# Tune-Up Procedure

## The built-in Channels are 15 channels +1 scan channel

## The range of frequency is 450-470MHz

1. **Both channels (15 channel+1 scan channel) can be preset by the computer with programming software.**
2. **Install the software we supplied in the computer.**
3. **Connect the transceiver with the PC by programming cable.**

**4.Open the software, Click on "Test Channel Setting", Select a channel, Setting the data in the "Edit Channel" .You can change the frequency by input the value or press "→" or "←" on the keyboard to add or deduct the value. Click "OK"/"Delete" to confirm/delete the setting.**

**5. The procedure of the adjusting power is similar with point 4(above).**

## Required Test Equipment

1. **Stabilized Power supply**
   ①The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
   ②The standard voltage is 7.5V.
2. DC Ammeter
   ①Class 1 ammeter (17 ranger and other features).
   ②The full scale can be set to either 300mA or 3A.
   ③A cable of less internal loss must be used.
3. Frequency Counter (f.counter)
   ①Frequencies of up to 1GHz or so can be measured.
   ②The sensitivity can be changed to 500MHz or below ,and measurements are highly stable and accurate (0.2ppm or so).
4. Power Meter
   ①Measurable frequency :Up to 500MHz.
   ②Impedance : 50Ω,unbalanced
   ③Measuring range :Full scale of 10W or so
   ④A standard cable (5D2W 1m) must be used.
5. RF Voltmeter (RF V.M)
   ①Measurable frequency : Up to 500MHz or so.
6. Linear Detector
   ①Measurable frequency : Up to 500MHz or so.
   ②Characteristics are flat ,and CN is 60Db or more.
7. Digital Voltmeter
   ①Voltage range : FS=18V or so
   ②Input resistance : 1MΩ or more.
8. Oscilloscope

①Measuring range : DC to 30MHz

②Provides highly accurate measurements for 5 to 25MHz.

**9. AF Voltmeter (AF V.M)**

①Measurable frequency :50Hz to 1MHz

②Maximum sensitivity : 1mV or more

**10. Spectrum Analyzer**

①Measuring range : DC to 1GHz or more

**11. Standard Signal Generator (SSG)**

①Maximum frequency : 500MHz or more

②Output :-133dBm/0.05μV to 7dBm/501Mv

③Output impedance :50Ω

**12. Tracking Generator**

①Center frequency : 50kHz to 500MHz

②Frequency deviation : ±35MHz

③Output voltage : 100mV or more

**13. Dummy Load**

①8Ω, 3W or more

**14. AF Generator (AG)**

①Frequency range : 100Hz to 100kHz

②Output : 0.5mV to 1V

**15. Distortion Meter**

①Measurable frequency :30Hz to 100kHz

②Input level : 50m V to 10Vrms

ADJUSTMENT FREQUENCY LIST

| Destination | M | |
|---|---|---|
| CH | TX f(MHz) | RX f(MHz) |
| Center | 460.025 | |
| Low | 450.025 | |
| Hi | 469.975 | |

Remarks

- Connect the transceiver to the PC
- Send the channel data to the transceiver,then backup the data.
- Program the adjustment frequencies which are in the list, into the transceiver.

