FT-2800M Operating Manual

Introduction

The FT-2800M is a deluxe, rugged FM mobile transceiver providing high power output and outstanding receiver performance for the 144 MHz band. Included in the FT-2800M's feature complement are:

- ❒ 60 Watts of power output, with selection of four power levels for every operating situation.
- ❒ Expanded receiver coverage: 137-174 MHz.
- ❒ Keyboard entry of operating frequencies from the microphone.
- ❒ Excellent protection from receiver intermodulation distortion, thanks to Yaesu's renowned Advanced Track Tuning front end.
- ❒ 219 memories which can store repeater shifts, odd repeater shifts, CTCSS/DCS tones, and 6-character Alpha-Numeric labels for easy channel recognition.
- ❒ 10 NOAA Weather Broadcast Channel.
- ❒ Built-in CTCSS and DCS Encoder/Decoder circuits.
- ❒ The Smart Search™ feature, which automatically sweeps a band and loads active frequencies into dedicated memory banks, is ideal for identifying active repeaters when visiting a city for the first time.
- ❒ Extensive Menu system, which allows customization of a number of transceiver performance characteristics.
- ❒ The Yaesu-exclusive multi-function LCD display.

Additional features include a transmit Time-Out-Timer (TOT), Automatic Power-Off (APO), Automatic Repeater Shift (ARS), plus provision for reduction of the Tx deviation in areas of high channel congestion. And an RF Squelch circuit allows the owner to set the squelch to open at a programmable setting of the S-Meter, thus reducing guesswork in setting the squelch threshold.

Congratulations on your purchase of the FT-2800M! Whether this is your first rig, or if Yaesu equipment is already the backbone of your station, the Yaesu organization is committed to ensuring your enjoyment of this high-performance transceiver, which should provide you with many years of satisfying operation. Yaesu's dealer network and technical support personnel stand behind every product we sell, and we invite you to contact us should you require technical advice or assistance.

We recommend that you read this manual in its entirety prior to installing the FT-2800M, so that you fully understand the capabilities of your new transceiver.

Specifications

General

Frequency Range:	Tx 144 - 146 MHz or 144 - 148 MHz
	Rx 144 - 146 MHz or 137 - 174 MHz
Channel Step:	5/10/12.5/15/20/25/50/100 kHz
Standard Repeater Shift	±600 kHz
Frequency Stability:	better than ±10 ppm
	[–4 °F to +140 °F (–20 °C to +60 °C)]
Mode of Emission:	F2/F3
Antenna Impedance:	50-ohms, unbalanced
Supply voltage:	13.8 V DC ±15%, negative ground
Current Consumption (typical):	Rx: less than 0.7 A, less than 0.3 A (squelched)
	Tx: 10 A (60 W)/6 A (25 W)/3 A (10 W)/2 A (5 W)
Operating Temperature Range:	????
Case Size (WxHxD):	6.3 x 2.0 x 7.3 inch (160 x 50 x 185 mm) (w/o knobs)
Weight (Approx.):	4.0 lb (1.8 kg)

Transmitter

Output Power:	60 W/25 W/10 W/5 W
Modulation Type:	Variable Reactance
Maximum Deviation:	±5 kHz/±2.5 kHz
Spurious Radiation:	better than –60 dB
Microphone Impedance:	2-kohm

Receiver

Circuit Type:	Double Conversion Superheterodyne
Ifs:	21.7 MHz & 450 kHz
Sensitivity (for 12dB SINAD):	better than 0.2 µV
Selectivity (–6/–60dB):	12 kHz/28 kHz
IF Rejection:	better than 70 dB
Image Rejection:	better than 70 dB
Adjacent Channel Selectivity	better than 70 dB
Inter Modulation	better than 95 dB
Maximum AF Output:	3.5 W into 4-ohms @10 % THD

Specifications subject to change without notice or obligation.

Accessory & Options

Supplied Accessories

Microphone MH-48A6J 1

Mobile Mounting Bracket MMB-?? 1

DC Power Cord w/Fuse (T9????????) 1

Spare Fuse 15 A (Q????????) 1

Standing Foot (R????????) 2

Operating Manual 1

Warranty Card 1

Optional Accessories

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Installation

This chapter describes the installation procedure for integrating the FT-2800M into a typical amateur radio station. It is presumed that you possess technical knowledge and conceptual understanding consistent with your status as a licensed radio amateur. Please take some extra time to make certain that the important safety and technical requirements detailed in this chapter are followed closely.

Preliminary Inspection

Inspect the transceiver visually immediately upon opening the packing carton. Confirm that all controls and switches work freely, and inspect the cabinet for any damage. Gently shake the transceiver to verify that no internal components have been shaken loose due to rough handling during shipping.

If any evidence of damage is discovered, document it thoroughly and contact the shipping company (or your local dealer, if the unit was purchased over-the-counter) so as to get instructions regarding the prompt resolution of the damage situation. Be certain to save the shipping carton, especially if there are any punctures or other evidence of damage incurred during shipping; if it is necessary to return the unit for service or replacement, use the original packing materials but put the entire package inside another packing carton, so as to preserve the evidence of shipping damage for

insurance purposes.

Installation Tips

To ensure long life of the components, be certain to provide adequate ventilation around the cabinet of the FT-2800M.

Do not install the transceiver on top of another heat-generating device (such as a power supply or amplifier), and do not place equipment, books, or papers on top of the FT-2800M. Avoid heating vents and window locations that could expose the transceiver to excessive direct sunlight, especially in hot climates. The FT-2800M should not be used in an environment where the ambient temperature exceeds +60 °C.

Safety Information

The FT-2800M is an electrical apparatus, as well as a generator of RF (Radio Frequency) energy, and you should exercise all safety precautions as are appropriate for this type of device. These safety tips apply to any device installed in a well-designed amateur radio station.

(!): Never allow unsupervised children to play in the vicinity of your transceiver or antenna installation.

(!): Be certain to wrap any wire or cable splices thoroughly with insulating electrical tape, to prevent short circuits.

(!): Do not route cables or wires through door jambs or other locations where, through wear and tear, they may become frayed and shorted to ground or to each other.

(!): Do not stand in front of a directional antenna while you are transmitting into that antenna. Do not install a directional antenna in any location where humans or pets may be walking in the main directional lobe of the antenna's radiation pattern.

(!): In mobile installations, it is preferable to mount your antenna on top of the roof of the vehicle, if feasible, so as to utilize the car body as a counterpoise for the antenna and raise the radiation pattern as far away from passengers as possible.

(!): During vehicular operation when stopped (in a parking lot, for example), make it a practice to switch to Low power if there are people walking nearby.

(!): Never wear dual-earmuff headphones while driving a vehicle.

(!): Do not attempt to drive your vehicle while making a telephone call on an autopatch using the DTMF microphone. Pull over to the side of the road, whether dialing manually or using the auto-dial feature.

Antenna Consideration

The FT-2800M is designed for use with antennas presenting an impedance of near 50 Ohms at all operating frequencies. The antenna (or a 50 Ohm dummy load) should be connected whenever the transceiver is turned on, to avoid damage that could otherwise result if transmission occurs accidentally without an antenna.

Ensure that your antenna is designed to handle 60 Watts of transmitter power. Some magnetic-mount mobile antennas, designed for use with hand-held transceivers, may not be capable of withstanding this power level. Consult the antenna manufacturer's specification sheet for details.

Most all FM work is performed using vertical polarization. When installing a directional antenna such as a Yagi or Cubical Quad, be certain to orient it so as to produce vertical polarization, unless you are engaged in a special operating situation where horizontal polarization is used. In the case of a Yagi antenna, orient the elements vertically for vertical polarization; for a Cubical Quad, the feedpoint should be at the center of one of the vertical sides of the driven element (or at a side corner, in the case of a diamond-shaped Cubical Quad).

Excellent reference texts and computer software are available for the design and optimization of VHF antennas. Your dealer should be able to assist you with all aspects of your antenna installation requirements.

