

FT-2700RH OPERATING MANUAL



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>>>>> ERRATUM <<<<<<

The information in the "Operation" section of this first edition of the operating manual concerning the storage and use of memory channels in which separate receive and transmit frequencies are stored is incomplete, and can mislead the operator into unintentional transmission on undesired frequencies, or unexplained error indications on the display when attempting to transmit.

The problem occurs when the - S + (repeater split) switch is in either the "-" or "+" position while a memory channel with separate transmit frequency is recalled. Reception will remain normal, but when the transmitter is activated the actual transmit frequency will be the sum of the stored frequency for (intended) transmission plus or minus the standard repeater shift, according to the the - S + switch setting. Thus the actual transmitting frequency will not be the same as that stored in the memory, and cannot be corrected only by moving the - S + switch to the "S" (simplex) position. In most export versions this will result in an unexplained "Err" being displayed, and no transmission will occur. However, in those versions which include coverage of frequencies outside of the amateur bands, transmission may occur on unauthorized frequencies.

While the transceiver remains on that memory channel it is not possible to correct the transmitting frequency. However, the problem can be corrected by setting the - S + switch to center ("S"), momentarily switching back to the VFO and then recalling the memory again (press VFO and then MR).

This problem does not occur when operating on memory channels that hold only the receiving frequency. To avoid the problem on memory channels with separate transmit frequencies, however, make certain that the - S + switch is in the "S" position before recalling such channels. Alternatively, when scanning the memories with - or + shift selected, be certain to center the switch and momentarily switch back and forth to the VFO before transmitting on a channel with stored split.

We apologize for the misleading information in the manual, and for any inconvenience that may have resulted to operators.

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**YAESU FT-2700RH
VHF/UHF DUAL BAND
FM MOBILE TRANSCEIVER**

Practically two transceivers in one case, the FT-2700RH is designed to be the ultimate in convenience for FM mobile and base operation on the 2m and 70cm bands. Utilizing Yaesu's new one piece die-cast aluminum chassis concept for optimum circuit shielding and efficient heat dissipation, this is the first transceiver of its size designed to handle 25 watts continuous power output in full-duplex crossband operation (of course 3-watt low power operation is also switch selectable).

Two 4-bit CPUs provide simple and convenient control of 10 memory channels (8 with independent transmit and receive frequencies), two calling channels (one programmable) and dual VFOs with lithium cell backup. Dual independent receiver front ends, local synthesizers, IFs and transmitter RF stages make this the first mobile transceiver of its kind, capable of true full-duplex (bi-directional) communication when using both bands, which previously required two separate transceivers.

Convenient tuning and scanning features include Yaesu's "PMS" (programmable memory scan) system, which permits scanning (or skip-scanning) between two memory channels in the same band, a MHz stepping switch linking both bands, and priority channel checking while operating on another band or frequency. Scan resume modes are switch selectable; either auto-resume after 6 seconds or resume only on carrier drop.

The independently programmable transmit and receive frequencies (as well as automatically programmable standard shifts) plus one-touch reverse allow the operator total freedom in all kinds of repeater operation on both bands. A burst tone generator is built-in, and when the optional FTS-8 Tone Squelch Unit is installed, any of 37 standard CTCSS (sub-audible) tone frequencies can be displayed, selected and programmed into the memories channels for either silent monitoring or encode-only operation.

The large green-lit LCD display is especially easy on the eyes, and shows the complete operating status of the transceiver, including memory and call channel selection and the CTCSS mode and tone frequency (if FTS-8 installed), plus a two-color graphic type PO/S-meter. Six piano-type control keys beneath the display incorporate translucent back-lit labelling for easy location, and a dimmer switch for the keys and LCD is provided for comfortable viewing at night.

A deluxe scanning microphone is supplied with the FT-2700RH (US version includes DTMF pad). A "speak" button is provided on the microphone to activate Yaesu's own (optional) Voice Synthesizer Unit, which gives you the operating frequency, selected VFO and CTCSS frequency (if FTS-8 installed), so you can keep your eyes on the road.

SPECIFICATIONS

GENERAL

Frequency range	per local requirements (see Model Chart)
Channel steps	(see Model Chart)
Mode	F3 (G3E)
Antenna impedance	50 ohms, unbalanced
Supply voltage	13.8 VDC \pm 15%
Current	7A@25W TX, 3A @3W TX, 0.6ARX (stby)
Oper. temp range	-10 to +60 degrees Centigrade
Case Size	150(W) x 50(H) x 168(D) mm
Weight	Approx. 1.5 kg

RECEIVER

Circuit type	Double conversion superheterodyne
First IF	21.6 MHz
Second IF	455 kHz
Sensitivity	0.2uV for 12dB SINAD; 1uV for 30dB S+N/N
Selectivity	14kHz (-6dB), 28kHz (-60dB)
Image rejection	60dB or better
Audio Output	2W into 8 ohms for 5% THD, or better
Ext Spkr imped.	4 to 16 ohms

TRANSMITTER

RF output	25W/3W selectable
Modulation	Variable reactance
Deviation	\pm 5 kHz
Maximum bandwidth	16 kHz
Spurious emissions	-60 dB or better
Stability	\pm 10ppm on 2m, \pm 5ppm on 70cm (-5—+50 C)
Microphone imped.	600 ohms

Specifications subject to change without notice.

FT-2700RH Model Chart

Type	Freq. Coverage (MHz)	Channel Steps (kHz)	Rptr Shift (MHz)	Tone Burst (Hz)	Default CALL 1 (MHz)	Fixed CALL 2 (MHz)
A1	144-148 440-450	5/10 12.5/25	±0.6 ±5.0	1800	147.00	445.00
B1	144-146 430-440	12.5/25 12.5/25	±0.6 ±7.6	1750	145.00	433.40
B2	144-146 430-440	12.5/25 12.5/25	±0.6 ±1.6	1750	145.00	433.40
C1	144-148 430-440	12.5/25 12.5/25	±0.6 ±7.6	1750	147.00	433.40
C2	144-148 430-440	12.5/25 12.5/25	±0.6 ±1.6	1750	147.00	433.40
D1	144-146 430-440	5/10 12.5/25	±0.6 ±7.6	1750	145.00	433.40
D2	144-146 430-440	5/10 12.5/25	±0.6 ±1.6	1750	145.00	433.40
E1	144-148 430-440	5/10 12.5/25	±0.6 ±7.6	1750	147.00	433.40
E2	144-148 430-440	5/10 12.5/25	±0.6 ±1.6	1750	147.00	433.40

SUPPLIED ACCESSORIES

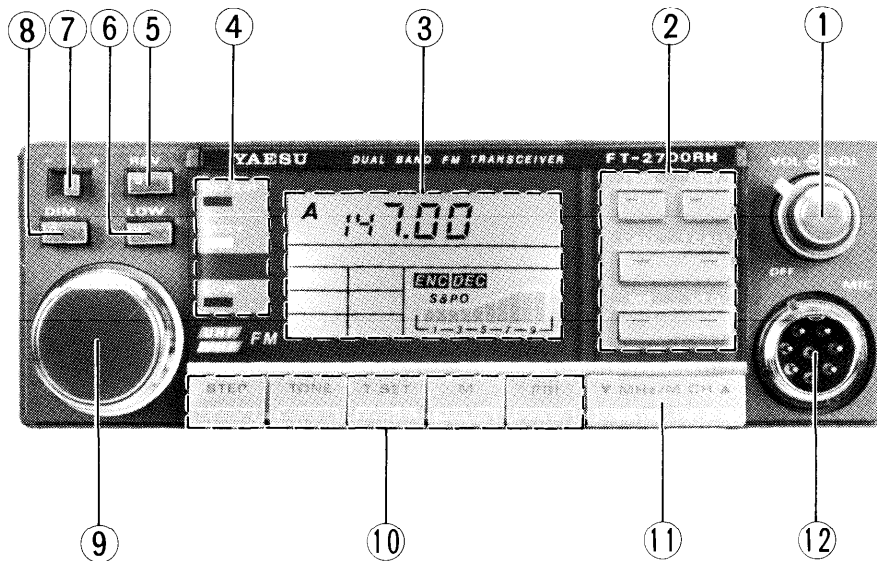
MMB-27 Mobile Mounting Bracket
MH-14A8 Scanning Hand Microphone (**MH-15A8** w/DTMF for USA)
 Fused DC Power Cord
 Spare fuse (10A)

OPTIONS

FTS-8 Tone Squelch Unit
FVS-1 Voice Synthesizer Unit (English)
SP-55 External Speaker
MH-15A8 Scanning Hand Microphone w/DTMF keypad
MF-1A3B Boom Microphone with flexible arm
YH-1 Headset (w/microphone)
SB-10 PTT Switch Unit for use with MF-1A3B and YH-1
FP-700 AC Power Supply

Note: certain options may be included as standard accessories according to local needs or popularity.

CONTROLS, SWITCHES AND CONNECTORS



(1) VOL SQL

The inner **VOL** control is the power on/off switch for the transceiver, as well as the audio gain control. The fully counterclockwise (click-stop) position is OFF. Turn the control clockwise out of the click-stop to turn on the set and increase the volume.

The outer **SQL** control sets the threshold level at which received signals will open the squelch and be passed to the audio (and automatic scan stop) stages during normal reception. Whenever the squelch is open, the green **BUSY** LED on the front panel will be illuminated. When the optional FTS-8 Tone Squelch Unit is installed and activated as a decoder, this control sets the threshold at which the **BUSY** LED will light and the scanner stop, if activated.

(2) Small Pushbutton Switches

PMS

This momentary switch activates the PMS (Programmable Memory Scan) function, described in detail in the "Operation" section.

DUP (Duplex)

This momentary switch toggles duplex operation on and off. When on, "DUP" is indicated on the display. When one of the VFOs is on 2 meters and the other on 70 cm, the duplex function allows simultaneous transmit and receive crossband operation. When both VFOs are on the same band, the duplex function provides reception on one VFO and transmission on the other (semi-duplex), but not simultaneously.

