I. Specifications

General

Receiver Frequency Range:
50 kHz ~ 29.99999 MHz

Transmitter Frequency Range:
1.8 ~ 29.99999 MHz (Selected memory channels and/or ITU marine channels; Amateur Radio bands only in FT-600).

Emission Modes: J3E (USB, LSB)
A1A (CW), A3E (AM)
H3E (2182 Mode only, Marine version only)
J2B (USB, LSB)

Frequency Synthesizer Step Resolution:
10 Hz, 100 Hz, 1 kHz

Frequency Stability:
±10 ppm from 0 °C ~ +40 °C (Standard Version)
±2 ppm from 0 °C ~ +50 °C (w/TCXO-4 Option)

Operating Temperature Range: –10°C ~ +50°C

Antenna Impedance:
50 Ω nominal (2:1 Maximum Permitted SWR)

Supply Voltage: 13.5 V DC ±10%, negative ground

Power Consumption:
1.2 A (Receive, no signal)
20 A (Transmit, 100 watts output)

Dimensions (WHD): 244 x 104 x 286 mm

Weight (approx.): 4.5 kg (9.9 lbs.)

Transmitter

Power Output: 100 watts (J2B, J3E, A1A)
25 watts AM Carrier (A3E, H3E)

Modulation Types:
SSB: Balanced modulator, filtered carrier
AM: Low-level (early stage)

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 @ 1.5 kHz modulation input

SSB Audio Response:
Not more than –6 dB from 400 Hz ~ 2600 Hz

Occupied Bandwidth: A1A: < 0.5 kHz
J2B: < 3.0 kHz, J3E: < 3.0 kHz
H3E: < 3.0 kHz, A3E: < 6.0 kHz

3rd-Order SSB IMD:
–25 dB or better @ 100W PEP (14 MHz)

Microphone Impedance: 500 ~ 600 Ω

Receiver

Circuit Type: Double-conversion Superheterodyne

Intermediate Frequencies:
1st: 47.055 MHz, 2nd: 8.215 MHz

Sensitivity (for 10 dB S/N):
0.5 ~ 1.8 MHz: J2B/J3E/A1A 2µV, A3E 8µV
1.8 ~ 29.999MHz: J2B/J3E/A1A 0.25µV, A3E 1µV

Squelch Sensitivity:
Better than 2µV (1.8 ~ 29.999MHz)

IF Rejection: Better than 60dB (1.8 ~ 29.999MHz)

Image Rejection: Better than 70dB (1.8 ~ 29.999MHz)

Selectivity:
J2B/J3E/A3E-Narrow/H3E-Narrow/A1A-Wide 2.2 kHz (–6 dB), 5.0 kHz (–60 dB)
A1A-Narrow 500 Hz (–6 dB), 1.2 kHz (–60 dB) A3E 6.0 kHz (–6 dB), 12.0 kHz (–60 dB)

Clarifier Range: ±300 Hz

Audio Output:
At least 1.5 watts into 4 Ω (@ 10% THD or less)

Conducted Radiation: Less than –55 dBm

Spurious Responses:
Below 1 mV equivalent signal level. (Except discrete spurious responses at 5.2428 MHz, 8.2150 MHz, 10.4857 MHz, and 19.6610 MHz)

FC-800 Antenna Tuner (Option)

Operating frequency range:
1.8~30 MHz with 12m+ end-fed wire;
3.5~30 MHz with 2.6m whip

Matching impedance: 50 Ohms (unbalanced)

Maximum transmitter power: 150 watts PEP

Maximum SWR after tuning:
1.5:1 (if antenna is not a multiple of ½λ)

Required RF power for tuning: 10 watts (±3W)

Tuning time:
3 s typical, 10 s maximum (for one channel)

Power requirements:
13.5 V DC ±15% @ 700 mA (from FC-800 jack on rear of transceiver)

Operating temperature range:
–30° to +65° C (–22° to +149° F)

Case size (WHD): 264 x 80 x 264 mm

Weight: 2.1 kg.

Supplied Cables:
Coaxial Cable (5m), p/n T9101366
Control Cable, 4-wire (5m), p/n T9101419

Specifications may be subject to change without notice.

V-3. Memory Backup and System 600 Switch-On Options

The System 600's memory system uses a non-volatile RAM chip, instead of a lithium or other battery-based backup system. No operator intervention should be required in order to maintain the integrity of memory information indefinitely.

Several switch-on options exist on the System 600. These may be useful for testing the display or clearing all memories, if desired (and if possible on your transceiver version). To perform the switch-on function, turn the transceiver off, then push *and hold in* the appropriate key or keys (see below) while you turn the transceiver on. Once the display stabilizes, you may release all keys.

Switch-On Options

Command	Push following key(s) while turning System 600 on	Comments
All Reset	$\boxed{1}^{\text{MODE}}$ + $\boxed{2}^{\text{NB}}$	Not Land Mobile/ Marine
Display Check	$\boxed{4}^{\text{STEP}}$ + $\boxed{7}^{\text{SPK}}$	Checks all display segments
Beep On/Off	$\boxed{8}^{\text{DW}}$	Front panel beeper on/off
J2B Mode	$\boxed{1}^{\text{MODE}}$	Toggles J2B mode LSB/USB
Reset Tuner Memories	$\boxed{3}^{\text{TUNER}}$	When using FC-800

typically 1.90 kHz *below* the station's "assigned" frequency. Thus, for a WeatherFax station assigned to 8.682.0 MHz, tune to 8.680.1 MHz.

☐ Set the Mode to J3E (USB), by pushing the [MODE 1] key as needed.

When the WeatherFax broadcast begins, no further operator intervention should be needed from the transceiver standpoint. The audio level from the **AFSK** jack on the rear of the transceiver is fixed, and cannot be adjusted. Fine adjustments in the grey-scale and the frame alignment are all accomplished using the computer connected to your WeatherFax demodulator.

Dual Watch

The FT-600 Dual Watch feature allows the operator to operate on one frequency while periodically making a brief check of Memory Channel 1-01 (Memory Bank #1, Channel #1). The Dual Watch feature is enabled so long as there is data (frequency and mode) written into Memory Channel 1-01.

Every five seconds, the transceiver will automatically switch over—for *two* seconds—to Memory Channel 1-01. If a station is transmitting on Memory Channel 1-01, one of two things will happen:

☐ If the FT-600 is in the "Carrier Drop" mode, the transceiver will hold on Memory Channel 1-01 until the transmission ceases. The transceiver will continue to hold for five seconds after the transmission ends, in case the other station decides to resume transmitting. After the five second delay, Dual Watch will resume, with your original operating frequency (not Memory Channel 1-01) restored to the Main Display.

☐ If the FT-600 is in the "Time Delay" mode, the transceiver will hold on Memory Channel 1-01 for ten seconds, then Dual Watch operation will resume (irrespective of the transmit/receive status of any stations on Memory Channel 1-01).

