



HF/50 MHz TRANSCEIVER

FT-2000D

OPERATING MANUAL



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ABOUT THIS MANUAL . . .

The **FT-2000D** is a leading-edge transceiver with a number of new and exciting features, some of which may be unfamiliar to you. In order to gain the most enjoyment and operating efficiency from your **FT-2000D**, we recommend that you read this manual in its entirety, and keep it handy for reference as you explore the many capabilities of your new transceiver.

Before using your **FT-2000D**, be sure to read and follow the instructions in the “Before You Begin” section of this manual.

Congratulations on the purchase of your Yaesu amateur transceiver! Whether this is your first rig, or if Yaesu equipment is already the backbone of your station, rest assured that your transceiver will provide many hours of operating pleasure for years to come.

The **FT-2000D** is an elite-class HF transceiver providing exceptional performance both on transmit and receive. The **FT-2000D** is designed for the most competitive operating situations, whether you primarily operate in contest, DX, or digital-mode environments.

Built on the foundation of the popular **FTdx9000** transceiver, and carrying the proud tradition of the **FT-1000** series, the **FT-2000D** provides up to 200 Watts of power output on SSB, CW, and FM (50 Watts AM carrier). Digital Signal Processing (DSP) is utilized throughout the design, providing leading-edge performance on both transmit and receive.

Available as an option for the **FT-2000D** is the Data Management Unit (**DMU-2000**), which provides extensive display capabilities via a user-supplied computer monitor. Included are Band Scope, Audio Scope, X-Y Oscilloscope, World Clock, Rotator Control, and extensive transceiver status displays, in addition to station logging capability.

For exceptional protection from strong nearby incoming signals, the Yaesu-exclusive VRF (Variable RF Front-End Filter) serves as a high-performance Preselector-ideal for multi-operator contest environments. This filter is manually tuned, allowing the operator to optimize sensitivity or signal rejection with the twist of a knob. And for then ultimate in receiver RF selectivity, the optional RF μ Tuning Kits may be connected via the rear panel, providing extraordinarily sharp selectivity to protect your receiver from close-in interference on a crowded band.

In addition to the contribution of the VRF Preselector, superb receiver performance is a result of direct lineage from the legendary **FTdx9000**, **FT-1000D**, and **FT-1000MP**. You may select, in the front end, one of two RF preamplifiers, or IPO (Intercept Point Optimization) utilizing direct feed to the first mixer, and/or three levels of RF attenuation in 6-dB steps.

Dual Receive is built into every **FT-2000D**. The Main receiver utilizes DSP filtering, incorporating many of the features of the **FTdx9000**, such as Variable Bandwidth, IF Shift, and Passband Contour tuning. Digital Noise Reduction and Digital Auto-Notch Filtering are also provided, along with a manually-tuned IF Notch filter. The Sub receiver, used for monitoring within the same band as the Main band, is an analog type ideal for watching both sides of a pile-up, or keeping an ear on a DX station working stations by call area, etc.

On the transmit side, the Yaesu-exclusive Three-Band Parametric Microphone Equalizer allows precise and flexible adjustment of the wave-form created by your voice and microphone. The Amplitude, Center Frequency, and Bandwidth of equalization may be adjusted independently for the low-frequency, mid-range, and high-audio-frequency spectra, and the transmitted bandwidth may also be adjusted, as well.

Advanced features include Direct Keyboard Frequency Entry and Band Change, Speech Processor, IF Monitor for Voice modes, CW Pitch control, CW Spot switch, Full CW QSK, adjustable IF Noise Blanker, and all-mode Squelch. Two TX/RX antenna ports, plus a receive-only antenna port, are provided on the rear panel. Two key jacks are provided (one each on the front and rear panels), and they may be configured independently for paddle input or connection to a straight key or computer-driven keying interface. Both Digital Voice Recording and CW Message Memory are provided.

Frequency setup is extraordinarily simple on the **FT-2000D**. Besides direct frequency entry for both the Main and Sub VFOs, separate keys are provided for band selection, and each band key accesses three independent VFO frequency/mode/filter settings per band, so you can establish separate VFO settings for three different parts of each band. The two (Main and Sub) VFOs allow simultaneous reception and display of two different frequencies, even in different modes and with different IF bandwidths. Receiver audio can be completely or partially mixed, or monitored separately in each ear.

In addition, 99 memories are provided, each of which stores its own mode and IF filter selection, in addition to frequency, Clarifier offset, and scan-skip status. What's more, five quick-recall ("QMB") memories can instantly store operational settings at the push of a button.

The built-in automatic antenna tuner includes 100 memories of its own, automatically storing antenna matching settings for quick automatic recall later.

Interfacing for digital modes is extremely simple with the **FT-2000D**, thanks to dedicated AFSK and FSK connection jacks on the rear panel. Optimization of the filter passbands, DSP settings, carrier insertion point, and display offset are all possible via the Menu programming system.

The Yaesu CAT system provides a direct link to the transceiver CPU for computer control and customization of tuning, scanning, and other operating functions. The **FT-2000D** includes a built-in data level converter for direction connection to a personal computer serial port. Yaesu products are supported by most all of the leading contest and DX logging programs, and the extensive programming protocol is described in the CAT System Manual, supplied with this transceiver, if you wish to write your own software!

Advanced technology is only part of the **FT-2000D** story. Vertex Standard stands behind our products with a worldwide network of dealers and service centers. We greatly appreciate your investment in the **FT-2000D**, and we look forward to helping you get the most out of your new transceiver. Please feel free to contact your nearest dealer, or one of Vertex Standard's national headquarters offices, for technical advice, interfacing assistance, or accessory recommendation. And watch Vertex Standard U.S.A.'s Home Page for late-breaking information about Vertex, Standard Horizon, and Yaesu products: <http://www.vertexstandard.com>.

Please read this manual thoroughly, so as to gain maximum understanding of the full capability of the **FT-2000D**, and we thank you again for your purchase!

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ACCESSORIES & OPTIONS

SUPPLIED ACCESSORIES

External Power Supply (FP-2000)	1 pc	
Hand Microphone (MH-31B8)	1 pc	A07890001
AC Power Cord	1 pc	T9017882: USA T9013285: Europe T9013283A: Australia
DC Power Cord	1 pc	T9207392
Spare Fuse (15 A)	1 pc	Q0000136
4-pin DIN Plug	1 pc	P0091004
5-pin DIN Plug	1 pc	P0091006
1/4-inch 3-contact Plug	1 pcs	P0090008
3.5 mm 3-contact Plug	1 pcs	P0091046
3.5 mm 2-contact Plug	1 pcs	P0090034
RCA Plug	2 pcs	P0091365
Operating Manual	1 pc	
CAT Reference Book	1 pc	
Warranty Card	1 pc	

AVAILABLE OPTIONS

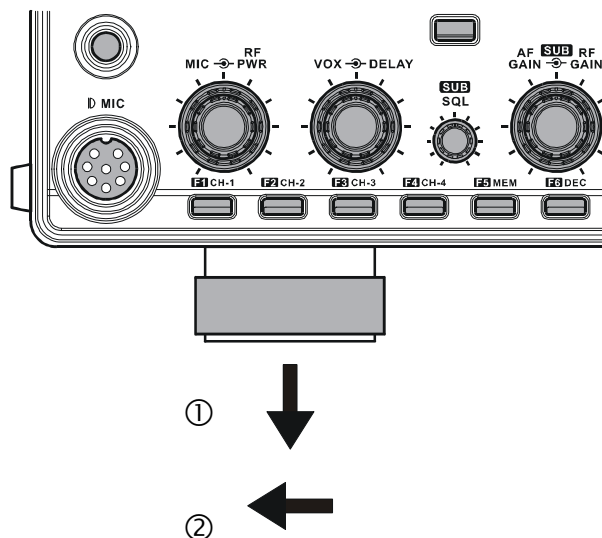
MD-200A8X	Ultra-High-Fidelity Desk-Top Microphone
MD-100A8X	Desk-Top Microphone
YH-77STA	Lightweight Stereo Headphone
SP-2000	External Speaker with Audio Filter
VL-1000/VP-1000	Linear Amplifier/AC Power Supply
DMU-2000	Data Management Unit
RF μTuning Kit A	For 160 m Band
RF μTuning Kit B	For 80/40 m Bands
RF μTuning Kit C	For 30/20 m Bands
FH-2	Remote Control Keypad
YF-122C	Collins® CW Filter (500 Hz/2 kHz: -6 dB/-60 dB)
YF-122CN	Collins® CW Filter (300 Hz/1 kHz: -6 dB/-60 dB)

BEFORE YOU BEGIN

EXTENDING THE FRONT FEET

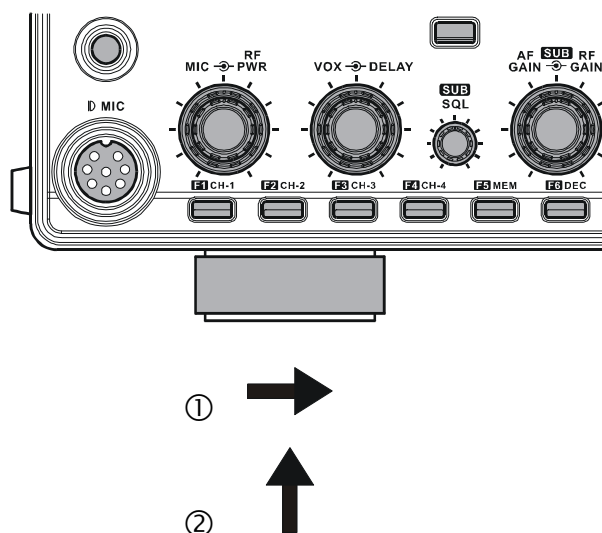
In order to elevate the front panel for easy viewing, the front left and right feet of the bottom case may be extended.

- ☐ Pull the front legs outward from the bottom panel.
- ☐ Rotate the legs counter-clockwise to lock them in the extended position. Be sure the legs have locked securely in place, because the transceiver is quite heavy and an unlocked leg could result in damage, should the transceiver move suddenly.



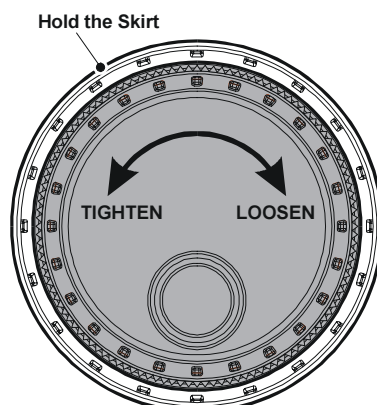
Retracting the Front Feet

- ☐ Rotate the legs clockwise, and push them inward while rotating to the right.
- ☐ The front feet should now be locked in the retracted position.



ADJUSTING THE MAIN TUNING DIAL TORQUE

The torque (drag) of the Main Tuning Dial knob may be adjusted according to your preferences. Simply hold down the rear skirt of the knob, and while holding it in place rotate the knob itself to the right to reduce the drag or to the left to increase the drag. Available adjustment range is 120°.

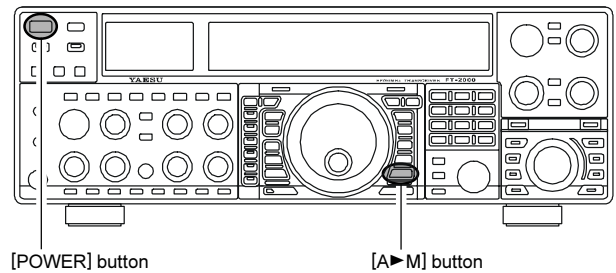


RESETTING THE MICROPROCESSOR

RESETTING MEMORIES (ONLY)

Use this procedure to reset (clear out) the Memory channels previously stored, without affecting any configuration changes you may have made to the Menu settings.

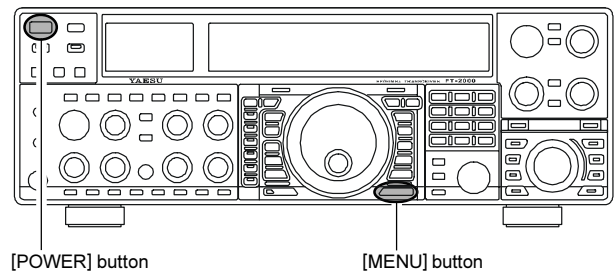
1. Press the front panel's **[POWER]** switch to turn the transceiver off.
2. Press and hold in the **[A►M]** button; while holding it in, press and hold in the front panel's **[POWER]** switch to turn the transceiver on. Once the transceiver comes on, you may release the **[A►M]** button.



MENU RESETTING

Use this procedure to restore the Menu settings to their factory defaults, without affecting the memories you have programmed.

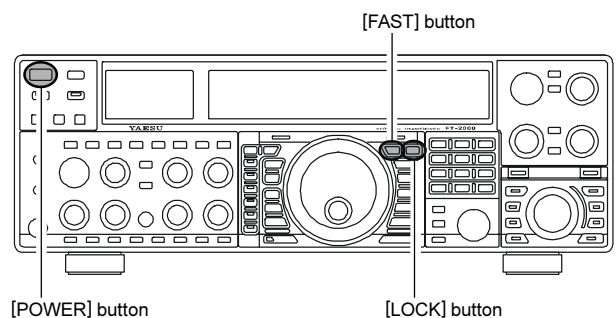
1. Press the front panel's **[POWER]** switch to turn the transceiver off.
2. Press and hold in the **[MENU]** button; while holding it in, press and hold in the front panel's **[POWER]** switch to turn the transceiver on. Once the transceiver comes on, you may release the **[MENU]** button.



FULL RESET

Use this procedure to restore all Menu and Memory settings to their original factory defaults. All Memories will be cleared out by this procedure.

1. Press the front panel's **[POWER]** switch to turn the transceiver off.
2. Press and hold in the **[FAST]** and **[LOCK]** buttons; while holding them in, press and hold in the front panel's **[POWER]** switch to turn the transceiver on. Once the transceiver comes on, you may release the other two switches.



IMPORTANT NOTE

When the optional **DMU-2000** is connected and is turned on the **[POWER]** switch, the **DMU-2000**'s data is also reset when perform the full reset of the **FT-2000D**.

INSTALLATION AND INTERCONNECTIONS

ANTENNA CONSIDERATIONS

The **FT-2000D** is designed for use with any antenna system providing a 50 Ohm resistive impedance at the desired operating frequency. While minor excursions from the 50-Ohm specification are of no consequence, the transceiver's Automatic Antenna Tuner may not be able to reduce the impedance mismatch to an acceptable value if the Standing Wave Ratio (SWR) present at the Antenna jack is greater than 3:1.

Every effort should, therefore, be made to ensure that the impedance of the antenna system utilized with the **FT-2000D** be as close as possible to the specified 50-Ohm value.

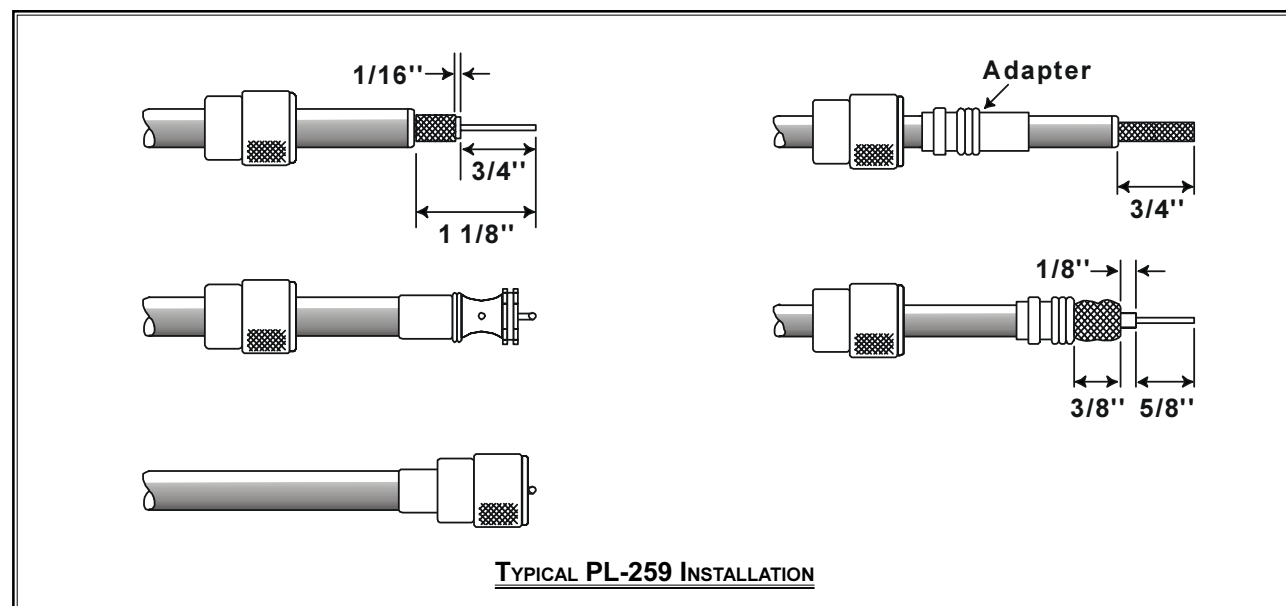
Note that the "G5RV" type antenna does not provide a 50-Ohm impedance on all HF Amateur bands, and an external wide-range antenna coupler must be used with this antenna type.

Any antenna to be used with the **FT-2000D** must, ultimately, be fed with 50 Ohm coaxial cable. Therefore, when using a "balanced" antenna such as a dipole, remember that a balun or other matching/balancing device must be used so as to ensure proper antenna performance.

The same precautions apply to any additional (receive-only) antennas connected to the RX ANT jack; if your receive-only antennas do not have an impedance near 50 Ohms at the operating frequency, you may need to install an external antenna tuner to obtain optimum performance.

ABOUT COAXIAL CABLE

Use high-quality 50-Ohm coaxial cable for the lead-in to your **FT-2000D** transceiver. All efforts at providing an efficient antenna system will be wasted if poor quality, lossy coaxial cable is used. This transceiver utilizes standard "M" ("PL-259") type connectors, except for the "RX OUT" BNC connector.



INSTALLATION AND INTERCONNECTIONS

GROUNDING

The **FT-2000D** transceiver, like any other HF communications apparatus, requires an effective ground system for maximum electrical safety and best communications effectiveness. A good ground system can contribute to station efficiency in a number of ways:

- ☐ It can minimize the possibility of electrical shock to the operator.
- ☐ It can minimize RF currents flowing on the shield of the coaxial cable and the chassis of the transceiver; such currents may lead to radiation which can cause interference to home entertainment devices or laboratory test equipment.
- ☐ It can minimize the possibility of erratic transceiver/accessory operation caused by RF feedback and/or improper current flow through logic devices.

An effective earth ground system may take several forms; for a more complete discussion, see an appropriate RF engineering text. The information below is intended only as a guideline.

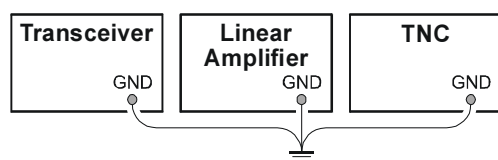
Typically, the ground connection consists of one or more copper-clad steel rods, driven into the ground. If multiple ground rods are used, they should be positioned in a “V” configuration, and bonded together at the apex of the “V” which is nearest the station location. Use a heavy, braided cable (such as the discarded shield from type RG-213 coaxial cable) and strong cable clamps to secure the braided cable(s) to the ground rods. Be sure to weatherproof the connections to ensure many years of reliable service. Use the same type of heavy, braided cable for the connections to the station ground bus (described below).

Inside the station, a common ground bus consisting of a copper pipe of at least 25 mm (1”) diameter should be used. An alternative station ground bus may consist of a wide copper plate (single-sided circuit board material is ideal) secured to the bottom of the operating desk. Grounding connections from individual devices such as transceivers, power supplies, and data communications devices (TNCs, etc.) should be made directly to the ground bus using a heavy, braided cable.

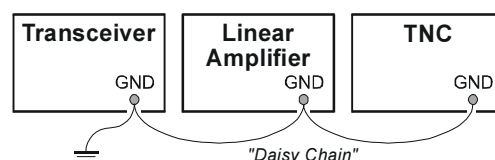
Do not make ground connections from one electrical device to another, and thence to the ground bus. This so-called “Daisy-Chain” grounding technique may nullify any attempt at effective radio frequency grounding. See the drawing below for examples of proper grounding techniques.

Inspect the ground system - inside the station as well as outside - on a regular basis so as to ensure maximum performance and safety.

Besides following the above guidelines carefully, note that household or industrial gas lines must never be used in an attempt to establish an electrical ground. Cold water pipes may, in some instances, help in the grounding effort, but gas lines represent a significant explosion hazard, and must never be used.



PROPER GROUND CONNECTION

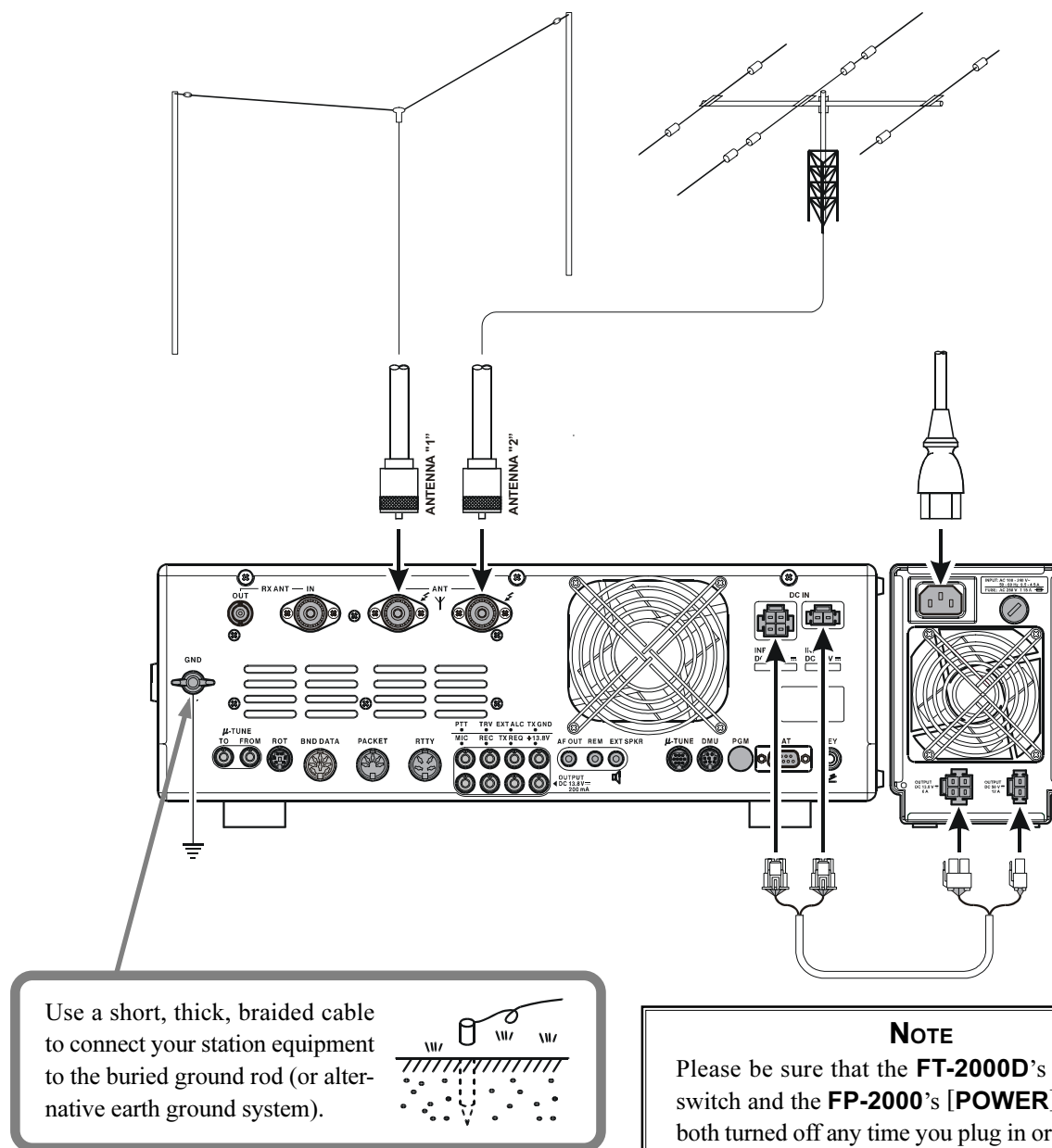


IMPROPER GROUND CONNECTION

INSTALLATION AND INTERCONNECTIONS

CONNECTION OF ANTENNA AND FP-2000 POWER SUPPLY

Please follow the outline in the illustration regarding the proper connection of antenna coaxial cables, as well as the **FP-2000D** Power Supply.