Use high-quality 50 Ohm coaxial cable for the lead-in to your FT-2800M transceiver. All efforts at providing an efficient antenna system will be wasted if poor quality, lossy coaxial cable is used. Losses in coaxial lines increase as the frequency increases, so an 8-meter-long (25' coaxial line with 1/2 dB of loss at 29 MHz may have a loss of 1.8 dB or more at 146 MHz; choose your coaxial cable carefully based on the installation location (mobile vs. base) and the overall length of the cable required (for very short runs of cable in a mobile installation, the smaller, more flexible cable types may be acceptable).

For reference, the chart below shows approximate loss figures for typically-available coaxial cables frequently used in VHF installations.

<<Cable Chart>>

Loss figures are approximate; consult cable manufacturers' catalogs for complete specifications.

In outdoor installations, be certain to weatherproof all connectors thoroughly, as water entering a coaxial cable will cause losses to escalate rapidly, thus diminishing your communications effectiveness. The use of the shortest possible length of the highest quality coaxial cable that fits within your budget will ensure the best performance from your FT-2800M.

Mobile Installation

The FT-2800M must only be installed in vehicles having a 13.8 Volt negative ground electrical system. Mount the transceiver where the display, controls, and microphone are easily accessible, using the supplied MMB-?? mounting bracket.

The transceiver may be installed in almost any location, but should not be positioned near a heating vent nor anywhere where it might interfere with driving (either visually or mechanically). Make sure to provide plenty of space on all sides of the transceiver so that air can flow freely around the radio's case. Refer to the diagrams showing proper installation procedures.

Transceiver Installation

- ❒ Choose a mounting location with sufficient clearance for the transceiver. Using the mounting bracket as a template for the mounting holes, use a 4.8 mm (3/16" bit to drill the mounting holes, and secure the mounting bracket with the supplied screws, washers, and nuts (see diagram).
- ❒ Position the transceiver in the bracket so that the holes in the side are aligned with those in the bracket, and bolt the transceiver into place using the supplied short screws and flat washers.

Mobile Power Connections

To minimize voltage drop and avoid blowing the vehicle's fuses, connect the supplied DC power cable directly to the battery terminals. Do not attempt to defeat or bypass the DC cable's fuse - it is there to protect you, your transceiver, and your vehicle's electrical system.

Warning!

Never apply AC power to the power cable of the FT-2800M, nor DC voltage greater than 15.8 Volts. When replacing the fuse, only use a 15-A fuse. Failure to observe these safety precautions will void the Limited Warranty on this product.

- ❒ Before connecting the transceiver, check the voltage at the battery terminals while revving the engine. If the voltage exceeds 15 Volts, adjust the vehicle's voltage regulator before proceeding with installation.
- ❒ Connect the RED power cable lead to the POSITIVE (+) battery terminal, and the BLACK power cable lead to the NEGATIVE (–) terminal. If you need to extend the power cable, use #12 AWG or larger insulated, stranded copper wire. Solder the splice connections carefully, and wrap the connections thoroughly with insulating electrical tape.
- ❒ Before connecting the cable to the transceiver, verify the voltage and polarity of the voltage at the transceiver end of the DC cable using a DC voltmeter. Now connect the transceiver to the DC cable.

Mobile Speakers

The optional MSL-100 External Speaker includes its own swivel-type mounting bracket, and is available from your Yaesu dealer.

Other external speakers may be used with the FT-2800M, if they present the specified 8-Ohm impedance and are capable of handling the 3.5 Watts of audio output supplied by the FT-2800M.

Base Station Installation

The FT-2800M is ideal for base station use as well as in mobile installations. The FT-2800M is specifically designed to integrate into your station easily, using the information to follow as a reference.

AC Power Supplies

Operation of the FT-2800M from an AC line requires a power source capable of providing at least 15 Amps continuously at 13.8 Volts DC. The FP-1023 and FP-1030A AC Power Supplies are available from your Yaesu dealer to satisfy these requirements. Other well-regulated power supplies may be used, as well, if they meet the above voltage and current specifications.

Use the DC power cable supplied with your transceiver for making power connections to the power supply. Connect the RED power cable lead to the POSITIVE (+) power supply terminal, and connect the BLACK power cable lead to the NEGATIVE (–) power supply terminal.

Front Panel Controls & Switches

1. VOL Knob
   This control adjusts the audio volume level. Clockwise rotation increases the volume level.
2. SQL Knob
   This control is used to silence background noise on the receiver. It should be advanced clockwise just to the point where the noise is silenced (and the "BUSY" indicator on the display turns off), so as to provide the best sensitivity to weak signals.
3. Microphone Jack
   Connect the supplied MH-48A6J Hand Microphone to this jack.
4. [%] Key
   This key allows operating the Internet Connection feature.
5. PWR Key
   Press and hold this key for one second to toggle the transceiver's power on and off.
6. [MHz(SET)] Key
   This key allows tuning in 1-MHz steps (the MHz digits will blink on the display). If receiving on a memory, pressing this key the first time activates the Memory Tuning mode, and pressing it again enables 1-MHz steps.
   Press and hold this key for one second to activate the "Set" (Menu) mode.
7. [REV(DW)] Key
   During split-frequency operation, such as through a repeater, this key reverses the transmit and receive frequencies.
   Press and hold this key for one seconds to activate the Dual Watch feature, described in the Operation chapter ("PRI" will be displayed on the LCD, indicating "Priority Channel" monitoring).
8. [LOW(A/N)] Key
   Press this key momentarily to select the transmitter power output level.
   The available power levels are:

HIGH(60W) → MID(25W) → LOW2(10W) → LOW1(5W)

While receiving on a memory, press and hold this key for one seconds to toggle the display between indication of the frequency and the channel's Alpha/Numeric label.

9. [D/MR(MW)] Key

   Press this key momentarily to switch the frequency control among the VFO, Memory System, and Home channel.

   Press and hold this key for one second to activate the Memory Storage mode.

10. DIAL Knob

    This 24-position detented rotary switch is used for tuning, memory selection and most function settings. The microphone UP/DWN buttons duplicate the functions of this knob.

11. Display

    The main digits on the display may show operating frequency, memory name, or any of many parameters during setting.

Microphone Switches

1. PTT Switch

   Press this switch to transmit, and release it to receive.

2. Keypad

   These 16 keys generate DTMF tones during transmission.

   In the receive mode, these 16 keys can be used for direct frequency entry and/or direct numeric recall of the Memory channels.

3. [P1]/[P2]/[P3]/[P4] Buttons

   [P1] button (SQL OFF)

   Pressing this button disable the noise and tone squelch system.

   [P2] button (S SRCH)

   Press this button to activate the Smart Search feature.

   [P3] button (T SRCH)

   Press this button to activate the Tone Search feature.

   [P4] button

   Press this button to recall the "Weather" broadcast channel bank.

   You can reprogram the [P1], [P2], [P3], and [P4] buttons for other functions, if desired. See page ?? for details.

4. LAMP Switch

This switch illuminates the Microphone keypad.

5. LOCK Switch

   This switch locks out the Microphone buttons (except for the keypad and PTT switch).

6. [UP]/[DWN] Button

   Press (or hold in) either of these buttons to tune (or scan up or down) the operating frequency or through the memory channels. In many ways, these buttons emulate the function of the (rotary) DIAL knob.

Rear Panel Connectors

1. EXT SP Jack

   This 2-contact mini 3.5-mm mini phone jacks provide receiver audio output for an optional external speaker. The audio impedance is 4-ohm, and the level varies according to the setting of the front panel's VOL control. Inserting a plug into this jack disable audio from the transceiver's internal speaker.

2. 13.8V DC Cable Pigtail w/Fuse

   This is the power supply connection for the transceiver. Use the supplied DC cable to connect this pigtail to the car battery or other DC power supply capable of at least 10 Amperes (continuous duty). Make certain that the red lead connects to the positive side of the supply. The fuse is 15-A.

