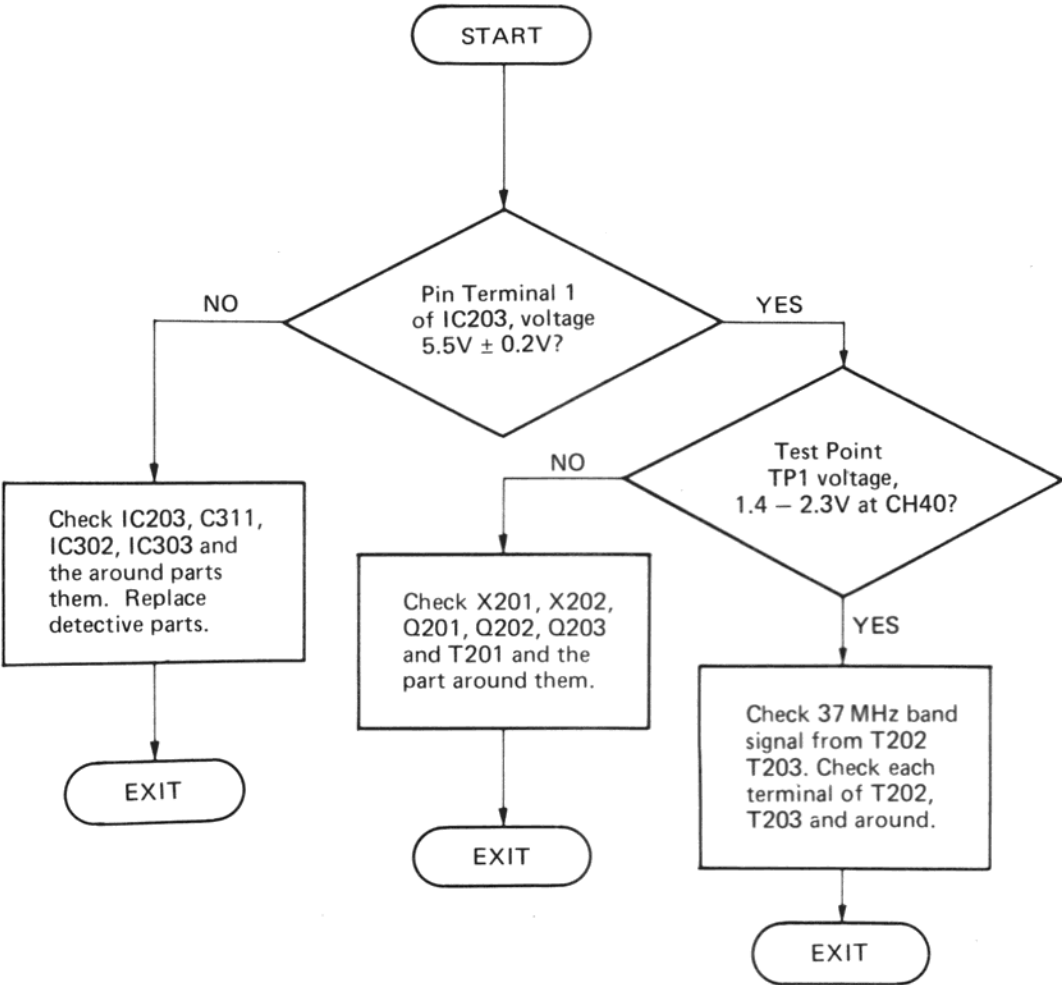
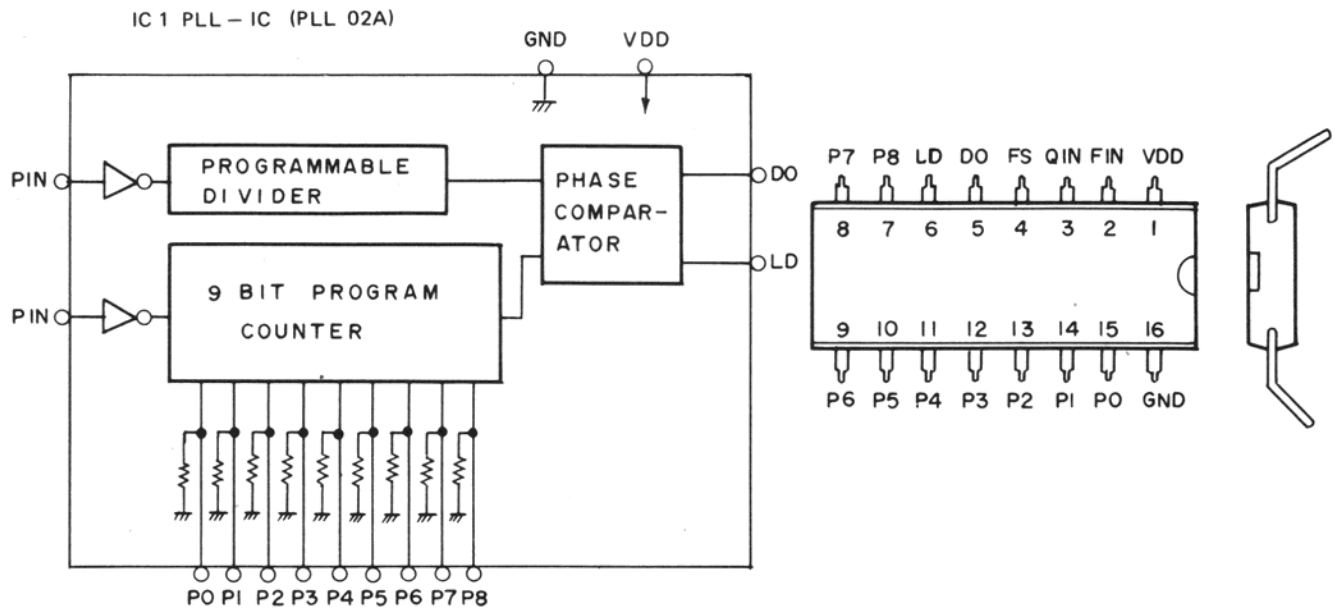
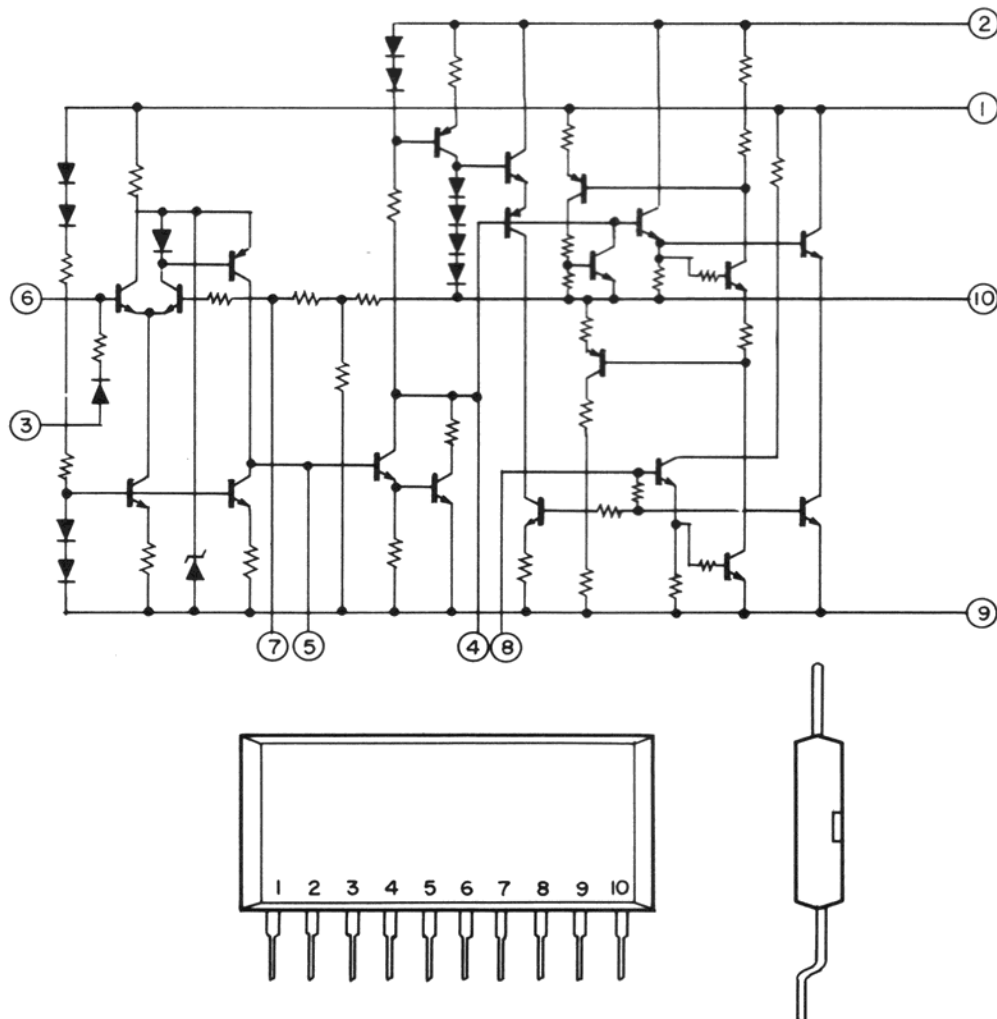


