USING THE AUTOMATIC ANTENNA TUNER

The Automatic Antenna Tuner (hereinafter referred to as the "ATU") built into each **FT DX 3000** is designed to ensure a 50-Ohm load for the final amplifier stage of the transmitter. We recommend that the ATU be used whenever you operate on the **FT DX 3000**.

ADVICE:

❒ Because the ATU of the **FT DX 3000** is located inside the station, it only adjusts the impedance presented to the transceiver at the station end of your coaxial cable feedline. It does not "tune" the SWR at the antenna feed point itself. When designing and building your antenna system, we recommend that every effort be made to ensure a low SWR at the antenna feed point.

❒ The ATU of the **FT DX 3000** includes 100 memories for tuning data. Eleven of these memories are allocated, one per Amateur band, so that each band has at least one setting preset for use on that band. The remaining 89 memories are reserved for the 89 most-recent tuning points, for quick frequency change without the need to retune the ATU.

❒ The ATU in the **FT DX 3000** is designed to match impedances within the range of 16.5 Ohms to 150 Ohms, corresponding to an SWR of 3:1 or less on the 160 through 6 meter amateur bands. Accordingly, simple non-resonant whip antennas, along with random-length wires and the "G5RV" antenna (on most bands) may not be within the impedance matching range of the ATU.

ATU OPERATION

1. Use the Main Tuning Dial knob to set the radio to the desired operating frequency within the Amateur band.

2. Press the [**TUNE**] button momentarily to place the ATU in the transmit line (no adjustment/tuning will occur yet). The "TUNER" icon will appear in the display.
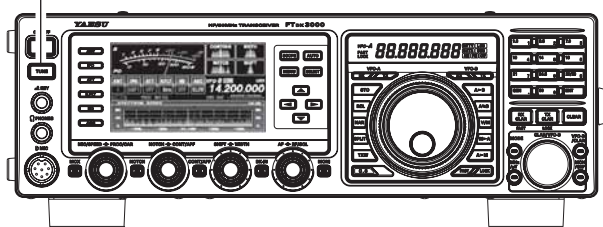
   QUICK POINT:

   The momentary press of the [**TUNE**] button will turn the tuner on, and the microprocessor will automatically select the tuning point closest to the current operating frequency.

3. Press and hold in the [**TUNE**] button for one second to begin automatic tuning. The transmitter will be engaged, and the "TUNER" icon will blink while tuning is in progress. When the optimum tuning point has been reached, the radio will return to receive, and the "TUNER" icon will again glow steadily (instead of blinking).

4. To disconnect the ATU from the transmit line, press the [**TUNE**] button momentarily. The "TUNER" icon will turn off, confirming that the ATU has been turned off. In the "Off" mode, the transceiver will be directly connected to the coaxial cable connected to your antenna, and will operate based on whatever impedance is present at the station end of the coax.

ADVICE:

The ATU circuit is located between the final amplifier and the rear-panel antenna jack; reception is not affected by the ATU.

[TUNE] Button

QUICK POINTS:

As shipped from the factory, only one ATU alignment point is saved on each Amateur band. This was memorized during the final alignment and performance verification stages on the production line.

NOTE:

Please check the operating frequency before beginning the tuning process, to be sure you are not interfering with others who may already be using the frequency.

TERMINOLOGY:

Antenna Tuner Memories: The microprocessor of the ATU makes a note of the positions of the tuning capacitors and the selected inductors, and stores the data for each 10 kHz window in which tuning has occurred. This eliminates the need to re-tune every time you return to a frequency on which you have already completed the tuning process.

USING THE AUTOMATIC ANTENNA TUNER

ABOUT ATU OPERATION

Figure 1 depicts a situation where normal tuning via the ATU has been successfully completed, and the tuning data has been stored in the ATU memory. The antenna system as seen by the transmitter is shown.

In Figure 2, the operator has changed frequency, and the " HI-SWR " icon has appeared. The operator presses and holds in the [**TUNE**] button for two seconds to begin impedance matching using the ATU.

