4. ADJUSTMENT

4.1 Frequency synthesizer (PLL)

a) After connecting the power meter and dummy load(50Ω), join the antenna connector of GMD-150 with above equipment.

b) Check the voltage between TP 1 & GND in digital volt meter

c) Then set the 16 channel of GMD-150

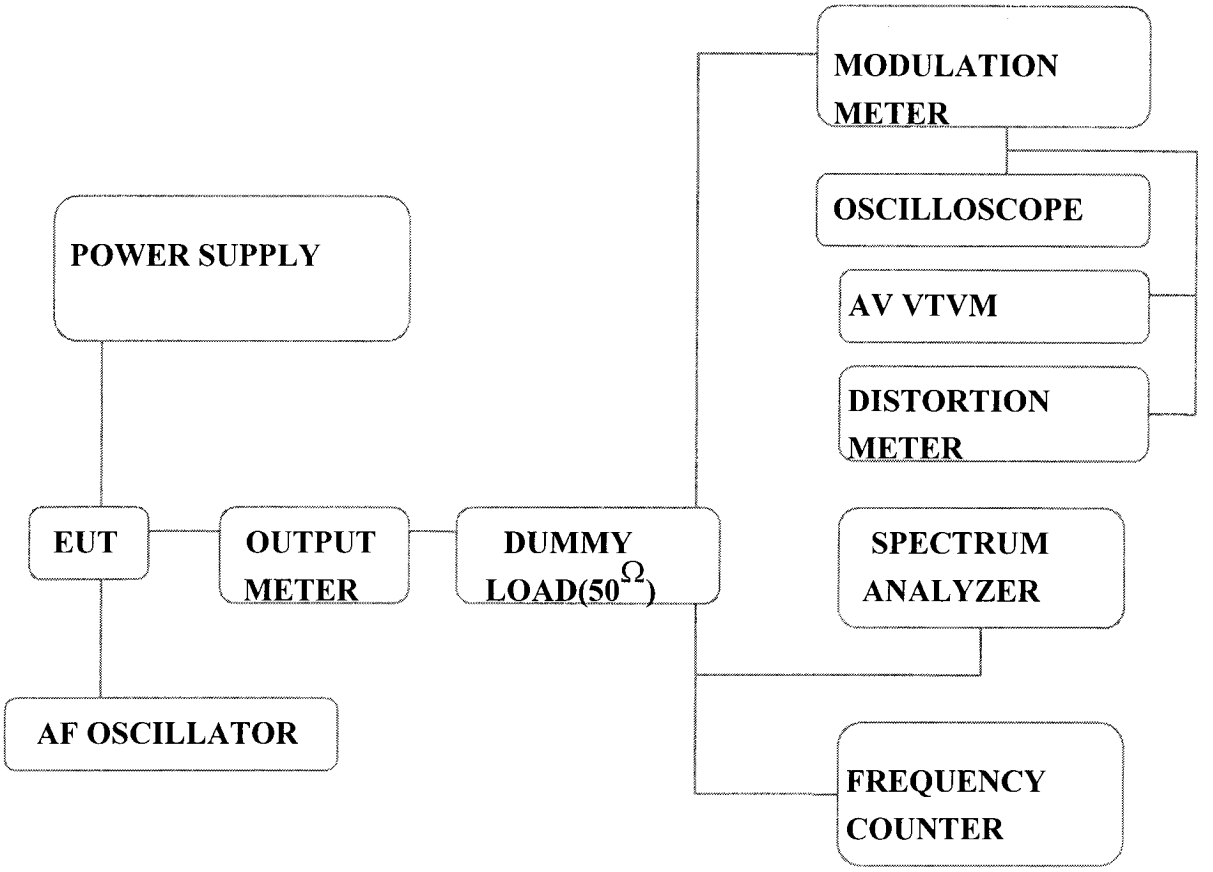
d) After releasing PTT key of GMD-150, trim L302 for adjusting the 16 channel to DC 2.0V in the voltage of TP1.

e) After pressing the PTT key, trim L305 for adjusting the 16 channel DC2.2 V in the voltage of TP1 and then

4-2 TRANSMITTER

a) Preparation

Connect EUT & measure equipment according to block diagram below.



b) Connect DC 9.6V , voltage preset to EUT.

c) Connect " power meter" & " dummy load(50^{Ω})".

d) Trim output power with RV1(TX power should be set " low" condition.)

e) Adjust TX frequency according to trimming trimmer TC1 in TCXO.

f) Connect AF oscillator to mic terminal(6 pin connector) for adjusting modulation degree.

g) Adjust the frequency of AF oscillator to 1 KHz and Adjust AF level should be 60mV.

h) Trim RV 401 with checking oscilloscope and modulation meter.