Note that, after ten seconds of "holding" on Memory Channel 1-01, the transceiver will *revert* to your original frequency for five seconds, checking *that frequency* for renewed activity. After the five seconds of checking the original frequency are completed, the transceiver will re-check Memory Channel 1-01, and will again hold there for ten seconds if the squelch is "open."

Dual Watch operation is simple to use. Follow these steps:

☐ First, set the desired "Resume" mode for Dual Watch. Usually, this will be "Carrier Drop," which will not allow the transceiver to move off Memory Channel 1-01 if someone is still transmitting. To do this, push [F] then [DW 8], and rotate the Main Dial until *CARR* is shown. If you prefer the "Time Delay" mode, rotate the Main Dial until *TIME* is displayed. Now push [DW 8] again to return to the normal display.

☐ Adjust the squelch control so that the **BUSY** icon disappears, and the receiver is silent.

☐ Push [DW 8] to activate Dual Watch. After five seconds, the transceiver will switch over to Memory Channel 1-01, and will stay there for two seconds, thereafter returning to your original frequency.

☐ If a call is received on Memory Channel 1-01 during Dual Watch operation, the transceiver will lock onto that channel, then resume in accordance with the "Resume" mode selected previously.

☐ Push [DW 8] again to de-activate Dual Watch. Operation will revert to your original operating frequency.

☐ Note that your main operating frequency can be changed during Dual Watch operation, but you cannot change frequencies while Memory Channel 1-01 is being checked for activity.

Front Panel Locking

To prevent inadvertent changing of the operating frequency or other front panel parameters, press the ⊤–L switch on the front panel. All keys will then be locked out of operational command capability except for the ⊤–L switch itself. Press the ⊤–L switch again to release the front panel to normal operation.

Selcall and Encryption Modes

The Encryption mode is blocked out of the FT-600, since encryption is prohibited on amateur radio frequencies.

We do not recommend that SELCALL operation be attempted, as the format used is not a standard format on the amateur radio bands, and annoying interference to other operators may likely result from any such attempt.

it off by pushing the ⏻(3) key again. If this is done, and an improperly-tuned antenna is connected to the rear panel Antenna jack, the power output from the transceiver will be suppressed by the power amplifier protection circuitry.

As a short-cut to tuning each antenna individually, you may use a special procedure for tuning *all* channels stored in Memory Bank 1 (Memory Channels 1-01 through 1-25). Push the (F) key, then (within five seconds) push the ⏻(3) key. The Main Display will indicate *TUNING* and the transmitter will be activated. When tuning of all channels on Memory Bank 1 is completed, the transceiver will revert to the receive mode. Note that this Automatic Memory Bank Tuning feature may take up to three minutes to complete. During this time, no transceiver operations may take place. Do not turn the transceiver off during Automatic Memory Bank Antenna Tuning.

The FC-800's microprocessor-based circuitry includes memory sufficient to retain 31 antenna tuning settings in memory. This will greatly reduce frequency change time. If you utilize more than 31 operating channels that are widely removed in frequency, the new tuning settings will be over-written onto tuner memory slot #31. The 31 tuner memory locations are more than adequate for most applications, however.

Important Note!

If the FC-800 is unable to attain a satisfactory impedance match to your antenna, tuning will cease and the TUNER *icon will cease to be illuminated. Under these conditions, you will have to change the antenna's length or otherwise modify your antenna for proper performance. See the FC-800 Operating Manual and/or consult your dealer or installer for advice.*

Operation using the 160 meter (1.8 MHz) band generally requires that the radiating element have a resonant frequency of not lower than 5.5 MHz. This may be achieved using a loading coil or coils if the physical space for a full-length antenna is not available.

Because of limited counterpoise and radiating element size, operation on 160 meters from a mobile antenna using the FC-800 is not recommended.

Shortwave Listening

When tuning outside the amateur bands, the FT-600 serves as a high-performance shortwave monitor receiver. Note, however, that the transmitter only operates inside the 500-kHz segments containing the amateur bands. If you try to transmit out of band, the **TX** icon still becomes illuminated, but no power output will occur.

The optional YF-112A 6 kHz AM Filter may provide better fidelity on shortwave broadcasts, and it is highly recommended if you do any extended listening in the AM mode.

The amateur band stepping feature, provided by the ▲ and ▼ keys on the front panel of the transceiver, ignores such non-amateur frequencies. If you push either of these buttons while in "General Coverage" reception, the transceiver will automatically be set to the next higher or lower amateur band, respectively.

Any displayed frequency may, of course, be stored in a memory (as described starting on page 37), so you can recall it quickly later. Once you become familiar with the memories, you will find them extremely helpful in recalling favorite stations quickly.

Popular Shortwave Broadcast Bands

Meter Band	Freq. (MHz)	Meter Band	Freq. (MHz)
LW	.150~.285	31	9.35~9.90
MW	.520~1.625	25	11.55~12.05
120	2.30~2.50	22	13.60~13.90
90	3.20~3.40	19	15.10~15.70
75	3.90~4.00	16	17.55~17.90
60	4.75~5.20	-	18.90~19.30
49	5.85~6.20	13	21.45~21.85
41	7.10~7.50	11	25.67~26.10

Weatherfax Monitoring

Monitoring of HF WeatherFax broadcasts is easily accomplished using the FT-600.

☐ Before proceeding, be certain that the WeatherFax demodulator unit is properly installed, pursuant to the "Installation" chapter of this manual.

☐ Set the transceiver to the VFO mode (unless a WeatherFax channel has been programmed into a "Memory" channel). Now, using the keypad (or Main Dial, in the Memory mode), select the operating frequency of the station transmitting the WeatherFax broadcast. Note that, in the USB mode, the frequency you should program onto the display is

Transmission

For Voice transmission, close the **PTT** (Push To Talk) switch on the microphone; the transmitter will now be activated (note that the **TX** icon has become illuminated on the Main Display). Hold the microphone about 25 mm (1 inch) from your mouth, and speak into the front of the microphone in a normal voice level. No adjustment of the microphone gain level should be necessary; this level has already been set by your dealer or installer. Release the **PTT** switch on the microphone to return to the receive mode (the speak into the front of the microphone in a normal voice level. No adjustment of the microphone gain level should be necessary; this level has already been set by your dealer or installer. Release the **PTT** switch on the microphone to return to the receive mode (the **RX** icon will again become illuminated, and the **TX** icon will go out).

For CW operation in the A1A mode, begin sending using your telegraph key or electronic keyer. The FT-600 will automatically be placed in the transmit mode (**TX**) when you start to send, and will revert to the receive mode (**RX**) when you stop sending.

As you send, a "Sidetone" audio generator allows you to monitor your sending. The level of this Sidetone may be adjusted through the small **SIDETONE** hole on the rear panel of the transceiver.

For Data transmission (including Morse Code telegraphy) using a TNC (Terminal Node Controller) and keyboard, or similar computer-driven data transmission devices, transmit/receive control is exercised by the software which accompanies the data transmission equipment in use. See the User's Manual for your terminal equipment for operating instructions.

