Congratulations on the purchase of the RF μTUNING KIT.
This is operating manual to gain maximum understanding of the full capability of the RF μTUNING KIT. To installation the Please keep this manual before reading.

**NOTICE**
- Do not modify or resolve the μ-TUNE UNIT
- Be Carefully to the miss-connection
- Do not install this apparatus in a mechanically-unstable location, or where objects may fall onto this product from above
- Ensure adequate ventilation around the RF μTUNING KIT
- Do not pull or pinch the cable
- Do not give a shock to the μ-TUNE-UNIT
- Do not install this apparatus in a location with direct exposure to sunshine
- Do not install this apparatus in a location where a child reaches
- Do not wipe the case with the chemicals such as thinner or benzine

**ADVICE**
- There is polarity in RF Jacks (RF IN and RF OUT) on the RF μTUNING KIT. Therefore, we prepared two cables (Black and Gray). Please connect polarity to be reliable.
- Does not break the RF μTUNING KIT even if the miss-connection. However, in this case, the RF μTUNING KIT does not keep the high performance.
- There is polarity in CNTL Jacks (CNTL IN and CNTL OUT) on the RF μTUNING KIT too. Please confirm the connection of the “CNTL OUT” and “CNTL IN” before turn on the transceiver.
  - When turn on the transceiver with miss-connection of the RF μTUNING KIT, the FT-2000 does not operation and blinks the frequency display sometimes. In this case, please confirm the connections regarding the “CNTL IN” and “CNTL OUT” jacks, then turn on the transceiver again.
- There is not connection order of the RF μ-Tuning Kit.

**SINGLE CONNECTION**

**MULTI CONNECTION**
This RF µTUNE KIT provide ultra-sharp RF selectivity for the RF front end of the transceiver. The high Q is made possible by the narrow-band design; one µ-Tune module is required for the 1.8 MHz band (MTU-160), while the 3.5 and 7 MHz bands are covered by the MTU-80/40, and the 10.1 and 14 MHz bands are covered by the MTU-30/20.

When one of three optional units is installed, it will automatically be adjusted so as to center on your operating frequency. The narrow bandwidth is especially useful on the low bands, where many strong signals being received via NVIS propagation (Near-Vertical-Incidence Signals) within a narrow bandwidth, and the added protection at the RF stage is especially helpful in preventing IMD and blocking.

The RF µTUNING KIT, with a Q and shape factor much higher than that afforded even by VRF, can also be manually adjusted to provide relief against interference as close as 10 kHz away. The insertion loss of the RF µ TUNING KIT is higher than that of the VRF circuit, so if Noise Figure is a concern you may select the VRF circuit, instead of RF µ TUNING KIT, via the Menu of the FT-2000 transceiver.

1. Press the [VRF] button momentarily. The “VRF” icon will appear at the FLT column of the Receiver Configuration Indicator on the FT-2000 display, and the µ-Tune circuit will be engaged.

- The µ-Tune circuit will automatically adjust itself onto your operating frequency.
- The VRF circuit will engage when the amateur band which is not connected the µ-TUNE UNIT.

2. Now rotate the [VRF] knob to peak the response (background noise) or reduce interference.
- You may observe the peak point of relative µ-Tune filter in the Tuning Offset Indicator on the display while tuning the [VRF] knob.
- The amount of change in the center frequency of the µ-Tune filter, when rotating the [VRF] knob by one click, can be configured using Menu item “D15 Gen µDIAL”.

3. Press the [VRF] button (momentarily) once more to disengage the µ-Tune filter; “VRF” icon turns on in substitution for “BAR SEL” icon. In this mode, only the fixed bandpass filter for the current band will be engaged.

**QUICK NOTE**

The permeability-tuning concept utilized in the µ-Tune circuit dates back many decades, as it was incorporated in such classic transceivers as the FT-101 and FT-901 series, in addition to the FTx 401 and similar models. The µ-Tune circuit in this RF µTUNING KIT is the highest development of this circuit concept ever employed in an Amateur transceiver, and is adopted in our highest grade transmitter FTx 9000 series.

