

User Manual

QUAD BAND MOBILE RADIO

Model name:TC-8900R
Brand name:HYS
FCC ID:OBL78900R

THANK YOU

Thank you for choosing our company's Radio . As you learn how to use this Radio , you will find that it is pursuing "user friendliness". For example, each time you change the Menu No.in Menu mode, you will see a text message on the display that lets you know what you are configuring.Though user friendly, this Radio is technically sophisticated and some features may be new to you.We recommend that you read this manual in its entirety prior to installing it, so that you fully understand the capabilities of your.

CAUTION

Please observe the following precautions to prevent fire, personal injury, and/or Radio damage:

- Do not attempt to configure your Radio while driving; it is simply too dangerous.
- Do not transmit with high output power for extended periods; the Radio may overheat.
- Do not modify the Radio unless instructed by this manual or other documentation.
- Do not exposes the Radio to long periods of direct sunlight nor places it close to heating appliances.
- Do not place the Radio in excessively dusty, humid or wet areas, or on unstable surfaces.If an abnormal odor or smoke is detected coming from the Radio , turn OFF the power immediately.
- This Radio is designed for a 13.8 V power source. Never use a 24 V battery to power the Radio .MSK signal encode/decode.

■ SUPPLIED ACCESSORIES

After carefully unpacking the **Radio**, identify the items listed in the table below. We recommend you keep the box and packaging for shipping.

Accessories	Quantity
HM-9900 Microphone	1
DC Power Cable	1
Fuse	1
Mounting	1
Screw Set	1
Instruction Manual	1

■ MAIN FUNCTIONS

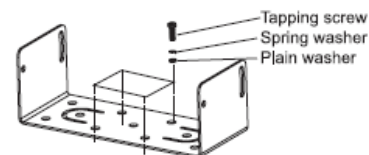
- receive frequency range,switchable among frequency ranges.
- 809 memory channels,squelch and volume independent control.
- CTCSS,DCS encode.
- DTMF encode
- cross-band transfer function
- scan and watch
- 6 Hyper Memory Channel,easy operation.

PREPARATION

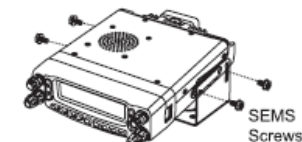
■ MOBILE INSTALLATION

To install the **Radio**, select a safe, convenient location inside your vehicle that minimizes danger to your passengers and yourself while the vehicle is in motion. Consider installing the unit at an appropriate position so that knees or legs will not strike it during sudden braking of your vehicle. Try to pick a well ventilated location that is shielded from direct sunlight.Install the mounting bracket in the vehicle using the supplied .

1. self-tapping screws , flat washers and spring washers.The bracket must be installed so that the 3 screw hole positions on the side of the mounting bracket are towards the rear of the bracket.Position the **Radio**, then insert and tighten the supplied



2. hexagon SEMS screws and flat washers.Double check that all hardware is tightened to prevent vehicle
 - vibration from loosening the bracket or **Radio** .Determine the appropriate angle of the transceiver, using the 3 screw hole positions on the side of the mounting bracket.

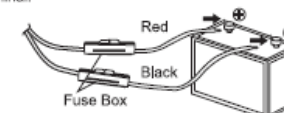


■ DC POWER CABLE CONNECTION

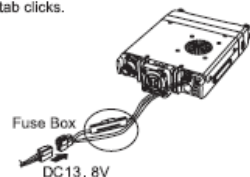
◆ MOBILE POWER SUPPLY CONNECTION

The vehicle battery must have a nominal rating of 12 V. Never connect the **Radio** to a 24 V battery. Be sure to use a 12 V vehicle battery that has sufficient current capacity. If the current to the **Radio** is insufficient, the display may darken during transmission, or transmit output power may drop excessively.

1. Confirm the correct polarity of the connections, then attach the power cable to the battery terminals; red connects to the positive (+) terminal and black connects to the negative (-) terminal.



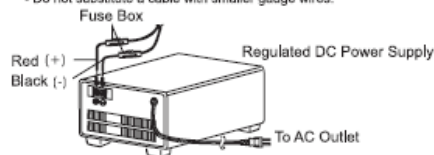
2. Connect the DC power cable to the **Radio**'s power supply connector. Press the connectors firmly together until the locking tab clicks.



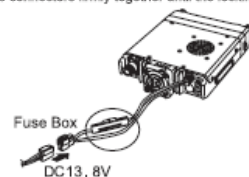
◆ BASE STATION POWER SUPPLY CONNECTION

Equipment can be mobile installation, base installation as well. For base installation, you need a DC 13.8V and 15A power supply.

1. Connect the DC cable to the stable voltage power supply. And check the electrode, (red: positive, black: negative)
 - Do not connect the mobile to AC outlet
 - Use DC cable to connect the mobile to stable voltage power supply.
 - Do not substitute a cable with smaller gauge wires.



2. Connect the DC power cable to the **Radio**'s power supply connector. Press the connectors firmly together until the locking tab clicks.

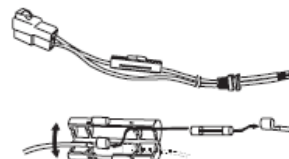


◆ REPLACING FUSES

If the fuse blows, determine the cause, then correct the problem.

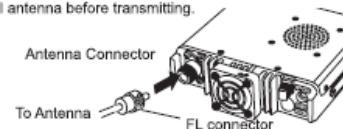
After the problem is resolved, replace the fuse.

If newly installed fuses continue to blow, disconnect the power cable and contact your authorized dealer or an authorized service center for assistance



■ ANTENNA CONNECTION

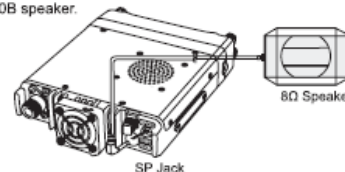
Before operating, install an efficient, well-tuned antenna. The success of your installation will depend largely on the type of antenna and its correct installation. The transceiver can give excellent results if the antenna system and its installation are given careful attention. Use a 50Ω impedance antenna and low-loss coaxial feed line that has a characteristic impedance of 50Ω, to match the **Radio** input impedance. NOTE: It is necessary to install antenna before transmitting.