For HF 300 baud packet work, it is recommended that you use the VFO mode (instead of a memory), as the use of packet generally requires your frequency to be accurate within about ±20 Hz, and this level of frequency resolution is not available in the Memory mode.

Remember to follow the maximum power output guidelines during continuous-duty operation such as RTTY (Radio TeleType) in the J2B mode. Adjust the TX

Audio level from the TNC for a maximum of 50 watts of power output (five segments illuminated on the Power Output Bar Graph) if long periods of continuous transmission are anticipated.

Antenna Tuning Procedures

When the Yaesu FC-800 External Antenna Tuner is installed, it must be activated on each channel in use. Otherwise, the necessary tuner settings will not be stored, and little power output will occur.

While transmitting, you should see the bargraph illuminate fully to the right side (to the **HI** icon). If this does not happen, the antenna system may require retuning. Use the following procedure.

☐ Be certain that all connections to the FC-800 have been properly made.

☐ With the appropriate channel selected via the Main Dial, press the ⃞ key on the keypad. The **TUNER** icon on the Main Display will blink, and the System 600 will transmit for a short time. Thereafter, the transceiver will return to the receive mode, and the **TUNER** icon will now be illuminated constantly.

Once the Antenna Tuner is activated on a particular channel or channels, it will remain active unless you turn

Memory Recall

☐ Once stored, memory channels are easily recalled. Use the following steps:

☐ Push the **M** key, as needed, to select the desired Memory Bank.

☐ Once the proper Memory Bank has been selected, rotate the Main Dial to select the desired Memory Channel from *within* the selected Memory Bank.

☐ If you have stored Alpha Tags into your memory channels, you may display the tags by pressing the ⑥ key on the keypad. All channels bearing Alpha Tags will now display their labels as you use the Main Dial to tune through the various memory channels. Any memory slots in which frequency *but not Alpha Tag* information has been stored will only display the channel number (e.g. "1-05"), but no frequency information, when in the Alpha Tag mode.

Frequency Control Using Microphone *UP/DWN* Switches

The **UP** and **DWN** switches *on the microphone* may also be used to exercise frequency control in either the VFO or Memory mode.

In the VFO mode, pushing the **UP** or **DWN** key causes the frequency to change upward or downward, respectively, by one synthesizer step (10 Hz, 100 Hz, or 1 kHz, as selected by the operator). Pushing *and holding in* the **UP** or **DWN** key causes the transceiver to *scan* manually in the selected direction; release the microphone key to halt the scan.

In the Memory mode, pushing the **UP** or **DWN** key causes the Memory Channel number to increment upward or downward, respectively, by one. Pushing *and holding in* the **UP** or **DWN** key causes the transceiver to *scan* (manually) through the available memories in the current Memory Bank. Release the microphone key to halt the scan.

Note that the **FST** (Fast) key on the MH-31A8J Hand Mic and the MD-100A8X Desk Mic has no function when operating with the FT-600.

"Dual Watch" operation (explained later), so it is advised that you not use this channel except for the Dual Watch Priority Channel.

☐ To *delete* channel information from a memory, follow the above procedure for *storage*, but enter all *Zeroes* for the frequency (e.g., 000000), then press ⟨ENT⟩. The memory data for that channel will then be erased.

If you make a mistake during memory entry, rotate the Main Dial so as to cause the erroneous digit of the frequency to blink; now, push the *correct* number on the keypad, and continue with the remainder of the memory frequency entry process.

For Semi-Duplex Channels
(different transmit/receive frequencies):

☐ Press the **M** key, as needed, to select the desired Memory Bank.

☐ Once the desired Memory Bank is selected, rotate the Main Dial to select the desired Memory Channel within that bank. If you choose a channel on which data is already stored, you will *overwrite* the data previously stored.

☐ Press the ⟨9⟩ (Memory Write) key momentarily. The **RX** icon will blink, indicating that you are setting the *receive* frequency. Now enter all six digits of the desired receive frequency (the 10s of Hz digit cannot be entered, as frequency resolution during memory operation is to the nearest 100 Hz step).

☐ Press the ⟨ENT⟩ key momentarily. The **TX** icon will blink, indicating that you are now setting the *transmit* frequency.

☐ Now enter all six digits of the desired transmit frequency.

☐ Press the ⟨ENT⟩ key momentarily.

☐ The mode icon will now be blinking. Press the ⟨1⟩ key, as needed, to select the desired operating mode.

☐ Now press *and hold in* the ⟨ENT⟩ key for 0.5 second to lock the split frequency pair into memory.

Note Regarding Memory Programming

*If you have programmed a split pair of frequencies into a memory, remember that **both** the receive **and** transmit frequencies must be entered if you over-write that memory slot, even if it is a "simplex" situation. Just re-enter the receive frequency when the* **TX** *icon is blinking, as described previously, to ensure that storage of an unwanted split frequency pair does not occur.*

Alpha Tag Programming

An Alpha-Numeric label, referred to as an "Alpha Tag" in this manual, may be added to the contents of a memory location. Such an "Alpha Tag" may be easier or more intuitive for the operator to utilize when recalling memories; frequency information alone can be especially confusing when a large number of memories are stored.

Storage of an Alpha Tag into a memory location is simple to perform. Use the following procedure:

☐ Select the Memory Bank and Memory Channel number on which you desire to add an Alpha Tag.

☐ Press the ⟨6⟩ key to select the Alpha Tag method of memory channel display. If an Alpha Tag has been previously stored, it will be displayed now. If *no* Alpha Tag has been stored, only the memory channel number will be displayed (e.g. *1-05*). You may want to double-check the frequency data at this point, to be certain you have selected the correct channel.

☐ Press the ⟨ENT⟩ key to enter the Alpha Tag Entry mode. The first digit location on the left side of the display will begin blinking.

☐ Select the first character of the proposed Alpha Tag by rotating the Main Dial.

☐ When the first digit has been chosen, press the ⟨ENT⟩ key. The second digit of the Alpha Tag will now blink.

☐ Repeat the entry procedure of rotating the Main Dial to select the desired character, then pressing the ⟨ENT⟩ key, for up to six digits of the Alpha Tag.

☐ To complete the entry and return to normal operation, push *and hold in* the ⟨ENT⟩ key for 0.5 second. This may be done at any point in the Alpha Tag Entry process.

If you make a mistake, just re-write the Alpha Tag from the beginning.

Useful tips: the "⎵" character is used to program a *blank space*, which may be useful on some Alpha Tags. Also, use the "Zero" figure when an upper-case "O" ("Oh") is desired, as the "O" figure in the Alpha Tag character set is *lower* case (o).

Split Frequency Entry Example

A typical operating scenario on the 7 MHz band (LSB mode) would be for station DX1DX to be transmitting on 7.075 MHz, listening for replies on 7.214 MHz. Here is the technique for quick programming of this split-frequency combination.