If a high SWR condition exists (above 3:1), corrective action must be taken in the antenna system to bring the impedance closer to 50 Ohms. The ATU will refuse to memorize settings on frequencies where the SWR exceeds 3:1. A High SWR may indicate a mechanical failure in the feed system, and can lead to the generation of spurious signals causing TVI, etc.
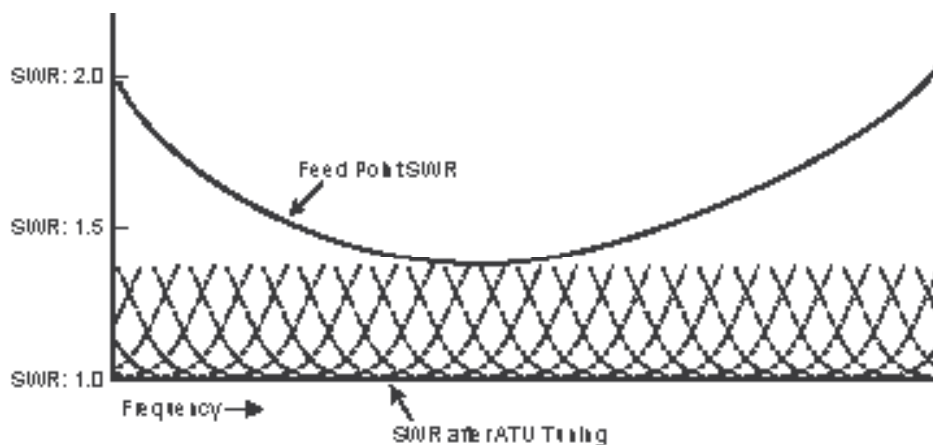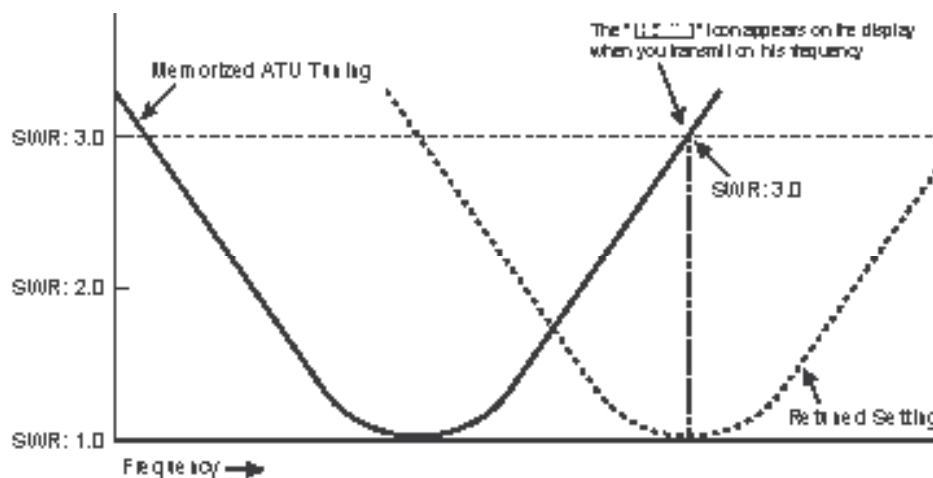

FIGURE 1

FIGURE 2

About ATU Memories

SWR (After tuning) Less than 1.5:1
The tuner settings are stored in the ATU memory.

SWR (After tuning) Greater than 1.5:1
Tuning data will not be retained in memory. If you return to the same frequency, the tuning process must be repeated.

SWR (After tuning) Greater than 3:1
The " HI-SWR " icon will light up, and the tuner settings, if achieved, will not be memorized. Please investigate the high SWR condition and resolve the problem, before attempting further operation using this antenna.

ENHANCING TRANSMIT SIGNAL QUALITY

PARAMETRIC MICROPHONE EQUALIZER (SSB/AM/FM MODE)

The **FT DX 3000** includes a unique Three-Band Parametric Microphone Equalizer that provides precise, independent control over the low, mid and treble ranges in your voice waveform. You may utilize one group of settings when the speech processor is off and an alternate group of settings when the speech processor is on. The speech processor feature is described in the next chapter.

QUICK POINT:

The Parametric Equalizer is a unique technique for adjusting the signal quality. The three audio ranges may be adjusted so precisely, it is possible to craft an audio response that provides a natural and pleasant sound that you may not have ever experienced before. Alternately, the Effective "talk power" can be significantly enhanced.

The aspects of configuration that you may adjust on the Parametric Equalizer are:

Center Frequency: The center frequency of each of the three bands may be adjusted.

Gain: The amount of enhancement (or suppression) within each band may be adjusted.

Q: The bandwidth over which the equalization is applied may be adjusted.

Setup of the Parametric Microphone Equalizer

1. Connect the microphone to the **MIC** jack.
2. Set the RF output power to minimum value via the Menu item "175 TX GNRL TX MAX POWER", so you will not cause interference to other users while making adjustments.