■ ACCESSORIES CONNECTION

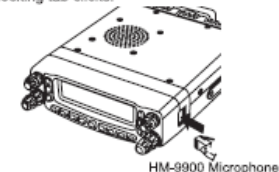
◆ EXTERNAL SPEAKER

If you plan to use an external speaker, choose a speaker with an impedance of 8Ω. The external speaker jack accepts a 3.5 mm (1/8") mono (2-conductor) plug. We recommend using the SP-50B speaker.



◆ MICROPHONE

For voice communications, connect HL-58 microphone plug into the socket on the front of the main unit. Press firmly on the plug until the locking tab clicks.



◆ PC CONNECTION

To utilize PL-900 wire connect the **Radio** to PC (VIC DATA Socket), install software to read **Radio** information.

◆ TNC

Connect TL-9900 data cable to rear panel connector to proceed a data transmission. Speed Optional 1200bps and 9600bps. As the electrical level, impedance and bandwidth of transmission signal are different under 1200bps and 9600bps. When using 1200bps, you should connect the mobile connector to the TNC "RADIO1". When using 9600bps, you should connect the mobile connector to the TNC "RADIO2".

NOTE:

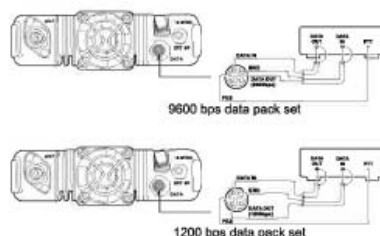
- When using 9600bps to transmit, the frequency offset should be set $\pm 2.75\text{kHz}$ or $\pm 0.25\text{kHz}$.
- When using 9600bps to transmit, request a stronger signal to

communicate, you should use a directive antenna..

- When using 1200bps to transmit, the frequency offset should be set $\pm 2.5\text{kHz}$ or $\pm 3.5\text{kHz}$.
- Menu mode No.26(PCKT S) could set data transmission rate of each frequency range separately(1200bps or 9600bps)
- Receiving band of Data communication can be set through menu mode No.27(PCKT B);The main working band, right band, left band. The transmitting band of data communication is main working band fixed, unchangeable.

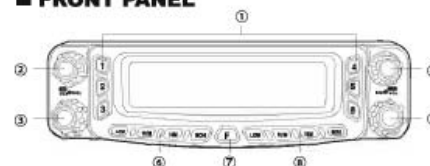
Item DATA connector each foot definition as follow:

NAME	FOOT	INSTRUCTION	TL-9900 Wire core color
DATA IN	1	Data Input Impeadance:10k Ω Max input electrical level: 40mV(1200bps),2V(9600bps)	Brown
9600- RX	4	9600bps data output Impeadance:10k Ω Max output electrical level:500mV	Yellow
1200- RX	5	1200bps data output Impeadance:10k Ω Max output electrical level:300mV	Green
SQL	6	Squelch Squelch on:5V,Squelch off:0V	Blue
PTT	3	Transmission control	Orange
GND	2	Ground Connection	Red



GETTING ACQUAINTED

■ FRONT PANEL



① Hyper Memory Channel buttons (6 letters, A/B/C/D/E/F)

- Pressing the button for 2 sec, store all the information of the present working condition in relevant Hyper Memory Channel reservoir.
- When tuning the content of Hyper Memory Channel, press the relevant Hyper Memory Channel button.

② Left encoding knob(with dial button)

- This encoding knob is the tuning knob, press the knob, the left part switches into main working part, as the main working channel switches into left part channel.
- If the left part becomes the main working part and under VFO, press the knob, tuning step frequency to 1MHz.
- Repeatedly press the knob for 0.5 sec, the working frequency of the left part will change recycledly as follow.
144MHz \rightarrow 350MHz \rightarrow 430MHz \rightarrow 29MHz \rightarrow 50MHz \rightarrow 144MHz.....

③ Left knob

- Volume knob inside circle is used for adjusting volume for left receiver. Up by clockwise; Press the knob, and on/off Internet connection function.

function.

- Squelch knob outside circle is used for adjusting squelch for left receiver. Tune the knob to the situation of disappearing of noise by counterclockwise ("BUSY" disappear), for improving the sensibility to weak signal.

④ Right encoding knob(with DIAL knob)

- The encoding knob is the tuning knob, press the knob, the right part switches into main working part, as the main working channel switches into right part channel.
- If the right part becomes the main working part and under VFO, press the knob, tuning step frequency to 1MHz.
- Press the knob for 0.5sec, making the left part working band changes between 144MHz and 430MHz.

⑤ Right knob

- Press the knob for 0.5sec to turn on/off the mobile.
- Volume knob inside circle is used for adjusting volume for right receiver. Up by clockwise; Press the knob, and on/off Internet connection function.
- Squelch knob outside circle is used for adjusting squelch for right receiver. Tune the knob to the situation of disappearing of noise by counterclockwise ("BUSY" disappear), for improving the sensibility to weak signal.

⑥ Left side keys

[LOW]KEY

- Press this key momentarily to select the transmitter power output level of the left band ("LOW", "MID2", "MID1", or "HIGH").
- When the left band is set to the memory mode or home channel, press and hold in this key for 0.5sec to switch the memory channel display between

the "Frequency" format and "Alpha-numeric tag" format.

[V/M] Key

- Press this key momentarily to switch the frequency control for the "left" band between the VFO and Memory System.
- When the left band is set to the Memory mode, press and hold in this key for 0.5 sec to activate the smart search feature.
- When the left band is set to the Memory mode, press and hold in this key for 0.5 sec to shift to the "Memory Tuning" feature.

[HM]Key

- Press this key momentarily to recall a favorite "Home" frequency memory
- Press and hold in this key for 0.5 sec to activate priority channel scanning.

[SCN]Key

- Press this key momentarily to activate the Scanner on the left band.
- When the left band is set to the Memory mode, press and hold in this key for 0.5 sec to set up the scan skip list or preferential scan list.

