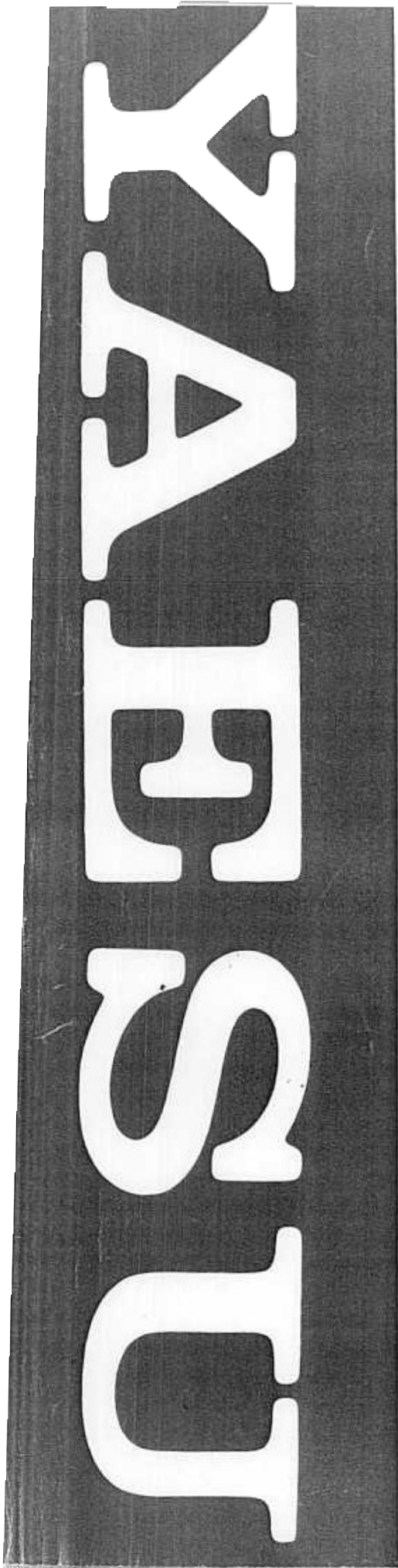


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# FT-840

## OPERATING MANUAL

*English*  
*Español*  
*Français*



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**FT-840**

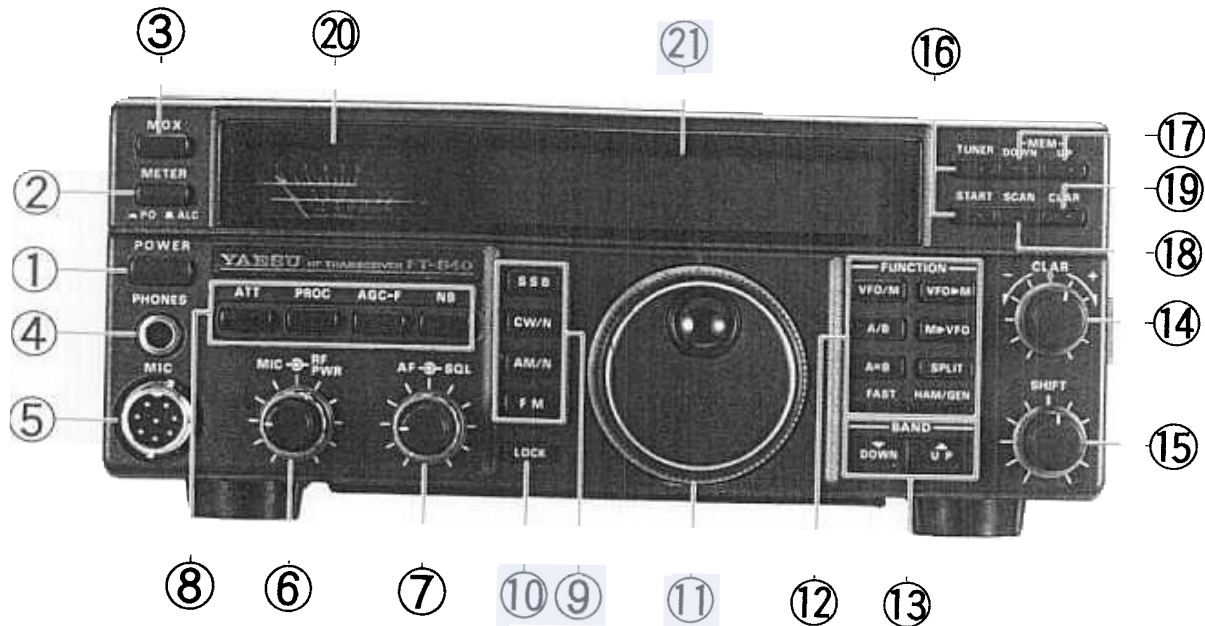
***English***



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## Front Panel Controls & Connectors



**1. POWER** This button turns the transceiver on and off. To avoid switching spikes, make sure it is off when you turn the DC power source (AC power supply) on and off. In mobile installations, the transceiver should be off when starting or stopping the engine.

**2. METER** This button determines the function of the multimeter during transmission. Press to change the selection. The meanings of the abbreviations are as follows: **PO** for Power Output or **ALC** relative Automatic Level Control

**3. MOX** This button can be used to manually activate the transmitter. It must be in the undepressed (■) position for reception.

**4. PHONES** This ¼-inch, 3-contact jack accepts either monaural or stereo headphones with a 2- or 3-contact plug. When a plug is inserted, the loudspeaker is disabled. Audio is supplied to both channels of a stereo headphone.