☐ Using the Main Dial, tune in DX1DX on 7.075 MHz. DX1DX announces, "I am listening on 7.214 MHz for any calls."

☐ Push the (ENT) key *twice* (after the *first* push of the (ENT) key, the r icon will blink; immediately skip over re-programming of the receive frequency by your second push of the (ENT) key). The t icon will now be blinking.

☐ Push (0) → (7) → (2) → (1) → (4) → (0) → (ENT) (hold (ENT) for 0.5 second) to enter DX1DX's listening frequency (your *transmitting* frequency).

☐ You will now be receiving again on 7.075 MHz. When you close the PTT switch, note that the display has changed to 7.214 MHz, your transmit frequency.

☐ To *cancel* Split operation, press (ENT) once *momentarily*, then once more *holding the* (ENT) key in for 0.5 second. The receive and transmit frequencies will again be the same (both will be locked to the current *receive* frequency), so you can continue tuning around the band.

☐ If you wish to resume Split operation after once cancelling it, the separate transmit frequency must be re-programmed. There is no "toggle" feature for "Normal" versus "Split" operation.

☐ Note that the *receive* frequency, if already acceptable, does not have to be over-written. Just press the (ENT) key *twice* at the beginning of the frequency entry process. This will bypass the receive frequency entry command and proceed directly to the *transmit* frequency command. The example in the box above illustrates this technique.

Memory Channel Storage

Four Memory Banks capable of storing up to 25 memory channels each yield a total of 100 available memory channels. Programming is easily accomplished using the keypad.

For Simplex Memory Channels (transmit and receive on same frequency):

☐ Press the **M** key, as needed, to select the desired Memory Bank.

☐ Once the desired Memory Bank is selected, rotate the Main Dial to select the desired Memory Channel within that bank. If you choose a channel on which data is already stored, you will *overwrite* the data previously stored.

☐ Press the (9) (Memory Write) key momentarily; the **RX** icon will blink. Now enter six digits of the desired operating frequency (the 10s of Hz digit cannot be entered, as frequency resolution during memory operation is to the nearest 100 Hz step).

☐ Press the (ENT) key. The **TX** icon will blink. If the displayed frequency is the same as the *receive* frequency just stored, press the (ENT) key again (see the note following "Semi-Duplex Channels" below).

☐ Now press the (1) key, as needed, to select the desired operating mode.

☐ Now press *and hold in* the (ENT) key for 0.5 second to lock the frequency and mode into memory.

☐ Repeat this procedure for all memory channels desired. Note that Memory Channel 1-01 is used for

($WIDE$ is the default). Rotate the Main Dial to display $NARROW$, then push $\overset{MODE}{1}$ again to resume normal operation.

$\boxed{F} \rightarrow \overset{MODE}{\boxed{1}} \rightarrow WIDE \rightarrow$ turn Main Dial $\rightarrow NARROW \rightarrow \overset{MODE}{\boxed{1}}$

☐ If, however, your transceiver has *not* been fitted with a narrow filter, activating the $NARROW$ mode may actually *degrade* reception. If such a filter has not been installed in your transceiver, leave the filter selection on its default $WIDE$ setting.

☐ When no signal is present on the frequency, the squelch control may be used to keep the receiver silent until activity begins. Rotate the squelch control clockwise until you reach the point where the background noise is just silenced. This is the point of best squelch sensitivity, and further advancement of the squelch control will prevent weak signals from breaking through the squelch threshold.

When a signal strong enough to override the squelch threshold is received, the incoming signal will be heard in the speaker or headphones, and the $BUSY$ icon will become illuminated. When the incoming transmission is complete, the $BUSY$ icon will disappear, although the r icon will still be illuminated.

☐ If the Main Display is too bright, push the $\overset{DIM}{0}$ key on the keypad. This will reduce display brightness by about 50%.

☐ To turn the internal speaker (or external speaker, if used) *off*, push the $\overset{SPK}{7}$ key on the keypad. Repeat this procedure to restore speaker audio. *Note: this action does not affect audio output delivered to the headphones or the rear panel AFSK receive audio jack.*

☐ To turn the front panel keypad "beep" tone generator off, turn the transceiver off. Now, push and hold in the $\overset{BW}{8}$ key while you turn the transceiver on. No tone will be emitted from the speaker when any front panel key is pushed. To re-activate the beeper, repeat the above procedure.

$I/O + \overset{BW}{\boxed{8}}$

Direct Frequency Entry Using Keypad

Keypad frequency entry makes quick QSY to a new frequency simple.

For Normal Operation (transmit and receive on same frequency):

☐ Press the **M** key, as needed, to select the VFO mode.

☐ Press the $\overset{MODE}{1}$ key, as needed, to select the desired operating mode (A1A, A3E, etc.).

☐ Push the $\boxed{ENT}$ key momentarily, then enter six digits of the desired operating frequency (the 10s of Hz digit cannot be entered, even if 10 Hz steps are selected—this is a time saving feature). If the frequency is below 10 MHz, press the leading Zero *before* the first digit of the operating frequency (e.g. *0* 7.035.0 MHz must be entered).

☐ Push *and hold in* the $\boxed{ENT}$ key for 0.5 second when all six digits have been entered. This will switch the transceiver to the new frequency.

Frequency entry may be terminated at *any* point in the entry process by pushing and holding in the $\boxed{ENT}$ key for ½ second. If entry is terminated before all six digits have been entered, the blinking digit and all digits to its *right* will be left unchanged. For example, to move from 21.326.0 MHz to 14.326.0 MHz, press $\boxed{ENT} \rightarrow \overset{MODE}{\boxed{1}} \rightarrow \overset{STEP}{\boxed{4}} \rightarrow \boxed{ENT}$ (push and hold for 0.5 second).

If you make a mistake during frequency entry, rotate the Main Dial so as to cause the erroneous digit of the frequency to blink; now, push the *correct* number on the keypad, and continue with the remainder of the frequency entry process.

For Split Operation (different transmit/receive frequencies):

☐ Press the **M** key, as needed, to select the VFO mode.

☐ Press the $\overset{MODE}{1}$ key, as needed, to select the desired operating mode. Note that this mode must be the same on the transmit and receive frequencies.

☐ Push the $\boxed{ENT}$ key momentarily, then enter six digits of the *receive* frequency, as above. Note that the RX icon is blinking.

☐ Push the $\boxed{ENT}$ key momentarily *again*, and now enter six digits of the *transmit* frequency. Note that the TX icon is blinking.

☐ Now press *and hold in* the $\boxed{ENT}$ key for 0.5 second to lock in the split frequency pair. You may confirm that the transmit frequency is different by pushing the PTT switch on the microphone; the displayed frequency will change if the split pair have been successfully entered.

Startup Procedures

☐ Be certain that all power supply, antenna, ground, microphone, and other accessory connections have been properly accomplished according to the information presented in Chapter III.

