



FT-817 Alignment

Local Oscillator Adjustment

Reference Frequency Adjustment

- a. Connect a frequency counter to J5002 2pin (TP1047).
- b. Adjust the trimmer capacitor (TC5001) for 22.625000MHz +/- 5Hz on the frequency counter.
- c. Connect a RF millivoltmeter or an oscilloscope to the J5002 2pin (TP1047) and confirm that the output level is at least 70mVrms or 200mVp-p.

PLL Adjustment

VCO VCV Adjustment

- a. Connect a DC voltmeter to J2002 6pin (TP1007) and referring to the table below, tune the transceiver to each frequency listed. Then confirm that the correct voltage is present, or adjust the listed components for the required voltage.

Tune to :	Adjust / Confirm	For
13.895MHz	Adjust TC2003	4.5V +/- 0.1V
76.000MHz	Confirm	At least 0.5V
32.995MHz	Adjust TC2002	4.5V +/- 0.1V
13.900MHz	Confirm	At least 0.8V
55.995MHz	Adjust TC2001	4.5V +/- 0.1V
88.000MHz	Confirm	At least 0.8V
153.995MHz	Adjust L2010	4.5V +/- 0.1V
108.000MHz	Confirm	At least 0.5V
469.995MHz	Adjust L2011	4.5V +/- 0.1V
420.000MHz	Confirm	At least 0.8V

1st Local Output Level

- a. Connect a RF millivoltmeter to J2002 11pin and tune the transceiver to 28.000MHz.
- b. Confirm that the RF level is at least +5dBm or 400mVrms.

PLL Unlock

- a. Connect a DC voltmeter to J2002 1pin (TP1001).
- b. When the reference input is not activated, the voltmeter shows less than 0.5V and “UNLOCK” is displayed on the LCD.
- c. When the reference input is activated, the voltmeter shows at least 3.5V and LCD displays as it normally should do.

PA Unit Adjustment

Before alignment, set the mode on CW and tune the transceiver to 1.800MHz. Nothing should be connected to the CW Key Jack.

Driver Stage Idling Current

- a. Remove the jumper connector J3005 and insert an ammeter.
- b. Press the PTT and adjust VR3001 for an indication of 28mA +/- 2mA on the ammeter.
- c. Disconnect the ammeter and reinstall the jumper connector at J3005
- d. Remove the jumper connector J3006 and insert an ammeter.
- e. Press the PTT and adjust VR3002 for an indication of 18mA +/- 2mA on the ammeter.
- f. Disconnect the ammeter and reinstall the jumper connector at J3006.

Final Stage Idling Current

- a. Connect an ammeter at each "13US" pin on PA Unit and Final Unit. If the "13US" line has already been connected by a wire, remove it and connect an ammeter.
- b. Turn both VR5401 and VR5402 fully to counterclockwise.
- c. Press the PTT and adjust VR5401 for an indication of 38mA +/- 2mA on the ammeter.
- d. Press the PTT and adjust VR5402 for an indication of 76mA +/- 4mA on the ammeter.
- e. Connect the "13US" line between PA unit and Final Unit again as it should be.

Local Oscillator Adjustment

2nd Local Adjustment

- a. Connect a RF millivoltmeter or an oscilloscope to Q1038 5pin (TP1067).
- b. Adjust T1024 and T1026 alternately for the maximum indication on the millivoltmeter or for the maximum amplitude on the oscilloscope.
- c. Confirm the indicated voltage is at least 120mVrms or 330mVp-p.

3rd Local Adjustment

- a. Connect a RF millivoltmeter or an oscilloscope to Q1055 5pin (T1087).
- b. Key the transceiver on CW mode and adjust T1021 for the maximum indication on the RF millivoltmeter.
- c. Confirm that the indicated voltage is at least 70mVrms or 200mVp-p.

TX IF Adjustment

CW TX IF Adjustment

- a. Tune the frequency to 1.8MHz band. Connect a RF millivoltmeter to J1002 terminated by 50ohm

dummy load.

b. Key the transceiver and adjust T1020, T1012, and T1005 alternately for the maximum indication on the RF millivoltmeter.

FM TX IF Adjustment

a. Tune the frequency to 28MHz band. Connect a RF millivoltmeter to J1002 terminated by a 50ohm dummy load.

b. Key the transceiver and adjust T1012 and T1013 alternately for the maximum indication on the RF millivoltmeter.

c. Connect a frequency counter to TP1008.

d. Key the transceiver on FM mode without microphone input. Adjust T1018 for 68.3300MHz +/- 50Hz.

Carrier Balance Adjustment

a. Terminate J1002 by a 50ohm dummy load and connect a spectrum analyzer or a RF millivoltmeter.

b. Key the transceiver on USB mode in 28MHz band without microphone input. Adjust VR1001 for the maximum carrier suppression on the spectrum analyzer or for the minimum indication on the RF millivoltmeter.

