

## VX-2R Alignment

### *Introduction*

The VX-2R is 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. Only an authorized Yaesu representative should perform all component replacement and service, or the warranty policy may be void. The following procedures cover the adjustments that are not normally required once the transceiver has left the factory. However, if damage occurs and some parts subsequently 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. 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 reserves 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 realignment determined to be absolutely necessary.

The following test equipment (and familiarity with its 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***

- ☐ RF Signal Generator with calibrated output level at 500 MHz
- ☐ Deviation Meter (linear detector)
- ☐ In-line Wattmeter with 5% accuracy at 500 MHz
- ☐ 50- $\Omega$ , 10-W RF Dummy Load
- ☐ 8- $\Omega$  AF Dummy Load
- ☐ Regulated DC Power Supply adjustable from 3 to 15 VDC, 2A
- ☐ Frequency Counter: 0.2-ppm accuracy at 500 MHz
- ☐ AF Signal Generator
- ☐ AC Voltmeter
- ☐ DC Voltmeter: high impedance
- ☐ VHF Sampling Coupler
- ☐ SINAD Meter

### ***Alignment Preparation & Precautions***

A 10-W RF load and in-line wattmeter must be connected to the main antenna jack in all procedures that call for transmission, alignment is not possible with an antenna. After completing one step, read the next step to see if the same test equipment is required. If not, remove the test equipment (except dummy load and wattmeter, if connected) before proceeding.

Correct alignment requires that the ambient temperature be the same as that of the transceiver and test equipment, and that this temperature be held constant between 20~30°C (68~86°F). When the transceiver is brought into the shop from hot or cold air, it should be allowed some time to come to room temperature before alignment. Whenever 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 the alignment procedure are based on 0dBm=0.5  $\mu$  V.*

### ***Test Setup***

Set up the test equipment as shown below for transceiver alignment, apply 6 V DC power to the transceiver. Refer to the drawings for Alignment Points.

### ***Internal System Alignment Routine***

This uses a programmed routine in the transceiver which simplifies many previously complex discrete component settings and adjustments with digitally-controlled settings via front panel buttons and LCD indications.

To begin, set the transceiver to the center of the 50MHz, 144MHz, 220MHz and 430MHz bands. Next, select the 430MHz band, then turn the transceiver off.

Now, press and hold the [BAND], [H/L] and [V/M] button together while powering the radio on again. The display will show the first setting.

Note that the first few settings are not adjustable and are left as set from the factory.

In the alignment process, each adjustment is selected by rotating the DIAL. Alignment is performed by:

- Pressing the [V/M] button;
- Injecting a signal of the required frequency and level; then
- Pressing the [V/M] button after a level setting or adjustment is made. This second pressing of the [V/M] button store the entry.

To exit the alignment routine, press the [HM/RV] button. After performing the system alignment in its entirety, individual settings can be returned to and adjust should the need arise

In the section to follow, typical default values (as set at the factory) are shown in brackets (e.g. [119]), to serve as a general guideline. As each transceiver is individually optimized at the factory, the precise settings for the transceiver on your bench may be slightly different.

### ***PLL Reference Frequency (PLL REF)***

Transmit and adjust the counter frequency for within  $\pm 300\text{Hz}$  by rotating the DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

### ***430MHz band Alignment***

#### *○ Squelch Hysteresis Adjust (HIS)*

Rotate the DIAL for minimum squelch hysteresis, then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Squelch Preset Threshold (tHL)*

Inject a  $-15\text{dB}\mu$  RF signal (1 kHz tone @  $\pm 3.5\text{kHz}$  deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Squelch Preset Tight (tIg)*

Adjust the generator level for a  $-4\text{dB}\mu$  signal, then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Low-Scale S-1 Adjustment (S1)*

Adjust the generator level to  $-7\text{dB}\mu$  (1 kHz tone @  $\pm 3.5\text{kHz}$  deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ S-Meter Full-Scale Adjust (S9)*

Adjust the generator level to  $+20\text{dB}\mu$  (1 kHz tone @  $\pm 3.5\text{kHz}$  deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Wide Low-Scale S-1 Adjustment (S1)*

Adjust the generator level to  $0\text{dB}\mu$  (1 kHz tone @  $\pm 20\text{kHz}$  deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Wide S-Meter Full-Scale Adjust (S9)*

Adjust the generator level to  $+20\text{dB}\mu$  (1 kHz tone @  $\pm 20\text{kHz}$  deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ High TX Power Adjust (HPo)*

Transmit and adjust the output power level for  $2\text{W} \pm 0.3\text{W}$  by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ Low TX Power Adjust (LPo)*

Transmit and adjust the output power level for  $50\text{ mW} \pm 30\text{ mW}$  by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

#### *○ TX Deviation Adjustment (dEV)*

Transmit and adjust the deviation for  $4.2\text{KHz} \pm 0.2\text{KHz}$  by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

This completes the UHF band internal alignment routine, to save all settings and exit, press [BAND] button.

### ***144MHz band Alignment***

○ *Squelch Hysteresis Adjust (HIS)*

Rotate the DIAL for minimum squelch hysteresis, then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Squelch Preset Threshold (tHL)*

Inject a -15dB $\mu$  RF signal (1 kHz tone @  $\pm 3.5$ kHz deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Squelch Preset Tight (tIg)*

Adjust the generator level for a -4dB $\mu$  signal, then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Low-Scale S-1 Adjustment (S1)*

Adjust the generator level to -7dB $\mu$  (1 kHz tone @  $\pm 3.5$ kHz deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *S-Meter Full-Scale Adjust (S9)*

Adjust the generator level to +20dB $\mu$  (1 kHz tone @  $\pm 3.5$ kHz deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Wide Low-Scale S-1 Adjustment (S1)*

Adjust the generator level to 0dB $\mu$  (1 kHz tone @  $\pm 20$ kHz deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Wide S-Meter Full-Scale Adjust (S9)*

Adjust the generator level to +20dB $\mu$  (1 kHz tone @  $\pm 20$ kHz deviation), then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *High TX Power Adjust (HPo)*

Transmit and adjust the output power level for 3W  $\pm 0.3$ W by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *Low TX Power Adjust (LPo)*

Transmit and adjust the output power level for 50mW  $\pm 30$ mW by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

○ *TX Deviation Adjustment (dEV)*

Transmit and adjust the deviation for 4.2KHz  $\pm 0.2$ KHz by rotating DIAL, then press the [V/M] button. Rotate the DIAL to select the next setting.

This completes the UHF band internal alignment routine, to save all settings and exit, press [BAND] button.