CALL T CALL

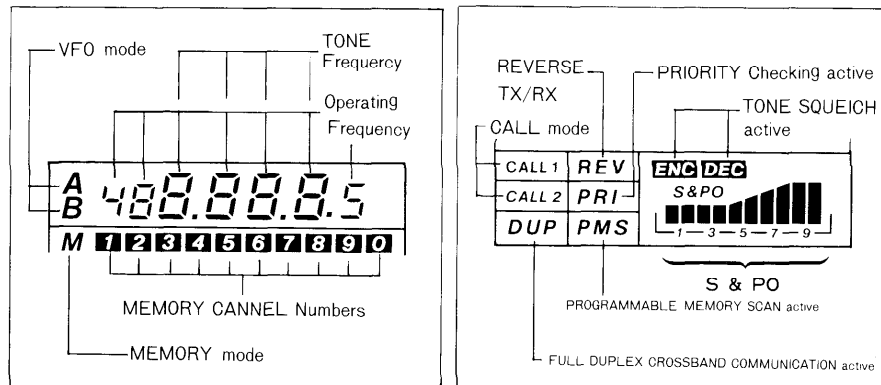
This double button has two functions, depending on which side of the button is pressed. Pressing the **CALL** side instantly sets the transceiver to programmable Call Channel 1. Pressing the **T CALL** side of the button transmits the 1750 or 1800 Hz Burst Tone, for accessing repeaters requiring such a tone. The tone is transmitted for as long as the button is depressed.

MR VFO

This is also a dual-function button; pressing the **MR** (Memory Recall) side selects the memory mode, in which operation is on the memories. When in the memory mode, pressing the **VFO** side of this button selects VFO operation (on the last selected VFO, A or B). When the VFO side of the button is pressed while already in the VFO mode, the alternate VFO is selected. The **A**, **B** or **M** indications on the display show the current state of the transceiver so the action of this button can be determined in advance.

(3) LCD (Display)

The multicolor LCD indicates the operating frequency and functions as shown in the diagram below, and relative received signal strength and transmitter power output. During full duplex operation the "meter" shows either signal strength or power output, whichever produces the higher reading.



(4) LED Indicator Lamps

ON AIR

This (red) lamp is lit whenever the transmitter is active.

BUSY

This (green) lamp is lit whenever the main receiver squelch is open. When the optional FTS-8 Tone Squelch Unit is used in the encode/decode mode, this lamp indicates whether the frequency is occupied, even though the receiver audio may be quieted by the tone squelch.

LOW (Low Power)

This (green) lamp is lit whenever low power (3W output) transmission is selected by the **LOW** switch.

(5) REV (Reverse TX/RX)

During repeater operation on a VFO or single-frequency memory using standard shifts, pressing this button exchanges the transmit and receive frequencies. When reversed from normal, **REV** appears on the display. This button is disabled when operating on memories in which both receive and transmit frequencies are stored.

(6) LOW Switch (Low Power)

This 2-position pushbutton switch selects LOW (3W) transmitter power output when in the depressed position, and high (25W) power otherwise. The LED with the same label is lit when this switch is in the depressed position.

(7) - S + (Shift)

This 3-position slide switch selects either simplex (center position) or plus or minus standard repeater shifts when operating on a VFO or single-frequency memory. It is disabled during duplex operation, and when operating from a memory having both transmit and receive frequencies preprogrammed. Standard repeater shifts for your model are listed in the "Specifications" section.

(8) DIM

This 2-position switch selects the brightness level of the display and panel lamps. The depressed position reduces the brightness of the lamps for comfortable viewing in the dark.

(9) Main Dial

This detented knob selects the operating frequency of the selected VFO. If the transceiver is in the memory mode, turning this knob will cause the operating (memory) frequency to be transferred into the last selected VFO as the transceiver automatically shifts to the VFO mode. Also, when the optional FTS-8 Tone Squelch Unit is installed, the main dial can be used to select the CTCSS tone frequency.

(10) "Piano" Switches

STEP

This momentary pushbutton selects the synthesizer step size for tuning and scanning, toggling between half and full channel steps, according to model type. See the "Specifications" section for details, since the step sizes used depend on local standards for each band. When changing from half to full steps, the operating frequency will change to the next-higher full step if originally on a half step.

TONE

This momentary pushbutton selects the operating state of the optional FTS-8 Tone Squelch Unit, when installed. The possible states are CTCSS Encode only (ENC displayed), Encode/Decode (ENC DEC displayed), or CTCSS off.

T SET (Tone Set)

Pressing this button allows you to set the CTCSS tone when the FTS-8 option is installed, without activating the CTCSS system for operation. The selected CTCSS tone frequency (in Hz) will appear on the display.

M (Memorize)

This button is used for writing the displayed VFO frequency into the selected memory channel, and also for masking and unmasking selected channels from memory scanning. It has up to three sequential levels of operation which are described in the "Operation" section.

PRI (Priority Function)

When in the VFO or memory mode, pressing this button causes the transceiver to check the current (or last selected) memory channel briefly for activity every six seconds, while operating on the current (or last selected) VFO. If a signal is found, operation shifts to the memory channel. Note that the main squelch level must be set properly for the priority function to work.

This button also provides access to fixed Call Channel 2 a few seconds after being pressed during operation on programmable Call Channel 1 (if the main squelch is not open on Call Channel 1). See the "Specifications" section for the frequency of Call Channel 2 in your model.

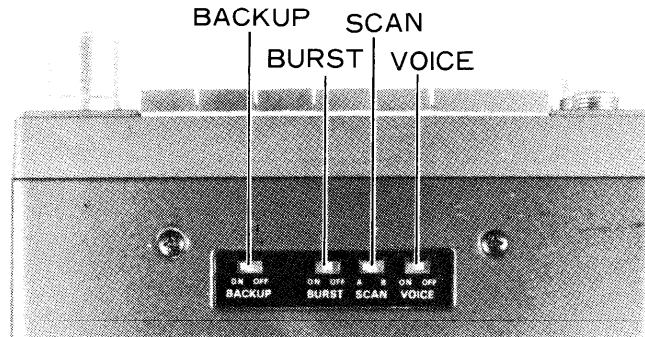
(11) ▼ MHz/MCH ▲

This double button allows upward and downward change of the selected VFO frequency in 1 MHz steps (and band-to-band) when in the VFO mode, or of the memory channel (number) in the memory mode, or of the CTCSS tone frequency when in the **T SET** mode (with optional FTS-8 installed). Stepping will repeat automatically as long as this button is held down.

(12) MIC (Microphone) Jack

This 8-pin jack accepts microphone input, scanning control and voice synthesizer keying (when FVS-1 installed), from the microphone.

(13) Bottom Cover Slide Switches



BACKUP

This is the on/off switch for the memory backup lithium battery. It is set to off at the factory, and should be turned on and left on except when the transceiver is to be stored without use for a long period of time, or for resetting the cpus.

BURST

This switch enables and disables the automatic tone burst function (different from the manual tone burst function activated by **T CALL** on the front panel). The automatic function, when enabled (ON position), causes a 1/2-second burst tone (1750 or 1800Hz) to be sent automatically whenever the PTT switch is closed to start transmission. Unless this access tone is required for the repeaters in your area, this switch should be set to OFF.

SCAN

The setting of this switch determines the resume function of the automatic scanner. "A" selects automatic resume scanning after six seconds, while "B" selects automatic resume after carrier drop.

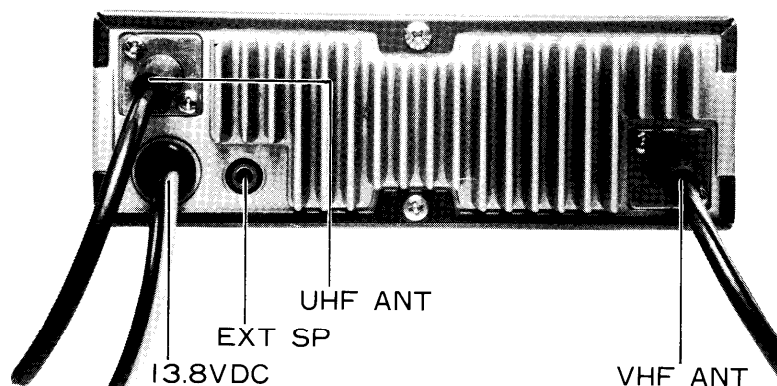
NOTE

THE TRANSCEIVER MUST BE SWITCHED OFF WHEN CHANGING SCAN RESUME MODES WITH THE SCAN A/B SWITCH ON THE BOTTOM COVER.

VOICE

This switch allows selection of the method of exciting the optional FVS-1 Voice Synthesizer to "speak", when installed. When set to the OFF position, the radio will only speak when the **SPEAK** button on the microphone is pressed. When ON, the radio will speak whenever one of the (announced) operating modes or parameters is changed.

(14) Rear Panel Connectors (Identified on Bottom Label)



13.8 VDC

This is the 13.8 volt DC power cable. Make certain that this cable is always connected with the RED lead positive, and that the supply voltage never exceeds 15V DC. Mobile installations require that the vehicle have a negative ground electrical system. AC voltage must never be connected here.

EXT SP (External Speaker Jack)

If desired, an external 4- to 16-ohm speaker may be connected to this 1/8-inch 2-conductor mini phone jack. The internal speaker is disabled when this jack is used.

UHF ANT

Your 70cm antenna cable should be connected to this in-line jack, using a type "N" coaxial plug.

VHF ANT

Your 2m antenna cable should be connected to this in-line jack, using a type "M" (so-called "UHF" coaxial plug).

INSTALLATION

Antenna Considerations

The FT-2700RH is designed for use with two antennas, one for each of the 2m and 70cm bands. Impedance at the operating frequency should be close to 50 ohms for proper performance of the transceiver, so it is good practice to use only high-quality, carefully designed antennas. While it is possible to operate with only one antenna, this can easily result in damage to the transceiver if transmission is accidentally attempted on the wrong band, and thus we recommend that two antennas be connected at all times.

While the FT-2700RH employs high-grade multiple bandpass filters in the two receiver front ends, full duplex operation can still result in desensitized reception if the antennas are not isolated from one another. Care should be taken in the selection and location of the antennas to minimize such possibility. In all installations, the 2m and 70cm antennas should be located as far from one another as is conveniently possible, and preferably positioned in such a way that they are not located in one another's main radiating lobes. For example, in mobile installations, if the 70cm whip was mounted on the roof, then the 2m whip would best be mounted on the trunk or bumper. For base stations, the best arrangement is to have the antennas stacked so that the ends of the elements (field nulls) are on the same line, one directly above the other. Antenna isolation is especially important at high power, and critical if a power amplifier (or receiver preamp) is used. See the section on Full Duplex Operation for further information.