☐ Preset the **I/O** (power) switch to OFF, and rotate the volume and squelch controls fully counter-clockwise.

☐ Now apply DC power to the System 600 by plugging in and turning on the AC Power Supply, if operating from a base station, or starting the vehicle's engine, if mobile.

☐ Next, turn on the transceiver by pushing in the **I/O** switch. The LED display will become illuminated; the current operating frequency or Alpha Tag, the operating mode, and/or the channel number will be displayed.

Reception and Frequency Selection

☐ Advance the volume control for a comfortable listening level on the incoming signals or noise present on the speaker or headphones.

☐ Select the desired band on which operation initially is desired by pressing the *front panel* ▲ or ▼ buttons as needed (not the **UP** or **DWN** switches on the microphone).
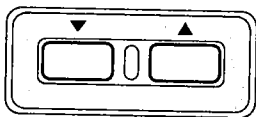
☐ Select the desired operating mode by pressing the keypad's 🔲 key as needed. The operating mode in use will be displayed on the left edge of the frequency display field.

☐ Rotate the Main Dial to tune around the band. If the VFO's synthesizer steps (default: 100 Hz/step) are inappropriate for your current operating needs, press the 🔲 key to select from among the available step sizes:

10 Hz/step (500 Hz per dial rotation)
100 Hz/step (5 kHz per dial rotation)
1 kHz/step (50 kHz per dial rotation)

☐ Fine tuning steps will be best for modes like A1A, where tuning is critical. The larger tuning steps may be more suitable for modes like AM (A3E), since broadcast stations operate on a more "channelized" basis, and precise tuning is usually not essential.

☐ Pressing the **M** button repeatedly will allow the operator to switch the transceiver from the VFO to and through the four Memory Banks, each of which can store as many as 25 Memory Channels. More about memory operation will follow shortly. The circulation of frequency selection modes is VFO → Memory Bank 1 → Memory Bank 2 → Memory Bank 3 → Memory Bank 4 → VFO.

VFO → MEM (Bank 1) → **MEM** (Bank 2) → **MEM** (Bank 3) → **MEM** (Bank 4) → **VFO** ...

☐ For now, stay in the VFO mode, as shown on the display above the frequency.

☐ When a signal is being received, the Bar Graph will become illuminated according to the strength of the incoming signal.

Note that the Signal Strength Bar Graph is not calibrated according to the RS(T) signal reporting system used by radio amateurs worldwide. However, the Bar Graph is very useful for making *relative* signal strength comparisons (for example, while rotating your beam antenna, or when making antenna performance comparisons with another station).
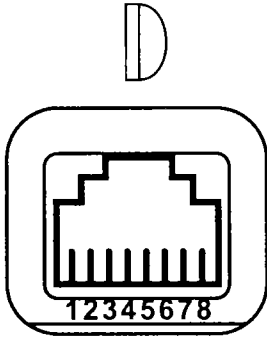
☐ Should you encounter impulse noise, such as that from a vehicle's ignition system or a power line, push the keypad's 🔲 (Noise Blanker) switch, which should help reduce the noise level.

☐ If the station you are listening to should drift or otherwise be unclear (the voice may sound too high-pitched or too bassy), rotating the Clarifier control may improve the sound of the incoming signal. Rotating the Clarifier control does *not* affect your *transmission* frequency; only the *receive* frequency is being adjusted. Note that the frequency change caused by the Clarifier control does not affect the displayed frequency. Accurate (receive) frequency readout only occurs when the Clarifier control is set to the 12 o'clock position.
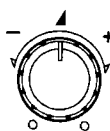
☐ Should you encounter interference in the CW (A1A) or AFSK (J2B) operating modes, reception may be improved by activating a narrower filter (if installed). Push ⒡ then 🔲 to view the current filter

Connector Pinouts
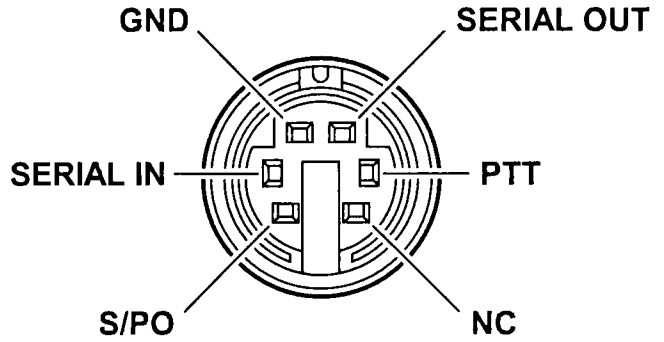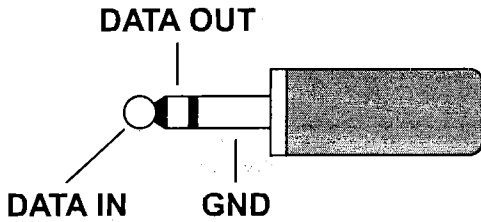
Front Panel Microphone Jack

1: FAST
2: GND
3: PTT
4: MIC
5: MIC GND
6: +5V
7: UP
8: DOWN

CLONE
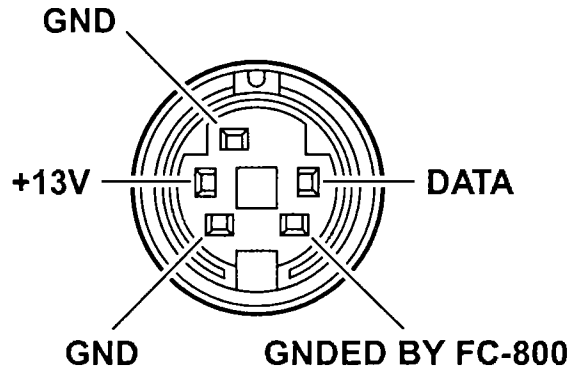
GND
SERIAL OUT
SERIAL IN
PTT
S/PO
NC

AFSK

DATA OUT
DATA IN
GND

FC-800

GND
+13V
DATA
GND
GNDED BY FC-800

PTT/EXT ALC

SIGNAL
GND
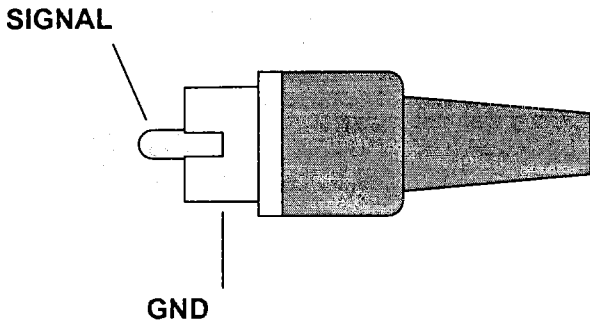
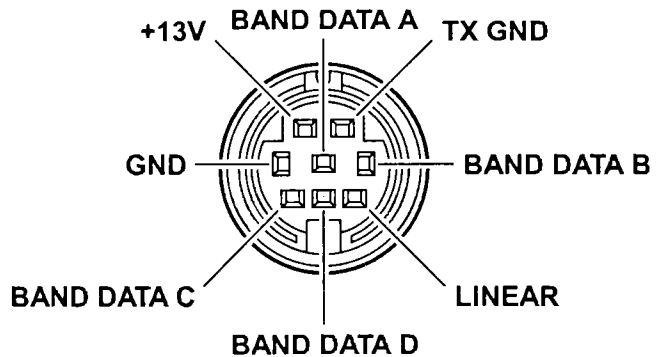## BAND DATA