   ADVICE:
   - ❒ We recommend that you connect a dummy load to one of the Antenna jacks, and monitor your signal on a separate receiver, to prevent interference to other users.
   - ❒ You will have the best chance of hearing the effects of adjustments if you wear headphones (connected to the monitor receiver) while listening to your transmitted signal.

3. To adjust the Parametric Microphone Equalizer while the speech processor is disabled, press the [**SELECT**] button until the "**MIC EQ**" appears in the display. To adjust the Parametric Microphone Equalizer with the speech processor engaged, press the [**SELECT**] button until the "**MIC EQ**" and "**PROC**" appear in the display.
4. Press the [**MONI**] button, if you want to listen on the **FT DX 3000**'s internal monitor.
5. Press and hold in the [**MENU**] button for one second. The Menu list will appear in the display.
6. Rotate the [**CLAR/VFO-B**] knob or press the ▲/▼ button to find the "**EQ**" Menu area, containing Menu items "157" through "165"; these parameters apply to the adjustment of the Parametric Microphone Equalizer when the speech processor is disabled. Menu items "166" through "174" apply to the adjustment of the Parametric Microphone Equalizer when the speech processor is engaged.
7. Rotate the [**CLAR/VFO-B**] knob or press the ▲/▼ button to perform adjustments to a particular Menu item.

[MENU] Button [SELECT] Button

[MONI] Button   [CLAR/VFO-B] Knob
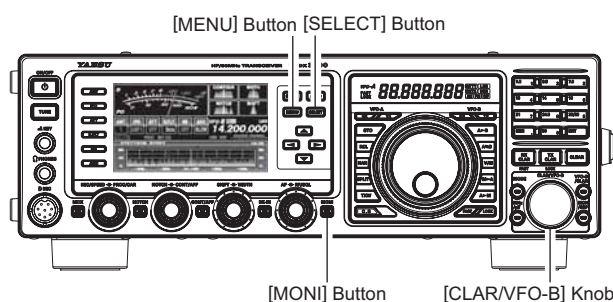
8. Close the **PTT** switch, and speak into the microphone while listening to the effect of the changes you are making. Because the overall effect on the sound will change with each adjustment, you should make several passes through each adjustment area, to be sure that you are achieving the optimum settings.
9. When you have completed all adjustments, press the [**SELECT**] button, then press the [**MENU**] button to save the new settings and exit to normal operation. If you only press the [**MENU**] button momentarily to exit, none of the changes you performed will be stored.

ADVICE:

To roll off excessive bass response in a wide-range studio microphone, try putting a 10 dB null at 100 Hz with a bandwidth of "1" or "2", do about a 3 dB null centered on 800 Hz with a bandwidth of "3," and then put an 8 dB peak centered on 2100 Hz with a bandwidth of "1." These are starting recommendations; each microphone and user's voice will be different, often requiring different settings.

ENHANCING TRANSMIT SIGNAL QUALITY

PARAMETRIC MICROPHONE EQUALIZER (SSB/AM/FM MODE)

Activating the Parametric Microphone Equalizer

1. Adjust the [**MIC/SPEED**] knob, as described on page ??.
2. Press the [**▲/▼/◄/►**] button to select the "**MIC EQ**", then press the [**SELECT**] button to select "ON".

   The "**MIC EQ**" will appear in the display, confirming that the Parametric Microphone Equalizer is engaged.
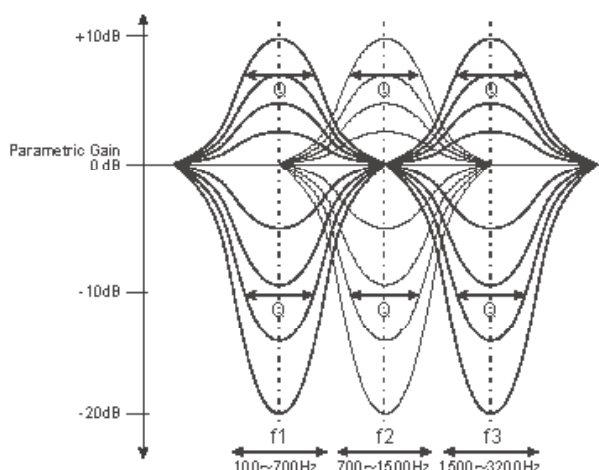
   ADVICE:

   A blinking "MIC EQ" icon indicates the Parametric Microphone Equalizer menu settings have all been set to "OFF" ("157 PRMTRC EQ1 FRQ", "160 PRMTRC EQ2 FRQ", "163 PRMTRC EQ3 FRQ").