NOTE

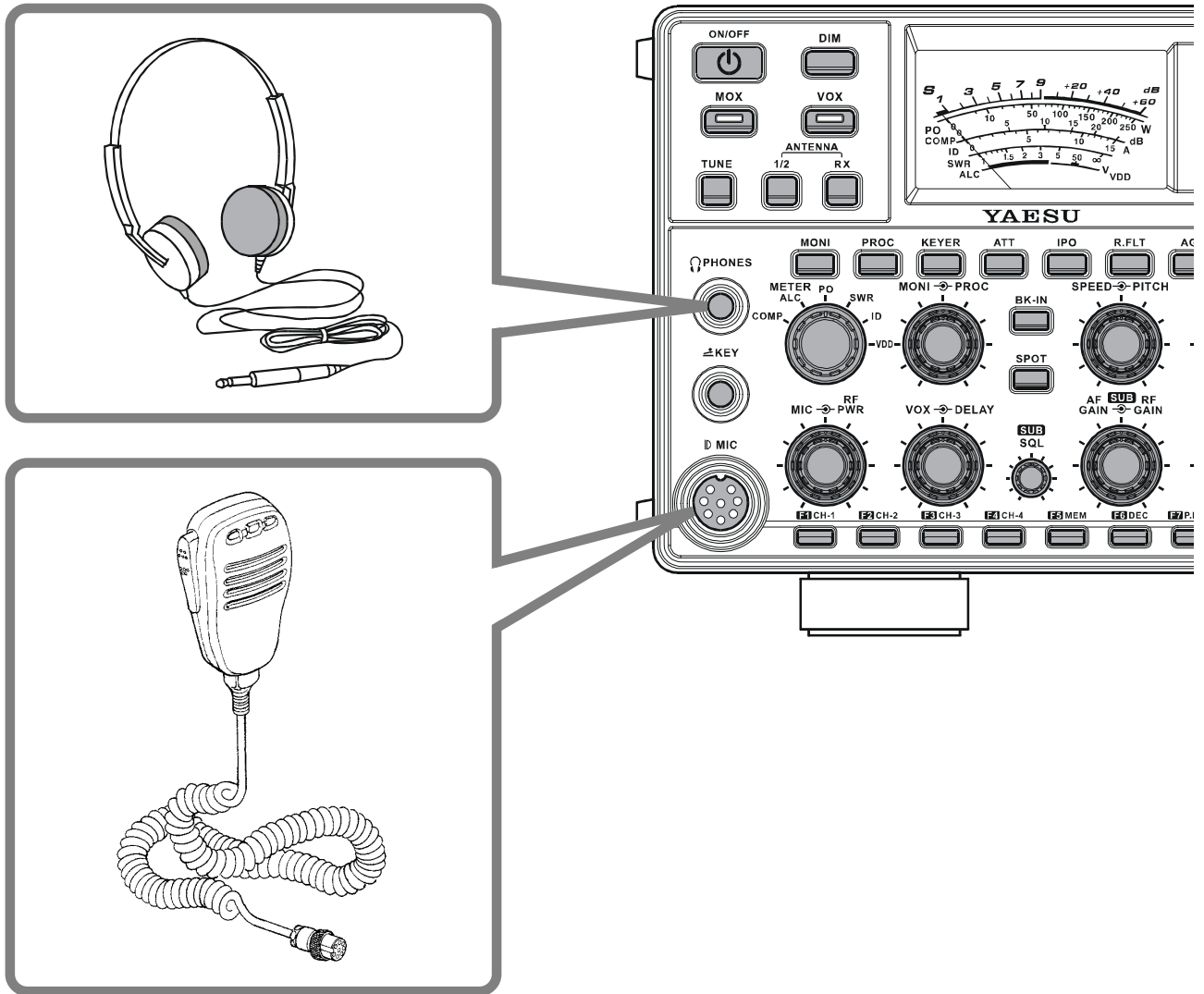
Please be sure that the **FT-2000D**'s [POWER] switch and the **FP-2000**'s [POWER] switch are both turned off any time you plug in or unplug any power cable to/from the **FP-2000**. This will avoid the possibility of potentially-damaging spikes and/or electrical shock.

ADVICE:

- ☐ Do not position this apparatus in a location with direct exposure to sunshine.
- ☐ Do not position this apparatus in a location exposed to dust and/or high humidity.
- ☐ Ensure adequate ventilation around this apparatus, so as to prevent heat build-up and possible reduction of performance due to high heat.
- ☐ Do not install this apparatus in a mechanically-unstable location, or where objects may fall onto this product from above.
- ☐ To minimize the possibility of interference to home entertainment devices, take all precautionary steps including separation of TV/FM antennas from Amateur transmitting antennas to the greatest extent possible, and keep transmitting coaxial cables separated from cables connected to home entertainment devices.
- ☐ Ensure that the AC power cord is not subject to undue stress or bending, which could damage the cable or cause it to be accidentally unplugged from the rear panel AC input jack.
- ☐ Be absolutely certain to install your transmitting antenna(s) such that they cannot possibly come in contact with TV/FM radio or other antennas, nor with outside power or telephone lines.

INSTALLATION AND INTERCONNECTIONS

CONNECTION OF MICROPHONE AND HEADPHONE



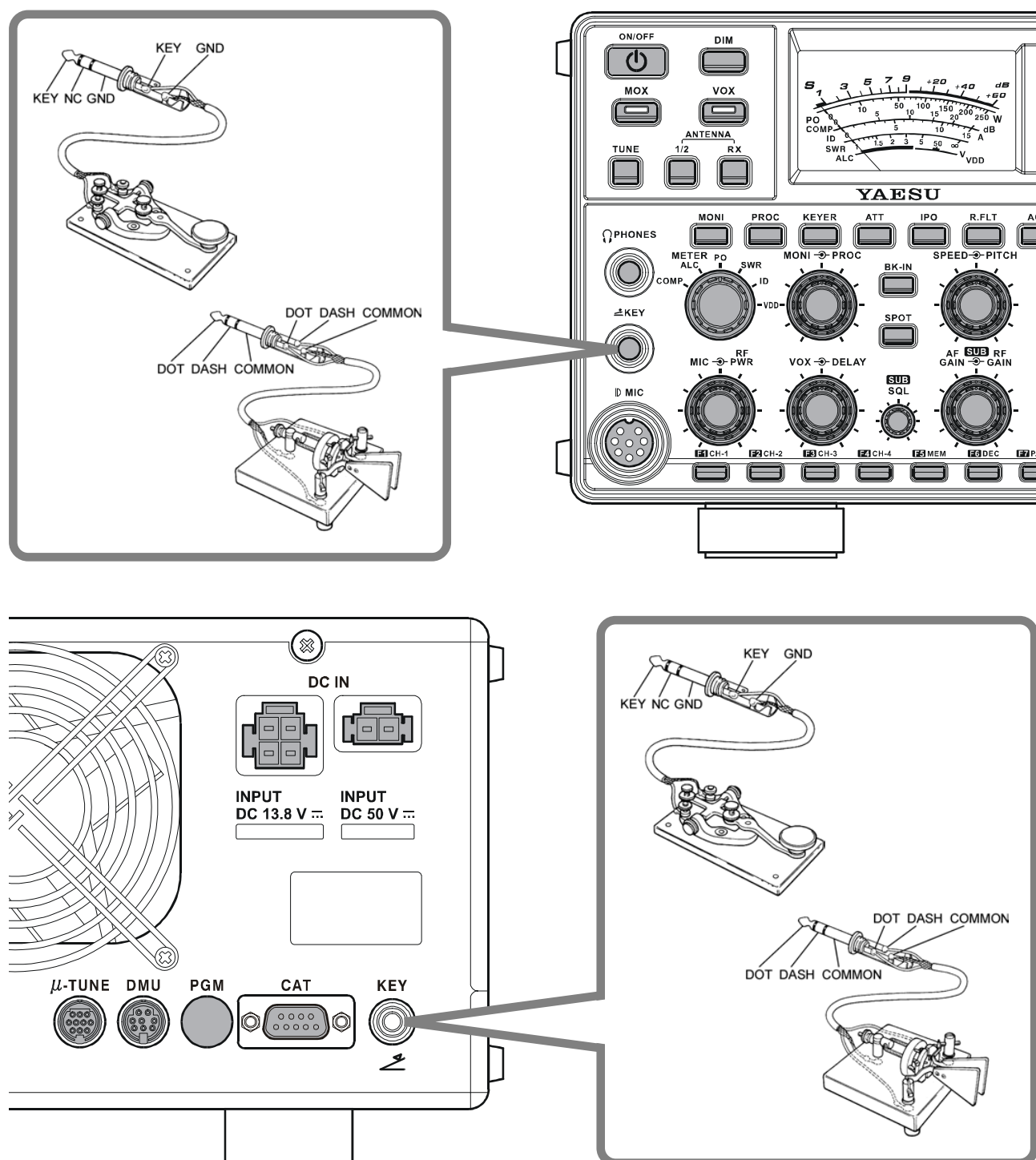
INSTALLATION AND INTERCONNECTIONS

KEY, KEYSER, AND COMPUTER-DRIVEN KEYING INTERCONNECTIONS

The **FT-2000D** includes a host of features for the CW operator, the functions of which will be detailed in the “Operation” section later. Besides the built-in Electronic Keyer, two key jacks are provided, one each on the front and rear panels, for convenient connection to keying devices.

The Menu system allows you to configure the front and rear panel **KEY** jacks according to the device you wish to connect. For example, you may connect your keyer paddle to the front panel **KEY** jack, and use Menu item “052 A1A F-TYPE” for paddle input, while connecting the rear panel’s **KEY** jack to the keying line from your personal computer (which emulates a “straight key” for connection purposes), and configure the rear panel jack using Menu item “054 A1A R-TYPE.”

Both **KEY** jacks on the **FT-2000D** utilize “Positive” keying voltage. Key-up voltage is approximately +5V DC, and key-down current is approximately 1 mA. When connecting a key or other device to the **KEY** jacks, use *only* a 3-pin (“stereo”) 1/4” phone plug; a 2-pin plug will place a short between the ring and (grounded) shaft of the plug, resulting in a constant “key-down” condition in some circumstances.



INSTALLATION AND INTERCONNECTIONS

VL-1000 LINEAR AMPLIFIER INTERCONNECTIONS

Be sure that both the **FT-2000D** and **VL-1000** are turned off, then follow the installation recommendations contained in the illustration.



Please set the “ATT” switch to the “ON” position on the front panel of the **VL-1000**. The 200-Watt power output from the **FT-2000D** is far in excess of what is required to drive the **VL-1000** to its full rated output.

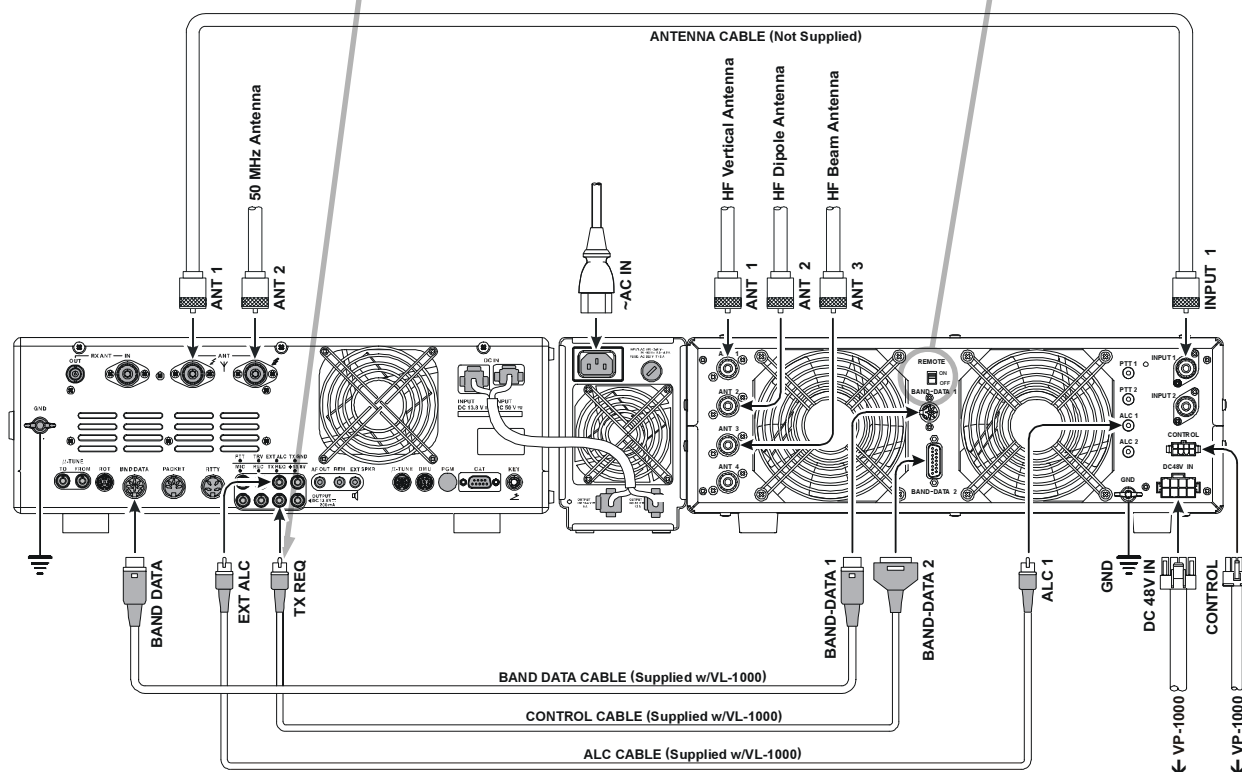
NOTE:

- ☐ Please refer to the **VL-1000** Operating Manual for details regarding amplifier operation.
- ☐ Please do not attempt to connect or disconnect coaxial cables when your hands are wet.

About the CONTROL Cable

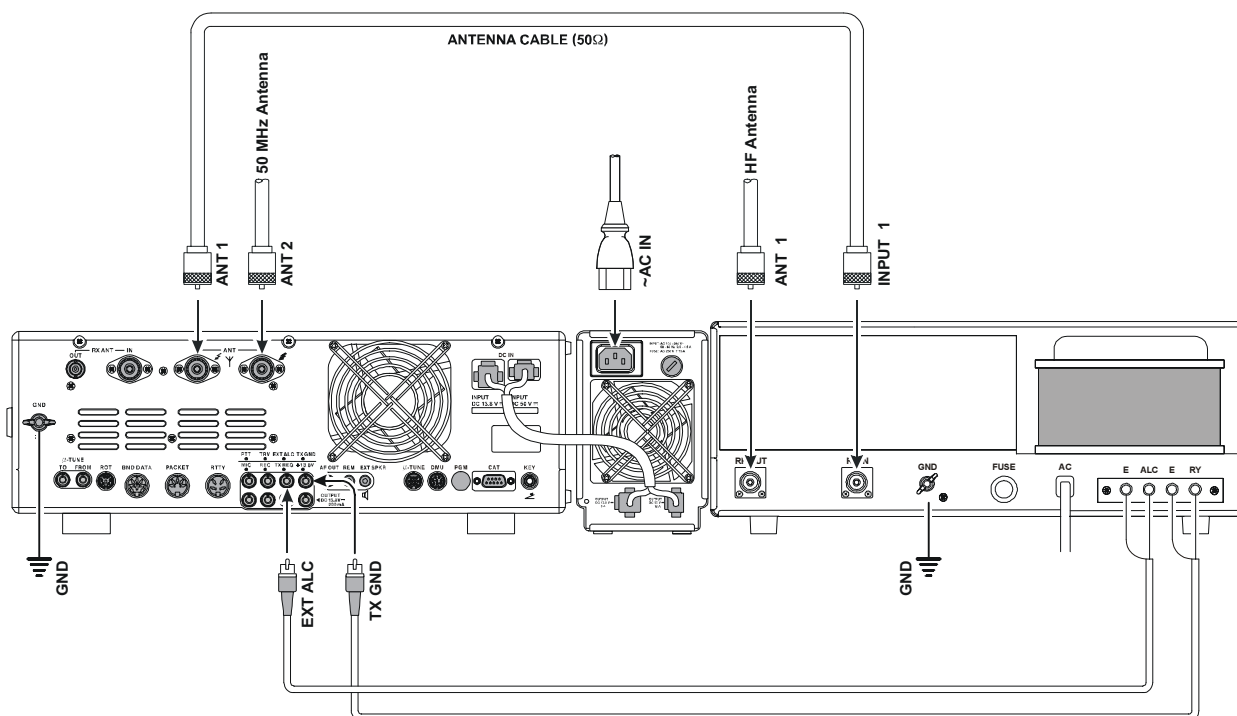
The **VL-1000** may be operated with the **FT-2000D** whether or not the **CONTROL** Cable is connected; however, the **CONTROL** Cable allows you to tune up the amplifier automatically by just pressing the [F SET] or [TUNE] key on the **VL-1000**, so as to transmit a carrier for tuning purposes.

To link the **FT-2000D** and **VL-1000** Power switches, set the **VL-1000** REMOTE switch to the “ON” position.



INSTALLATION AND INTERCONNECTIONS

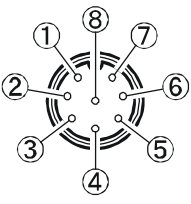
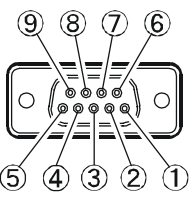
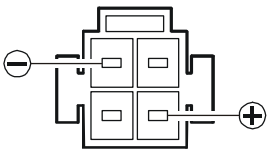
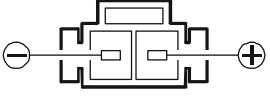
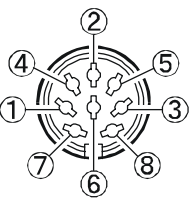
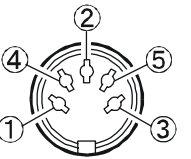
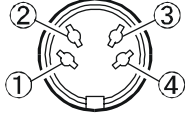
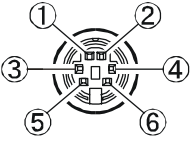
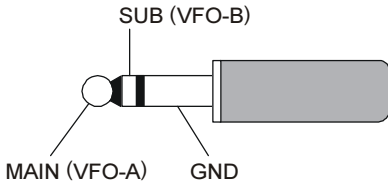
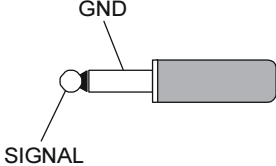
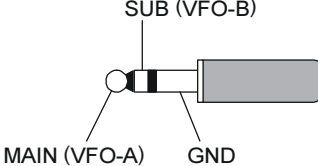
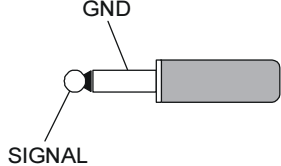
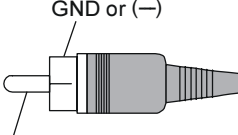
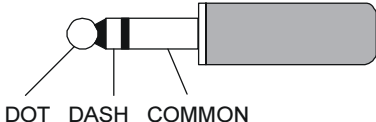
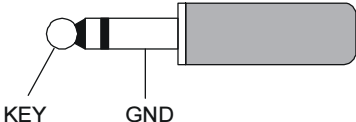
INTERFACING TO OTHER LINEAR AMPLIFIERS



NOTE

- ❑ The TX/RX switching in the linear amplifier is controlled by switching components in the transceiver. The relay circuit of the **FT-2000D** used for this switching is capable of switching AC voltage of 100 Volts at up to 300 mA, or DC voltages or 60 V at 200 mA or 30 V at up to 1 Amp. In order to engage the switching relay, use Menu item “144 tGEn ETX-GND;” set this Menu item to “EnA (Enable)” to activate the amplifier switching relay.
- ❑ The specified range for ALC voltage to be used with the **FT-2000D** is 0 to -4 Volts DC.
- ❑ Amplifier systems utilizing different ALC voltages will not work correctly with the **FT-2000D**, and their ALC lines must not be connected if this is the case.

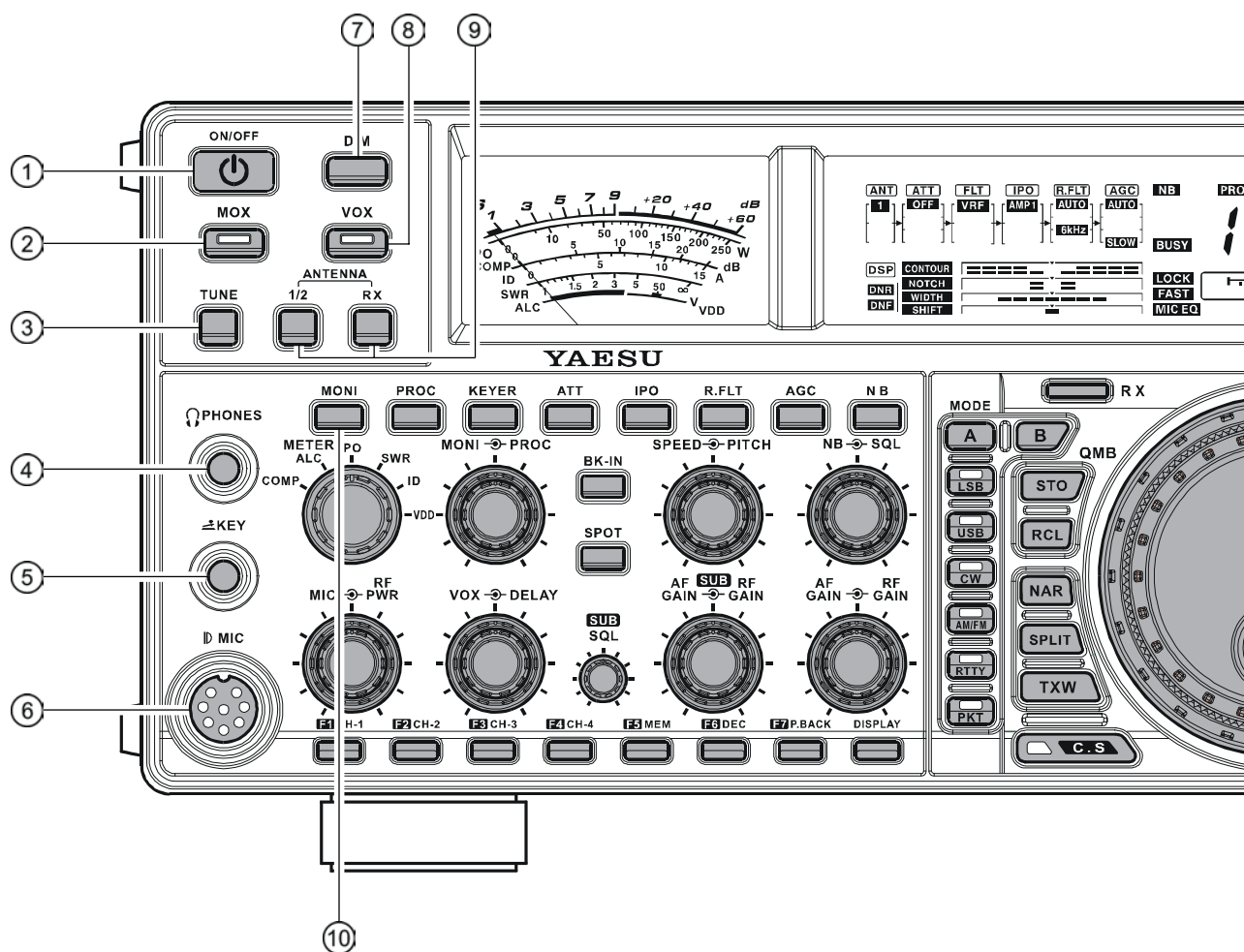
PLUG/CONNECTOR PINOUT DIAGRAMS

MIC	CAT	DC IN 13.8 V
 (as viewed from front panel)	 (as viewed from rear panel)	 (as viewed from rear panel)
DC IN 50 V	BAND DATA	PACKET
 (as viewed from rear panel)	 (as viewed from rear panel)	 (as viewed from rear panel)
RTTY	ROT (ROTATOR)	PHONE
 (as viewed from rear panel)	 (as viewed from rear panel)	
REM (REMOTE)	AF OUT	EXT SPKR
		
RCA PLUG	KEY	
	For Internal Keyer 	For Straight Key  Do not use 2-conductor type plug

IMPORTANT NOTE:

The **μ-TUNE**, **DMU**, and **PGM** connectors are special connectors for this transceiver. Please do not connect any accessory or other device not specifically approved by Vertex Standard. Failure to observe this precaution may cause damage not covered by the Limited Warranty on this apparatus.