3. ANT Coaxial Socket

   Connect a 144-MHz antenna to this type-M (SO-239) socket using 50-ohm coaxial cable and a type-M (pl-259) plug. Male sure the antenna is designed specifically for use on the operating frequency.

Basic Operation

R. F. Says: Hi! I'm R. F. Radio, and I'll be helping you along as you learn the many features of the FT-2800M. I know you're anxious to get on the air, but I encourage you to read "Basic Operation" section of this manual as thoroughly as possible, so you'll get the most out of this fantastic new transceiver. Now. . .let's get operating!

Turning the Transceiver On and Off

1. To turn the transceiver on, press and hold in the PWR key for one second.

   When you turn on the FT-2800M, the current DC supply voltage is indicated on the

LCD for 2 seconds. After this interval, the display will switch its normal indication of the operating frequency.

2. To turn the transceiver off, again press and hold in the PWR key for one second.

Adjusting the Audio Volume Level

Rotate the VOL control to adjust the receiver volume. Clockwise rotation increases the audio output level.

Adjusting the Squelch Setting

Rotate the SQL control just to the point where the noise is silenced and the "BUSY" indicator on the display turns off. If the SQL control is set further clockwise, sensitivity to weak signals is reduced.

A special "RF Squelch" feature is provided on this radio. This feature allows you to set the squelch so that only signals exceeding a certain S-meter level will open the squelch. See page ?? for details

Frequency Navigation

1) Tuning Dial

Rotating the DIAL knob allows tuning in the pre-programmed steps. Clockwise rotation of the DIAL knob causes the FT-2800M to be tuned toward a higher frequency, while counter-clockwise rotation will lower the operating frequency.

Press the [MHz(SET)] key momentarily, then rotate the DIAL knob, to change the frequency steps to 1 MHz per step. This feature is extremely useful for making rapid frequency excursions over the wide tuning range of the FT-2800M.

2) Direct Keypad Frequency Entry

The keypad of the MH-48A6J DTMF Microphone may be used for direct entry of the operating frequency.

To enter a frequency from the MH-48A6J keypad, just press the numbered digits in the proper sequence. There is no "decimal point" key on the MH-48A6J keypad. However, there is a short-cut for frequencies ending in zero - press the [#] key after the last non-zero digit.

Examples: To enter 146.520 MHz, press [1] → [4] → [6] → [5] → [2] → [0]

To enter 146.000 MHz, press [1] → [4] → [6] → [#]

3) Scanning

From the VFO mode, press the microphone's [UP]/[DWN] keys momentarily to initiate scanning toward a higher- or lower frequency, respectively. The FT-2800M will stop when it receives a signal strong enough to break through the squelch threshold. The FT-2800M will then hold on that frequency according to the setting of the "Resume" mode (Menu #23 (SCAN); see page ??).

If you wish to reverse the direction of the scan (i.e. toward a lower frequency, instead of a higher frequency), just rotate the DIAL knob one click in the counter-clockwise direction while the FT-2800M is scanning. The scanning direction will be reversed. To revert to scanning toward a higher frequency once more, rotate the DIAL knob one click clockwise.

Press the [UP]/[DWN] keys again to cancel scanning.

Transmission

To transmit, simply close the PTT (Push To Talk) switch on the microphone when the frequency is clear. Hold the microphone approximately 1" (25 mm) from your mouth, and speak into the microphone in a normal voice level. When your transmission is complete, release the PTT switch; the transceiver will revert .

During transmission, the "TX" indicator will appear at the upper left corner on the display.

Changing the Transmitter Power Level

You can select from among a total of four transmit power levels on your FT-2800M.

To change the power level, press the [LOW(A/N)] key (or microphone's [A] key) to select one of four power settings. These power levels will be stored, in memory registers, at the time of memory storage (see page ?? for details on Memory operation).

During transmission, the Bar Graph will deflect in the display, according to the power output selected.

Advanced Operation

Weather Broadcast Reception

The FT-2800M includes a unique feature which allows reception of weather broadcasts

in the 160-MHz frequency range. Ten standard Weather Broadcast channels are pre-loaded into a special memory bank.

To listen to a Weather Broadcast Channel:

1. Press the Microphone's [P4] button to recall the Weather Broadcast channels.
2. Turn the DIAL knob to select the desired Weather Broadcast channel.
3. If you wish to check the other channels for activity by scanning, just press the Microphone's PTT switch.
4. To exit to normal operation, press the [P4] button again. Operation will return to the VFO or Memory channel you were operating on before you began Weather Broadcast operation.

R.F. Says: In the event of extreme weather disturbances, such as storms and hurricanes, the NOAA (National Oceanic and Atmospheric Administration) sends a weather alert accompanied by a 1050 Hz tone and subsequent weather report on one of the NOAA weather channels. You may enable the this feature via Menu Item (32 W ALT), if desired. See page ?? for details.

LOCK Feature

To order to prevent accidental frequency change or inadvertent transmission, various aspects of the FT-2800M's keys and knob may be locked out. The possible lockout combinations are:

KEY: Just the front panel keys are locked out
DIAL: Just the front panel DIAL knob is locked out
K+D: Both the keys and DIAL knob are locked out
PTT: The PTT switch is locked (TX not possible)
K+P: Both keys and PTT switch are locked out
D+P: Both DIAL knob and PTT switch are locked out
ALL: All of the above are locked out
OFF: The Lock feature is disabled

To lock out some or all of the keys:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "14 LOCK."
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the display to "OFF."
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit

to normal operation.

When activate the locking feature, the “KEY” icon will appear on the LCD.

Keypad Beeper

A key/button beeper provides useful audible feedback whenever a key/button is pressed. If you want to turn the beeper off (or back on again):

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “03 BEEP.”
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the display to “OFF.”
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

Channel Step Selection

Tuning steps are factory present to default increments which are appropriate for the country to which this radio is exported. To change to another step size as following:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “29 STEP”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired step size (5/10/12.5/15/20/25/50/100 kHz).
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

Display Brightness

The FT-2800M display illumination has been specially engineered to provide high visibility with minimal disruption of your “night vision” while you are driving. The brightness of the display is manually adjustable, using the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “07 DIMR”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select a comfortable brightness level (1, 2, 3, and OFF).
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

RF Squelch

A special RF Squelch feature is provided on this radio. This feature allows you to set the squelch so that only signals exceeding a S-meter level will open the squelch. To set up the RF squelch circuit for operation, use the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “20 RF SQL”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired signal strength level for the squelch threshold (1 - 10 or OFF).
3. Press and hold the [MHz(SET)] key for 1/2 second to save your new setting and exit to normal operation.

Note: The receiver’s squelch will open based on the highest level set by the two squelch system “Noise Squelch and RF Squelch). For example:

1) If the Noise Squelch (SQL control) is set so that signals at a level of S-3 will open the squelch, but the RF Squelch (Menu #20) is set to “S-9,” the squelch will only open on signals which are S-9 or stronger on the S-meter.
2) If the RF Squelch is set to “S-3,” but the Noise Squelch is set to a high level which will only pass signals which are Full Scale on the S-meter, the squelch will only open on signals which are Full Scale on the S-meter. In this case, the Noise Squelch overrides the action of the RF Squelch.

Repeater Operation

The FT-2800M includes a host of convenience features which makes operation on amateur repeaters both efficient and enjoyable.

Repeater Splits

This transceiver offers three methods of setting up split-frequency operation on repeaters:

[1] Manual selection of preset repeater shifts;
[2] Automatic Repeater Shift (ARS), providing automatic activation of repeater shifts during designated repeater frequency subbands; and
[3] Independently stored transmit and receive frequencies (typically not corresponding to established repeater frequency shifts).