VHF TX BPF Adjustment

a. Set the frequency at 145.995MHz. Connect RF millivoltmeter to J1002 terminated by a 50ohm dummy load.

b. Key the transceiver on FM mode and adjust T1011, T1010, and T1009 alternately for the minimum indication on RF millivoltmeter.

UHF TX BPF Adjustment

a. Set the frequency at 439.995MHz. Connect a RF millivoltmeter to J1002 terminated by a 50ohm dummy load.

b. Key the transceiver on FM mode and adjust TC1005, TC1004 and TC1002 alternately for the minimum indication on RF millivoltmeter.

RX Adjustment

PA Unit must be connected in RX adjustment. Signal Generator should not be connected to J1002 directly because DC voltage comes on there.

RX IF Adjustment

Connect a signal generator to the antenna connector and a SINAD meter to the speaker jack.

FM IF Adjustment

- a. Tune the transceiver to 51.995MHz. Inject a RF signal from a signal generator at 10dBu output, 1KHz AF FM modulation of 3.5KHz deviation.
- b. Adjust T1023, T1025, T1028, T1030 and T1034 alternately for the best SINAD sensitivity.
- c. Increase the output level of the signal generator up to 12dBu approximately and adjust T1023 and T1025 alternately for the best SINAD sensitivity.

SSB IF Adjustment

- a. Connect a DC voltmeter to TP1063.
- b. Tune the transceiver to 51.995MHz. Inject a RF signal from a signal generator at 40dBu output.
- c. Adjust T1033 and T1029 alternately for the minimum indication on the DC voltmeter.

Air-Band Reception Adjustment

- a. Connect a DC voltmeter to TP1063.
- b. Tune the transceiver to 128.00MHz on AM mode. Inject a RF signal from a signal generator at 40dBu output, 40% AM modulation of 400Hz AF.
- c. Adjust T1001, T1003 and T1007 for the minimum indication on the DC voltmeter.

VHF Band Alignment

- a. Connect a DC voltmeter to TP1063.
- b. Tune the transceiver to 145.995MHz. Inject a RF signal from a signal generator at 40dBu output.
- c. Adjust T1002, T1004 and T1008 alternately for the minimum indication on the DC voltmeter.

UHF Band Alignment

- a. Connect a DC voltmeter to the TP1063.
- b. Tune the transceiver to 439.995MHz. Inject a RF signal from a signal generator at 40dBu output.
- c. Adjust TC1001 for the minimum indication on the DC voltmeter.

W-FM Reception Adjustment

- a. Connect a SINAD meter to the speaker jack.
- b. Tune the transceiver to 88.00MHz. Inject a RF signal from a signal generator at 30dBu output, 22.5KHz deviation FM modulation of 1KHz AF.
- c. Adjust TC1003 for the best SINAD sensitivity. Then reduce the output level of the signal

generator and adjust TC1003 again.

Image Rejection Trap Adjustment

- a. Connect an AF millivoltmeter to the speaker jack.
- b. Tune the transceiver to 51.995MHz on CW mode. Inject a RF signal from a signal generator at 68.330MHz, 50dBu output.
- c. Adjust T1014 for the minimum indication on the AF millivoltmeter. Then increase the output level of the signal generator slightly and adjust T1014 again.

Noise Blanker Adjustment

- a. Connect a DC voltmeter to TP1072 or the base of Q1074. Tune the transceiver to 51.995MHz and inject a RF signal from a signal generator at 40dBu output.
- b. Activate the noise blanker and adjust T1027 for the minimum indication on the DC voltmeter at TP1072, for the maximum indication at the base of Q1074.

CM Coupler Balance Adjustment

- a. Terminate the antenna jack with a 50ohm dummy load. Set the mode on CW, connect a DC voltmeter to J3004 7pin.
- b. Tune the transceiver in 28MHz band and key the transceiver.
- c. Adjust TC3003 for the minimum indication on the DC voltmeter.
- d. Tune the transceiver in 145.995MHz band and key the transceiver.
- e. Adjust TC3001 for the minimum indication on the DC voltmeter.
- f. Tune the transceiver in 439.995MHz band and key the transceiver.
- g. Adjust TC3002 for the minimum indication on the DC voltmeter.

Software Menu Alignment

Antenna connector should be connected to a dummy load in case of transmission or a signal generator in case of reception. General alignment conditions are as follows in case otherwise noted.

AF-gain knob : Center

RF-gain knob : Fully clockwise

SQL : Fully counterclockwise

ATT / IPO / CTCSS / DCS : Off

Output power : High

AGC : Auto

Break-in : On CW Keyer : Off

VOX : Off

Keep pressing the Multi Function Key [A],[B],[C] simultaneously and turn on the transceiver, the alignment menu will be activated.