FRONT PANEL CONTROLS & SWITCHES



① POWER Switch

Press and hold in this switch for one second to turn the transceiver on, after first setting the **FP-2000**'s [POWER] switch to the "I" position. Press and hold in this switch for one second, similarly, to turn the transceiver off. If the **FP-2000**'s [POWER] switch is set to the "O" position, this switch will not function.

ADVICE:

- ❑ The main power switch for the system is located on the front panel of the **FP-2000** Power Supply. When the **FP-2000** main power switch is pushed down on the "I" side, the **FP-2000** is turned on, and the **FT-2000** is placed in the "standby" state. If the **FP-2000** main power switch is not pressed in this manner, it is not possible to turn on the transceiver. For more details about the main power switch location on the **FP-2000**, please see the discussion on page 34.
- ❑ If you press this switch momentarily while the transceiver is turned on, the transceiver's audio will be muted for three seconds.

② MOX Switch

Pressing this button engages the PTT (Push to Talk) circuit, to activate the transmitter (the LED inside this button will glow red). It must be turned off (the red LED will be off) for reception. This button replicates the action of the Push to Talk (PTT) switch on the microphone. When engaging the [MOX] button (the LED inside this button glows red) or otherwise causing a transmission to be started, be certain you have either an antenna or 50-Ohm dummy load connected to the selected Antenna jack.

FRONT PANEL CONTROLS & SWITCHES

③ TUNE Switch

This is the on/off switch for the **FT-2000D**'s Automatic Antenna Tuner.

Pressing this button momentarily places the antenna tuner in line between the transmitter final amplifier and the antenna jack (“**TUNER**” icon will appear in the display). Reception is not affected.

Pressing and holding in this button for 1/2 second, while receiving in an amateur band, activates the transmitter for a few seconds while the automatic antenna tuner rematches the antenna system impedance for minimum SWR. The resulting setting is automatically stored in one of the antenna tuner's 100 memories, for instant automatic recall later when the receiver is tuned near the same frequency.

Pressing this button momentarily, while the Tuner is engaged, will take the Automatic Antenna tuner out of the transmit line.

NOTE:

When the Automatic Antenna Tuner is tuning itself, a signal is being transmitted. Therefore, be absolutely certain that an antenna or dummy load is connected to the selected antenna jack before pressing and holding in the [**TUNE**] button to start antenna tuning.

④ PHONES Jack

A 1/4-inch, 3-contact jack accepts either monaural or stereo headphones with 2- or 3-contact plugs. When a plug is inserted, the loudspeaker is disabled. With stereo headphones such as the optional **YH-77STA**, you can monitor both Main (VFO-A) and Sub (VFO-B) receiver channels at the same time during Dual Receive operation.

NOTE:

When wearing headphones, we recommend that you turn the AF Gain levels down to their lowest settings before turning power on, to minimize the impact on your hearing caused by audio “pops” during switch-on.

⑤ KEY Jack

This 1/4-inch, 3-contact jack accepts a CW key or keyer paddles (for the built-in electronic keyer), or output from an external electronic keyer. Pinout is shown on page 15. Key up voltage is 5 V, and key down current is 1 mA. This jack may be configured for keyer, “Bug,” “straight key,” or computer keying interface operation via Menu item “052 A1A F-TYPE” (see page 121). There is another jack with the same name on the rear panel, and it may be configured independently for Internal Keyer or pseudo-straight-key operation.

NOTE:

You cannot use a 2-contact plug in this jack (to do so produces a constant “key down” condition).

⑥ Microphone Connector

This 8-pin jack accepts input from a microphone utilizing a traditional YAESU HF-transceiver pinout.

⑦ DIM Switch

Press this button to lower the illumination intensity of the analog meter and the frequency display. Press it once more to restore full brightness.

ADVICE:

Menu Items “008 diSP DIM MTR” and “009 diSP DIM VFD” allow you to configure the dimming levels for the analog meter and the frequency display independently, so you can customize the brightness levels.

⑧ VOX Switch

This button enables automatic voice-actuated transmitter switching in the SSB, AM, and FM modes. While activated, the LED inside this button glows red. The controls affecting VOX operation are the front panel's [**VOX**] and [**DELAY**] knobs. By proper adjustment of these controls, hands-free voice-actuated operation is possible.

⑨ ANTENNA Select Switch

[1/2]: Pressing this selects either the ANT 1 or 2 jack on the rear panel, and allows convenient antenna switching at the press of button. The selected antenna jack is indicated at the upper left corner of the display. [**RX**]: Normally, the antenna connected to the ANT 1 or 2 jack is used for receive (and always used for transmit). When the [**RX**] switch is pressed, an antenna connected to the RX ANT will be used during receive.

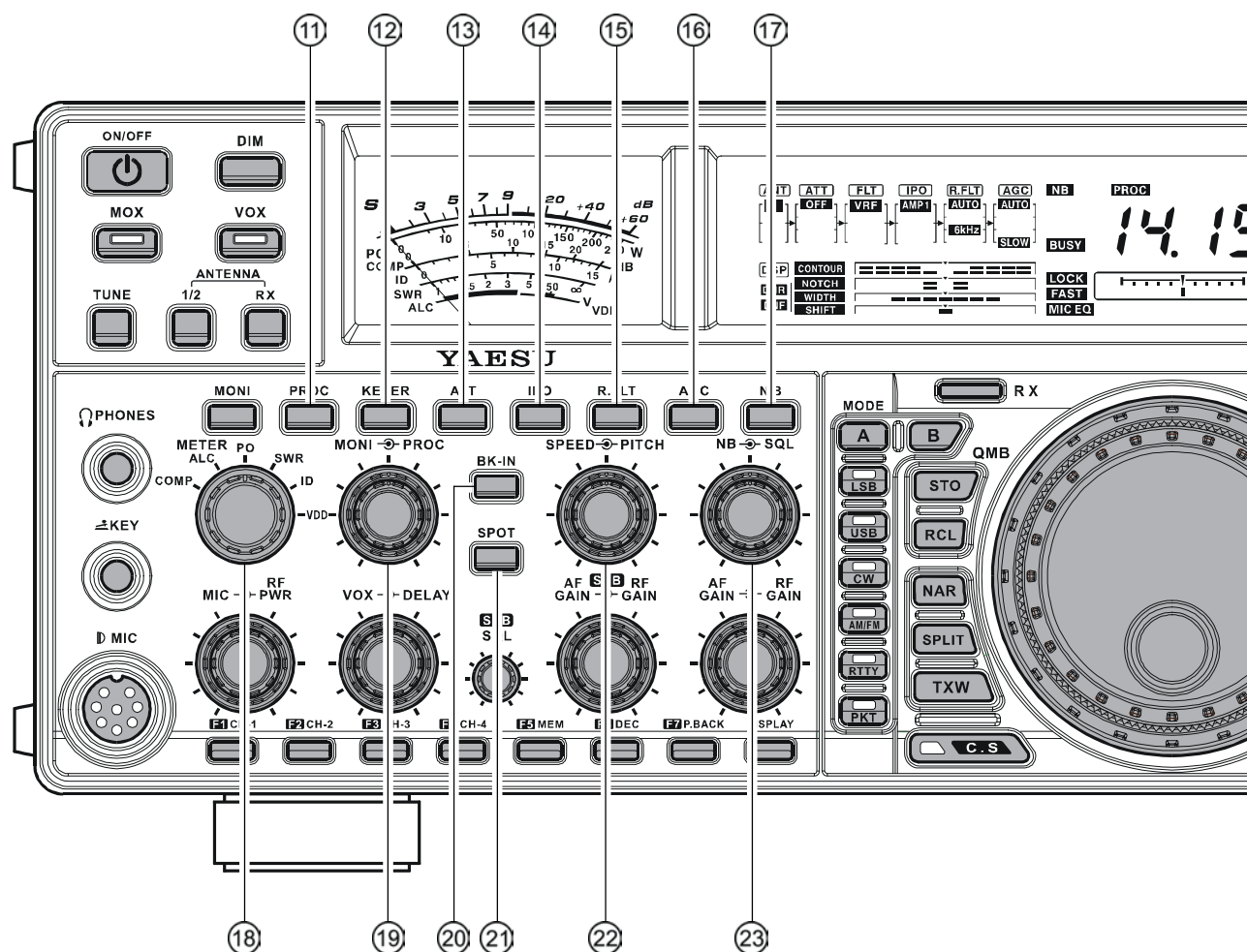
⑩ MONI (Monitor) Switch

This button enables the transmit monitor in all modes. While activated, the “**MONI**” icon appears in the display. Adjustment of the Monitor level is accomplished using the [**MONI**] knob.

ADVICE:

When using headphones, the Monitor is highly useful for making adjustments to the Parametric Equalizer or other voice quality adjustments, because the voice quality heard in the headphones is such a “natural” reproduction of the transmitted audio quality.

FRONT PANEL CONTROLS & SWITCHES



11 PROC (Processor) Switch

This button enables the Parametric Microphone Equalizer and Speech Processor for SSB/AM transmission. While activated the Parametric Microphone Equalizer, the “**MICEQ**” icon appears in the display.

While activated the Speech Processor, the “**MICEQ**” and “**PROC**” icons appear in the display. Adjustment of the Processor level is accomplished using the [PROC] knob.

ADVICE:

- ❑ The Speech Processor is a tool for increasing the average power output through a compression technique. However, if the [PROC] knob is advanced too far, the increase in compression becomes counter-productive, as intelligibility will suffer. We recommend that you monitor the sound of your signal using the Monitor (with headphones).
- ❑ When the optional **DMU-2000** Data Management Unit is connected, you may use the Audio Scope/Oscilloscope page to help you adjust the setting of the compression level of the Speech Processor for optimum performance using your voice and microphone.

12 KEYER Switch

This button toggles the internal CW keyer on and off. While activated, the “**KEYER**” icon appears in the display. The Keyer sending speed and the CW Hang Time are adjusted via the front panel’s [SPEED] and [DELAY] knobs.

13 ATT Switch

This button selects the degree of attenuation, if any, to be applied to the receiver input.

Available selections are –6 dB, –12 dB, –18 dB, or OFF, and the selected attenuation level appears in the ATT column of the Receiver Configuration Indicator on the display.

ADVICE:

- ❑ The Attenuator affects **both** the Main (VFO-A) and Sub (VFO-B) receivers.
- ❑ The Attenuator may be used in conjunction with the [IPO] switch to provide two stages of signal reduction when an extremely strong signal is being received.

FRONT PANEL CONTROLS & SWITCHES

⑭ IPO (INTERCEPT POINT OPTIMIZATION) Switch

This button may be used to set the optimum front end characteristics of the receiver circuit for a very strong-signal environment. Available selections are AMP 1 (low distortion amplifier), AMP 2 (2-stage low-distortion RF amplifier), or ON (bypasses the front end RF amplifier), and the selected receiver RF amplifier appears at the IPO column of the Receiver Configuration Indicator in the display.

ADVICE:

The IPO switch affects both the Main (VFO-A) and Sub (VFO-B) receivers.

⑮ R.FLT Switch

This button selects the bandwidth for the Main Band (VFO-A) receiver's first IF Roofing Filter. Available selections are 3 kHz, 6 kHz, 15 kHz, or Auto, and the selected bandwidth appears in the FLT column of the Receiver Configuration Indicator on the display.

ADVICE:

- ☐ The Roofing Filter selection applies to the Main band (VFO-A) only.
- ☐ Because the roofing filter is in the first IF, the protection it provides against interference is quite significant. When set to AUTO, the SSB bandwidth is 6 kHz, while CW is 3 kHz and FM/RTTY are 15 kHz. On a crowded SSB band, however, you may wish to select the 3 kHz filter, for the maximum possible interference rejection.

⑯ AGC Switch

This button selects the AGC characteristics for the receiver. Available selections are FAST, MID, SLOW, or AUTO, and the "AGC" icon will change according to the AGC characteristics selected.

Press the [AGC] button repeatedly to select the desired receiver-recovery time constant. Press and hold in the [AGC] button for two seconds to disable the AGC (for testing or weak-signal reception).

When the [AGC] button is pressed independently, it applies to the Main band (VFO-A) receiver.

When you press the [B] button, followed by the [AGC] button (within five seconds of pressing the [B] switch), it affects the Sub band (VFO-B) receiver.

ADVICE:

If the AGC receiver-recovery time is set to "Off" by pressing and holding in the [AGC] button, the S-meter will no longer deflect. Additionally, you will likely encounter distortion on stronger signals, as the IF amplifiers and the following stages are probably being overloaded.

⑰ NB Switch

This button turns the IF Noise Blanker on and off.

Press this button momentarily to reduce a short-duration pulse noise; the "NB" icon will appear in the display.

Press and hold in this button for one second to reduce a longer-duration man-made pulse noise; the "NB" icon will blink for three seconds, then will appear continuously in the display.

Press this button again to disable the noise blanker; the "NB" icon will disappear.

ADVICE:

When you press (or press and hold) the [NB] button momentarily, it affects the Main band (VFO-A) receiver. When you press the [B] button, then press (or press and hold in) the [NB] button (within five seconds of pressing the [B] button), it affects the Sub band (VFO-B) receiver.

⑱ METER Switch

This control switch determines the function of the meter during transmission.

COMP: Indicates the speech compressor level (SSB mode only).

ALC: Indicates the relative ALC voltage.

PO: Indicates the power output level.

SWR: Indicates the Standing Wave Ratio (Forward: Reflected).

ID: Indicates the final amplifier drain current.

VDD: Indicates the final amplifier drain voltage.

⑲ MONI-PROC Knobs

MONI Knob

The inner [MONI] knob adjust the audio level of the transmit RF monitor during transmission (relative to the AF GAIN control), when activated by the [MONI] button.

PROC Knob

The outer [PROC] knob sets the compression (input) level of the transmitter RF Speech Processor in the SSB and AM modes, when activated by the [PROC] button.

⑳ BK-IN Switch

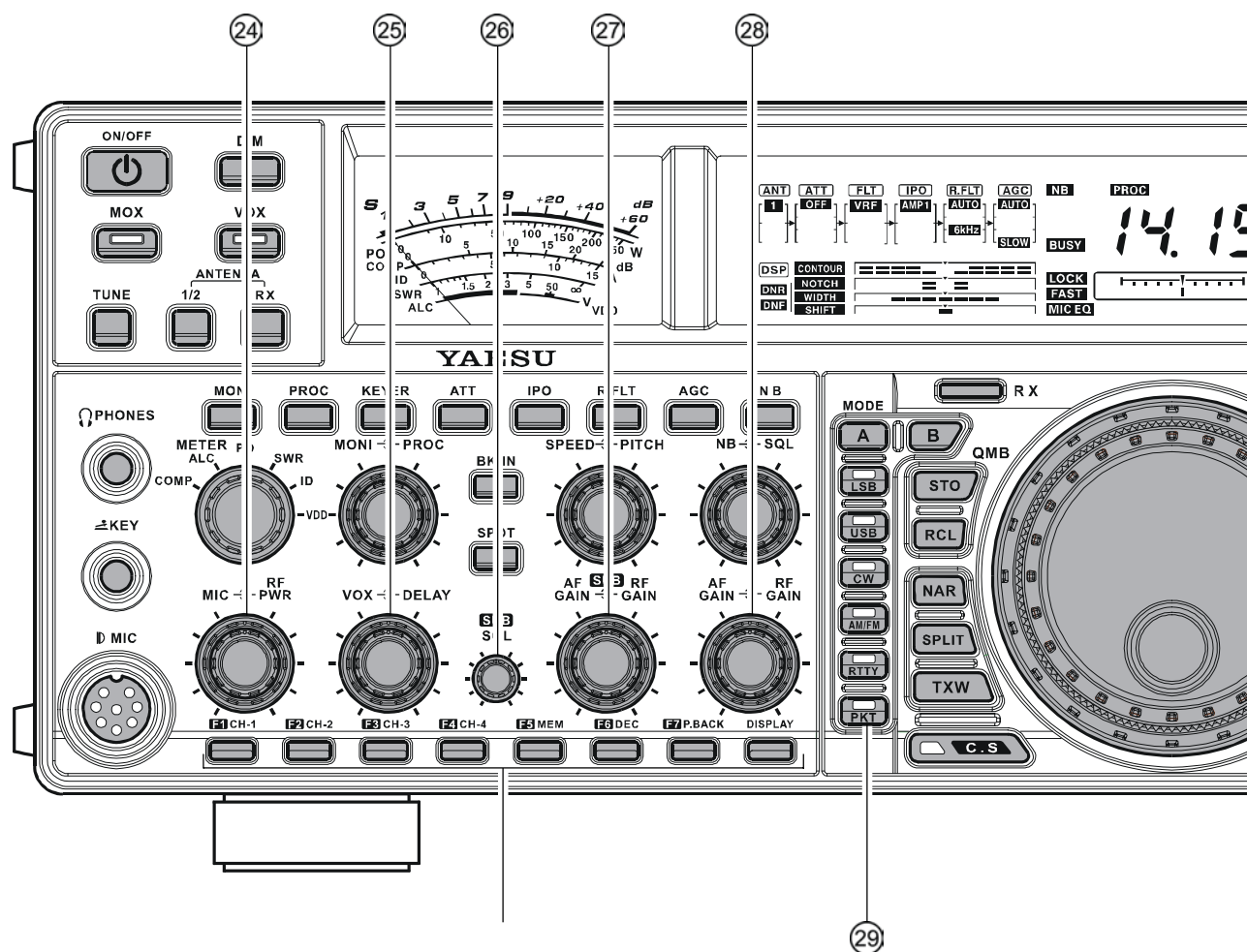
This button turns the CW break-in capability on and off. While the CW break-in is activated, the "BK-IN" icon appears in the display.

㉑ SPOT Switch

This button turns on the CW receiver spotting tone; by matching the SPOT tone to that of the incoming CW signal (precisely the same pitch), you will be "zero beating" your transmitted signal on to the frequency of the other station.

The Sub (VFO-B) frequency display will indicate the offset tone frequency when this button is pressed.

FRONT PANEL CONTROLS & SWITCHES



22 SPEED↔PITCH Knobs

SPEED Knob

The inner [SPEED] knob adjusts the keying speed of the internal CW keyer (4 ~ 60 WPM). Clockwise rotation increases the sending speed.

When turning this knob while pressing the [KEYER] button, the Sub (VFO-B) frequency display shows the keying speed.

PITCH Knob

The outer [PITCH] knob selects your preferred CW tone pitch (from 300 ~ 1050 Hz, in 50 Hz increments). The Tx sidetone, receiver IF passband, and display offset from the BFO (carrier) frequency are all affected simultaneously. The Pitch control setting also affects the operation of the CW Tuning Indicator, as the center frequency of the CW Tuning Indicator will follow the setting of this control.

23 NB↔SQL Knobs

NB Knob

The inner [NB] knob adjusts the noise blanking level when the (analog) IF noise blanker is activated by pressing the [NB] button.

SQL Knob

The outer [SQL] knob sets the signal level threshold at which the Main (VFO-A) receiver audio is muted, in all modes. It is very useful during local rag-chews, to eliminate noise between incoming transmissions. This control is normally kept fully counter-clockwise (off), except when scanning and during FM operation.

FRONT PANEL CONTROLS & SWITCHES

②④ MIC → RF PWR Knobs

MIC Knob

The inner [MIC] knob adjusts the microphone input level for (non-processed) SSB transmission.

ADVICE:

If you adjust the MIC Gain while speaking in a somewhat-louder-than-normal voice level, watch the ALC level and adjust the MIC Gain so that the ALC reaches just to the right edge of the ALC scale. Then, when you speak in a more normal voice level, you'll be certain not to be over-driving the mic amplifier stage.

RF PWR Knob

The outer [RF PWR] knob is the main RF Power output control for the transceiver, active in all operating modes. Clockwise rotation increases the power output. Adjust this control for the desired power output from the FT-2000D.

②⑤ VOX → DELAY Knobs

VOX Knob

The inner [VOX] knob sets the gain of the VOX circuit, to set the level of microphone audio needed to activate the transmitter during voice operation while the [VOX] switch is engaged. The [VOX] switch must be switched "ON" to engage the VOX circuit.

DELAY Knob

The outer [DELAY] knob sets the hang time of the VOX circuit for voice operation and keying delay for CW operation.

During voice operation, this knob sets the hang time, between the moment you stop speaking, and the automatic switch from transmit back to receive. Adjust this for smooth VOX operation, so the receiver is only activated when your transmission is ended and you wish to receive.

For CW operation, this knob sets the keying delay, between the moment you stop sending, and the automatic switch from transmit back to receive during "Semi-break-in" operation. Adjust this just long enough to prevent the receiver from being restored during word spaces at your preferred sending speed.

②⑥ SUB SQL Knob

This knob sets the signal level threshold at which Sub (VFO-B) receiver audio is muted, in all modes. It is very useful during local rag-chews, to eliminate noise between incoming transmissions. This control is normally kept fully counter-clockwise (off), except when scanning and during FM operation.

②⑦ SUB AF GAIN → SUB RF GAIN

AF GAIN Knob

The inner [SUB AF GAIN] knob sets the Sub (VFO-B) receiver's audio volume level. Typically, you will operate with this control set between the 9 o'clock and 10 o'clock positions.

RF GAIN Knob

The outer [SUB RF GAIN] knob is the Sub (VFO-B) receiver's RF gain control, which adjusts the gain of the Sub (VFO-B) receiver's RF and IF amplifier stages. This control is normally left in the fully clockwise position.

