
YAESU FT-708R
1
2
3
4
5
6
7
8
9
0
M
MR
DIAL
MATCHES

INDEX

GENERAL 1
SPECIFICATIONS 2
SEMICONDUCTORS 3
ACCESSORIES 3
TOP PANEL CONTROLS AND SWITCHES 4
FRONT PANEL SWITCHES 5
BOTTOM PANEL CONNECTIONS 7
BATTERY PACK INFORMATION 8
BATTERY CHARGER INFORMATION 10
OPERATION 16
BLOCK DIAGRAM 24
CIRCUIT DESCRIPTION 25
MAINTENANCE AND ALIGNMENT 29
PARTS LIST 38

MODEL	FREQUENCY RANGE	PRESET FREQUENCY	FREQUENCY STEP	REPEATER SHIFT	TONE BURST
	(MHz)	(MHz)	(kHz)	(MHz)	(Hz)
A	440.000–449.975	446.000	25/50	± 5	–
• B	430.000–439.975	433.400	25/50	± 7.6	1750
X	430.000–439.975	436.000	25/50	± 5	–

FT-708R MODEL CHART

FT-708R MICROPROCESSOR CONTROLLED 0.7 METER BAND FM HAND-HELD TRANSCEIVER

GENERAL

The FT-708R is an all-new microprocessor-based 70 cm FM transceiver for the demanding amateur operator. Featuring one watt of RF output, the FT-708R provides 10 MHz coverage in 25 kHz or 50 kHz steps, along with 10 memories for storage of favorite channels.

The microprocessor-controlled scanner allows sweeping of the band with automatic holding on busy or clear channels. Scanning of the 10 memories may also be selected. An important new feature in the FT-708R is the limited band scanning mode, whereby a favorite segment of the band may be scanned, instead of the entire band. The FT-708R may also be programmed to exclude a given section of the band, if you wish.

Digital display of the last four digits of the operating frequency is provided by an LCD display. A nighttime display illumination lamp is provided, along with a lithium cell for memory backup. The lithium cell has an estimated lifetime of approximately five years. The front panel keyboard allows entry of all channels, up/down scanning and repeater split programming, as well as two-tone (DTMF) encoding for autopatch or control purposes.

We encourage you to read this manual in its entirety, so as to become more familiar with the fantastic new FT-708R. With proper care, this equipment will provide many years of reliable performance.

SPECIFICATIONS

GENERAL

Frequency coverage:
440.000–449.975 MHz
(Model A)
430.000–439.975 MHz
(Model B, X)

Number of channels:
400 (25 kHz steps)

Emission type:
F3

Batteries:
Ni-Cd battery pack FNB-2

Voltage requirement:
10.8 VDC (maximum 13V)

Current consumption:
RX 150 mA
(20 mA squelched)
TX 500 mA (HI),
300 mA (LOW)

Case dimensions:
168 (H) x 61 (W) x 49 (D) mm

Weight: 720 g Approx.
(with battery pack, rubber antenna)

TRANSMITTER

Power output:
1 watt (HIGH)
200 mW (LOW)

Deviation:
±5 kHz

Spurious radiation:
–50 dB or better

Microphone:
Condenser type,
2000 ohms impedance

RECEIVER

Circuit type:
Double conversion
superheterodyne

Intermediate frequencies:
1st IF = 46.255 MHz
2nd IF = 455 kHz

Sensitivity:
Better than 0.4 μV for 12 dB
SINAD
Better than 1 μV for S/N
30 dB

Selectivity:
±15 kHz at –60 dB

Audio output:
500 mW at 10% THD

* Specifications subject to change without notice or obligation.

SEMICONDUCTOR

ICs:

HD44820A07	1
MC3357	1
MC14069UB	1
TC5082P	1*
TP0401	1
μPC577H	1
μPD2819C	1
MK5087	1

FETs:

2SK184Y	1
2SK192Y	1
2SK193K	3

* Model B only

Transistors:

2SA950Y	1
2SA1175E	3
2SC1780	1
2SC2026	1
2SC2120Y	1
2SC2131	2
2SC2407	2
2SC2549	1
2SC2785E	9
2SC2786L	10
2SC2787L	1
2SD892Q/R	1

LCD

HI301	1

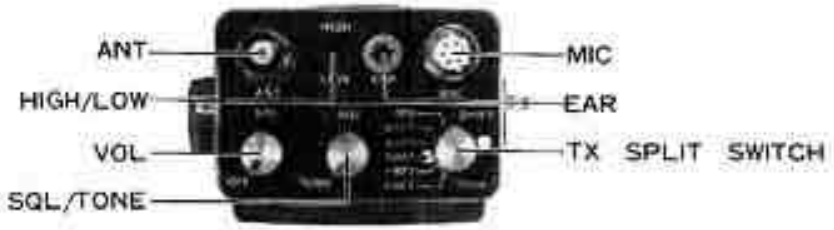
Diodes:

1S1555	(Si)	1
1SS53	(Si)	15
V06B	(Si)	1
1SS97		
(Schottky Barrier)		1
1SV69	(Varactor)	6
1T25	(Varactor)	1
FC53	(Varactor)	1
MV11	(Varistor)	1
MV103	(Varistor)	1
HZ6B-1L	(Zener)	1
HZ7A-2	(Zener)	1
HZ7B-1L	(Zener)	1
SG235D	(LED)	1
SR535D	(LED)	1

ACCESSORIES

Rubber Whip Antenna	YHA-44	(Q3000019)	1
Ni-Cd Battery Pack	FNB-2	(Q9000088)	1
Ni-Cd Battery Charger	NC-9B (117V)	(Q9000071)	1
	NC-9C (200–234V)	(Q9000072)	
Carrying Case (Vinyl)		(R7068220)	1
Shoulder Strap with Ring		(R7048792B)	1
Earphone		(M4190001)	1

TOP PANEL CONTROLS AND SWITCHES



VOL

This is the main volume and power ON/OFF switch for the transceiver.