**ADVICE**

- The µ-Tune filters are the most advanced, selective RF preselector filters ever incorporated into an Amateur Radio transceiver. The RF selectivity provided by µ-Tune can be of tremendous value in ensuring quiet, intermod-free reception even in the most crowded bands on a contest weekend. The µ-Tune filters provide RF selectivity on the order of a few dozen kHz at -6 dB, at the expense of a few dB of system gain on bands where noise figure is seldom an issue. You will notice that the S-meter deflection, when µ-Tune is engaged, is slightly less than when it is out of the circuit; this is normal. If your antenna system gain is so low as to make it impossible to hear band noise when µ-Tune is engaged (highly unlikely), just switch it out or revert to the VRF system, which has slightly less insertion loss.

- As you tune around on an amateur band with µ-Tune engaged, the microprocessor automatically commands the stepper motor driving the toroid core stack to center the filter on your current operating frequency (the tuning resolution is 5 kHz). You may, however, use the [VRF] knob to skew the filter response to one side or the other from your operating frequency, to deal with heavy interference on one side. To re-center the µ-Tune filter on your operating frequency, and eliminate any offset, press and hold in the [VRF] switch for two seconds.

- You can use the µ-Tune circuit on the Sub band (VFO-B) receiver. However, in this case, does not move the stepper motor driving the toroid core stack to center the filter on your current operating frequency. You must adjust the peak response (background noise) or reduce interference by rotating the [VRF] knob.

- You may always observe the peak point of the µ-Tune filter in the Tuning Offset Indicator on the display via Menu item “D10 DSP BAR SEL”.

- While µ-Tune is a superior RF preselection circuit, it may be disabled via the Menu on the FT-2000; if this is done, the VRF circuit will engage when the [VRF] button is pressed. To disable µ-Tune, enter the Menu item “D15 Gen µDIAL” of the FT-2000 then set the selection to “OFF.”

**µ-TUNE AND VRF: COMPARISONS TO FIXED BANDPASS FILTERS**

### µ-Tune

Inspection of the illustrations to the right will demonstrate the profound advantage of the µ-Tune circuit. In illustration [A], the gray area represents the passband of a typical fixed bandpass filter covering the 1.8 – 3 MHz range; this is typical of the kind of bandpass filter found in many high-quality HF receivers today. Note also the hypothetical distribution of signals across the 160-meter band.

In illustration [B], note the narrow white segment within the gray passband of the fixed BPF. These narrow segments represents the typical bandwidth of the µ-Tune filter, and one can see that the passband has been reduced from about 750 kHz in the case of the fixed BPF) to a few dozen kHz when µ-Tune is engaged. The vast majority of the incoming signals are outside the passband of the high-Q µ-Tune filter, and they will not impinge on any of the RF/IF amplifiers, the mixers, or the DSP. Very strong out-of-band signals like this can cause Intermodulation, blocking, and an elevated noise floor for a receiver.

### VRF

In this example, illustration [A] depicts a typical fixed bandpass filter covering 14.5 to 22 MHz, and once again the gray shaded area depicts the fixed bandpass filter’s frequency coverage. The vertical lines in the illustration, once again, represent hypothetical signals throughout this frequency range.

Figure [B] shows the same fixed BPF, with the white area representing the typical passband of the VRF filter operating in the same frequency range. Although the selectivity of the VRF is not as tight as that of the µ-Tune filter, the RF selectivity of the VRF preselector is still magnitudes better than that of the usual fixed bandpass filter, affording significant protection against the ingress of high signal voltage from strong out-of-band signals.

**SPECIFICATIONS**

<table>
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<tr>
<th>Case Size (WxHxD)</th>
<th>4.7 x 5 x 12.9 (120 x 127 x 328 mm)</th>
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<tbody>
<tr>
<td>Weight (Approx.)</td>
<td>5.7 lbs (2.6 kg)</td>
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