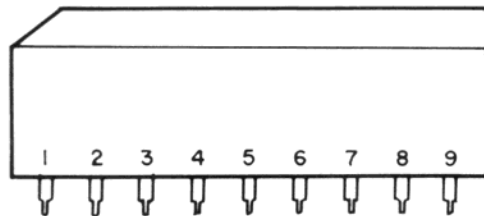
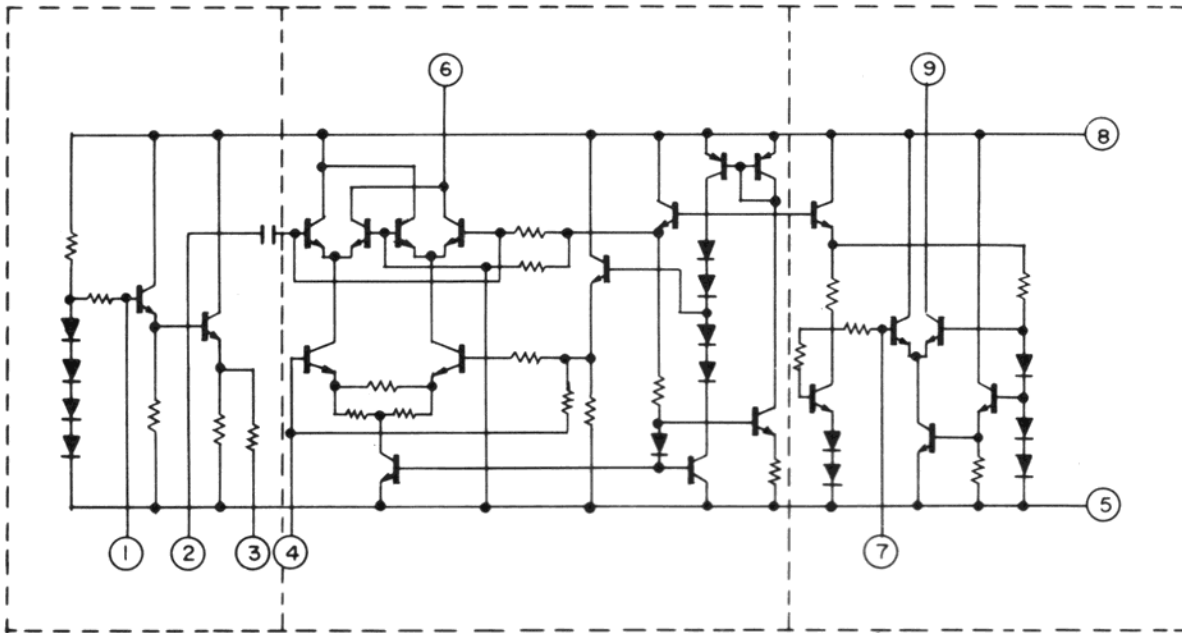
FIG. 5-14 IC EQUIVALENT CIRCUITS



IC 4 AF AMP. (TA 7205P)



IC 2 & IC 3 : IC 2 V. C. O / MIXER / BUFFER . IC 3 OSC 2 / MIXER / RF AMP . (TA 7310P)



IC 4 : BALANCE MOD.