SQL/TONE

The squelch control silences the receiver audio until a signal is received. When rotated to the TONE position, this switch will activate the optional Tone Squelch Unit, FTS-32, which provides silent monitoring of busy channels.

MIC

This connector accommodates the optional YM-24A Remote Speaker/ Microphone.

ANT

The ANT jack is a BNC type connector for quick connection of the rubber flex antenna or an external antenna.

EAR

This is a miniature phone jack used to accommodate an external earpiece.

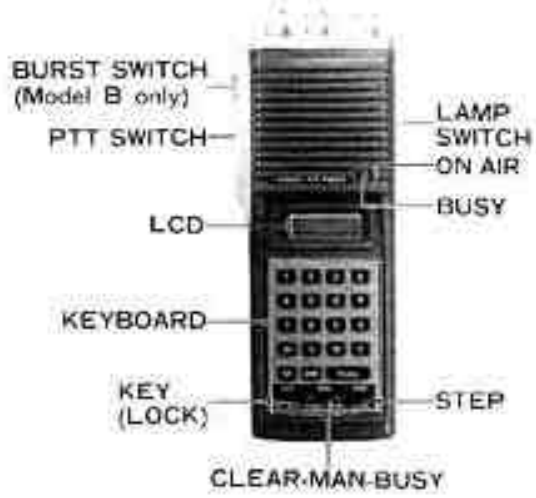
HIGH/LOW

This switch selects transmitter powers of 1 watt RF output or 200 mW of RF output.

SHIFT

This switch selects the repeater transmit frequency offset desired. In the SIMP position, the transmit and receive frequencies are the same. Shifts of ±5 MHz (7.6 MHz: per local requirements) and auxiliary splits (±SET) can be selected. When set to the MS position, you will receive on the dial frequency, while transmission will occur on the memory channel selected. See the "Operation" Section for details.

FRONT PANEL SWITCHES



PTT Switch

The Push to Talk switch activates the transmitter. Release the switch for receiver recovery.

TONE BURST Switch (Model B only)

When the TONE BURST switch is squeezed along with the PTT switch, a 1750 Hz tone will be superimposed on the transmitted signal. The repeater access tone is manually actuated; the tone signal length can thus be controlled by the operator.

LAMP Switch

This switch activates the LCD illumination lamp (for nighttime operation).

ON AIR

This indicator lights up while you are transmitting.

BUSY

This indicator lights up when the main receiver squelch is opened up by an incoming signal.

KEYBOARD

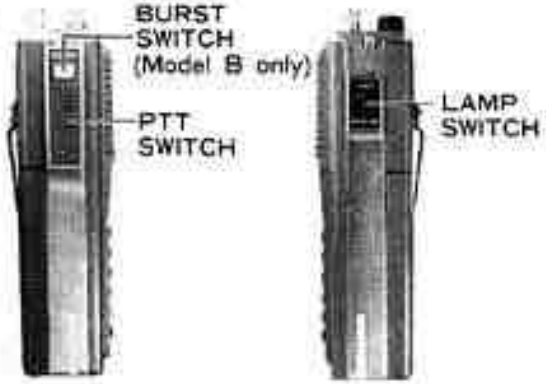
On receive, the keyboard controls frequency programming, up/down scanning, and setting of auxiliary repeater splits. On transmit, the keyboard becomes a 16 button dual-tone multi-frequency encoder for autopatch or control purposes.

KEY

This control disables the keyboard, so as to prevent accidental frequency change caused by inadvertant bumping of one of the buttons on the keyboard. When the keyboard is in the "LOCK" mode, the letter "L" will be shown on the LCD display.

BUSY-MAN-CLEAR

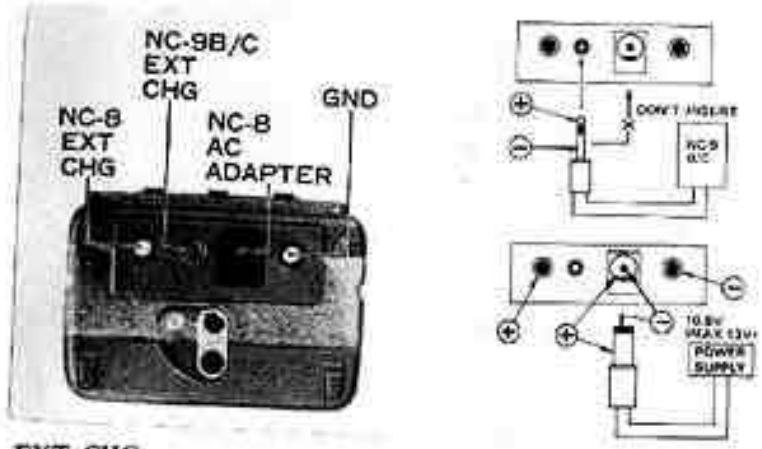
This switch selects the STOP mode of the scanner.



