Owner's Manual

for the

HEATH ZENITH

VHF/UHF TRANSCEIVER

Model HW 24HT

595-4141-02

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

Heathkit HEATH COMPANY BENTON HARBOR, MICHIGAN 49022
TLX 72-9421

IMPORTANT NOTICE

Your Heath HW-24-HT Handheld Tranceiver can receive frequency ranges of 130 - 169.995 MHz and 418 - 469.995 MHz. Normally, the Tranceiver is factory-set to receive these ranges. However, due to back orders, we did not perform this adjustment to avoid further delaying shipment of your Transceiver.

To widen the receiving range of your Transceiver, perform the following steps:

1. Turn POWER on.
2. Push RESET switch.
3. Press FUNCTION (hold) and STEP, rotate CH to 12.50 kHz.
4. Press CLEAR (#).
5. Rotate CH to 146.0375 MHz.
6. Press FUNCTION (hold) and RPT.
7. Press FUNCTION (hold) and +.
8. Press FUNCTION (hold) and ENTER.
9. Press FUNCTION (hold) and ENTER.
10. Press CLEAR (#).

The Owner's Manual assumes you are using wideband operation. Please keep this notice; if you ever reset your Transceiver, you will need to perform these steps again.

If you have any question concerning your Transceiver, the extended frequency range, or the steps listed above, please contact us.

Amateur radio technical consultation:	(616) 982-3296
Service information:	(616) 982-3363
Replacement parts:	(616) 982-3571

Sincerely,
HEATH COMPANY

925-6000

HW-24-HT/595-4141
591-5495

Heathkit HEATH COMPANY BENTON HARBOR, MICHIGAN 49022
TLX 72-9421

IMPORTANT NOTICE

Please add the following statements to your HW-2-P Owners Manual in the specified locations.

Page 2-12 — Left column, bottom of page.
Add: NOTE: In M channels individual transmit offset and tone squelch frequencies may be entered in each memory channel.

Page 2-14 — Right column, after note 3.
Add: 4. In M memory channels, the transmit offset and tone squelch frequencies are the same for each memory channel.

Thank you,
HEATH COMPANY

HW-2-P/595-4405
591-5505

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INTRODUCTION

Your Heath Model HW-24HT is a highly versatile, yet compact VHF and UHF FM Transceiver that is built and tested to stringent specifications. It uses the latest surface mount and microcomputer technologies to provide you with many useful functions. The following features are built into your transceiver:

- Frequencies can be entered directly from the keyboard or via a rotary channel switch.
- A wide range of acceptable external power supply voltages (5.5 to 16 volts DC) allows you to power it directly from an automobile battery.
- An Auto-Power OFF function reduces the current drain to approximately 4 mA if you forget to turn the Transceiver off.
- A nine-step Battery-Save function allows you to reduce the current drain during receiver standby.
- Vacant Channel Search (VCS) automatically searches vacant channels and makes QSY easy.
- Internal dual watch allows the Transceiver to watch the selected frequency and the frequency that is stored in memory address #1 or any other memory frequency. Alternately, it can watch the selected frequency and each memory frequency in sequence.
- Two internal VFOs.
- Up to 20 memory channels are available, ten in each VFO. VHF and UHF frequencies may be intermixed. Split or simplex receiver-transmitter operation may be set for each memory channel. For repeater operation, an offset frequency and a tone frequency can be additionally memorized in channel #1 in both VFOs.
- Duplex operation permits a semi-duplex QSO using the two VFOs or one of the VFOs and a memory frequency.

Full-duplex operation (similar to a telephone conversation) is available when you use a combination of the VHF and UHF bands.

- A Function button allows you to select 100 kHz steps when you turn the rotary channel selector.
- Either Pause or Busy scan functions can be selected. Scanning of the dial frequency provides a 1 MHz scan, all scan, or program scan. Scanning of a memory frequency provides A-VFO scan, B-VFO scan, all memory scan, or MSM memory scan.
- Tone squelch frequencies can be selected via the rotary channel selector.
- A single pushbutton press opens the squelch so you can easily check the volume setting.
- Selected frequencies may be locked to prevent inadvertent frequency changes.
- PTT may be locked to prevent inadvertent transmission.
- Internal RF attenuator.
- DTMF function allows you to control some repeaters and make telephone calls via your Transceiver through certain repeaters.

The lightweight and compact size make this Transceiver a handy addition to any amateur radio operator's equipment.

AVAILABLE ACCESSORIES

HWA 110 Standard Nickel-cadmium rechargeable Battery Pack.

HWA 120 Hi-Power Nickel-cadmium rechargeable Battery Pack. Increases peak power output to 5.0 watts.

HWA 125 Long-Life Nickel-cadmium rechargeable Battery Pack. Approximately doubles the time between charges, as compared to the Models HWA 110 and HWA 120.

HWA 130 Wall Charger. For use with the above Model HWA 110 and HWA 125 rechargeable battery packs. Plugs directly into a wall outlet.

HWA 140 Quick Charger. Desk-top charger quickly charges the above rechargeable batteries.

HWA 160 Mobile Adaptor. Plugs into car or truck cigarette lighter. For use with Model HWA-110 or HWA-125 Battery Pack.

HWA 180 Speaker/Mic. Combines functions in a hand-held unit.

HWA 190 Handset with microphone and remote push-to-talk button.

HWA 250 Carrying Case for Transceivers that have a standard or Model HWA 110 battery.

HWA 260 Carrying Case for transceivers that have a Model HWA 120 or HWA 125 battery.

SPECIFICATIONS

GENERAL

Frequency Range	VHF Receive:130.00 to 169.995 MHz. UHF Receive: 418.00 to 469.995 MHz (in 5 kHz steps). VHF Transmit: 144.00 to 147.995 MHz. UHF Transmit: 438.00 to 449.995 MHz (in 5 kHz steps).
Modulation Type	F3.
Microphone Input Impedance	600 ohms.
Speaker Impedance	8 ohms.
Antenna Impedance	50 ohms.
Power Requirements	9 volts, nominal. Requires six AA (nickel-cadmium or alkaline) batteries.
External Input Voltage	5.5 to 16 volts DC.

Size (excluding knobs and antenna)	6-3/8" H x 2-3/8" W x 1-3/8" D (173 x 60 x 34 mm).
Weight (including antenna and batteries)	17 oz. (490 g).

RECEIVER

Receiver type	Double-conversion superheterodyne.
First Intermediate Frequency	55.05 MHz. VHF: Upper heterodyne. UHF: Lower heterodyne.
Second Intermediate Frequency	455 kHz.
Sensitivity (within the amateur bands)	0.15 µV for 12 dB SINAD*.
Signal-to-noise ratio at 1 µV input	30 dB or better.
Acceptable Modulation Bandwidth	±7 kHz (-6 dB).

$$*\text{SINAD} = \frac{\text{Signal + Noise + Distortion}}{\text{Noise + Distortion}}$$

Selectivity	-60 dB.
Squelch Sensitivity	-14 dB.
Audio Output	400 mW into 8 Ω (10% distortion).
Power Consumption (approximate)	150 mA unsquelched. VHF: 35 mA squelched (no signal). UHF: 40 mA squelched (no signal).
Battery Save (3:1)	VHF: 10 mA. UHF: 12 mA.

TRANSMITTER

RF Output Power	VHF: 3.5 watts with HWA-110, 5.0 watts or more with HWA-120. UHF: 3.0 watts with HWA-110, 5.0 watts or more with HWA-120. Low: 400 mW.
Spurious and Harmonic Attenuation	Better than -60 dB.

Maximum Frequency Deviation	±5 kHz.
Modulation System	Reactance modulation.
Power Consumption (approximate)	VHF High: 750 mA at 2.5 watts RF output, 1000 mA at 5.0 watts RF output. VHF Low: 350 mA. UHF High: 900 mA at 2.5 watts RF output, 1300 mA at 5.0 watts RF output. UHF Low: 400 mA.

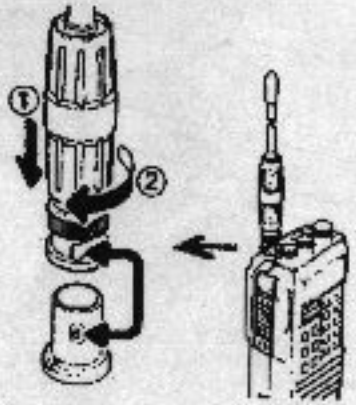
Specifications above are guaranteed only within the U.S. amateur bands both on UHF and VHF.

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

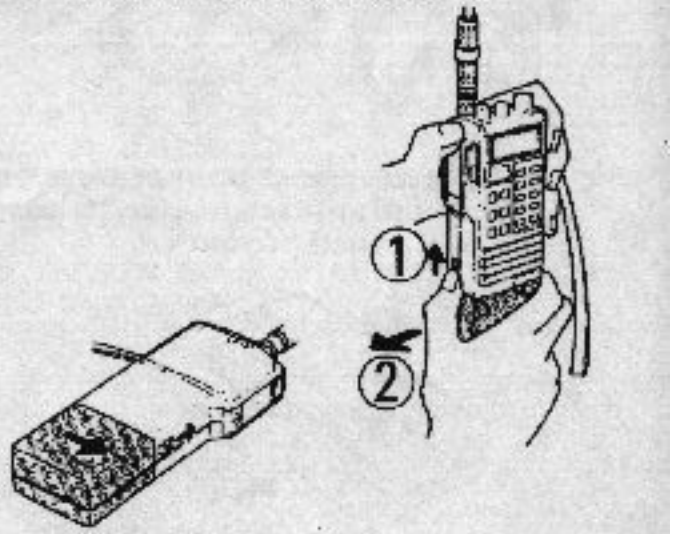
GETTING READY

When you first unpack your Transceiver, you will have to perform the following steps to get it ready for operation:

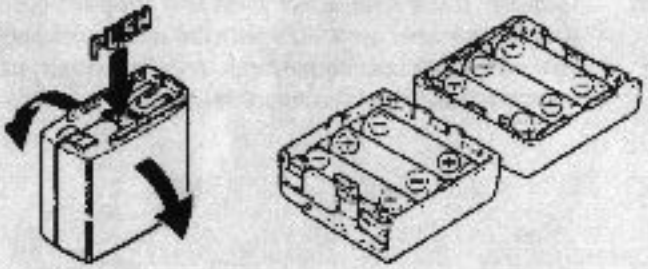
1. Push the end of the antenna onto the Transceiver's (ANT) ANTENNA connector. Be sure to match the locking pin on eah side of the connector with the slots in the end of the antenna. Then switch the antenna clockwise to lock it into place.



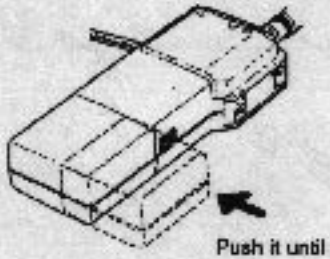
2. Hold the Transceiver in one hand and grasp the battery pack in your other hand. Now push the battery lock button upward with your thumb and carefully pull the battery pack toward you until it slides completely free.