In the alignment procedure, each alignment parameter is selected by rotating the main dial. Alignment item is selected by rotating VFO/M-CH knob.

To store the alignment parameters, press the [MENU] key for longer than half second.

RX Gain Adjustment

- a. Select the CW mode. Tune the transceiver to 1.8MHz band. Select “HF1RXG” in the menu by rotating VFO/M-CH knob. Inject a RF signal from a signal generator at 2dBu output.
- b. Set the parameter “HF1RXG” at the value of lighting the first dot of the S-meter (S1) on the LCD by rotating the main dial.
- c. Other RX gain adjustment should be performed as this routine. Output levels of the signal generator at each frequency are shown as follows.

Frequency	Output Level of SG
1.8MHz Band	12dBu
7MHz Band	12dBu
21MHz Band	9dBu
50MHz Band	6dBu
144MHz Band	3dBu
430MHz Band	3dBu

SSB S-Meter Adjustment

- a. Tune the transceiver to 21MHz band on CW mode. Inject a RF signal from a signal generator at 36dBu output.
- b. Set the parameter “SSB-S9” at the value of lighting the 6 dots of the S-meter (S9) on the LCD by rotating the main dial.
- c. Tune the transceiver to 21MHz band on CW mode. Inject a RF signal from the signal generator at 86dBu output.
- d. Set the parameter “SSB-FS” at the value of lighting all the dots of the S-meter on the LCD by rotating the main dial.

FM S-Meter Adjustment

- a. Tune the transceiver to 144MHz band on FM mode. Inject a RF signal from a signal generator at 3dBu output, 3.5KHz deviation FM Modulation of 1KHz AF.
- b. Select the menu item “FM-S9” and press [A] key to set the parameter.
- c. Increase the output level of the signal generator up to 25dBu. Select the menu item “FM-FS” and press [A] key to set the parameter.

FM Center Meter Adjustment

- a. Tune the transceiver to 144MHz band on FM mode. Inject a RF signal from a signal generator at 10dBu output, 3.5KHz deviation FM Modulation of 1KHz AF.
- b. Set the frequency of the signal generator 3KHz below the receiving frequency of the transceiver. Select the menu item “DISC-L” and press [A] to set the parameter.
- c. Set the frequency of the signal generator 3KHz above the receiving frequency of the transceiver. Select the menu item “DISC-H” and press [A] to set the parameter.

FM Squelch Adjustment

- a. Tune the transceiver to 144MHz band on FM mode. Confirm that the squelch knob is turned to fully counterclockwise.
- b. Select the menu item “FM-TH1” and press [A] key without antenna input to set the parameter. Select the menu item “FM-TH2” and press [A] key again.
- c. Inject a RF signal from a signal generator at 5dBu output, 3.5KHz deviation FM modulation of 1KHz AF. Select the menu item “FM-TI1” and press [A] key to set the parameter. Select the menu item “FM-TI2” and press [A] key again.

Power Supply Voltage Adjustment

- a. Tune the transceiver to 144MHz band on FM mode. Confirm that the power supply voltage is 13.8V +/- 0.1V.
- b. Select the menu item “VCC” and adjust the parameter for “138” displayed on LCD.

Over-current Protection Adjustment

- a. Set the mode on CW. Select the menu item “HF1-IC”. Tune the transceiver to 1.8MHz band and key the transceiver. Adjust the parameter for 6.0W transmission power.
- b. Other over-current protection adjustment menu, “HF2-IC”, “HF3-IC”, “50M-IC”, “VHF-IC”, and “UHF IC” should be adjusted as the same routine on 7MHz, 21MHz, 50MHz, 144MHz, and 430MHz band respectively.

RF Power Adjustment

- a. Tune the transceiver to 1.8MHz band on CW mode. Select the menu item “HF1-HI”. Key down and adjust the parameter for 5.0W +/- 0.1W transmission power.
- b. Select the menu item “HF1-L3” Key down and confirm that the output power is 2.5W +/- 0.5W. In case the transmission power is not within the tolerance, adjust the parameter for 2.5W +/- 0.1W transmission power.

- c. Select the menu item “HF1-L2” Key down and confirm that the output power is 1.0W +/- 0.3W. In case the power is not within the tolerance, adjust the parameter for 1.0W +/- 0.1W transmission power.
- d. Select the menu item “HF1-L1”. Key down and confirm that the output power is 0.5W +/- 0.2W. In case the power is not within the tolerance, adjust the parameter for 0.5W +/- 0.1W transmission power.
- e. Other RF power adjustment menu, such as [HF2-**], [HF3-**], [50M-**], [VHF-**], [UHF-**] should be adjusted as the same routine on 7MHz, 21MHz, 50MHz, 144MHz and 430MHz band respectively.