STEP

This switch selects the desired synthesizer step. When this switch is set to the X2 position, 50 kHz steps are programmed. When not in the X2 position, 25 kHz steps are programmed.

BOTTOM PANEL CONNECTIONS



EXT CHG

This jack is used for connection to the external NC-9B/C Ni-Cd charger.

CHG TERMINAL

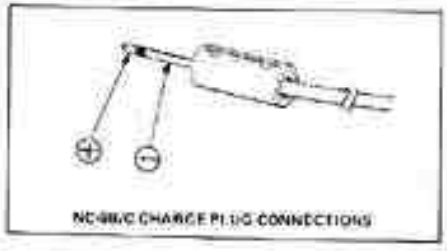
This terminal is for use with the NC-7 and NC-8 chargers.

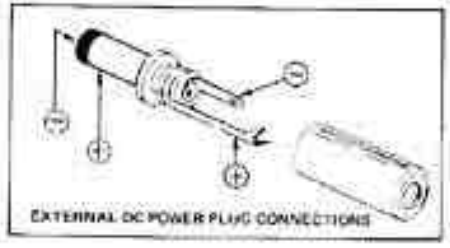
EXT DC

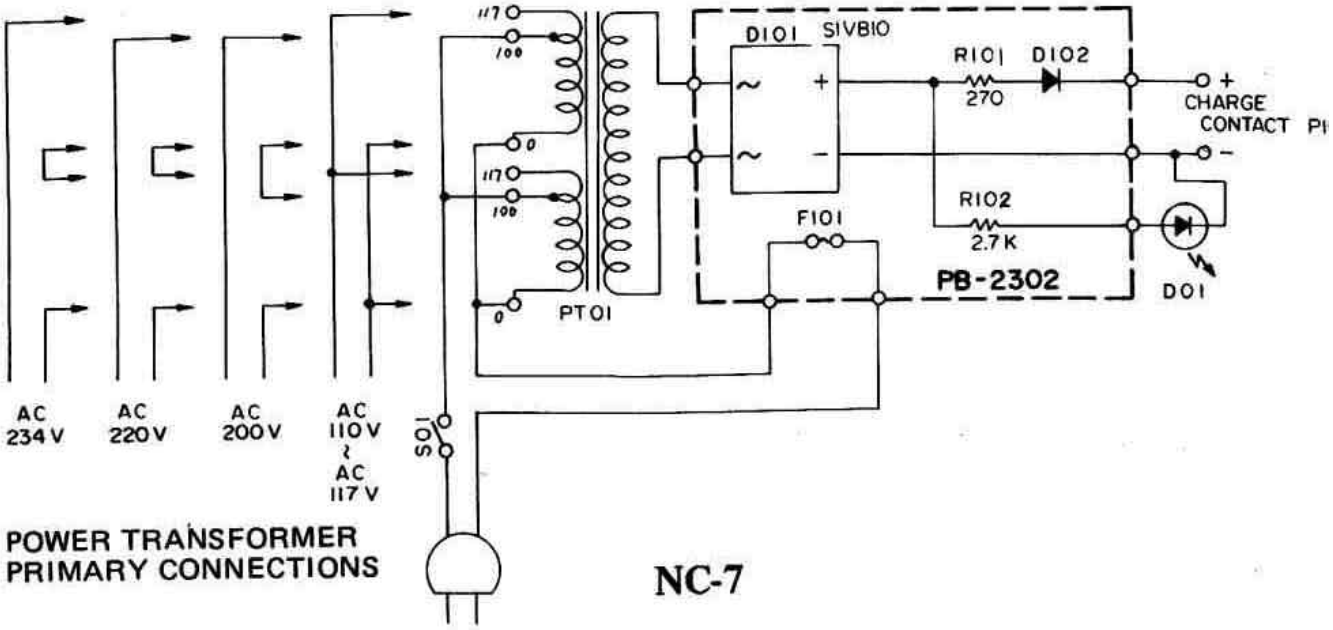
This jack accommodates an external DC power supply. When a plug is inserted, the Ni-Cd battery is automatically switched off.

