

NEGATIVE terminal. Make sure the battery terminal connections are tight, and remember to check them periodically for signs of loosening or corrosion.

- ❑ Make sure the **POWER** switch on the transceiver is off, and plug the DC cable into the 6-pin molex jack on the rear panel.

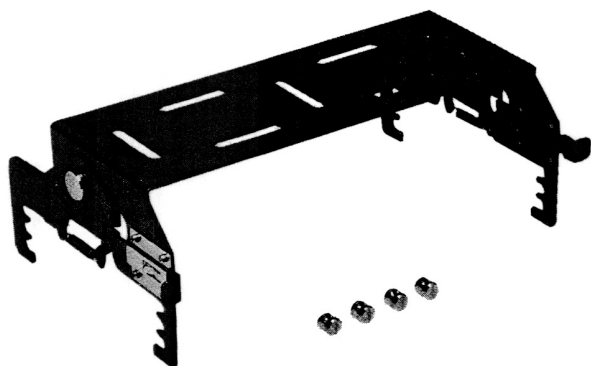
Caution!

*In mobile installations, check to ensure that the transceiver **POWER** switch is off whenever starting or stopping the engine, to avoid damage from switching transients.*

Mobile Mounting

The optional MMB-20 Mobile Mounting Bracket allows quick insertion and removal of the transceiver from the vehicle. Complete instructions are provided with the bracket, which can be mounted above or below the transceiver.

MMB-20 Mobile Mounting Bracket



Mobile Antenna Installation

Please review the Antenna Considerations on the previous page, as they apply equally to base and mobile antennas. The FC-800 Remote Antenna Tuner is particularly desirable in a mobile station, where the short antenna elements have very narrow bandwidth. Make sure that the shield of the antenna coax is firmly grounded to the car body at the antenna feedpoint if using a base-loaded vertical.

Interconnection of Accessories

The diagrams on the following pages show interconnections of external accessories. If you have

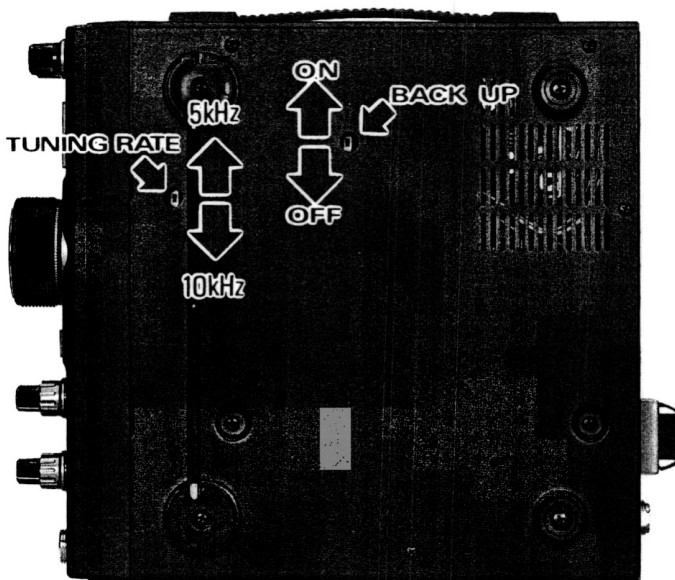
any questions on these accessories or connecting devices not shown, contact your dealer for advice.

Memory Backup

The lithium memory **BACKUP** switch inside the hole in the center of the bottom panel is turned on at the factory, allowing VFO and memory data to be retained while power is off. Backup current is miniscule, so it is not necessary to turn the **BACKUP** switch off unless the transceiver is to be stored for a long time.

After about five years the transceiver may fail to retain memories (although operation will be otherwise unaffected), and the lithium battery should be replaced. Ask your dealer for replacement of the battery, or for instructions on how to do so yourself, see page 34.