**5. MIC** This 8-pin jack accepts the MD-1B8 or MD-1C8 Desktop Microphone or the MH-1B8 Handie Scanning Microphone. Proper microphone input impedance is 500 to 600 ohms.

**6.** The inner **MIC** control adjusts the microphone input level for SSB and AM transmission.

The outer **RF PWR** control sets transmitter output power in all modes. The adjustment range is from less than 15 to 100 W (15 to 25 W AM).

**7.** The inner **AF** gain control adjusts the volume of the receiver in the speaker or headphones.

The outer **SQL** control sets the signal threshold at which receiver audio is muted (and the **BUSY** indicator turns off), in all modes. This control is normally kept fully CCW, except when scanning, and during FM operation. Scanning stops when the squelch is open. See page 26.

**8. ATT** If the the band is noisy or very strong signals are present, press this button to insert a 12-dB attenuator in the front end to protect the receiver from overload. **PROC** activates the speech processor in the SSB and AM modes. See page 18. **AGC-F** sets the receiver Automatic Gain Control decay time for fast recovery, which can improve CW reception and fast-fading (QSB) SSB signals. **NB** is used to reduce man-made noise.

**9.** These four momentary buttons select the operating mode, indicated above the frequency display.

**10. LOCK** This button toggles locking of the tuning knob to prevent accidental frequency changes. "**LOCK**" appears at the bottom of the display window when locked (the knob can still be turned, but it does nothing). Press again to re-enable the tuning knob. You can change the function of this button to lock most of the controls and buttons, instead of just the tuning knob, by holding the button while switching the transceiver on.



**11.** This knob tunes the operating frequency of the VFO or a recalled memory. Tuning increments are normally 10 Hz (100 Hz in AM and FM modes). The markings on the knob represent 25 increments each, and one full turn of the knob provides 500 increments (5 kHz, or 50 kHz in AM/FM).

## 12. — FUNCTION —

**VFO/M** This button toggles operation between a memory and a VFO. Either **VFO-A** (or **VFO-B**), or **MEM** is displayed to the left of the frequency to indicate the current selection. If a displayed memory has been retuned, pressing this button once returns the display to the original memory contents, and pressing it again returns to the (last used) VFO.

**VFO ► M** When receiving on a VFO or a retuned memory, holding this button for ½-second writes the current operating data to the currently selected memory. Two beeps sound, and any previous data in the memory is overwritten. Also, pressing and holding this button after recalling a memory (without retuning) causes the memory to be “blanked.” Repeat to unblank the memory.

**A/B** When receiving on a VFO, this button toggles operation and display between VFOs A and B. On a memory, it toggles front and rear halves.

**M ► VFO** Pressing this button momentarily displays the contents of the currently selected memory channel for three seconds. Holding this button for ½ second copies all data from the memory to the VFOs, as two beeps sound. Previous data in the VFOs is overwritten. See page 25.

**A = B** This button copies the contents of the display to the other VFO or memory half. Previous contents of the non-displayed VFO/memory half are overwritten (lost!).

**SPLIT** This button activates split frequency transceive operation. The displayed frequency is used for reception, and the other VFO or rear half of the memory for transmission. The “**SPLIT**” indicator at the left side of the display is lit while this function is active.

**FAST** For fast tuning, press this button while rotating the tuning knob or pressing the **UP** or **DOWN** button, to increase the tuning rate ten times. See the table on page 13 for all available steps. When fast tuning is active, “**FAST**” is displayed above the MHz digits. You can set the function of this button to be either “press-and-hold”, or toggle on/off, by holding it while switching the transceiver on.

**HAM/GEN** This button determines the function of the **DOWN/UP** buttons when receiving on a VFO or retuned memory: GEN steps are 100 kHz, and HAM steps are from one amateur band to the next.

## 13. — BAND —

Pressing either of these buttons [**DOWN▼/UP▲**] momentarily steps the operating frequency down or up one ham band, or 100 kHz (if receiving in GEN mode), respectively. Pressing **FAST** with one of these buttons steps down or up 1 MHz if receiving in GEN mode. Continue holding either button for repeated stepping.

**14. CLAR** This knob tunes the clarifier offset frequency up to ± 1.25 kHz (or optional ± 2.50 kHz), when activated by the **CLAR** button to the left of it. Operating details are on page 22.

**15. SHIFT** In modes other than AM and FM, this control offsets the IF passband center frequency from the displayed frequency when turned away from the detented 12-o’clock position.

**16. TUNER** Pressing this button puts the antenna tuner in line. Reception is not affected. Pressing the **START** button while receiving in a ham band activates the transmitter for while the tuner rematches the antenna for minimum SWR. The resulting settings are stored in the antenna tuner’s 31 memories, for automatic recall later. See page 18.

**17. ←MEM→ [DOWN/UP]** Press these buttons to momentarily step through all memory channels. While doing so from the VFO mode, the “**MEM**” LCD indicator will blink, and if no further buttons are pressed within 3 seconds, activity returns to the last used VFO.

**18. SCAN** In the VFO mode with the squelch closed, pressing this button starts scanning the entire frequency range of the radio, and pauses when activity is found (according to the scan delay mode selected). In memory channel operation, pressing this button scan the front halves of all stored memories (see page 26).

**19. CLAR** Pressing this activates the receiver offset (“**CLAR**” displayed) and recalls any previously tuned offset. The clarifier offset display can be hidden by holding this button while turning the transceiver on to toggle the function.