Another important consideration in installing antennas for the FT-2700RH is the feedlines: For optimum performance use the shortest possible lengths of the best quality coaxial cable available, and be sure to use properly matching fittings for the cable connectors on the transceiver.

Mobile Installation

The FT-2700RH must only be installed in cars having a negative ground electrical system. The transceiver should be located where the display, controls and microphone are easily accessible, and should be securely affixed using the supplied MMB-27 mobile mounting bracket. The transceiver may be installed in any position without adversely affecting its performance, but it should not be mounted near a heater vent or where it could interfere with safe operation of the vehicle. Refer to the diagrams on the facing page for installation of the MMB-27.

- (1) Use the mounting bracket as a template for positioning the mounting holes, after determining the proper location with sufficient clearance for the transceiver. Use a 3/16" bit for drilling the holes. Secure the bracket with the screws, washers and nuts supplied, as shown in Figure 1.
- (2) Screw the mounting rings to the transceiver using the supplied spacers and flat washers as shown in Figure 2. Be sure that the rings are oriented as shown.
- (3) Referring to Figure 3, align the mounting rings with the notches in the bracket, and slide the transceiver backward and upward into the bracket until it snaps into place.

To remove the transceiver from the bracket, pull it straight forward, with slight upward pressure at the rear, if necessary.

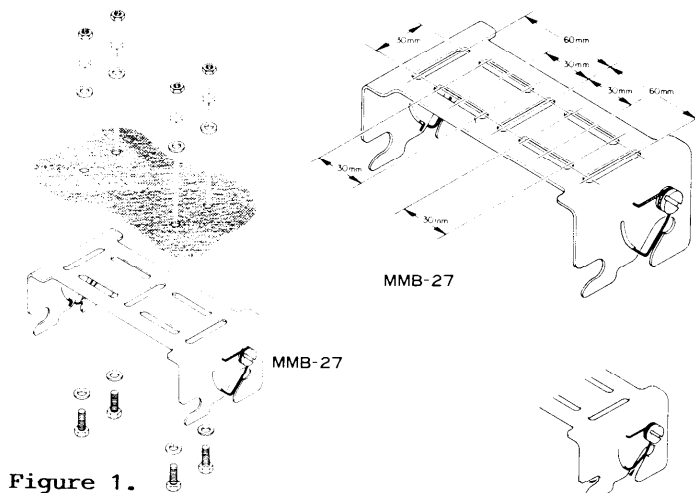


Figure 1.

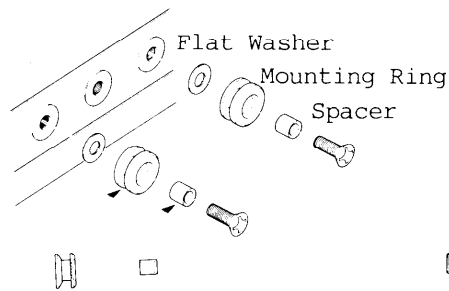


Figure 2.

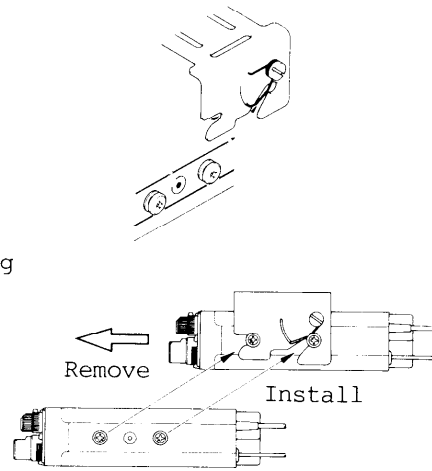


Figure 3.

Before connecting the power cable the maximum battery charging voltage should be checked to ensure that it remains below 15V when the engine is run fast. If more than 15V, the voltage regulator of the car should be adjusted before connecting the transceiver.

Power connections should be made directly to the automobile battery, using the supplied cable with 10A inline fuses. Connection to the cigarette lighter or other accessory circuit may cause the fuse to blow in that circuit. Connecting the supplied DC power cable to the battery independently of the rest of the automobile electrical system will minimize possible ignition noise pickup and excessive supply voltage drop during transmission.

Do not connect any power to the transceiver except via the supplied fused cable, and do not attempt to defeat or bypass the fuses - they are there to protect you and the equipment.

Connect the RED lead of the power cable to the POSITIVE (+) battery terminal, and the BLACK lead to the NEGATIVE (-) terminal. If it is necessary to extend the power cable, use #16 AWG or larger insulated, stranded copper wire, and in all cases use the minimum power cable length practicable to keep voltage drop minimal.

WARNING

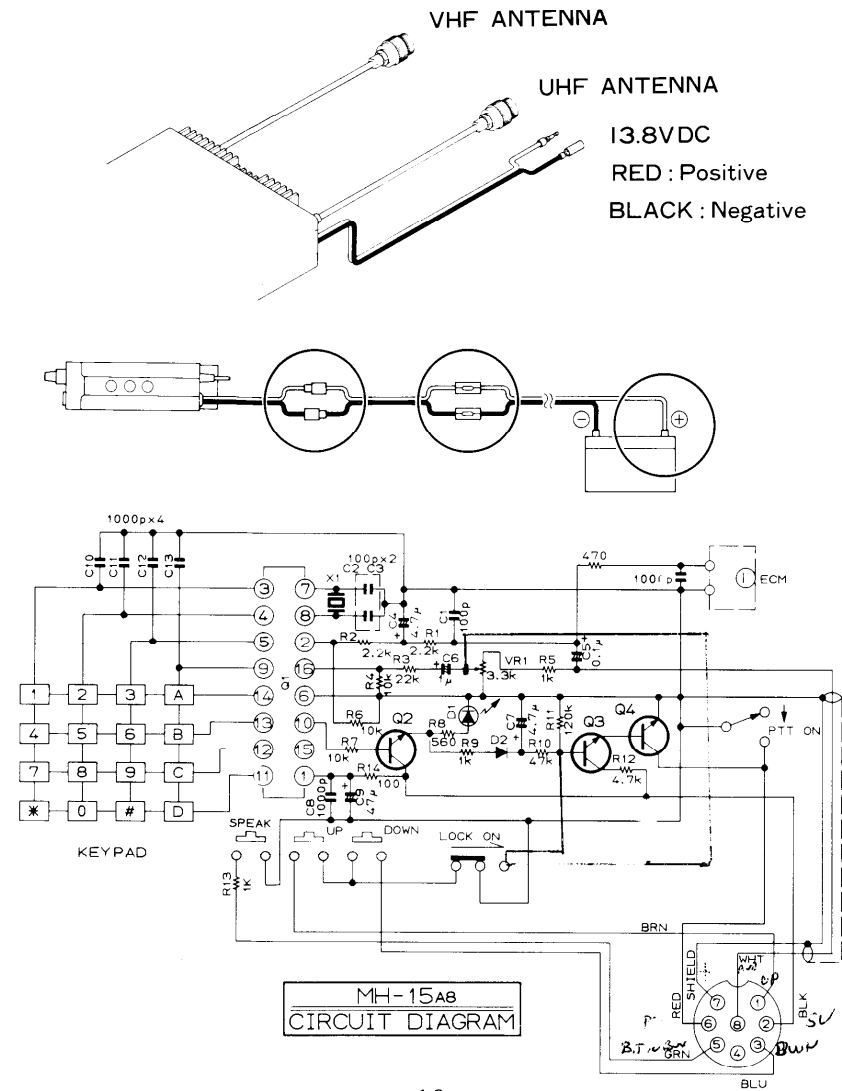
NEVER APPLY AC POWER TO THE REAR PANEL POWER JACK OF THE TRANSCEIVER. NEVER CONNECT DC VOLTAGE OF MORE THAN 15 VOLTS TO THE POWER JACK. ALWAYS REPLACE FUSES WITH THE PROPER RATING (10A). FAILURE TO OBSERVE THESE PRECAUTIONS WILL VOID THE WARRANTY.

Connect the power cable to the short pigtailed on the back of the transceiver; red-to-red and black-to-black.

The SP-55 External Speaker is an optional accessory for the FT-2700RH, allowing the source of audio from the transceiver to be repositioned for optimum hearing. Especially practical for the noisy mobile environment, the SP-55 includes its own swivel-type mounting bracket, and is available from your Yaesu dealer. Also available for safe "hands-free" mobile operating convenience are the YH-1 Headset with miniature boom microphone, and the full size MF-1A3B boom microphone with flexible arm (both of which use the SB-10 PTT switch).

Base Station Installation

A base station mounting stand is supplied with your transceiver, to provide easy viewing of the display, and clearance for the internal speaker. A power supply capable of providing at least 8A continuously at 13.8VDC is required for operation from the AC line. The FP-700 AC power supply is available from your Yaesu dealer for this purpose. Use the fused DC power cable supplied with the transceiver for making power connections.

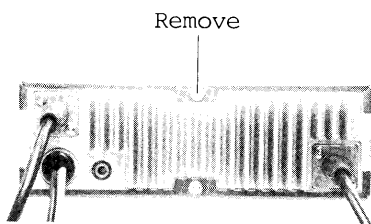


FTS-8 TONE SQUELCH UNIT INSTALLATION

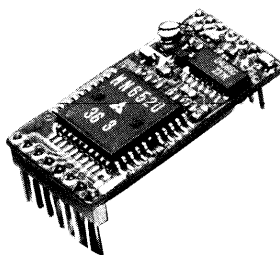
The FTS-8 provides either encode-only or encode/decode operation with 37 front panel selectable subaudible CTCSS tones, and is available for all versions FT-2700RH, from your local Yaesu dealer. See the "Operation" section for functional details.

1. Disconnect the power cable at the rear of the transceiver, and remove the rear panel screw affixing the top cover. Remove the cover by sliding it back about 1 cm, and then lifting it away. Then remove the seven screws affixing the shield cover at the left rear corner of the chassis, and remove the shield cover.
2. Referring to the photos at the top of the facing page, locate and remove the small dummy board, and replace it with the FTS-8, positioned as shown. Gently press the FTS-8 into place.
3. If the FVS-1 Speech Synthesizer Unit is also to be installed now, proceed to step 2 on page 16. Otherwise, replace the shield cover and its screws, and then replace the top cover in the reverse manner from which it was removed, sliding it forward so that the spring clip grasps the chassis before replacing the screw.

