

## FT-897 Alignment

### Local Oscillator Adjustment

#### Reference Frequency Adjustment

- Connect a frequency counter to TP1032.
- Adjust the trimmer capacitor (TC5001) for 67.875000MHz  $\pm$ 5Hz on the frequency counter.
- Connect a RF millivoltmeter or an oscilloscope to the J5002 2pin (TP1032) and confirm that the output level is at least 70mVrms or 200mVp-p.

### PLL Adjustment

#### VCO VCV Adjustment

- Connect a DC voltmeter to J2002 6pin (TP1028) 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 T2001	5.5V $\pm$ 0.5V
76.000MHz	Confirm	At least 0.8V
32.995MHz	Adjust T2002	5.5V $\pm$ 0.5V
13.900MHz	Confirm	At least 0.8V
55.995MHz	Adjust T2003	5.5V $\pm$ 0.1V
88.000MHz	Confirm	At least 0.8V
163.995MHz	Adjust L2010	5.5V $\pm$ 0.1V
108.000MHz	Confirm	At least 0.8V
469.995MHz	Adjust L2011	5.5V $\pm$ 0.1V
420.000MHz	Confirm	At least 0.8V

#### 1<sup>st</sup> Local Output Level

- Connect a RF millivoltmeter to J2002 11pin and tune the transceiver to 28.000MHz.
- Confirm that the RF level is at least +3dBm or 300mVrms.

#### PLL Unlock

- Connect a DC voltmeter to J2002 1pin (TP1027).
- When the reference input is not activated, the voltmeter shows less than 0.5V and "UNLOCK" is displayed on the LCD.
- When the reference input is activated, the voltmeter shows at least 3.5V and LCD displays as it normally should do.

#### Idling Current Adjustment

Before alignment, set the mode on CW and tune the transceiver to 1.800MHz.

Nothing should be connected to the CW Key Jack.  
Switch off the S1001.

### **Pre-Driver Stage Idling Current**

- a. Connect an ammeter at TP1019 and TP1010.
- b. Press the PTT and adjust VR1004 for an indication of 30mA  $\pm$ 2mA on the ammeter.

### **Driver Stage Idling Current**

- a. Connect an ammeter at TP1007 and TP1008.
- b. Press the PTT and adjust VR1003 for an indication of 20mA  $\pm$ 2mA on the ammeter.

### **Exciter Stage Idling Current**

- a. Connect an ammeter at J1004.
- b. Turn both VR5401 and VR5402 fully to counterclockwise.
- c. Press the PTT and adjust VR1002 for an indication of 100mA  $\pm$ 10mA on the ammeter.
- d. Press the PTT and adjust VR1001 for an indication of 200mA  $\pm$ 10mA on the ammeter.
- e. Connect the J1004 and switch on the S1001.

## **Local Oscillator Adjustment**

### **2<sup>nd</sup> 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.

### **3<sup>rd</sup> 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**

### **SSB/CW TX IF Adjustment**

- a. Tune the frequency to 14MHz band. Connect a RF millivoltmeter to TP1033 and J1002 terminated by 50 $\Omega$  dummy load.
- b. Key the transmitter and adjust T1033, T1023, and T1021 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 TP1033 and J1002 terminated by a 50 $\Omega$  dummy load.

- b. Key the transmitter by FM mode and adjust T1014 for the maximum indication on the RF millivoltmeter.
- c. Connect a frequency counter to TP1008.
- d. Key the transmitter on FM mode without microphone input. Adjust L1049 for 68.3300MHz  $\pm$ 100Hz.

### **Carrier Balance Adjustment**

- a. Terminate J1002 by a 50ohm dummy load and connect a spectrum analyzer or a RF millivoltmeter.
- b. Key the transmitter on USB mode in 14MHz band without microphone input. Adjust VR1005 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 T1013, T1012, and T1011 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 TC1004, TC1003 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 J1003 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.