②⑧ AF GAIN → RF GAIN Knobs

AF GAIN Knob

The inner [AF GAIN] knob sets the Main (VFO-A) receiver's audio volume level. Typically, you will operate with this control set between the 9 o'clock and 10 o'clock positions.

RF GAIN Knob

The outer [RF GAIN] knob is the Main (VFO-A) receiver's RF gain control, which adjusts the gain of the Main (VFO-A) receiver's RF and IF amplifier stages. This control is normally left in the fully clockwise position.

②⑨ MODE Switches

[A], [B] Switch

Pressing the [A] or [B] button will illuminate the respective indicator imbedded within the switch, allowing adjustment of the operating mode on the Main (VFO-A) or Sub (VFO-B) band. Usually, the [A] button glow Red, signifying that the Main band (VFO-A) is being adjusted. Similarly, pressing the [B] button will cause its indicator to blink Orange for five seconds, signifying Sub band (VFO-B) adjustment.

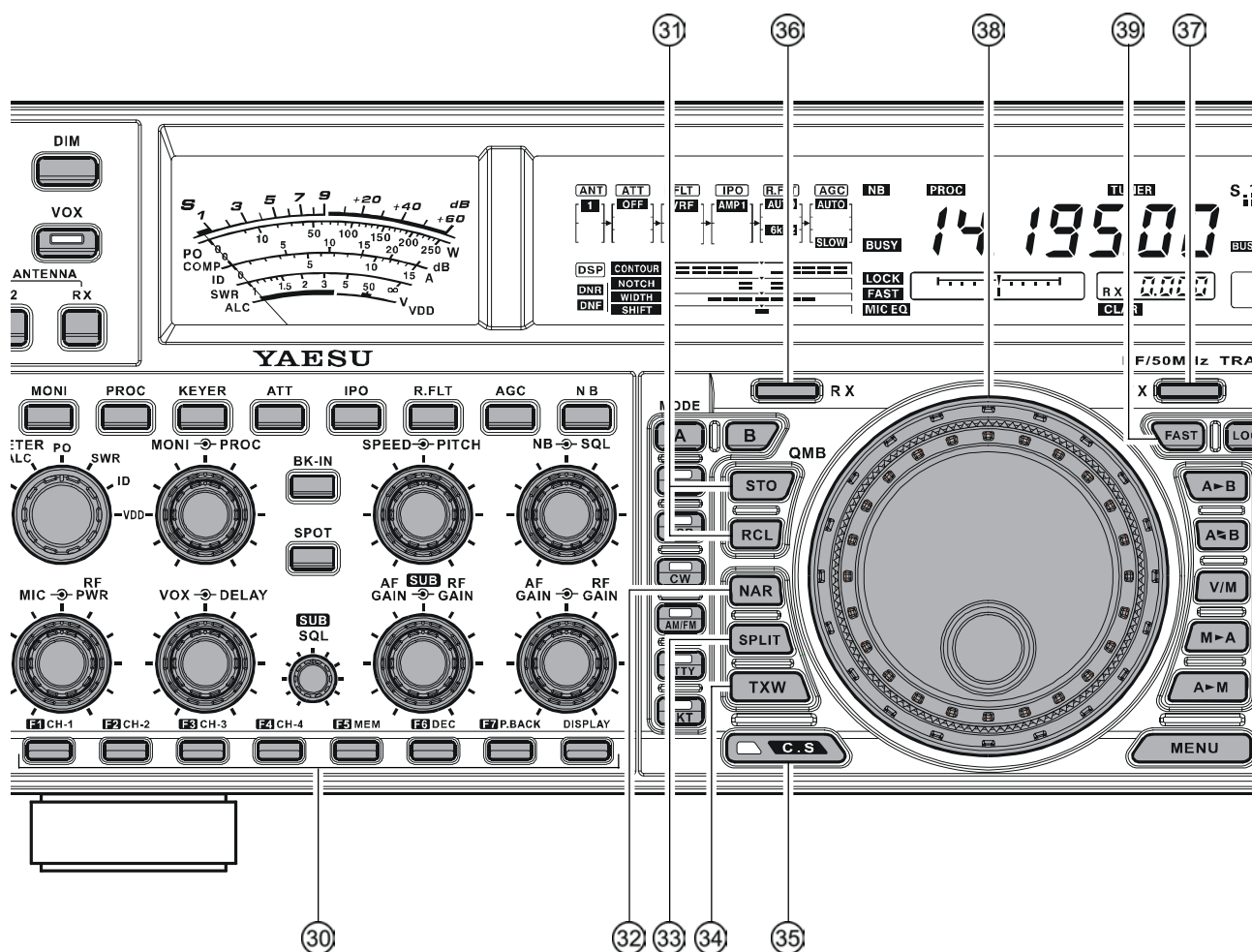
ADVICE:

When changing bands, confirm the [A] or [B] button illumination status at first, *then* press the appropriate [BAND] button, so as to change operating frequencies on the proper (Main or Sub) band.

[LSB], [USB], [CW], [AM/FM], [RTTY], [PKT] Switch

Pressing the [LSB], [USB], [CW], [AM/FM], [RTTY], or [PKT] button will select the operating mode. Pressing the [CW], [AM/FM], [RTTY], or [PKT] button multiple times will switch between the alternate operating features that can be used on these modes (covered later).

FRONT PANEL CONTROLS & SWITCHES



③① F1 - F7 / DISPLAY Keys

These keys can be used to control the Voice Memory capability for the SSB/AM/FM modes, and the Contest Keyer for the CW mode. You can also play back up to 15 seconds of incoming received audio, as well, for verification of a missed callsign or other purposes. When the optional **DMU-2000** Data Management Unit is connected, you can also use the “Function” keys for the various functions associated with each “page” of the external display’s capability.

[F1(CH 1)] - [F4(CH 4)] key

In the case of Voice Memory, up to 20 seconds of audio may be stored on each channel. For CW messages, up to 50 characters (“PARIS” specification) may be stored into each channel. See page 76 (Voice Memory) or page 88 (Contest Keyer) for details.

[F5(MEM)] key

This key is pressed for the purpose of storing either a Voice Memory or a Contest Keyer Memory channel’s contents. See page 76 (Voice Memory) or page 88 (Contest Keyer) for details.

[F6(DEC)] key

When utilizing the sequential contest number capability of the Contest Keyer, press this key to decrement (back up) the current Contest Number by one digit (i.e. to back up from #198 to #197, etc.). See page 91 for details.

[F7(P.BACK)] key

Press and hold in this button for 2 seconds to activate the recording feature of the internal Digital Voice Recorder. The Voice Recorder allows you to record the Main band (VFO-A) receiver audio for the most-recent 15 seconds. While you’re recording the receiver audio, the “**REC**” icon will appear in the display.

Press this button momentarily to stop the recording, then press this button momentarily again to play back the receiver audio for the most-recent 15 seconds of reception before you stopped the recording.

While playing back the receiver audio, the “**PLAY**” icon will appear in the display.

Press and hold in this button for 2 seconds again to resume recording.

[DISPLAY] key

Press and hold in this key for two seconds to cause the [F1(CH 1)] - [DISPLAY] keys to act as “Function” keys for the optional **DMU-2000** Data Management Unit if connected.

FRONT PANEL CONTROLS & SWITCHES

③① QMB (Quick Memory Bank) Switches STO (Store) Button

Pressing this button copies operating information (frequency, mode, bandwidth, and also repeater direction/shift frequency and CTCSS functions on the FM mode) into consecutive QMB Memories.

RCL (Recall) Button

Pressing this button recalls one of up to five Quick Memory Bank memories for operation.

③② NAR (Narrow) Switch

In the SSB/CW modes on the Main band (VFO-A), this button is used to set the bandwidth of the DSP (digital) IF filters to a user-programmed bandwidth (default values are SSB: 1.8 kHz and CW/RTTY/PSK: 300 Hz).

ADVICE:

When [NAR] has been engaged, the [WIDTH] knob will be disabled, although the [SHIFT] knob still works normally.

In the SSB/CW modes on the Sub Band (VFO-B), this button is used to toggle the receiver's bandwidth between wide (2.4 kHz) and narrow (1.0 kHz).

ADVICE:

When the Sub Band's (VFO-B) optional YF-122C (500 Hz) or YF-122CN (300 Hz) CW narrow filter is installed, the optional narrow filter will be activated when the [NAR] switch has been engaged on the CW/RTTY/PSK modes.

In the AM mode, this button is used to toggle the receiver's bandwidth between wide (9 kHz) and narrow (6 kHz).

In the FM mode on the 28 MHz and 50 MHz bands, this button is used to toggle the FM deviation/bandwidth between wide (± 5.0 kHz Dev./25.0 kHz BW) and narrow (± 2.5 kHz Dev./12.5 kHz BW).

Pressing the [A] or [B] button (located above the [MODE] selection buttons) will select either the Main band (VFO-A) or Sub band (VFO-B) for individual bandwidth setting.

③③ SPLIT Switch

Pressing this button to activate split frequency operation between the Main band (VFO-A), used for reception, and the Sub band (VFO-B), used for transmission. If you press and hold in the [SPLIT] button for two seconds, the "Quick Split" feature will be engaged, whereby the Sub band VFO (VFO-B) will automatically be set to a frequency 5 kHz higher than the Main band (VFO-A) frequency with same operating mode, and the transceiver will be placed in the Split mode.

③④ TXW "TX Watch" Switch

Pressing this button lets you monitor the transmit frequency when split frequency operation is engaged. Release the button to return to normal operation.

③⑤ C.S Switch

Press this button momentarily to recall a favorite Menu Selection directly.

To program a Menu selection as the short-cut, press the [MENU] button to enter the Menu, then select the Menu item you want to set as the short-cut. Now press and hold in the [C.S] button for two seconds; this will lock in the selected Menu item as the short-cut.

③⑥ RX Indicator/Switch

This button, when pressed, engages the Main band (VFO-A) receiver; the LED inside this button will glow Green when the Main receiver is active.

When the Main (VFO-A) receiver is active, pressing this button momentarily will mute the receiver, and the indicator will blink. Pressing the button once more will restore receiver operation, and the indicator will glow Green steadily.

③⑦ TX Indicator/Switch

When this button is pushed, the LED inside this button will glow Red, and the transmitter will be engaged on the same frequency and mode as set up for the Main band (VFO-A) (subject to any Clarifier offset, of course).

ADVICE:

If this indicator is not illuminated, it means that the Sub (VFO-B) TX indicator has been selected (it will be glowing Red). In this case, transmission will be effected on the frequency and mode programmed for the Sub (VFO-B) band.

③⑧ Main Tuning Dial Knob

This large knob adjusts the operating frequency of the Main band (VFO-A) or a recalled memory. Clockwise rotation of this knob increases the frequency. Default tuning increments are 10 Hz (100 Hz in AM and FM modes); when the [FAST] button is pressed, the tuning steps increase. The available steps are:

OPERATING MODE	1 STEP	1 DIAL ROTATION
LSB/USB/CW/RTTY/PKT(LSB)	10 Hz (100 Hz)	10 kHz (100 kHz)
AM/FM/PKT(FM)	100 Hz (1 kHz)	100 kHz (1 MHz)

Numbers in parentheses indicate steps when the [FAST] button is On.

ADVICE:

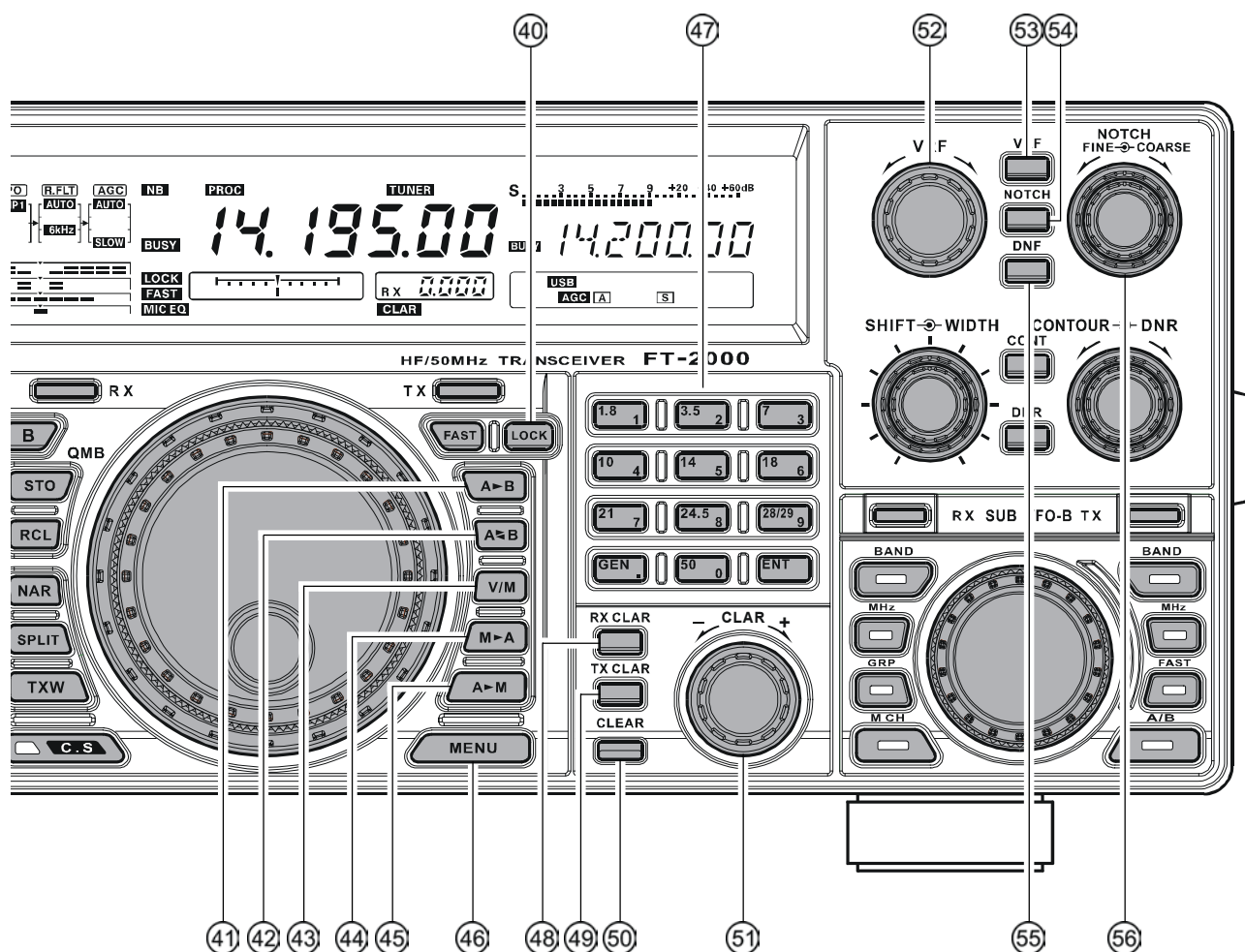
The tuning steps for the Main Tuning Dial knob are set, at the factory, to 10 Hz per step. Via Menu item "116 tun DIALSTP," however, you may change this setting from 10 Hz to 1 Hz instead. When 1 Hz basic steps are selected, the action of the [FAST] button will be changed to 1/10 of the values listed above.

③⑨ FAST Switch

Pressing this button will increase or decrease the tuning rate of the Main Tuning Dial knob by a factor of ten, as mentioned in the previous section.

When this function is activated, the "[FAST]" icon appears in the display.

FRONT PANEL CONTROLS & SWITCHES



④① LOCK Switch

This button toggles locking of the Main Tuning Dial knob, to prevent accidental frequency changes. When the button is active, the Main Tuning Dial knob can still be turned, but the frequency will not change, and the “**LOCK**” icon appears in the display.

④② [A▶B] Switch

Press this button momentarily to transfer data from the Main band (VFO-A) frequency (or a recalled memory channel) to the Sub band (VFO-B), overwriting any previous contents in the Sub band (VFO-B). Use this key to set both Main band (VFO-A) and Sub band (VFO-B) receivers to the same frequency and mode.

④③ [A↔B] Switch

Pressing this button momentarily exchanges the contents of the Main band (VFO-A) (or a recalled memory channel) and the Sub band (VFO-B).

④④ [V/M] Switch

This button toggles Main band (VFO-A) receiver operation between the memory system and the VFO. Either “**MR**” or “**MT**” will be displayed to the under the main frequency display field to indicate the current selection. If you have tuned off of a Memory channel frequency (MT), pressing this button returns the display to the original memory contents (MR), and pressing it once more returns operation to the Main VFO (no icon).

④⑤ [M▶A] Switch

Pressing this button momentarily displays the contents of the currently-selected memory channel for three seconds.

Holding this button in for 2 seconds copies the data from the currently-selected memory to the Main VFO (VFO-A), as two beeps sound. Previous data in the Main VFO will be overwritten.

FRONT PANEL CONTROLS & SWITCHES

④5 [A►M] Switch

Pressing and holding in this key for 1/2 second (until the double beep) copies the current operating data from the Main band (VFO-A) into the currently selected memory channel, overwriting any previous data stored there.

Also, pressing and holding in this button after recalling a memory, without first retuning, causes the memory channel to be “masked,” and repeating the process restores the masked memory.

④6 MENU Switch

This button is used for gaining access to the Menu system, for configuring various transceiver characteristics. Menu operation is described in detail, in this manual, beginning on page 112.

IMPORTANT NOTE:

Pressing this button momentarily activates the Menu, and the Menu items will appear on the display; once you are finished, you must press and hold in the [MENU] button for two seconds to save any configuration changes (momentarily pressing the [MENU] button to exit will not save the changes).

④7 BAND Keys

These keys allow one-touch selection of the desired Amateur band (1.8 ~ 50 MHz).

What’s more, these keys may be used for direct entry of a desired operating frequency during VFO operation.

④8 RX CLAR Switch

Pressing this button activates the RX Clarifier, to allow offsetting the Main (VFO-A) receiving frequency temporarily. Press this button once more to return the Main receiver to the frequency shown on the main frequency display field; the Clarifier offset will still be present, though, in case you want to use it again. To cancel the Clarifier offset, press the [CLEAR] button.

④9 TX CLAR Switch

Pressing this button activates the TX Clarifier, to allow offsetting the Main (VFO-A) transmit frequency temporarily.

Press this button once more to return the transmitter to the Main (VFO-A) frequency shown on the main frequency display field; the Clarifier offset will still be present, though, in case you want to use it again. To cancel the Clarifier offset, press the [CLEAR] button.

⑤0 CLEAR Switch

Pressing this button clears out any frequency offset you have programmed into the Clarifier register (thereby setting the offset to “Zero”).

⑤1 CLAR Knob

This knob tunes the Clarifier offset frequency up to 9.99 kHz.

⑤2 VRF Knob

This knob tunes the passband of the VRF (Variable RF Filter) preselector circuit for maximum receiver sensitivity (and out-of-band interference rejection).

ADVICE:

- ❑ The relative position of the VRF passband can be observed on the Tuning Offset Indicator of the display via Menu item “010 diSP BAR SEL.”
- ❑ When the optional RF μ Tuning Kit is connected, this knob allows adjustment of the center frequency of the μ -Tuning filter passband (which is much narrower than that of the VRF).

⑤3 VRF Switch

This button turns the VRF filter on and off. While activated, the “VRF” icon will appear in the FLT column of the Receiver Configuration Indicator on the display.

ADVICE:

When the optional RF μ Tuning Kit is connected, pressing this button will engage the μ -Tuning filter. The μ Tuning Kit provides much better RF selectivity than any other RF filter in the Amateur industry, yielding outstanding protection from high RF levels not far removed from the current operating frequency.

⑤4 NOTCH Switch

This button turns the Main band (VFO-A) receiver’s IF Notch Filter on and off.

When the IF Notch Filter is activated, the peak position of the IF Notch Filter is depicted graphically in the display. The IF Notch Filter center frequency is adjusted via the [NOTCH] knob.

⑤5 DNF Switch

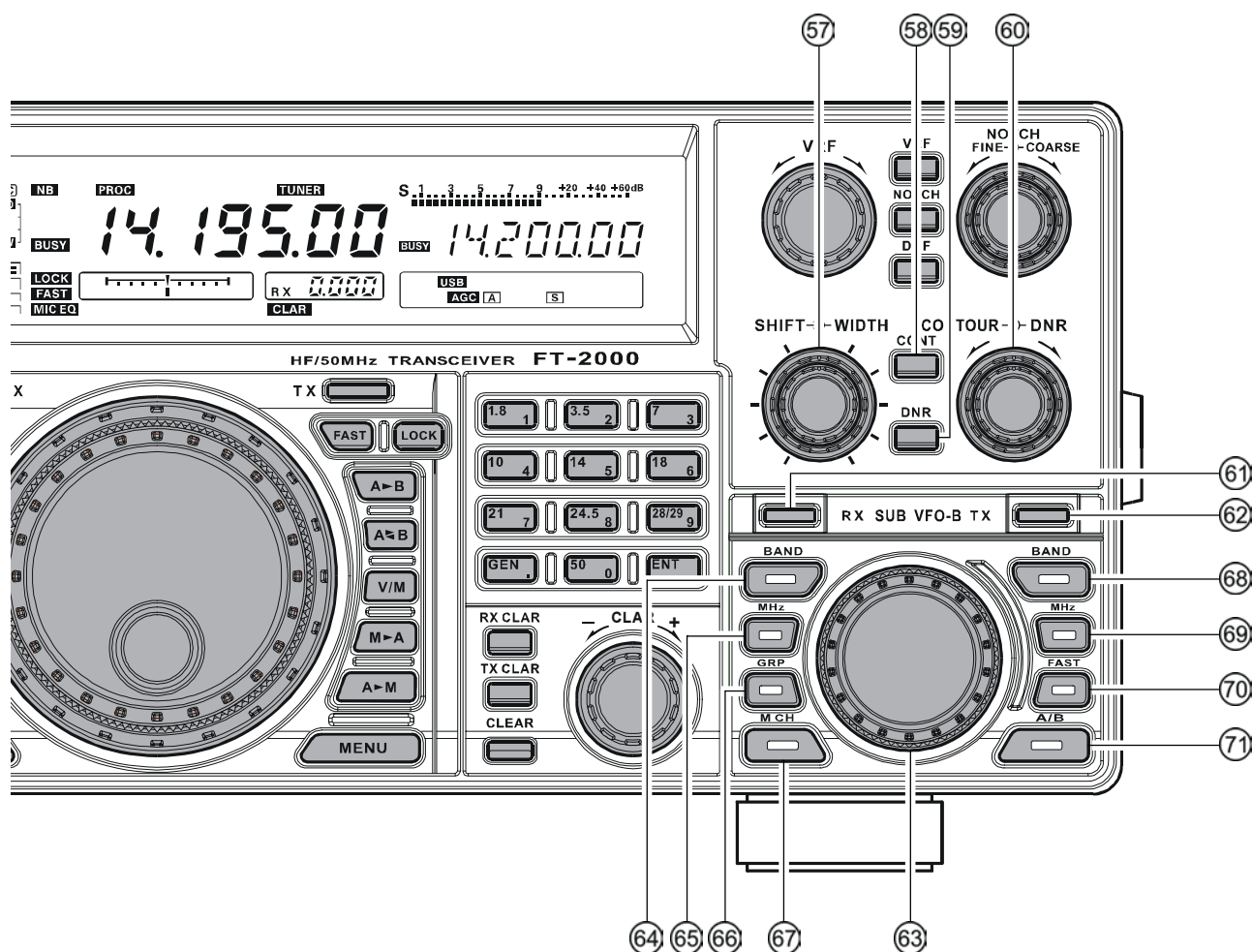
This button turns the Main band (VFO-A) receiver’s Digital Notch Filter on and off. When the Digital Notch Filter is activated, the “DNF” icon appears in the display. This is an automatic circuit, and there is no adjustment knob for the DNF.