CAUTION

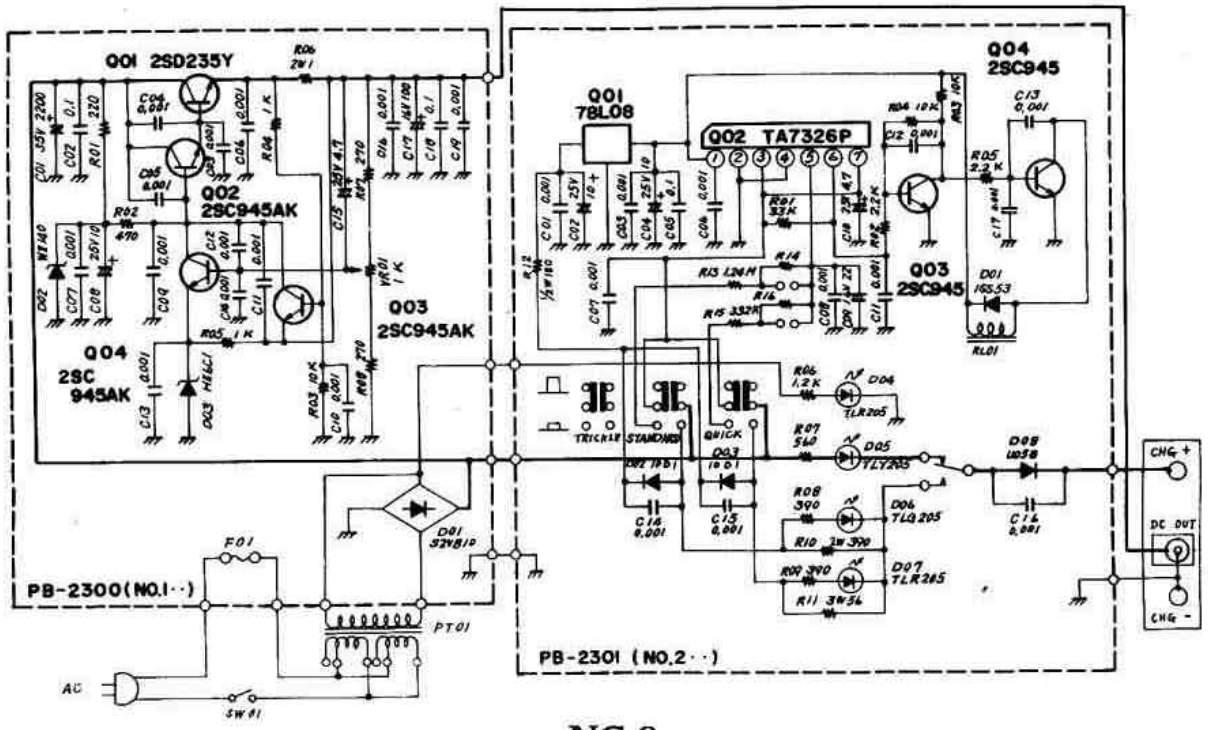
Never attempt to insert the charge plug from the NC-9B/C or other metal material to the DC adapter jack on the bottom of the FT-708R, as the internal protection fuse will blow.



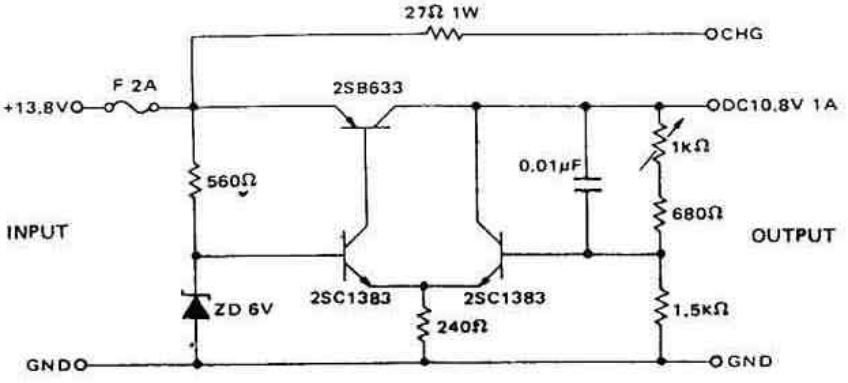



AC 234 V
AC 220 V
AC 200 V
AC 110 V ~ AC 117 V
SO1
PT01
D101 SIVBIO
R101 270
D102
R102 2.7K
F101
PB-2302
D01
CHARGE CONTACT P
POWER TRANSFORMER PRIMARY CONNECTIONS

NC-7


Q01 2SD235Y
Q02 2SC945AK
Q03 2SC945AK
Q04 2SC 945AK
Q01 78L08
Q02 TA7326P
Q04 2SC945
Q03 2SC945
PB-2300(NO.1··)
PB-2301 (NO.2··)
PT01
F01
SW01
AC
TRICKLE
STANDARD
QUICK
CHG +
DC OUT
CHG -