**20.** The meter indicates the selected parameter during transmission, and signal strength in S-units during reception (on the top scale). Each S-unit is approximately 6 dB. See the following page.

**21.** The display indicates operating frequency, clarifier offset, memory number and special states. Details are on the following page.

# Rear Panel

This red phono jack provides 13.5-V DC (pin positive) at up to 200 mA for powering an external accessory.

**CAUTION! The line is not fused, so be careful not to reverse polarity or draw more than 200 mA, as serious damage can result!**

**Note:** The only required connections for operating the transceiver are DC power (below) and an antenna. Also, a proper ground is highly recommended, and may be necessary for proper operation. All other rear panel connections are optional.

This 2-contact mini phone jack provides receiver audio for an external loudspeaker, such as the one provided in the FP-800, or the SP-6. Inserting a plug in this jack disables the internal loudspeaker. Impedance is 4 to 8  $\Omega$ .

Use this control to adjust CW side tone level heard during CW operation, as described on page 20.

The **DELAY** control serves to set CW semi-break-in timing, as described on page 20.

Use this control to adjust speech processor compression as described on page 19.

This phone jack provides constant-level receiver audio output for use with a packet TNC or other terminal unit. Output level is approximately 100 mV peak at 600 $\Omega$ . See page 30.

Connect your CW key, keyer paddles or external keyer to this 1/4-inch 2-contact jack. Wiring is on page 20. Open circuit voltage is +5 V DC, and closed circuit current is 0.7 mA.

This phono jack accepts external ALC (Automatic Level Control) voltage from a linear amplifier, to prevent over-excitation. ALC voltage range is 0 ~ -4 VDC.

This yellow phono control input jack can be used to activate the transmitter remotely (by shorting the contacts). Open circuit voltage is 13.5 V, and closed circuit current is 15 mA.

This grill is the air outlet for the cooling system. Make sure nothing blocks this grill in your installation, as air must be free to exit here for proper cooling.

Connect the 50- $\Omega$  coaxial feedline to your antenna or external ATU here using a type M (UHF, PL-259) plug. **Do not operate the transceiver without an antenna or dummy load!**

Connect this terminal to a good earth ground, for safety and optimum performance.

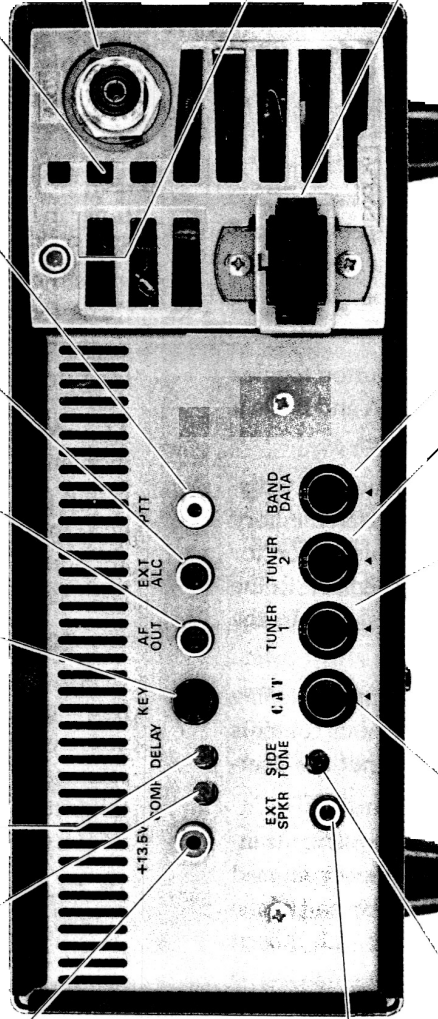
This is the 13.5-volt DC power connector. Connect a 20-A supply as shown below. See also the Caution on page 7.

This 6-pin mini DIN input/output jack allows external computer control of the FT-840. Signal levels are TTL (0 and 5 V DC). Pinout is on page 10, and the signalling protocol and data formats are described in the CAT chapter, starting on page 35.

This 5-pin mini DIN jack is for the FC-800 External Automatic Antenna Tuner. Pinout diagram is on page 10.

This 8-pin mini DIN jack is for the FC-10 External Automatic Antenna Tuner. Pinout diagram is on page 10.

This 8-pin jack outputs control signals for the FL-7000 Linear or FC-1000 ATU, including band selection data to set the Linear or Tuner to the same band as the FT-840. Pinout is on page 10, and QSK connections on page 11.





# Front Panel LCD

This indicator appears when external computer-aided-transceiver control is being used (with optional FIF-232 interface box).

This indicator appears whenever the transmitter is activated (PTT).

This indicator appears whenever the squelch is open (while receiving).

This indicator appears whenever split-frequency operation is activated (by pressing the SPLIT button).

This indicator appears whenever general coverage tuning is selected (via the HAM/GEN button).

This MEM indicator shows memory operation is selected (by pressing the VFO/M button). It blinks after pressing the M VFO or VFO M button, to indicate that Memory Checking is active. While it is blinking, you can press the MEM-DOWN/UP buttons to check the contents of memories, without affecting operation. Wait 3 seconds and Memory Checking stops. See page 23.

One of these five indicators shows the current operating mode as selected by the buttons to the left of the tuning knob.

One of these two indicators shows the current VFO selected by the A/B button to the right of the main tuning knob.

(NARrow IF filter) While operating in the AM or CW mode, pressing the AM/N or CW/N button, respectively, toggles this indicator and the narrow IF filter for that mode (both filters are optional). Press the same button again to return to the wide IF filter.