3. Press the PTT switch on the microphone, and speak into the microphone in a normal voice level.
4. To switch the Parametric Microphone Equalizer off, press the [**SELECT**] button repeatedly until the "**MIC EQ**" icon disappears.

[SELECT] Button

[MIC/SPEED] Knob
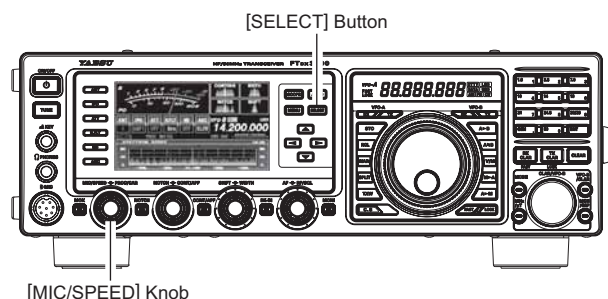
3-STAGE PARAMETRIC EQUALIZER ADJUSTMENTS (SPEECH PROCESSOR: "OFF")		
Center Frequency	"157 PRMTRC EQ1 FREQ"	"100" (Hz) ~ "700" (Hz)
	"160 PRMTRC EQ2 FREQ"	"700" (Hz) ~ "1500" (Hz)
	"163 PRMTRC EQ3 FREQ"	"1500" (Hz) ~ "3200" (Hz)
Parametric Gain	"158 PRMTRC EQ1 LEVEL"	(Low) "–20" (dB) ~ "+10" (dB)
	"161 PRMTRC EQ2 LEVEL"	(Mid) "–20" (dB) ~ "+10" (dB)
	"164 PRMTRC EQ3 LEVEL"	(High) "–20" (dB) ~ "+10" (dB)
Q (Bandwidth)	"159 PRMTRC EQ1 BWTH"	(Low) "1" ~ "10"
	"162 PRMTRC EQ2 BWTH"	(Mid) "1" ~ "10"
	"165 PRMTRC EQ3 BWTH"	(High) "1" ~ "10"

3-STAGE PARAMETRIC EQUALIZER ADJUSTMENTS (SPEECH PROCESSOR: "ON")		
Center Frequency	"166 P-PRMTRC EQ1-FREQ"	"100" (Hz) ~ "700" (Hz)
	"169 P-PRMTRC EQ2-FREQ"	"700" (Hz) ~ "1500" (Hz)
	"172 P-PRMTRC EQ3-FREQ"	"1500" (Hz) ~ "3200" (Hz)
Parametric Gain	"167 P-PRMTRC EQ1-LEVEL"	(Low) "–20" (dB) ~ "+10" (dB)
	"170 P-PRMTRC EQ2-LEVEL"	(Mid) "–20" (dB) ~ "+10" (dB)
	"173 P-PRMTRC EQ3-LEVEL"	(High) "–20" (dB) ~ "+10" (dB)
Q (Bandwidth)	"168 P-PRMTRC EQ1-BWTH"	(Low) "1" ~ "10"
	"171 P-PRMTRC EQ2-BWTH"	(Mid) "1" ~ "10"
	"174 P-PRMTRC EQ3-BWTH"	(High) "1" ~ "10"

+10dB

Parametric Gain 0 dB

-10dB

-20dB

f1   f2   f3
100~700Hz   700~1500Hz   1500~3200Hz

# ENHANCING TRANSMIT SIGNAL QUALITY

USING THE SPEECH PROCESSOR (SSB AND AM MODES)

The **FT DX 3000**'s Speech Processor is designed to increase "talk power" by increasing the average power output, (via a sophisticated compression technique) and adjusting the audio quality to the menu settings ("166 P-PRMTRC EQ1 FREQ", "169 P-PRMTRC EQ2 FREQ", "172 P-PRMTRC EQ3 FREQ". The result is improved intelligibility when conditions are difficult.

1. Adjust the [**MIC/SPEED**] knob, as described on page 56.
2. Press the [▲/▼/◄/►] button to select the "**METER**", then press the [**SELECT**] button to select "COMP" (Compression) meter.
3. Press the [▲/▼/◄/►] button to select the "**MIC EQ**", then press the [**SELECT**] button to select "ON". The "**MIC EQ**" will appear in the display.
4. Press the [▲/▼/◄/►] button to select the "**PROC**", then press the [**SELECT**] button to select "ON". The "**PROC**" will appear in the display, confirming that the Speech Processor is engaged.
   ADVICE:
   Blinking "**MIC EQ**" icons indicate the Parametric Microphone Equalizer menu settings have all been set to "OFF" ("166 P-PRMTRC EQ1 FREQ", "169 P-PRMTRC EQ2 FREQ", "172 P-PRMTRC EQ3 FREQ").
4. Press the **PTT** switch on the microphone, and speak into the microphone in a normal voice level. Confirm that the compression level is within the 5 dB to 10 dB range.
5. To switch the Speech Processor off, press the [**SELECT**] button once more. The "**PROC**" will turn off, confirming that the Speech processor is turned off.