[1] Standard Repeater Shift

To activate the standard shift manually, as following:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “21 RPTR”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired shift direction (–RPTR, +RPTR, or SIMP).
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

With repeater shift activated, you can temporarily reverse the transmit and receive frequencies by pressing the [REV(DW)] key (or microphone’s [B] key). Use this feature to display the transmit frequency without transmitting, and to check the strength of signals on a repeater uplink frequency (so as to determine whether or not a particular station is within “Simplex” range, for example).

The repeater offset is fixed to 600 kHz from the factory. You can change the offset by following procedure, if needed:

1. Press and hold the [MHz(SET)] key for one second, then rotate the knob to select “24 SHIFT”.
2. Press the [MHz(MHz)] key, then rotate the DIAL knob to set the desired offset. Note that the resolution of the “standard” repeater shift is to the nearest 50 kHz multiple.
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

[2] Automatic Repeater Shift

The ARS (Automatic Repeater Shift) feature in this transceiver allows easy and convenient repeater operation by automatically activating the repeater shift function whenever you tune to a standard repeater sub band. The ARS function is preset at the factory to conform to the standards for the country to which it is exported.

The ARS function is enabled at the factory. To disable it:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “02 ARS”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to change the display to “OFF”.
3. Press and hold the [MHz(SET)] key for one second to save your new setting and exit to normal operation.

To enable the ARS function again, select to “ON” in step 2 above.

[3] Separate Transmit Frequency Memories

All memory channels can store independent receive and transmit frequencies, to accommodate occasional non-standard offsets with greater frequency resolution than is available using the “standard” shift feature.

1. First store the receive (repeater output) frequency. In the VFO mode, tune the transceiver to the desired receive frequency. Now press and hold the [D/MR(MW)] key on the for one second.
2. Within five seconds of pressing the [D/MR(MW)] key, use the DIAL knob or microphone’s [UP]/[DWN] buttons to select the desired memory for storage.
3. Now press the [D/MR(MW)] key momentarily to store the receive frequency into the selected memory.
4. Next store the transmit (repeater input) frequency. Since you are still in the VFO mode, tune the transceiver to the desired transmit frequency.
5. Now press and hold the [D/MR(MW)] key for one second.
6. Press and hold the PTT switch, and press the [D/MR(MW)] key momentarily while holding in the PTT switch. This will not cause transmission, but rather it will instruct the transceiver that you are programming a separate transmit frequency into memory.

When you have finished the above procedure, press the [D/MR(MW)] key momentarily. The channel number and repeater downlink frequency will appears onto the display. If you press the PTT switch, you will observe the display changing to indicate the repeater’s uplink frequency. Note also that the display shows “–+” in the upper left-hand corner; this indicates that an “odd” (non-standard) shift has been stored on this channel.

CTCSS/DCS Operation

CTCSS Operation

Many repeater systems require that a very-low-frequency audio tone be superimposed on your FM carrier in order to activate the repeater. This helps prevent false activation of the repeater by radar or spurious signals from other transmitters. This tone system, called “CTCSS” (Continuous Tone Coded Squelch System), is included in your FT-2800M, and is very easy to activate.

R. F. Says: CTCSS setup involves two actions: setting the Tone Mode and then setting of the Tone Frequency. These actions are set up by using the Set mode #28 (SQ TYP) and #27 (SQ TNF).

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “28 SQ TYP”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob so that “T ENC” appears on the display; this activates the CTCSS Encoder, which allows repeater access.
   R. F. Says: You may notice an additional “DC ENC” and “DCS” appearing while you rotate the DIAL knob in this step. We’ll discuss the Digital Code Squelch system shortly.
3. Rotating the DIAL knob one more click clockwise in above step will cause “TSQ” to appear. When “TSQ” appears, this means that the Tone Squelch system is active, which mutes your FT-2800M’s receiver until it receives a call from another radio sending out a matching CTCSS tone. This can help keep your radio quiet until a specific call is received, which may be helpful while operating in congested areas.
4. When you have made your selection of the CTCSS tone mode, press the [MHz(SET)] key momentarily, then rotate the DIAL knob one click counter-clockwise to select Menu #27 (SQ TNF). This Menu selection allows setting of the CTCSS tone frequency to be used.
5. Press the [MHz(SET)] key to enable adjustment of the CTCSS frequency.
6. Rotate the DIAL knob until the display indicates the Tone Frequency you need to be using.
7. When you have made your selection, press and hold the Press the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

R. F. Says: Your repeater may or may not re-transmit a CTCSS tone - some systems just use CTCSS to control access to the repeater, but don’t pass it along when transmitting. If the S-Meter deflects, but the FT-2800M is not passing audio, repeat steps “1” through “3” above, but rotate the DIAL knob so that “T ENC” appears - this will allow you to hear all traffic on the channel being received.

DCS Operation

Another form of tone access control is Digital Code Squelch, or DCS. It is a newer, more advanced tone system which generally provides more immunity from false paging than does CTCSS. The DCS Encoder/Decoder is built into your FT-2800M, and operation is very similar to that just described for CTCSS. Your repeater system may be configured for DCS; if not, it is frequently quite useful in Simplex operation if your friend(s) use transceivers equipped with this advanced feature.

R. F. Says: Just as in CTCSS operation, DCS requires that you set the Tone Mode to DCS and that you select a Tone Code.

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “28 SQ TYP”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob until “DCS” appears on the display; this activates the DCS Encoder/Decoder.
3. Now, press the [MHz(SET)] key momentarily, then rotate the DIAL knob to select Menu #26 (SQ DCS).
4. Press the [MHz(SET)] key momentarily to enable the adjustment of the DCS code.
5. Rotate the DIAL knob to select the desired DCS Code (a three-digit number).
6. When you have made your selection, press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

R. F. Says: Remember that the DCS is an Encode/Decode system, so your receiver will remain muted until a matching DCS code is received on an incoming transmission. Switch the DCS off when you’re just tuning around the band!

Tone Search Scanning

In operating situations where you don’t know the CTCSS or DCS tone being used by another station or stations, you can command the radio to listen to the incoming signal and scan in search of the tone being used. Two things must be remembered in this regard:

- You must be sure that your repeater uses the same tone type (CTCSS vs. DCS).

- Some repeaters do not pass the CTCSS tone; you may have to listen to the station(s) transmitting on the repeater uplink (input) frequency in order to allow Tone Search Scanning to work.

To scan for the tone in use:

1. Set the radio up for either CTCSS or DCS Decoder operation (see the previous discussion). In the case of CTCSS, “TSQ” will appear on the display; in the case of DCS, “DCS” will appear on the display.
2. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select Menu #27 (SQ TNF) when CTCSS is selected, or Menu #26 (SQ DCS) during DCS operation.
3. Press the Microphone’s [P3] key momentarily to start scanning for the incoming CTCSS or DCS tone/code.
4. When the radio detects the correct tone or code, it will halt on that tone/code, and audio will be allowed to pass.
5. Press and hold the [MHz(SET)] key for one second to lock in that tone/code and exit

to normal operation.

R. F. Says: If the Tone Scan feature does not detect a tone or code, it will continue to scan indefinitely. When this happens, it may be that the other station is not sending any tone. You can press the Microphone's [P3] key to halt the scan at any time.

Tone Scanning works either in the VFO or Memory modes.

CTCSS/DCS Bell Paging

During CTCSS Decode or DCS operation, you may set up the FT-2800M such that a ringing "bell" sound alerts you to the fact that a call is coming in. Here is the procedure for activating the CTCSS/DCS Bell:

1. Set the transceiver up for CTCSS Decode ("Tone Squelch") or DCS operation, as described previously.
2. Adjust the operating frequency to the desired channel.
3. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "04 BELL".
4. Rotate the DIAL konb to set the desired number of rings of the Bell. The available choices are 1, 3, 5, or 8 rings, REPEAT (continuous ringing), or OFF.
5. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

When you are called by a station whose transceiver is sending a CTCSS tone or DCS code which matches that set into your Decoder, the Bell will ring in accordance to this programming.