This indicator appears when the automatic antenna tuner detects an abnormally high SWR that it cannot match.

This indicates that an automatic antenna tuner is connected to the appropriate rear panel connector and selected for operation (on-line).

This indicator appears while the automatic antenna tuner is seeking an impedance match with the antenna. It also flashes each time the main microprocessor sends the frequency update data to the tuner microprocessor (while you tune).

These two small digits display the ch. number when operating on a memory. For VFO operation, you can turn these off by holding the VFO M button while switching the transceiver on to toggle this choice.

This indicator appears whenever the fast (x 10) tuning rate is activated by the FAST button to the right of the tuning knob.

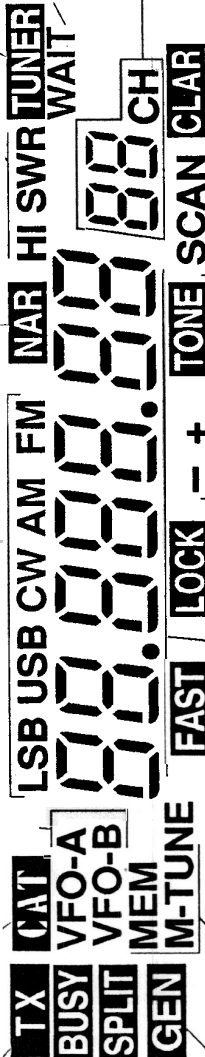
This is the current operating frequency, with decimals at the MHz and kHz positions. The rightmost large digit is 10's of Hz. The displayed frequency changes when you transmit with either clarifier off-set or split transceive enabled. While selecting memories during Memory Checking, the decimal points appear when the selected memory is vacant while the frequency display is blank.

One of these segments lights along with the TONE indicator when the FM repeater function is activated, indicating the repeater offset. TONE indicates the CTCSS tone is also activated to access CTCSS-controlled repeaters (page 21).

This indicator appears whenever the main tuning knob is locked (still turns but freq. does not change) by pressing the LOCK button below the mode selection keys. Front-panel keys can also be locked by holding this button while turning the set on to toggle this function (page 17).

This indicator appears when the Clarifier (receiver offset) is activated by the CLAR button. *Remember that your transmit frequency may be different from the display when this indicator is visible!*

(Memory scan select) This indicator appears when displaying a memory that has been selected to be scanned. It is not displayed if the memory has been tagged to be skipped during memory scanning (pg. 26).

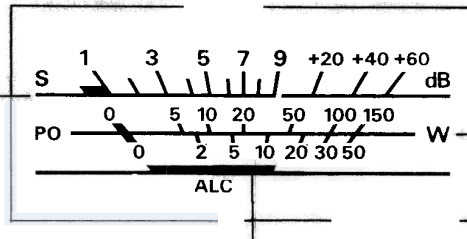


# Meter Functions

*Note: While receiving, refer only to the S-meter function: the top scale of the meter.*

*While transmitting, the meter function is determined by the **METER** button to the left of it.*

During reception, the top "S" scale indicates incoming signal strength in S-units at the left end of the scale, and in dB above S-9 at the right end. Each S-unit is approximately 6 dB.



The second, "PO" scale indicates transmitter power output, in watts, when selected by the **METER** button in the depressed ( **PO** ) position. This scale is calibrated to be most accurate when the antenna impedance is 50-Ω. Refer only to the numbers above the scale (0 - 150) for the FT-840; the numbers below apply only to special low-power versions.

The bottom "ALC" scale indicates transmitter Automatic Level Control voltage when selected by the **METER** button in the undepressed ( **ALC** ) position. The position and movement of the meter needle give a good indication of transmitter performance. This meter function is important when setting the **MIC** gain control for SSB and AM modes, and the **RF PWR** control in CW and FM modes. See the Transmitting instructions beginning on page 18.



# General Description

The FT-840 is a high-performance transceiver providing up to 100 watts transmitter output power on all HF amateur radio bands in CW, SSB and FM modes, and up to 25 watts carrier in AM. The receiver tunes all frequencies between 100 kHz and 30 MHz in 10-Hz steps. Ease of operation and flexible features are combined in a compact, reliable rig that both beginners and seasoned operators will enjoy.

Modular circuit design employs surface-mount components on composite epoxy boards for high reliability and serviceability. Twin direct-digital synthesizers (DDSs) and a magnetic rotary encoder provide silent, silky-smooth tuning. Frequency accuracy and stability are assured by driving both DDSs from a single master oscillator, and the optional TCXO-4 temperature-compensated crystal oscillator is available for enhanced  $\pm 2$ ppm stability from 0 ~ +50° C.

The FT-840 features a low-noise, high performance receiver front end. Interference rejection is facilitated by the unique "up-down" conversion scheme, and includes an IF shift circuit. The optional YF-112C crystal filter can be installed to provide enhanced CW reception, and an AM-wide filter is also available for greater fidelity during broadcast reception.

A few new features have been introduced that CW enthusiasts will enjoy. The CW reverse sideband feature lets you switch the receiver carrier point (offset) to help sidestep QRM and not have to re-tune signals when changing between LSB and CW modes (really convenient when working 40 meters and below). If you use a multi-mode TNC or CW decoder, the adjustable BFO offset lets you match the CW pitch to that used by your unit for best CW copy.