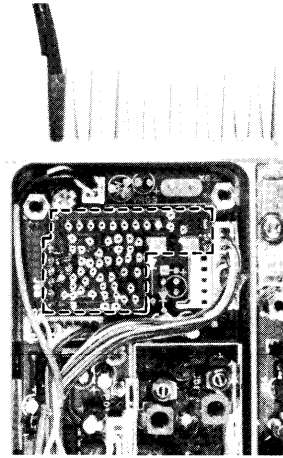
The output tone level (VR1) is adjusted at the factory for the proper deviation.



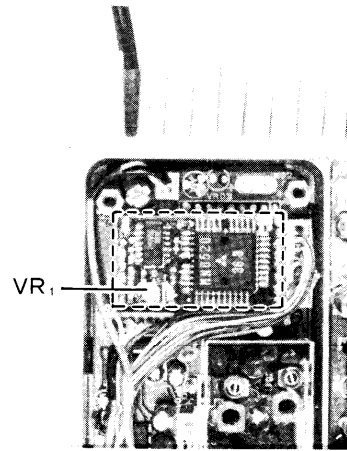
REAR PANEL



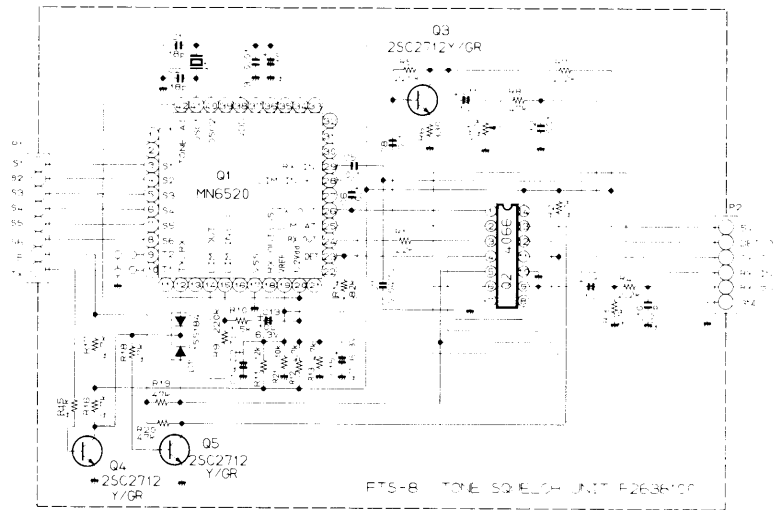
FTS-8 TONE SQUELCH UNIT



REMOVE DUMMY BOARD



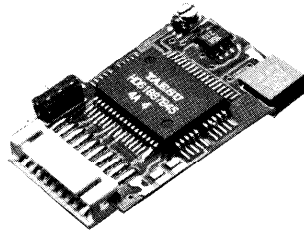
INSTALL FTS-8



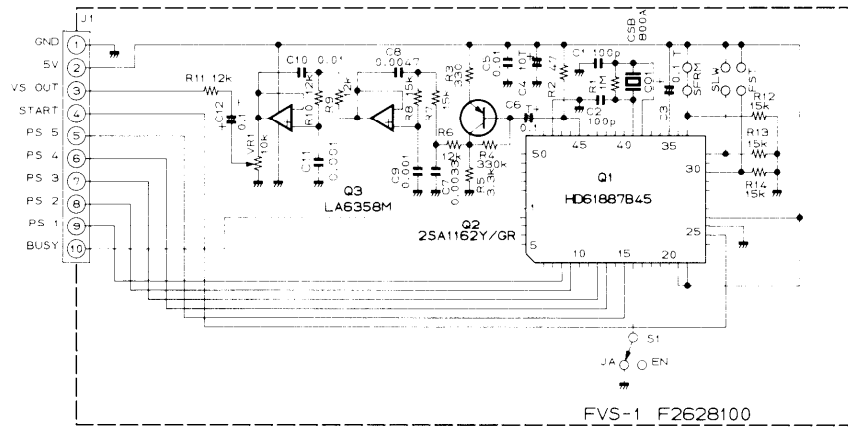
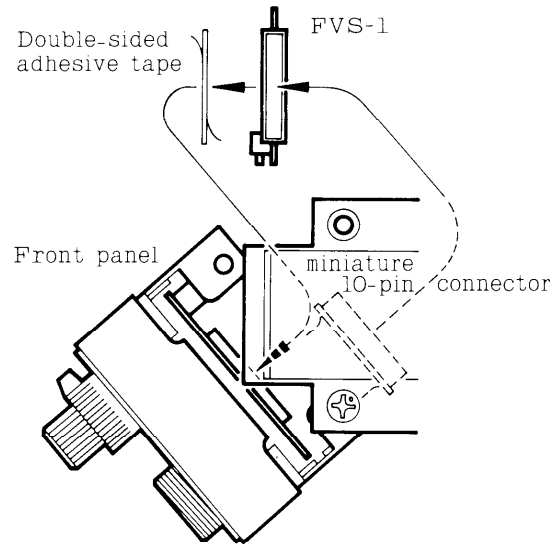
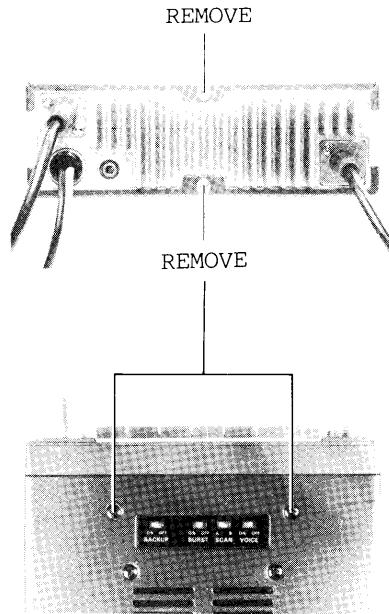
FVS-1 VOICE SYNTHESIZER INSTALLATION

The FVS-1 provides automatic and/or manually actuated synthesized voice readout of VFO or memory band and frequency, or tone squelch frequency if the FTS-8 is installed. See the "Operation" section for details.

1. Disconnect the power cable at the rear of the transceiver, and remove the rear panel screw affixing the top cover. Remove the cover by sliding it back about 1 cm, and then lifting it away.
2. Remove the one screw on the rear and the two screws on the bottom (near the front) affixing the bottom cover. Lift the cover away slowly, using care not to pull on the speaker wires.
3. Remove the upper two (of the four) screws affixing the front panel subchassis on the sides of the set, and then loosen the lower two screws slightly: this should allow the front panel to be tilted forward, permitting access to the cpu circuit board on the inside of the front panel.
4. Locate the (unconnected) miniature 10-pin connector in the space between the front panel subchassis and the main chassis, and carefully mate this connector to its counterpart on the FVS-1. Use the supplied double-sided adhesive tape to affix the flat surface of the IC on the FVS-1 to the flat surface of the cpu in the transceiver, as shown on the facing page.
5. Replace the top cover in the reverse manner from which it was removed, sliding it forward so that the spring clip grasps the chassis before replacing the screw. Then replace the bottom cover and its screws, using care to ensure that the speaker leads are secure on the speaker, and that no wires are pinched between the covers.



FVS-1 VOICE SYNTHESIZER UNIT



OPERATION

Please read this section carefully to gain an understanding of the functions of each control and switch. Your enjoyment and efficient operation of this transceiver depend on a clear understanding of how the various controls and switches work together for optimum performance.

Before proceeding, be certain that an antenna is connected to each antenna connector, and that a DC supply of the proper voltage (13.8V DC, negative ground) is connected to the power cable, RED positive.

Preset the controls and switches as follows:

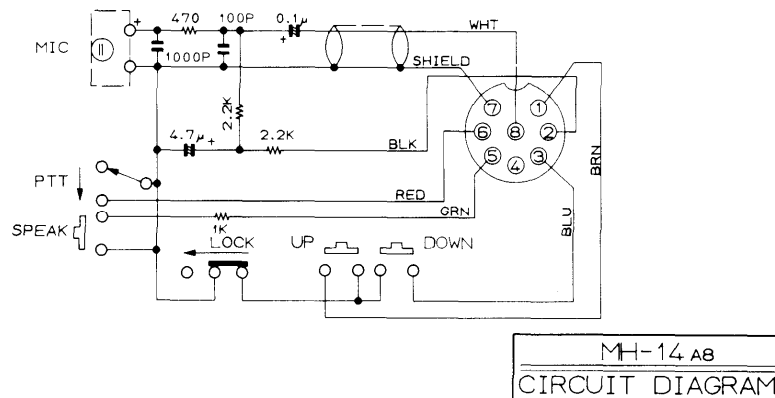
VOL fully counterclockwise into the click-stop (off)
SQL fully counterclockwise
LOW depressed position
- **S +** . . . center "S" position
BACKUP . . (bottom cover) **OFF**

Initializing and Basic Checkout

- (1) Rotate the **VOL** control clockwise out of the click-stop. The panel lamps should come on, and the **BUSY** and **ON AIR** lamps will blink before frequency data appears on the display. Advance the **VOL** control for a comfortable level of noise or signal from the speaker.
- (2) Now set the **BACKUP** switch on the bottom cover to the ON position. Switching on the transceiver with the backup switch off resets the cpus, and then switching on the backup allows all operating data to be retained in memory until the backup switch is again turned off.
- (3) Rotate the dial to an unoccupied channel, if necessary, and then rotate the **SQL** control clockwise until the noise just disappears and the **BUSY** lamp turns off. This is the point of maximum squelch sensitivity, where the **SQL** control should be kept for all except special situations where reduced sensitivity is required (such as when awaiting a call from a strong local station). The **BUSY** lamp will be lit whenever the main squelch is open.
- (4) Press either side of the **▼MHz/MCH▲** button to change frequency in 1 MHz steps. When the end of the 2m band is reached, the VFO frequency will automatically jump to the 70cm band and the proper antenna be selected. (Be certain that proper antennas are connected for both bands.)