DTMF Autodialer Operation

Nine DTMF Autodialer memories are available on this radio. These DTMF Autodialer memories can store up to 16 digits of a telephone number for repeater autopatch or other use.

To load DTMF Autodialer memories, use following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "10 DT MEM".
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the DTMF Autodialer memory channel number into which you wish store a telephone number ("DTMF-1" to "DTMF-9").

3. Press the [D/MR(MW)] key momentarily, then rotate the DIAL knob to select the first digit of the telephone number you wish to store.
4. When you have selected the correct digit, press the [REV(DW)] key momentarily. Now, rotate the DIAL knob to select the second of 16 available numbers in the current DTMF Autodialer memory resistor.
5. Repeat this procedure for each digit in the telephone number. If you a mistake, press the microphone's [DWN] key to move back to the first digit, then re-enter the correct number.
6. When entry of all digits is complete, press the [MHz(SET)] key.
7. If you wish to store another DTMF string, repeat steps 2 through 6 above.
8. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

To transmit the memorized telephone number, use the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "08 DTMF".
2. Press the [MHz(SET)] key, then rotate the DIAL knob to set the DTMF Autodialer memory function to the "ON" position (the "Telephone" icon will appear).
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.
4. In the Autodialer function mode, first press the PTT switch, the press the microphone's numeric key ([1] through [9]) corresponding to the DTMF memory string you wish to send. Once the string begins, you may release the PTT switch, as the transmitter will be held "on the air" until the DTMF string is completed.

To disable the Autodialer function mode, select "OFF" in step "2" above.

The speed at which the DTMF digits are sent can be changed. Two speed levels are available: Low (10 digits per second) and High (20 digits per second: default). To toggle between Low and High speed, use the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "11 DT SPD".
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired speed ("50": High speed or "100": Low speed).
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

You can also set a longer delay between the time your transmitter is keyed and the first DTMF digit is send. To set a delay time, use the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “09 DT DLY”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired speed (50/250/450/750/1000 ms).
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Memory Operation

Memory Storage

To store a frequency into memory:

1. In the VFO mode, select the desired frequency, repeater shift, CTCSS/DCS tone, and TX power level.
2. Press and hold the [D/MR(MW)] key for one second. A memory number will appear blinking in the display.
3. Within five seconds of pressing the [D/MR(MW)] key, use the DIAL knob to select the desired memory for storage.
4. Press the [D/MR(MW)] key again, this time momentarily, to store the displayed data into the selected memory channel slot. The memory label will disappear (since you are still operating in the VFO mode).

Storing Independent Transmit Frequencies (“Odd Splits”):

1. Store the receiving frequency using the method already described.
2. Turn to the desired transmit frequency, the press and hold [D/MR(MW)] key for one second.
3. Within five seconds of pressing the [D/MR(MW)] key, use the DIAL knob to select the same memory channel number as used in step 1 above.
4. Press and hold in the PTT switch, then press the [D/MR(MW)] key momentarily while holding the PTT switch to save the entry and exit to normal operation. This will not cause transmission; instead, it signals the microprocessor that a separate transmit frequency is being programmed into that memory register.

R. F. Says: Whenever you recall a memory which contains independently-stored transmit and receive frequencies, the “–+” indication will appear in the display.

Memory Recall

1. Press the [D/MR(MW)] key, repeatedly if necessary, until "MR" icon and memory channel number appears on the display; this indicates that the memory channel is recalled (Memory Mode).
2. When more than one memory has been stored, use the DIAL knob to select a memory for operation. Alternatively, microphone's [UP] or [DWN] button may be used to stop or scan through the available memories. When using the microphone's buttons, press and release the button to move one step up or down; press and hold the [UP] or [DWN] button for one second to begin memory scanning.

Memory Recall from the Microphone's keypad:

While operating on the Memory Recall mode, the keypad of the MH-48A6J Microphone may be used for direct recall of memory channels.

To do this, press the Channel Number you wish to recall, then press the [∗] key. For example, to recall Memory Channel "5," press [5] → [∗]. To recall Memory Channel "118," press [1] → [1] → [8] → [∗].

Labeling Memories

You may wish to append an alpha-numeric "Tag" (label) to a memory or memories, to aid in recollection of the channel's use (such as club name, etc.). This is easily accomplished using the Menu mode.

1. Recall the memory channel on which you wish to append a label.
2. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "00 ALPH".
3. Press the [MHz(SET)] key. You will notice the first entry's place blink. Within the A/N entry mode, rotate the DIAL knob to select characters, and pressing the [REV(DW)] key to move the character's entry place to the right.
4. Rotate the DIAL knob to select the desired number, letter, or symbol, then press the [D/MR] key to move the next character's place.
5. Do this as necessary to complete a name tag (up to six characters) for your memory, then press the [MHz(SET)] key momentarily to save the A/N name entry.
6. Press and hold the [MHz(SET)] key for one second to exit to normal operation.

While operating on the Memory Recall mode, press and hold the [LOW(A/N)] key for one seconds to toggle the display between indication of the frequency and the channel's Alpha/Numeric label.

Memory Tuning

Once you have recalled a particular memory channel, you may easily tune off that channel, as though you were in the VFO mode.

1. With the FT-2800M in the Memory Recall mode, select the desired memory channel.

2. Press the [MHz(SET)] key momentarily. The “MR” indicator will be blinks; this indicates that the Memory Tuning.
3. Rotate the DIAL knob, as desired, to tune to anew frequency. The synthesizer steps for VFO operation will be the steps used during Memory Tuning.
4. IF you wish to return to the original memory frequency, press the [D/MR(MW)] key momentarily. The “MR” indicator will be stop the blinking.
5. If you wish to store a new frequency set during Memory Tuning, just press and hold in the [D/MR(MW)] key for one second, per normal memory storage procedure.

Deleting Memories

With 219 total memories available, there frequently are situations where you may desire to delete certain memories temporarily (except the Memory Channel “1”). The procedure for deleting a channel is quite simple:

1. Press and hold the [D/MR(MW)] key for one second, then rotate the DIAL knob to select the memory channel on which you wish to be deleted.
2. Press the [LOW(A/N)] key momentarily. The “CLEAR” will be appear on the display.
3. Press again the [LOW(A/N)] key momentarily. This will cause the display to shift to Memory Channel “00,” and the previously-selected memory will be deleted.

Important Note: Once deleted, channel data cannot be recovered.

Home Channel Memory

A Convenient one-touch “Home” channel memory is available to simplify return to your most-often-used frequency. This memory do not appear in the regular memory banks, simplify operation.

To recall the Home channel, just press the [D/MR(MW)] key repeatedly, if necessary, until “HM” icon appears on the display; this indicates that the Home Channel is recalled.

The factory default frequency for the Home channel is 144.000 MHz. You can re-program the Home channel in a manner identical to that used for the regular memories:

1. From the VFO mode, tune in the frequency you wish to store, and set all repeater shifts and other data just the way you do for “normal” memory channel storage.
2. Press and hold the [D/MR] key for one second, then press the [REV(DW)] key to store the displayed data into the Home channel. The memory label will disappear (since you are still operating in the VFO mode).

You may also append an alpha-numeric “Tag” (label) to a Home channel, described previously.

Memory-Only Mode

Once memory channel programming has been completed, you may place the radio in a “Memory Only” mode, whereby VFO and Home Channel operation are impossible. This may be particularly useful during public-service events where a number of operators may be using the radio for first time, and ultimate simplicity of channel selection is desired.

To place the radio into the Memory Only mode, turn it off. Now press and hold in the [MHz(SET)] and [D/MR(MW)] keys while turning the radio on. The VFO and Home Channel will now be disabled.

To return to normal operation, repeat the above power-on procedure.

Scanning

The FT-2800M’s scanning capability provides the operator with many convenient methods of rapid frequency navigation.