A 16-bit microprocessor in the FT-840 is programmed to provide the simplest possible control interface for the operator. Two independent (A/B) VFOs for each band (20 total) hold their own frequencies and modes settings. One-hundred memories store all of this data for both VFOs, giving a total of 220 independent sets of frequency, mode and other selections. Flexible scanning features allow all 100 memories or only those selected to be freely-tuned and scanned. Group scanning allows you to organize your memories into ten groups, and only scan channels within a selected group. In addition, ten special memories also let you limit the tuning/scanning range between their stored frequencies. Scan resume is selectable be-

tween timed or carrier-delay, and scanning speed is also adjustable.

Other valuable features include an effective noise blanker, all-mode squelch, multi-function meter, and an AF speech compressor which lets you increase the average power of your SSB and AM signal.

The FT-840 weighs under 5 kg and an internal thermally-switched fan allows full transmitter output without any rear panel protrusions, giving easy access to rear panel controls and connectors.

A choice of two external automatic antenna tuners makes multi-band operation with a single antenna as simple as pressing a button. The FC-10 is a compact, automatic antenna-tuner styled to match the size and appearance of the FT-840, and fits neatly into your shack. A simple two-cable connection to your FT-840 is all that is required for operation. For more demanding applications, the FC-800 tuner unit can be mounted outside at the antenna feedpoint (or in the trunk of your car for mobile use) for optimum performance. Both automatic tuners are controlled from the front panel of the transceiver.

Other accessories include the FP-800 AC Power Supply with Loudspeaker; the SP-6 External Loudspeaker with audio filters; the MMB-20 Mobile mounting bracket; the YH-77ST Headset; and the MD-1<sub>CS</sub> Desktop and MH-1<sub>BS</sub> Hand Microphones.

Before connecting the power cord, you should read the Installation section carefully, heeding the warnings in that section to avoid damage to the set. After installation, please take time to work through the Operation chapter, referring to the fold-out panel diagrams at the back of the manual as necessary for details. This manual is intended to be read while sitting down in front of the FT-840, so you can try out each control and feature as they are described.

# Specifications

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## General

Receiving Frequency range: 100 kHz ~ 30 MHz

Transmitting Frequency Ranges:

160 ~ 10 meter Amateur Bands

Frequency stability:  $\pm 10$  ppm (or  $\pm 500$  Hz FM),  
from 0 ~ +40° C and  $\pm 2$  ppm (or  $\pm 300$  Hz FM),  
from 0 ~ +50° C (w/TCXO-4 option)

Emission modes: USB, LSB(J3E), CW(A1A),  
AM(A3E), FM (F3E)

Frequency Tuning Steps: 10 Hz/100 Hz (CW, SSB)  
100 Hz /1 kHz (AM, FM)

Antenna impedance: 50  $\Omega$  nominal

Operating temp. range: -10 ~ +50° C

Supply voltage: 13.5-V DC  $\pm 10\%$  negative ground

Power consumption (approx): 1.2 A rx (no signal)  
20 A tx (100 watts)

Dimensions (WHD) 238 x 93 x 243mm

Weight (approx): 4.5 kg

## Transmitter

Power Output: adjustable up to 100 watts  
(25 watts AM carrier)

Modulation types: SSB: Balanced, filtered carrier

AM: Low-level (early stage)

FM: Variable reactance

Maximum FM Deviation:  $\pm 2.5$  kHz

Harmonic radiation: > 50 dB below peak output  
45 dB (10, 18 MHz)

Spurious Radiation: > 40 dB below peak output

SSB carrier suppression: > 40 dB below peak output

Undesired sideband suppression: at least 50 dB  
below peak output at 1.5 kHz modulation

Audio response (SSB): not more than -6dB  
from 400 ~ 2600 Hz

3rd-order IMD: -25 dB @ 100 watts PEP, 14.2 MHz

Microphone impedance 500 to 600  $\Omega$

FM operation requires installation  
of the optional FM UNIT-747.

## Receiver

Circuit type: dual-conversion superheterodyne

Intermediate frequencies: 1st: 47.055 MHz

2nd: 8.215 MHz

3rd: 455 kHz (FM)

Sensitivity:

(for 10 dB S/N, 0 dB $\mu$  = 1  $\mu$ V FM 12 dB SINAD)

Frequency $\Rightarrow$ Mode (BW) $\downarrow$	150 ~ 250 kHz	250 ~ 500 kHz	0.5 ~ 1.8 MHz	1.8 ~ 30 MHz
SSB, CW (2.4 kHz)	< 5 $\mu$ V	< 2 $\mu$ V	< 1 $\mu$ V	< 0.25 $\mu$ V
AM (6 kHz)	< 40 $\mu$ V	< 16 $\mu$ V	< 8 $\mu$ V	< 1 $\mu$ V
FM (28 ~ 30 MHz) (8 kHz)	—	—	—	< 0.5 $\mu$ V

Selectivity: (-6/-60 dB): ripple 3dB or better

Modes	Minimum 6 dB BW	Maximum 60 dB BW
CW narrow (optional)	500 Hz	1.8 kHz
SSB, CW, AM narrow	2.2 kHz	5.0 kHz
AM-wide (optional)	6 kHz	14 kHz (-50 dB)
FM (optional)	8 kHz	19 kHz

Squelch sensitivity:

1.8 ~ 30 MHz (CW, SSB, AM): < 2.0  $\mu$ V

28 ~ 30 MHz (FM): < 0.32  $\mu$ V

IF rejection (1.8 ~ 30 MHz): 60 dB or better

Image Rejection (1.8 ~ 30 MHz): 70 dB or better

IF Shift Range:  $\pm 1.2$  kHz

Clarifier tuning range/steps:  $\pm 1.25$  kHz/ 20 Hz  
 $\pm 2.50$  kHz/ 10 Hz

Maximum audio power output:

at least 1.5 watts into 4  $\Omega$  with < 10% THD

Audio output impedance: 4 to 8  $\Omega$

Specifications are subject to change, in the interest of  
technical improvement, without notice or obligation.