- (5) Rotate the dial to observe channel selection. Now press the **STEP** button and turn the dial again to observe the half-step tuning function. Note that the **UP** and **DWN** scanning buttons on the microphone, if pressed only momentarily, can also be used to single-step the frequency by the selected step size. Set the transceiver to a (simplex) frequency on which you wish to transmit.
- (6) Press the PTT (Push-To-Talk) switch on the microphone to transmit. The **ON AIR** lamp will light, and you can then speak into the microphone (using a normal voice). Never transmit without having a proper antenna or dummy load connected to each of the antenna connectors. As it is so easy to change bands with the FT-2700RH, be certain to always follow this precaution to avoid damage to the transceiver.
- (7) If high power (25W) operation is necessary for communication, set the **LOW** switch to the undepressed position (the **LOW** lamp will turn off). It is best to operate with low power (3W) whenever possible, to minimize current drain, heating and potential interference to others. The best practice is to keep the **LOW** switch depressed during all normal operation, switching to high power only after it is determined that low power is insufficient.

NOTE: If a continuous transmission is made for more than about 20 minutes (or less at high ambient temperatures), the transceiver may overheat, in which case the automatic thermal protection system will reduce transmit power to 3W automatically until the transceiver has had time to cool. While it is unlikely that this would occur during simplex or semi-duplex operation, it is likely during full power full duplex communications.



General Operating Features

(1) VFO Selection

The two VFOs in the FT-2700RH are labelled "A" and "B", one of which is indicated just to the left of the frequency on the display whenever the transceiver is in the VFO mode. The frequency of the displayed VFO can be selected and changed by the **▼MHz/MCH▲** button and the main knob or scanning buttons on the microphone. The displayed VFO frequency can also be stored in a memory, as described later.

When the transceiver is in the VFO mode, (A or B displayed), press the right side of the **MR VFO** button to change to the alternate VFO (if the transceiver is initially in the memory mode, this same button would first select VFO operation on the most recently used VFO, and then change to the alternate VFO after another press).

Each VFO is independent of the other; that is, changing the frequency of one will not affect the frequency of the other. They can each be set to different bands, or both to the same band. Either VFO can be used for semi-duplex operation with standard splits, just by setting the **- S +** switch to the left or right. Also, odd (non-standard) repeater splits can be worked by setting one VFO to the transmitting frequency, the other to the receiving frequency, and then pressing the **DUP** button. In this case the transceiver will receive on the last selected VFO and transmit on the other. Note that, in this case (semi-duplex operation) both VFOs must be on the same band, or full duplex operation (Part 14 of this section) will result.

(2) Frequency Selection

Frequency selection can only be performed in the VFO mode (either A or B). If moving to a frequency far (>500kHz) from that presently selected, use the **▼MHz/MCH▲** button to select the 1 MHz digit nearest to the desired frequency. If moving more than 1 or 2 MHz, just hold this button for repeated stepping. Note that the **▼MHz/MCH▲** button must be used to change bands; the other controls will only loop within the selected band.

Now rotate the dial knob or press and hold the **UP** or **DWN** button on the microphone to select the desired frequency (if the microphone buttons are used, press the button again to stop). Depending on the model version of your transceiver and the setting of the **STEP** switch, tuning steps will be either 5 or 10kHz, or 12.5 or 25kHz. When using the microphone scanning buttons for tuning, a momentary press of the **UP** or **DWN** button will tune up or down a single step (the same as one click of the dial knob). Scan-tuning can be stopped by one press of the PTT switch; transmission will not occur unless the switch is released and pressed again.

(3) Single-Frequency Memory Storage

The FT-2700RH has ten memory channels, numbered 1 through 9 and 0, all of which can be used for storing frequencies directly from the VFOs. However, memories 1 through 8 can also be used to store transmit and receive frequencies independently for split-frequency operation, such as for repeaters or cross-band full duplex, while memories 9 and 0 have a special application in the PMS system described later.

Before storing a frequency in memory, it must be selected on VFO A or B as described in the preceding section.

First, press the **M** button once. This activates the memory status checking mode for six seconds, which does nothing more than show you (on the display) the status of all of the memories (reception on the selected VFO is not affected, although transmission, tuning and some other buttons are disabled during this time). The status indicators are a blinking **M** at the left just below the frequency display, indicating the memory status mode; followed by one or more channel numbers in small black squares, one of which will also be blinking. The blinking channel is the one that is the currently "selected" one, ie., the channel that was last selected and which will be the one to be stored by the following steps. The presence (or absence) of other channel numbers simply indicates whether they are currently holding data, or not.

Initially, before any memories have been stored, only a blinking 1 will appear, signifying that memory 1 is selected (by default) for storing, and that all other memories are vacant. The selected "blinking" memory may be changed (at any time) while in the memory status mode, using the **▼MHz/MCH▲** button. If no other buttons are pressed within the six-second memory status check, that mode will cancel and everything will return to its previous state (in the VFO mode).

If the **M** button is pressed again while still in the status mode, the displayed frequency will be memorized in the (blinking) channel and the status info will disappear from the display. At this point operation is still in the original VFO mode. To recall the memory, just press the left side of the **MR VFO** button.

When only the receiving frequency is stored in a memory, as just described, repeater operation is possible for repeaters with standard shifts (as with each of the VFOs), by setting the - **S** + switch to the appropriate - or + position. This method of operation has the advantage of the REVERSE capability; allowing exchange of the receive and transmit frequencies with the **REV** button. Memories 9 and 0 are limited to this type of repeater operation, or simplex.

To store additional memories, press the **M** button to enter the memory status mode (from the VFO mode), and then press the **▼MHz/MCH▲** button to select the next memory for storing (the new channel number will blink).

(4) Storage of Transmit Frequencies

As mentioned earlier, memories 1 through 8 have the capability of storing a transmit frequency in addition to the receive frequency. These memories thus allow the required data for all kinds of repeaters to be recalled instantly, without the need to select shift direction or any particular split. However, remember that the **- S +** switch and **REV** button will be disabled during operation on a memory that has both receive and transmit frequencies stored.

To store an independent transmit frequency, press the right (VFO) side of the **MR VFO** button to return to the VFO mode, and retune the VFO to the desired transmit frequency. Now make sure that the **- S +** switch is set to the center. Press the **M** button once, and then press and hold the PTT switch while pressing the **M** button again. Of course, if you want to store standard repeater shifts, it is not necessary to retune the VFO after the receive frequency has been stored: instead, just set the **- S +** switch as required before storing the transmit frequency.

While it is possible to store either the receive or transmit frequency first, it is best to store the receive frequency first, since it is not possible to recall, display or use a memory that has only the transmit frequency stored.

Storing receive and transmit frequencies on different bands will automatically result in a full duplex memory, and DUP will appear on the display whenever that memory is recalled.

(5) Memory Erasure

If you make a mistake in programming a memory channel, or no longer need that channel data, you can simply overwrite it with new data. However, in cases where a separate receive/transmit memory is to be replaced with simplex data, it is too easy to forget to change the transmit frequency, which can result in unexpected transmission on the wrong frequency. Thus the following memory erasing procedure is recommended for use whenever a memory is to be changed.

To erase the selected memory (from the VFO mode), press **M** to enter the memory status mode, and then press the **MR** side of the **MR VFO** button. The selected memory will be cleared, but remain selected for immediate reprogramming, if desired. It is a good idea to keep unneeded memories clear so that memory checking and channel scanning are simplified.

(6) Memory Selection and Recall

To recall a memory channel when operating in the VFO mode, press the MR side of the **MR VFO** button. An **M** should be displayed at the left and just below the channel frequency, with the channel number under the frequency. If the channel number is blinking and no frequency is displayed, the memory is vacant.

To select a different memory channel (that has already been stored) for operation, press the **▼MHz/MCH▲** button (and hold it for multi-stepping). The memory channel (M CH) function of this button is automatically selected when in the memory mode. The UP and DWN buttons on the microphone can also be used for memory channel selection, but with an additional feature described in part (9) below.

Be careful to note the setting of the - **S** + switch if you transmit after moving from one memory to another, since it will shift the transmit frequency of memories that do not have both receive and transmit frequencies already stored.

(7) Call Channel Storage and Recall

The Call Channel feature allows the operator to program one additional high-priority memory channel for instant recall, by pressing the CALL side of the **CALL T CALL** button. A second (fixed frequency) Call Channel on 70cm is also provided.

To store a frequency in the programmable Call Channel (denoted CALL 1 on the display), first select the desired frequency in the VFO mode. Then press the **M** button followed by the left side of the **CALL T CALL** button.

To recall the Call Channel just press the left side of the **CALL T CALL** button again. CALL 1 will now be displayed on the left side of the display. Fixed Call Channel (CALL 2) can be recalled by pressing the **PRI** button (and waiting a few seconds) while receiving on CALL 1. This will cause alternating reception on CALL 1 and CALL 2, which will halt if activity appears on either channel. To operate only on CALL 2, use the SQL control to manually halt the alternating reception when CALL 2 is displayed, and then return the SQL to the normal position.

It is possible to use the Call Channel for repeater operation if the repeater has a standard shift. Just set the - **S** + switch as needed before transmitting.

Pressing the UP or DWN buttons on the microphone while operating on a Call Channel will cause the Call Channel frequency to be shifted into the last selected VFO and moved up or down by one tuning step. Transceiver operation will be transferred to the VFO.

To escape from Calling Channel operation without disturbing the VFO, press the VFO side of the **MR VFO** button (to return to the VFO), or the MR side to return to the selected memory.

(8) Frequency Scanning with a VFO

If either the UP or DWN button on the microphone is pressed and held for 1/2-second while the transceiver is in the VFO mode, scanning will commence. Once started, scanning will continue automatically, if no other buttons are pressed, for as long as the main squelch (as set by the SQL control) does not open, looping around at the band edges to remain in the same band. Scanning steps are the same as the tuning steps set by the **STEP** button.

Whenever the main squelch is opened by a signal (assuming the **SQL** control has been set properly), the scanner will halt temporarily. If the SCAN switch on the bottom cover is set to the "A" position, scanning will resume automatically after about six seconds (regardless of activity on the frequency). If the SCAN switch is set to the "B" position, scanning will not resume until about two seconds after the received carrier drops, unless another signal appears in that time. While the scanner is halted temporarily the decimal in the frequency display will blink.

Of course the scanner can be manually stopped at any time by pressing either the UP or DWN button momentarily, or the PTT switch. If the PTT switch is used to stop the scanner the transceiver will not transmit until the switch is released and pressed again. When the scanner is stopped manually it is necessary to press and hold the UP or DWN button for 1/2-second to restart the scanner.