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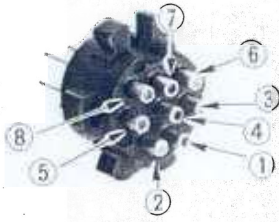
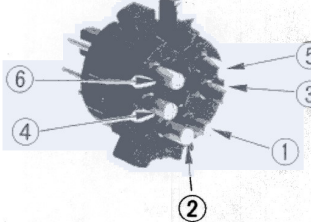
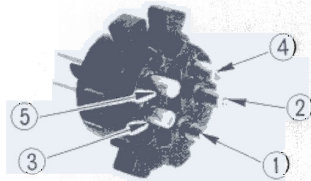
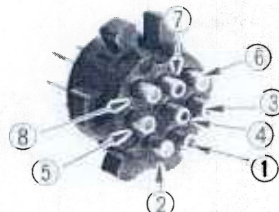
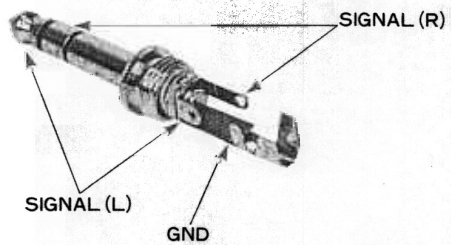
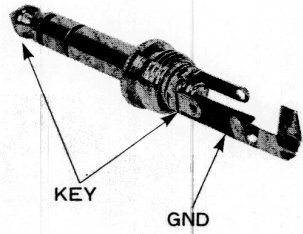
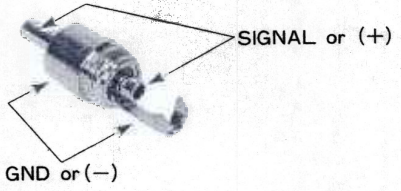
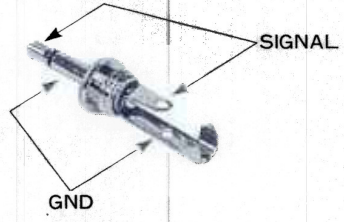
Switch Locations in Bottom Cover