# Accessories & Options

## Supplied Accessories

**Hand-held Microphone (1 pc)**

**Fused DC Cable (1 pc)**

**20-A Fuse (1 pc)**

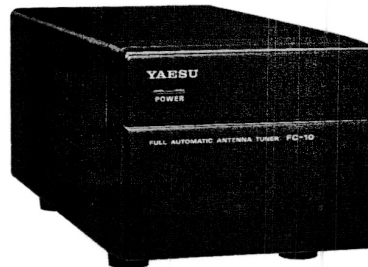
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## Options

### *FC-10 Compact External Auto-Antenna Tuner*

The FC-10 is a compact, easy-to-use automatic antenna tuner unit styled to match the FT-840 in size and appearance. Its small size enables it to sit next to the FT-840 while not taking up valuable space in your shack. The FC-10 requires only two simple cable connections to the rear panel of the transceiver, and is controlled entirely from the front panel of the FT-840.



### *FC-800 Automatic Antenna Tuner*

The FC-800 (external remote) antenna tuner match impedances of up to about 3:1 with the transmitter. Operation is controlled from the front panel. The FC-800 plugs into the rear panel, and can be mounted at the antenna feedpoint to avoid feedline losses.



### *TCXO-4 Master Reference Oscillator*

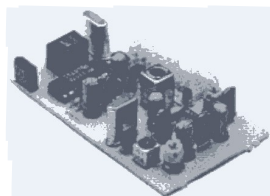
For special applications and environments where extra frequency stability is essential, the TCXO-4 temperature-compensated crystal oscillator is a 2-ppm (from 0 to +50 °C) replacement for the reference oscillator.





### *SP-6 Loudspeaker with Audio Filters*

Selectable audio high- and lowpass filters with a large loudspeaker complement the audio characteristics of the FT-840 with your choice of 12 different audio filtering combinations. Two input terminals are provided for multiple transceivers, with a front panel switch to select between them. A phone jack is provided on the front panel to take advantage of the audio filters with headphones.



### *FM Unit -747*

Installing this unit permits narrow-band FM reception and transmission, as used with 29.0 MHz Amateur 10-meter simplex and repeater operation.



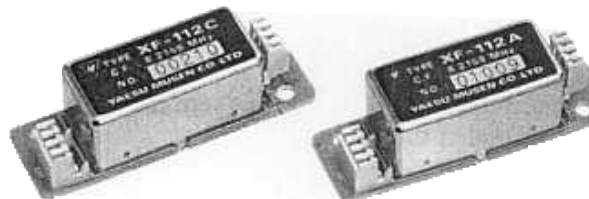
### *YH-77ST Lightweight Headphones*

Dual Samarium-Cobalt transducers with sensitivity of 103 dB/mW (2 dB @ 1 kHz, 35  $\Omega$ ) provide the perfect match for the FT-840, taking full advantage of the spectacular audio performance.



### *FIF-232 CAT System Interface*

To control your FT-840 from an RS-232C serial port of an external personal computer, use the FIF-232C to convert the TTL levels required by the transceiver to the RS-232C levels required by the serial port. A cable is included for connections between the transceiver and the FIF-232C (the cable to the computer must be provided separately). The FIF-232 includes its own power supply.