[SELECT] Button

[MIC/SPEED] Knob
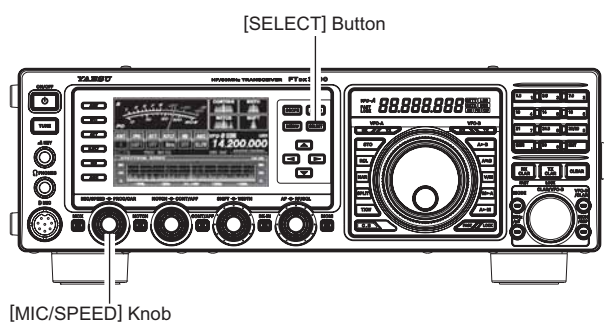
ADVICE:

❒ You may set the RF power output via the Menu item "175 TX MAX PWR", whether or not the Speech Processor is engaged.

❒ You may adjust the Parametric Microphone Equalizer when the speech processor is engaged, using Menu Items "166" through "174". See page 117 for details.

❒ When the optional **DMU-2000** Data Management Unit is connected, you may observe the effect of your compression level adjustments by viewing the waveform on the "Oscilloscope" page.

ENHANCING TRANSMIT SIGNAL QUALITY

## ADJUSTING THE SSB TRANSMITTED BANDWIDTH (SSB MODE)

For transmission on SSB, a default bandwidth of 2.4 kHz is provided. This bandwidth provides reasonable fidelity along with good talk power, and is typical of the bandwidth used for decades for SSB transmission. The bandwidth may be varied by the operator, to provide different levels of fidelity or talk power, according to your preferences.

Here are the steps to adjust the SSB transmit bandwidth:

1. Press and hold in the [**MENU**] button for one second to engage the Menu.
2. Rotate the [**CLAR/VFO-B**] knob or press the ▲/▼ button to select Menu item "105 SSB TX BPF".
3. Press the [**SELECT**] button, then rotate the [**CLAR/VFO-B**] knob or press the ▲/▼ button to select the desired bandwidth. The available selections are 100-3000 (100-3000 Hz), 100-2900 (100-2900 Hz), 200-2800 (200-2800 Hz), 300-2700 (300-2700 Hz), and 400-2600 (400-2600 Hz). The default is 300-2700 (300-2700 Hz). A wider bandwidth will provide greater fidelity. A narrow bandwidth will compress the available transmitter power into less spectrum, resulting in more "talk power" for DX pile-ups.
4. Press the [**SELECT**] button, then press the [**MENU**] button to save the new setting and exit to normal operation.

[SELECT] Button

[MENU] Button   [CLAR/VFO-B] Knob

ADVICE:

❐ The Transmit Monitor function is a very helpful way to confirm the effect changing the bandwidth will have on fidelity. By Pressing the [**MONI**] button and then adjusting the [**MONI**] knob for a comfortable listening level while you are transmitting, you will be able to hear the difference in sound quality as you make changes.

❐ When the optional **DMU-2000** Data Management Unit is connected, you may verify the effect of your adjustments of the transmitted bandwidth by observing the Audio Scope on the "Oscilloscope" page.
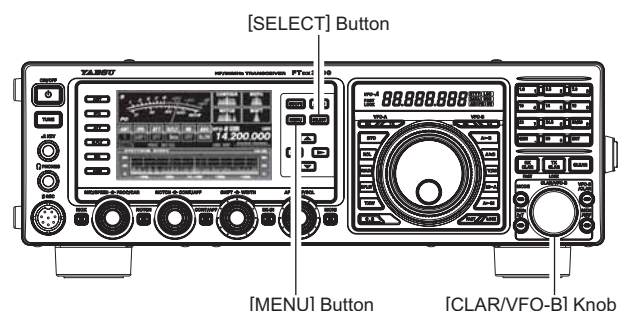
QUICK POINTS:

The higher fidelity associated with wide bandwidth will be particularly enjoyable on the low bands during local rag-chew QSOs.