English

Station Installation

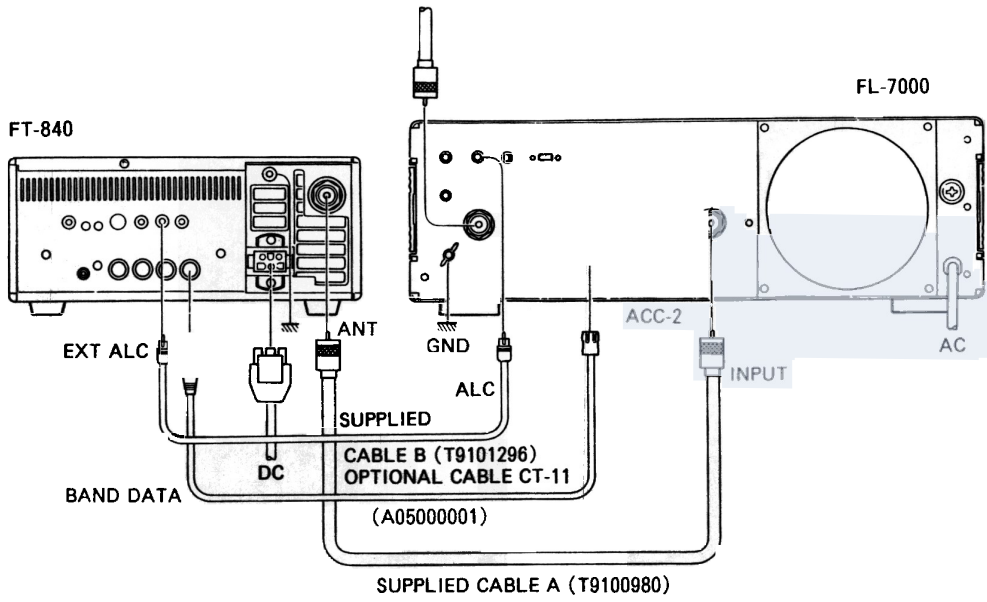
Connector Pinouts

English

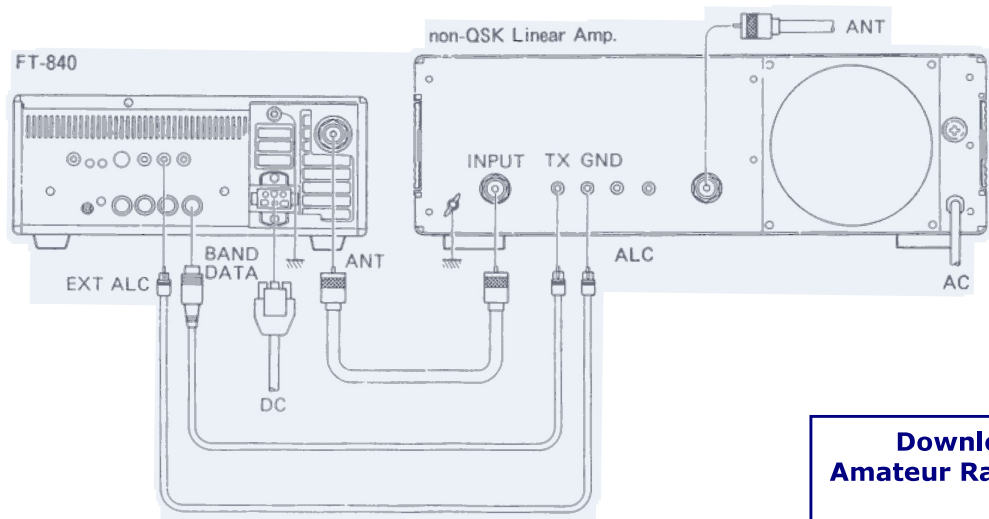
BAND DATA	CAT
 <ol style="list-style-type: none"> 1. +13.5 V 2. TX GND 3. GND 4. BAND DATA A 5. BAND DATA B 6. BAND DATA C 7. BAND DATA D 8. LINEAR 	 <ol style="list-style-type: none"> 1. GND 2. SERIAL OUT 3. SERIAL IN 4. PTT 5. S/PO 6. NC
TUNER 1 (used w / FC-800)	TUNER 2 (used w / FC-10)
 <ol style="list-style-type: none"> 1. GND 2. +13.5V 3. DATA 4. GND 5. GND BY FC-800 	 <ol style="list-style-type: none"> 1. +13.5V 2. TX GND 3. GND 4. DATA IN 5. DATA OUT 6. TUNER SENSE 7. RESET 8. TX INH
PHONES	KEY
 <p>SIGNAL (L)</p> <p>SIGNAL (R)</p> <p>GND</p>	 <p>KEY</p> <p>GND</p>
RCA PLUG	EXT SPKR
 <p>SIGNAL or (+)</p> <p>GND or (-)</p>	 <p>SIGNAL</p> <p>GND</p>

Connecting External Accessories

English



FL-7000 Linear Amplifier



Other non-QSK Linear Amplifier

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Connecting a Linear Amplifier

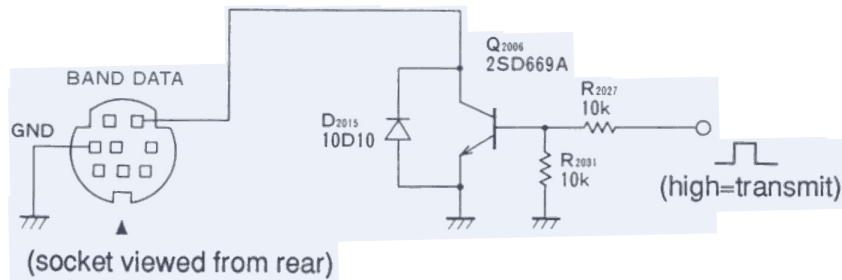
For all linear amplifiers, connect the ALC output from the linear to the **EXT ALC** jack on the rear of the transceiver. After making the RF and t/r switching connections described below, you will probably need to adjust the ALC output level of the linear so that it is not overdriven by the FT-840. Your linear's manual should describe how to do this.

If using an FL-7000 with the FT-840, use optional cable CT-11 to provide automatic band selection for the linear, as well as t/r switching control. If using another linear, and if it can be switched with less than 1500 mA of DC voltage below 150 V, you can connect the the t/r switch line for the linear to pin 2 of the **BAND DATA** jack, and the linear's exciter-enable output to pin 8 of the **BAND DATA** jack. This line must be held high (+5 to 15 V) to inhibit transmission until the linear is ready for excitation by the FT-840. If your linear amplifier requires more than 1500 mA or uses more than 150 V for t/r relay switching, you will have to provide a suitable external interface transistor/mechanical relay (such as the FRB-757 relay box), controlled by pin 2.

Caution!