Basic Scanner Operation

Before activating the scanner, make sure that the Squelch is set to silence the background noise when no signal is present.

Scanning may be started or stopped using the microphone’s [UP] or [DWN] button. The following techniques are used for scanning:

- ❒ Press and hold either the [UP] or [DWN] button for one second in the VFO mode will causes upward or downward band scanning, respectively, to begin.
- ❒ Press and hold either the [UP] or [DWN] button for one second in the Memory mode will causes memory channel scanning toward a higher- or lower-numbered memory channel, respectively.
- ❒ Scanning pauses when a signal opens the squelch, and the decimal point on the

display will blink. You can choose one of three scan-resume modes (described later).

- ❒ To holt the scan manually, the easiest way is to push the PTT switch on the microphone momentarily (no transmission will occur while you are scanning). The scan may also be halted manually by pressing the microphone's [UP] or [DWN] button, or the [D/MR(MW)] key.

Scan-Resume Options

Three scan-resume modes are available on the radio:

- ❒ In the "BUSY" mode, the scanner will remain halted for as long as there is carrier present on the channel; after the carrier drops at the end of the other station's transmission, the scanner will resume.
- ❒ In the "HOLD" mode, the scanner will halt on a signal it encounters. It will not restart automatically; you must manually re-initiate scanning if you wish to resume.
- ❒ In the "5 SEC" mode, the scanner will halt for five seconds only, after which scanning will resume (whether or not the other station is still transmission).

To change the scan-resume mode, as following:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "23 SCAN".
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired scan-resume mode (BUSY/HOLD/5 SEC).
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Memory Skip Scanning

When you have some continuously-active channels in memories, you may wish to skip them for scanning, but still have them available for manual selection.

To mask a memory to be skipped during scanning, as following:

1. Set the radio to memory mode by pressing the [D/MR(MW)] key repeatedly, if necessary.
2. Rotate the DIAL knob to select the Memory Channel to be skipped during scanning.

3. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "25 SKIP".

4. Press the [MHz(SET)] key, then rotate the DIAL knob so as to select “SKIP”. The current Memory Channel will now be ignored during scanning. The “ONLY” selection is used for “Preferential Memory Scan,” described in the next column.
5. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

A “SKIP” icon will appear when you recall the “skipped” memory channel manually.
To re-institute a channel into the scanning loop, select “OFF” in step 4 above (the “Skipped” channel will, of course, still be accessible via manual channel selection methods using the DIAL knob in the Memory mode, whether or not it is locked out of the scanning loop).

Preferential Memory Scan

The FT-2800M also allows you to set up a “Preferential Scan List” of channels which you can “flag” within the memory system. These channels are designated by a blinking “SKIP” icon when you have selected them, one by one, for the Preferential Scan List.
When you initiate memory scanning, beginning on a channel with the Blinking “SKIP” icon appended, only those channels bearing the Blinking “SKIP” icon will be scanned. If you initiate scanning on a channel which does not have the Blinking “SKIP” icon appended, you will scan all channels including those with the Blinking “SKIP” icon appended.

Here is the procedure for setting up and using the Preferential Scan List:

1. Set the radio to memory mode by pressing the [D/MR(MW)] key repeatedly, if necessary.
2. Rotate the DIAL knob to select the Memory Channel which you wish to add to the Preferential Scan List.
3. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “25 SKIP”.
4. Press the [MHz(SET)] key, then rotate the DIAL knob so as to select “ONLY.”
5. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

To initiate Preferential Memory Scan:

1. Set the radio to memory mode by pressing the [D/MR(MW)] key repeatedly, if necessary.
2. Rotate the DIAL knob to select any memory channel which has a Blinking” “SKIP”

icon appended to the channel number.

3. Press and hold either the microphone's [UP] or [DWN] button for one second to initiate Preferential Memory Scanning. Only the channels which have a Blinking "SKIP" icon appended to the channel number will be scanned.

Programmable Band-Scan Limits

Besides band and memory scanning, this radio can be set to tune or scan only the frequencies between user-defined lower and upper limits. For example, you may wish to limit tuning/scanning to 144.5 - 148.0 MHz, to avoid encroachment on the SSB/CW sub-band between 144.0 and 144.5 MHz

These scanning limits are stores in special "Sub-Band Limit Memories" labeled L0/U0 through L9/U9, with "L" and "U" designations representing the Lower and Upper limit, respectively.

To utilize this feature, use the following steps:

1. Store the lower edge of the desired scanning/tuning range in memory "L0", and the upper edge in memory "U0" (or, alternatively, in memories "L1/U1" through "L9/U9").
2. With any of these memories recalled, press the [MHz(SET)] key momentarily to activate the Programmable Band-Scan Limits. The "PMS" icon will be appeared. Tuning and scanning will now be limited within the just-programmed range.

To cancel the Sub-Band Limits and return to normal memory operation, press the [D/MR(MW)] key momentarily.

Priority Channel Scanning (Dual Watch)

The FT-2800M's scanning features include a two-channel scanning capability which allows you to operate on a VFO, Memory channel or Home channel, while periodically checking a user-defined Memory Channel for activity. If a station is received on the Memory Channel which is strong enough to open the Squelch, the scanner will pause on that station in accordance with the Scan-Resume mode set via Menu mode "23 SCAN." See page xx.

Here is the procedure for activating Priority Channel Dual Watch operation:

1. Set the radio to memory mode by pressing the [D/MR(MW)] key repeatedly, if necessary.
2. Press and hold in the [D/MR(MW)] key for one second (blink the Memory Channel

Number), then select the memory channel you wish to be the “Priority” channel.

3. Press and hold in the [D/MR(MW)] key for one second. The “P” icon will appear to the upper left of the “MR” icon, indicating it is the Priority channel.
4. Now set the FT-2800M for operation on another memory channel, Home channel, or on a VFO frequency.
5. Press and hold the [REV(DW)] key for one second. The display will remain on the VFO, memory channel selected, or Home channel, but every five seconds the FT-2800M will check the Priority Channel for activity.

Priority Revert Mode

During Priority channel operation (Dual Watch), a special feature is available which will allow you to move to the Priority Channel instantly, without waiting for activity to appear on the Priority Channel.

When this feature is enabled, and priority monitoring is engaged, just press the microphone’s PTT switch. Operation will instantly revert to the Priority Channel.

To enable Priority Revert operation:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “22 RVRT”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select “ON.”
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

To disable Priority Revert operation, select “OFF” in step 2 above.

Band Edge Beeper

The FT-2800M will automatically “beep” when a band edge is encountered during scanning (either in standard VFO scanning or during PMS operation). You may enable this feature (band edge beeper) when the frequency reaches the band edge while selecting the VFO frequency by the DIALknob.

The procedure for enabling the Band-Edge Beeper is:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “12 EDG BP”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to set this Menu to “ON.”
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Smart Search Operation

The Smart Search feature allows you to load frequencies automatically according to where activity is encountered by your radio. When Smart Search is engaged, the transceiver will search above and below your current frequency, storing active frequencies as it goes (without stopping on them even momentarily); these frequencies are stored into a special Smart Search memory band, consisting of 31 memories (15 above the current frequency, 15 below the current frequency, plus the current frequency itself).

Two basic operating modes for Smart Search are available:

SINGLE: In this mode, the transceiver will sweep the current band once in each direction starting on the current frequency. All channels where activity is present will be loaded into the Smart Search memories; whether or not all 31 memories are filled, the search will stop after one sweep in each direction.

CONT: In this mode, the transceiver will make one pass in each direction as with One-Shot searching; if all 31 channels are not filled after the first sweep, however, the radio will continue sweeping until they are all filled.