⑦ [SET] Key

- Press this key momentarily to enter the set ("menu") mode.
- Press and hold in this for 0.5 sec to transfer the contents of the "main band" VFO into a Memory register.

⑧ Right side keys

- Four keys on the right side, dual-function, set the function by Menu No.20.

[LOW] Key and [MHz]key

[LOW] Key-1(default)

- Press this key momentarily to select the transmitter power output

level of the right band("LOW", "MID2", "MID1", or "HIGH").

- When the right band is set to the memory mode or home channel, press and hold in this key for 0.5 sec to switch the memory channel display between the "Frequency" format and "Alpha-numeric tag" format.

[MHz]Key2

- Press this key, the home channel VFO mode will activate the 1MHz step tune.
- Press this key for 0.5 sec, the home channel VFO mode will activate the 10MHz step tune.

[V/M] Key and [REV]key

[V/M]Key-1(default)

- Press this key momentarily to switch the frequency control for the "left" band between the VFO and Memory System.
- When the right band is set to the Memory mode, press and hold in this key for 0.5 sec to activate the smart search feature.
- When the right band is set to the Memory mode, press and hold in this key for 0.5 sec to shift to the "Memory Tuning" feature.

[REV]Key-2

- If the home channel is under the condition of different frequency, press this key to change the transmitting and receiving frequency.
- Press this key momentarily for 0.5 sec, Direction of Frequency difference will be +, -, off.

[HM]Key and [Tone] Key

[HM]Key-1(default)

- Press this key momentarily to recall a favorite "Home" frequency memory
- Press and hold in this key for 0.5 sec to activate priority channel scanning.

[TONE]Key-2

- Press this key momentarily to cyclically change the CTCSS Squelch mode: ENC(CTCSS encoding), ENC.DEC(CTCSS decoding) or DCS operation.

[SCN]Key and [SUB]Key

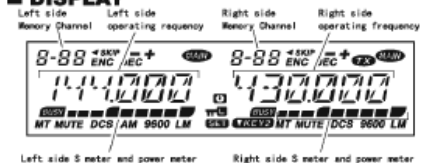
[SCN]Key-1(default)

- Press this key momentarily to activate the Scanner on the right band.
- When the right band is set to the Memory mode, press and hold in this key for 0.5 sec to set up the scan skip list or preferential scan list.

[SUB]Key-2

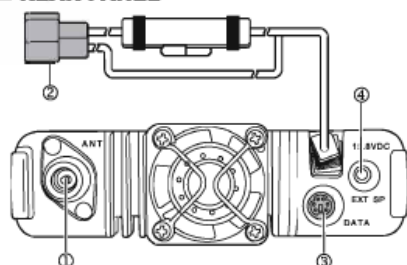
- Press this key, the second channel **MAIN** will flash, Press other keys will work only in second channel.

■ DISPLAY



Icon	Instruction
MAIN	Main working Machine(Home channel)
+	Positive frequency difference
-	Negative frequency difference
- +	Frequency difference
SKIP	Scan ignorant channel
◀	Priority channel
ENC	CTCSS Encode
DEC	CTCSS Decoding
OFF	Busy(Squelch off)
MT	Memory channel mode
MUTE	Mute
DCS	DCS
AM	Amplitude Modulation
9600	9600bps Data communication
L	Low power
M	Mid power
OFF	Auto power off
LOCK	Keypad knob lock
SET	Menu set mode
KEY2	Dual-function key-2

■ REAR PANEL



① Antenna connector

Connect an external antenna here. Please use Q16 antenna connector or relevant adapter.

② 13.8V DC power cable

Connect the mobile to DC 13.8V. Require power supply DC 9A. Please use the attached DC power cable, red is positive, black is negative.

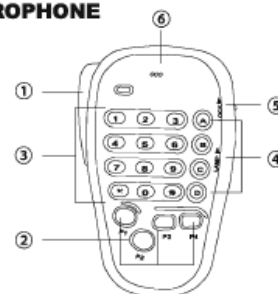
③ Data connector

TNC can use 1200bps or 9600bps data communication. Please use 6-pin Mini-DIN connector.

④ External speaker

Connect the external speaker, impedance is 8Ω, use 2-pin 3.5mm mono audio connector.

■ MICROPHONE



① PPT switch

Press and hold to transmit. Release to receive.

② Encode keys(P1/P2/P3/P4)

P1/P2/P3/P4 can re-encode the function, see relevant chapter for reference.

P1 KEY

- Set Main working frequency as left band or right. Band.
- Press and hold for 0.5 sec to make Main working band transfer to next band's top frequency.

P2 KEY

- Make Main working band switch between VFO and channel.
- When Main working band in VFO mode. Press and hold the key for 0.5sec, activate the smart search function
- When Main working band in channel mode. Press and hold the key for

0.5 sec, activate the channel tuning mode.

P3 KEY

- Press the key momentarily to activate the following functions of CTC-SS & DCS.
- ENC→ENC.DEC→DCS→OFF→ENC...

P4 KEY

- Press the key momentarily, choose Main working band output power "LOW", "MID2", "MID1", "HIGH".
- When Main working band is under channel mode or Home mode, press the key momentarily for 0.5 sec, to make the frequency display pattern switch between "frequency display" and "channel display".

③ DTMF keypad

16 buttons on the keypad, use for transmitting DTMF dual-audio dial and inputting the frequency or channel number.

④ LIGHT OF KEYPAD

Open the floodlight of microphone keypad.

⑤ LOCK

Lock the microphone(except the DTMF keypad and PTT)

⑥ [UP]/[DOWN]

Press or hold the key, make the Main working band's frequency tune(up scan or down scan) or channel switch. Usually, the key is as dial key on Main working band.

OPERATING BASICS

■ SWITCHING THE POWER ON/OFF

1. Press and hold the "right" VOL knob for 2 sec to switch the power on.
 - The current DC supply voltage is indicated on the LCD. After this interval, the display will switch its normal indication of the operating frequency.
2. Press and hold in the "right" knob for 2 sec to switch the power off.