NC-8

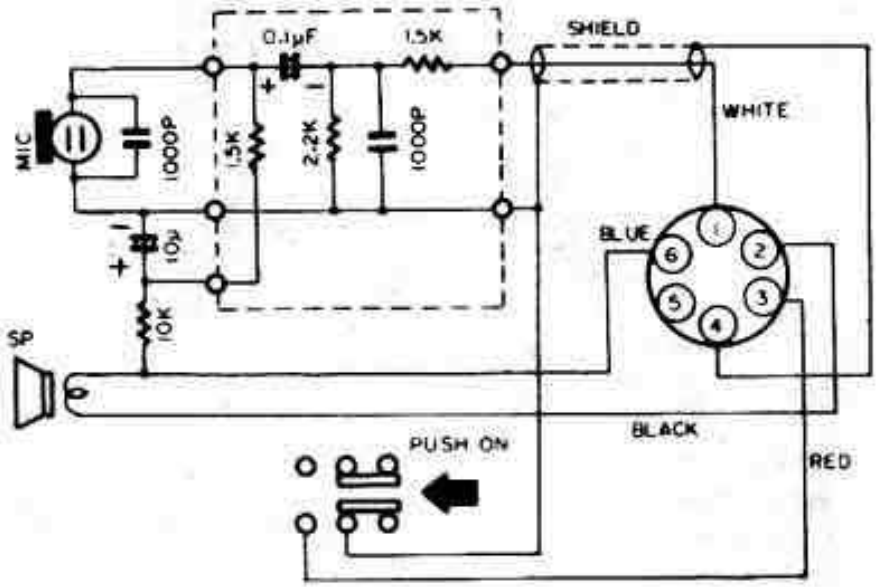

27Ω 1W
CHG
F 2A
+13.8V
2SB633
DC10.8V 1A
560Ω
0.01μF
1kΩ
680Ω
INPUT
OUTPUT
ZD 6V
2SC1383
2SC1383
240Ω
1.5kΩ
GND
GND

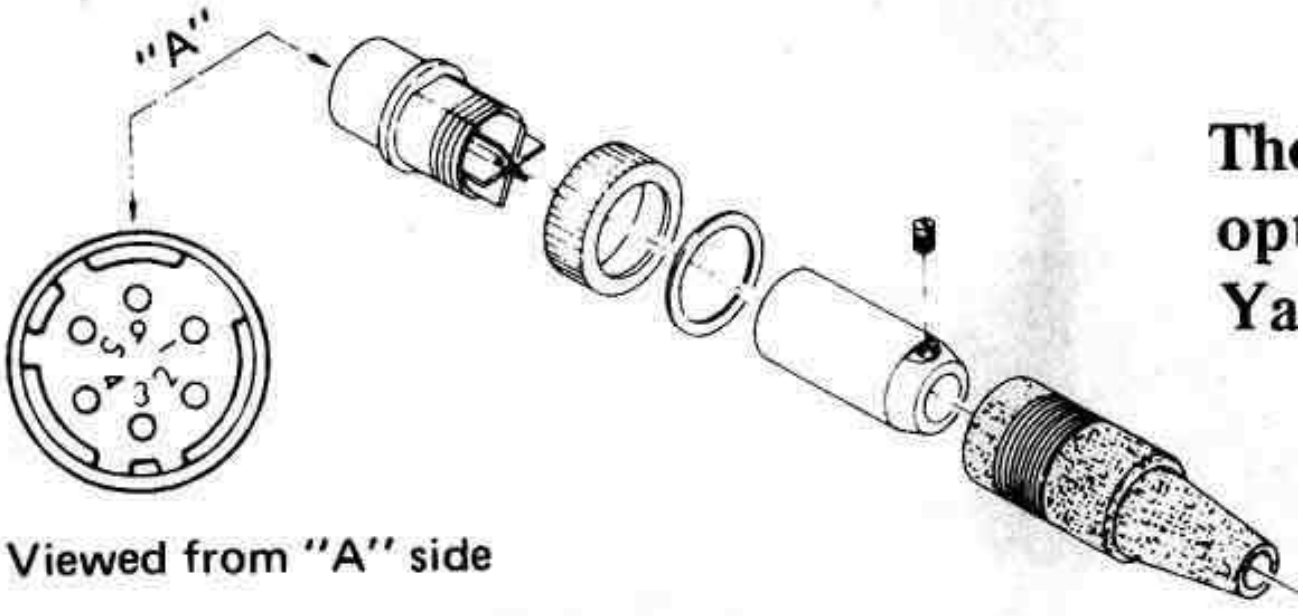
PA-3

NC-9B (for 117V AC)

NC-9C (for 200–234V AC)

PA-3





Viewed from "A" side

YM-24A Speaker/Microphone Connection

OPERATION

A. Basic Operation

1. Preset the controls and switches as follows:

SHIFT	SIMP position
VOL	OFF position
SQL	Position just before the click-stop
KEY	UNLOCK (left) position
CLEAR-MAN-BUSY	MAN position
STEP	X1 (left) position
BACKUP	ON position (located in the battery compartment)

See page 23

2. Make certain that the battery pack is correctly installed and that the antenna has been properly connected.
3. Turn the VOL control clockwise out of the click-stop position. The digital display will indicate "6.000", meaning 446.000 MHz (Model B: "3.400" = 433.400 MHz; Model X: "6.000" = 436.000 MHz). Gradually rotate the VOL control for a comfortable level on the background noise or incoming signals.
4. When the channel is clear, rotate the SQL control clockwise until the background noise is just silenced. Do not go beyond this threshold point, or the receiver will not respond to weak signals.
5. Squeeze the push-to-talk (PTT) switch to transmit. Release the PTT switch for receiver recovery. If your FT-708R (Model B) is equipped with a tone burst switch, press this switch, along with the PTT switch, to transmit a 1750 Hz tone to access repeators.

B. Entering Frequencies from the Keyboard

1. When a frequency is entered from the keyboard, the last four digits of the operating frequency must be entered. This frequency must be divisible by 25 kHz (e.g., 6.325, 6.350, etc.).

2. To enter 446.025 MHz (model B/X: 436.025 MHz), press "6025" on the keyboard. The digital display will now show those digits. Now press the DIAL key, and the decimal point will appear between the "6" and the "025". You are now operating on 446.025 MHz (model C/X: 436.025 MHz).
3. Let's try another example: To operate on 447.725 MHz (model B/X: 437.725 MHz), press "7725" and DIAL.