Max. Frequency deviation should be in $\pm$5.0KHz.

4-3 TRANSMITTER TEST

a) Output power test

High power should be 2W and in ±10% range.

b)Audio Response

Connect AF oscillator to Mic terminal(6 pin connector) and then firm the audio level that doesn't distort the wave of oscilloscope in the Frequency range, 300Hz - 3 KHz.

Check the audio level for 300Hz - 3KHz based on frequency standard, 1 KHz.

c) Modulation degree Test

1. **Connect AF oscillator to the MIC terminal(6 pin connector) and then adjust the AF level to 60 mV**
2. **Measure the oscilloscope wave and he point needle of modulation meter after pressing PTT key.**
3. **Sweep gradually the frequency of AF oscilloscope from 300Hz to 3 KHz.**
4. **At this time, the point needle of modulation meter should be in ±5.oKHz.**

d) Spectrum Test

1. **Antenna is 50Ω and attunator degree should be 20 dB more.**
2. **Observe the spectrum with pressing PTT key. The Harmonics should be less 70 dB than carrier.**

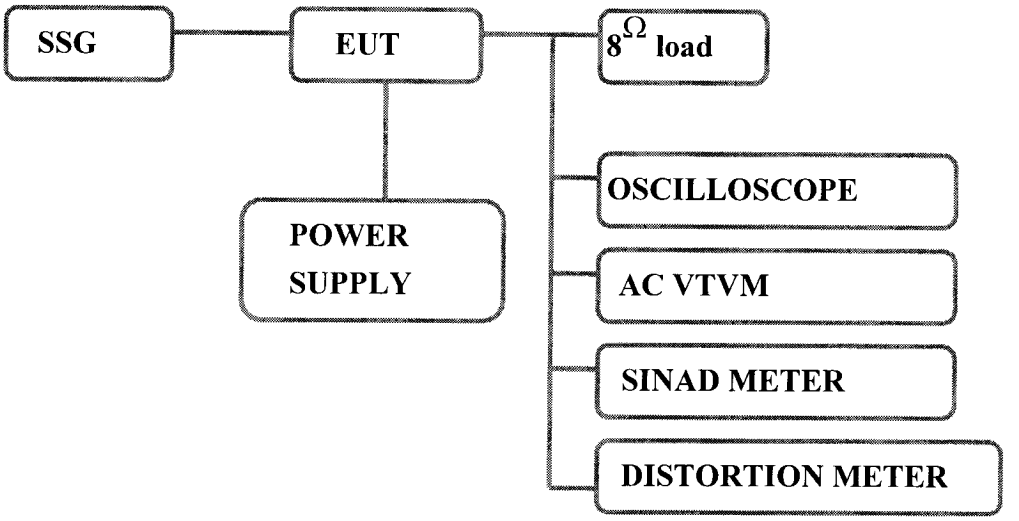
4-4 RECEIVER

4-4-1 Preparation

a) Adjust the power supply to DC9.6V

b) Adjust level to 1 Vrms in 8^{Ω} load after POWER-ON.

4-4-2 Connection method



4-2-3 Adjustment of RX sensitivity

a) Adjust SSG to Channel Frequency

b) Adjust Modulation Frequency, 1KHz to Modulation degree, 3KHz.

c) After Adjusting the Frequency of SSG to Channel Frequency, RF level sets to -47dBm and then listen the signal sound.

d) The Min. Audio Level of distortion should be adjusted to Max. Audio level with trimming L13,14,15,& 16.

e) Audio wave should be adjusted to the max. with trimming T2. Audio distortion should be adjusted to the min. with trimming T1.

4-4-4 The adjustment of Squelch sensitivity

a) Set the Standard channel, CH16.

b) In Squelch mode, SQ level bar should be adjusted to " 1 " bar.

c) After adjusting SSG to channel frequency, the RF level of SSG is set on the lowest level.

RF level should be increased gradually until speaker makes Audio sound.

d) At this point there is no SQ Hysterisis, Hysterisis value should be adjusted with using PC programmer.