+13V
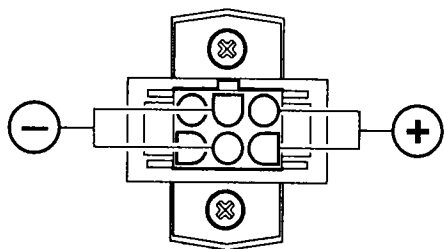BAND DATA A
TX GND
GND
BAND DATA B
BAND DATA C
BAND DATA D
LINEAR

(7) POWER

This is the main DC power input jack for the System 600 transceiver. Pinout is shown here, and you must be absolutely certain to follow the connection specification precisely!

(8) ANTenna

This PL-259 ("M" Type) connector is used for connection of the coaxial feedline from the antenna. When the optional FC-800 External Antenna Tuner is used, the RF interconnection cable from the FC-800 connects here, while the antenna wire or whip connects to the FC-800.

(9) Ground Lug

Connect your station ground here, using a heavy, braided cable for the connection to your station's ground bus.

(10) PTT

This RCA jack accepts external Push To Talk control from an external device. Shorting the center conductor to the shield will activate the System 600 transmitter, while opening the short will return the transceiver to the receive mode. A footswitch may be attached here, or it may be connected to a data transmission device (such as a Terminal Node Controller) PTT line to allow remote transmit/receive control to be exercised by the TNC. Open circuit voltage is 13.5 V DC, and closed circuit current is approximately 2.5 mA.

(11) ALC

If an external Linear Amplifier (such as the Yaesu FL-7000) is used, or one with power-output-derived ALC (Automatic Level Control), the ALC line from the Amplifier may be connected here. This jack may be used to control the output from the System 600 to prevent over-drive of the amplifier. The ALC control voltage range is 0 to –4 V DC, going more negative as more power cut-back is being exercised. Adjustment of the ALC range is performed at the Linear Amplifier per the manufacturer's instructions.

(12) AFSK

This 3.5-mm three-conductor miniature phone jack provides constant-level receiver output on the *ring* contact, and accepts transmit audio input on the *tip* contact, for use with a Terminal Node Controller (TNC) or other data transmission/reception device (such as a WeatherFax demodulator). Input level should be approximately 60 mV at 3 kΩ, and available receiver output is 100 mV peak at 600 Ω.

(13) KEY

This 3.5-mm miniature phone jack accommodates a telegraph key or output from an electronic telegraphy keying unit. The open circuit voltage is +7 V DC, and closed circuit current is approximately 8 mA. Never connect a device to this jack that is configured for "Negative" or "Grid Block" keying, as serious damage may result.

II-3. Microphone Controls

(1) PTT

This is the Push To Talk switch which activates the transmitter. With the PTT switch pushed in, you may speak into the microphone to convey your message.

(2) DWN

This button allows downward manual scanning or channel stepping, depending on the transceiver configuration.

(3) UP

This button allows upward manual scanning or channel stepping, depending on the transceiver configuration.

(4) TONE

This switch activates a low-cut filter which, in Position 2, may be used to reduce unwanted bass response in your voice. Position 1 results in a wider frequency response. Experiment with the two settings to determine which is best for your voice characteristics.

Note!The **FST** *(Fast) key on the MH-31$_{A8J}$ Hand Microphone has no function with this transceiver model, regardless of the configuration.*

SEL CALL Selective Calling system is in use.

ENCRP Encryption system is in use; not active in "FT-600" version.

DW Dual Watch feature is active.

π-L The Front Panel Lockout feature is active.

BUSY A signal strong enough to override the Squelch threshold is being received. In the SELCALL mode, signals *not* sending the appropriate selective-calling code will activate the **BUSY** indicator, but will *not* be heard.

TX The transceiver is in the Transmit mode.

RX The transceiver is in the Receive mode.

SP OFF The internal speaker has been turned off via the ⑦ key.

NB The Noise Blanker is activated.

TUNER The FC-800 Automatic Antenna Tuner is activated.

(F) The (F) key on the keypad has been pushed to activate the secondary keypad functions. The **F** icon will disappear after five seconds if no further keystrokes are completed.
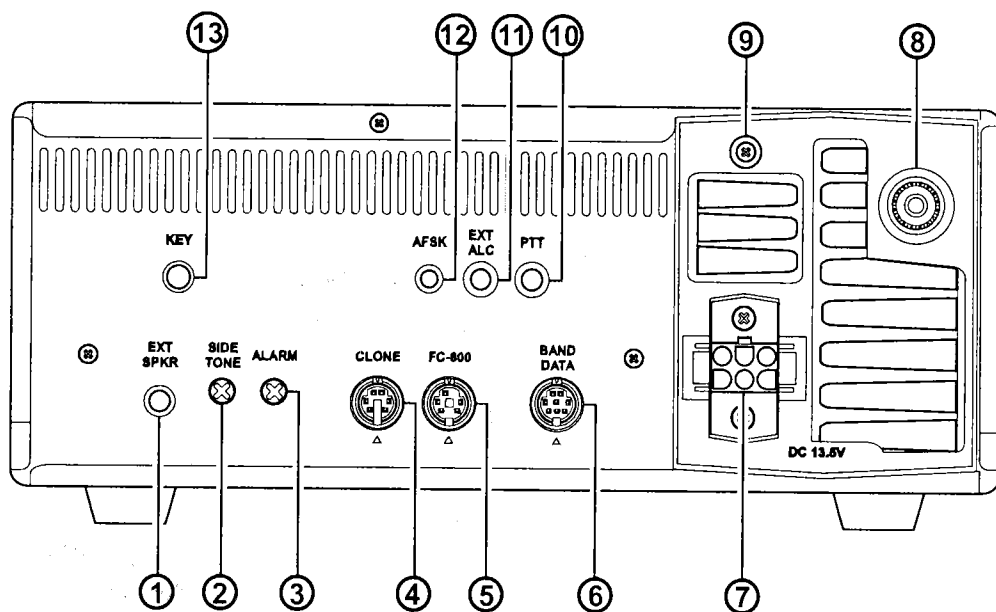
II-2. Rear Panel Connections

(1) EXT SPKR

This 3.5-mm miniature phone jack provides receiver audio output for an external speaker. Available audio output is 1.5 watts, and the permitted impedance is 4 to 16 Ω. Insertion of a plug into this jack automatically disables the internal speaker; insertion of headphones into the *front panel* headphone jack disables audio from *both* speaker jacks.