Setting the Smart Search Mode

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “30 S SRCH”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired Smart Search mode (see above).
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Storing Smart Search Memories

1. Set the radio to the VFO mode. Be sure that you have the Squelch adjusted properly (so that band noise is quieted).
2. Press the Microphone’s [P2] key to enter the Smart Search mode. The “S.S” icon will be appears at the left bottom corner of the display.
3. Press the Microphone’s [A] key to begin Smart Search scanning.
4. As active channels are detected, you will observe the number of “loaded” channels increasing in the regular memory channel window.
5. Depending on the mode you set for Smart Search operation (“SINGLE” or “CONT”), the Smart Search scan will eventually terminate, and the LCD will revert to Smart

Search Memory Channel "C."

6. To recall the Smart Search memories, rotate the DIAL knob to choose from among the Smart Search memories.
7. To return to normal operation, press the [D/MR(MW)] key.

R.F. Says: Smart Search is a great tool when visiting a city for the first time. You don't need to spend hours looking up repeater frequencies from a reference guidebook…just ask your FT-2800M where the action is!

Internet Connection Feature

The FT-2800M can be used to access the repeater which provide the Vertex Standard WIRES™ (Wide-Coverage Internet Repeater Enhancement System).

1. Press the [%] key to activate the Internet Connection feature. The "int" icon will appear in the memory channel field.
2. Rotate the DIAL, while pressing and holding in the [%] key, to select the access number corresponding to the WIRES™ repeater to which you wish to establish an Internet link (ask your repeater owner/operator if you don't know the access numbers in the network).
3. With the Internet Connection feature activated (as in step 1 above), the FT-2800M will generate a brief (0.2 second) DTMF tone according to your selection in step 2. This DTMF tone is sent at the beginning of every transmission to establish or maintain the link to the remote WIRES™ repeater.
4. To disable the Internet Connection feature, press the [%] key again.

You may access other Internet Link Systems that use a DTMF string for access.

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "10 DT MEM".
2. Press the [MHz(SET)] key momentarily, then load the DTMF tones which you wish to use to establish an Internet link (ask your repeater owner/operator if you don't know the access numbers in the network) into the desired DTMF Memory channel.
   1). Rotate the DIAL knob to select the DTMF Autodialer memory channel number ("DTMF-1" through "DTMF-9").
   2). Press the [D/MR(MW)] key momentarily.
   3). Rotate the DIAL knob to select the DTMF code, then press the [REV(DW)] key momentarily to move the digit.

4). Repeat step 3) above.

5). Press the [MHz(SET)] key momentarily to save the new setting.

3. Rotate the DIAL knob to select "13 INTNET."
4. Press the [MHz(SET)] key momentarily, then rotate the DIAL knob to set this Item to "IRLP" (to enable the alternative Internet Link, and disable the WIRES™ access option).
5. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.
6. Press the [%] key momentarily to activate the Internet Link System. The "int" icon will then appear in the memory channel field while the Internet Link System access feature is engaged.
7. Rotate the DIAL knob, while pressing and holding in the [%] key, to select the DTMF access number ("DTMF-1" ~ "DTMF-9") corresponding to the Internet link repeater to which you wish to establish an Internet link.
8. With the Internet link feature activated (as in step 6 above), press the [%] key or microphone's [P2] key to send out the DTMF tones according to your selection in step 7 (to establish the link to the Internet link repeater).
9. To disable the Internet link feature, press the [%] key again.

R. F. Says: To return to WIRES™, recall Menu "13 INTNET" then set it to "WIRES."

Miscellaneous Setting

Time-Out Timer

The "Time-Out Timer" (TOT) feature is designed to force the transceiver into the "receive" mode after a present time period of continuous transmission (the default is 6 minutes). This feature prevents your transceiver from transmitting a "dead carrier" for a long period of time in the event that the microphone PTT switch is accidentally locked in the "TX" condition.

The Time-Out Timer's "switch-to-receive" time may be adjusted, in one minute increments, for any period between 1 and 60 minutes.

To change the default (6 minutes) time setting as follows:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select "31 TOT".
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired interval (between 1 and 60 minutes), or OFF.
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit

to normal operation.

Automatic Power-Off

The “Automatic Power-Off” (APO) feature will turn the radio completely off after a user-defined period of PTT or key/button inactivity. If you do not press any front panel keys or buttons, rotate the DIAL knob or use the microphone’s keys and buttons, or transmit, and so long as the transceiver is not scanning or engaged in priority monitoring, the radio will shut itself off after the specified time period. This feature is useful in minimizing battery drain in a mobile installation if you forget to turn the transceiver off when you leave your vehicle.

To activate the APO feature as follows:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “01 APO”.
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the desired “switch-off” time (between 1 and 12 hours), or OFF.
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Programming the key assignment

Default FT-2800M key functions have been assigned to Microphone’s [P1]/[P2]/[P3]/[P4] buttons at the factory. These may be changed by the user, if you wish to make another function.

To programming the function:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select the Menu Item to be configured (“15 PRG P1,” “16 PRG P2,” “17 PRG P3,” or “18 PRG P4”).
2. Press the [MHz(SET)] key, then rotate the DIAL knob to select the function you wish to assign to the button you selected in the previous step. The available choices are:

   DC IN: Indicates the current DC supply voltage

   DIMR:

   WX CH:

   INTKEY:

   SKIP:

   SQLOFF: Opens the Squelch to allow un-muted reception

   S SRCH:

TONE: Selects CTCSS frequency

T SRCH:

T CALL: Activates 1750 Hz Tone Burst

RPTR: Selects Repeater Shift direction

3. Press the [MHz(SET)] key momentarily to save the new setting, then rotate the DIAL knob to select another programmable button to modify, if desired, and repeat above steps.
4. Press and hold the [MHz(SET)] key for one second to exit to normal operation.

FM Bandwidth & MIC Gain Control

You can reduce the microphone input level and receiver bandwidth when operating on tightly-clustered frequencies (channel spacing of 12.5 or 15 kHz). This will reduce the transmitter and receiver deviation, thus minimizing interference to other users (and improving reception, as well).

To configure for the narrower bandwidth, use the following procedure:

1. Press and hold the [MHz(SET)] key for one second, then rotate the DIAL knob to select “33 W/N DV.”
2. Press the [MHz(SET)] key, then rotate the DIAL knob to change the display to “NARROW.”
3. Press and hold the [MHz(SET)] key for one second to save the new setting and exit to normal operation.

Reset Procedure

In some instances of erratic or unpredictable operation, the cause may be corruption of data in the microprocessor (due to static electricity, etc.). If this happens, resetting of the microprocessor may restore normal operation. Note that all memories will be erased if you do a complete microprocessor reset, as described below.

Microprocessor Resetting

To clear all memories and other settings to factory defaults:

1. Turn the radio off.
2. Press and hold in the [MHz(SET)], [REV(SET)], [LOW(A/N)] and [D/MR(MW)] keys while turning the radio on. The “MASRST” will be appears on the display.
3. Press the [D/MR(MW)] key momentarily to reset all settings to their factory defaults (press any other key to cancel the Reset procedure).

Set Mode Resetting

To reset the Set (Menu) mode settings to their factory defaults:

1. Turn the radio off.
2. Press and hold in the [REV(SET)], [LOW(A/N)] and [D/MR(MW)] keys while turning the radio on. The “SETRST” will be appears on the display.
3. Press the [D/MR(MW)] key momentarily to reset the Set (Menu) mode settings to their factory defaults (press any other key to cancel the Reset procedure).

Cloning

The FT-2800M includes a convenient “Clone” feature, which allows the memory and configuration data from one transceiver to be transferred to another FT-2800M. This can be particularly useful when configuring a number of transceivers for a public service operation. Here is the procedure for Cloning one radio's data to another:

1. Turn both radios off.
2. Connect the user-constructed cloning cable between the MIC jacks of the two radios.
3. Press and hold in the [MHz(SET)], [LOW(A/N)] and [D/MR(MW)] keys while turning the radios on. Do this for both radios (the order of switch-on does not matter). “TX RX” will appear on the displays of both radios when the Clone mode is successfully activated in this step.
4. On the Destination radio, press the [D/MR(MW)] key (“????” will appear on the LCD).
5. Press the [MHz(SET)] key on the Source radio; “????” will appear on the Source radio, and the data from this radio will be transferred to the other radio.
6. If there is a problem during the cloning process, “ERROR” will be displayed. Check your cable connections and battery voltage, and try again.
7. If the data transfer is successful, “????” will reappear on both displays. Turn both radios off and disconnect the cloning cable. You can then turn the radios back on, and begin normal operation.