*The FT-840 is designed for use and easy connection with the FL-7000, when operation with a linear amplifier is required. We recommend using an external t/r relay for operation with all other amplifiers that exceed the voltage and current ratings described above. Using pins 2 and 8 of the **BAND DATA** jack for other amplifiers will not work unless the control line signals are carefully matched, and damage may result otherwise. Your warranty does not cover damage resulting from improper connections to this jack, so if you are unsure, use the **TX GND** jack only.*

(on rear panel)



Linear Amp T/R Switching in the FT-840

Power-Up Customization & Button Combination Settings

By pressing and holding certain buttons *while switching on the FT-840*, you can customize features as desired, and perform some troubleshooting functions. Other settings can also be selected by holding the **FAST** button while pressing certain other buttons, as described below. Default settings are in *italics*.

Power-Up Functions	Hold this button	Comments
Panel Button Beeper <i>Enable/Disable</i>	A = B	Press a button to see if the beeper is enabled.
Display <i>BFO Offset</i> or Carrier Freq. in CW mode	BAND-DOWN	BFO Offset added to displayed CW frequency. Affects display only.
<i>Enable/disable</i> 10-Hz Digit at right end of display,	BAND-UP	Affects display only.
Make FAST Button <i>press-on/press-off</i> , or active-only-while-pressed	FAST	"FAST" is displayed when active.
<i>Display/hide</i> clarifier receiver offset.	CLAR	Affects display only
Select wide/ narrow clarifier range	MEM-UP	±2.5 kHz or ±1.25 kHz
Adjust Repeater Shift (0 to 500 kHz, <i>100 kHz default</i>). Press FM again after setting.	FM	Shift is displayed. Use tuning knob or DOWN/UP to change in 1-kHz steps.
Select normal/reverse carrier point (sideband) for CW reception	CW/N	Toggles LSB offset for CW reception (<i>USB</i> default).
<i>Display/ hide</i> memory channel display during VFO operation	VFO ► M	Affects display only
Clear All Memories and return settings to factory defaults	MEM-[DOWN + UP]	VFOs and Memory 1 default to 7.000 MHz LSB.
Scan Resume Mode: Always after 5-sec pause, or <i>only after squelch closes</i> .	SCAN	There is always a pause after squelch closes before scanning resumes.
Select Lock Mode: <i>Tuning Knob Only</i> , or Knob & Buttons	LOCK	"Lock" displayed when buttons are locked. MOX and POWER cannot be locked.

FAST Button Combinations	Hold FAST button and press...	Comments
Set Beeper Audio Frequency (310 to 1700 Hz, <i>880-Hz default</i>). Press AM/N again when done.	AM/N	Repeating double beep sounds and beep frequency displayed in Hz while adjusting.
Display/set VFO/PMS scanning speed.	VFO/M	Scanning speed value adjustable from 1 ~ 200, <i>10</i> is default.
Display/Select CTCSS Tone Frequency (from standard tones, <i>default 88.5 Hz</i>). Press FM again when done.	FM	Displays tone frequency in Hz. Use tuning knob or DOWN/UP buttons to select.
Adjust BFO Carrier Offset to CW mode.	CW/N	Adjust offset from 400~1000 Hz, CW sidetone also matches offset.
Tag Current Memory to be skipped when Memory Scanning (<i>skip/no-skip</i>)	SCAN	Affects only memory scanning. "SKIP" displayed when activated.

Getting Started Tutorial

While reading this chapter, refer to the fold-out photos of the panels for the locations and functions of the controls and jacks.

Before plugging in the transceiver the first time, make sure your supply voltage is correct, and that your ground and antenna are connected as described in the *Installation* chapter. Then preset the following controls:

- POWER & MOX** switches: off (■);
- MIC, RF PWR, SQL**: all ccw (minimum);
- AF**: 10 o'clock;
- CLAR**: off;
- SHIFT**: 12 o'clock.

Connect your microphone and/or CW key or keyer, and then press the **POWER** switch on. The meter and display should light up.

At the left side of the panel, if the **ATT** or **PROC** button are depressed, press to turn them off.

Take a moment to study the display. You should see "VFO-A" or "VFO-B" at the left, with the operating frequency in large digits in the center (if you don't see a VFO indicator, press the **VFO/M** button near the top right). At the right side of the display is a small 2-digit memory channel number ("0" by default).