■ SELECTING THE OPERATING BAND.

In the factory default configuration, the **Radio** operates in the "Receive" mode. During Receiver operation, the main band frequency will be indicated by main icon.

- To establish Main working band: press the microphone's [P1] key or dial knob for the "left" or "right" side momentarily, as appropriate. You will observe the **MAIN** icon lighting up alternate sides of the display as you switch **MAIN** bands from "left" side to the "right" side, and vice-versa.
- Press and hold in the "left" dial knob to move the operating band on the "left" band.
144MHz→350MHz→430MHz→29MHz→50MHz→144MHz.....
- Press and hold in the "right" dial knob to switch the operating band on the "right" band between the 144MHz and 430MHz.

NOTE:

- Press the [P1] key on the microphone for 0.5 sec to adjust the frequency of main working band.
- The mobile may be configured to operate either in a V-V or U-U mode, if needed.



■ ADJUSTING THE AUDIO VOLUME LEVEL

The audio volume level is set independently for the "left" and "right" sides of the transceiver. The "left" VOL knob provides adjustment for the "left" side, while the "right" VOL knob provides adjustment for the "right" side.

■ ADJUSTING THE SQUELCH SETTING

- The squelch is also set independently for the "left" and "right" sides of the **Radio**. The "left" SQL knob provides adjustment for the "left" side, while the "right" SQL knob provides adjustment for the "right" side.
- A special "RF Squelch" feature is provided on this radio. This feature allows you to set the squelch so that only signals exceeding a certain S-meter level will open the squelch.

■ SELECTING THE FREQUENCY BAND

◆ TUNING DIAL

- Rotating the DIAL knob or [UP]/[DOWN] key allows tuning in the pre-programmed steps established for the current operating band. Clockwise rotation of the DIAL knob causes the mobile to be tuned toward a higher frequency, while counter-clockwise rotation will lower the operating frequency.
- On the "Main" band frequency, press the DIAL knob momentarily, then rotate the DIAL knob, to change the "Main" band frequency steps to 1MHz per step. This feature is extremely useful for making rapid frequency excursions over the wide tuning range of the mobile.

◆ DIRECT KEYPAD FREQUENCY ENTRY

- The keypad of the DTMF microphone may be used for direct entry of the "Main" band operating frequency.
- Just press the numbered digits in the proper sequence. There is no "decimal point" key on the keypad, so if the frequency is below 100MHz, any required leading zeros must be entered.

Examples:

To enter 51.680MHz, press [0] [5] [1] [6] [8] [0]

To enter 145.200MHz, press [1] [4] [5] [2] [0] [0]

◆ SCANNING

From the VFO mode, press the [SCN] key momentarily to initiate scanning toward a higher frequency. The mobile will stop when it receives a signal strong enough to break through the squelch threshold. The mobile will then hold on that frequency according to the setting of No.34.

If you wish to reverse the direction if the scan, just rotate the DIAL knob one click in the counter-clockwise direction while the mobile is scanning. The scanning direction will be reversed. To revert to scanning toward a higher frequency once more, rotate the DIAL knob one click clockwise. Press the [SCN] key again to cancel scanning.

MENU SETUP

When operating the **Radio**, you can operate and set many function through the menu setup, the menu setup is convenient.

■ MENU OPERATION

- Press the **[set]** key momentarily to enter the menu.
 - Display on the main screen.
 - Brief menu instruction, set and item will display on the screen.
- Turn the "Main" band DIAL knob to select the Menu item.
 - When changing the menu item, will display brief instruction on the screen.
- Press the "Main" band DIAL knob to perform the actual adjustment.
- Press DIAL key or **[SET]** to store the new set parameter, and exit the set mode and exit to normal operation.

NOTE:

- The "h" character which is in front of the menu number denotes that enable to provide the individual values for each Hyper Memory Channel.
- The "b" character which is in front of the menu number denotes that enable to provide the individual values for each operating band and mode (VFO, Memory Channel, and Home Channel)

■ MENU FUNCTION LIST

ITEM	MENU ITEM	FUNCTION	PREFERENCES	DEFAULT
1	AP0	Selects the automatic power off time	OFF/0.5-12 H	OFF
2	ARS	Activates/deactivates the automatic repeater shift feature	ON/OFF	OFF
3	ARTS	Select the ARTS beep mode	IN RNG/OUT ING	—
4	BAND	Enables/disables the VFO band edge for the current band	BND ON/BND OFF	BND OFF
5	BEEP	Enables/disables the VFO band edge for the current band.	BEP.ON/BEP.OFF	BEP.ON
6	CLK.SFT	Shifting of CPU clock frequency	SFT.ON/SFT.OFF	SFT.OFF
7	CWID	Enables/disables the CW identifier during ARTS operation.	TX ON/TX OFF	TX OFF
8	CWIDW	Stores your call sign into the CW identifier.	—	—
9	DIMMER	Setting of the display brightness level	DIM1/DIM2/DIM3/OFF	DIM1
10	DCS.COD	Setting DCS code	104 standard DCS Code	023
11	DCS.N/R	Select normal/inverted DCS coding	TRXN/RXR/RTXR	TRX N
12	DSP.SUB	Selects the sub band display format	FREQ/CWID/DCIN/OFF	FREQ
13	DTMF D	Setting of the DTMF autodialer delay time	50/250/450/750/1000ms	450ms
14	DTMF S	Setting of the DTMF autodialer sending speed.	50/75/100ms	50ms
15	DTMF W	Loading of the DTMF autodialer memories	—	—
16	HYPER	Enable/disable the automatic writing feature for the Hyper Memory	MANUAL/AUTO	MANUAL
17	INET	Selects the Internet Connection mode	INT.COD/INT.MEM	INT.COD
18	INET C	Selects the Access Number (DTMF digit) for WIRES™ operation	CODE0-9/A/B/C/D/E/F	CODE1
19	INET M	Selects the Access Number (DTMF code) for non-WIRES™ Internet Link System access	d-1 ~d-16	d-1
20	KEY.MOD	Selects the key functions for the "right" band function switches	KEY1/KEY2	KEY1
21	LOCK	Enables/disables the Key/Button Lock feature	ON/OFF	OFF
22	LOCKT	Enables/disables the PTT Lock feature	OFF/BANDR/BAND L/BOTH	OFF