Menu (“Set”) Mode

The FT-2800M Set (Menu) mode, already described in parts of many previous chapters, is easy to activate and set. It may be used for configuration of a wide variety of

transceiver parameters, some of which have not been detailed previously. Use the following procedure to activate the Set (Menu) mode:

1. Press and hold the [MHz(SET)] key for one second to enter the Set mode.
2. Rotate the DIAL knob to select the Menu Item to be adjusted.
3. Press the [MHz(SET)] key momentarily to enable adjustment of the selected Menu item, then rotate the DIAL knob to perform the actual adjustment.
4. After completing your selection and adjustment, press and hold in the [MHz(SET)] key for one second to exit the Set mode and exit to normal operation.

Menu Selection Details

00 ALPH

Function: Programming an Alpha/Numeric label for a memory. See page ?? for details.

01 APO

Function: Enables/disables the Automatic Power Off feature.

Available Values: 1H - 12 H, or OFF

Default: OFF

02 ARS

Function: Activates/deactivates the Automatic Repeater Shift feature.

Available Values: ON/OFF

Default: ON

03 BEEP

Function: Enables/disables the key beeper.

Available Values: ON/OFF

Default: ON

04 BELL

Function: Selects the CTCSS/DCS Bell Ringer repetitions.

Available Values: 1, 3, 5, 8, REPEAT, or OFF

Default: OFF

05 CK SFT

Function: Shifting of CPU clock frequency.

Available Values: ON/OFF

Default: OFF

This function is only used to move a spurious response “birdie,” shold it fall on a desired frequency.

06 DC IN

Function: Indicate the Supply Voltage.

07 DIMR

Function: Setting of the front panel display’s illumination level.

Available Values: 1, 2, 3, or OFF

Default: 2

08 DTMF

Function: Enables/disables the DTMF Autodialer.

Available Values: ON/OFF

Default: OFF

09 DT DLY

Function: Setting of the DTMF Autodialer Delay Time.

Available Values: 50/250/450/750/1000 (ms)

Default: 450 (ms)

10 DT MEM

Function: Loading of the DTMF Autodialer Memories. See page ?? for details.

11 DT SPD

Function: Setting of the DTMF Autodialer Sending Speed.

Available Values: 50/100 (ms)

Default: 50 (ms)

12 EDG BP

Function: Enables/disable the Band-edge beeper while scanning.

Available Values: ON/OFF

Default: ON

13 INTNET

Function: Select the Internet Connection mode.

Available Values: WIRES/IRLP

Default: WIRES

14 LOCK

Function: Select the Control Locking Lockout combination.

Available Values: KEY/DIAL/K+D/PTT/K+P/D+P/ALL/OFF

Default: OFF

KEY: Just the front panel keys are locked out

DIAL: Just the front panel DIAL knob is locked out

K+D: Both the keys and DIAL knob are locked out

PTT: The PTT switch is locked (TX not possible)

K+P: Both keys and PTT switch are locked out

D+P: Both DIAL knob and PTT switch are locked out

ALL: All of the above are locked out

OFF: The Lock feature is disabled

15 PRG P1

Function: Programming the function assigned to Microphone's [P1] key. See page ?? for details.

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/WX CH/INTKEY/SKIP

Default: SQLOFF

16 PRG P2

Function: Programming the function assigned to Microphone's [P2] key. See page ?? for details.

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/WX CH/INTKEY/SKIP

Default: S SRCH

17 PRG P3

Function: Programming the function assigned to Microphone's [P3] key. See page ?? for details.

Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/WX

CH/INTKEY/SKIP
Default: T SRCH

18 PRG P4

Function: Programming the function assigned to Microphone's [P4] key. See page ?? for details.
Available Values: SQLOFF/S SRCH/TONE/T SRCH/T CALL/RPTR/DC IN/DIMR/WX CH/INTKEY/SKIP
Default: WX CH

19 REV HM

Function: Select the Primary function of the [REV(DW)] key.
Available Values: REV/HOME
Default: REV

REV: Pressing the [REV(DW)] key reverses the transmit and receive frequencies during repeater operation.

HOME: Pressing the [REV(DW)] key instantly recalls a favorite "Home" channel.

20 RF SQL

Function: Adjust the RF Squelch threshold level.
Available Values: 1 - 10, or OFF
Default: OFF

21 RPTR

Function: Sets the Repeater Shift direction.
Available Values: –RPTR/+RPTR/SIMP
Default: SIMP

22 RVRT

Function: Enables/disables the "Priority Channel Revert" feature.
Available Values: ON/OFF
Default: OFF

23 SCAN

Function: Select the Scan Resume mode.
Available Values: BUSY/HOLD/5 SEC

Default: BUSY

BUSY: the scanner will remain halted for as long as there is carrier present on the channel; after the carrier drops at the end of the other station's transmission, the scanner will resume.

HOLD: the scanner will halt on a signal it encounters. It will not restart automatically; you must manually re-initiate scanning if you wish to resume.

5 SEC: the scanner will halt for five seconds only, after which scanning will resume (whether or not the other station is still transmission).

24 SHIFT

Function: Set the magnitude of the Repeater Shift

Available Values: 00.00 - 99.95 (MHz) (only shifts of less than 4 MHz will work)

Default: 00.60 (MHz)

25 SKIP

Function: Select the Memory Scan mode.

Available Values: SKIP/ONLY/OFF

Default: OFF

SKIP: The Scanner will "skip" the flagged channels during scanning.

ONLY: The scanner will only scan channels that are flagged (Preferential Scan List).

OFF:

26 SQ DCS

Function: Setting of the DCS code

Available Values: 104 standard DCS codes.

Default: 023

27 SQ TNF

Function: Setting of the CTCSS Tone Frequency.

Available Values: 50 standard CTCSS tones.

Default: 67.0 (Hz)

28 SQ TYP

Function: Selects the Tone Encoder and/or Decoder mode.

Available Values: T ENC/TSQ/DC ENC/DCS/T+DCS/TSQ+DC/OFF

Default: OFF

T ENC: CTCSS Encoder

TSQ: CTCSS Encoder/Decoder

DC ENC: DCS Encoder only

DCS: Digital Code Squelch Encoder/Decoder

T+DCS: Encodes a CTCSS tone and Decodes a DCS code

TSQ+DC: Encodes a DCS tone and Decodes a CTCSS tone

OFF

29 STEP

Function: Sets the Synthesizer steps.

Available Values: 5k/10k/12.5k/15k/20k/25k/50k/100k (Hz)

Default: 5 k (Hz)

30 SSCRH

Function: Selects the Smart Search Sweep mode.

Available Values: SINGLE/CONT

Default: SINGLE

SINGLE: In this mode, the transceiver will sweep the current band once in each direction starting on the current frequency. All channels where activity is present will be loaded into the Smart Search memories; whether or not all 31 memories are filled, the search will stop after one sweep in each direction.

CONT: In this mode, the transceiver will make one pass in each direction as with One-Shot searching; if all 31 channels are not filled after the first sweep, however, the radio will continue sweeping until they are all filled.

31 TOT

Function: Sets the Time-Out Timer.

Available Values: 1 MIN - 60 MIN, or OFF

Default: 6 MIN

32 W ALT

Function: Enables/disables the Weather Alert feature.

Available Values: ON/OFF

Default: OFF

33 W/N DV

Function: Reducing the MIC gain (and Deviation)

Available Values: WIDE/NARROW

Default: WIDE