Use the **BAND- DOWN/UP** buttons (to the right of the tuning knob) to select a band for which your antenna is designed. These buttons have several different functions:

- By default (the *ham stepping* mode), when receiving on a VFO, these step from one ham band to another. Changing bands stores the current frequency automatically, so that **DOWN** and **UP** always return you to the frequency last used on each band (if it is inside the 500-kHz range of the ham band). The 10-meter band has two 1-MHz ham bands (see table above-right).
- If the **HAM/GEN** button has been pressed (to activate *GENeral coverage tuning* mode), "GEN" appears to the left of the frequency on the display, and the **DOWN** and **UP** buttons step in 100-kHz increments (or 1-MHz if **FAST** tuning is activated as described next).

Full details of all of the **DOWN** and **UP** buttons are shown in the table at the bottom of page 24.

Ham Bands

Meter Band	Frequency Range (MHz)
160	1.800 ~ 2.000
80	3.500 ~ 4.000
40	7.000 ~ 7.500
30	10.000 ~ 10.500
20	14.000 ~ 14.500
17	18.000 ~ 18.500
15	21.000 ~ 21.500
12	24.500 ~ 25.000
10	28.000 ~ 29.700

Example: say you're tuned to 7.000 MHz, and want to change to 21.200 MHz.

- First check to see if "GEN" appears on the left side of the display. If so, press the **HAM/GEN** button.
- Then press the **UP** button 4 times to change to the last-used frequency on the 15-meter band.
- Now you can use the tuning knob to tune to 21.200. However, if the current frequency is more than 100 kHz away, you can save some cranking: press **HAM/GEN** again so that "GEN" appears, and press the **DOWN** and **UP** buttons, as needed, to get within 100 kHz. Then use the tuning knob. When you want to change bands again, remember to press **HAM/GEN** so that "GEN" disappears.

Press the mode button (to the left of the tuning knob) corresponding to the mode you wish to operate — for now, we suggest an SSB mode: **USB** if you have selected a band above 10 MHz, or **LSB** otherwise. The selected mode is indicated above the frequency on the LCD.

Adjust the **AF** control for a comfortable volume level, then tune around the band a bit with the tuning knob to get the feel of it (if you want to adjust the torque, see page 23. For faster (x10) tuning steps, press the **FAST** button at the lower left side of the knob, to enable the "FAST" indicator below the MHz digits on the display.

Blanking the 10's-of-Hz Digit

If you prefer to have the 10's-of-Hz digit hidden on the frequency display, you can toggle display of this digit off and on by holding the **BAND- UP** button while switching the set on. Repeat this process to blank the digit. Tuning steps are not affected.

Tuning & Scanning Steps

Control ↓	Mode ⇒	LSB, USB, CW	AM & FM
Tuning knob, Mic UP/DWN Keys	Normal	10 Hz	100 Hz
	w/FAST button	100 Hz	1 kHz
DOWN/UP buttons	Normal	100 kHz	100 kHz
	w/FAST button	1 MHz	1 MHz
One rev of tuning knob*	Normal	10 kHz	100 kHz
	w/FAST button	100 kHz	1 MHz

* To halve knob tuning rate, move slide switch S2003

The **FAST** key normally toggles (press on/press off), but if you hold it while switching the FT-840 on, it becomes momentary, and you have to hold it while you tune. The table shown above lists all available tuning steps in each mode. If your microphone has **UP** and **DWN** buttons, you can use them to tune in 10- or 100-Hz steps. Also, the **FAST** button on the microphone duplicates the **FAST** button on the front panel.

General Coverage Reception

You may have already noticed that you can tune outside one of the amateur bands (actually, outside the 500-kHz segment that includes each ham band) regardless of whether **GEN** or ham-stepping is se-

10- or 20-Hz Steps in AM & FM Modes

When changing modes from SSB or CW to AM or FM, operation initially remains on the same frequency, even if it is not a multiple of 100 Hz. As soon as you tune, the operating frequency jumps up or down to the nearest whole 100-Hz step. However, the clarifier can tune in 10- or 20-Hz steps (selectable) in all modes, so if you need fine tuning resolution in AM or FM mode, activate the clarifier (see page 22).

lected for the **BAND-DOWN** and **UP** buttons. However, the transmitter (and antenna tuner) are disabled on such frequencies. If you try to transmit, the indicator still appears, but there is no RF power output.