C. Entry and Recall of Memory Channels

1. To store a frequency in memory, the desired channel is first entered on the dial. Then press the desired memory channel number, 0 to 9, and then press M. Now the frequency is stored in the memory.
2. To store 443.475 MHz (model B/X: 433.475 MHz) in memory channel 1, press "3475", DIAL, "1", and then "M".
3. Now store another frequency in memory channel 2. For example, to store 448.125 MHz (model B/X: 438.125 MHz) press "8125", "DIAL", "2", and then "M".
4. Now memory channels 1 and 2 have been programmed. If you desire additional memory channels, store the frequencies in the same manner described in Steps 2 and 3.
5. To recall a memory channel, push the desired memory channel number (0 to 9) and then "MR". For example, to recall the frequencies stored in the above examples, first press "1" and then "MR". The digital display will show "3.475", which is the frequency stored in memory channel 1. To recall memory channel 2, press "2" and then "MR". The display will then show "8.125". If other memory channels have been stored, press the corresponding channel number and "MR", and the digital display will show the desired frequency.
6. To return to the dial frequency, press "DIAL", and the display will return to 8.125, unless other frequencies were stored in the memory

channels during Step 4. If you wish to operate on frequencies other than the memory channel, press the desired frequency and "DIAL". The display will then show the frequency and allow operation on that frequency. For example, press "5775" and "DIAL" to operate on 445.775 MHz (model B/X: 435.775 MHz).

D. Priority Channel Operation

1. First enter into the memory all desired memory channels for priority use.
2. Now enter another frequency onto the dial. In this example, we will use 443.500 MHz (model B/X: 433.500 MHz). Press "3500" and "DIAL". The display will show "3.500".
3. Now recall any of the stored memory channels. As 448.125 MHz was previously stored in memory channel 2, press "2" and "MR" to recall that frequency. Now press the "#" key. The display will indicate "8.125 P", and every few seconds the display will switch to the dial frequency "3.500".
4. When the CLEAR-MAN-BUSY switch is in the BUSY position, the transceiver will lock on the memory channel for as long as a carrier is present when the channel is checked by the priority search feature. If you place the CLEAR-MAN-BUSY switch in the CLEAR position, the search will stop when the memory channel is clear (no signal is present).
5. To use different memory channels with priority channels, enter the priority frequency from the keyboard and press "DIAL". Now press the number of the desired memory channel for recall, and then press "#". The transceiver will search the memory channel from the dial frequency every few seconds.

E. Repeater Operation

1. Repeater shifts of +5 MHz and –5 MHz (model B: ±7.6 MHz) are built into the FT-708R. To select the shift frequency, set the SHIFT switch to either the +RPT or –RPT position.
2. When nonstandard repeater shifts (other than the built-in shifts of the FT-708R) are required, the repeater shift can be programmed from the keyboard. For example, to program a split of ±1.6 MHz, push "1600" and then the "S" key. Now the repeater shift is programmed. Set the SHIFT switch to the +SET position, and close the PTT switch. The display will indicate the frequency that is +1.6 MHz from the receive frequency. If the SHIFT switch is in the –SET position, the transmit frequency will be –1.6 MHz from the receive frequency.

F. Split Operation

1. To transmit on the dial frequency and receive on one of the memory frequencies, set the SHIFT switch to the MS position, and enter the desired transmit frequency from the keyboard.
2. Now recall the desired memory channel for receive. Close the PTT switch, and the display will indicate the dial frequency during transmission. Release the PTT switch to return to the receive mode (on the memory channel).

G. Scanner Operation

1. With the CLEAR-MAN-BUSY switch in the MAN position and the STEP switch in the X1 position (left side), press the UP or DOWN switch to move 25 kHz up or down, respectively. If you push the UP or DOWN switch for more than 1 second, the scanner will become activated.

2. To stop the scan, press the UP, DOWN, or PTT switch. If you hit the PTT switch while scanning, no transmission will occur. Release the PTT switch momentarily, then press the PTT switch again to transmit.
3. To stop the scanner on a busy or clear channel, place the CLEAR-MAN-BUSY switch to the desired position, and press the UP or DOWN switch for a moment. The scanner will search until a busy or clear channel is found. After a 5 second stop on the channel for monitoring, the scanner will again start to search other channels. If you wish to stop on a channel, momentarily close the PTT switch.
4. To scan only the memory channels, press the MR switch, and then either the UP or DOWN switch. The scanner will move to search all ten memory channels. Press the PTT switch on the channel you wish to remain on. You may choose the desired scan mode as described in the above steps.

H. Limited Band Scanner Operation

1. To scan between a dial frequency and one of the memory channels, enter the desired frequency from the keyboard, and then call the memory frequency and press the "#" key. The priority function will then be activated. Now, press either the UP or DOWN switch. If UP is pressed with the CLEAR-MAN-BUSY switch in the MAN position, the display will move from the dial frequency to the memory channel continuously. If the CLEAR-MAN-BUSY switch is placed in the BUSY position, the scanner will stop at a channel where a carrier is present, and start scanning again after 5 seconds.
2. For example, enter 448.750 (model B/X: 438.750 MHz) into memory channel 1, and press "7750". Next, press "DIAL", "1", and finally "#". The priority function will then be activated. When the UP switch is pressed, the transceiver will scan up to "8.750", and then the display will jump back to 447.750 MHz (model B/X: 437.750 MHz), continuing the scan up to 448.750 MHz.