(2) SIDE TONE

This is an access hole for adjustment of the CW (A1A) sidetone monitor level. This potentiometer also adjusts the level of the SELCALL alert tone, as well as the front panel "Beep" tone. Adjust the potentiometer inside, using a small Phillips screwdriver, for a comfortable sidetone level.

(3) ALARM

This is an access hole for the level control for the (Marine version) Alarm feature when in the "2182" mode. Adjust the potentiometer inside, using a small Phillips screwdriver, for a suitable alarm level.

(4) CLONE

This 6-pin mini-DIN input/output jack allows external computer control of the System 600, or Cloning by a dealer or installer during fleet installation. Signal levels are TTL (0 and 5 V DC). Pinout is on page 8, and data formats are described in the CAT System chapter of the Appendix.

(5) FC-800

This 5-pin mini-DIN jack is for interconnection to the optional FC-800 External Antenna Tuner. Pinout is on page 8.

(6) BAND DATA

This 8-pin mini-DIN jack is for interconnection to a station accessory such as a linear amplifier. Pinout is on page 8.

Secondary Functions

(F) + (1 MODE) These keystrokes allow Wide/Narrow filter selection in the J2B and A1A modes (only).

(F) + (3 TUNER) These keystrokes cause all memory channels in MB1 (Memory Bank 1) to be tuned by the FC-800 Automatic Antenna Tuner.

(F) + (8 DW) These keystrokes allow selection of the desired "Resume" modes, using the following selections:

TIME Dual Watch will resume scanning ten seconds after it stops on a signal, whether or not that station is still transmitting.

CARR Dual Watch will resume five seconds after the signal which caused the scanning to stop disappears (and the **BUSY** icon disappears from the display).

(11) E

This key activates the Encryption mode, not available on the Amateur Radio configuration. When this feature is activated, the **ENCRP** icon on the Main Display becomes illuminated.

(12) S

Pushing this key activates the Selective Calling feature. When this feature is activated, the **SEL CALL** icon on the Main Display becomes illuminated.

(13) M

Pushing this key allows selection of the various VFO and/or Memory Bank combinations, depending on the configuration of the transceiver in use. For example, on the Land Mobile version, repeated pushes of this key causes MB1, MB2, MB3, and MB4 to be chosen in that order, returning to MB1 after MB4. The specific memory channel *within the selected memory bank* is chosen via one of the Up/Down switches or the Main Dial. See Section IV: Operation.

(14) Lock (π─L)

When this key is pushed, all keys on the front panel (except the **2182** and **ALARM** keys in the Marine version and the π─L key itself) are locked out and cannot be used. This feature prevents inadvertent changing of the transceiver operating frequency, mode, etc.

(15) LCD Display

This multi-function LCD (Liquid Crystal Display) includes frequency readout or Alpha-Tag labeling of the channel in use, plus a Bar Graph which reads out differently on transmit as opposed to receive:

❏ On transmit, the Bar Graph indicates transmitter power output on a scale of 10 watts per segment; accordingly, a reading of **10** corresponds to 100 watts of power output.

❏ On receive, the Bar Graph indicates the relative strength of the incoming signal (with **10** corresponding to a signal level of 100 dB above 1 mV).

The right side of the LCD field is used to display the current memory channel number. Memory channels are presented in hyphenated form, with the Memory Bank first, followed by the Memory Channel *within that bank* second. Thus, the designation 4-25 indicates Memory Channel #25 in Memory Bank #4. More discussion of Memory Channels will be presented in Section IV: Operation.

Surrounding the Frequency/AlphaTag/Memory Channel display area are a series of icons which provide visual confirmation of transceiver status. These icons include:

USB Upper Sideband mode is in use.

J3E SSB Mode (**USB** or **LSB** will also be lit) is in use.

LSB Lower Sideband mode is in use.

J2B AFSK Mode (**USB** or **LSB** will also be lit) is in use.

**A1A** CW (Morse Code Telegraphy) mode is in use.

A3E AM (Double Sideband plus carrier) mode is in use.

H3E AM (Single Sideband plus carrier) mode is in use (Marine version only, in **182** Emergency Channel mode).

MEM Frequency/mode control is from Memory system.

ITU Frequency/mode control is from special "ITU Memory" system; active in Marine version only.

VFO Frequency control is from Main Dial; not active in Land Mobile version, restricted in Marine version.
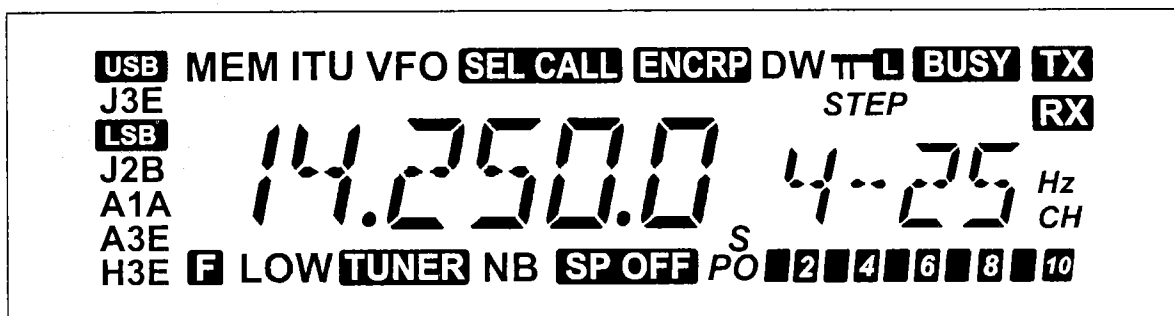
(8) Volume

This control adjusts the (receiver) audio volume level from the speaker or headphones. Clockwise rotation of this control increases the volume level.

(9) Squelch

This control may be used to silence the receiver when no signals are being received. Clockwise rotation of this control causes the receiver to respond only to progressively *stronger* signals; conversely, counterclockwise rotation of this control allows progressively *weaker* signals to be heard.

When a signal or noise breaks through the squelch "threshold," the **BUSY** icon on the main display will be illuminated.

(10) Keypad

The Keypad is used for both frequency entry and/or certain operational commands, depending on the transceiver configuration. The following rules apply during Keypad operation, which will be discussed in detail in Section IV (Operation):

❐ The *keypad entry* function on the keypad is used on transceiver configurations where direct frequency entry is possible, and is activated by pressing the (ENT) key; thereafter, the digits of the desired operating frequency may be entered.

❐ The *primary* function on the keypad—the action which is accomplished by a single keystroke (e.g. (1)ᴹᴼᴰᴱ, (2)ᴺᴮ, etc.)—is the function which is printed above the key.