3. Push down on the battery pack latch and open the pack as shown. Now install six size AA alkaline or fully-charged nickel-cadmium batteries as shown. Be sure to observe the proper polarity.



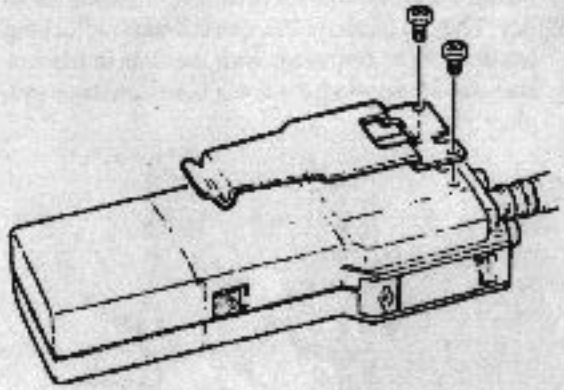
4. Close the battery pack and slide it back onto the bottom of the Transceiver until it locks into place. The battery pack is designed to fit only the correct way.



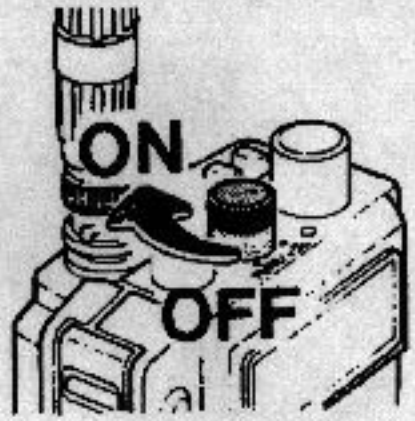
Push it until it clamps tightly.

NOTE: If you installed nickel-cadmium batteries in the battery pack that was supplied with the Transceiver, you will have to remove the batteries from the pack to charge them.

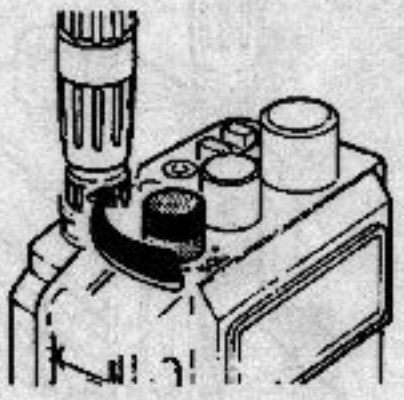
5. Use the two metric screws that were supplied with the Transceiver to mount the belt clip onto the rear cover.



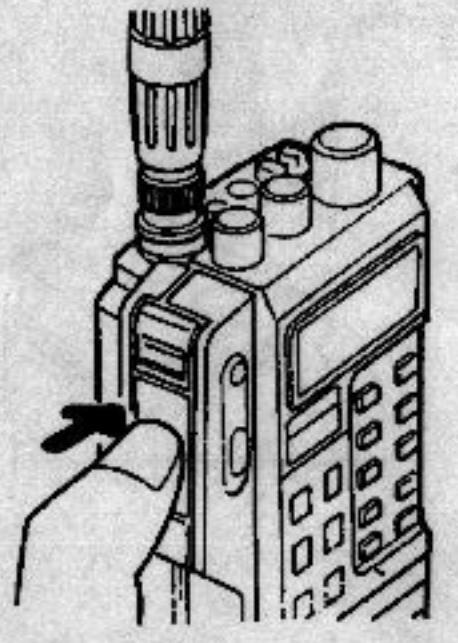
6. Rotate the POWER SWITCH in a clockwise direction to turn the Transceiver on. Then set the control to the desired volume level.



7. Rotate the SQL (Squelch) control counterclockwise until you hear noise; then slowly adjust the control clockwise until the noise just disappears. NOTE: Advancing the control further clockwise from this position will reduce the receiver sensitivity.



8. To transmit, push the PTT (push-to-talk) button on the side of the Transceiver. To receive, release the button.



Your Transceiver is now ready for operation.

OPERATION

GENERAL

Refer to Figure 2-1 while you read the following descriptions of top panel controls.

PWR/VOL (Power Switch/Volume Control) — Turns the Transceiver on and off and sets the volume level. Depress the SQL OFF button or turn the SQL control fully counterclockwise while you set the receiver volume to the level you desire.

SQL (Squelch Control) — Mutes the receiver when no signal is being received. Start with this control set fully counterclockwise; then rotate the control clockwise until the background noise just disappears. NOTE: Further clockwise rotation of this control will reduce the receiver sensitivity.

TX (Transmit Indicator/Battery Indicator) — Lights during the transmit mode. NOTE: If this LED fails to light in the transmit mode, it indicates that the batteries need to be recharged (nickel-cadmium only) or replaced.

CH (Rotary Channel Selector) — Sets the transmitter and receiver frequencies, tone frequency, channel step rate, and memory address channel. Rotating this control clockwise increases the frequency, while rotating it counterclockwise decreases the frequency. The following channel step rates are available: 5 kHz, 10 kHz, 12.5 kHz, 20 kHz, 25 kHz, and 50 kHz.

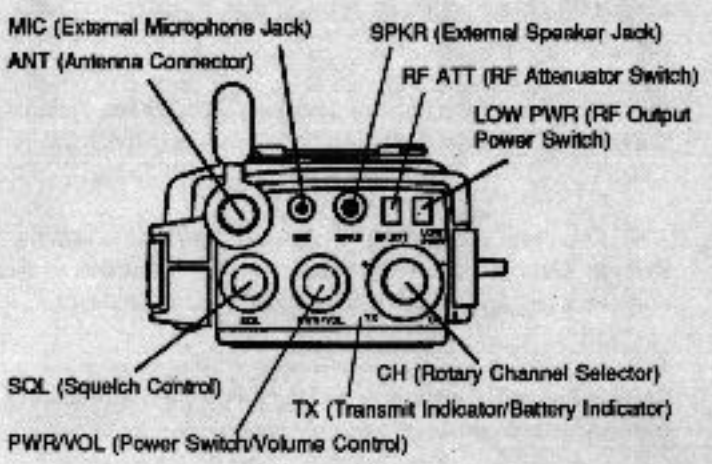


Figure 2-1

LOW PWR Switch — Sets the transmitter for low power (depressed) or high power (released) operation. NOTE: Always set this switch to LOW PWR for short-distance communications.

RF ATT (RF attenuator Switch) — Reduces receiver sensitivity by approximately 20 dB. NOTE: Weak signals will not be received when this switch is depressed.

SPKR (External Speaker Jack) — Accepts the optional Speaker/MIC (Model HWA-180) or Headset (Model HWA-190). Also can be used with external 8-ohm speakers or headphones.

MIC (External Microphone Jack) — Accepts the optional Speaker/MIC (Model HWA-180) or headset (Model HWA-190).

ANT (Antenna receptacle) — Accepts the flexible antenna. Refer to "Getting Started" for installation. NOTE: Be sure to use only the antenna supplied or an equivalent, dual-band type.

Refer to Figure 2-2 while you read the following descriptions of front and side controls.

FUNCTION Switch — Works together with other buttons to perform special functions.

PTT (Push-To-Talk Switch) — Pressing this switch places the Transceiver in the transmit mode.

LAMP Switch — Illuminates the display for operation at night.

SQL OFF — Unsquelches the receiver regardless of the Squelch control setting. This is the same as turning the Squelch control fully counterclockwise.

RESET — Initializes the microprocessor when improper operation occurs, or after the internal memory backup battery (not the battery pack) has been replaced. Turn the Transceiver on; then use a slender nonmetallic object (such as a toothpick) to depress this recessed switch.

DC IN (External Power Connector) — Provides a connection for external power. The Model HWA-160 Mobile Adaptor is available for operation from a car or truck cigarette lighter.

NOTES:

1. Make sure the Transceiver is off while you connect to or disconnect from this connector.

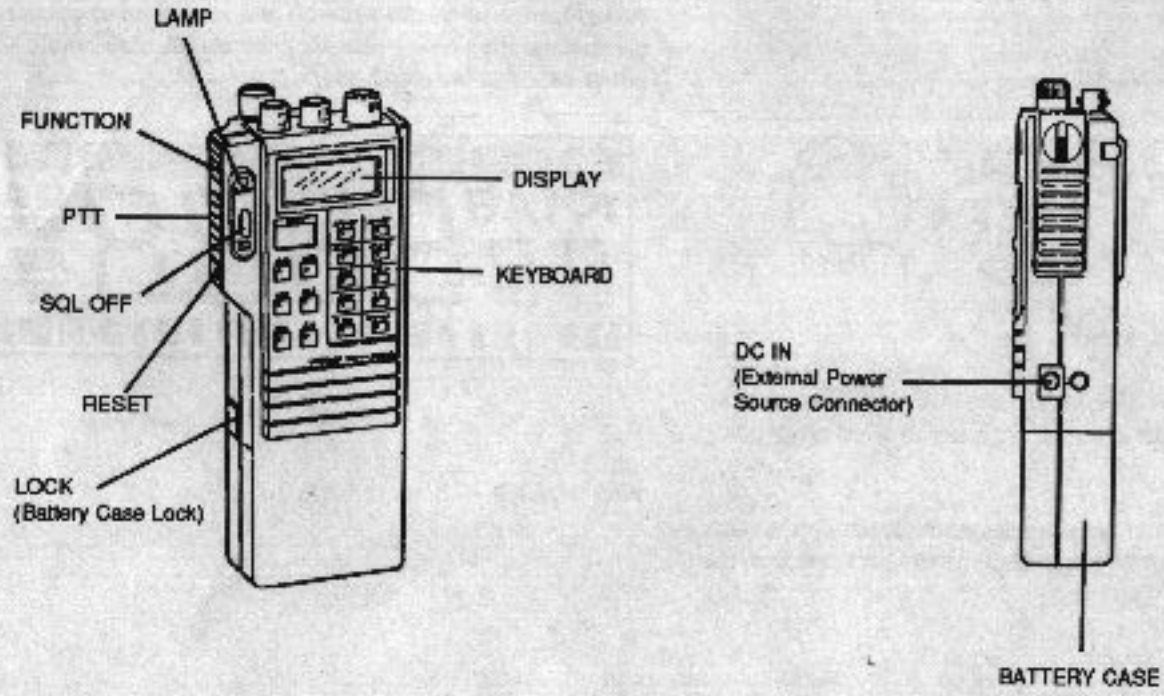
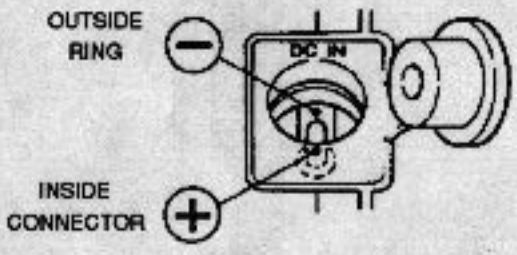

LAMP
FUNCTION
PTT
SQL OFF
RESET
LOCK
(Battery Case Lock)
DISPLAY
KEYBOARD
DC IN
(External Power
Source Connector)
BATTERY CASE

Figure 2-2

2. Make sure the external supply supplies between 5.5 and 16 volts DC.

3., Be sure to observe the correct polarity.