### **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 T1024, T102, T1028, T1030, T1035, T1036, T1037, T1034 and T1029 alternately for the minimum indication on the DC voltmeter.

### **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.
- Adjust T1024, T1026, and T1028 alternately for the best SINAD sensitivity.
  - Increase the output level of the signal generator up to 12dBu approximately and adjust T1024 and T1026 alternately for the best SINAD sensitivity.

#### **Air-Band Reception Adjustment**

- Connect a DC voltmeter to TP1044.
- 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.
- Adjust T1005 and T1008 for the minimum indication on the DC voltmeter.

#### **VHF Band Alignment**

- Connect a DC voltmeter to TP1044.
- Tune the transceiver to 145.995MHz. Inject a RF signal from a signal generator at 20dBu output.
- Adjust T1006, T1009 and T1010 alternately for the minimum indication on the DC voltmeter.

#### **UHF Band Alignment**

- Connect a DC voltmeter to the TP1044.
- Tune the transceiver to 439.995MHz. Inject a RF signal from a signal generator at 20dBu output.
- Adjust TC1001 for the minimum indication on the DC voltmeter.

#### **W-FM Reception Adjustment**

- Connect a SINAD meter to the speaker jack.
- 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.
- Adjust TC1005 for the best SINAD sensitivity. Then reduce the output level of the signal generator and adjust TC1003 again.

#### **Image Rejection Trap Adjustment**

- Connect an AF millivoltmeter to the speaker jack.
- Tune the transceiver to 51.995MHz on CW mode. Inject a RF signal from a signal generator at 68.330MHz, 70dBu output.
- 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**

- Connect a DC voltmeter to TP1043. Tune the transceiver to 51.995MHz and inject a RF signal from a signal generator at 20dBu output.
- Activate the noise blanker and adjust T1027 and T1031 for the minimum indication on the DC voltmeter at TP1043, for the maximum indication at the base of Q1074.

## **Power Amplifier Adjustment**

### **HF/50MHz Idling Current Adjustment**

- a. Connect an ammeter at TP3021 and TP3022.
- b. Turn both VR3002 fully to counterclockwise.
- c. Press the PTT and adjust VR3002 for an indication of 300mA  $\pm$ 10mA on the ammeter.

### **V/UHF Idling Current Adjustment**

- a. Connect an ammeter at TP3021 and TP3022.
- b. Turn both VR3001 fully to counterclockwise.
- c. Press the PTT and adjust VR3001 for an indication of 300mA  $\pm$ 10mA on the ammeter.
- e. Connect the J1004 and switch on the S1001.

### **CM Coupler Balance Adjustment**

- a. Terminate the antenna jack with a 50 $\Omega$  dummy load. Set the mode on CW, connect a DC voltmeter to TP3002.
- b. Tune the transceiver in 28MHz band and key the transceiver.
- c. Adjust TC3002 for the minimum indication on the DC voltmeter.
- d. Tune the transceiver in 145.995MHz band and key the transceiver.
- e. Adjust VR3003 for the minimum indication on the DC voltmeter.
- f. Tune the transceiver in 439.995MHz band and key the transceiver.
- g. Adjust TC3001 for the maximum indication on the RF Power meter.

## **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	12 dBu
7MHz Band	12 dBu
21MHz Band	9 dBu
50MHz Band	0 dBu
144MHz Band	0 dBu
430MHz Band	0 dBu

### **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 22dBu. 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 3dBu 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  $13.8V \pm 0.1V$ .
- b. Select the menu items “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 120W 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 and 50MHz band respectively.
- c. Set the mode on CW. Select the menu item “VHF-IC”. Tune the transceiver to 144MHz band and key the transceiver. Adjust the parameter for 60W transmission power.
- d. Set the mode on CW. Select the menu item “UHF-IC”. Tune the transceiver to 430MHz band and key the transceiver. Adjust the parameter for 25W transmission power.

