

FT-1500M Alignment

The FT-1500M 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 200 MHz
2. Deviation Meter (linear detector)
3. AF Millivoltmeter
4. SINAD Meter
5. Inline Wattmeter with 5% accuracy at 200 MHz
6. Regulated DC Power Supply: adjustable from 10 to 17 VDC, 15A
7. 50-ohm Non-reactive Dummy Load: 100W at 200 MHz
8. Frequency Counter: >0.1 ppm accuracy at 200 MHz
9. AF Signal Generator
10. DC Voltmeter: high impedance
11. VHF Sampling Coupler
12. AF Dummy Load: 4 ohm, 5W
13. Oscilloscope
14. Spectrum Analyzer

Alignment Preparation & Precautions

A dummy load and inline wattmeter must be connected to the main antenna jack in all procedures that call for transmission, except where specified otherwise. Correct alignment is not possible with an antenna. After completing one step, read the following step to determine whether the same test

equipment will be 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 and 30 C (68 86F). When the transceiver 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 dBm = 0.5 mV(closed circuit).

PLL & Transmitter

Set up the test equipment as shown for transmitter alignment.

Maintain the supply voltage at 13.8V DC for all steps.

Press the [LOW] and [D/MR] key, and hold while you turn the radio on. The radio now is in the Alignment Mode.

PLL Reference Frequency

Tune the dail knob and select [TX FREQ], then press the [MHz] key. The radio now is in the frequency tuning mode.

With the wattmeter, dummy load and frequency counter connected to the antenna jack, and while tuned to 146.100 MHz, key the transmitter and tune the dail knob, if necessary, so the counter frequency is within 100 Hz of 146.100 MHz. Then press the [MHz] key.

Transmitter Output

Tune the dail knob and select [TX PWR], then press the [MHz] key. The radio now is in the TX power tuning mode.

Key the transmitter, and rotate the dail knob so as to achieve 5 Watts on the wattmeter. Then press the [LOW] button.

Rotate the dail knob so as to achieve 10 Watts on the wattmeter. Then press the [LOW] button.

Rotate the dail knob so as to achieve 25 Watts on the wattmeter. Then press the [LOW] button.

Rotate the dail knob so as to achieve 50 Watts on the wattmeter. Then press the [LOW] button.

Transmitter Deviation

While tuned to 146.000 MHz, adjust the AF generator level for 50 mV output at 1kHz to the MIC jack.

Tune the dail knob and select [MAX DEV], then press the [MHz] key. The radio now is in the TX deviation tuning mode.

Key the transmitter, and rotate the dail knob so as to achieve 4.2kHz on the deviation meter. Then press the [LOW] button.

Receiver

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

Interstage Transformers

S-Meter(S1) Calibration

1) S1

The RF signal generator turned to 146.100MHz, set the generator for +/-3.5 kHz deviation with 1kHz tone modulation, and set the output level for -7dBu at the antenna jack.

Tune the dail knob and select [S MTR], then press the [MHz] key. The radio now is in the S-Meter

calibration mode.

Press and hold the [LOW] button, and then press the [LOW] button.

2) Full

The RF signal generator turned to the same frequency, set the generator for +/-3.5 kHz deviation with 1kHz tone modulation, and set the output level for +20dBu at the antenna jack.

Press and hold the [LOW] button, and then press the [LOW] button.

Squelch Threshold Calibration

The RF signal generator turned to 146.100MHz, set the generator for +/-3.5 kHz deviation with 1kHz tone modulation, and set the output level for -15dBu at the antenna jack.

Tune the dial knob and select [SQL], then press the [MHz] key. The radio now is in the squelch calibration mode.

1) Threshold

Press and hold the [LOW] button, and then press the [LOW] button.

2) Tight

The RF signal generator turned to the same frequency, set the generator for +/-3.5 kHz deviation with 1kHz tone modulation, and set the output level for -4dBu at the antenna jack.

Press and hold the [LOW] button, and then press the [LOW] button.

Sensitivity

Tune the dial knob and select [RX TUN], then press the [MHz] key. The radio now is in the squelch calibration mode.

Adjust the dial knob for optimum SINAD, reducing the signal generator output level as necessary for proper meter deflection.

After the previous step, the final signal generator level should be less -9 dBu for 12 dB SINAD.