BATTERY CASE — Holds six size AA nickel-cadmium or alkaline batteries. Always use fresh batteries when you replace them.

LOCK BUTTON — Locks or releases the battery pack. Push this button upward while you slide the battery pack free from the Transceiver.

DISPLAY — Indicates operating frequencies, received signal strength, relative transmit power, and several other operating parameters. High power transmit indicates full scale, while low power indicates between 3 and 5.

Display

KEYBOARD — Refer to Table 2-1 on Page 2-5.

Table 2-1

Keyboard Button	By Itself	Combined with Function Button
CALL		
A/[DUP] A, B	Switches the A and B VFOs.	Turns duplex on and off.
B/[DUAL] VFO	Setting VFO Mode	ON/OFF of Dual Watch
C/[BAND] VCS	Turns VCS (Vacant Channel Search) on.	Switches the VFO between VHF and UHF
D/MSM M, S	Turns Memory scan on and off.	Sets the MSM of the memory frequency.
*/[ENT] RCL	Recalls the memory frequency.	Sets the memory frequency.
#/[BZ] S, C	Selects scan or clear.	Turns the buzzer on and off.
1/APO/S ▼	Enters a 1 in the Display. Scans downward in frequency (except during memory scans).	Turns Auto Power off.
2/SAVE/S ▲	Enters a 2 in the display. During scanning, it scans upward in frequency.	Turns Save on and off.
3/STEP/SB	Enters a 3 in the display. During scanning it switches between Pause and Busy scans.	Sets the frequency step rate.
4/Γ, L/SS	Enters a 4 in the display. During VFO scan, it switches between 1 MHz scan, all scan, or program scan. During Memory scan, it switches between A or B memory scan and all-memory scan.	Locks and unlocks the frequency control.
5/REV	Enters a 5 in the display.	Exchanges the transmitter and received frequencies. (Repeater mode)
6/PPT, L	Enters a 6 in the display.	Enables and disables the transmit mode.
7/RPT	Enters a 7 in the display.	Turns repeater operation on and off.
8/ +/-	Enters a 8 in the display.	Selects + or - transmitter offset operation during repeater operation.
9/T, SQL	Enters a 9 in the display.	Selects the tone encoder or tone squelch.
0/OFFSET	Enters a 0 in the display.	Sets the offset frequency.

NOTE: The words and letters shown in brackets in the following headings are the actual key labels.

CHANGING VFOs [A/DUP A.B]

Your Transceiver contains two internal controls. The A-VFO is initially set to 146.00 MHz, while the B-VFO is initially set to 446.00 MHz. To switch from the A-VFO to the B-VFO, simply press the A/DUP A.B button once as shown below. To return to the A-VFO, simply press the button again. The display will indicate which VFO you have selected.

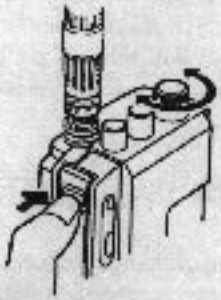
NOTES:

1. Depressing the A/DUP A.B button while the display is indicating the receiver frequency or a memory frequency changes the VFO as described above.
2. Depressing the A/DUP A.B button and the FUNCTION button at the same time switches the Transceiver to the duplex mode. Refer to "Duplex Feature" on Page 2-26 for more information about duplex operation.
3. We recommend that you allocate the A-VFO to the VHF band and the B-VFO to the UHF band. **All of the examples in this Manual assume that the VFOs are set this way.**

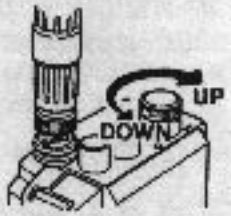
SETTING THE TRANSMITTER FREQUENCY

You can use either the Rotary Channel Selector or the keyboard to set the transmitter frequency.

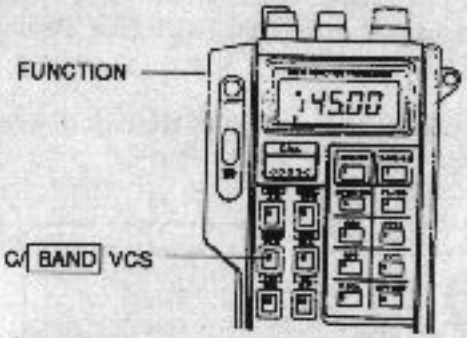
To use the ROTARY CHANNEL SELECTOR, just rotate the knob clockwise to increase the frequency or counterclockwise to decrease the frequency, until you obtain the frequency you desire. This knob normally changes the frequency in 5 kHz steps. Refer to "Changing the Channel Step" on Page 2-30 for information about changing this step rate to 10 kHz, 12.5 kHz, 20 kHz, 25 kHz, or 50 kHz.



To change frequency in 100 kHz steps, hold the FUNCTION button down while you turn the ROTARY CHANNEL SELECTOR.

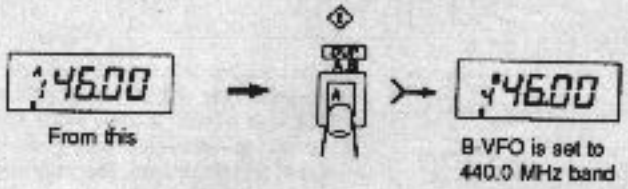


To use the keyboard, press the 0 through 9 buttons to select the frequency you desire (beginning with the MHz digit).



If you wish to select 448.80 MHz, for example, perform the following steps:

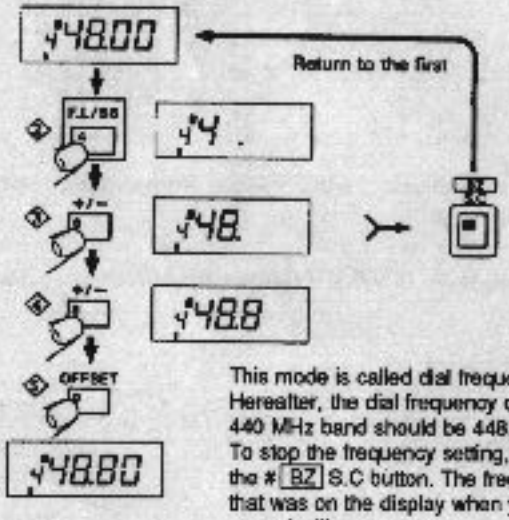
1. Select the B-VFO, if this has not already been done.



2. Press the 4 button to set the 10 MHz digit. The display will change to 44.

3. Press the 8 button to set the 1 MHz digit. The display will change to 448.

4. Press the 8 button to set the 100 kHz digit. The display will change to 448.8.

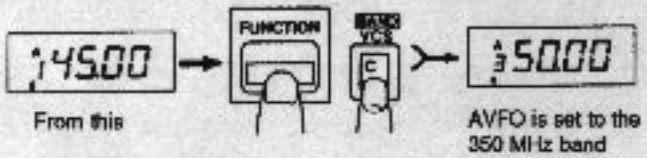


This mode is called dial frequency. Hereafter, the dial frequency on the 440 MHz band should be 448.8 MHz. To stop the frequency setting, depress the * BZ S.C button. The frequency that was on the display when you started will reappear.

5. Press the 0 button to set the 10 kHz digit. NOTE: After you have pressed three numerical button as described in steps 2 through 4, you will hear a long beep. This long beep indicates that frequency selection is complete.

SELECTING THE BAND [C/BAND VCS]

This button allows you to change the band to VHF or UHF in the same VFO. To use this feature, hold the FUNCTION button while you press the C/BAND VCS button. If the frequency was between 130.00 and 169.995 MHz before you pressed these buttons, it will change to the 350 MHz band. Pressing these two buttons again changes it to 446.00 MHz. If the frequency was between 418.00 and 469.995 MHz, it will change to 146.00 MHz. Pressing these two buttons again changes it to 350.00 MHz. A third press of these buttons changes it to 446.00 MHz. NOTE: This feature works only in the VFO mode.

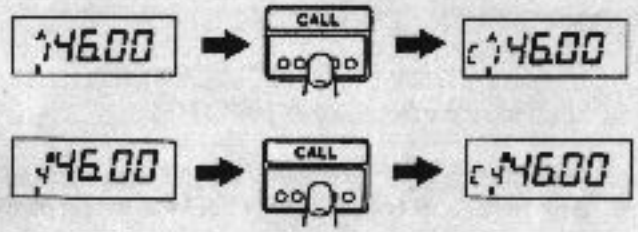


From this

AVFO is set to the 350 MHz band

NOTE: As was mentioned earlier, we recommend that you set the A-VFO to the VHF band and the B-VFO to the UHF band.

PRIORITY RECALLING OF 446.00 MHZ AND 146.00 MHZ [CALL]



To recall 146.00 MHz to the display, press the CALL button while the A-VFO is being displayed.

To recall 446.00 MHz to the display, press the CALL button while the B-VFO is being displayed.

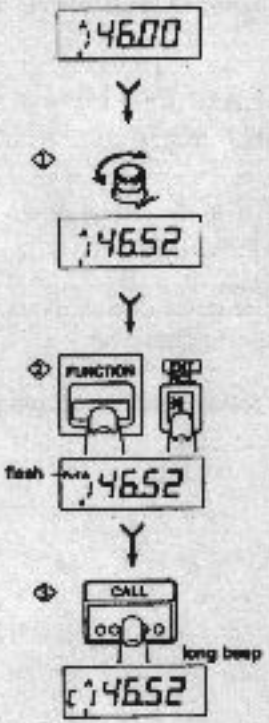
Depress the CALL button again to redisplay the original non-priority frequency.

NOTE: The A and B VFOs are initially set to priority frequencies of 146.00 MHz and 446.00 MHz, respectively. To change the Call frequency to 146.52 MHz, for example, perform the following steps:

1. Use the ROTARY CHANNEL SELECTOR or the keyboard to set the frequency to 146.52 MHz.

2. Press the */ENT RCL button while you depress and hold the FUNCTION button. A letter "M" will appear on the display.

3. Press the CALL button. A long beep indicates that frequency setting is complete. You can now use the procedure described earlier to recall 146.52 MHz as your priority frequency.



PLACING FREQUENCIES IN MEMORY [*/ENT RCL]

Your Transceiver has provisions for twenty memory frequencies (or channels). You can easily recall, change, and scan these frequencies. Each memory channel is assigned a memory address number. The memory address numbers for the A-VFO are A-M0 through A-M9, while the B-VFO numbers are B-M0 through B-M9. In addition to frequencies, your Transceiver can remember repeater requirements such as offset frequencies and shift directions (+ or -).