⑤6 NOTCH Knob

This knob adjusts the center frequency of the Main band (VFO-A) receiver’s IF Notch Filter. The Notch Filter is engaged via the [NOTCH] button.

Initially, the approximate center frequency of the IF Notch Filter is adjusted by the outer [COARSE] knob; then, fine tuning of the center frequency is adjusted by the inner [FINE] knob.

FRONT PANEL CONTROLS & SWITCHES



57 SHIFT WIDTH Knobs (EXCEPT ON FM MODE)

SHIFT Knob

The inner [SHIFT] knob provides adjustment of the IF DSP passband, using 20 Hz steps for precise adjustment and easy reduction of interference on either side of your operating frequency. The total adjustment range is ± 1 kHz. The normal operating setting for this knob is straight up, in the 12 o'clock position.

ADVICE:

You may shift the Sub band (VFO-B) filter passband via Menu item "042 S-IF LSB SET" through "049 S-IF PKT-USB."

WIDTH Knob

The outer [WIDTH] knob sets the overall bandwidth of the IF DSP filter for the Main (VFO-A) receiver. The center (12 o'clock) position establishes the "default" bandwidth (for example, 2.4 kHz for SSB); clockwise rotation of this knob increases the bandwidth (out to a maximum of 4 kHz), while counter-clockwise rotation reduces the bandwidth.

When the NAR (Narrow) filter selection is engaged, the [WIDTH] knob is disabled.

The [SHIFT] knob may be used to re-center the passband response on the incoming signal, and you may find that the CONTOUR and IF Notch Filter may also help improve intelligibility and/or reduce interference. See also the discussions of the [CONTOUR] knob and [NOTCH] knob.

ADVICE:

When the [NAR] button has been pushed, the [WIDTH] knob no longer functions. The IF SHIFT system is still fully operational, however.

FRONT PANEL CONTROLS & SWITCHES

⑤8 CONT Switch

This button turns the Main band (VFO-A) receiver's CONTOUR filter on and off. When the CONTOUR Filter is activated, the peak position of the CONTOUR Filter is depicted graphically in the display. Adjustment of the CONTOUR filter's center frequency is provided by the [CONTOUR] knob.

NOTE:

There are times, when you're trying to remove interference with a sharp DSP filter, that the remaining signal has a somewhat unnatural sound. This is caused by the cutting of some frequency components, leaving other components in excess. The CONTOUR filter allows you (especially) to roll off certain frequency components inside the remaining passband, but in a smooth manner that helps restore a natural sound and/or raise intelligibility.

⑤9 DNR Switch

This button turns the Main band (VFO-A) receiver's Digital Noise Reduction circuit on and off. When the Digital Noise Reduction is activated, the "DNR" icon appears in the display. Adjustment of the Noise Reduction level is provided by the [DNR] knob.

⑥0 CONTOUR → DNR Knob

CONTOUR Knob

The inner [CONTOUR] knob selects the desired Main band (VFO-A) receiver's CONTOUR filter response. The CONTOUR filter is engaged via the [CONTOUR] button.

DNR Knob

The outer [DNR] knob selects the Main band (VFO-A) receiver's optimum Digital Noise Reduction response. The Noise Reduction circuit is engaged via the [DNR] button.

⑥1 RX Indicator/Switch

This is the button that turns the Sub (VFO-B) receiver On and Off. When this button is pressed to make the Sub (VFO-B) receiver active, the Green LED imbedded within the button will light up. Pressing the button again will disable this receiver, and the imbedded Green LED will turn off.

⑥2 TX Indicator/Switch

This is the button that turns the Sub (VFO-B) transmitter On and Off. When this button is pressed to transfer transmitter control to the Sub (VFO-B) frequency and mode, the Red LED imbedded within the button will light up. Pressing this button once more will transfer frequency/mode control back to the Main (VFO-A) side, and the Red LED imbedded within this button will turn off.

⑥3 SUB VFO-B Knob

Depending on the status of the [A/B] button located at the right bottom of the [SUB VFO-B] knob, the [SUB VFO-B] knob is used for functions associated with the Main (VFO-A) or Sub (VFO-B) frequency control registers.

⑥4 (VFO-A) BAND Switch

Pressing this button allows you to select the Main (VFO-A) operating band (Amateur bands) using the [SUB VFO-B] knob.

⑥5 (VFO-A) MHz Switch

Pressing this button allows you to tune the Main band (VFO-A) frequency down or up in 1 MHz increments, using the [SUB VFO-B] knob.

⑥6 GRP Switch

Pressing this button allows you to select the memory group using the [SUB VFO-B] knob.

⑥7 M CH Switch

Pressing this button allows you to select the memory channel using the [SUB VFO-B] knob.

⑥8 (VFO-B) BAND Switch

When the [A/B] button is pressed, and the Orange lamp to the right of the [SUB VFO-B] knob lights up, pressing this button allows you to select the Sub (VFO-B) operating band (Amateur bands) using the [SUB VFO-B] knob.

⑥9 (VFO-B) MHz Switch

When the [A/B] button is pressed, and the Orange lamp to the right of the [SUB VFO-B] knob lights up, pressing this button allows you to tune the Sub band (VFO-B) frequency down or up in 1 MHz increments, using the [SUB VFO-B] knob.

⑦0 FAST Switch

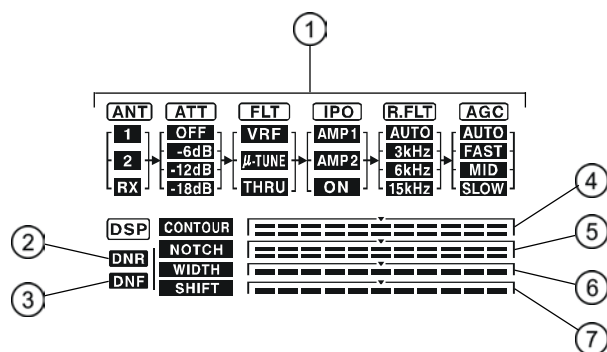
When the [A/B] button is pushed, and the Orange lamp to the right of the [SUB VFO-B] knob lights up, the [SUB VFO-B] knob will be controlling the Sub band (VFO-B) frequency; pressing the [FAST] button will increase the tuning rate by a factor of 10.

⑦1 A/B Switch

The [A/B] button determines whether the actions of the [SUB VFO-B] knob will be applied to the Main band (VFO-A) or the Sub band (VFO-B).

Pressing this button once causes the Orange lamp to the right of the [SUB VFO-B] knob to light up; in this case, rotation of the [SUB VFO-B] knob affects operation on the Sub band (VFO-B). Pressing the [A/B] button once more causes the Orange lamp to turn off; in this instance, rotation of the [SUB VFO-B] knob affects operations associated with the Main band (VFO-A).

DISPLAY INDICATIONS (LEFT SIDE & CENTER)



① Receiver Configuration Indicators

ANT (1, 2, RX):

Indicates the antenna selected for operation by the front panel [1/2] and [RX] antenna switches.

ATT (OFF, -6 dB, -12 dB, -18 dB):

Indicates the attenuation level selected for operation by the front panel [ATT] button.

FLT (VRF, μ-TUNE, THRU):

Indicates the RF filter selected for operation by the front panel [VRF] button.

ADVICE:

The μ-TUNE filter is an option. The “μ-TUNE” icon will not appear when the optional μ-TUNE unit is not connected.

IPO (AMP 1, AMP 2, ON):

Indicates the front end RF amplifier selected for operation by the front panel [IPO] button.

R.FLT

Indicates the 1st IF Roofing Filter selected: AUTO (mode-determined), 3 kHz, 6 kHz, or 15 kHz.

AGC (AUTO, FAST, MID, SLOW):

Indicates the AGC decay time selected for Main band (VFO-A) operation by the front panel [AGC] switch.

② DNR

This indicator appears whenever the Digital Noise Reduction feature is activated.

③ DNF

This indicator appears whenever the Digital Notch Filter is activated.

④ CONTOUR

The peak position of the CONTOUR Filter is depicted graphically here when the CONTOUR Filter is activated.

⑤ NOTCH

The null position of the IF Notch Filter is depicted graphically here when the IF Notch Filter is activated.

⑥ WIDTH

Indicates the bandwidth of the DSP IF filter.

⑦ SHIFT

Indicates the peak position of the DSP IF filter.

⑧ NB

This indicator appears when the Main band (VFO-A) receiver's (short duration) Noise Blanker is activated. This indicator will blink for three seconds, and thereafter appears continuously, when the Main band (VFO-A) receiver's longer-pulse Noise Blanker is activated.

⑨ NAR

This indicator appears whenever the Main band (VFO-A) receiver's narrow IF DSP filter is engaged.

⑩ PROC

This indicator appears whenever the DSP Speech Processor is activated.

⑪ MONI

This indicator appears whenever the transmit monitor circuit is activated.

⑫ KEYER

This indicator appears whenever the internal CW keyer is activated.

⑬ BK-IN

This indicator appears whenever CW break-in operation is activated.

⑭ TUNER

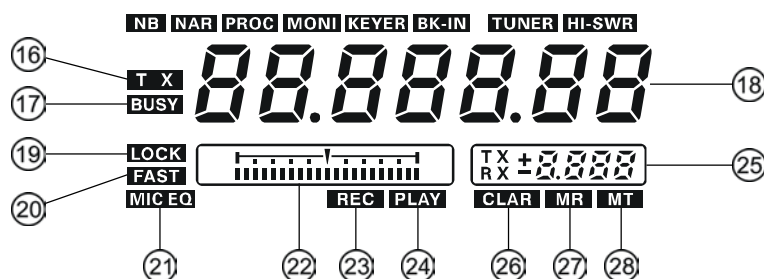
This indicator appears when the internal Automatic Antenna Tuner is activated.

⑮ HI SWR

This indicator appears if the directional coupler and microprocessor detect an abnormally high SWR condition (over 3.0:1) that cannot be resolved by the Automatic Antenna Tuner.

NOTE:

If this indicator appears, check to be sure that you have the correct antenna selected on the current operating band. If so, you will need to check the condition of the antenna, its coaxial cable, and/or the connectors on the cable so as to locate and correct the fault.



①⑥ TX

This indicator appears during transmission on the Main band (VFO-A) frequency.

①⑦ BUSY

This indicator appears whenever the Main band (VFO-A) receiver squelch is open. If this indicator is not showing, and reception seems to have been lost on the Main receiver for no apparent reason, check the position of the SQL knob and rotate it fully counter-clockwise to restore reception.

①⑧ Main (VFO-A) Frequency Display

This is the Main band (VFO-A) frequency display.

ADVICE:

- ☐ When setting the Menu items, the Menu item number and Menu group name will appear in this area during setup.
- ☐ When setting the CTCSS frequency for Encoding or Tone Squelch operation, the current tone information will appear in this area during setup.

①⑨ LOCK

This indicator appears when the Main Tuning Dial knob is locked.

②⑦ FAST

This indicator appears when the Main Tuning Dial knob's tuning rate is selected to fast.

②① MIC EQ

This indicator appears whenever the Three-Band Parametric Microphone Equalizer is activated.

②② Tuning Offset Indicator

This is a tuning scale that, as configured from the factory, provides a visual CW tuning indication of the incoming signal's offset from your transceiver's CW carrier frequency, as programmed by the relative clarifier offset, or the peak position of the VRF/ μ -TUNE filter.

②③ REC

This indicator appears while the voice recorder is recording the receiver audio, and/or the memory is recording your CW or voice message.

②④ PLAY

This indicator appears while the voice recorder is playing back the recorded audio, and/or the memory is playing back the recorded CW or voice message.

②⑤ Multi-Display Window

This window displays either the Clarifier offset or Memory Channel Number.

ADVICE:

- ☐ During FM operation, the Repeater Shift will be indicated in this window. A Negative frequency shift will be indicated by “-” while a Positive frequency shift will be indicated by “+.”
- ☐ When setting the Menu items, the current setting will appear in this area.
- ☐ When setting the CTCSS frequency for Encoding or Tone Squelch operation, the current repeater shift direction will appear in this area.

②⑥ CLAR

This indicator appears whenever the Clarifier function is activated.

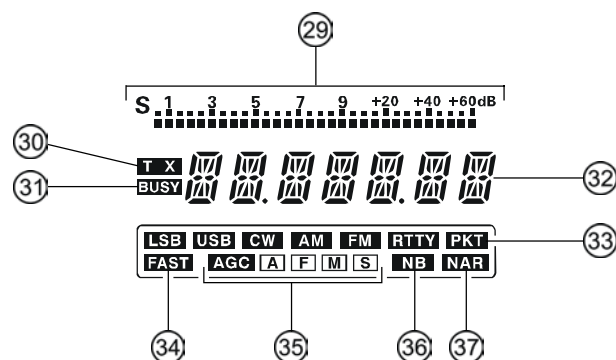
②⑦ MR

This indicator appears when the **FT-2000D** is in the Memory Recall mode.

②⑧ MT

This indicator appears when the **FT-2000D** is in the Memory Tune mode to indicate that the memory contents have been temporarily changed.

DISPLAY INDICATIONS (RIGHT SIDE)



29 Sub (VFO-B) Receiver S-Meter

Displays the strength of signals received on the Sub band (VFO-B).

30 TX

This indicator appears during transmission on the Sub band (VFO-B) frequency.

31 BUSY

This indicator appears whenever the Sub band (VFO-B) receiver squelch is open. If this indicator is not showing, and reception seems to have been lost on the Sub receiver for no apparent reason, check the position of the Sub [SQL] knob and rotate it fully counter-clockwise to restore reception.

32 Sub (VFO-B) Frequency Display

This is the Sub band (VFO-B) frequency display.

ADVICE:

- ☐ When setting the Menu items, the Menu item name will appear in this area during setup.
- ☐ When setting the CTCSS frequency for Encoding or Tone Squelch operation, the current tone frequency will appear in this area during setup.
- ☐ When activating the CW Spot Tone, the current tone frequency will appear in this area.

33 LSB, USB, CW, AM, FM, RTTY, PKT

Displays the currently-selected operating mode for the Sub (VFO-B) receiver.

34 FAST

This indicator appears when the [SUB VFO-B] knob's tuning rate is selected to fast.

35 AGC A, F, M, S

Displays the currently-selected AGC decay time for the Sub (VFO-B) receiver.

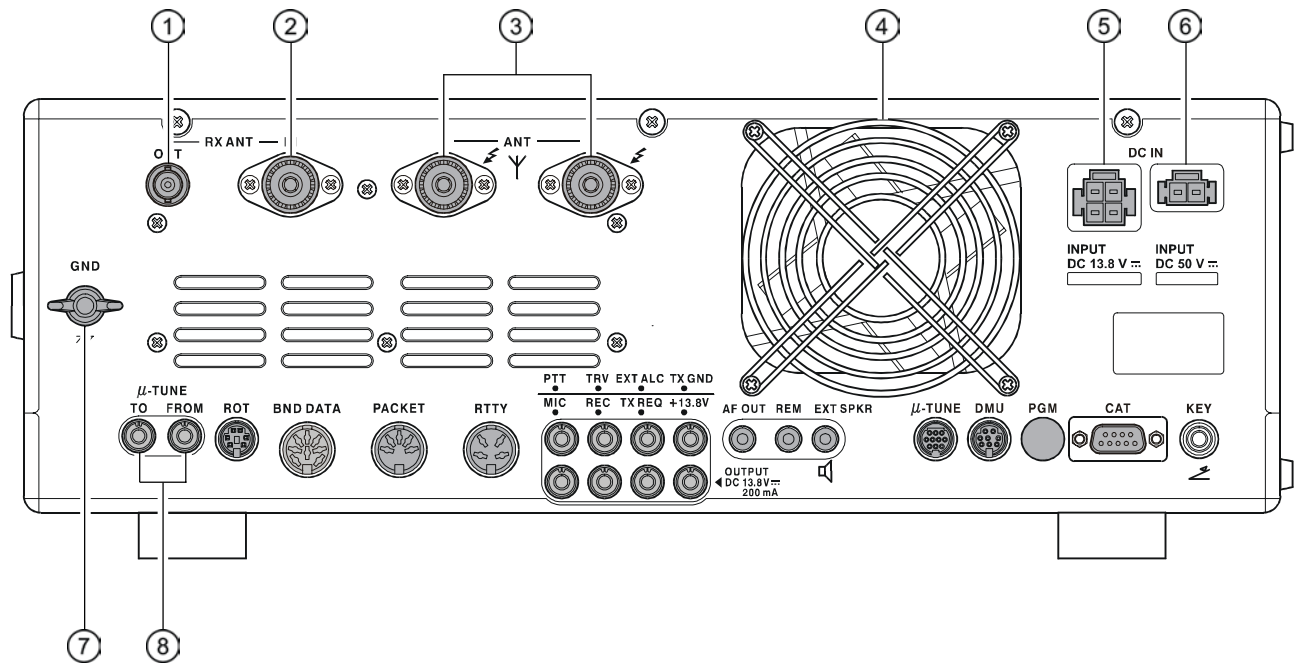
A: Auto, F: Fast, M: Medium, S: Slow

36 NB

This indicator appears when the Sub (VFO-B) receiver's (short duration) Noise Blanker is activated. This indicator will blink for three seconds, and thereafter appears continuously, when the Sub (VFO-B) receiver's longer-pulse Noise Blanker is activated.

37 NAR

This indicator appears whenever the optional Sub (VFO-B) receiver's narrow filter is selected.



① RX ANT OUT Jack

This BNC jack provides output of the receiver signal lines from the Antenna jacks which are connected to “RX” side of the transceiver’s main T/R switching circuitry.

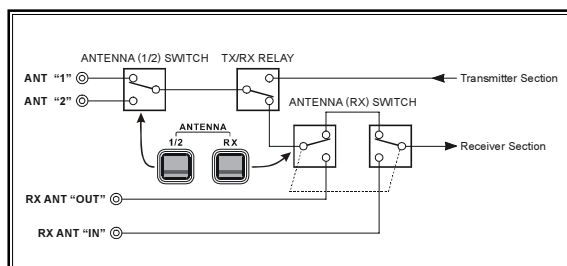
② RX ANT IN Jack

This type-M jack is for a separate receive-only antenna. An antenna connected here can be used when the [RX] antenna button on the front panel is pressed.

If you want to use some special kind of external bandpass filter or preamplifier, you may connect it between the RX ANT OUT and RX ANT IN jacks.

③ ANT 1/2 Jacks

Connect your main antenna(s) here, using a type-M (PL-259) plug and coaxial feedline for each. These antenna ports are always used for transmission, and also are used for reception unless a separate receive antenna is also used for the receiver. The internal antenna tuner affects only the antenna(s) connected here, and only during transmission.



④ COOLING FAN

This is a cooling fan for cooling down the internal power supply unit.

Usually, this cooling fan does not rotation. However, when the temperature begins to rise, a cooling fan begins a rotation.

⑤ DC 13.8 V IN Jack

Connect this 6-pin connector to the **DC 13.8 V** Output Jack on the **FP-2000** AC Power Supply, using the supplied DC Power Cord. This connector provides +13.8 V DC supply voltage for the **FT-2000D**.

⑥ DC 50 V IN Jack

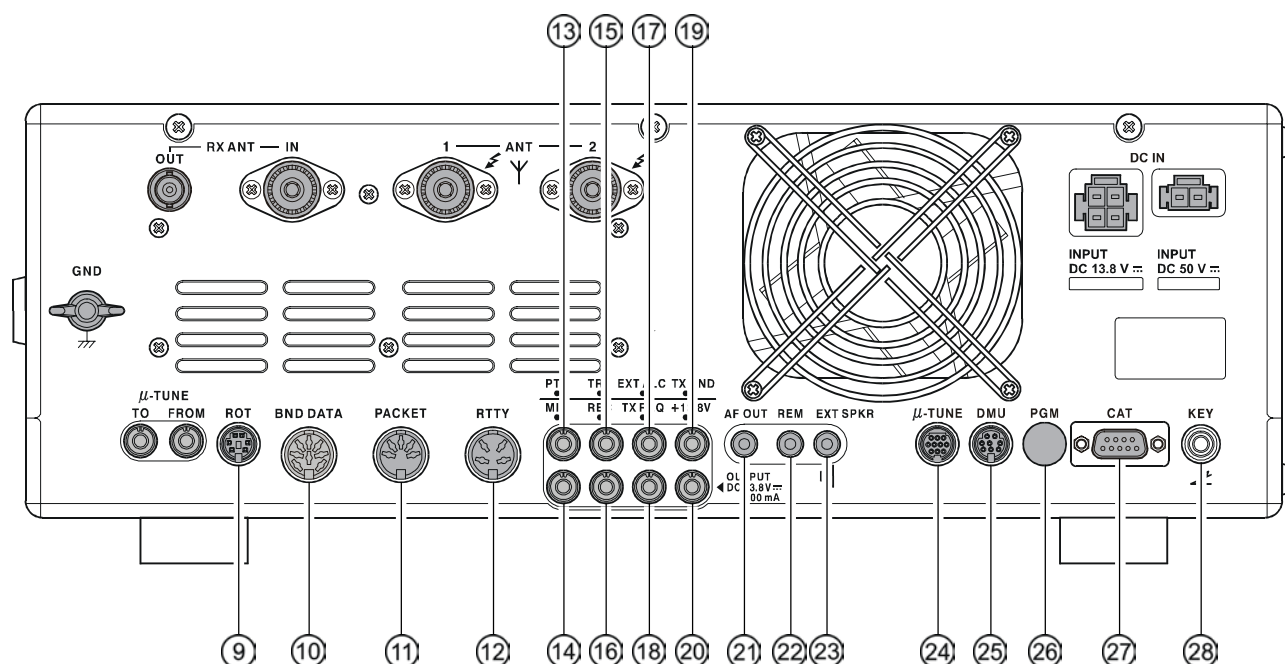
Connect this 2-pin connector to the **DC 50 V** Output Jack on the **FP-2000** AC Power Supply, using the supplied DC Power Cord. This connector provides +50 V DC supply voltage for the power amplifier of the **FT-2000D**.

⑦ GND

Use this terminal to connect the transceiver to a good earth ground, for safety and optimum performance. Use a large diameter, short braided cable for making ground connections, and please refer to page 9 for other notes about proper grounding.

⑧ μ-TUNE Jacks

These jacks are used for signal input/output of the optional RF μ Tuning Kit.



⑨ ROT (ROTATOR) Jack

This 5-pin MINI-DIN Jack accepts a cable connected to a YAESU **G-800DXA/-1000DXA/-2800DXA** Antenna Rotator (listed models are current as of early 2006). You may control the antenna azimuth rotation (and rotation speed) using the Function buttons on the front panel.

⑩ BND (BAND) DATA Jack

This 8-pin output jack provides band selection data which may be used for control of optional accessories such as the **VL-1000** Solid-state Linear Amplifier.

⑪ PACKET Jack

This 5-pin input/output jack provides receiver audio and squelch signals, and accepts transmit (AFSK) audio and PTT control, from an external Packet TNC. Pinout is shown on page 15. The receiver audio level at this jack is approximately 100 mVp-p (@600 Ohms).

⑫ RTTY Jack

This 4-pin input/output jack provides connections for an RTTY terminal unit. Pinout is shown on page 15. The receiver audio level at this jack is at a constant 100-mV (@600 Ohms) level. FSK keying at this jack is accomplished by a closure of the SHIFT line to ground by the terminal unit.

⑬ PTT Jack

This RCA input jack may be used to provide manual transmitter activation using a footswitch or other switching device. Its function is identical to the **[MOX]** button on the front panel. The same line is available at the **PACKET** and **RTTY** jacks for TNC control. Open-circuit voltage is +13.5 VDC, and closed-circuit current is 5 mA.