### *IF Crystal Filter Options*

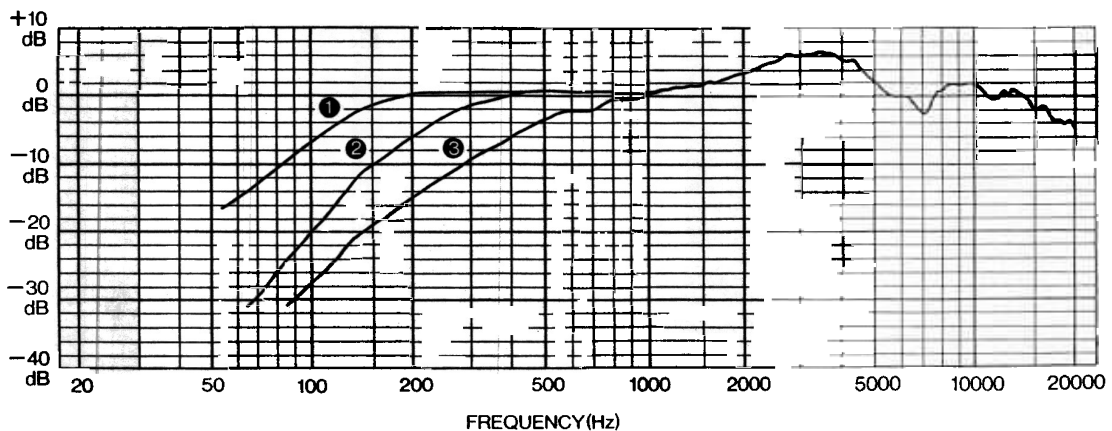
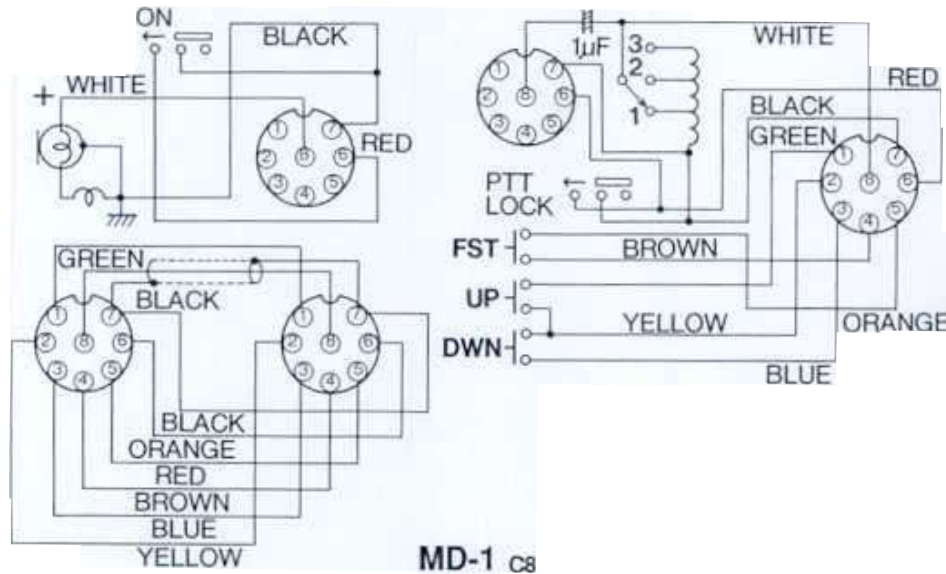
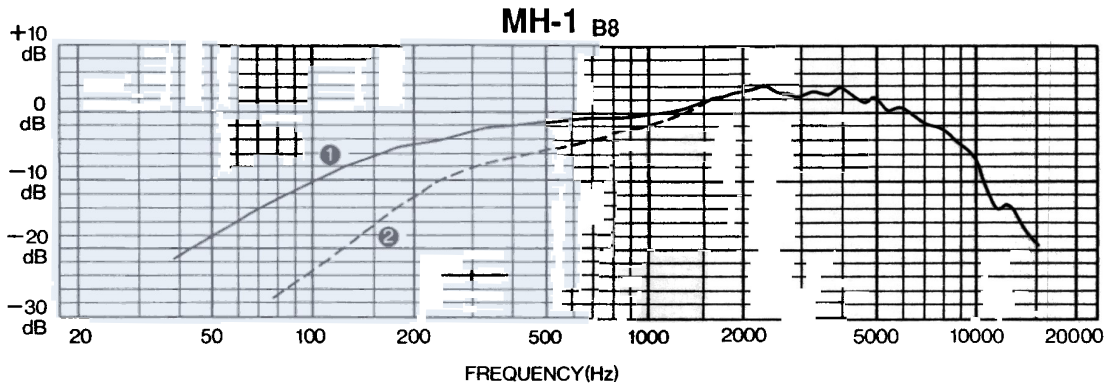
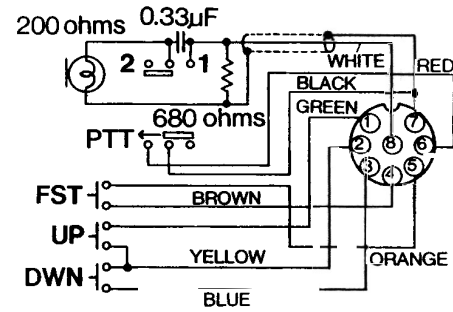
For extra CW receiver selectivity, the 500-F YF-112C 8-pole crystal filter may be installed in the 8.215-MHz 2nd IF of the FT-840. The 6-kHz YF-112A is also available for improved AM reception.



## Accessories & Options

### Microphones

Matching the electrical and cosmetic features of the FT-840, the MH-1B8 Hand Mic and MD-1C8 Desktop Mic have 600- $\Omega$  impedance, and include **UP/DWN** scanning buttons and a large PTT switch. The MH-1B8 also has a 2-position transmit audio characteristic selector, while the MD-1C8 has a 3-position selector. Typical audio characteristic plots with the different switch settings are indicated in the graphs below.



# Station Installation

## Preliminary Inspection

Inspect the transceiver thoroughly immediately upon opening the packing carton. Confirm that all controls and switches work freely, and inspect the cabinet for any damage. Make sure the accessories and cables pictured on page 3 are included. If any damage is found document it completely, and contact the shipping company (or dealer, if you purchased it over the counter) right away. Save the packing materials in case you need to return the set for service.

If you purchased optional internal accessories separately, install them as described in *Installing Internal Accessories* (page 33). This chapter describes base station installation first, followed by mobile installation and then interconnections with external accessories.

## AC Power Supply

The FT-840 is designed for operation from 13.5-V DC, negative ground. For base station installations, we recommend the matching Yaesu FP-800 AC power supply which was specifically designed for this purpose, and which includes a large loudspeaker for the transceiver and its own cooling fan. You can use another DC source capable of providing 20 amperes at 13.5-V DC with the supplied DC

### Caution!

Permanent damage can result if improper supply voltage is applied to the transceiver. Your warranty does not cover damage caused by application of AC, reversed polarity DC, or DC outside of the specified range of 13.5 V  $\pm$ 10%.