3. If the DOWN key is pressed instead, the display will drop from 447.750 MHz (model B/X: 437.750 MHz) to the low band edge of "0.000" and then jump to the high band edge of "9.975". From this band edge, the scanning moves to the memory frequency of "8.750", and then jumps to the dial frequency of "7.750", omitting the frequencies in between. This scanning function will repeat itself until you stop on a specific frequency.

> **Note:**
>
> The frequencies of "0.000", "0.025", "9.950" and "9.975" cannot be programmed as the band edges for the limited band scanning function.

I. Miscellaneous

1. To disable the keyboard and lock the FT-708R on the frequency you are currently using, slide the LOCK switch to the right side. This will provide protection against accidental frequency changes. When the LOCK switch is moved to the right, the display will indicate "L". Locking the keyboard will not disable the two-tone (DTMF) generator during transmission.
2. To activate the memory backup in the CPU, place the BACKUP switch in the ON position. The built-in lithium battery will serve to backup the memory frequency, programmable shift frequency, etc., while the power switch is OFF, or while the transceiver is without battery power. The battery has an estimated lifetime of more than 5 years. After this period, please ask your Yaesu Dealer for a replacement.
3. The top panel HIGH-LOW switch may be set to either the HIGH (1 watt output) or LOW (200 mW output) position, allowing you to select different transmitter output powers.

Error Modes

1. If you inadvertently program a frequency incorrectly (e.g., by pushing "7353" and DIAL), the display will indicate "E" to tell you an error has been made. If this occurs, push C (Clear Entry) to return to the previous frequency.
2. If you program a repeater shift outside the amateur band, such as +5 MHz shift at 449.000 MHz (Model B/X: 439.000 MHz), the display will indicate "E" when the PTT switch is closed. No transmission will occur under this condition.

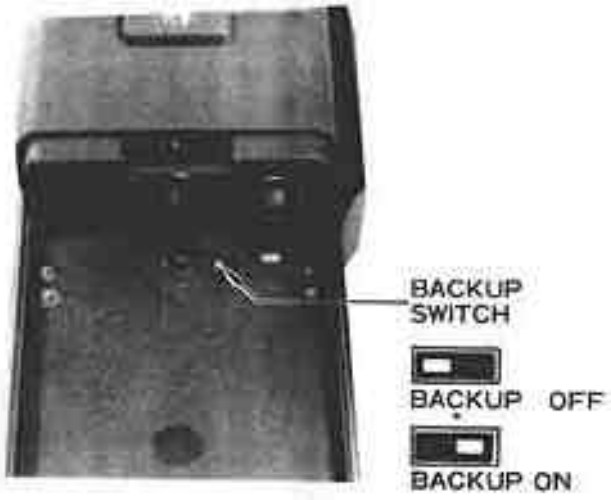
K. Tone Squelch Operation (Option)

1. When the optional FTS-32 tone squelch unit is installed, it may be activated by placing the SQL control in the TONE position (click-stop).
2. When a signal is received which contains a similar subaudible tone signal, the FT-708R squelch will open normally. If the incoming signal does not contain the subaudible tone squelch signal, the receiver will remain silent, but the BUSY indicator will become illuminated. This will alert the operator to the fact that the channel is in use.
3. On transmit, a subaudible tone will be superimposed on your voice signal, activating the receiver of other stations equipped with a similar tone squelch system. The tone frequency (both transmit and receive) can be selected by the DIP switch mounted on the FTS-32. Refer to the frequency chart supplied with the optional FTS-32 to determine the tone frequency you require.
4. For autopatch or control purposes, the two-tone (DTMF) encoder can be activated from the keyboard by pushing the PTT switch and dialing the required access codes and telephone number.

For installation information regarding the FTS-32 Tone Squelch and FTS-32AE Tone Encoder, please refer to the instructions supplied with the respective units.

Memory Backup Information

The FT-708R memory channels are protected by a memory backup lithium cell in the transceiver. When the transceiver is delivered from our factory, the memory backup switch is in the OFF position in order to clear the information in the memory. To activate the memory backup, turn the memory backup switch in the battery compartment to the ON position. Once this switch is turned on, it is not necessary to turn it off because of the extremely low current consumption of approximately 0.1 μA. The estimated life of the cell is more than five years. If, after this period, the memory backup becomes intermittent, ask your Yaesu dealer for a replacement cell.



CIRCUIT DESCRIPTION

The block diagram and circuit description to follow should provide the owner with a better understanding of the FT-708R transceiver. Please refer to the schematic diagram for details.