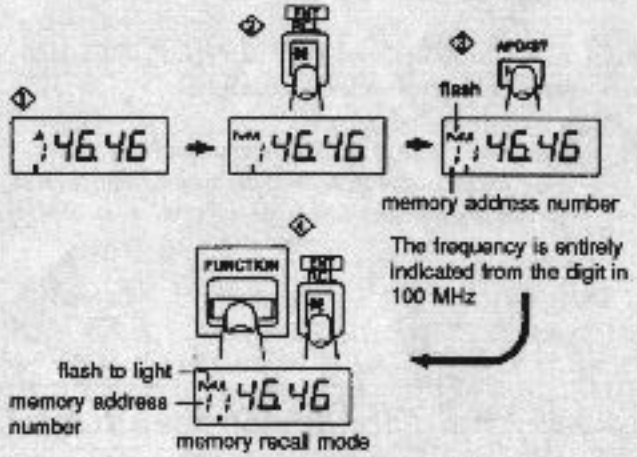
To place the frequency 146.46 MHz in memory location A-M1, for example, perform the following steps:

1. Set the A-VFO to the 146.46 MHz.

2. Press the */ENT RCL button. A letter "M" will appear on the display.

3. Press the 1 button to recall memory address A-M1. The "M" on the display will now flash and the memory address number will be displayed.

4. Hold down the FUNCTION key while you press the */ENT RCL button. A long beep indicates that the memorization process is complete. In addition, the "M" will remain on the display to indicate that the Transceiver is in the memory recall mode.



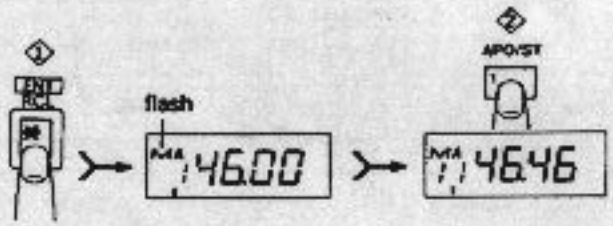
NOTE: To exit the memory recall mode (M still appears on the display), you can press the #/BZ S.C button or the B/DUAL VFO button.

RECALLING A MEMORY FREQUENCY [*/ENT RCL]

To recall a frequency that has already been set into memory A-M1, perform the following steps:

1. Select the A-VFO and press the */ENT RCL button. A letter "M" will appear on the display.

2. Press the 1 button to recall memory address A-M1. The memory address number and corresponding frequency of 146.46 MHz will be displayed.

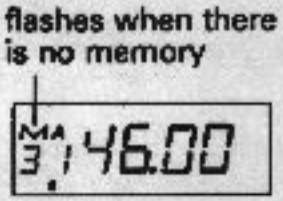


NOTES:

1. If you desire to recall a different memory address frequency while the Transceiver is in the memory recall mode, just press one of the other numeric buttons.

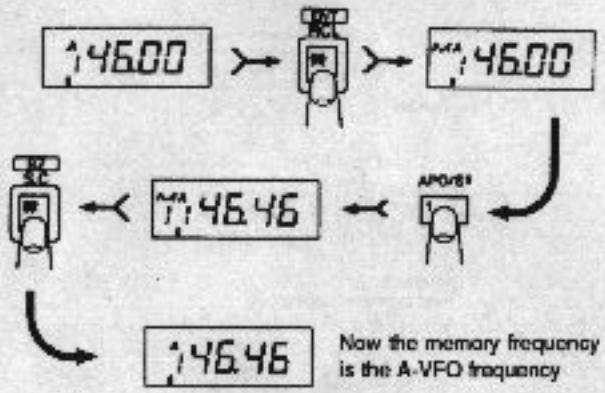
2. While the Transceiver is in the memory recall mode, the Rotary Channel Selector is operational so you can sequentially change the memory channel up or down. This allows you to recall memory frequencies from the A-VFO and the B-VFO, one after the other.

3. When you select a memory address that does not yet contain a frequency, an "M" on the display will flash and the dial frequency will be displayed.



LOADING A MEMORY FREQUENCY INTO A VFO (*/BZ S.C.)

The #/BZ S.C. button allows you to change the recalled frequency to the dial frequency (memory shift) when the Transceiver is in the memory recall mode.



NOTE: In addition to memory shift, the B/DUAL VFO button allows you to set the dial frequency mode by releasing the memory recall mode.

CHANGING A MEMORY FREQUENCY

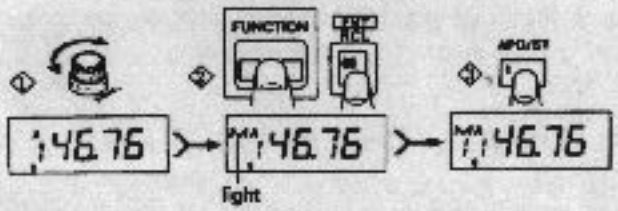
Any time you enter a new frequency into a memory address, the old frequency is deleted.

To memorize 146.76 MHz in memory address A-M1 without recalling the present frequency of 146.46 MHz, for example, perform the following steps:

1. Use the ROTARY CHANNEL SELECTOR or the numeric buttons from the dial mode to set the frequency to 146.76 MHz.

2. Hold the FUNCTION button down while you press the */ENT RCL button. An "M" will appear on the display.

3. Push the 1 button to select memory address number 1. A long beep indicates that the new frequency has been placed into memory.



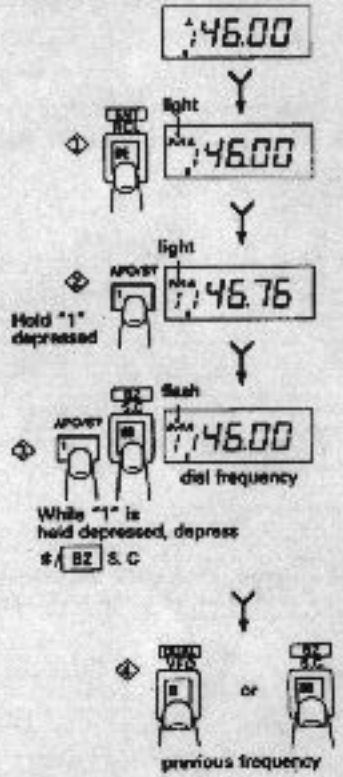
DELETING A MEMORY FREQUENCY

If you wish to delete the frequency that is stored in A-M1, for example, perform the following steps:

1. Press the */ENT RCL button. An "M" will appear on the display.

2. Hold down the 1 button while you press the #/BZ S.C. button. You will hear a long beep, which indicates that the frequency has been deleted. In addition, the "M" on the display will flash to indicate that the memory address is empty.

3. Press the B/DUAL VFO button or the #/BZ S.C button to recall the previous dial frequency mode.



SETTING AN OFFSET FREQUENCY

[0/OFFSET]

By selecting the proper offset frequency, you can use your Transceiver with most amateur repeaters. The offset frequencies you select for each VFO and memory address, however, must agree with the following groups:

A-VFO, A-M0, A-M2 — A-M9	Group 1
A-M1	Group 2
B-VFO, B-M0, B-M2 — B-M9	Group 3
B-M1	Group 4

NOTE: Offset frequencies must be between 0.000 and 39.995 MHz.

Select the VFO you desire or the memory recall mode. NOTE: When no frequency has been entered in memory addresses A-M1 or B-M1, the offset frequency that is set in group 1 or 3 is used.

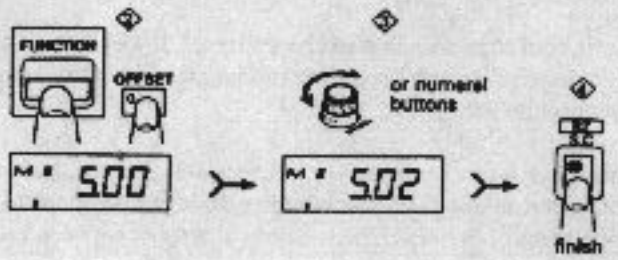
To set an offset frequency, perform the following steps.

1. Select the A or B VFO and the appropriate memory channel from the above table. NOTE: If no frequency has been set in the memory address you select, the offset frequency is the same as the dial frequency.

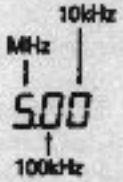
2. Hold down the FUNCTION button while you press the 0/ OFFSET button. The latest memory frequency will be displayed. NOTE: The initial settings of the A and B VFOs are 0.60 MHz and 5.00 MHz, respectively.

3. Use the ROTARY CHANNEL SELECTOR or the numeric buttons to select the new frequency. Now press the */ENT RCL button to enter this frequency.

4. Press the #/BZ S.C button to return to the previous mode.



NOTE: When you use the numeric buttons to set the offset frequency, enter the MHz digit first followed by the other two digits. Entry is complete when you enter three digits.



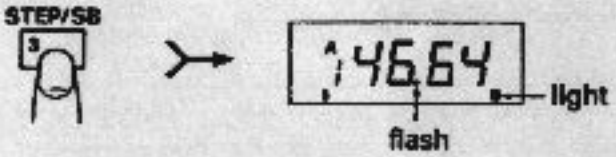
SCANNING

You can make the Transceiver scan in the dial-frequency mode or the memory-frequency mode. No matter which mode you choose, you can either pause scan or busy scan.

Pause scan ceases when it receives a signal. It will then resume scanning five seconds later or when the signal disappears, whichever occurs first.

Busy scan stops scanning when it receives a signal, but only resumes scanning 1-1/2 seconds after the signal disappears.
Each press of the 3/STEP/SB button alternates between pause and busy scan. A "B" appears on the display when busy scan is selected and disappears when pause scan is selected. The "B" does not appear on the display while the transceiver is in a non-scanning mode.

During scanning;



NOTES:

1. You can use the 1/APO/S▼ or 2/SAVE/S▲ buttons during scanning or a pause to decrease or increase the frequency one step per press.

2. Holding the 1/APO/S▼ or 2/SAVE/S▲ button down for more than 1/2 second continually and rapidly changes the frerquency.

3. When you press the #/BZ S.C or B/DUAL VFO buttons during scanning, the scanning operation will stop and the display will indicate the frequency at which it stopped.

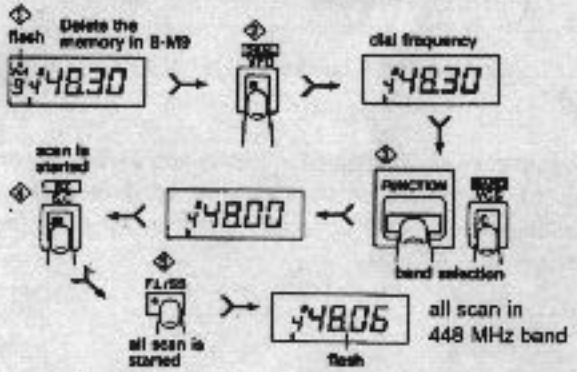
Dial-Frequency Scanning

This scanning mode can perform a 1 MHz scan, all scan, or program scan. The 1 MHz scan function causes the Transceiver to scan within a specified 1 MHz range of frequencies. All scan searches the entire VHF (4 MHz total) and UHF (10 MHz total) bands. Program scan performs a scanning operation either with or without a specified frequency.

1 MHz scan — If you press the #/BZ S.C button during the dial-frequency mode, scanning begins at the displayed frequency and then continues for 1 MHz. During this function, the decimal point in the frequency display will flash.