4-5 RECEIVER TEST

a) RX sensitivity test

SSG should be adjusted to 20dB(with CCITT) OF SINAD's point needle seeing wave of oscilloscope as SSG sets in 1KHz with 3KHz frequency deviation.

b) Audio Distortion Test

1. SSG should be adjusted like way of point a) and RF level sets to -47dBm.
2. Adjust to 1Vrms(8Ω load) seeing Audio wave.
3. Read the needle of distortion meter(normal condition would be less than 3% distortion.)

c) Squelch Test

After RF level of SSG should be set to the least level, RF level should be gradually increased until speaker makes audio sound. At this point, check RF level.

4-6 Symtoms, Check point & Correction

a) Diagnosis method

1. Check each switch to work well.
2. Check voltage of battery
3. Problem develops from transmitter or Receiver?

b) Troubleshooting

b-1) Transmitter

1. power switch is on but does not work.

1-1) Battery could completely discharge

1-2) Touch problem come between Battery and Radio

1-3) Check and replace Fuse.

1-4) Power switch could have a fault.

2. Fail to transmit

2-1) Run-out of battery or charge problem

2-2) fault of PTT key

2-3) fault of Q4, IC3.

3. Transmitter works but frequency is unmatched

3-1) Out of order in frequency synthesizer.

3-2) Out of order in TCXO.

4. Audio does not sound(TX power and TX frequency are normal)

4-1) Problem of microphone or mic connector.

4-2) Problem of RV401 Trimming

4-3) IC 406, 407D problem

4-4) Connector problem of RF PCB and Digital PCB.

5. Low TX power problem

5-1) RV1 trimming problem

5-2) VCO problem

5-3) Q4 problem

5-4) Power module problem

6. Too much TX Frequency deviation

6-1) Check channel program is normal.

6-2) TCXO problem

7. TX is set when switch is on.

7-1) TX switch problem

7-2) Mic input line short.

b-1)RECEIVER

1. RX does not work
   1) Speaker line open problem or connector problem
   2) Receiver power circuit problem
   3) Audio amplifier IC 408 problem
2. Only noise sound
   1) X2 problem
   2) VCO problem
   3) IC5 problem

GMD-150
CHANNEL DATA

채널 수	표시	TX Freq	USA RX	INT'RX
1	1	156.050	156.050	160.650
2	2	156.100	156.100	160.700
3	3	156.150	156.150	160.750
4	4	156.200	156.200	160.800
5	5	156.250	156.250	160.850
6	6	156.300	156.300	156.300
7	7	156.350	156.350	160.950
8	8	156.400	156.400	156.400
9	9	156.450	156.450	156.450
10	10	156.500	156.500	156.500
11	11	156.550	156.550	156.550
12	12	156.600	156.600	156.600
13	13	156.650	156.650	156.650
14	14	156.700	156.700	156.700
15	15	156.750	156.750	156.750
16	16	156.800	156.800	156.800
17	17	156.850	156.850	156.850
18	18	156.900	156.900	161.500
19	19	156.950	156.950	161.550
20	20	157.000	161.600	161.600
21	21	157.050	157.050	161.650
22	22	157.100	157.100	161.700
23	23	157.150	157.150	161.750
24	24	157.200	161.800	161.800
25	25	157.250	161.850	161.850
26	26	157.300	161.900	161.900
27	27	157.350	161.950	161.950
28	28	157.400	162.000	162.000
29	37	157.850		157.850
30	38	161.425		161.425
31	60	156.025	156.025	160.625
32	61	156.075	156.075	160.675
33	62	156.125	156.125	160.725
34	63	156.175	156.175	160.775
35	64	156.225	156.225	160.825
36	65	156.275	156.275	160.875
37	66	156.325	156.325	160.925
38	67	156.375	156.375	156.375
39	68	156.425	156.425	156.425
40	69	156.475	156.475	156.475
41	70	156.525	156.525	156.525
42	71	156.575	156.575	156.575
43	72	156.625	156.625	156.625
44	73	156.675	156.675	156.675
45	74	156.725	156.725	156.725
46	77	156.875	156.875	156.775
47	78	156.925	156.925	156.825
48	79	156.975	156.975	156.875
49	80	157.025	157.025	156.925
50	81	157.075	157.075	156.975
51	82	157.125	157.125	161.725
52	83	157.175	157.175	161.775
53	84	157.225	161.825	161.825
54	85	157.275	161.875	161.875
55	86	157.325	161.925	161.925
56	87	157.375	161.975	161.975
57	88	157.425	157.425	162.025
58	91	155.025	155.025	155.025