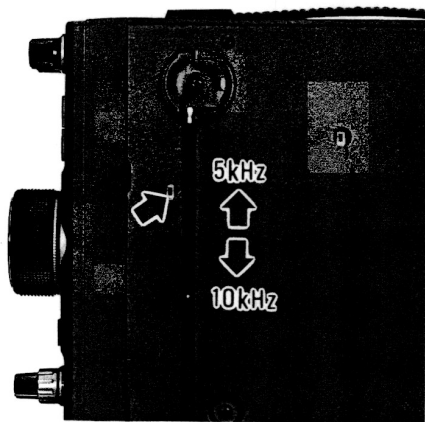
Also, the ham band recall system ignores such frequencies. If you select a ham band and then tune outside the band, the non-ham frequency will be lost when you change bands. When you return to the original band you will find that it has reverted to the (ham-band) frequency it was on when that band was previously selected.

Don't let this worry you: any displayed frequency can always be stored in a memory (as described on page 24) so you can recall it quickly later. Once you become familiar with the memories, you will find this convenient: each memory can be tuned just like a VFO, and stored again without having to go through the VFO.

Besides the above, general coverage reception provides all the features available on ham frequencies, and is also an interesting source of international music, news and entertainment. A table of international Shortwave broadcast bands is provided for your reference.

Halving the Tuning Rate

The FT-840 default tuning rates are listed in the table above, and are selected using the **FAST** button. To halve the tuning rate (kHz per tuning knob revolution) for all modes, move slide switch S2003, accessible through the small hole on the bottom panel as shown below. Use a long non-metallic object to slide the switch. Tuning step size is not affected.



Shortwave Broadcast Bands

Meter Band	Freq. (MHz)	Meter Band	Freq. (MHz)
LW	.150-.285	31	9.35-9.90
MW	.520-1.625	25	11.55-12.05
120	2.300-2.495	21	13.60-13.90
90	3.20-3.40	19	15.10-15.70
75	3.90-4.00	16	17.55-17.90
60	4.75-5.20	-	18.90-19.30
49	5.85-6.20	13	21.45-21.85
41	7.10-7.75	11	25.67-26.10

Dealing with Interference

The FT-840 includes special features to suppress the many types of interference you may encounter on the HF bands. Still, real-world 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 controls. Therefore the following information should be considered only as general guidelines for typical situations, and a starting point for your own experimentation.

The controls are described in the order that you would usually make them after changing bands. An exception to this is if strong pulse noise is present, in which case you may need to activate the noise blanker (described below) before making other adjustments. Two special features, "Reverse CW Sideband" and "BFO Carrier Offset," are described later in the *CW Operation* section.

Attenuation

The FT-840 receiver front end provides high sensitivity to weak signals. A 12-dB attenuator can be inserted by pressing the **ATT** button.

When looking for weak signals on a quiet band, the **ATT** button should be switched off for maximum sensitivity. This situation is typical during quiet times on frequencies above 20 MHz, and when using a small antenna on other bands.

If you notice intermodulation, or if the signals you want to listen to are very strong, you can press the **ATT** button. This reduces the strength of all signals (and noise) by 12-dB (about 2 S-units), and can make reception more comfortable, important especially in long QSOs.

AGC-F (Automatic Gain Control - Fast Recovery) Selection

When tuning around the band looking for signals, the **AGC-F** button is usually best kept on (—), so receiver gain recovers quickly after tuning past strong signals. Once a signal is tuned in, unless it is

Locking the Dial or Buttons

Normally, pressing the **LOCK** button disables only the tuning knob (it still turns, but does nothing). If you wish to have it also disable the buttons (except itself, **MOX** and **METER**), turn the set off and then hold it while switching back on. Use this feature to prevent accidental changes to your settings.

very weak, you should find reception more comfortable with slow AGC (■).

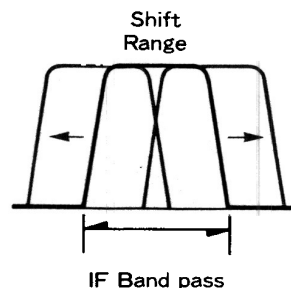
Noise Blanker Setting

The noise blanker circuit in the FT-840 can blank both wide and narrow pulses, and can sometimes also reduce the level of static crashes from electrical storms. Pressing the **NB** button activates the blanker. If you hear pulse noise, just press in the **NB** button. If the blanker seems to distort a signal you're listening to, leave it off for optimum readability.