⑭ MIC (PATCH) Jack

This RCA input jack accepts transmitter audio - either AFSK or voice - for transmission. This line is mixed with the microphone audio input line, so the microphone should be disconnected if using this jack and mixing is not desired. The optimum impedance is 500 ~ 600 Ohms, and the nominal input level should be 5 mV.

⑮ TRV Jack

This RCA jack provides a low level RF output for use with a transverter. Maximum output is approximately -10 dBm (0.1 mW) at 50 Ohms.

⑯ REC Jack

This RCA jack provides low-level receiver audio output and transmit audio, for recording or external amplification. Peak signal level is 30 mVp-p at 10 kOhms.

⑰ EXT ALC Jack

This RCA input jack accepts negative-going external ALC (Automatic Level Control) voltage from a linear amplifier, to prevent over-excitation by the transceiver. Acceptable input voltage range is 0 to -4 VDC.

⑱ TX REQ Jack

When this RCA jack shorted to ground, it puts the **FT-2000D** into the transmit mode, and sends out a steady CW carrier, for linear amplifier or manual antenna tuner adjustment.

⑲ TX GND Jack

This RCA jack's center pin is closed to ground while the transceiver's transmitter is engaged. It may be used for control of a peripheral device, most typically a linear amplifier. To enable this jack, please set Menu item "144 tGEn ETX-GND" to the "EnA" (Enable) selection.

The relay circuit of the **FT-2000D** used for this jack is capable of switching AC voltage of 100 Volts at up to 300 mA, or DC voltages or 60 V at 200 mA or 30 V at up to 1 Amp.

⑳ +13.8 V Jack

This RCA output jack provides regulated, separately fused 13.8 VDC at up to 200 mA, to power an external device such as a packet TNC. Make sure your device does not require more current (if it does, use a separate power source).

㉑ AF OUT

This gold-plated 3-contact jack provides dual-channel low-level receiver output, for recording or external amplification. Peak signal level is 300 mVp-p at 10 k-Ohms. Main band (VFO-A) receiver audio is on the left channel (tip), and sub band (VFO-B) receiver audio is on the right channel (ring). A stereo amplifier or recorder is recommended, to record each receiver's audio separately when dual reception is enabled (audio from either receiver, or both, may be used via this jack). The front panel **[AF GAIN]** knobs do not affect the signals at this jack.

㉒ REM (REMOTE) Jack

By plugging in the optional **FH-2** Remote Control Keypad to this gold-plated jack, direct access to the **FT-2000D** CPU is provided for control functions such as contest memory keying, plus frequency and function control.

㉓ EXT SPKR

This gold-plated two-contact output jack provides receiving audio from the Main (VFO-A) and Sub (VFO-B) receivers for an external loudspeaker or speakers, such as the **SP-2000**. Inserting a plug into this jack disables the internal loudspeaker. Impedance is 4 ~ 8 Ohms.

㉔ μ -TUNE Jack

This 10-pin MINI-DIN jack used for control of the optional RF μ Tuning Kit.

㉕ DMU Jack

This 8-pin MINI-DIN jack accepts a cable connected to an optional **DMU-2000** Data Management Unit.

㉖ PGM (PROGRAM) Jack

This covered 9-pin MINI-DIN jack is used at the factory. *Please do not connect any equipment to this jack.*

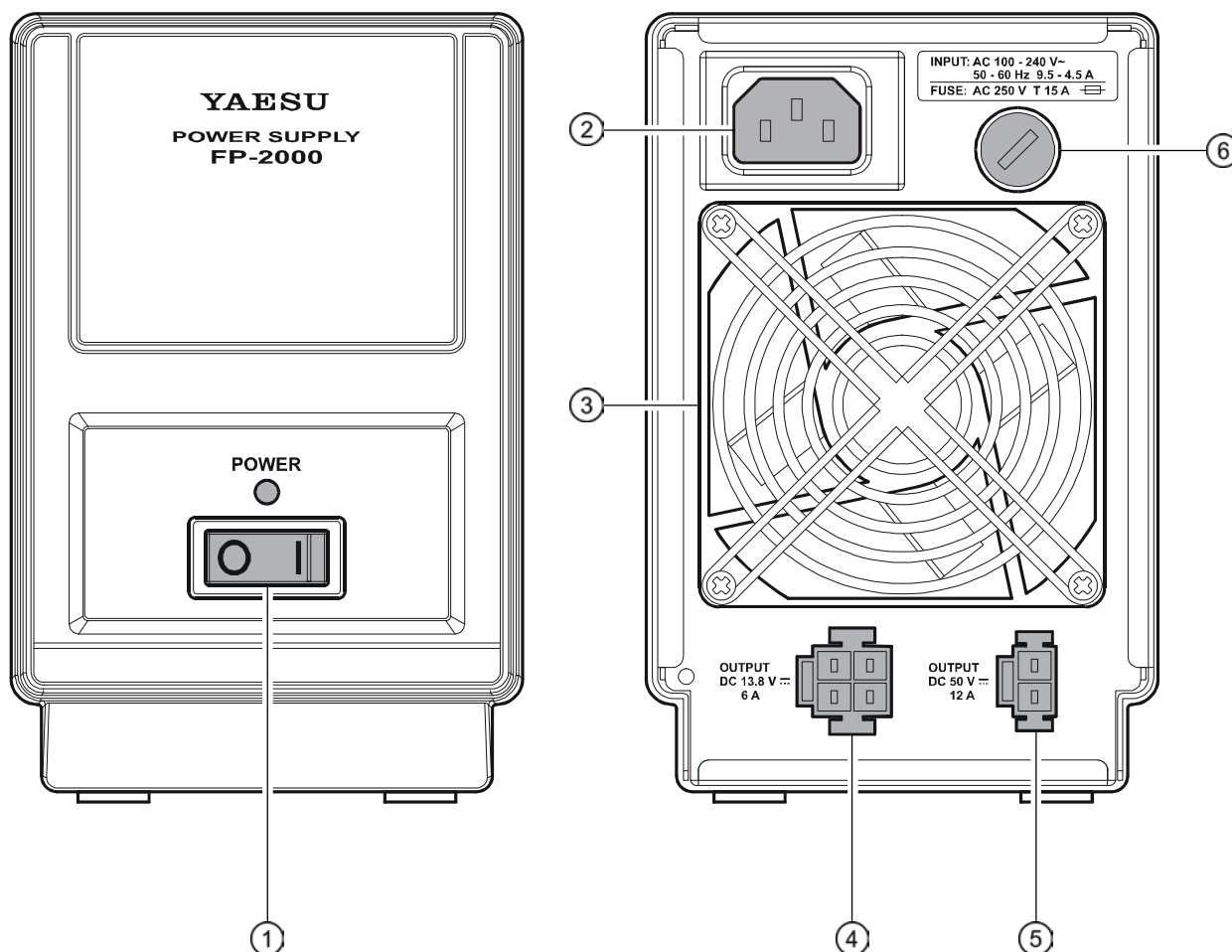
㉗ CAT Jack

This 9-pin serial DB-9 jack allows external computer control of the **FT-2000D**. Connect a serial cable here and to the RS-232C COM port on your personal computer (no external interface is required).

㉘ KEY Jack

This 1/4-inch phone jack accepts a CW key or keyer paddle. A 2-contact plug cannot be used in this jack. Key-up voltage is +5 V, and key-down current is 1 mA. Plug wiring is shown on page 15, and this jack may be configured for keyer, "Bug," "straight key," or computer keying interface operation via Menu item "054 A1A R-TYPE."

FP-2000 SWITCHES & JACKS



① POWER Switch

This is the **FP-2000**'s main ON (I)/OFF (O) switch. When turn on the **FP-2000**, the LED indicator will glow red several seconds later. If this main switch is not set to the "(I)" position, the **FT-2000D**'s [POWER] switch will not function.

NOTE

Rarely, when a rush current flowed, the **FP-2000** is buzzed faintly. This is normal condition.

② AC IN Jack

Connect the supplied 3-wire AC line cord to this socket.

③ Cooling Fan

This is a cooling fan for cooling down the internal power supply unit.

Usually, this cooling fan does not rotation. However, when the temperature begins to rise, a cooling fan begins a rotation.

④ OUTPUT DC 13.8 V Jack

Connect this 6-pin connector to the **DC 13.8 V** Input Jack on the **FT-2000D**, using the supplied DC Power Cord. The DC output is 13.8 Volts, with maximum current of 6 Amps.

⑤ OUTPUT DC 50 V Jack

Connect this 2-pin connector to the **DC 50 V** Input Jack on the **FT-2000D**, using the supplied DC Power Cord. The DC output is 50 Volts, with maximum current of 12 Amps.

⑥ FUSE

This holder requires a 15-A fuse. Always use the 10 Amp fuse, whether operating on 100 - 120 VAC or 200 - 240 VAC.

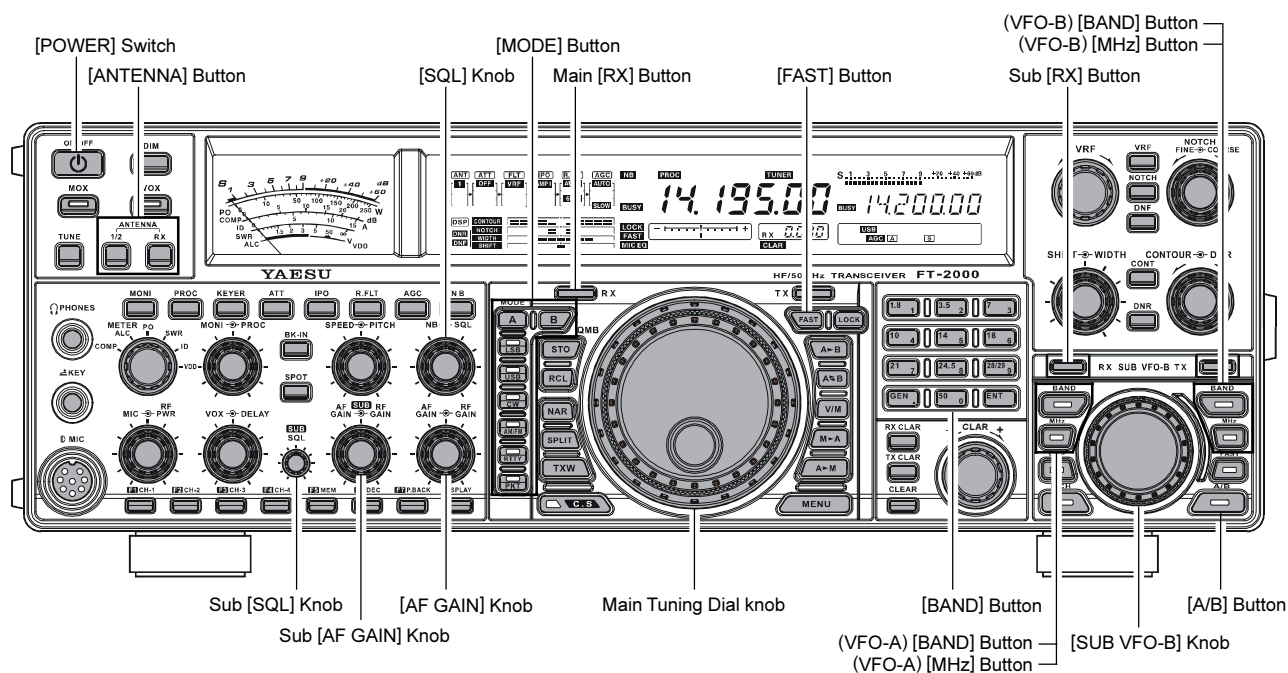
BASIC OPERATION: RECEIVING ON AMATEUR BANDS

Before turning on main power, please verify the following items once more.

- ☐ Have you made all ground connections securely? See page 9 for details.
- ☐ Do you have your antenna(s) connected to the rear-panel Antenna jack(s)? See page 10 for details.
- ☐ Is your microphone (and/or key or paddle) connected? See pages 11 and 12 for details.
- ☐ If using a linear amplifier, have all interconnections been successfully completed? See pages 13 and 14 for details.
- ☐ Please rotate both [**AF GAIN**] controls to their fully counter-clockwise positions, to avoid a loud blast of audio when the transceiver turns on. See page 21 for details.
- ☐ Rotate the [**RF PWR**] control fully counter-clockwise, to set minimum power at first. See page 21 for details.
- ☐ If your AC mains power should suffer a significant fluctuation or interruption, we recommend that you go through a complete power-up cycle, in order to ensure that all circuits are properly initialized. To do this, be sure the **FT-2000D**'s [**POWER**] switch is turned off, then set the **FP-2000**'s [**POWER**] switch to the “**O**” position. Now unplug the AC cable from the rear panel of the **FP-2000**, and wait ten seconds before proceeding with the start-up procedure described on next page.

BASIC OPERATION: RECEIVING ON AMATEUR BANDS

Here is the typical start-up procedure for normal operation:



1. Set the **FT-2000D's** **[POWER]** switch to "I" position.
2. Press and hold in the **FT-2000D's** **[POWER]** switch for one second to turn the transceiver on.
3. The transceiver will start up on 7.000.00 MHz LSB, and normal operation may begin.

NOTE:

To turn power off, press and hold in the **FT-2000D's** **[POWER]** switch for one second.

4. Rotate the **[AF GAIN]** knob to set a comfortable audio level on incoming signals or noise. Clockwise rotation of the **[AF GAIN]** knob increases the volume level.

NOTE:

When using headphones, start by rotating the **[AF GAIN]** knob counter-clockwise, then bring the volume level up after you put the headphones on. This will minimize the chance of damage to your hearing caused by an unexpectedly-high audio level.

5. Press the Main **[RX]** button to engage the Main (VFO-A) receiver; the imbedded LED will glow Green.

ADVICE:

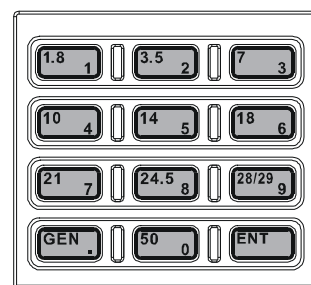
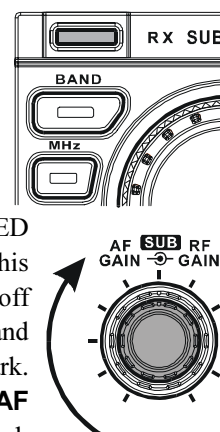
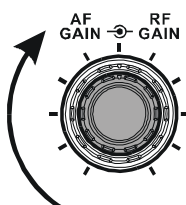
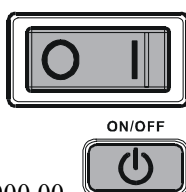
- ☐ If you press the Main **[RX]** button when the imbedded LED is already glowing Green, the LED will now blink on and off; this indicates that the Main (VFO-A) receiver is temporarily muted. Just press the Main **[RX]** button once more to restore Main (VFO-A) receiver operation.

- ☐ Press the Sub **[RX]** button to engage Dual Reception (using the Sub (VFO-B) receiver in addition to the Main (VFO-A) receiver). When you press the Sub **[RX]** button, its imbedded LED will glow green; pressing this button once more will turn off the Sub (VFO-B) receiver, and the imbedded LED will go dark. Use the Sub receiver's Sub **[AF GAIN]** knob to adjust the Sub (VFO-B) receiver volume level.

6. Press the **[BAND]** button corresponding to the Amateur band on which you wish to begin operation.

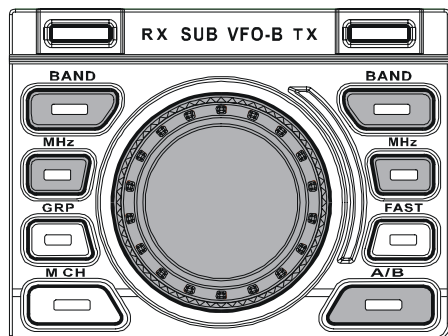
ADVICE:

- ☐ One-touch selection of each Amateur band between 1.8 and 50 MHz is provided.
- ☐ The **FT-2000D** utilizes a triple band-stack VFO selection technique, which permits you to store up to three favorite frequencies and modes onto each band's VFO register. For example, you may store one frequency each on 14 MHz CW, RTTY, and USB, then recall these VFOs by successive, momentary presses of the **[14]** MHz band button. Each Amateur band button may similarly have up to three frequency/mode settings applied.



BASIC OPERATION: RECEIVING ON AMATEUR BANDS

- ❑ If you press the (VFO-A) **[BAND]** button, the **[SUB VFO-B]** knob may be used as a band selection knob. If you press the (VFO-A) **[MHz]** button, rotation of the **[SUB VFO-B]** knob allows frequency navigation in 1 MHz steps. Depending on the setting of the (VFO-A) **[BAND]**, (VFO-A) **[MHz]**, and **[A/B]** buttons, the function of the **[SUB VFO-B]** knob will change.



- Press the **[ANTENNA 1/2]** button to select the appropriate antenna for the band in use; alternatively, if one is connected, you may also press the **[ANTENNA RX]** antenna selection button. Two TX/RX antennas may be connected, or one RX-only antenna.

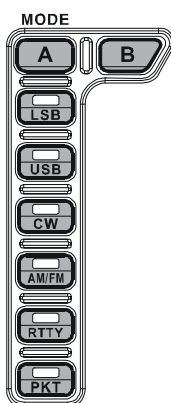
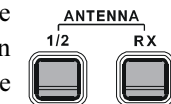
ADVICE:

Once you have made your antenna selection, that antenna is “remembered” by the microprocessor in conjunction with the VFO register (frequency and mode) in use when you chose that particular antenna.

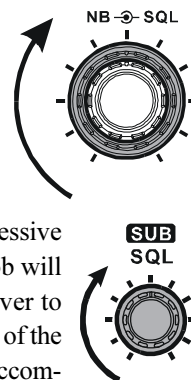
- Press the appropriate **[MODE]** button to select the desired operating mode.

ADVICE:

- ❑ By convention in the Amateur bands, LSB is used on the 7 MHz and lower bands (with the exception of 60 meters), while USB is utilized on the 14 MHz and higher bands.
- ❑ When changing modes from SSB to CW, you will observe a frequency shift on the display. This shift represents the BFO offset between the “zero beat” frequency and the audible CW pitch (tone) you can hear (the pitch is programmed by the **[PITCH]** knob), even though the actual tone that you hear is not changing. If you do not want this frequency shift to appear when changing modes from (for example) USB to CW, use the Menu item “061 A1A FRQDISP,” described on page 122.



- ❑ When operating on the FM mode, rotate the **[SQL]** (Squelch) knob clockwise just to the point where the background noise is just silenced. This is the point of maximum sensitivity to weak signals. Excessive advancement of the **[SQL]** knob will degrade the ability of the receiver to detect weak signals. Adjustment of the Sub band (VFO-B) Squelch is accomplished using the Sub **[SQL]** knob.

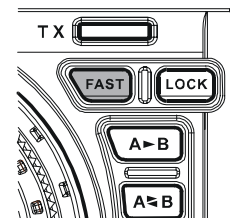


- Rotate the Main Tuning Dial knob to tune around the band, and begin normal operation.

ADVICE:

- ❑ Clockwise rotation of the Main Tuning Dial knob increases the operating frequency, one “step” of the synthesizer at a time; similarly, counter-clockwise rotation of the Main Tuning Dial knob will decrease the frequency.

Two steps, one “normal” and one “fast,” are available on each operating mode. Pressing the **[FAST]** button engages the “Fast” tuning selection.



- ❑ It is possible to separate the frequency change over one dial rotation, only while operating solely on the CW mode, using the Menu items “116 tun DIALSTP,” and “117 tun CW FINE.” See page 127.
- ❑ If you want to navigate quickly, so as to effect rapid frequency change, there are several techniques available:
 - Direct keyboard entry of the frequency (see page 49).
 - Use the **[SUB VFO-B]** knob to tune in 1 MHz steps (see page 49).
 - Use the microphone’s **[UP]/[DWN]** scanning keys, if your microphone is so equipped (see page 49).

MAIN TUNING DIAL KNOB TUNING RATE

OPERATING MODE	1 STEP	1 DIAL ROTATION
LSB, USB, CW, RTTY, PKT(LSB)	10Hz [100Hz]	10kHz [100kHz]
AM, FM, PKT(FM)	100Hz [1kHz]	100kHz [1MHz]

[] : **[FAST]** switch set to “ON”

BASIC OPERATION: RECEIVING ON AMATEUR BANDS

OPERATION ON 60-METER (5 MHz) BAND (U.S. VERSION ONLY)

The **FT-2000D** includes the capability for transmission and reception on the five spot frequencies assigned to the Amateur Service in the United States. To operate on the 5 MHz band:

1. Press the **[V/M]** button once to enter the “Memory” mode (a memory channel number “USx” will appear on the Multi-Display Window in the display).
2. Press the **[M CH]** button. The LED imbedded in the button will glow red to signify that rotation of the **[SUB VFO-B]** knob will allow selection the memory channel.

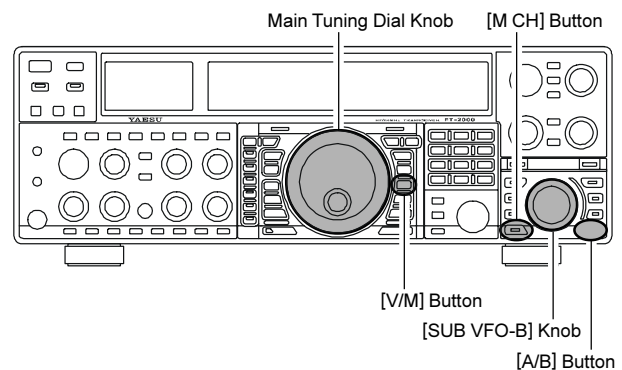
ADVICE:

If the memory channel selection seems not to be operating, check see if the orange lamp to the right of the **[SUB VFO-B]** knob is illuminated. If so, pressing the **[A/B]** button will cause the orange lamp to the right of the **[SUB VFO-B]** knob to go out. Now, press the **[M CH]** button to begin memory channel selection.

3. Memory channels “US1” through “US5” are pre-programmed, at the factory, with the permitted frequencies in the 5 MHz band, and the USB mode is automatically selected on these channels.
4. To exit from 60-meter operation and return to the VFO mode, just press the **[V/M]** button.

NOTE:

The frequencies and operating mode for 5 MHz band operation are both fixed, and may not be changed.



CLAR (CLARIFIER) OPERATION ON MAIN (VFO-A)

The [TX CLAR], [RX CLAR], [CLEAR] buttons and [SUB VFO-B] knob are used to offset either the receive, transmit, or both frequencies from their settings on the Main band (VFO-A) frequency (the Clarifier does not affect the Sub band (VFO-B), however). The four small numbers on the Multi-Display Window show the current Clarifier offset. The Clarifier controls on the **FT-2000D** are designed to allow you to preset an offset (up to ± 9.990 kHz) without actually retuning, and then to activate it via the Clarifier's [RX CLAR] and [TX CLAR] buttons. This feature is ideal for following a drifting station, or for setting small frequency offsets sometimes utilized in DX "Split" work.