RECEIVER

The UHF signal from the antenna is fed through relay RL_{401} to RF amplifier Q_{101} (2SC2549), which is protected by a two-stage helical resonator which minimizes intermodulation caused by strong out-of-band signals. The amplified signal from Q_{101} is fed to the first mixer, Q_{102} (2SC2026), where the RF signal is mixed with the first IF signal delivered from Q_{103} (2SC1780), producing a 46.255 MHz first IF. The IF signal is passed through a monolithic crystal filter, XF_{101}, which has a 3 dB bandwidth of ±14 kHz, and is fed to the second mixer, Q_{104} (2SC2786L). Here the first IF signal is heterodyned with the second local oscillator signal (45.8 MHz) delivered from Q_{105} (2SC2786L), resulting in a second IF of 455 kHz. The IF signal is passed through a ceramic filter, CF_{101}, amplified by Q_{106} (2SC2787L), then fed through another ceramic filter, CF_{102}. The highly filtered IF signal is then fed to Q_{107} (MC3357), which functions as an IF amplifier, limiter, discriminator, and squelch control. The amplification and limiting process eliminates amplitude variations in the IF signal, which is then fed to the discriminator section of Q_{107}, where an audio response is produced in accordance with a corresponding frequency shift in the IF signal. The audio signal is then amplified by Q_{403} (2SC2785E), Q_{404} (2SA1175E), Q_{405} (2SC2120Y), and Q_{406} (2SA950Y). The audio PA section delivers 500 mW of audio output power to the speaker.

When no carrier is present in the 455 kHz IF, the high frequency noise at the output of the discriminator is amplified by the noise amplifier section of Q_{107}. This amplified signal drives a squelch switch in the same IC, which in turn biases Q_{401} (2SC2785E) and Q_{402} (2SA1175E) such that DC voltage is removed from AF amplifier Q_{402}, thus silencing the receiver.

When a carrier is present in the 455 kHz IF, the noise is removed from the discriminator output, and Q_{403} is then biased for normal operation, thus allowing receiver recovery. VR_{102} sets the squelch sensitivity level. Scanning control voltages are also provided by Q_{107}, allowing interactive operation with the Central Processing Unit for control of the SCAN STOP function.

TRANSMITTER

The transmitter produces a frequency modulated signal. The audio input from the microphone or DTMF encoder Q_{304} (MK5087) is amplified by Q_{217} (μPC577H), which also limits the maximum amplitude of the audio input and filters out signal components above the normal speech range. The audio signal is then applied to varactor diode D_{209}(FC53), which varies the frequency of a 15.4183 MHz crystal oscillator, Q_{213} (2SC2786L). This signal is then delivered to the balanced mixer and frequency multiplier stages.

A portion of the output from Q_{201} is fed through buffer amplifier Q_{202} (2SC2786) to PLL mixer Q_{203} (2SC2876L), where the signal is mixed with a local signal of 129.5733 MHz (low band model B/X: 126.240 MHz) delivered from Q_{209} (2SC2786L). This results in a 1.675–5.00 MHz PLL IF signal.

The PLL IF signal is amplified by Q_{204} and Q_{205} (2SC2786L) and then fed to Q_{206} (μPD2819C). This programmable divider divides the signal by a factor of 201–600, producing basic 8.3333 kHz steps for the synthesizer. One section of Q_{206} acts as a 5.3333 MHz oscillator, which, in turn, is divided into 8.3333 kHz steps. The phase comparator section of Q_{206} then compares the phase of the PLL IF signal with that of the PLL reference signal, and any difference in phase produces an error-correcting voltage, which is used to control varactor diodes to lock the PLL onto the correct frequency. This feedback system produces a highly stable output signal.

The IF signal is fed to a balanced mixer, Q_{214}/Q_{215} (2SK193K), where the 15.4183 MHz FM signal is mixed with a local signal from the VCO, with the output being at 1/3 the ultimate transmitting frequency. A three-stage

auto-tune resonator between Q_{214}/Q_{215} and Q_{216}, along with a filter immediately following Q_{216} (2SC2786L), provide superior rejection of spurious signals.

The signal is then multiplied by a factor of three by Q_{109} (2SC2407) and delivered to a three-stage RF power amplifier consisting of Q_{110} (2SC2407), Q_{111} (2SC2131), and Q_{112} (2SC2131), resulting in a power output of 1 watt.

HETERODYNE OSCILLATOR

The heterodyne signal of 131.2483 – 134.5733 MHz (low band model B/X: 127.915 – 131.240 MHz) for the receiver and transmitter is generated by a PLL (Phase Locked Loop) circuit.

The VCO oscillator, Q_{201} (2SK192Y), generates a signal of 131.2483 – 134.5733 MHz. The oscillator frequency is controlled by varactor diode D_{201} (1T25), which varies the capacitance of the oscillator tuned circuit in accordance with a control voltage. This control voltage is generated by phase comparator Q_{206} (μPD2819C) and delivered through a lowpass filter consisting of Q_{207} (2SK184Y) and Q_{208} (2SC2785E), to the VCO.

This voltage is then fed to varactor diode D_{201}, which changes the output phase of the VCO to lock with that of the reference signal. The control voltage is also used to tune the transmitter bandpass filters and local signal amplifier filter, thus providing optimum spurious attenuation.

PLL CONTROL SECTION

The PLL control Unit employs a 4-bit microprocessor chip, Q_{301} (HD-44820A07), which provides various control information for display control, transmit disable, DTMF encoder, etc. The reader is referred to the block diagram of the PLL control Unit for an explanation of the functions of the CPU. A full description of every logic state is well beyond the scope of this manual.