All scan — This function causes the Transceiver to scan the entire VHF (4 MHz) and UHF (10 MHz) amateur bands. The following steps assume that frequencies within the same band are stored in memory addresses B-M8 and B-M9.

1. Delete the frequencies in memory addresses B-M8 and B-M9 (refer to "Deleting a Memory Frequency").
2. Press the B/ DUAL VFO button to enter the dial-frequency mode.
3. Hold the FUNCTION button down while you press the C/ BAND VCS button to select the band that you wish to scan.
4. Press the #/ BZ S.C button to begin a 1 MHz scan.
5. Press the 4/F.L/SS button to begin all scan. Scanning starts at the frequency where the button is pressed.



NOTES:

1. Press the 4/F.L/SS button during all scan to return to a 1 MHz scan. Scanning begins at the frequency where the button was depressed.

2. You cannot tell from the display whether the Transceiver is performing a 1 MHz scan or an all-scan function. You can, however, use the 1/APO/S▼ or 2/SAVE/S▲ buttons to check which type of scan is being performed.

3. If you quit scanning and then wish to return to scanning, just press the #/BZ S.C button. The Transceiver will begin a 1 MHz scan function.

4. Turning the Transceiver off does not cancel scanning.

Program scan — This function allows you to scan a specified range of frequencies or scan a whole band of frequencies, excluding a frequency or range of frequencies you do not want to scan.

To scan a specific range of frequencies, store the lower frequency limit in B-M8 and the higher limit in B-M9. NOTE: Both frequencies should be in the same band.

To scan between 448.30 and 448.80 MHz, for example:

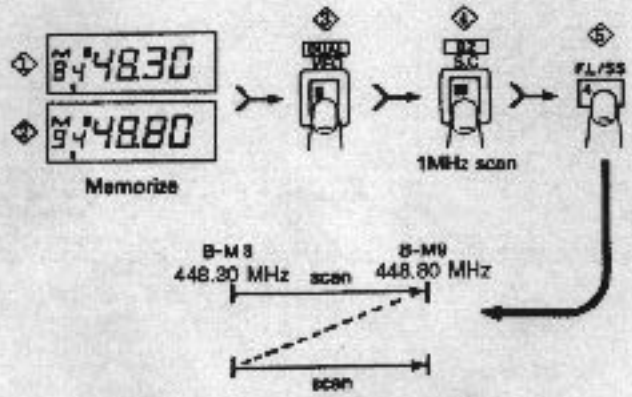
1. Store 448.30 MHz in B-M8.

2. Store 448.80 MHz in B-M9.

3. Press the B/ DUAL VFO button to enter the dial-frequency mode.

4. Press the #/ BZ S.C button to begin a 1 MHz scan.

5. Press the 4/F.L/SS button during the 1 MHz scan to begin program scan.



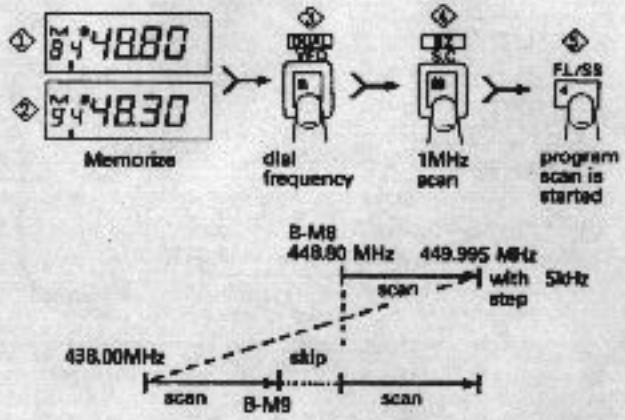
NOTE: Program scan always uses the frequencies that are stored in B-M8 and B-M9, even if 1 MHz scanning is performed in the A-VFO. To release program scan, press the 4/F.I./SS button. This returns to a 1 MHz scan which starts at the frequency where you press the button.

To scan an entire band except for a specific frequency or range of frequencies, store the higher frequency limit in B-M8 and the lower limit in B-M9. NOTE: Both frequencies should be in the same band.

To scan the UHF band except for 448.30 to 448.80 MHz, for example:

1. Store 448.80 MHz in B-M8.
2. Store 448.30 MHz in B-M9.
3. Press the B/ DUAL VFO button to enter the dial-frequency mode.
4. Press the #/ BZ S.C button to begin a 1 MHz scan.

5. Press the 4/F.L/SS button during the 1 MHz scan to begin program scan. NOTE: Even if the Transceiver is performing a 1 MHz scan in the A-VFO when you press this button, program scan will use the frequencies that are stored in B-M8 and B-M9.



Memory Frequency Scanning

This scanning mode can perform all-memory scan, A-memory scan, or B-memory scan. In addition, during a save operation, a save-memory scan occurs. The save memory scan is available during save operation. Memories are intermittently received in sequence according to the save timer. Within memory-frequency scanning there is normal memory scan (MSM I) and preferential scan among memory frequencies (MSM II). These are described separately below.

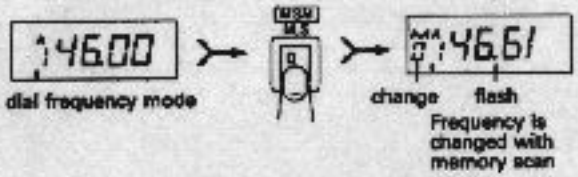
Normal Memory Scan — Press the D/ MSM M.S button to enter the memory scan mode. Only memory addresses that contain frequencies will be scanned, starting at the lower frequency and scanning upward.

Perform the following steps to perform an A-memory scan:

1. Press the A/ DUP A.B button to select either the A or B VFO. The display will indicate the VFO you have selected.

2. Press the D/ MSM M.S button to begin scanning within the VFO you have selected. The decimal point (scan indicator) on the display will flash.

3. Press the D/ MSM M.S button again to stop scanning. The memory recall mode is set at the frequency where you pushed this button. If you press the D/ MSM M.S button again, memory scan will begin with the next frequency.



Perform the following steps to perform an all-memory scan, which scans all of the frequencies that have been memorized in the A or B VFO.

1. Press the 4/F.L/SS button during memory scan to begin all-memory scan. The Transceiver can scan a maximum of 20 frequencies.

2. Press the 4/F.L/SS button again to restart scanning from the frequency where you press the button.

Memory Frequency Scanning

This scanning mode can perform all-memory scan, A-memory scan, or B-memory scan. In addition, during a save operation, a save-memory scan occurs. The save memory scan is available during save operation. Memories are intermittently received in sequence according to the save timer. Within memory-frequency scanning there is normal memory scan (MSM I) and preferential scan among memory frequencies (MSM II). These are described separately below.

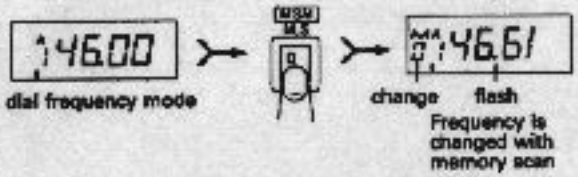
Normal Memory Scan — Press the D/ MSM M.S button to enter the memory scan mode. Only memory addresses that contain frequencies will be scanned, starting at the lower frequency and scanning upward.

Perform the following steps to perform an A-memory scan:

1. Press the A/ DUP A.B button to select either the A or B VFO. The display will indicate the VFO you have selected.

2. Press the D/ MSM M.S button to begin scanning within the VFO you have selected. The decimal point (scan indicator) on the display will flash.

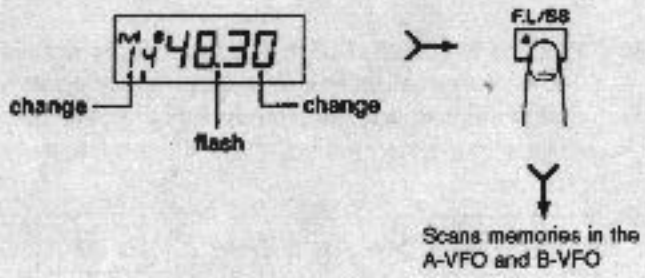
3. Press the D/ MSM M.S button again to stop scanning. The memory recall mode is set at the frequency where you pushed this button. If you press the D/ MSM M.S button again, memory scan will begin with the next frequency.



Perform the following steps to perform an all-memory scan, which scans all of the frequencies that have been memorized in the A or B VFO.

1. Press the 4/F.L/SS button during memory scan to begin all-memory scan. The Transceiver can scan a maximum of 20 frequencies.

2. Press the 4/F.L/SS button again to restart scanning from the frequency where you press the button.



NOTES:

1. A-VFO and B-VFO memory scan always starts after you release the scan mode; turning the Transceiver off does not release scanning.

2. You can press the 2/SAVE/S▲ button to increase the memory address one step. NOTE: You cannot, however, press the 1/APO/S▼ button to decrease the memory address.

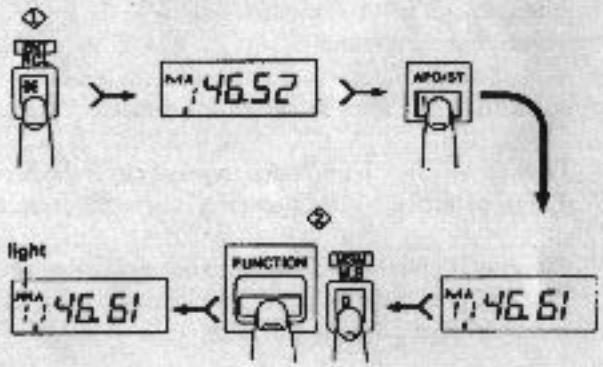
Preferential scan among memory frequencies (Memory Scan Memory) — This feature allows you to scan specific memory frequencies. A "▼" above the M on the display indicates whether each frequency in memory is an MSM frequency (appears only during non-memory recall).

Perform the following steps to set an MSM frequency:

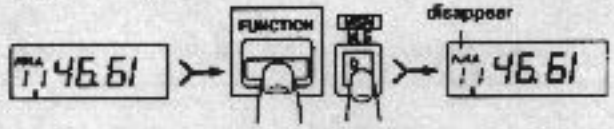
1. Press the */ ENT RCL button. Then press the numeric button that corresponds to the recall memory frequency you wish to set as an MSM.

2. Hold the FUNCTION button down while you press the D/ MSM M.S button. A "▼" will appear above the M on the display to indicate that the frequency has been set as an MSM frequency.

3. Repeat steps 1 and 2 for each memory frequency you wish to set as an MSM frequency.



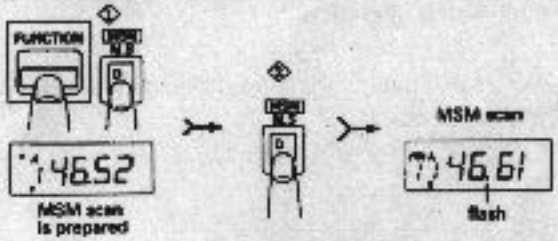
To delete an MSM frequency, recall the MSM frequency you wish to delete. Then hold down the FUNCTION button while you press the D/ MSM M.S button. The "▼" above the M on the display will disappear.