(9) Memory Scanning

When in the memory mode, the scanning functions just described will act on the programmed memory channels only, instead of the whole band. If you have some frequencies stored in memory that you do not want to include in memory scanning (for example, if they are too busy, or stored for use only in special situations), they can be masked from the scanner without erasing.

To mask a memory from scanning, just recall the memory, and press **M**. The channel number beneath the displayed frequency should now start to blink, and any time this channel is recalled for operation the channel number will be blinking, as a reminder that it is masked from memory scanning. Whenever memory scanning is activated, masked channel(s) will be skipped over just as though they were not there.

Note that masked memories can only be selected for operation by the **▼MHz/MCH▲** button, while the microphone **UP** and **DWN** buttons can be used to select only unmasked (and non-vacant) memories. This can be used to advantage for easily checking which channels are included in memory scanning.

To unmask a previously masked channel recall the memory and press **M** once again. The channel number should stop blinking.

(10) Programmable Memory Scan (PMS)

The frequencies stored in memories 9 and 0 serve as the scanning limits for limited band scanning, as well as the manual tuning limits, when the PMS function is activated. This function is useful for limiting operation to only the FM portion of the band, for example. Both channel frequencies must be in the same band.

It is generally best to store the lower frequency in memory 9, for reasons that will become obvious. After storing the desired limits in the memory channels, press the **PMS** button to activate the function. **PMS** will appear at the lower center of the display, and the displayed frequency will be that stored in memory 9. Press the **UP** button on the microphone to scan to the frequency stored in memory 0, at which time the scanner will jump to memory 9 and continue (until halted in the usual manner described in part (8) above). Notice that if the frequency in memory 0 is lower than that in memory 9, the scanner will loop from the top of the band to the bottom and continue scanning outside of the range between memories 9 and 0. Of course, if the **DWN** button is pressed instead, scanning will be in the opposite direction, but will still cover the same frequencies.

Note that while the PMS function is active, the frequency range covered by the main tuning knob will also be limited to the range selected as above. Press either side of the **MR VFO** button, as desired, to cancel the PMS function.

(11) Priority Channel Monitoring

During operation on a VFO it is possible to monitor the (previously selected) memory channel for activity. For example, if you are waiting for a call on a simplex frequency while operating elsewhere on the band (or even on the alternate band), the priority feature lets the expected call break in immediately when you are receiving on the other frequency.

To set up priority channel operation, first select the desired priority channel from among the stored memories, using the **MR** and **▼MHz/MCH▲** buttons. Then press the **PRI** button. **PRI** will appear at the lower center of the display, and the (last selected) VFO frequency will be displayed.

You may now go ahead and operate with that VFO in any way you like: every six seconds the display (and receiver) will shift to the memory frequency briefly (about 300ms) to check for activity, and then return if no activity (to open the main squelch) is found.

If a signal appears on the priority (memory) frequency when it is being checked, operation will jump to the priority frequency and priority operation cease. At that time you can respond to the calling station, and if necessary, have him wait while you press the VFO side of the **MR VFO** button to return to the VFO frequency, to announce that you have QSYed. Then press the MR side of the same button to return to the memory.

Note that if the **- S +** button is set for plus or minus repeater shift on any of the frequencies used for the above operation, it may be necessary to change its position when changing frequencies (unless both receive and transmit frequencies are stored in the memory used for priority checking, even if simplex).

It is possible to combine manual band- or PMS scanning with priority monitoring, though the auto-scan features are then dedicated to the priority function. For band scanning, just activate the PRI button first, and then use the microphone **UP** and **DWN** buttons, holding the button down to scan, and releasing to halt (or use the tuning knob). For PMS/priority scanning, the **PMS** button must be pressed first, followed by the PRI button and then the microphone **UP/DWN** buttons (or tuning knob).

(12) Tone Squelch (CTCSS) Functions (FTS-8 Option req'd)

When the optional FTS-8 Tone Squelch Unit is installed (see page 14), either CTCSS encode only or full encode/decode operation can be selected as required. CTCSS (Continuous Tone-Coded Squelch System) is a subaudible tone system that uses a continuous tone below the lowest audio frequency used for speech communications, superimposed on the transmitted signal. In the encode-only mode, the subaudible tone can be used for selective access to special repeaters only by users informed of the particular CTCSS tone frequency or code required by the particular repeater. The encode/decode mode allows silent monitoring of busy channels, since the receiver remains squelched unless a signal with the correct preset tone is detected. Some repeaters retransmit incoming CTCSS signals (allowing silent monitoring of the repeater frequency for CTCSS calls), while others do not; so contact the repeater group for details of a particular repeater.

Before selecting the CTCSS frequency and function, set the transceiver to the VFO mode (A or B) if you plan to save the CTCSS data in a memory channel later.

To select a CTCSS tone frequency, first press **T SET**. This will cause the **ENC** and **DEC** indicators on the display to appear and blink, and the selected tone frequency (default = 67.0 Hz) to appear in place of the operating frequency. The tone setting function will automatically cancel after six seconds unless you press a button, but while it is active you can use the microphone UP and DWN buttons, **▼MHz/MCH▲** button or main dial to select from the 42 different tone possibilities. Refer to the FTS-8 Tone Chart on the facing page for the actual tone frequencies. Once the desired tone is selected, before the tone setting mode times out, press **T SET** again to set the selected tone frequency for operation.

Note that the five of the tones, including the 67.0Hz default, appear twice in the Tone Chart (and during selection in transceiver), once with a leading 0 and once without. Those five tone selections (between 67.0 and 88.5Hz) that do not have a leading zero have special low-Q decoder filters with $Q = 40$, providing half the tone selectivity to allow proper reception of CTCSS signals from older or less stable tone generators. All other tone selections have standard high-selectivity ($Q = 80$) decoder filters.

Now select the CTCSS operation mode, using the front panel **TONE** button. One press of the button selects encode-only, with just **ENC** displayed. In this mode the subaudible tone just selected will be superimposed on your voice signal, for repeater access or selective outgoing calls. The receiver will not be affected.

Press the **TONE** button again (when **ENC** is displayed) to select encode/decode operation, displayed as **ENC** and **DEC**. In this mode the receiver will remain quiet to all but those signals bearing a CTCSS tone identical to the one you previously selected. Note that the main receiver squelch can still be opened (the **BUSY** lamp lit) by other stations, but the receiver will remain quiet. This feature allows you to make sure that the channel is clear (**BUSY** off) before transmitting in the encode/decode mode.

Pressing the **TONE** button once more (when **ENC** and **DEC** are displayed) will deactivate the tone squelch system.

To store the tone squelch frequency and mode in a (selected) memory, first set a VFO for the desired tone squelch data to be stored, and also make sure that the VFO frequency is that which you wish to store. Then press the **M** button twice, in the same way as described in part (3) above.

Note that tone squelch data can be set or reset at any time using the **T SET** and **TONE** buttons. However, if this is done in the memory mode, the new data will be lost when changing channels or to the VFO mode, and when returning to the original memory the original data will be present. The VFOs must be used to permanently restore data in the memories.

FTS-8 CTCSS Tone Chart

Frequency in Hertz (as displayed)

67.0*	118.8	173.8	067.0
71.9*	123.0	177.9	071.9
77.0*	127.3	186.2	074.4
82.5*	131.8	192.8	077.0
88.5*	136.5	203.5	079.7
94.8	141.3	210.7	082.5
100.0	146.2	218.1	085.4
103.5	151.4	225.7	088.5
107.2	156.7	233.6	091.5
110.9	162.2	241.8	
114.8	167.9	250.3	

* Decoder Q=40, other codes have decoder Q=80

(13) Voice Synthesizer FVS-1 (Option)

When the optional FVS-1 Unit is installed, band and operating frequency, VFO or memory indication and CTCSS tone frequency (if used) are indicated by a female voice in English, each time one of these is changed (or the **SPEAK** button on the microphone pressed). This feature allows easy and safe operation without looking at the transceiver, such as while driving, or for visually handicapped operators.

The voice synthesizer is activated all the time when it is installed. However, when the **VOICE** switch on the bottom cover is set to OFF, the it will only speak when the **SPEAK** button on the microphone is pressed. When the **VOICE** switch is ON, the radio will let you know whenever the VFO, memory or tone modes are reselected, or frequency changed. Press the **SPEAK** button on the microphone and adjust the VOL control for a comfortable volume level of the synthesized voice. In the VFO mode, the first word will be "VFO", followed by "A" or "B", and then frequency. The format for frequency announcements is "V" (for VHF) or "U" (for UHF), followed by the 1MHz digit, "point" (decimal), and the kHz digits. For example, "V five point seven seven zero" indicates (14)5.770 MHz. In the memory mode, the first word will be "memory", followed by the frequency in the same manner as above. In the T SET mode, the first word is "tone", followed by the selected CTCSS tone frequency in Hz.

(14) Full Duplex Crossband Communication

Full duplex (simultaneous transmit and receive) operation of the FT-2700RH allows telephone-like two-way communications, using both bands: one for each side of the conversation. This means that the operator does not need to stop transmitting in order to hear the other station; the PTT switch is held all the time, and the receiver remains active (on the other band), even while you transmit. Of course both stations must have full duplex equipment to make use of it. The Yaesu FT-726R is a base station transceiver that also has full duplex FM capability when the optional Satellite Unit is installed.

Please note that full duplex operation requires twice as much channel space as simplex operation, and if you work full duplex through two repeaters, the spectrum space will double again, taking four times the space of direct simplex. Thus we do not recommend full duplex at times when the bands are crowded.

Although the unique diecast chassis of the FT-2700RH is a very efficient heat dissipator, high power full duplex operation for more than 20 minutes (or less at high ambient temperatures) will cause the thermal protective circuitry to decrease power output to 3W automatically, until the transceiver has had time to cool. This can be avoided by selecting low power (3W) for full duplex conversations longer than 20 minutes.

Furthermore, use of an external linear amplifier for full duplex may cause blocking of the receiver, especially if the two antennas are not well isolated. If received signals are degraded, try isolating the antennas better, or use bandpass filters to improve isolation if such amplifiers are required for effective communications.