**Note:** Remember to reload the channel data you backed up after making the transceiver.

**1. Jig(chassis)for adjustment**

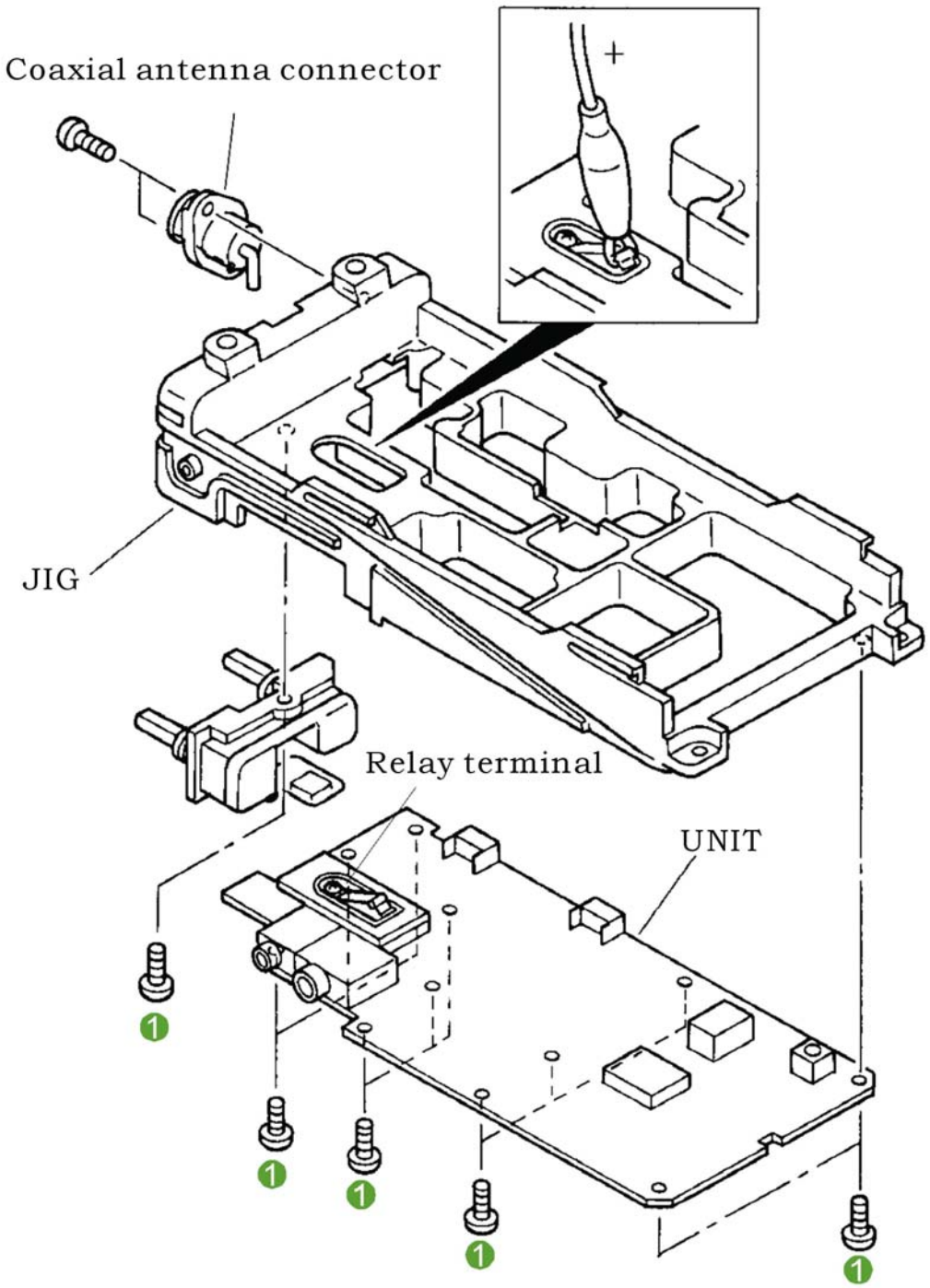
**2. Use the jig as follows:**

1. Insert the coaxial antenna connector into the jig.
2. Place the unit on the jig and fix it with 12 screws.①
3. Solder the antenna terminal to the terminal of the unit.

**Notes :** Supply power from an external power supply.

Relay terminal: +

Jig (chassis): -

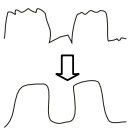



**ADJUSTMENT**

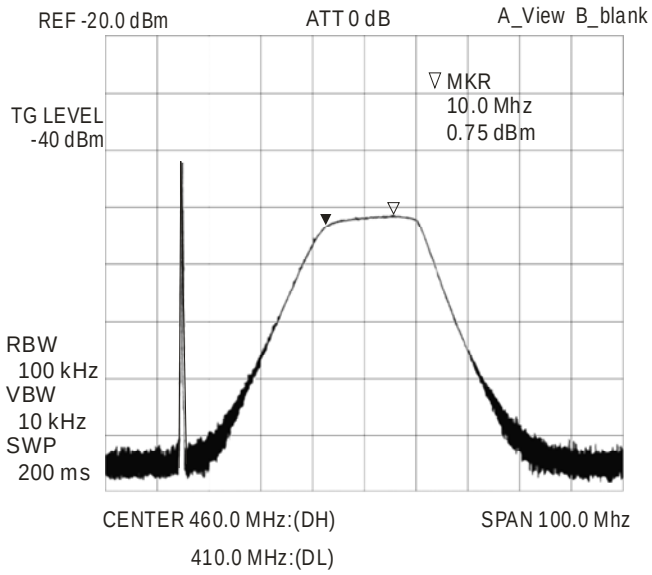
**Squelch Level, Transmit frequency, DQT Balance, RF Power, QT Deviation, DQT Deviation, Battery Level Section common to the transmitter and receiver(VCO)**