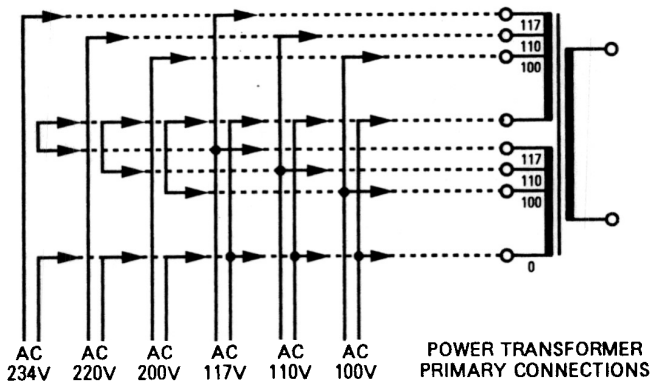
If using a power supply other than the FP-800, ensure the DC supply connector to the transceiver matches the FT-840 requirements. Other manufacturers have power supplies with a physically matched connector that is wired differently: this will cause serious damage to the FT-840!

cable assembly, but you must be extremely careful to avoid reversed polarity connection. See the Caution box above.

If you are connecting the FP-800 with the FT-840, before connecting power, check the label on the rear of the FP-800 which indicates the AC mains voltage range for which the supply is cur-

## Changing the AC Voltage Range of the FP-800 Power Supply (Not CE marked)

- Disconnect the AC cable from the rear of the FP-800, and the DC cable from the FT-840.
- Remove the 8 screws affixing the top cover.
- Unsolder the wires from the transformer, and resolder for the required voltage as indicated below.
- Replace the fuse in the rear panel holder with a fast-blow, 8-A fuse (for 100 ~ 117-V AC) or 4-A (for 200 ~ 234-V AC).
- Check your work carefully, then replace the top cover and its 8 screws. Change the voltage marking on the FP-800 rear panel label, and replace the AC cord, if necessary.



### Important!

If you change the AC voltage range you must change the fuse in the rear panel holder. Do not use a slow-blow fuse. Also make sure to change the voltage marking on the label on the rear panel to match the new voltage setting.

## Station Installation

rently set. If your AC mains voltage is outside of this range, the transformer taps inside the power supply must be rewired, and the fuse in the FP-800 must be changed. This involves some soldering of the AC mains input (see previous page, bottom), so you should ask your dealer for assistance if you are not experienced with this sort of work. *Incorrect connections could cause serious damage not covered by the warranty.*

In any case, make sure the power supply is set correctly before connecting power. If you have any doubts about the procedure, ask your dealer for help.

You should also make sure the fuse in the FP-800 rear panel fuse holder is correct for your mains voltage:

AC Mains Voltage	Fuse Capacity
100 ~ 117	8 A
200 ~ 234	4 A

After making certain the AC voltage for which the power supply is set matches your mains voltage, and that the correct fuse is installed in the fuse holder, connect the DC cable from the power supply to the jack on the rear panel. Don't plug the power supply cord into the wall until all other transceiver interconnections have been made.

### Transceiver Location

To assure long life of the components, make sure to provide adequate ventilation around the cabinet. The cooling system of the FT-840 must be free to draw cool air in at the side of the transceiver, and to expel warm air out of the rear panel. Do not place the transceiver on top of another heat-generating device such as a linear amplifier, and do not place equipment, books or papers on top of the transceiver. Place the transceiver on a hard, flat surface. Avoid heating vents and window locations that could expose the transceiver to excessive direct sunlight, especially in hot climates.

### Grounding

For protection from shock and proper performance, connect the **GND** terminal on the rear panel to a good earth ground, using a heavy braided cable of the shortest length possible. *Do not use gas lines as a ground connection.* All other station equipment should be connected to the same grounding cable, as close together as practical. If you use a computer with or near the FT-840, you may need to experiment with grounding of both the transceiver and the computer to suppress computer noise in the receiver.

### Adjusting the Front Panel Angle

If your installation places the FT-840 much below eye level, you may want to prop up the front. A wire bail on the bottom of the FT-840 can be folded down for this purpose.

### Antenna Considerations

Any antenna connected to the FT-840 should have a coaxial feedline with 50- $\Omega$  impedance, and include a well-grounded lightning arrestor. The FC-10 and FC-800 antenna tuners are capable of matching antennas with an SWR of up to 3:1 or more on the amateur bands to the transmitter. Nevertheless, optimum performance for both reception and transmission will generally result with an antenna designed to provide a 50- $\Omega$  unbalanced resistive load at the operating frequency. An antenna that is not resonant at the operating frequency may present too high an SWR for proper matching with the antenna tuner, in which case the antenna should be readjusted, or a wide-range manual antenna tuner should be used. If the tuner is unable to bring the SWR down to an acceptable level, attempting to transmit will result in an automatic reduction in power output and increased losses in the feedline. Operation under such conditions can waste power and cause TVI, RFI and RF feedback: it is better to install another antenna designed for that band. Also, if your antenna has a balanced feedpoint and you use a balanced feedline, install a balun transformer between the feedline and the transceiver's antenna jack.

### Mobile Power Connection

A fused (20-A) DC power cable for mobile installation is supplied with the transceiver. Please note the *Caution* at the beginning of this chapter before connecting power. Plan to connect the DC cable directly to the vehicle battery, rather than to the ignition or accessory circuitry. Route the cable as far away from ignition cables as possible, and then cut off any extra cable (from the battery end) to minimize voltage drop losses. If the cable is not long enough, use #12 AWG stranded, insulated wire to extend it, but no more than is necessary. Use the following procedure to connect the cable:

- Before connecting the cable, measure the voltage across the battery terminals with the engine running fast enough to show a charge. If above 15 volts, the automobile voltage regulator must be adjusted to reduce the charging voltage before proceeding.
- With the radio end of the cable unconnected, connect the RED cable lead to the POSITIVE battery terminal, and the BLACK lead to the