To operate full duplex in the VFO mode, first load a frequency (e.g. 145.620 MHz) into VFO-A. Then load a frequency on the other band (e.g. 438.800 MHz) into VFO-B. Now press the **DUP** button (**DUP** will appear at the lower left corner of the display). The station at the other end uses the same frequencies in reverse, so if he entered the same data as above he would press the VFO side of the **MR VFO** button (to select VFO B for receiving) before pressing **DUP** (or, as in the case of example frequencies, he could enter 438.800 in VFO A, and 145.620 in VFO B).

Full duplex frequencies can also be stored in memory, for quick recall later. First, if **DUP** is shown on the display, press the **DUP** button again to cancel full duplex operation. Just set a VFO to the receive frequency, press **M** and select the desired memory channel, and press **M** again to store.

Then set the same (or the other) VFO to the transmit frequency on the other band, and press **M**, press and hold the PTT switch, and press **M** again. Be sure that you and the other station store your transmit and receive frequencies reversed, since it is not possible to reverse them again without restoring from the VFO once they have been stored in a memory.

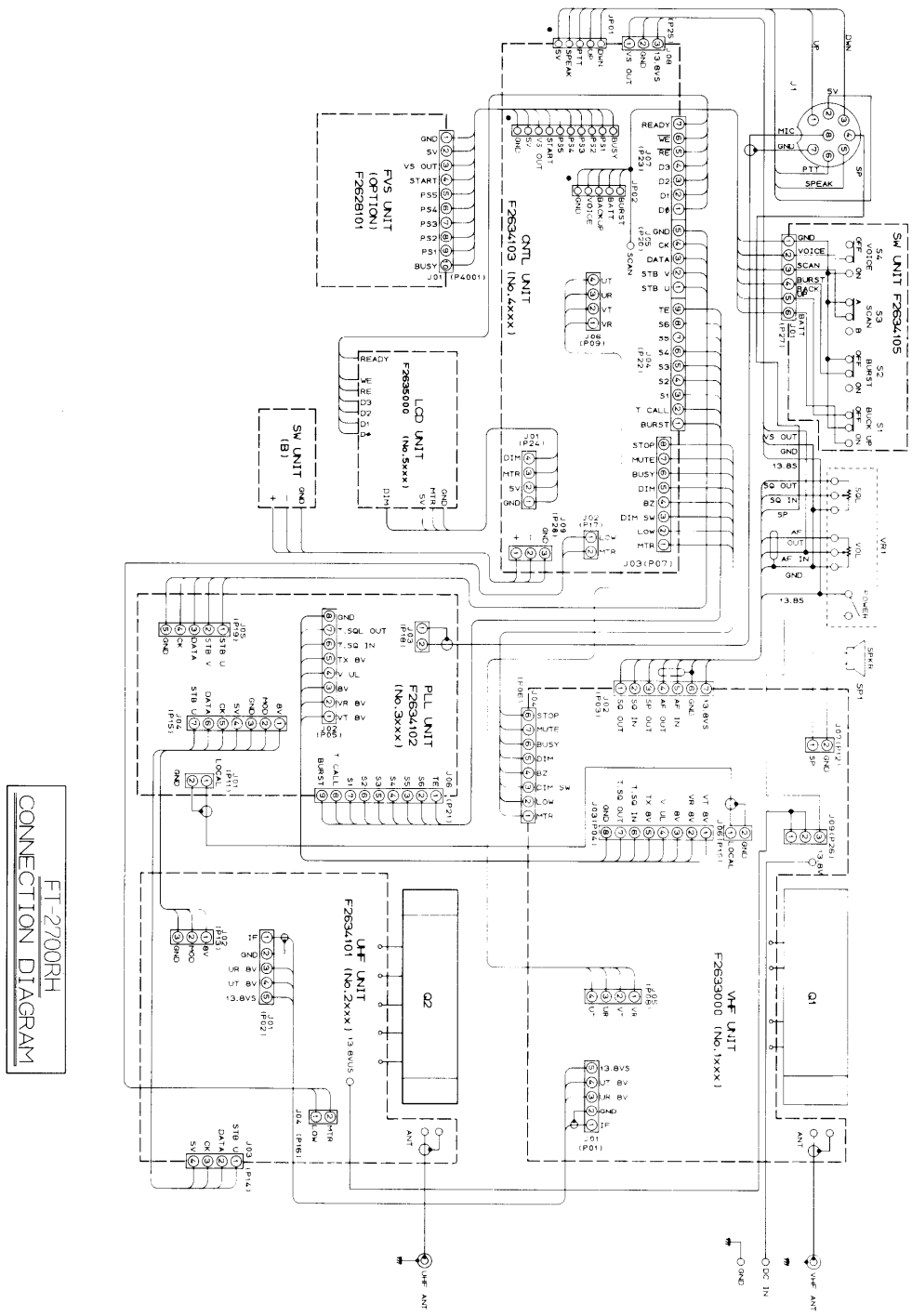
To operate full duplex from the memory mode simply recall the full duplex channel. In this case it is not necessary to press the **DUP** button: **DUP** will be displayed automatically whenever the memory's receive and transmit frequencies are on different bands.

Be certain that antennas for the proper bands are connected to the coaxial antenna jacks on the transceiver at all times. Also, if using a microphone with a locking PTT switch be especially careful to avoid leaving the transmitter on, since the receiver is on all the time anyway.

MEMORY BACKUP INFORMATION

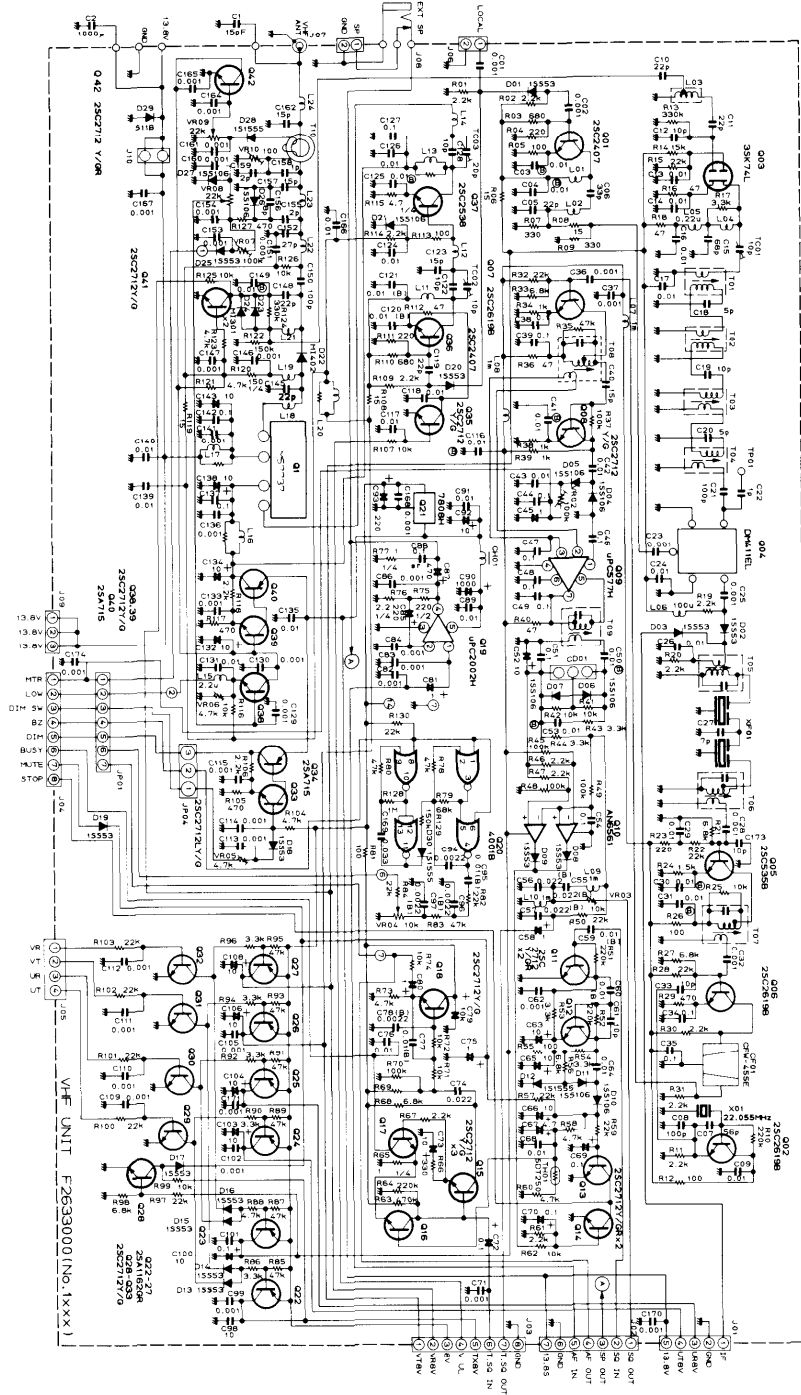
If the FT-2700RH is exposed to high voltage "static" discharge the microprocessor circuitry in the transceiver may shut itself down. If this happens it may be impossible to change frequency or perform normal operation.

Before seeking repairs, you can use the built-in reset system for the microprocessor, provided for such circumstances. First turn the **VOL** control OFF, and set the bottom cover **BACKUP** switch to OFF. Then turn on the **VOL** control, and set the **BACKUP** switch back to ON. Normal operation should now return, although all previously stored memory data will have been erased. If this does not cure the problem contact the dealer from whom you purchased your transceiver for service assistance.