### **RF Power Adjustment**

- a. Tune the transceiver to 1.8MHz band on CW mode. Select the menu item “HF1-MAX”. Key down and adjust the parameter for  $100W \pm 5W$  transmission power.
- b. Select the menu item “HF1-MID2” Key down and confirm that the output power is  $50W \pm 5W$ . In case the transmission power is not within the tolerance, adjust the parameter for  $50W \pm 5W$  transmission power.
- c. Select the menu item “HF1-MID1” Key down and confirm that the output power is  $10W \pm 1W$ . In case the power is not within the tolerance, adjust the parameter for  $10W \pm 1W$  transmission power.
- d. Select the menu item “HF1-MIN”. Key down and confirm that the output power is  $5W \pm 1W$ . In case the power is not within the tolerance, adjust the parameter for  $5W \pm 1W$  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 and 50MHz band respectively.
- f. Tune the transceiver to 144MHz band on CW mode. Select the menu item “VHF-MAX”. Key down and adjust the parameter for  $50W \pm 2.5W$  transmission power.
- g. Select the menu item “VHF-MID” Key down and confirm that the output power is  $20W \pm$

2W. In case the transmission power is not within the tolerance, adjust the parameter for  $20W \pm 2W$  transmission power.

h. Select the menu item "VHF-MIN". Key down and confirm that the output power is  $5W \pm 1W$ . In case the power is not within the tolerance, adjust the parameter for  $5W \pm 1W$  transmission power.

i. Tune the transceiver to 430MHz band on CW mode. Select the menu item "UHF-MAX". Key down and adjust the parameter for  $20W \pm 1W$  transmission power.

k. Select the menu item "UHF-MID" Key down and confirm that the output power is  $20W \pm 0.3W$ . In case the transmission power is not within the tolerance, adjust the parameter for  $20W \pm 0.3W$  transmission power.

### **TX Gain Adjustment**

a. Select the USB mode. Inject a 1mV 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  $50W \pm 10W$  transmission power.

c. Other TX gain adjustment menu, such as [HF2TXG], [HF3TXG] and [50MTXG] should be adjusted as the same routine on 7MHz, 21MHz and 50MHz band respectively.

d. Tune the transceiver to 144MHz band and key the transmitter. Select the menu item "VHFTXG" and adjust the parameter for  $25W \pm 5W$  transmission power.

e. Tune the transceiver to 430MHz band and key the transmitter. Select the menu item "UHFTXG" and adjust the parameter for  $10W \pm 2W$  transmission power.

### **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 4.0mV 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  $150\Omega$  dummy load to the antenna connector.

b. Key the transceiver to 1.8MHz band and select the menu item "HF1-RV" and adjust the parameter for 50W transmission power.

c. Other reverse ALC adjustment menu, such as [HF2-RV], [HF3-RV] and [50M-RV] should be adjusted as the same routine on 7MHz, 21MHz and 50MHz band respectively.

d. Key the transceiver to 144MHz band and select the menu item "VHF-RV" and adjust the parameter for 25W transmission power.

e. Key the transceiver to 430MHz band and select the menu item "UHF-RV" and adjust the



parameter for 10W transmission power.

### **Carrier Level Adjustment**

- a. Tune the transceiver to 21MHz band. Connect a 50Ω 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 1.0mV AF at 1KHz from an audio generator into the microphone jack.
- e. Key the transceiver and adjust the parameter for 33% 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 “DTMF”. Key the transceiver with DTMF signal input and adjust the parameter for maximum deviation of 2.5KHz +/- 0.3KHz on the FM linear detector.
- f. 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.
- g. 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 1.0mV AF from an audio generator into the microphone jack.
- b. Lower the AF frequency down to 400Hz and adjust the parameter for 20W output power of the transceiver.
- d. Change the AF frequency to 2600Hz and confirm that the output power is at least 20W ±2.
- 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”.