ITEM	MENU ITEM	FUNCTION	PREFERENCES	DEFAULT
23	MIC	Selects the microphone type to be used	—	—
24	MUTE	Selects the Audio Mute mode	OFF/TX/RX/(TX/TX)	OFF
25	NAME	Stores an Alpha-Numeric "Tag" for a memory channel	—	—
26	PCKT S	Sets the transceiver's circuitry for the Packet baud rate to be used	1200bps/9600bps	1200bps
27	PCKT B	Sets the receiving band for Packet operation	MAIN/R-FIX/L-FIX	MAIN
28	PG P1	Programming the microphone's [P1]/[P]button assignment	SCAN /SQL.OFF/TCALL/RPTR /	BAND
29	PG P2	Programming the microphone's [P2]/[P]button assignment	PRI LOW /TONE /MHz/REV/	VFO.MR
30	PG P3	Programming the microphone's [P3]/[P1]button assignment	HOME/	TONE
31	PG P4	Programming the microphone's [P4]/[P2]button assignment.	BAND/(VFO.MR)	LOW
32	RF SQL	Adjusts the RF SQL threshold level.	OFF/S-2/S-5/S-9/S-FULL	OFF
33	RPT.MOD	Sets the Repeater Shift Direction	RPT.OFF/RPT.- /RPT.+	RPT OFF
34	SCAN	Selects the Scan-Resume mode	TIME/BUSY	TIME
35	SCAN M	Selects the Memory Scan mode	MEM/MSM	MEM
36	SHIFT	Sets the magnitude of the Repeater Shift	0.0-99.5MHz	0.60MHz
37	STEP	Sets the Synthesizer steps	5/10/12.5/20/25/50 kHz	5.00kHz
38	SPCONT	Defines the audio path to the external speaker (when used)	EXT/OFF/INT.EXT/INT	EXT
39	TONE F	Sets the CTCSS Tone Frequency	50 Standard CTCSS Tones	100Hz
40	TONE M	Selects the Tone Encoder and/or Decoder mode	OFF/ENC/ENC.DEC/DCS	OFF
41	TOT	Sets the Time-Out Timer	1-30 mins	6mins
42	VFO.TR	Enables/disables the VFO Tracking feature	ON/OFF	OFF
43	WID.NAR	Reducing the MIC Gain (and Deviation)	WIDE/NARROW	WIDE
44	X-RPT	Switches the Cross-Band Repeater feature on and off	—	—
45	AM	Enables/disables the AM mode	ON/OFF	OFF
46	AUT.AM	Selects the receiving mode	AUT/OFF	AUTO

REPEATER OPERATION

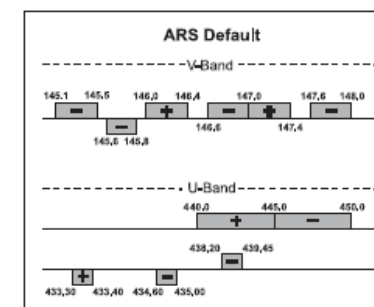
Repeater stations, usually located on mountaintops or other high locations, provide a dramatic extension of the communication range for low-powered hand-held or mobile radio. The radio includes a number of features which make repeater operation simple and enjoyable.

Depending on the part of the band in which you are operating, the repeater shift may be either downward (–) or upward (+), and one of these icons will appear at the bottom of the LCD when repeater shifts have been enabled.

Your Radio has been configured, at the factory, for the repeater shifts customary in your country. For the 50 MHz band, this usually will be 1 MHz, while the 144 MHz shift will be 600 kHz; on 70 cm, the shift may be 1.6 MHz, 7.6 MHz, or 5 MHz.

■ AUTOMATIC REPEATER SHIFT(ARS)

The Radio provides a convenient Automatic Repeater Shift feature, which causes the appropriate repeater shift to be automatically applied whenever you tune into the designated repeater sub-bands in your country. These sub-bands are shown below.



◆ TO RE-ENABLE ARS

1. Press the [SET] key momentarily to enter the Set mode.
2. Rotate the "Main" band DIAL knob to select Menu #2 (ARS).
3. Press the "Main" band DIAL knob momentarily, then rotate the "Main" band DIAL knob to change the setting to "ON" (to enable Automatic Repeater Shift).
4. Press and hold in the "Main" band DIAL knob for 0.5sec to save the new setting and exit to normal operation.

■ MANUAL REPTER SHIFT ACTIVATION

If the ARS feature has been disabled, or if you need to set a repeater shift direction other than that established by the ARS, you may set the direction of the repeater shift manually.

◆ TO SET THE DIRECTION OF FREQUENCY

1. Press the [SET] key momentarily to enter the Set mode.
2. Rotate the "Main" band DIAL knob to select Menu #33 (RPT. MOD).
3. Press the "Main" band DIAL knob momentarily, then rotate the "Main" band DIAL knob to select the desired shift among "-", "+," and "OFF."
4. Press and hold in the "Main" band DIAL knob for 0.5sec to save the new setting and exit to normal operation.

◆ TO SET THE DATA OF THE FREQUENCY

1. Press the [SET] key momentarily to enter the Set mode.
2. Rotate the "Main" band DIAL knob to select Menu #36 (SHIFT).
3. Press the "Main" band DIAL knob momentarily, then rotate the "Main" band DIAL knob to select the new repeater shift magnitude.
4. Press and hold in the "Main" band DIAL knob for 0.5sec to save the new setting and exit to normal operation.

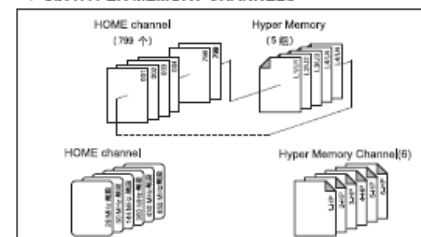
MEMORY OPERATION

The radio provides a wide variety of memory system resources.

