

ALIGNMENT PROCEDURES

The alignment procedure described here is for the M11 covering 138MHz to 174MHz.refer to Fig. 1
For the location of adjustment.

PRELIMINARIES

Before alignments can be performed, the following functions should be programmed into the memory (EEPROM) by PC programing.

CH	RX FREQ	TX FREQ	RX/TX TONE	TX PWR
01	138.005	138.005	-	H
02	155.005	155.005	-	H
03	155.005	155.005	123.0(CTCSS)	L
04	155.005	155.005	023(DCS)	H
05	173.995	173.995		H

RECEIVER

VCO VOLTAGEADJUSTMENT

- 1.Set the channel to CH 01(the channel with the lowest receiver frequency).
- 2.Connect a Digital Multimeter (DC range) to TP305 on the Main PCB.
- 3.Adjust T1 to get 1.0V on the Multimeter.
- 4.Change the channel to CH 05 (the channel with the highest receiver frequency) and check that TP305 Voltage is less than 7.5V)

1st LOCAL FREQUENCY ADJUSTMENT

- 1.Set the channel to CH 02 (the centre frequency of the band)
- 2.Connect a Frequency Counter to TP306 on the Main PCB.
- 3.Check that the frequency is MHz \pm 100Hz.(receive frequency-21.4MHz)
- 4.Adjust VC301 inside synthesizer if necessary.

RX SENSITIVITY ADJUSTMENTS

- 1.Set the channel to CH 02.
- 2.Connect a Signal Generator (1kHz modulation at 60% deviation) with -47dBm output to the antenna connector and an Oscilloscope to the external speaker jack across an 8 ohms load.
- 3.Adjust T301 to give a maximum voltage with the best waveform on the Oscilloscope.
- NOTE:: 60% deviation is \pm 3.0kHz for a system with \pm 5.0kHz full channel deviation.
- 4.Set the channel to CH 01.
- 5.Decrease the output of the Signal Generator and adjust T308,307,306,305,303 and 302 for the best Sensitivity. It should be better than 0.25uV at -12dB SINAD.
- 6.Change the channel to CH 02 and CH 05 to confirm the radio's sensitivity across the band.

TRANSMITTER

VCO VOLTAGE ADJUSTMENT

- 1.Set the channel to CH 01(the channel with the lowest transmitter frequency).
- 2.Connect a Digital multimeter(DC range) to TP305 on the Main PCB.
- 3.Activate the PTT(transmit)switch.
- 4.Adjust T2 to get 1.0V on the Multimeter.
- 5.Change the channel to the highest frequency (CH 05) and check that the voltage is less than 8.5V when the PTT is activated.
- NOTE:
If at any time the radio CH display blinks, this indicates that the PLL is out of lock.. this may occur if a Frequency out of the set bandwidth is selected or may indicate a fault in the radio.

TX EXCITOR OUTPUT POWER CHECK

1. Connect a Power Meter (full scale 1W) to J 301 on the Main PCB.
2. Activate the PTT switch.
3. Check that the output power is about 30mW on CH 01, CH 02, and CH 05 on the Power Meter.

TRANSMITTER OUTPUT POWER ADJUSTMENT

1. Set the channel to CH 02 (the centre of the frequency band)
2. Connect a Spectrum Analyzer and a Power Meter (full scale more than 50W) to the antenna connector.
3. Activate the PP switch.
4. Turn VR502 (PA PCB) clockwise until TX power reaches a maximum (APC off).
5. Check that the output is more than 30W.
6. Adjust VR502 to give an output of 30W.
7. Check that conducted spurious and harmonics are better than -70dB below the carrier.
8. Set the channel to CH 03 (Low TX Power)
9. Adjust VR501 for 5W TX output.

FREQUENCY DEVIATION ADJUSTMENT

1. Set the channel to CH 02.
2. Connect a Deviation Meter to the antenna connector through a T-coupler.
3. Apply a 1kHz audio frequency at 100mV RMS to pin 2 of the 8 pin microphone connector.
4. Activate the PTT switch.
5. Adjust VR302 to give a deviation of $\pm 4.4\text{kHz}$ ($\pm 100\text{Hz}$) on the meter. This sets the deviation limit.
6. Then decrease the audio to the microphone connector down to 3mV RMS and adjust VR301 to give a deviation $\pm 3.0\text{kHz}$ ($\pm 100\text{Hz}$).
7. Change the channel to CH 03 and adjust VR1 to give a deviation (audio and CTCSS tone) of $\pm 5.0\text{kHz}$ ($+0\text{Hz}/-100\text{Hz}$)
8. Change the channel to CH 04 and adjust VR2 to give a deviation (audio and DCS tone) of $\pm 5.0\text{kHz}$ ($+0\text{Hz}/-100\text{Hz}$)

AUDIO OUTPUT POWER

1. Set the channel to CH 02.
2. Connect an Audio Millivoltmeter and Oscilloscope across an 8 ohm dummy load. Also connect a Signal Generator (1kHz modulation at 60% deviation) of -47dBm (1mV) output to the antenna connector.
3. Check that the audio level reads more than 4V RMS at maximum volume and more than 3.4RMS with no visible distortion.

BEEP ADJUSTMENT

1. Adjust VR303 on the Main PCB to give a reasonable audio level when depressing one of the keys on the front panel.