IF Shift Adjustment

(not used in AM & FM modes)

Once you have tuned in a signal you are going to listen to for a while, if you hear interference from nearby frequencies, use the **SHIFT** control to suppress the interference. Turning the **SHIFT** control left or right from center shifts the center frequency lower or higher, as depicted here.



You will want to press the **LOCK** button beneath the tuning knob ("LOCK" displayed) before adjusting the **SHIFT** control, as accidentally retuning would invalidate your setting (particularly in narrow-bandwidth CW). When ready to retune to a new frequency, press **LOCK** again to release it, and return the **SHIFT** control to its normal position (centered).

AM & CW Narrow IF filters

Pressing the **AM/N** mode button once (when switching from another mode), selects 100-Hz tuning steps and the 2.4-kHz narrow AM bandwidth. For weaker AM signals, or where adjacent channel interference is present, this narrow IF bandwidth offers a compromise between interference rejection and fidelity. For better AM reception, the optional YF-112A wide crystal filter can be installed. This gives the highest fidelity, and is best on strong AM

broadcasts (and particularly music). After installation, this will automatically be selected when pressing **AM/N**. The narrow 2.4-kHz filter can then be selected by pressing the **AM/N** button a second time ("**NAR**" appears at the top of the display).

For even better reception of AM signals under these conditions, you can switch to an SSB mode (whichever sideband gives the clearest reception). Along with the choice of the best sideband, you gain several benefits of the **SHIFT** control. After selecting the best sideband (LSB or USB mode), you need to zero beat the carrier to avoid distortion: turn the **SHIFT** control all the way clockwise for LSB or counterclockwise for USB, fine tune until the signal sounds steady and natural, then return the **SHIFT** control to center (or for best audio and interference suppression).

Pressing the **CW/N** mode button once selects the standard 2.4-kHz IF bandwidth, also used for SSB. With the optional YF-112C 500-Hz narrow IF filter installed, pressing the **CW/N** button a second time selects this filter, with "**NAR**" appearing at the top of the display. The 2.4-kHz bandwidth is often convenient to give a "wide view" when tuning around, but once you find a signal of interest and center it in the passband, the narrow selection optimizes selectivity. The next section on transmission gives more details of CW operation.

Transmitting

The FT-840 can transmit within the 500-kHz segments of the HF amateur bands above 1.8 MHz, and from 28 to 30 MHz. When tuned between 1.5 and 1.8 MHz, the tuner will not function, and when tuned to any other (general coverage) frequency,

Button Beeper Settings

Pressing a front panel button normally causes a beep to sound. Its volume is independent of receiver volume, and can be set by adjusting the **SIDE TONE** trimpot on the rear panel.

If you wish to change the pitch of the beeper, hold the **FAST** button (right of the tuning knob) while pressing the **AM/N** button. This causes the display to show the beeper frequency in Hz, while double beeps sound. Turning the **DIAL** knob adjusts the beep pitch (310 ~ 1700 Hz). When done, press the **AM/N** button again to return to normal operation.

You can also disable (or re-enable) the beeper by holding the **A=B** button while switching the transceiver on.

the transmitter is disabled. Still, you should restrict your transmissions to those frequencies authorized by your license, and for which your antenna is designed.

Attempting to transmit out of band still causes the **TX** indicator to appear, but the transmitter provides no output. The transmitter is also temporarily inhibited when stopping scanning (described later), as pressing the **PTT** switch while scanning just causes the scanner to stop.

When you transmit on an amateur band, the FT-840 senses reflected power at the antenna jack. If an impedance mismatch causes too much reflected power, the transmitter reduces power output to a nominal level (about 5 watts). Although this should prevent damage to the transceiver, we still recommend that you *do not transmit without having a proper antenna connected to the antenna jack*.

Automatic Antenna Matching

The external FC-10 & FC-800 automatic antenna tuners makes even first-time transmitter setup very simple. After using the tuner once on a band, it recalls previous settings from memory (the tuner has 31 of its own) during reception, whenever you tune to the same part of the band again. When using the tuner the first time on an antenna, we recommend you set the **RF PWR** control to around the 12-o'clock position or greater to maintain at least 10-watts available for the tuning process. All you have to do beforehand is ensure your transmit frequency is clear of other signals. If you want to monitor the tuner's action, press the **METER** button (**PO** position).

