

## VR-5000 Alignment

The VR-5000 has been carefully aligned at the factory for the specified performance across the amateur band.

Realignment should therefore not be necessary except in the event of a component failure. All component replacement and service should be performed only by an authorized Yaesu representative, or the warranty policy may be voided.

The following procedures cover the sometimes critical and tedious adjustments that are not normally required once the transceiver has left the factory. However, if damage occurs and some parts are replaced, realignment may be required. If a sudden problem occurs during normal operation, it is likely due to component failure; realignment should not be done until after the faulty component has been replaced.

We recommend that servicing be performed only by authorized Yaesu service technicians who are experienced with the circuitry and fully equipped for repair and alignment. Therefore, if a fault is suspected, contact the dealer from whom the transceiver was purchased for instructions regarding repair. Authorized Yaesu service technicians realign all circuits and make complete performance checks to ensure compliance with factory specifications after replacing any faulty components. Those who do undertake any of the following alignments are cautioned to proceed at their own risk. Problems caused by unauthorized attempts at realignment are not covered by the warranty policy. Also, Yaesu must reserve the right to change circuits and alignment procedures in the interest of improved performance, without notifying owners. Under no circumstances should any alignment be attempted unless the normal function and operation of the transceiver are clearly understood, the cause of the malfunction has been clearly pinpointed and any faulty components replaced, and the need for realignment determined to be absolutely necessary. The following test equipment (and thorough familiarity with its correct use) is necessary for complete realignment. Correction of problems caused by misalignment resulting from use of improper test equipment is not covered under the warranty policy. While most steps do not require all of the equipment listed, the interactions of some adjustments may require that more complex adjustments be performed afterwards. Do not attempt to perform only a single step unless it is clearly isolated electrically from all other steps. Have all test equipment ready before beginning, and follow all of the steps in a section in the order presented.

### Required Test Equipment

1. RF Signal Generator with calibrated output level at 1000 MHz
2. AF Millivoltmeter
3. SINAD Meter
4. Regulated DC Power Supply: adjustable from 10 to 17 VDC, 5A
5. Frequency Counter: >0.1 ppm accuracy at 500 MHz
6. AF Signal Generator
7. DC Voltmeter: high impedance
8. AF Dummy Load: 8 ohm, 5W
9. Oscilloscope

### **Alignment Preparation & Precautions**

Correct alignment requires that the ambient temperature be the same as that of the receiver and test equipment, and that this temperature be held constant between 20 and 30 C (68 86F). When the receiver is brought into the shop from hot or cold air it should be allowed some time for thermal equalization with the environment before alignment. If possible, alignments should be made with oscillator shields and circuit boards firmly affixed in place. Also, the test equipment must be thoroughly warmed up before beginning.

*Note: Signal levels in dB referred to in this procedure are based on 0 dBu = 0.5 uV(closed circuit).*

### **PLL**

Set up the test equipment as shown for alignment.  
Maintain the supply voltage at 13.8V DC for all steps.

#### PLL VCV (Main VCO)

- 1) Connect the positive lead of the DC voltmeter to the test point TP2011(VCV) on the RF Unit, as indicated in the figure, and the negative lead to chassis ground.
- 2) Set the receiver to the 312.900 MHz, and adjust coil L2076 on the Unit for 7 V on the voltmeter.
- 3) Next tune to 1.000 MHz and confirm about 1.0 V on the voltmeter.
- 4) Set the receiver to the 621.900 MHz, and adjust coil L2098 on the Unit for 7 V on the voltmeter.
- 5) Next tune to 313.000 MHz and confirm about 1.0 V on the voltmeter.

#### PLL VCV (Sub VCO)

- 1) Connect the positive lead of the DC voltmeter to the test point TP2010(VCV) on the RF Unit, as indicated in the figure, and the negative lead to chassis ground.
- 2) Set the receiver to the 2599.900 MHz, and adjust coil L2053 on the Unit for 6.5 V on the voltmeter.
- 3) Next tune to 4.900 MHz and confirm about 2.0 V on the voltmeter.

#### PLL Reference Frequency

The frequency counter connected to J2010, and while tuned to 1.000 MHz, and adjust TC2001 on the RF Unit, if necessary, so the counter frequency is within 100 Hz of 568.245 MHz.

### **Receiver**

Set up the test equipment as shown below for receiver alignment.  
Interstage Transformers

- 1) While tuned to 101.000 MHz, and the RF signal generator turned to the same frequency, set the generator for  $\pm 3.5$  kHz deviation with 1kHz tone modulation, and set the output level for 10 dBuV at the antenna jack.
- 2) Adjust CV3001 & CV3002 on the IF Unit for optimum SINAD, reducing the signal

generator output level as necessary for proper meter deflection.

3) After the previous step, the final signal generator level should be less  $-3\text{dBu}$  for 12 dB SINAD.

#### S-Meter Calibration

1) While tuned to 51.000 MHz, and turn the radio off. Press the [PWR] and [SACN] of the panel and hold while you turn the radio on. The radio now is in the Alignment Mode.

2) The [SCAN] buttons on the panel to select the "MAIN S-METER 1", and press the [ENT] button.

3) The RF signal generator turned to the same frequency, set the generator for  $\pm 3.5$  kHz deviation with 1kHz tone modulation, and set the output level for  $-5\text{dBu}$  at the antenna jack, press the [ENT] button.

5) The [SCAN] buttons on the panel to select the "MAIN S-METER 5", and press the [ENT] button.

6) The RF signal generator turned to the same frequency, set the generator for  $\pm 3.5$  kHz deviation with 1kHz tone modulation, and set the output level for  $+28\text{dBu}$  at the antenna jack, and press the [ENT] button.

#### Squelch

1) While tuned to 51.000 MHz, and turn the radio off. Press the [PWR] and [SACN] of the panel and hold while you turn the radio on. The radio now is in the Alignment Mode.

2) The [SCAN] buttons on the panel to select the "MAIN THRESH", and press the [ENT] button.

3) The RF signal generator turned to the same frequency, set the generator for  $\pm 3.5$  kHz deviation with 1kHz tone modulation, and set the output level for  $-5\text{dBu}$  at the antenna jack, press the [ENT] button.

5) The [SCAN] buttons on the panel to select the "MAIN TIGHT", and press the [ENT] button.

6) The RF signal generator turned to the same frequency, set the generator for  $\pm 3.5$  kHz deviation with 1kHz tone modulation, and set the output level for  $+5\text{dBu}$  at the antenna jack, press the [ENT] button.