❐ The *secondary* function on the keypad—the action which is accomplished by *first* pressing the (F) key *followed by* another key (e.g. (F) + (1)ᴹᴼᴰᴱ) — is a function which may adjust, modify, or otherwise expand on settings of the transceiver. In other words, pushing (1)ᴹᴼᴰᴱ will change the operating mode of the transceiver, while pushing (F) + (1)ᴹᴼᴰᴱ will allow the selectivity filters *which apply to that operating mode* to be changed.

The keypad functions are as follows:

Keypad Entry Functions

(1)ᴹᴼᴰᴱ ~ (0)ᴰᴵᴹ These keys are used during frequency entry. They permit the operator or dealer to enter the precise frequency directly.

Primary Functions

(1)ᴹᴼᴰᴱ This key allows selection of the operating mode:

J3E: USB (Upper Sideband) or LSB (Lower Sideband) SSB Voice transmission and reception.

J2B: AFSK (Audio Frequency-Shifted Keying) Data transmission and reception, using LSB as the default sideband.

A1A: CW (Continuous Wave—Morse Code) telegraphy.

A3E: AM (Double Sideband with full carrier).

The H3E (Single Sideband AM) mode is only activated via the **2182** key in the Marine configuration. It is not possible to change modes in the Land Mobile configuration, and only in the *Rʜ GEN* (General Coverage reception) mode in the Marine configuration. See Section IV: Operation.

The operating mode is displayed, for operator reference, along the left side of the main LCD display.

(2)ᴺᴮ Pushing this key activates the Noise Blanker. When the Noise Blanker is activated, the **NB** icon on the Main Display becomes illuminated.

(3)ᵀᵁᴺᴱᴿ Pushing this key turns the FC-800 Antenna Tuner option on and off. When the Tuner is activated, the **TX** icon on the display becomes illuminated.

(ENT) Pushing this key activates or terminates frequency entry from the keypad.

(4)ˢᵀᴱᴾ Pushing this key changes the synthesizer steps in the VFO operating mode, if enabled in the transceiver configuration in use.

(6)ᴬ/ᴺ Pushing this key toggles the main display area between the "frequency display" and "Alpha-Tag" (if programmed) modes.

(F) Pushing this Function key prior to another keystroke activates the *secondary* keystroke function.

(7)ˢᴾᴷ Pushing this key turns the internal speaker (or external speaker, if used) on and off. If the speaker is switched off, the s icon on the Main Display becomes illuminated.

(8)ᴰᵂ Pushing this key activates or deactivates the Dual Watch feature, which allows a frequency other than the main operating frequency to be checked periodically for activity.
When the Dual Watch function is activated, the **DW** icon on the Main Display becomes illuminated.

(9)ᴹ/ᵂ Pushing this key activates the **M**emory **W**rite mode, used for entry of operating frequencies into memory locations.

(0)ᴰᴵᴹ Pushing this key allows selection of the display brightness. Two levels of brightness are available.

II. Controls and Connectors
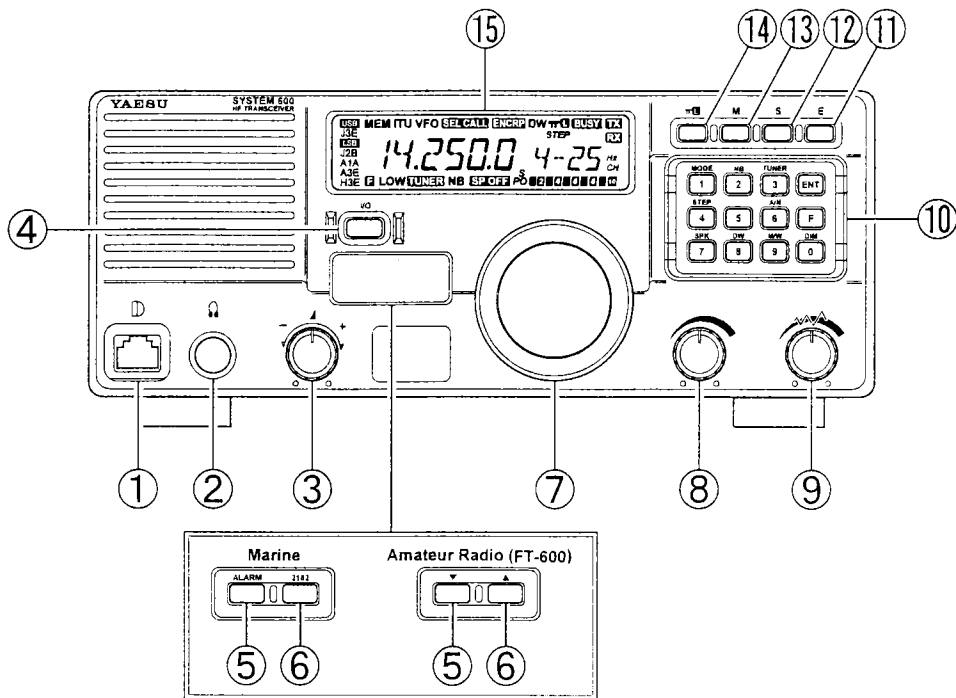
II-1. Front Panel Controls

(1) Microphone Jack

This modular jack accepts microphone voice input, as well as scanning and PTT (Push To Talk) control from the microphone. Specified microphone impedance is $500 \sim 600 \, \Omega$.

(2) Headphone Jack

Use this jack for connection to Yaesu YH-77STA or equivalent headphones. Specified headphone impedance is $4 \sim 8 \, \Omega$.

(3) Clarifier: Receiver Offset Tuning (− ↓ +)

Use this control for fine tuning around the current operating frequency. Rotating the Clarifier control tunes the receiver (up to ±300 Hz) *without affecting the transmit frequency*. The center detent of this control yields zero offset between the transmit and receive frequencies.

(4) Power (I/O)

This is the main Power On/Off switch for the transceiver. The switch is a locking type.

(5) ▼/ALARM

In most transceiver configurations, this button serves as a frequency, memory, or band stepping control which causes *downward* frequency, memory channel, or band change.

In the *Marine* configuration, pressing this button activates the alarm generator, with the alarm tone emanating from the Speaker (receive audio is muted,

and no transmission occurs). To *transmit* the alarm tone, press *both* the ▼/ALARM key and the ▲/2182 key (described next).

This key is non-functional during frequency or memory channel entry.

(6) ▲/2182

In most transceiver configurations, this button serves as a frequency, memory, or band stepping control which causes *upward* frequency, memory channel, or band change.

In the *Marine* configuration, pressing this button places the System 600 in the **"Emergency Channel"** mode, with the following results:

(A) The transceiver is instantly set to 2182 kHz in the H3E mode;

(B) On the LCD, $E \cdot CH$ appears on the display, indicating Emergency CHannel operation.

This key is non-functional during frequency or memory channel entry.

(7) Main Dial

The main dial tunes memory or VFO channels (depending on transceiver configuration) in 50 steps per revolution. It is also used for selecting alpha-numeric characters during "Alpha-Tag" entry.

Main dial operation is covered in considerable detail in Section IV (Operation) later in this manual.