◆ REGULAR MEMORY CHANNELS

- 799 "Standard" memory channels, numbered "001" through "799."
- Six Home channels, providing storage and quick recall of one prime frequency on each operating band.
- Five sets of band-edge memories also known as "Programmable Memory Scan" channels, labeled "L1/U1" through "L5/U5."

◆ SIX HYPER MEMORY CHANNELS



■ REGULAR MEMORY CHANNEL OPERATION

◆ MEMORY STORAGE

1. Select the desired frequency, while operating in the VFO mode on the "Main" band. Be sure set up any desired CTCSS or DCS tones, as well as any desired repeater offset. The power level may be also set at this time, if you wish to store it.
2. Press and hold in the [SET] key for 0.5sec. A memory number will appear (blinking) on the display.
3. Within ten seconds of pressing the [SET] key, use the "Main" band DIAL knob or the microphone's [UP]/[DWN] buttons to select the desired memory channel for storage (if the channel is already occupied by data stored previously, the "channel frequency" notation will appear on the display).
4. To attach an alpha/numeric name "Tag" to the memory, press and hold in the [SET] key for 0.5sec, then proceed to the next step; otherwise press the [SET] key momentarily to save the entry and exit to normal operation.

◆ TO APPEND AN ALPHA-NUMERIC "TAG" TO A MEMORY

1. After press and holding in the [SET] key in step 4 above, rotate the "Main" band DIAL knob to select the first character in the name you wish to store, then press the "Main" band DIAL knob momentarily to move on to the next character. Letters, numbers, and symbols are available for storage.
2. Again rotate the "Main" band DIAL knob to select the desired letter, number, or symbol, then press the "Main" band DIAL knob momentarily to move on to the next character's slot. If you make a mistake, press the microphone's [DWN] button to move back to the

- previous character's slot, then re-select the correct letter, number, or symbol.
3. Repeat the above step to program the remaining letters, numbers, or symbols of the desired label. A total of six characters may be used in the creation of a label.
 4. When you have completed the creation of the label, press the [SET] key momentarily to save the label and exit to normal operation.

◆ MEMORY RECALL

1. While operating in the VFO mode, press the [V/M] key momentarily to enter the Memory mode.
2. Rotate the DIAL knob to select the desired channel.
3. To return to the VFO mode, press the [V/M] key momentarily again.

NOTE: 1) When the radio is already set to the Memory mode, an easy way to recall memories is to enter the microphone's key in the

memory channel number. For example, to recall memory channel #4, press [0] - [0] - [4].

- 2) Memory channels on which you may have stored frequencies on the 29 MHz and 50 MHz amateur bands cannot be recalled on the "right" band.

◆ MEMORY OFFSET TUNING

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

1. With the mobile in the "MR" (Memory Recall) mode, select the desired memory channel.
2. Now press and hold in the [V/M] key for 0.5sec; the "MT" icon will appear on the display.
3. Rotate the DIAL knob, as desired, to tune to a new frequency. The synthesizer steps selected for VFO operation on the current band will be the steps used during Memory Tuning.
4. Press and hold in the [V/M] key for 0.5sec during Memory Tuning, the data will now have been copied to VFO, although the original memory contents will remain intact on the previously-stored channel.
5. If you wish to return to the original memory frequency, press and hold in the [V/M] key for 0.5sec. The "MT" icon will disappear.

◆ DELETING MEMORY

With 808 total memories available, there frequently are situations where you may desire to delete certain memorized frequencies.

1. Press the [V/M] key, if needed, to enter the Memory mode.
2. Press and hold in the [SET] key for 0.5sec, then rotate the "Main" band DIAL knob to select the memory channel to be deleted. Note that memory channel 1 may not be deleted.
3. Press the "Main" band [SCN] key momentarily. The display will revert to memory channel #1. If you rotate the "Main" band DIAL

knob to the location you just "Masked," you will observe that it is now invisible.

Note: One deleted, the channel data cannot be recovered.

◆ HOME CHANNEL MEMORY

A special one-touch "HOME" channel is available (one for each of the 6 operating bands), to allow quick recall of a favorite operating frequency on each band. Memory storage is simple to accomplish:

1. Select the desired frequency, while operating in the VFO mode on the "Main" band. Be sure to set up any desired CTCSS or DCS tones, as well as any desired repeater offset. The power level may also be set at this time, if you wish to store it.
2. Press and hold in the [SET] key for 0.5sec. A memory number will appear (blinking) on the display.
3. While the memory channel number is blinking, just press the "Main" [H/M] key. The frequency and other data (if any) will now be stored in the special HOME channel register.
4. You may repeat this process on the other operating bands.
5. To recall the HOME channel, just press the [H/M] key while operating either in the VFO or MR mode.

◆ MEMORY ONLY MODE

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

To place the radio into the Memory Only mode:

1. Turn the radio off.
2. Press and hold in the "left" [V/M] key while turning the radio on.
3. Rotate the "right" DIAL knob to select the (F-5 M-ONLY MODE),

- then press the [SET]
4. key momentarily.
5. To return to normal operation, repeat the above steps.

■ HYPER MEMORY MODE

The Radio usually stores, into memory, the operating frequency and some aspects of operating status (such as CTCSS/DCS data, repeater shift, power level etc.). However, the "Hyper Memory" Mode allows you to store the total current configuration of the radio into a special "Hyper" memory bank. For example, a Hyper Memory location may store the frequencies of both the "Left" and "right" bands, plus Scanning features, etc.

◆ HYPER MEMORY STORAGE

1. Set up the radio according to the desired configuration.
2. Press and hold in the Hyper Memory key ([1] through [6]), corresponding to the Hyper Memory channel into which you wish to store this configuration, for 2 seconds.

◆ HYPER MEMORY RECALL

Press the appropriate Hyper Memory key ([1] through [6]) to recall the desired Hyper Memory channel.