Perform the following steps to begin an MSM scan I, which scans all loaded memory frequencies:

1. To display an MSM frequency, or add one, hold down the FUNCTION button while you press the D/ MSM M.S button. A "▼" will appear on the display to indicate an MSM frequency.

2. Press the D/ MSM M.S button again to start the MSM scan.

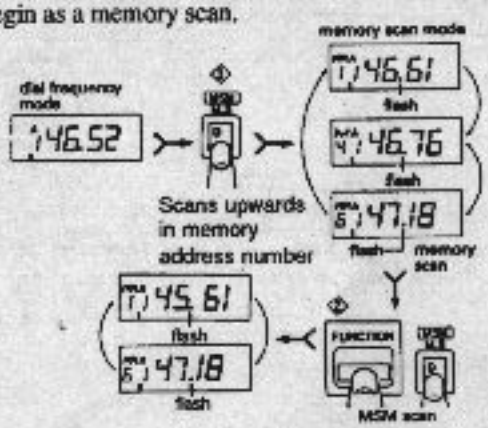


Perform the following steps to begin an MSM scan II, which scans only selected memory frequencies:

1. Press the D/ MSM M.S button to enter the memory scan mode.

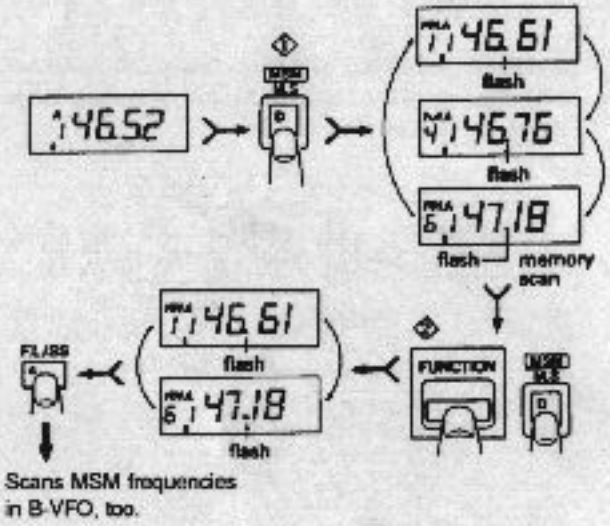
2. Hold down the FUNCTION button while you press the D/ MSM M.S button during memory scan to start the MSM scan.

3. Hold down the FUNCTION button and press the D/ MSM M.S button again to release MSM scan. Scanning will now begin as a memory scan.



NOTE: Memory scan always scans upward by memory address numbers.

Perform the following steps to begin an all-MSM scan; press the 4/F.L/SS button during an MSM scan. This causes the Transceiver to scan all of the MSM frequencies in the A and B VFOs in sequence. Now press the 4/F.L/SS button again to begin A or B-memory scan from the frequency where you press the button.



DUAL WATCH [B/ DUAL VFO]

Your Transceiver can provide you with the following types of dual-watch operation:

1. Listen on the dial frequency and memory frequency A-M1 or B-M1.

2. Listen on the dial frequency and a memory frequency other than A-M1 and B-M1.

3. Listen on the dial frequency and memory scan frequencies (or MSM scan frequencies).

NOTES:

1. The word "DUAL" is indicated on the display during dual-watch operation.

2. You can change the dial frequency during dual-watch operation.

3. During dual-watch operation, the Transceiver receives the memory frequency or calling frequency once every three seconds (instantly) and instantaneously displays its frequency upon reception.

4. When the memory frequency or a recall is received, dual-watch operation pauses.

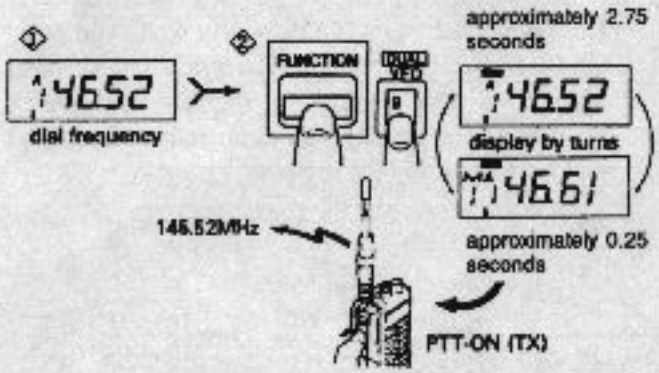
5. When a signal is received on the dial frequency during dual-watch operation, some combinations of fequencies may cause the signal to be noisy.

6. If you rotate the SQL control fully counterclockwise during dual-watch operation with a memory frequency the operation will pause.

7. You can press the PTT button to transmit at the dial frequency during dual-watch operation. To return to dual watch, simply release the PTT button.

8. If a station calls you on the memory frequency, first release the dual-watch operation. You can then communicate at the recalled memory address.

To operate dual watch with the dial frequency and memory address A-M1 or B-M1, first set the dial frequency mode. Then hold down the FUNCTION button while you press the B/ DUAL VFO button. The display will indicate "DUAL" to indicate that the Transceiver is operating in dual watch.

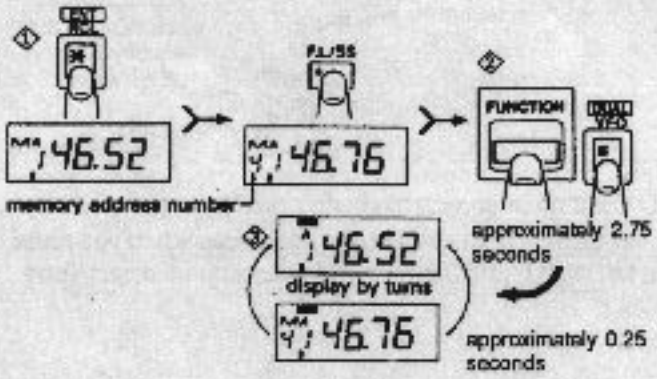


NOTE: If no frequency has been stored in memory address A-M1 or B-M1, you will hear a short beep when you press the D/ DUAL VFO button to indicate an incorrect entry.

To operate dual watch with the dial frequency and a memory address other than A-M1 or B-M1, perform the following steps:

1. Recall a memory frequency that you wish to use in the dual watch.

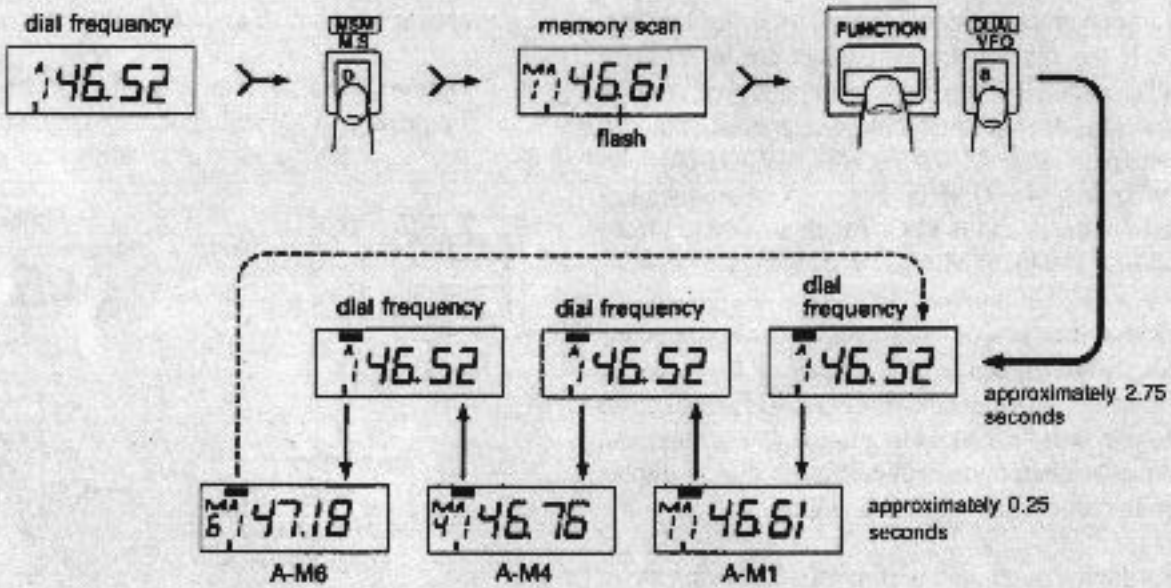
2. Hold down the FUNCTION button while you press the B/[DUAL]VFO button. The word "DUAL" will appear on the display to indicate dual-watch operation. The display will alternately indicate the dial frequency and the memory frequency.



To operate dual watch with the dial frequency and a memory-scanning frequency or an MSM scan frequency, perform the following steps. NOTE: You can dual watch with the dial frequency and up to ten memory frequencies. Dual watch with all memory scan is not possible.

1. Set the memory-scan mode.

2. Hold down the FUNCTION button while you press the B/[DUAL]VFO button. The word "DUAL" will appear on the display to indicate dual-watch operation. The display will sequentially indicate the dial frequency and the memory frequencies you have selected.



(Example for dual watch when there are memories in A-M1, A-M4 and A-M6.)

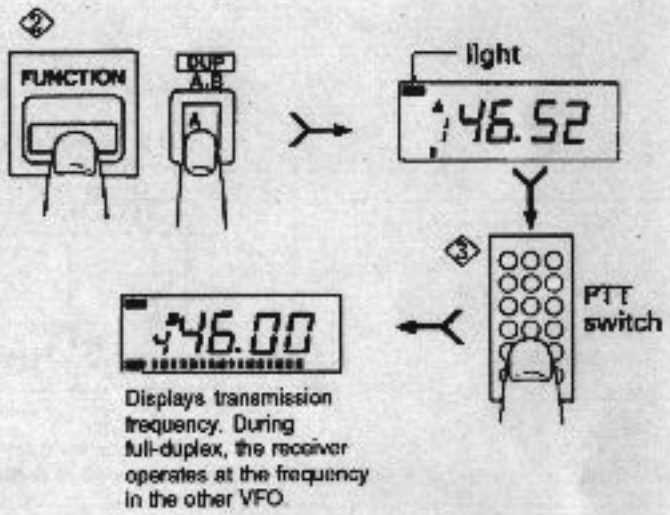
DUPLEX FEATURE [A/ DUP A.B]

Your Transceiver can operate duplex by using two frequencies. If the frequencies you select are in different bands (VHF and UHF), you can transmit and receive at the same time. This operates much like a telephone. You can either use frequencies in the A- and B-VFOs (such as 146.52 MHz and 446.00 MHz) , or you can use memory frequencies in the A and B VFOs (such as A-M1: 146.61 MHz and B-M1: 443.30 MHz).

NOTE: Make sure you do not select a second frequency that is exactly three times the first frequency. If you set the A-VFO to 145.02 MHz and the B-VFO to 435.06 MHz, for example, you will hear a howling noise. We recommend that you use an earphone or headphones during duplex operation to reduce any possible howling.