If "**SPLIT**" is displayed to the left of the frequency, press the **SPLIT** button near the top right to disable split operation for now.

After making sure you are on a valid transmitting frequency, and that the channel is clear of other signals, press the **START** button near the upper right corner of the front panel. The "**TUNER**" indicator comes on, indicating the automatic tuner is activated, "**WAIT**" appears at the top right corner of the display, and the "**TX**" indicator at the left end of the display lights while the tuner seeks the proper matching settings.

If monitoring SWR on an external meter, you should see the tuner select the lowest possible reading. When the "**WAIT**" indication on the display turns off (usually less than 30 seconds), you are ready to transmit (assuming the "**HI SWR**" indicator didn't come on).

Once you have used the antenna tuner, the "TUNER" indicator remains on (unless you press the TUNER button to switch the tuner off). If the tuner found a match, the "WAIT" indicator will occasionally flash when you change frequency (while receiving), as the main microprocessor reports the frequency change to the tuner coprocessor (reception is unaffected). The tuner coprocessor compares the current frequency with its memories, and rematches the antenna to the new range if it has any previously stored settings for that range. However, when you first connect a new antenna, the tuner does not have the correct settings stored in these memories, so you need to "train" the tuner, by pressing the START button whenever you change to a new frequency range.

Important!

When using the FC-10, if the "HI SWR" indicator appears at any time, the tuner is unable to match your antenna at the displayed frequency. You will have to tune to another frequency, or repair or replace your antenna or feed line.

SSB Operation

To transmit in LSB or USB mode:

- Make sure the appropriate mode indicator above the frequency read-out appears, and ensure that the METER button is in the undepressed (■ ALC) position. The meter now shows automatic level control voltage when you transmit. This is negative feedback to the transmitter amplifiers that prevents overdriving the finals (higher ALC indicates greater reduction of RF amplification).
- If this is the first time you are transmitting SSB with the FT-840, preset the MIC control to about 12 o'clock, and the RF PWR control fully clockwise.
- Confirm that the display shows the frequency you want to transmit on.
- Listen carefully on the frequency to make sure you will not interfere with any other stations. Then, if you have an automatic antenna tuner option, press START to match the antenna.
- After "WAIT" disappears from the display, press the PTT (push-to-talk) switch on your microphone, and give your callsign (to identify your transmission) or make your call. You should see the meter fluctuate as you speak.

Note: Adjusting the MIC control for proper ALC indication on the meter requires that the SWR be

below 1.5:1. Otherwise the ALC meter may behave erratically.

- To find the optimum setting of the MIC control for your microphone, begin with it fully counterclockwise (minimum), and adjust it while the RF PWR control is fully clockwise. Speak into the microphone (at a normal level) so that the meter deflects no further than mid-range (the upper end of the blue ALC range) on voice peaks. This will normally be about the 10-o'clock position with the MH-1B8 or MD-1C8 microphone.
- You can press the METER button (— PO position) and adjust the RF PWR control for less output power, as indicated on the center meter scale. We recommend using the lowest power output possible to maintain reliable communications — not only as a courtesy to other stations, but to minimize power consumption and the possibility of causing RFI and TVI, and to maximize the life of the equipment.

Microphone Tone Selection

Before setting up the speech processor, set the selector switch on your microphone for the desired audio characteristic. The higher-numbered setting(s) suppress low frequencies. See page 5.

AF Speech Compressor

Once you have found the proper MIC control setting (with full power) and selected the microphone tone characteristic, you can activate the speech compressor to increase the average power of your signal. The RF PWR setting does not affect speech processor adjustment.

- With the METER button set for ALC (■ ALC position), press the PROC button below and to the right. Now speak into the microphone and adjust the MIC control slightly, if necessary, so the meter needle stays within the thick blue ALC zone on the bottom scale.
- The COMP control on the rear panel (the shaft nearest the red 13.5 V DC jack) sets the degree of compression. This control is preset to the 12-o'clock position at the factory, which provides about 10 dB of speech compression with an average voice pitch. Setting it for more compression can seriously distort your signal, so it should only be adjusted if you have some means of monitoring the transmitter. You can do this with an external receiver, if you have one, or by having another station give you signal reports as you adjust it.
- If you adjust the COMP control, you should recheck your MIC control setting as described in the step before last.