| Item | Condition | Measurement | | Adjustment | | Specifications/remarks |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1. Setting | 1)Power supply voltage<br>Battery<br>teriminal:7.5V | | | | | |
| **2.VCO lock voltage** | 1)CH:TX high | Digital voltmeter | CV | TC1 | 3.8V | ±0.1V |
| | 2) CH:RX high | | | TC2 | 3.8V | ±0.1V |
| | 3) CH:TX low | | | | Check | More than 0.7V |
| | 4) CH:RX low | | | | | |

| Item | Condition | Measurement | | Adjustment | | Specifications/remarks |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Band-pass filter | 1).CH:RX center<br>2).Tra generator output-40dBm<br>Connect the spectrum analyzer to TP2 terminal. | Tra generator<br>Spectrum analyzer | ANT<br>TP2 | TC201 | Adjust the frequency so that it becomes the spectrum waveform shown in Fig.1. | |
| 2.AF level | 1).CH:RX center<br>SSG output:-53dBm(501μV)<br>MOD:1KHz<br>DEV:±3.0KHz(Wide)<br>: ±1.5KHz(Narrow) | SSG<br>Oscilloscope<br>AF.V.M<br>Distortion meter | ANT<br>SP | L212 | Adjust to the MAX AF level | |
| 3.Sensitivity | 1)CH:RX center<br>CH:RX LO<br>CH:RX Hi<br>SSG ouput:-116dBm(0.35μV)<br>MOD:1kHz<br>DEV:±3.0kHz(Wide)<br>±1.5kHz(narrow) | | | | Check | SINAD:12dB or higher |
| 4.Squelch Level (PC MODE) | 1)CH:RX center<br>MONI:ON | | | PC key | Level 9<br>Adjust to close the squelch. | The squelch must be closed. |
| | 2)Level 9<br>SSG output:-117dBm(0.36μV) | | | | | |
| | 3)level 3<br>SSG output:-125dBm(0.126μV) | | | | Level 3<br>Adjust to close the squelch | The squelch must be closed. |

| Item | Condition | Measurement | | Adjustment | | **Specifications/remarks** |
|---|---|---|---|---|---|---|
| | | Test equipment | Terminal | Parts | Method | |
| 1.Transmit frequency (PC MODE) | 1)CH:TX center PTT:ON | Frequency Counter | ANT | PC key | Adjust to center frequency | Within±100Hz |
| 2.DQT/QT Balance (PC MODE) | 1)CH:TX center | Modulation Analyzer or linear Detector(LPF:3kHz) Oscilloscope | | VR 500 | Rectify the waveform to square wave |  |
| 3.Power (PC MODE) | 1) CH:TX center Battery terminal:7.5V PTT:ON | Power meter Ammeter | | | Adjust it to 5.1W | ±0.1W |
| 4.MAX DEV | 1)CH:TX center AG:1kHz/120Mv PTT:ON | Modulation Analyzer or linear Detector(LPF:15kHz) Oscilloscope | ANT MIC | VR 501 | Adjust it to ±4.2kHz (Wide) Narrow check | ±100Hz ± 1.8kHz~2.2 kHz |
| 5.MIC SENS | 1)CH:TX center AG:1kHz/12Mv | AG AF.V.M | | | Check (+,-Peak whichever is Maximum) | ± 2.2kHz ~ 3.6kHz(Wide) ± 1.1kHz ~ 1.9kHz(Narrow) |
| 6.QT DEV (PC MODE) | 1)CH:TX high:M TX Center:M2 QT;67.0Hz | Modulation Analyzer or linear Detector(LPF:3kHz) Oscilloscope AG AF.V.M | ANT | PC key | Adjust it to ±0.9kHz:M Adjust it to ±0.75kHz:M2 (Wide) Adjust it to ±0.45kHz:M Adjust it to ±0.35kHz:M2 (Narrow) | ±50Hz ±50Hz |
| 7.DQT DEV (PC MODE) | 1)CH:TX center | Modulation Analyzer or linear Detector(LPF:3kHz) Oscilloscope | | PC key | Adjust it to ±0.75kHz (Wide) Adjust it to ±0.35kHz (Narrow) | ±50Hz ±50Hz |
| 8.Battery Level (PC MODE) | 1)Battery terminal:5.8V | Digital voltmeter | BATT | PC key | Adjust so that the LED flashes. | The LED must Flash. |

**BPF-Wave**


REF -20.0 dBm
ATT 0 dB
A_View B_blank
▽MKR
10.0 Mhz
0.75 dBm
TG LEVEL
-40 dBm
RBW
100 kHz
VBW
10 kHz
SWP
200 ms
CENTER 460.0 MHz:(DH)
410.0 MHz:(DL)
SPAN 100.0 Mhz