NOTE: The current (original) configuration will be lost when you recall the Hyper Memory Channel. To prevent this from happening, press and hold in the Hyper Memory key (generally the [1] key) to store the current configuration into that Hyper Memory Channel before recalling the Hyper Memory Channel, or set Menu #16 to enable the Automatic Writing feature for the Hyper Memory. See page 62 for details.

SCANNING

The **Radio** allows you to scan just the memory channels, the entire operating band, or a portion of that band. It will halt on signals encountered, so you can talk to the station(s) on that frequency, if you like.

■ SETTING THE SCAN-RESUME TECHNIQUE

Scanning operation is basically the same in each of the above modes. Before you begin, take a moment to select the way in which you would like the scanner to resume scanning after it halts on a signal. Two options for the Scan-Resume mode are available:

TIME: In this mode, the scanner will halt on a signal it encounters, and will hold there for five seconds. If you do not take action to disable the scanner within five seconds, the scanner will resume even if the stations are still active.

BUSY: In this mode, the scanner will halt on a signal it encounters. Two seconds after the carrier has dropped because the other station(s) ceased transmission, the scanner will resume.

◆ TO SET THE SCAN-RESUME MODE:

1. Press the **[SET]** key momentarily to enter the Set mode.
2. Rotate the "Main" band DIAL knob to select Menu #34 (SCAN).
3. Press the "Main" band DIAL knob momentarily, then rotate the "Main" band DIAL knob to select the desired scan-resume mode.
4. Press and hold in the "Main" band DIAL knob for 0.5sec to save the new setting and exit to normal operation.

■ VFO SCANNING

This mode allows you to scan the entire current operating band.

1. Select the VFO mode by pressing the **[V/M]** key, if necessary.
2. Press the **[SCN]** key momentarily to start scanning.
3. If and when the scanner encounters a signal strong enough to open the squelch, the scanner will halt temporarily; the decimal point of the frequency display will blink during this "Pause" condition.
4. The scanner will then resume according to the Scan-Resume mode selected in the previous section.
5. To cancel scanning, press the **[SCN]** key momentarily again (or press the microphone's PTT key).

NOTE: When you start scanning, the transceiver will be changing frequency in the upward direction. If you want to change direction of the scan while it is underway, rotate the DIAL knob one click in the opposite direction (in this case, one click counterclockwise). You'll see the scanner turn around and change frequency downward!

You may change the scanning function so that the VFO frequency will jump to the low band edge of the next band when the VFO frequency reaches the high edge of the current band (or vice versa). See relevant page regarding Menu #4 (BAND).

■ MEMORY SCANNING

◆ MEMORY SCANNING IS SIMILARLY EASY TO INITIATE

1. Set the radio to the Memory mode by pressing the **[V/M]** key, if necessary.
2. Press the **[SCN]** key to initiate scanning.
3. As with VFO scanning, the scanner will halt on any signal encountered that is strong enough to open the squelch; it will then resume scanning according to the Scan-Resume mode set previously.
4. To cancel scanning, press the **[SCN]** key again (or press the microphone's PTT key).

NOTE: On the "right" band, Memory Channel scan will only search through the memory channels which are stored inside the 144 MHz and 430 MHz amateur bands.

◆ HOW TO SKIP (OMIT) A CHANNEL DURING MEMORY SCAN OPERATION

Some continuous-carrier stations like a Weather Broadcast station will seriously impede scanner operation if you are using the "Carrier Drop" Scan-Resume mode, as the incoming signal will not pause long enough for the transceiver to resume scanning. Such channels may be "Skipped" during scanning, if you like:

1. Set the radio to the Memory Mode by pressing the **[V/M]** key, if necessary.
2. Rotate the DIAL knob to select the Memory Channel to be skipped during scanning.
3. Press and hold the **[SCN]** key for 0.5sec so as to make the small "SKIP" icon appear on the display. The current Memory Channel will now be ignored during scanning. The small "SKIP" icon will also appear when you recall the "skipped" memory channel manually.

4. To re-institute a channel into the scanning loop, press and hold in the **[SCN]** key for 0.5sec twice to select "OFF" (the "Skipped" channel will, of course, still be accessible via manual channel selection methods using the DIAL knob in the MR mode, whether or not it is locked out of the scanning loop).

◆ PREFERENTIAL MEMORY

The transceiver also allows you to set up a "Preferential Scan List" of channels which you can "flag" within the memory system. These channels are designated by a * ◀ icon when you have selected them, one by one, for the Preferential Scan List.

1. Press the **[V/M]** key momentarily to enter the Memory Recall mode, if you are not using memories already.
2. Rotate the DIAL knob to select the channel which you wish to add to the Preferential Scan List.
3. Press and hold the **[SCN]** key for 0.5sec, several times if necessary, so as to make the * ◀ icon appear by the channel designator.

◆ TO INITIATE PREFERENTIAL MEMORY SCAN

1. Press the **[SET]** key momentarily to enter the Set mode.
2. Rotate the "Main" band DIAL knob to select Menu #35 (SCAN M).
3. Press the "Main" band DIAL knob momentarily, then rotate the "Main" band DIAL knob to "MSM."
4. Press and hold in the "Main" band DIAL knob for 0.5sec to save the new setting and exit to normal operation.
5. Now, press the **[SCN]** key momentarily to initiate Preferential Memory Scanning. Only the channels which have the "W" icon appended to the channel number will be scanned.
6. To cancel the Preferential Memory Scanning, select "MEM" in step 3 above.

■ PROGRAMMABLE MEMORY SCAN (PMS)

This feature allows you to set sub-band limits for either scanning or manual so as to prevent encroachment into the SSB/CW "Weak Signal" portion of the band. For example, you might wish to set up a limit of 144.000 MHz to 146.000 MHz.

1. Set the radio to the VFO mode by pressing the **[V/M]** key, if necessary.
2. Using the techniques learned earlier, store 144.300 MHz into Memory Channel #L1 (the "L" designates the Lower sub-band limit).
3. Likewise, store 146.000 MHz into Memory Channel #U1 (the "U" designates the Upper sub-band limit).
4. Switch to the Memory mode by pressing the **[V/M]** key once, then rotate the DIAL knob to select Memory Channel # L1.
5. Press and hold in the **[V/M]** key for 0.5sec to start PMS operation; the "MT" label will be appears on the display. Tuning and scanning will now be limited within the just programmed range.
6. Five pairs of Band Limit memories, labeled L1/U1 through L5/U5 are available. You therefore can set upper and lower operation limits on a number of bands, if you like.