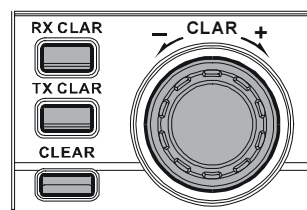
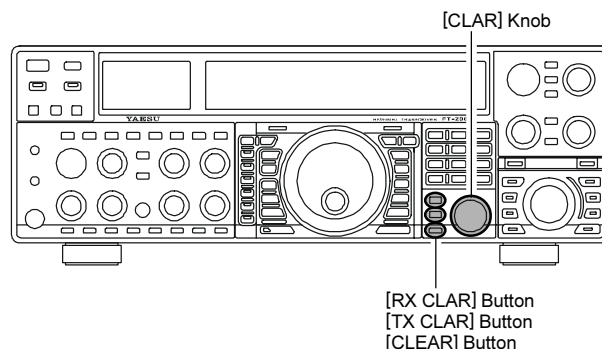
Here is the technique for utilizing the Clarifier:

1. Press the [RX CLAR] button. In the Multi-Display Window, the "RX" notation will appear, and the programmed offset will be applied to the receive frequency.
2. Rotation of the [CLAR] knob will allow you to modify your initial offset on the fly. Offsets of up to ± 9.990 kHz may be set using the Clarifier.

To cancel Clarifier operation, press the [RX CLAR] button. The "RX" notation will disappear from the display.

ADVICE:

Turning the Clarifier Off simply cancels the application of the programmed offset from the receive and/or transmit frequencies. To clear out the programmed Clarifier offset altogether, and reset it to "zero," press the [CLEAR] button. The programmed offset is displayed in the small multi-channel window of the frequency display.



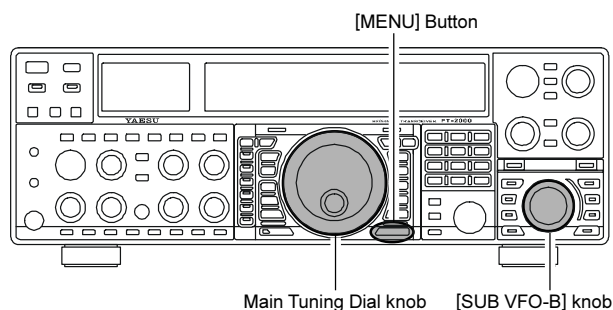
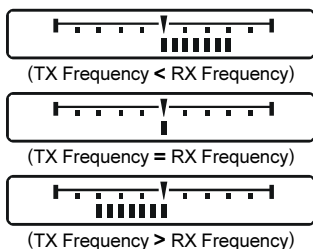
TX CLAR

Without changing the receive frequency, you may alternatively apply the Clarifier offset to the transmit frequency (typically, for "split" DX pile-ups). See page 79 for details.

The Tuning Offset Indicator provides a graphical representation of the Clarifier offset.

On CW, the Tuning Offset Indicator is used for CW Center Tuning, instead of Clarifier Offset, as the transceiver is configured at the factory. If you wish to change this, so that the Clarifier Offset is also displayed on CW, use the following procedure:

1. Press the [MENU] button to enter the Menu mode.
2. Rotate the Main Tuning Dial knob to select Menu item "D10 diSP BAR SEL."
3. Rotate the [SUB VFO-B] knob to select "CLAR (Clarifier)" (replacing the default "C-TN (CW TUNING)" selection).
4. Press and hold in the [MENU] button for two seconds to save the new setting and exit to normal operation.

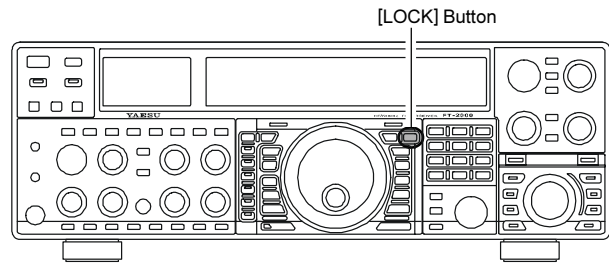
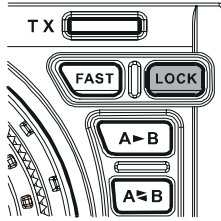


BASIC OPERATION: RECEIVING ON AMATEUR BANDS

LOCK

You may lock the setting of the Main Tuning Dial knob, to prevent accidental frequency change.

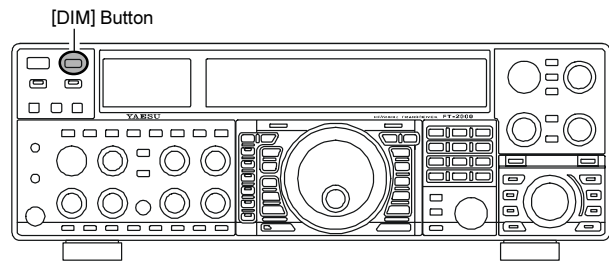
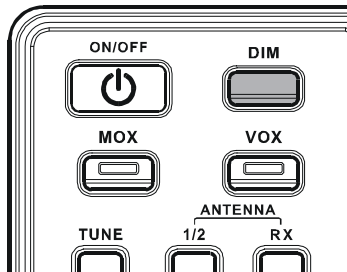
To lock out the Main Tuning Dial knob, just press the **[LOCK]** button that is located to the right of the Dial. To unlock the Dial setting, and restore normal tuning, just press the **[LOCK]** button once more.



DIM

The illumination level of the analog meter and frequency display may be reduced, if you are using the transceiver in a dark environment where high brightness is not desired.

To reduce the illumination level, press the **[DIM]** button, located to the left of the analog meter. To restore full brightness, press the **[DIM]** button once more.



You may also customize the amount of brightness reduction engaged by the pressing of the **[DIM]** button, and may use different brightness levels for different front panel areas. Menu item “008 diSP DIM MTR” adjusts the brightness level of the analog meter; while menu item “009 diSP DIM VFD” sets the brightness levels of the frequency display (these settings are effective only when the **[DIM]** button is pressed).

CONVENIENCE FEATURES

DUAL RECEIVE

The **FT-2000D** is capable of simultaneous reception on the *same amateur band*, using the Main (VFO-A) and Sub (VFO-B) receivers, in what is called the Dual Receive mode. Especially useful for DX work, here is the operating procedure for Dual Receive operation.

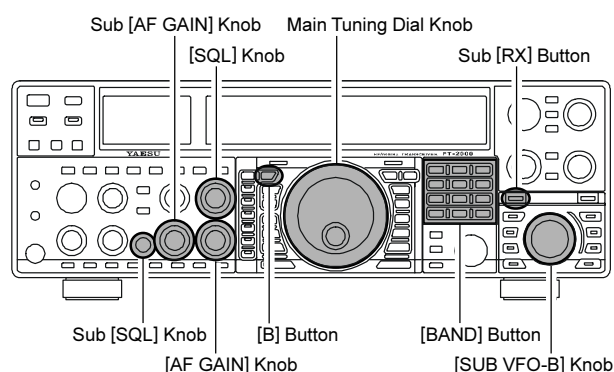
1. While receiving on the Main band (VFO-A), engage the Sub (VFO-B) receiver by pressing the Sub **[RX]** button, located to the upper left of the **[SUB VFO-B]** knob. You will now be receiving on the two frequencies shown on the frequency display.
2. Adjusting the volume:
To adjust the Main (VFO-A) audio level, rotate the Main **[AF GAIN]** knob. To adjust the Sub (VFO-B) audio level, rotate the Sub **[AF GAIN]** knob. In both cases, clockwise rotation of the knob will increase the volume level.
3. Press the **[B]** button. Within five seconds of pressing the **[B]** button, while the orange LED is blinking, you may now change the operating mode for the Sub (VFO-B) band by pressing the appropriate Mode selection button.
4. Having pressed the **[B]** button in the previous step, you may also press the **[BAND]** buttons to select the operating band on which you want to set up the Sub (VFO-B) receiver.
5. Rotate the Main Tuning Dial knob to adjust the Main (VFO-A) frequency, and rotate the **[SUB VFO-B]** knob to adjust the Sub (VFO-B) frequency.
6. To cancel Dual Receive operation, and receive just on the Main (VFO-A) receiver, press the Sub **[RX]** button; the imbedded green LED will go out, and monoband operation on the Main (VFO-A) receiver will resume.

NOTE:

Please remember that, while the **[B]** mode button is blinking (for five seconds), any mode or band changes will still be applied to the Sub band (VFO-B), whether or not Dual Receive is engaged.

QUICK POINT:

By convention in the Amateur bands, LSB is used on the 7 MHz and lower bands (with the exception of 60 meters), while USB is utilized on the 14 MHz and higher bands.



ADVICE:

- ❑ When operating in Dual Receive, the manner in which the audio is fed to the left and right sides of your headphones (Stereo, Monaural, or Mixed) may be configured using Menu item "089 rout HEADPHN" (see page 124).
- ❑ When changing modes from SSB to CW, you will observe a frequency shift on the display. This shift represents the BFO offset between the "zero beat" frequency and the audible CW pitch (tone) you can hear (the pitch is programmed by the **[PITCH]** knob), even though the actual tone that you hear is not changing. If you do not want this frequency shift to appear when changing modes from (for example) USB to CW, use the Menu item "061 A1A FRQDISP," described on page 122.
- ❑ When operating on the FM mode on the Sub band (VFO-B), rotate the Sub **[SQL]** knob clockwise just to the point where the background noise is just silenced. This is the point of maximum sensitivity to weak signals. Excessive advancement of the Sub **[SQL]** knob will degrade the ability of the receiver to detect weak signals. Adjustment of the Main band (VFO-A) Squelch is accomplished using the Main **[SQL]** knob.
- ❑ The frequency ranges of the various fixed bandpass filters are shown in the chart below. You may operate on Dual Receive with both receivers set within the same range, even if they are not on the same Amateur band (for example, the 14 and 18 MHz, or 21 and 24.9 MHz bands). Of course, a suitable multiband antenna is required.

RF BPF FREQUENCY DIVISION

0.03000 MHz ~ 0.49999 MHz
0.50000 MHz ~ 1.69999 MHz
1.70000 MHz ~ 2.49999 MHz
2.50000 MHz ~ 3.39999 MHz
3.40000 MHz ~ 4.69999 MHz
4.70000 MHz ~ 6.89999 MHz
6.90000 MHz ~ 9.89999 MHz
9.90000 MHz ~ 13.89999 MHz
13.90000 MHz ~ 20.89999 MHz
20.90000 MHz ~ 30.09999 MHz
30.10000 MHz ~ 44.99999 MHz
45.99999 MHz ~ 59.99999 MHz

DUAL RECEIVE

Using Headphones for Dual Receive

To take advantage of dual reception, you will want to connect stereo headphones to the **PHONES** jack. Like the **AF GAIN** control, headphone audio mixing can also be configured as desired from Menu item “089 rout HEADPHN.” Three audio mixing schemes are selectable as follows:

- SEP: Audio from the Main band (VFO-A) receiver is heard only in the left ear, and Sub band (VFO-B) receiver audio solely in the right ear.
- Con1: Audio from both Main band (VFO-A) and Sub band (VFO-B) receivers can be heard in both ears, but Sub band (VFO-B) audio is attenuated in the left ear and Main band (VFO-A) audio is attenuated in the right ear.
- Con2: Audio from both Main band (VFO-A) and Sub band (VFO-B) receivers are combined and heard equally in both ears “Monaural” mode).

Sideband Diversity Reception

Here you receive a single AM signal through the two receivers, each receiving the opposite sideband. Skywave-propagated signals often show phase distortion in this mode, but it gives you a view of the entire passband, from which you can then select the best sideband for listening (or for SWL Dx'ing, you may want to listen to both sidebands at the same time, to get the best copy). On groundwave signals, where the phase of the sidebands is likely to be the same, there is an interesting sense of depth to the signal.

To tune in a signal using this mode, you should have stereo headphones connected to the front panel **PHONES** jack.

- ☐ Set the Main band (VFO-A) to either LSB or USB mode, and tune for zero beat on the desired signal.
- ☐ Press the [**A►B**] button to copy this mode and frequency into the Sub band (VFO-B), then press the mode button to select the opposite sideband for the Main band (VFO-A).
- ☐ If using headphones, set the headphone mixing scheme to the “Con1” mode via the Menu item “089 rout HEADPHN,” and activate dual reception.
- ☐ Adjust the [**AF GAIN**] knob(s) to balance the volume of the two receivers.
- ☐ If interference is present on one of the channels, you may have to turn its [**AF GAIN**] knob to suppress that channel (or press the green [**RX**] LED/button to disable the receiver with the sideband experiencing interference). Otherwise, try changing the headphone audio mixing scheme to “Con2” or “SEP” in the Menu item “089 rout HEADPHN,” for different effects (or try settings with similar effects on your external amplifier). Although you don't get the “stereophonic” effect in the monaural mode, the two signals are still mixed, offering the potential for much better copy than in regular AM or even single-sideband ECSS modes.

CONVENIENCE FEATURES

DUAL RECEIVE

Bandwidth Diversity Reception

This mode involves receiving the same signal through two different bandpass filters. The frequency and mode of both the Main band (VFO-A) and Sub band (VFO-B) are the same. The Main band (VFO-A) can be set up for a wide bandpass, using the **[WIDTH]** knobs, and the Sub band (VFO-B) for a narrow bandpass, resulting in a spatial perception of the channel. Although any mode (except FM) can be used, CW offers the widest array of choices, and perhaps the most startling effects on crowded channels.

Stereo headphones or an external stereo speaker are recommended for this mode. To set up the transceiver for bandwidth diversity reception:

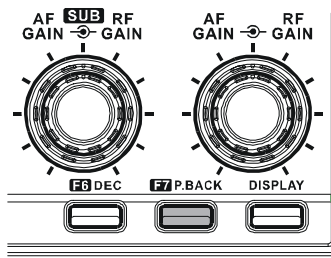
- ☐ Select the desired mode on the Main band (VFO-A).
- ☐ Tune to the signal of interest.
- ☐ Press the **[A►B]** button to copy this mode and frequency into the Sub band (VFO-B).
- ☐ If using headphones, set the headphone mixing scheme to the “Con1” mode via the Menu item “089 rout HEADPHN,” and activate dual reception.
- ☐ Adjust the **[AF GAIN]** knob(s) to balance the volume of the two receivers.
- ☐ Now try manipulating the **[SHIFT]** and **[WIDTH]** knobs to observe the interesting effects of bandwidth diversity.

P.BACK (AUDIO PLAYBACK) FROM MAIN (VFO-A) RECEIVER

Once engaged by the operator, the **FT-2000D** begins the automatic recording of the last 15 seconds of incoming receiver audio on the Main band (VFO-A). This capability is especially useful for confirming a callsign that may have been difficult to copy due to noise or QRM, etc.

Recording

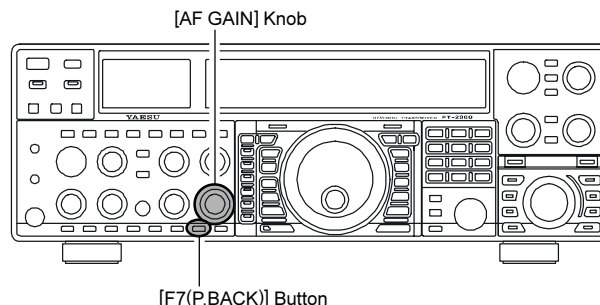
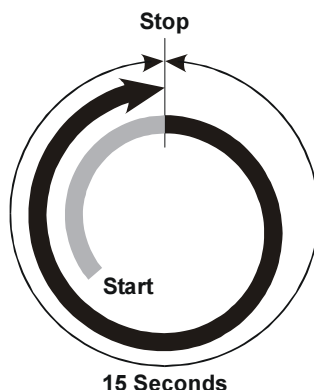
Press and hold in the **[F7(P.BACK)]** button for two seconds to initiate recording; the “**REC**” icon will appear in the display to confirm that recording is in progress. The recorder will store up to 15 seconds of the Main band (VFO-A) received audio, and will retain the most-recent 15 seconds of audio on a running basis.



Pressing the **[F7(P.BACK)]** button once more will halt the recording, and the “**REC**” icon will go out.

NOTE:

When the transceiver is turned off, the contents of the recording memory will be erased!



Playback

Press the **[F7(P.BACK)]** button *momentarily*, after recording has been halted, to begin playback of the recorded audio; the “**PLAY**” icon will appear in the display to confirm that playback is in progress. The last 15 seconds of audio will be heard in the speaker or headphones. If you do not intervene, the entire 15 seconds will be played back, after which the playback will stop automatically. To halt playback at any time, just press the **[F7(P.BACK)]** button momentarily again. The next time you press the **[F7(P.BACK)]** button, it will pick up the playback where you left off.

ADVICE

You may adjust the playback level of the recording by the main **[AF GAIN]** knob

P.BACK feature from the optional FH-2 Remote Control Keypad

The **[P/B]** key of the optional **FH-2** Remote Control Keypad can also serve as a remote-control recording/playback switch. Operation is described below.

Recording

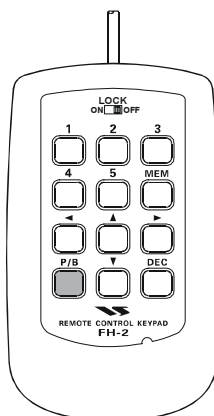
Press and hold in the **FH-2's [P/B]** key for two seconds to initiate recording.

The “**REC**” icon will appear in the display to confirm that recording is in progress.

Press the **FH-2's [P/B]** key momentarily to halt recording; the “**REC**” icon will go out.

You may also press the front panel's **[F7(P.BACK)]** button (momentarily) to halt recording, as well.

When the transceiver is turned off, the contents of the recording memory will be erased.



Playback

Press the **FH-2's [P/B]** key *momentarily*, after recording has been halted, to begin playback of the recorded audio; the “**PLAY**” icon will appear in the display to confirm that playback is in progress.. The last 15 seconds of audio will be heard in the speaker or headphones. If you do not intervene, the entire 15 seconds will be played back, after which the playback will stop automatically. To halt playback at any time, just press the **[P/B]** key momentarily again. The next time you press the **[P/B]** key, it will pick up the playback where you left off. You may also press the front panel's **[F7(P.BACK)]** button (momentarily) to play back the recorded audio, as well.

ADVICE

You may adjust the playback level of the recording by the main **[AF GAIN]** knob

CONVENIENCE FEATURES

“MY BANDS” OPERATION

When operating on an Amateur Band, it is possible to use the [BAND] buttons to engage the use of the [SUB VFO-B] knob for Amateur band selection. The “My Bands” feature allows you to select several Amateur bands, and make *only* those bands available for selection via the [SUB VFO-B] knob.

This feature can be *very* useful in a contest, where the 10/18/24 MHz band are not used, or if you do not have antennas for some bands.

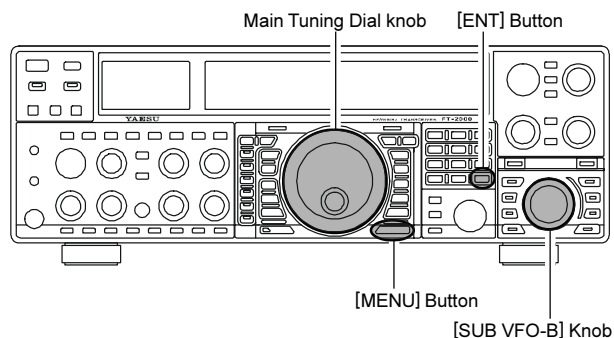
“My Bands” Setup

1. Press the [MENU] button to engage the Menu mode.
2. Rotate the Main Tuning Dial knob to select Menu item “122 tun MY BAND.”
3. Rotate the [SUB VFO-B] knob to choose a band that you wish to *skip* (omit) from the band-selection loop (when using the [SUB VFO-B] knob for band selection). The available choices are 1.8/3.5/5/7/10/14/18/21/24/28/50/GE (General Band)/AU (Transverter).
4. Press the [ENT] button to set the omission command to ON. The “E” (Enable) notation at the right of the band notation will change to “d” (disable).
5. Repeat steps 3 and 4 to select/deselect as many bands as you like.

NOTE:

The “ON” command sets the selected band to be *skipped*, while the “OFF” command sets the selected band to be *included* in the band-selection list. Return the “d” notation to “E” to restore operation on a previously-deleted band.

6. Press and hold in the [MENU] button for two seconds to lock in the new configuration and exit to normal operation.



ADVICE:

The “My Band” feature affects both the Main (VFO-A) and Sub (VFO-B) bands.

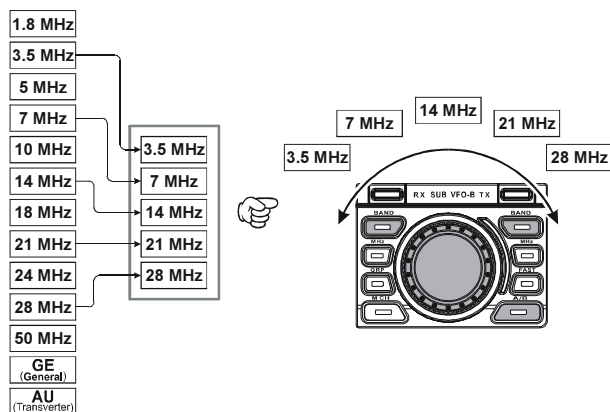
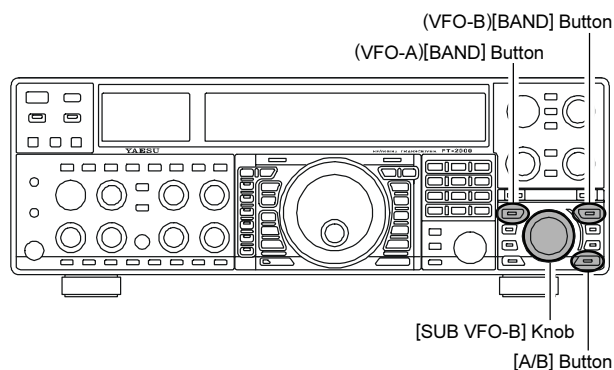
“My Band” Operation

1. Press the (VFO-A) [BAND] button; the imbedded LED will glow Red, if you operate the “My Band” feature on the Main band (VFO-A).

ADVICE:

If the “My Band” feature on the Main band (VFO-A) seems not to be operating, check see if the orange lamp to the right of the [SUB VFO-B] knob is illuminated. If so, pressing the [A/B] key will cause the orange lamp to the right of the [SUB VFO-B] knob to go out. Now, press the (VFO-A) [BAND] button to begin “My Band” feature.

2. Press the (VFO-B) [BAND] button; the imbedded LED will glow Orange, if you operate the “My Band” feature on the Sub band (VFO-B).
3. Rotate the [SUB VFO-B] knob to choose the Amateur band on which you wish to operate. Only those Amateur bands that have not been skipped will appear as you scroll through the bands.



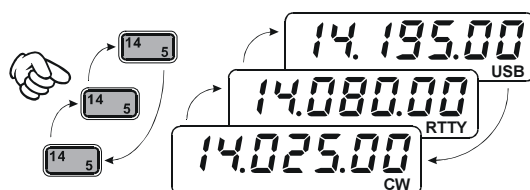
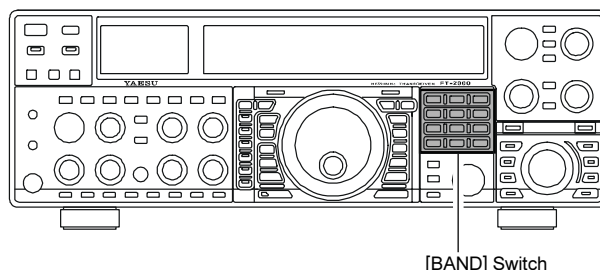
BAND STACK OPERATION

The **FT-2000D** utilizes a triple band-stack VFO selection technique, that permits you to store up to three favorite frequencies and modes onto each band's VFO register. For example, you may store one frequency each on 14 MHz CW, RTTY, and USB, then recall these VFOs by successive, momentary presses of the **[14]** MHz band button. Each Amateur band key may similarly have up to three frequency/mode settings applied. Both the Main (VFO-A) and Sub (VFO-B) systems have their own, independent, band stacks.