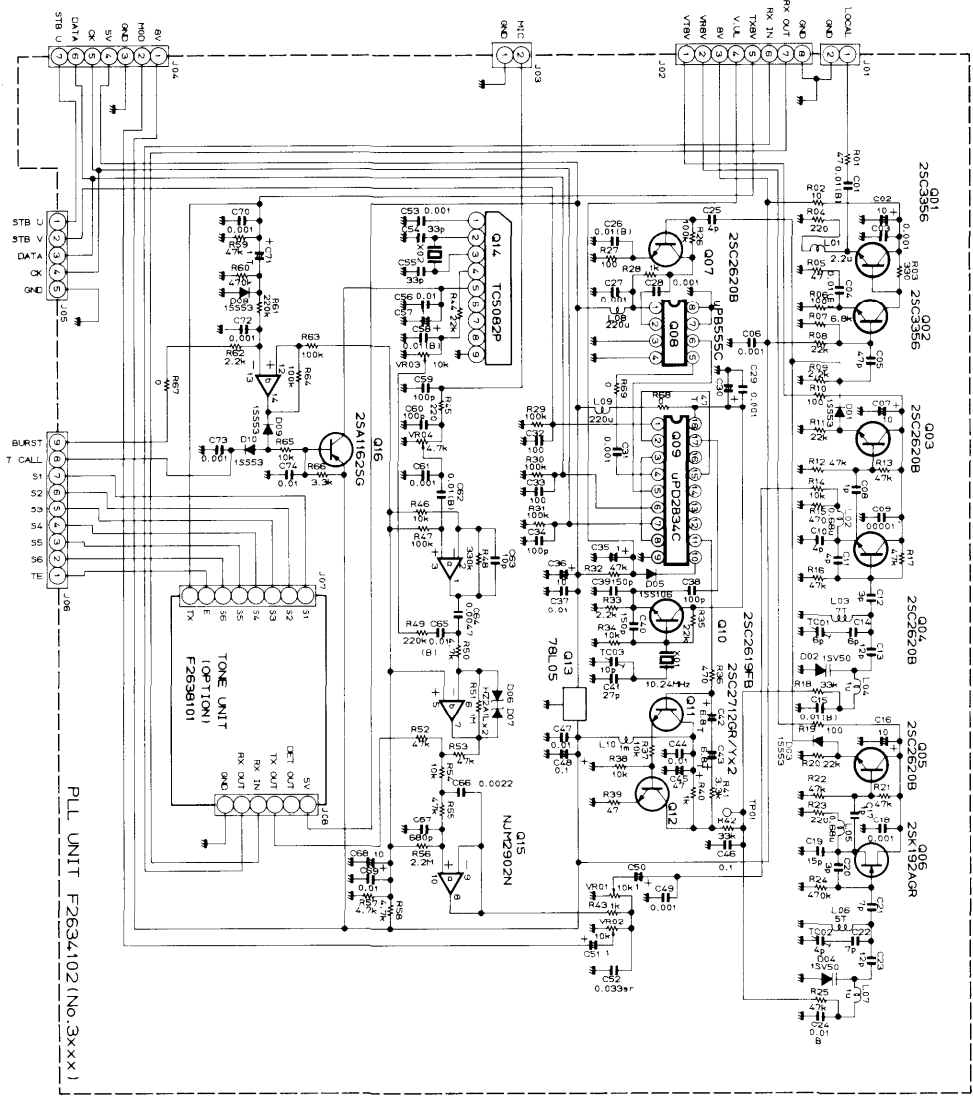


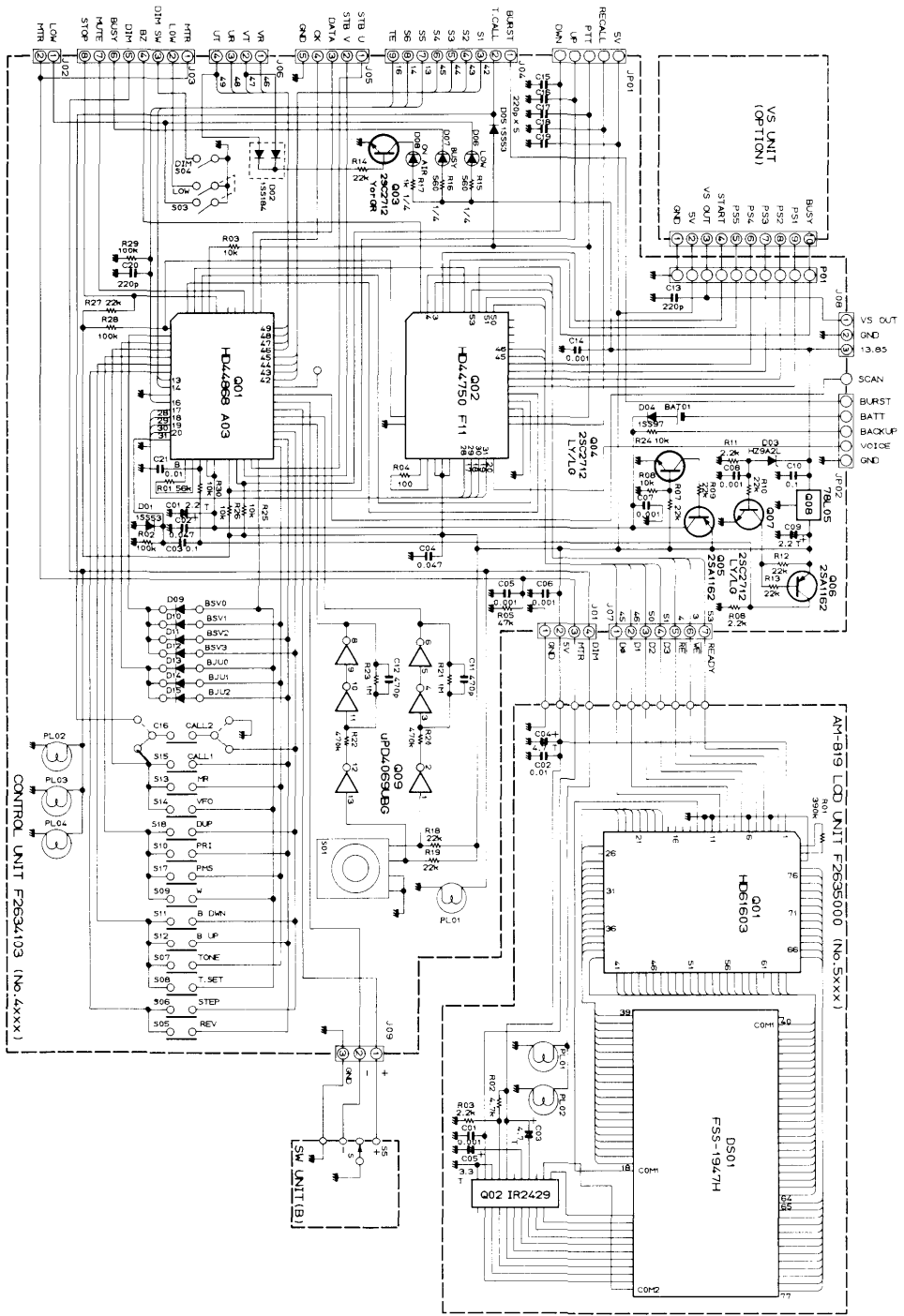
FT-2700RH
CONNECTION DIAGRAM

VHF UNIT SCHEMATIC DIAGRAM



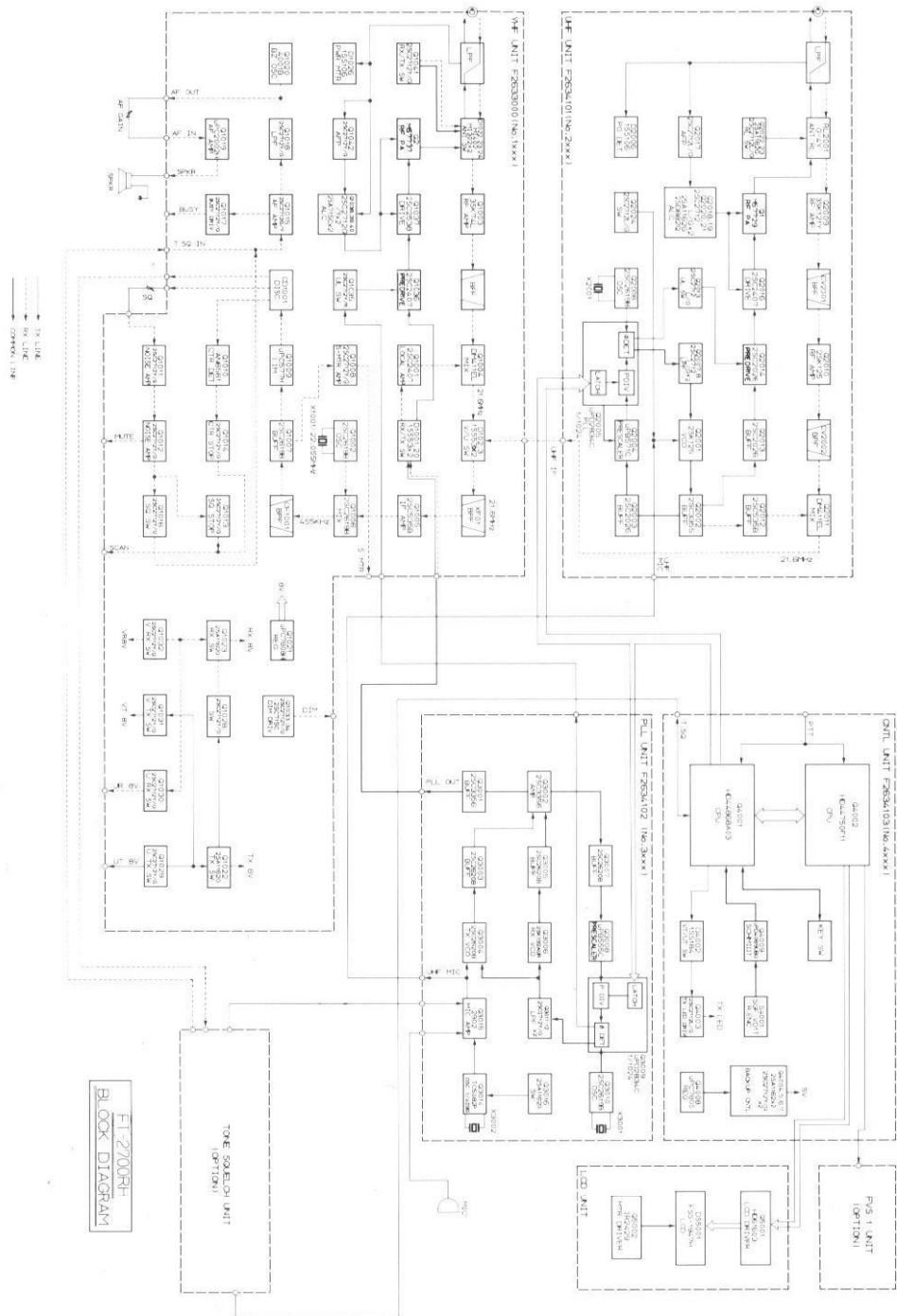
PLL UNIT SCHEMATIC DIAGRAM





CONTROL UNIT SCHEMATIC DIAGRAM

BLOCK DIAGRAM





E3990185A(8502-A)