To enable duplex operation, perform the following steps:

1. Set the receiver frequency you wish to use during the duplex operation.
2. Hold down the FUNCTION button while you press the A/ DUP A.B button. The word "DUP" will be appear on the display to indicate duplex operation.
3. Depress the PTT button to display the transmitter frequency. "TX" will appear on the display.



NOTE: You can use the A/ DUP A.B button to exchange the transmitter and receiver frequencies.

AUTO-POWER OFF [1/APO/S▼]

An Auto-power off feature is built into your Transceiver to conserve power. This takes effect 30 minutes after the keyboard, PTT button, and Squelch On/Off buttons have not been operated. The Transceiver will beep after approximately one minute of inactivity and then again at the end of 30 minutes. Power consumption is reduced to approximately 4 MA (sleep standby) by extinguishing the most of the display. Only "APO" will be indicated on the display.

NOTES:

1. When "APO" appears on the display, the receiver and transmitter are both disabled.

2. Even though power is reduced to a minimum when auto-power off occurs, be sure to turn the Transceiver off when you are finished using it.

Perform the following steps to enable the auto-power off feature:

1. Hold down the FUNCTION button while you press the 1/APO/S▼ button. "APO" will appear on the display to indicate auto-power off.

2. When 1 minute of inactivity passes, the Transceiver will beep and extinguish the display except for "APO". The Transceiver will then beep again after 30 minutes of inactivity.

3. Hold down the FUNCTION button while you press the 1/APO/S▼ button to release the auto-power off feature.

4. Press #/ BZ S.C button while "APO" is being displayed to release only sleep standby. NOTE: Auto-power off will still operate.

NOTE: You can use the A/ DUP A.B button to exchange the transmitter and receiver frequencies.

AUTO-POWER OFF [1/APO/S▼]

An Auto-power off feature is built into your Transceiver to conserve power. This takes effect 30 minutes after the keyboard, PTT button, and Squelch On/Off buttons have not been operated. The Transceiver will beep after approximately one minute of inactivity and then again at the end of 30 minutes. Power consumption is reduced to approximately 4 MA (sleep standby) by extinguishing the most of the display. Only "APO" will be indicated on the display.

NOTES:

1. When "APO" appears on the display, the receiver and transmitter are both disabled.

2. Even though power is reduced to a minimum when auto-power off occurs, be sure to turn the Transceiver off when you are finished using it.

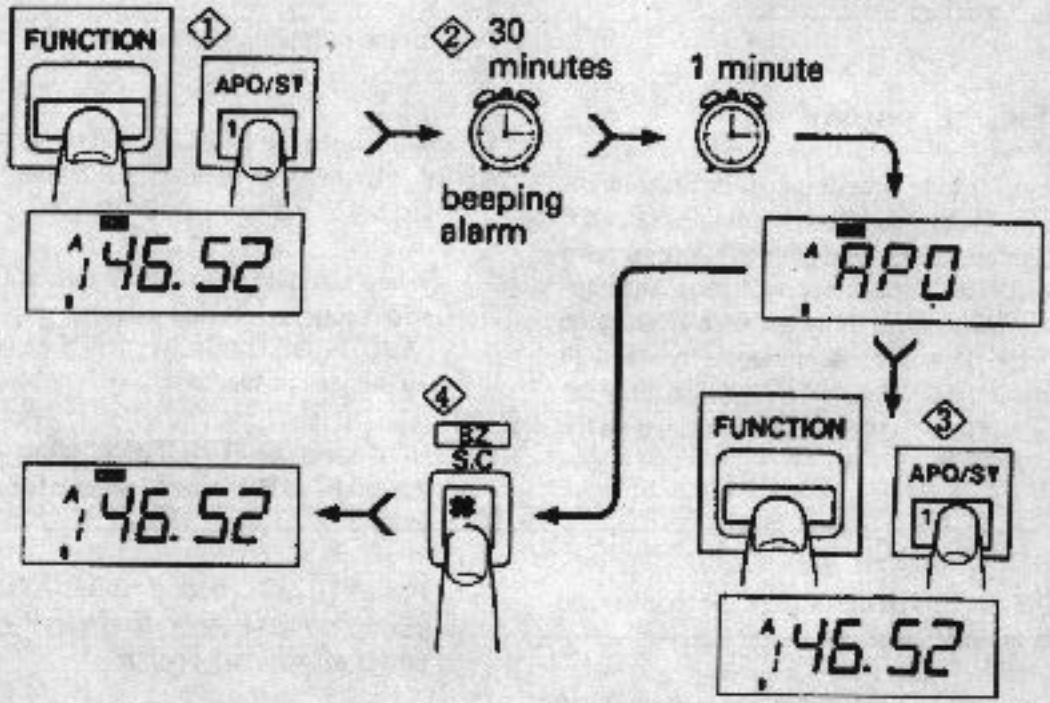
Perform the following steps to enable the auto-power off feature:

1. Hold down the FUNCTION button while you press the 1/APO/S▼ button. "APO" will appear on the display to indicate auto-power off.

2. When 1 minute of inactivity passes, the Transceiver will beep and extinguish the display except for "APO". The Transceiver will then beep again after 30 minutes of inactivity.

3. Hold down the FUNCTION button while you press the 1/APO/S▼ button to release the auto-power off feature.

4. Press #/ BZ S.C button while "APO" is being displayed to release only sleep standby. NOTE: Auto-power off will still operate.

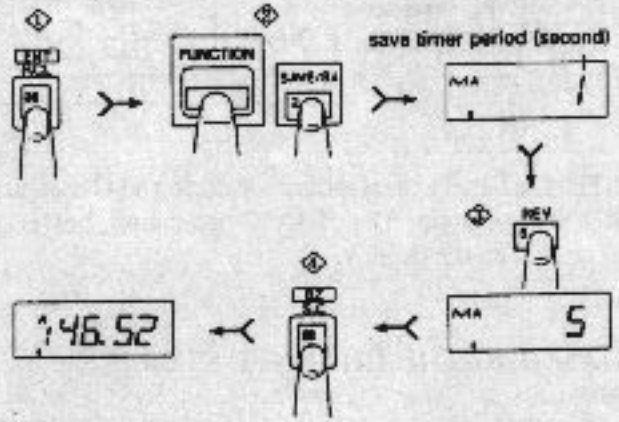

FUNCTION
1
APO/ST
2
30
minutes
1 minute
beeping
alarm
APO
3
FUNCTION
APO/ST
4
BZ
S.C
146.52
146.52
146.52

BATTERY SAVE [2/SAVE/S▲]

Nine selectable save-timer periods allow you to conserve power consumption.

Perform the following steps to set the save timer:

1. Press the */ ENT RCL button.
2. Hold down the FUNCTION button while you press the 2/SAVE/S▲ button. The frequency display will extinguish except for a single digit, which corresponds to the save timer period. If the digit is a 5, it indicates that the save timer is set to receive once every 5 seconds.
3. Press the numeric button that corresponds to the save timer period you desire. NOTE: As you set the timer to higher numbers, you will save more battery power, but the chances of missing the first part of a received transmission become greater.
4. Press the #/ BZ S.C button to set return to the previous mode.



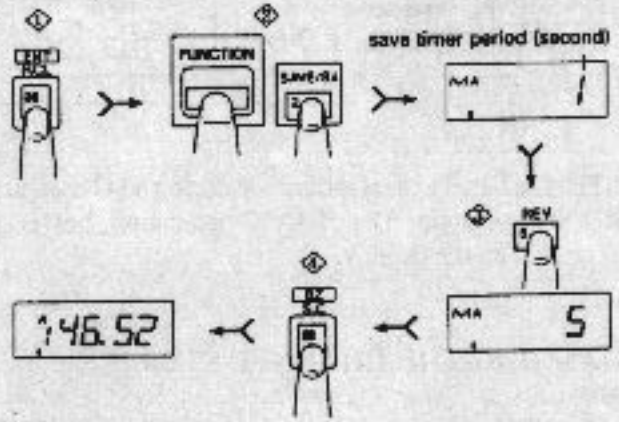
To operate the battery saver, hold down the FUNCTION button while you press the 2/SAVE/S▲ button. The word "SAVE" will appear on the display to indicate that the battery saver feature is enabled. To release the battery saver, hold down the FUNCTION button while you press the 2/SAVE/S▲ button again.

BATTERY SAVE [2/SAVE/S▲]

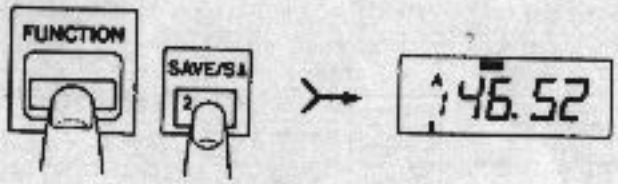
Nine selectable save-timer periods allow you to conserve power consumption.

Perform the following steps to set the save timer:

1. Press the */ ENT RCL button.
2. Hold down the FUNCTION button while you press the 2/SAVE/S▲ button. The frequency display will extinguish except for a single digit, which corresponds to the save timer period. If the digit is a 5, it indicates that the save timer is set to receive once every 5 seconds.
3. Press the numeric button that corresponds to the save timer period you desire. NOTE: As you set the timer to higher numbers, you will save more battery power, but the chances of missing the first part of a received transmission become greater.
4. Press the #/ BZ S.C button to set return to the previous mode.



To operate the battery saver, hold down the FUNCTION button while you press the 2/SAVE/S▲ button. The word "SAVE" will appear on the display to indicate that the battery saver feature is enabled. To release the battery saver, hold down the FUNCTION button while you press the 2/SAVE/S▲ button again.



NOTE: The battery saver is disabled during VFO scanning and VSC operation. The "SAVE" indication, however, will remain on the display.

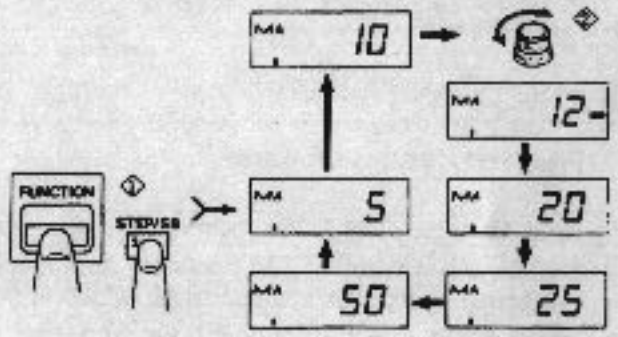
CHANGING THE CHANNEL STEP

[3/STEP/SB]

You have the option of setting your Transceiver's step rate to 5 kHz, 10 kHz, 12.5 kHz, 25 kHz, or 50 kHz. To change the step rate:

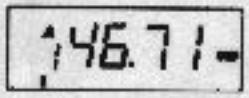
1. Hold down the FUNCTION button while you press the 3/STEP/SB button. The frequency display will extinguish and indicate the current step rate.

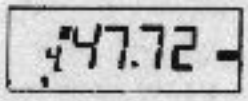
2. Rotate the ROTARY CHANNEL SELECTOR and note that the step rate changes.