TX Gain Adjustment

- a. Select the USB mode. Inject a 0.5mV audio signal at 1KHz from an AF generator into the microphone jack.
- b. Tune the transceiver to 1.8MHz band and key the transmitter. Select the menu item “HF1TXG” and adjust the parameter for 2.5W +/- 0.1W transmission power.
- c. Other TX gain adjustment menu, such as [HF2TXG], [HF3TXG], [50MTXG], [VHFTXG] and [UHFTXG] should be adjusted as the same routine on 7MHz, 21MHz, 50MHz, 144MHz and 430MHz band respectively.

Power Meter Sensitivity Adjustment

- a. Set the mode on CW, output power HIGH. Select the menu item “HF1POM” and key the transceiver.
- b. Set the parameter at the value of lighting 7 dots of the power meter on the LCD.
- c. Other power meter sensitivity adjustment menu, such as [HF2POM], [HF3POM], [50MPOM], [VHFPOM] and [UHFPOM] should be adjusted as the same routine on 7MHz, 21MHz, 50MHz, 144MHz and 430MHz band respectively.

ALC Meter Adjustment

- a. Tune the transceiver to 21MHz band on USB. Select the menu item “ALC-1”. Key the transceiver without microphone input and press [A] key. Then a value which microprocessor computes is displayed on the LCD.
- b. Set the parameter taken four away from the displayed value.
- c. After setting the parameter, confirm that all the dots of the ALC meter go out.
- d. Select the menu item “ALC-M”. Inject a 2.0mV AF signal at 1KHz from an audio generator and key the transceiver.
- e. Press [A] key and confirm that 5 dots of ALC meter light on the LCD.

Reverse ALC Adjustment

- a. Set the mode on CW, connect a 150ohm dummy load to the antenna connector. Tune the transceiver to 1.8MHz band and select the menu item "HF1-RV".
- b. Key the transceiver and set the parameter at the value of lighting 5 dots of the power meter on the LCD.
- c. Other reverse ALC adjustment menu, such as [HF2-RV], [HF3-RV], [50M-RV], [VHF-RV] and [UHF-RV] should be adjusted as the same routine on 7MHz, 21MHz, 50MHz, 144MHz and 430MHz band respectively.

Carrier Level Adjustment

- a. Tune the transceiver to 21MHz band. Connect a 50ohm dummy load to the antenna connector. Set the mode on CW. Select the menu item "CW-CAR" and key the transceiver.
- b. Set the parameter at the value of lighting 5 dots of the ALC meter on the LCD.
- c. Connect an oscilloscope to the antenna connector via an appropriate attenuator.
- d. Set the mode on AM. Select the menu item "AM-CAR". Inject a 0.5mV AF at 1KHz from an audio generator into the microphone jack.
- e. Key the transceiver and adjust the parameter for 50% AM modulation on the oscilloscope.

FM Modulation Adjustment

- a. Tune the transceiver to 144MHz band on FM mode. Connect a FM linear detector to the antenna connector via an appropriate attenuator. Select the menu item "DEV-W". Inject a 15mV AF at 1KHz from an audio generator.
- b. Key the transceiver and adjust the parameter for maximum deviation of 4.5KHz +/- 0.2KHz on the FM linear detector.
- c. Change the menu item to "DEV-N". Key the transceiver and adjust the parameter for maximum deviation of 2.25KHz +/- 0.1KHz on the FM linear detector.
- d. Change the menu item to "M-MTR". Key the transceiver and set the parameter at the value of lighting 5 dots of the MOD Meter on the LCD.
- e. Change the menu item to "CTCSS". Key the transceiver without microphone input and adjust the parameter for maximum deviation of 0.7KHz +/- 0.1KHz on the FM linear detector.
- f. Change the menu item to "DCS". Key the transceiver without microphone input and adjust the parameter for maximum deviation of 0.7KHz +/- 0.1KHz on the FM linear detector.

SSB Carrier Point Adjustment

- a. Tune the transceiver to 21MHz band. Select the menu item "LSB-CP". Set the mode on LSB,

inject a 0.5mV AF from an audio generator into the microphone jack.

- b. Vary the AF frequency of the audio generator to search the maximum output power of the transceiver. Confirm that the output power is at least 2.5W. Then adjust the AF output level of the audio generator for 2.0W +/- 0.1W output power of the transceiver.
- c. Lower the AF frequency down to 400Hz and adjust the parameter for 0.6W +/- 0.1W output power of the transceiver.
- d. Change the AF frequency to 2600Hz and confirm that the output power is at least 0.5W.
- e. The adjustment for the USB carrier point is performed in the same routine as done for LSB by changing the transmission mode to USB and menu item to "USB-CP".