

RF Module Alignment Procedure

The RF modules can only be aligned using Motorola 'TUNER' software along with a Motorola RIB box. There are no adjustments that can be made with conventional adjustment tools. Adjustable parameters are saved as 'softpot' values in memory and are loaded each time the module is turned on. The following are the adjustable parameters.

Caution: These procedures should only be attempted by Qualified Service Personnel.

Rx VCO Crossover Frequency

Definition:

This alignment procedure adjusts the corner frequencies of a RF front end bandpass filter. It needs to be performed at multiple frequencies to allow for proper alignment across the entire RF band. The RF band is divided into frequency zones with a calibration point (value) in each zone.

Procedure:

1. Apply the appropriate RF signal to the radio.
2. Adjust the softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box until the maximum RSSI value is displayed. Click on the RSSI button to get an updated RSSI value from the radio.
3. Press the "Program" button to save each of the new values.
4. Repeat the above process for all frequencies.

Note:

Rx Front End Filter Alignment is required after replacing (or servicing) the RF Board.

Reference Oscillator

Definition:

This alignment procedure warps the reference oscillator of the radio.

Procedure:

1. Click on the "PTT Toggle" button to command the radio to transmit.
2. Measure the radio's transmit RF frequency with a service monitor.
3. Adjust the softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box until the measured value is as close as possible to the frequency displayed on the screen.

4. Click on the "Program" button to save to the radio the value displayed in the "New Softpot Value" spin box.

Note:

Reference Oscillator Alignment is required after replacing (or servicing) the RF Board.

RX Crossover Frequency

Definition:

This field allows the selection of a new Rx VCO Crossover frequency.

The actual frequency programmed differs from shown on the screen.

For VHF radios, the frequency programmed is 45.15 greater than what shows on the screen. For UHF radios, the frequency programmed is 73.35 less than what shows on the screen.

This procedure sets the crossover frequency at which the negative control voltage (Vcntl) switches from zero to negative.

Procedure:

1. A DC voltmeter must be connected to test point 5 (TP5).
2. Adjust the UP/DOWN arrow keys until the voltage reading at TP5 is between 2.9 and 3.1 volts.
3. Press the program button to program the new frequency.

Tx Current Limit

Definition:

This alignment procedure limits the transmitter current drain of the radio.

Procedure:

1. Click on the "PTT Toggle" button to make the radio transmit.
2. While transmitting, measure the current drain at each of the test frequencies.
3. Re-select the frequency which had the highest current reading (This only needs to be done on a single frequency since all other frequencies will be adjusted automatically).
4. Adjust the softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box. Using a service monitor to measure transmit power, decrease the softpot value from its maximum until the measured transmit power begins to drop.

5. Increase the softpot value by one unit.
6. Click on the "Program" button to save the tuned value in the radio.

Note:

Transmit Current Limit adjustment is required after replacing (or servicing) the RF Board.

Tx Deviation Balance

Definition:

This alignment procedure balances the modulation contributions of the low and high frequency portions of a baseband signal. Proper alignment is critical to the operation of signaling schemes that have very low frequency components (e.g. DPL) and could result in distorted waveforms if improperly adjusted.

This procedure needs to be performed at multiple frequencies to allow for proper alignment across the entire RF band. The RF band is divided into frequency zones with a calibration point (value) in each zone.

Procedure:

1. Click on the "PTT Toggle" button to make the radio transmit.
2. Click on the "PTT Tone : Low" button.
3. Measure the transmitted signal deviation of the radio with a service monitor.
4. Click on the "PTT Tone : High" button.
5. Adjust softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box until the measured deviation when using the high tone is as close as possible to that observed when using the low tone.
6. Click on the "Program" button to save the tuned values in the radio.
7. Repeat the above process for all frequencies.

Note:

Balanced Attenuator Alignment is required after replacing (or servicing) the Controller Board or the RF Board.

Tx Deviation Limit

Definition:

This alignment procedure limits the modulation of a baseband signal. It is used for primary modulation limiting.

This procedure needs to be performed at multiple frequencies to allow for proper alignment across the entire RF band. The RF band is divided into frequency zones with a calibration point (value) in each zone.

Procedure:

1. Click on the "PTT Toggle" button to make the radio transmit.
2. Measure the transmitted signal deviation of the radio with a service monitor.
3. Adjust softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box until the measured deviation is as close as possible to 2.83KHz.
4. Click on the "Program" button to save each of the tuned values in the radio.
5. Repeat the above process for all frequencies.

Note:

TX Deviation Limit Alignment is required after replacing (or servicing) the Controller Board or the RF Board.

Tx Power

Definition:

This alignment procedure adjusts the transmit power of the radio and must be performed at multiple frequencies to allow for proper alignment across the entire RF band. The RF band is divided into frequency zones with a calibration point (value) in each zone.

NOTES:

[1] This value determines an attenuation setting, not the actual level of transmitted power.

[2] For Astro Portable, decreasing the softpot value increases the amount of attenuation (decreases the transmitted power output).

[3] The same softpot attenuation value will result in DIFFERENT radio output power levels for the other power level fields settings.

Procedure:

1. Click on the "PTT Toggle" button to command the radio to transmit.
2. Measure the transmit power of the radio with a service monitor.
3. Adjust softpot value by manipulating the slider bar, incrementing the "New Softpot Value" spin box, or directly entering the desired value into the "New Softpot Value" spin box until the required power is indicated on the service monitor.
4. Click on the "Program" button to save each of the tuned values in the radio.
5. Repeat the above process for all frequencies.

Note:

All power measurements are to be made at the antenna port.

Transmit Power Alignment is required after replacing (or servicing) the RF Board.

Tx Test Pattern

Definition:

This screen is used to transmit specific test patterns at a desired frequency so that the user can perform tests on the radio's transmitter.

For more information about the test pattern types, the tests which can be performed using this screen, how to perform the tests, and the necessary equipment, refer to 'Digital C4FM/CQPSK Transceiver Measurement Methods' (Telecommunications Industry Association, TIA, Document Number TIA/EIA/IS-102.CAAA)."

This screen contains the following fields:

Tx Frequency:

This field selects the Transmit Frequency directly in MHz.

Test Pattern Type:

This field represents the type of test pattern which will be transmitted by the radio when "PTT TOGGLE" button is pressed.

NOTE: If Audio Modulation Input is selected, a white noise source generator should be placed at the microphone prior to test execution.

The factory default is V.52.

Tx VCO Crossover Frequency

Definition:

This field allows the selection of a new Tx VCO Crossover frequency or enter the new frequency directly in MHz.

The valid range of frequencies is the same as the bandsplit of the radio, in increments of .0050 MHz. The factory default is as follows:

ASTRO XTS 3000 VHF (136-178 MHz) models: 164.8500