■ DUAL-WATCH

The transceiver's scanning features include a two-channel scanning capability which allows you to operate on a VFO, Memory channel, or Home channel, while periodically checking a user-defined "Priority" Memory Channel for activity. If a station is received on the "Priority" Channel which is strong enough to open the Squelch, the scanner will pause on that station in accordance with the Scan-Resume mode set via Set mode **[Menu #34 [SCAN]]**.

◆ VFO PRIORITY

1. Recall the memory channel you wish to use as the "priority" frequency.
2. Press and hold in the **[HM]** key for 0.5sec to activate the VFO Priority mode. The display will remain on the VFO frequency, but every five seconds the transceiver will check the Priority Channel (memory channel) for activity.
3. Press the **[V/M]** key to disable the VFO Priority mode and exit to regular VFO operation.

◆ MEMORY PRIORITY

1. Store the frequency you wish to be the "Priority" Channel into memory channel "1."
2. Press and hold in the **[HM]** key for 0.5sec to activate the Memory Priority mode.
3. The display will remain on the current memory channel frequency, but every five seconds the transceiver will check the Priority Channel (memory channel "1") for activity.
4. Press the **[V/M]** key to disable the Memory Priority mode and exit to regular memory operation.

◆ HOME PRIORITY

1. Recall the memory channel you wish to use as the "priority" frequency.
2. Press and hold in the **[HM]** key for 0.5sec to activate the HOME Priority mode. The display will remain on the HOME channel frequency, but every five seconds the transceiver will check the Priority Channel (memory channel) for activity.
3. Press the **[V/M]** key to disable the HOME Priority mode and exit to regular VFO operation.

NOTE: You may operate individual Priority Channel Dual Watch features on both bands at the same time.

SMART SEARCH

The Smart Search feature may be used to load - automatically with no operator intervention a special bank of up to 25 memory channels (per band) on activity.

"Main" band by press and hold the microphone's **[P2]** key.
3) You may activate the Smart Search operation on the "left" and "right" bands at the same time.

■ SMART SEARCH OPERATION IS SIMPLE TO ACTIVATE

1. Set the radio to the VFO mode by pressing the **[V/M]** key, if necessary.
2. Press and hold in the **[V/M]** key; this will cause the radio to scan upward on the current band, loading channels on which it encounters a signal strong enough to open the squelch.
3. When 25 channels are loaded, or when the scanner reaches the band edge, the scanner will stop and the transceiver will revert to the starting frequency.
4. To recall the Smart Search memories just stored, rotate the DIAL knob or press the microphone's **[UP]/[DWN]** keys (for the "Main" band Smart Search memories only).
5. If you found particular channels which you wish to store into the "regular" memory channel, follow the memory storage procedures described on relevant page.

NOTE:

- 1) The Smart Search memories are so-called "soft" memories; they will be lost if you exit the Smart Search mode or initiate a new Smart Search sweep.
- 2) You may activate the Smart Search operation on the

SPECIFICATION

General	
Frequency	28-29.7MHz
	50.000-54.000MHz
	144-148MHz
	420-450MHz
Channel step	5/10/12.5KHz
Transmitting method	F3, F2, F1
Antenna impedance	50Ω, Imbalance
Frequency stability	±5ppm
Usable temperature range	-20°C+60°C
Current	Receiver:0.5A Transmitter: 8.0A(50MHz/ 430MHz) 8.5A(29 MHz / 144MHz)
Dimensions	168 mm×140 mm×41.5mm
Weight	1.07kg(Without microphone)

TROUBLE SHOOTING

The problems described in the following tables are commonly encountered operational malfunctions. These types of difficulties are usually caused by improper hook-up, accidental incorrect control settings, or operator error due to incomplete programming. These problems are usually not caused by circuit failure. Please review these tables and the appropriate section(s) of this instruction manual before assuming your transceiver is defective.

Problem	Probable Cause	Corrective Action
The Radio will not power up after connecting a 13.8V DC power supply and pressing the [] (Power) switch. Nothing appears on the display	1. The power cable was connected backwards. 2. One or more of the power cable fuses disconnect.	1. Connect the supplied DC power cable correctly: Red -(+); Black -(-). 2. Look for the cause of the blown fuse(s). After inspecting and correcting any problems, install a new fuse(s) with the same ratings(15A).
The display is too dim, even though you selected a high brightness level	The supply voltage is too low	The supply voltage requirement is 13.8 V DC ±15% (11.7 V to 15.8 V DC). If the input voltage is outside this range, adjust your regulated power supply and/or check all power cable connections.
The frequency cannot be selected by turning the Encoding control or by pressing Mic [UP]/[DWN].	Memory Recall was selected	Press [VFO]
Most buttons/keys and the Encoding knob do not function.	1. One of the Lock functions is ON. 2. The transceiver is in Channel Display mode.	1. Unlock all of the Lock functions 2. Press [V/M] to switch to VFO mode.

Problem	Probable Cause	Corrective Action
Memory Channels cannot be selected by turning the Encoding knob or by pressing Mic [UP]/[DOWN]	No data has been stored in any Memory Channels.	Store data in some Memory Channels
You cannot transmit even though you press Mic[PTT]	<ol style="list-style-type: none"> 1. The microphone plug was not inserted completely into the front panel connector. 2. You selected a transmit offset that places the transmit frequency outside the allowable transmit frequency range 	<ol style="list-style-type: none"> 1. Switch OFF the power, then insert the microphone plug until the locking tab clicks in Place 2. Retransmit the frequency deviation, to match the Tx frequency range. Press [SET] to enter the menu mode, turn the HOME Dial knob, select menu #36, press the HOME dial knob, then turn it to select the right frequency deviation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

***Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**