A typical setup, for the 14 MHz band, might be arranged like this:

1. Program 14.025 MHz, CW Mode, then press the **[14]** MHz band button;
2. Program 14.080 MHz, RTTY Mode, then press the **[14]** MHz band button;
3. Program 14.195 MHz, SSB Mode, then press the **[14]** MHz band button.

With this configuration, successive momentary presses of the **[14]** MHz band button will allow you to toggle sequentially through these three VFOs.

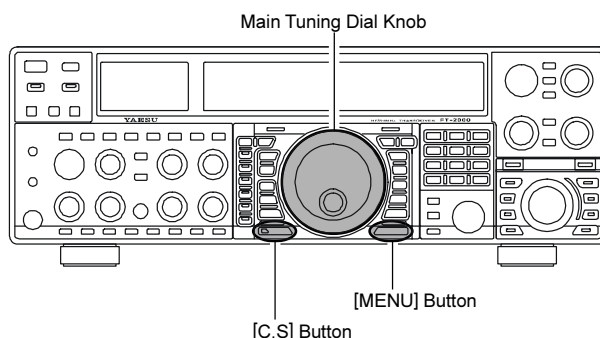


C.S (CUSTOM SWITCH)

An often-used Menu mode selection may be brought out to the front panel's **[C.S]** button.

C.S Setup

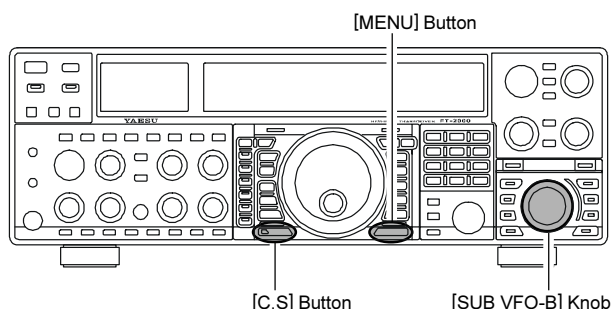
1. Press the **[MENU]** button to engage the Menu mode; the Menu list will appear on the display.
2. Rotate the Main Tuning Dial knob to select the Menu item you want to be able to access via the **[C.S]** button.
3. Press and hold in the **[C.S]** button for two seconds to lock in your selection.
4. Press and hold in the **[MENU]** button for two seconds to save the new configuration and exit to normal operation.



Menu Selection Recall via **[C.S]** button

Press the **[C.S]** button.

The programmed Menu item will appear on the display. You may now rotate the **[SUB VFO-B]** knob to change the setting of this menu item. Press the **[MENU]** button for two seconds, when you are done, to save the new configuration and exit to normal operation.



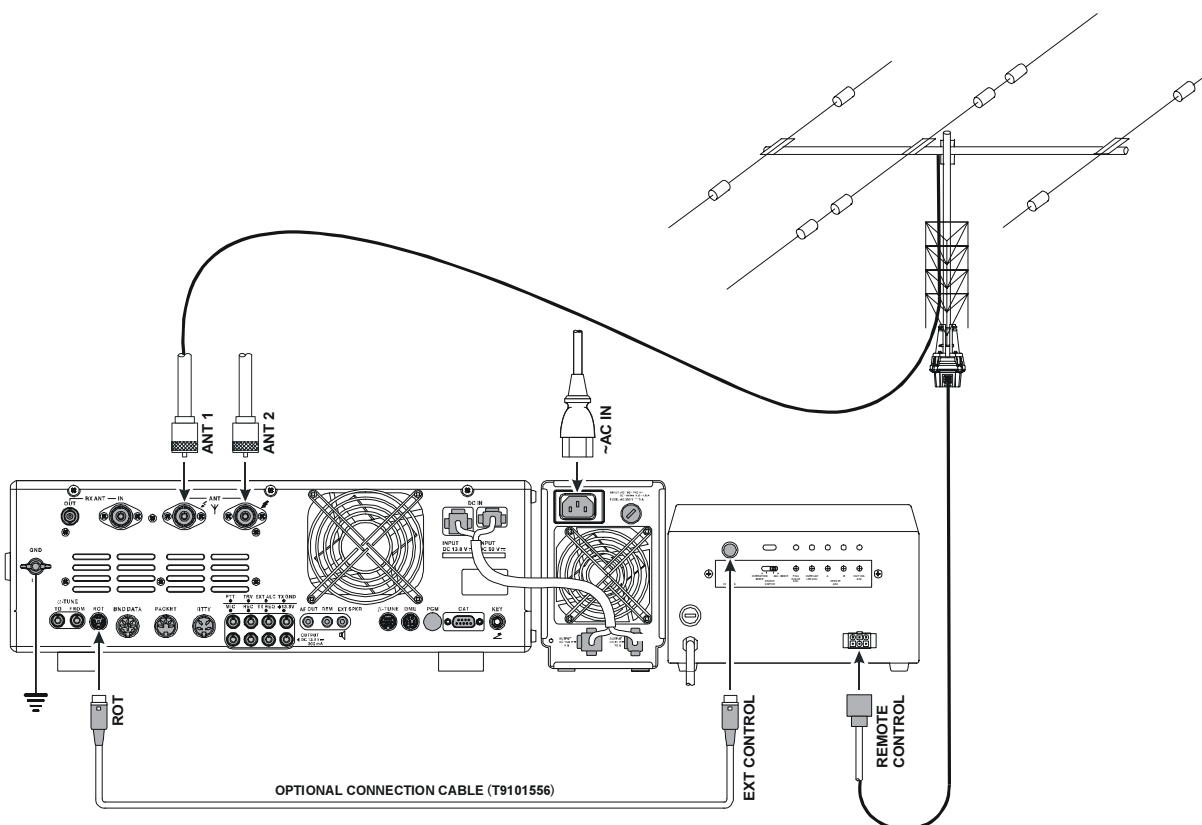
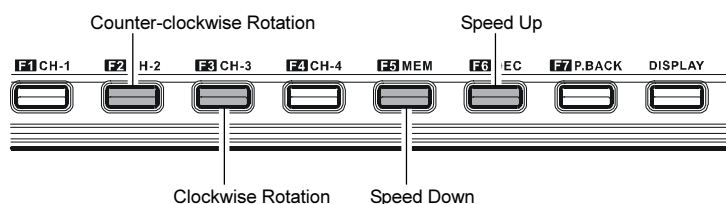
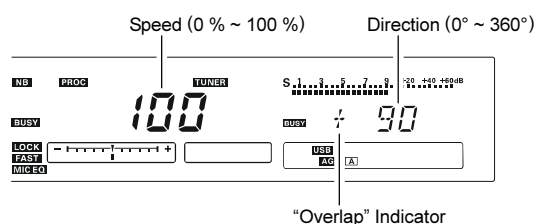
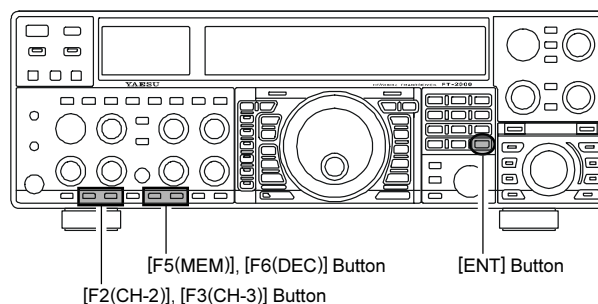
CONVENIENCE FEATURES

ROTATOR CONTROL FUNCTIONS

When using a YAESU model **G-800DXA**, **G-1000DXA**, or **G-2800DXA** rotator (not supplied), it is possible to control it from the front panel of the **FT-2000D**.

- 1 Press and hold in the **[ENT]** button (one of the **[BAND]** button) for two seconds. The frequency display area will change over to the “Rotator Control” configuration.
- 2 Press either the **[F2(CH-2)]** button or the **[F3(CH-3)]** button to rotate the antenna. Pressing the **[F2(CH-2)]** button will cause rotation to the left (counter-clockwise), while pressing the **[F3(CH-3)]** button will cause rotation to the right (clockwise).
- 3 Press the **[F5(MEM)]** button or the **[F6(DEC)]** button to control the speed of rotation. Pressing the **[F5(MEM)]** button will cause slower rotation, while pressing the **[F6(DEC)]** button will speed up rotation. Usually, you will be using the “100%” setting.

When you are through exercising rotator control, press the **[ENT]** button momentarily. The frequency display will return to the main display field.



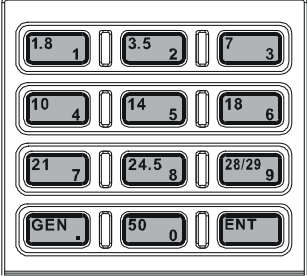
MORE FREQUENCY NAVIGATION TECHNIQUES

Keyboard Frequency Entry

You may enter operating frequencies, for either the Main (VFO-A) or Sub (VFO-B) bands, using the front panel band/frequency selection keys.

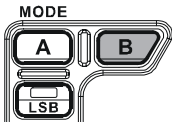
Example 1:

Enter 14.250.00 MHz into the Main band (VFO-A):

1. Press the **[ENT]** button to engage the direct frequency entry process. Now, beginning with the “10 MHz” digit of the frequency (the leftmost digit), we will enter the required digits of the frequency.
- 
2. Press, in order, the digits of the operating frequency, using the **[BAND]** buttons (which have the frequency-entry digit or decimal point on the right side of the slash bar). In this example, enter
[1.8/1] → [10/4] → [GEN./.] → [3.5/2] → [14/5] → [50/0] → [50/0] → [50/0] → [50/0]
 The decimal point after the “MHz” portion of the frequency must be entered, but no decimal point is required after the “kHz” portion.
 3. Press the **[ENT]** button once more. A short “beep” will confirm that the frequency entry was successful, and the new operating frequency will appear on the Main (VFO-A) frequency display fields.

Example 2:

Enter 7.100.000 MHz into the Sub band (VFO-B):

1. Press the **[B]** button.
 2. Within five seconds (blinking the imbedded orange LED) of pressing the **[B]** button, press the **[ENT]** button to engage the direct frequency entry process. Now, beginning with the “10 MHz” digit of the frequency (the leftmost digit), we will enter the required digits of the frequency to be entered into the Sub band (VFO-B) register.
- 
3. Press, in order, the digits of the operating frequency, using the **[BAND]** buttons (which have the frequency-entry digit or decimal point on the right side of the slash bar). In this example, enter
[21/7] → [GEN./.] → [1.8/1] → [50/0] → [50/0] → [50/0] → [50/0] → [50/0]
 4. Press the **[ENT]** button once more. A short “beep” will confirm that the frequency entry was successful, and the new operating frequency will appear on the Sub (VFO-B) frequency display fields.

ADVICE:

If you attempt to enter a frequency outside the operating range of 30 kHz ~ 60 MHz, the microprocessor will ignore the attempt, and you will be returned to your previous operating frequency. If this happens, please try again, taking care not to repeat the error in the frequency entry process.

Using the **[SUB VFO-B]** knob

You may change the Main band (VFO-A) frequency in 1 MHz steps. If you press the (VFO-A) **[BAND]** button, the 1 MHz steps will be applied to the Main band (VFO-A) frequency. The imbedded LED in the (VFO-A) **[BAND]** button will glow Red in the latter case.

When tuning in 1 MHz steps, clockwise rotation of the **[SUB VFO-B]** knob will increase the frequency, while counter-clockwise rotation will decrease the frequency.

Using the UP/DOWN Switches of the Supplied MH-31B8 Hand Microphone

The **[UP]/[DWN]** switches on the supplied **MH-31B8** Hand Microphone may also be used for manually scanning upward or downward in frequency, respectively.

The microphone's **[UP]/[DWN]** switches utilize the tuning steps of the Main Tuning Dial knob; moreover, when the microphone's **[FAST]** key is pressed, the tuning rate increases by a factor of ten, in a manner similar to the effect of the transceiver's front-panel **[FAST]** button.



ADVICE:

In the AM and FM modes, you may independently set the tuning steps when using the **[UP]/[DWN]** switches. To set new tuning steps, use Menu items “119 tun AM STEP” and “120 tun FM STEP.”

CONVENIENCE FEATURES

RECEIVER OPERATION (FRONT END BLOCK DIAGRAM)

The **FT-2000D** includes a wide range of special features to suppress the many types of interference that may be encountered on the HF bands. However, real world interference conditions are constantly changing, so optimum setting of the controls is somewhat of an art, requiring familiarity with the types of interference and the subtle effects of some of the controls. Therefore, the following information is provided as a general guideline for typical situations, and a starting point for your own experimentation.

The **FT-2000D**'s interference-fighting circuitry begins in its "RF" stages, and continues throughout the entire receiver section. **FT-2000D** allows configuration of the features described below. However, the Sub band (VFO-B) receiver does not have the DSP (Digital Signal Processor) features.

VRF (SEE PAGE 53)

On the 1.9 - 28 MHz Amateur bands, Yaesu's powerful VRF (Variable RF Filter) preselector circuit provides excellent suppression of out-of-band interference, with a passband much narrower than that provided by traditional fixed bandpass filters.

R. FLT (IF Roofing Filters) (SEE PAGE 54)

On the Main (VFO-A) receiver, three automatically-selected Roofing filters, in bandwidths of 15 kHz, 6 kHz, and 3 kHz, are provided in the 69 MHz First IF, right after the first mixer. These filters provide narrow-band selectivity to protect the following IF and DSP stages, and the filters' automatically-selected bandwidths may be manually changed by the operator, if desired, for special operating circumstances.

The Sub (VFO-B) receiver's 40 MHz IF includes a fixed Roofing filter, with a bandwidth of 15 kHz.

CONTOUR Filter (SEE PAGE 55)

The DSP Contour filter is a unique capability on the Main (VFO-A) receiver, providing either nulling or peaking of tunable segments of the receiver passband, so as to suppress interference or excessive frequency components on an incoming signal, or to peak those tunable frequency segments. The amount of nulling/peaking, and the bandwidth over which it is applied, are adjustable via the Menu.

IF SHIFT (SEE PAGE 56)

The passband center frequency response of the IF DSP filtering may be adjusted using this control.

IF WIDTH (SEE PAGE 57)

The width of the IF DSP filtering may be adjusted using this control.

IF NOTCH (SEE PAGE 58)

The IF Notch filter is a high-Q notch filter that can significantly reduce, if not eliminate, an interfering carrier. The Q (sharpness) of the filter may be adjusted using the Menu.

DNR (DIGITAL NOISE REDUCTION) (SEE PAGE 59)

The DSP's Digital Noise Reduction (DNR) feature utilizes sixteen different mathematical algorithms to analyze and suppress different noise profiles encountered on the HF/50 MHz bands. Choose the selection that provides the best noise suppression, which concurrently will allow the signal to rise up out of the noise.

DNF (DIGITAL NOTCH FILTER) (SEE PAGE 59)

When multiple interfering carriers are encountered during reception, the Digital Notch Filter can significantly reduce the level of these signals.

AGC (SEE PAGE 62)

The AGC system is highly adaptable to changing signal and fading characteristics, making reception possible under the most difficult conditions.

SLOPED AGC (SEE PAGE 63)

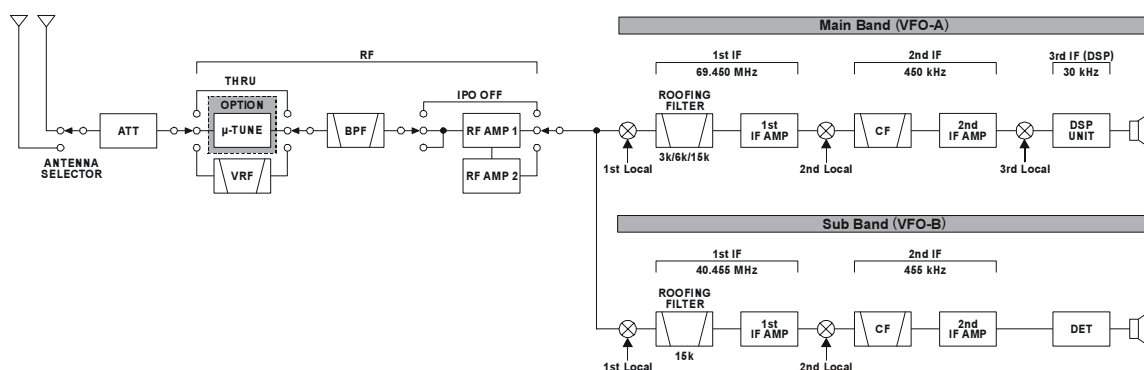
The Sloped AGC system on the Main (VFO-A) receiver, instead of clamping a fixed upper bound on audio output across a wide range of input signals, actually allows the audio output to rise, very gently, with ever-increasing signal strength. This capability allows you to separate signals, using your brain, according to signal strength in addition to slight frequency differences.

IF Filter Quality Adjustment (SEE PAGE 125)

The "Q" (quality factor) of the IF DSP filters may be adjusted using the Menu.

Variable IF Filter Shape Factor (SEE PAGE 125)

You may adjust the shape factor of the receiver IF DSP filters using the Menu.



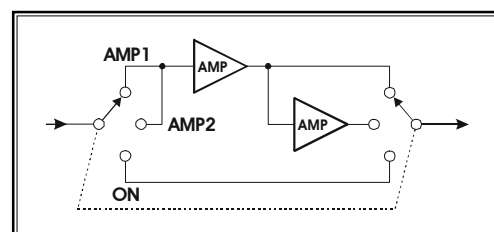
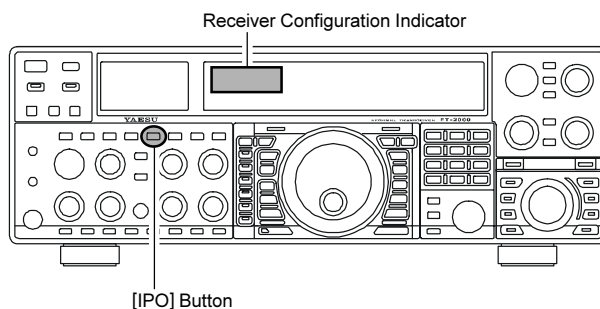
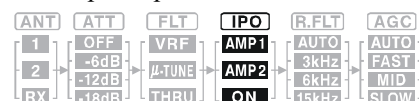
IPO (INTERCEPT POINT OPTIMIZATION)

The IPO feature allows the operator to optimize the characteristics of the receiver front end, depending on the current noise level and the strength of incoming signals.

Press the **[IPO]** button several times to set the desired characteristic of the receiver front end, per the chart below.

- AMP1: Amplifies the incoming signal path using a low distortion RF preamplifier (gain: approx. 10 dB).
- AMP2: Amplifies incoming signal path using a 2-stage low-distortion RF preamplifier (total gain: approx. 17 dB).
- ON: Bypasses the RF preamplifier, yielding direct feed to the first mixer.

The selected receiver RF preamplifier will be indicated in the IPO column of the Receiver Configuration Indicator on the display.



ADVICE:

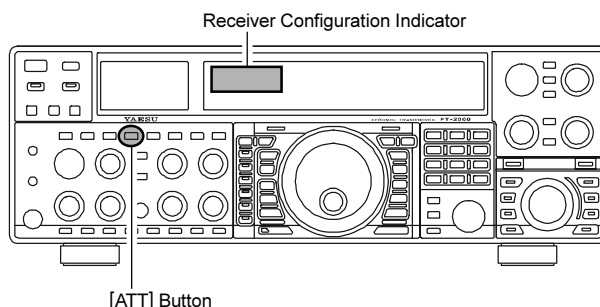
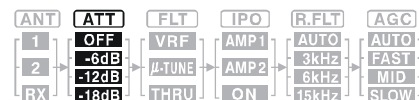
On the 10 MHz and lower bands, it generally is not necessary to use any preamplifier at all; selecting the “ON” position described above will increase the strong-signal-handling capability of the receiver, and generally will result in more pleasant reception due to reduced noise. If you can hear band noise with the preamplifiers disengaged, then a preamplifier is generally not needed.

ATT

Even with the IPO function on, extremely strong local signals or high noise can still degrade reception. In such situations, you can use the **[ATT]** button to insert 6, 12, or 18-dB of RF attenuation in front of the RF amplifier.

- Press the **[ATT]** button several times to set the desired attenuation level, per the chart below.
 - OFF: Attenuator is Off
 - 6 dB: The incoming signal power is reduced by 6 dB (Signal voltage reduced by 1/2)
 - 12 dB: The incoming signal power is reduced by 12 dB (Signal voltage reduced by 1/4)
 - 18 dB: The incoming signal power is reduced by 18 dB (Signal voltage reduced by 1/8)

The selected attenuation level will be indicated in the ATT column of the Receiver Configuration Indicator on the display.



- To restore full signal strength through the Attenuator circuit area, press the **[ATT]** button to restore the ATT display to the “OFF” position.

ADVICE:

- ☐ The Attenuator affects both the Main (VFO-A) and Sub (VFO-B) bands.
- ☐ If background noise causes the S-meter to deflect on clear frequencies, press the **[ATT]** button until the S-meter drops to about “S-1.” This setting optimizes the trade-offs between sensitivity, noise, and interference immunity. Also, once you have tuned in a station you want to work, you may want to reduce sensitivity further (or add more attenuation) by pressing the **[ATT]** button to a more setting. This reduces the strength of all signals (and noise) and can make reception more comfortable, important especially during long QSOs. When looking for weak signals on a quiet band, you will want maximum sensitivity, so the IPO should be disabled and the **[ATT]** button should be set to “OFF.” This situation is typical during quiet times on frequencies above 21 MHz, and when using a small or negative-gain receiving antenna on other bands.

CONVENIENCE FEATURES

RF GAIN (SSB/CW/AM MODES)

The RF Gain controls provide manual adjustment of the gain levels for the receiver RF and IF stages, to account for noise and/or signal strength conditions at the moment.

1. The Main [RF GAIN] knob should, initially, be rotated to the fully clockwise position. This is the point of maximum sensitivity, and counter-clockwise rotation will gradually reduce the system gain.
2. The Sub [RF GAIN] knob operates identically to the Main [RF GAIN] knob. The fully clockwise position of the Sub [RF GAIN] knob should always be utilized as a starting point for operation.

ADVICE:

- ❑ As the [RF GAIN] knob is rotated counterclockwise to reduce the gain, the S-meter reading will rise. This indicates that the AGC voltage being applied to the receiver is increasing (which causes a *reduction* in receiver gain).
- ❑ Rotating the [RF GAIN] knob control to the fully counter-clockwise position will essentially disable the receiver, as the gain will be greatly reduced. In this case, as well, the S-meter will appear to be “pegged” against the right edge of the analog S-meter scale.
- ❑ The Sub [RF GAIN] knob operates identically to the Main [RF GAIN] knob. The effects of counter-clockwise rotation of the Sub (VFO-B) receiver’s RF Gain control may be observed visually on the Sub band (VFO-B) S-meter.

QUICK POINT:

- ❑ Reception frequently can be optimized by rotating the [RF GAIN] knob slightly counter-clockwise to the point where the incoming noise level is just about the same as the “stationary” meter needle position as set by the adjustment of the [RF GAIN] knob. This setting ensures that excessive gain is not being utilized, without so much gain reduction that incoming signals cannot be heard.
- ❑ The RF Gain control, along with the IPO and Attenuator features, all affect the system receiver gain in different ways. As a first step in dealing with high noise or a crowded, high-level signal environment, the IPO generally should be the first feature engaged, if the frequency is low enough to allow the preamplifier to be bypassed. Thereafter, the RF Gain and Attenuator features may be employed to provide precise, delicate adjustment of the receiver gain so as to optimize performance fully.

