

VADER
PROFESSIONAL SECURE RADIO
ALIGNMENT PROCEDURES

1. Set-up of the Radio for Test Mode & Test Frequency

“Refer to **VADER Programming Instructions.**”

- a. Using “GF Command”, write the 7 frequencies in 2 MHz step within the applied bandwidth (150-162 MHz or 160-172 MHz) on the No.1 channel of each Group #1 ~ #7.

<Step-1; in case of using 4 MHz band in 150-162 MHz>:

GF0101150.0250[cr]

GF0201152.0250[cr]

GF0301154.0250[cr]

GF0401156.0250[cr]

GF0501158.0250[cr]

GF0601160.0250[cr]

GF0701161.9750[cr]

- b. Using “RT Command”, set the Transmit and Receive frequency to be fixed on the No.1 channel of each Group.

<Step-2>: RT01[cr]

With this procedure, both Transmit and Receive frequencies are fixed at Group #1 150.025MHz, #2 152.025MHz, #3 154.025MHz, #4 156.025MHz, #5 158.025, #6 160.025MHz, and #7 161.975MHz.

Remarks: It is not obliged to use the Group # and Channel No. as like above for setting-up the testing of the VADER radio, but it is compulsory to set the same Channel in each Group.

- c. Using “TO Command”, disable the TIME-OUT-TIMER.

<Step-3>: TO990[cr]

2. Adjustment of VCO

Remarks: This adjustment is not required for changing the frequency band on the radio already having proper function.

- a. Select Group #1 by Group Selector Switch. Connect a DC Voltmeter having high input impedance on the test point “PCV” on the MAIN PWB.
- b. Connect a Dummy Load of 50 Ω on Antenna Connector and adjust T9 to indicate the DC Volt Meter at 0.5V +/-0.1V in Transmit.
- c. Connect a SSG being set at the frequency of Group #1 on Antenna Connector and adjust T10 to indicate the DC Volt Meter at 0.5V +/-0.1V in Receive.

Remarks: When adjusting T10 in Receive, the radio receiver must receive the carrier wave. Otherwise the detected voltage on DC Voltmeter tends to be unstable due to channel scanning function.

3. Adjustment of Transmitter and Modulator

- a. Connect a RF Power Meter having impedance of 50Ω , Frequency Counter, and Deviation Meter to Antenna connector. Connect an Audio Oscillator to MIC terminal.
- b. By Group Selector Switch, select appropriate Group of which the frequency has been set nearly in the midst of the 4MHz band to be used.
- c. By Power Selector Switch, select the RF output power to Hi.
- d. Adjust the RV1 on MAIN PWB to obtain the maximum reference voltage.
- e. Press PTT Button to engage the Transmitter in Transmit.
- f. Adjust T1, T2, VC1, VC2, and VC3 to obtain the maximum value (200-250mW) at the RF Power Meter.
- g. Try selecting the Group having frequency closer to both band-edges in 4MHz band and check if the RF output power has no significant deterioration (below 150mW). If the RF output power significantly drops at any band-edge, retry the procedure f. and make balancing the RF output power at both edges and center of the band. When the adjustment is properly done, the VADER radio has approx. ± 4 MHz of efficient bandwidth.
- h. Adjust RV1 on MAIN PWB to obtain 100mW at the RF Power Meter.
- i. Adjust Trimmer TCX1 on MAIN PWB to obtain the frequency error in 1PPM at the Frequency Counter.

Remarks: This adjustment is not required for changing the frequency band on the radio already having proper function. For adjusting this, the CPU PWB has to be taken off.

- j. Adjust RV2 on MAIN PWB to obtain 10mW at the RF Power Meter.
- k. Adjust the Audio Oscillator to obtain the voltage of 100mVrms/1KHz at the MIC terminal. Select appropriate Group of which the frequency has been set nearly in the midst of the 4MHz band to be used.
- l. Turn the RV1, RV3 on DSP PWB and RV4 on CPU PWB to maximum. Adjust RV2 on DSP PWB to obtain the voltage of 0.7V P-P at the #4 pin of CN2 on DSP PWB.
- m. Adjust RV5 on MAIN PWB to obtain the value of Deviation Meter at ± 4.8 KHz.
- n. Adjust the Audio Oscillator to obtain the voltage of 1mVrms/1KHz at MIC terminal.
- o. Adjust the RV1 on DSP PWB to obtain the value of Deviation Meter at ± 4 KHz.
- p. Check the function of transmitter at both edges of 4MHz band to be used.

4. Adjustment of Receiver

- a. Connect SSG to Antenna terminal and SINAD Meter to SPK terminal.
- b. Select appropriate Group at nearly the center of 4MHz band to be used.
- c. Set the frequency of SSG with the selected Group. Set the RF output at $1\mu\text{V}$, modulating frequency at 1KHz, and frequency transition at $\pm 3\text{KHz}$.
- d. Adjust the RV3 on MAIN PWB to open squelch.
- e. Adjust T3 ~ T7 alternatively to obtain the value of SINAD Meter at maximum. If necessary, the RF output from SSG may be changed.
- f. Set the RF output from SSG at $0.5\mu\text{V}$.
- g. Adjust the RV3 on MAIN PWB to the limit at where the squelch is about to open.
- h. Check the function of Receiver at both edges of 4MHz band to be used. When the adjustment is properly done, the VADER radio has approx. $\pm 4\text{MHz}$ (-3dB band) of efficient bandwidth.
- i. If the deterioration of Receiver sensitivity is observed at any band-edge, retry above procedures and make balancing the sensitivity at both edges and center of the band to be used.

Notes: Using the Tracking Generator and Spectrum Analyzer makes easier adjustment while observing the shape of band. In this case, the output of Tracking Generator is to be set at -30dBm , and the Reference Level of Spectrum Analyzer at approx. -30dBm , and get the signal from the Drain of Q3 to be picked-up by an high impedance probe.