3. Set the ROTARY CHANNEL SELECTOR to the step rate you desire. Then press the #/BZ S.C button to return to the previous mode.

NOTE: When you have the step rate set to 12.5 kHz, the kHz digits of the dial frequency is shown in a small black box on the right side of the display.



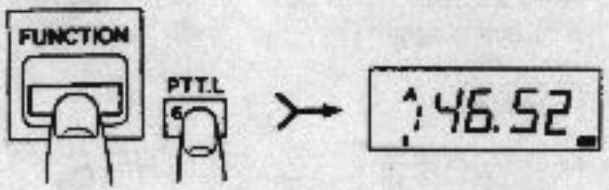


PTT LOCK [6/PTT.L]

This function allows you to disable the PTT button to help reduce the chance of accidental transmission. To disable the PTT button:

1. Hold down the FUNCTION button while you press the 6/PTT.L button. A "P.L" will be indicated on the display to indicate that the PTT circuitry is disabled. Pressing the PTT button will have no effect.

2. To enable the PTT circuitry, hold down the FUNCTION button while you press the 6/PTT.L button again.



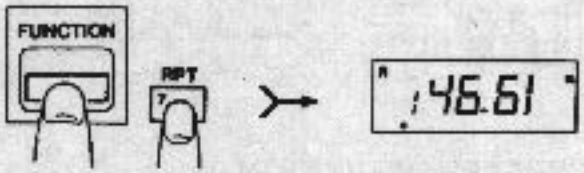
REPEATER OPERATION [7/RPT]

During repeater operation, the receiver and transmitter need to operate on different frequencies. The following steps show you how to setup the Transceiver for repeater operation.

1. Set the Transceiver to the frequency of the repeater.

2. Hold down the FUNCTION button while you press the 7/RPT button. The display will indicate [-] or [+] to show whether the transmitter will operate lower or higher than the receiver (dial) frequency.

3. To return to normal nonrepeater operation, hold down the FUNCTION button while you press the 7/RPT button again. The - or + will extinguish.



NOTES:

1. Your Transceiver was initially set for a 600 kHz offset on VHF (A-VFO) and a 5 MHz offset on UHF (B-VFO).

2. You can set the A and B VFOs for repeater operation.

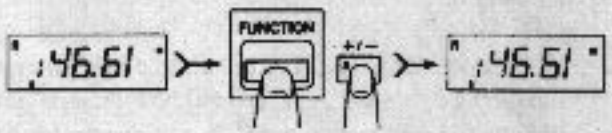
3. It is possible to set the transmitter offset to a frequency that is outside of the amateur bands. If you attempt to transmit outside of the amateur bands, the PTT button will be disabled and the display will indicate "OFF".

SWITCHING ⊞ / ⊟ SHIFT [8/+/-]

Your Transceiver is initially set for a 5 MHz offset, 100.0 Hz tone, and negative (-) shift. To change the shift:

1. Set up the Transceiver for repeater operation as described above.

2. Hold down the FUNCTION button while you press the 8/⊞/⊟ button. The shift will alternate between ⊞ and ⊟ each time you press the button. Be sure to leave the shift set to "-" for normal repeater operation.



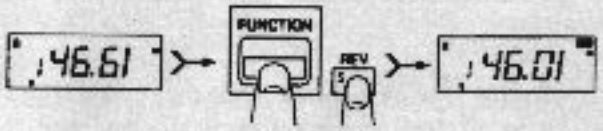
NOTE: If you attempt to set the shift without first setting the Transceiver for repeater operation, you will hear a short beep.

EXCHANGING TRANSMITTER AND RECEIVER FREQUENCIES DURING REPEATER OPERATION [5/REV]

Use the following procedure to interchange the transmitter and receiver frequencies. This feature is handy for listening to the other station without going through a repeater.

1. Setup your Transceiver for repeater operation.

2. Hold down the FUNCTION button while you press the 5/REV button. "REV" will be indicated on the display to indicate that the transmitter and receiver frequencies have been exchanged.



3. To return to normal repeater operation, hold down the FUNCTION button and press the 5/REV button again. The "REV" will disappear from the display.

NOTE: If you attempt to use exchange frequencies without first setting the Transceiver for repeater operation, you will hear a short beep.

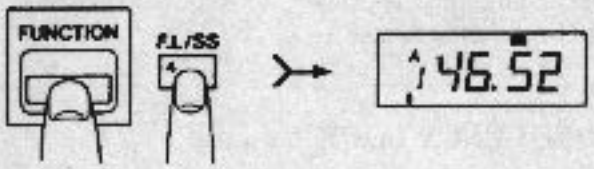
FREQUENCY LOCK [4/F.L/SS]

This feature allows you to lock the frequency and operating mode so they are not changed by accident. You can also use this feature during scanning and dual-watch operation to prevent improper operation.

To use this feature:

1. Hold down the FUNCTION button while you press the 4/F.L/SS button. "F.L." will appear on the display to indicate that the frequency is locked.

2. Hold down the FUNCTION button and the 4/F.L/SS button again to unlock the frequency.



TONE SQUELCH CONTROL [9/T.SQL]

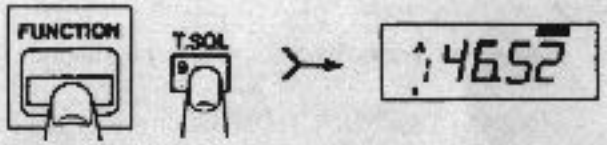
The tone squelch (CTCSS) feature allows the receiver in your Transceiver to remain quiet, except when certain stations call you. In addition, some repeaters require a tone to be present before you can access them.

NOTE: You must select the required tone before you attempt tone squelch operation.

To use the tone squelch during nonrepeater operation:

1. Hold down the FUNCTION button while you press the 9/T.SQL button. "T.SQL" will appear on the display to indicate that the tone squelch is turned on.

2. Hold down the FUNCTION button and press the 9/T.SQL button again to disable the tone squelch. "T.SQL" will disappear from the display.



NOTES:

1. Tone squelch operation is available in both A and B VFOs.

2. During repeater operation, the tone encoder and tone squelch circuitry are automatically switched.

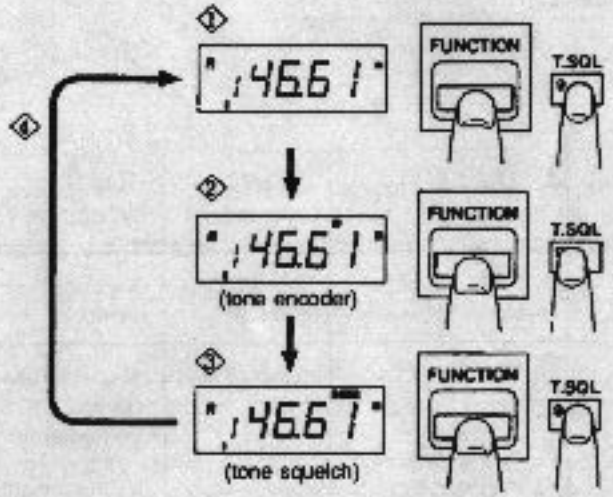
To use the tone squelch with repeaters:

1. Setup the Transceiver for repeater operation.

2. Hold down the FUNCTION button while you press the 9/T.SQL button. A "T" will appear on the display to indicate that the tone encoder is enabled.

3. Hold down the FUNCTION button while you press the 9/T.SQL button again. "SQL" will also appear on the display to indicate that the tone squelch (CTCSS) operation is enabled.

4. Hold down the FUNCTION button while you press the 9/T.SQL button a third time to disable tone encoder and tone squelch operation. The "T" and the "SQL" will disappear from the display.



NOTE: You can use the A and B VFOs to setup the Transceiver for repeater operation. In addition, you can independently use A-M1 and B-M1 for repeater operation.

Table 2-2 shows you how the tone frequencies are grouped.

Table 2-2

Group	Operating Mode	Normal Operation	Repeater Operation
1	A-VFO, A-CALL, A-M0, A-M2—A-M9	Memory Tone Group 1	Memory Tone Group 1
2	A-M1	Memory Tone Group 1	Memory Tone Group 2 (independent)
3	B-VFO, B-CALL, B-M0, B-M2—B-M9	Memory Tone Group 3	Memory Tone Group 3
4	B-M1	Memory Tone Group 4	Memory Tone Group 4 (independent)

Tone memory groups 1 and 3 may be used when you do not use repeater operation. All four tone memory groups may be used during repeater operation.

You can select any one of the thirty seven tones shown in Table 2-3.

Table 2-3

AVAILABLE TONE FREQUENCIES (in Hz)			
67.0	100.0	141.3	203.5
71.9	103.5	146.2	210.7
74.4	107.2	151.4	218.1
77.0	110.9	156.7	225.7
79.7	114.8	162.2	233.6
82.5	118.8	167.9	241.8
85.4	123.0	173.8	250.3
88.5	127.3	179.9	
91.5	131.8	186.2	
94.8	136.5	192.8	

To set one of the available tones into memory:

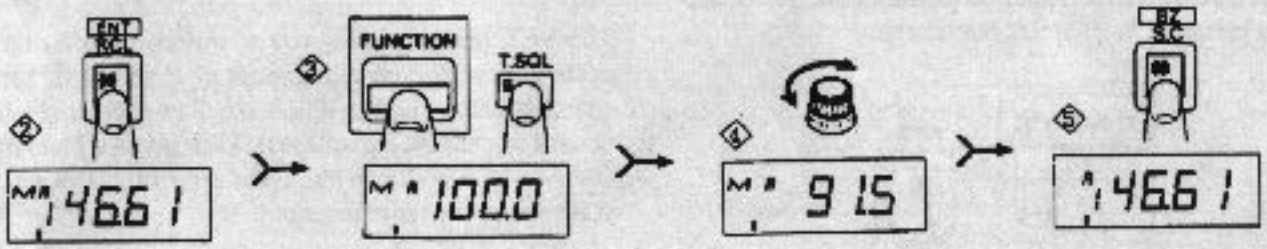
1. Set the VFO or recall mode to the tone frequency. Set up for repeater operation, if you desire. NOTE: Refer to the Tone Memory Group Table. If you do not have frequencies in set memory addresses A-M1 and B-M1, the A-VFO group uses group 1 and the B-VFO uses group 3.

2. Press the */ ENT RCL button. An "M" will appear on the display.

3. Hold down the FUNCTION button while you press the 9/T.SQL button. The frequency will be extinguished from the display and a tone frequency will appear. NOTE: The tone frequency is initially set to 100.0 Hz.

4. Turn the ROTARY CHANNEL SELECTOR to select the tone frequency you desire.

5. Press the #/ BZ S.C button to return to the previous mode.



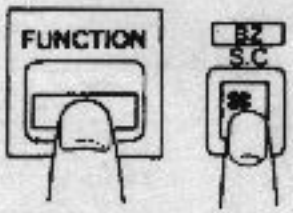
MUTING THE BUZZER [#/ BZ S.C]

Your Transceiver makes the following sounds:

Long beep ..... Proper operation
Beeping alarm ..... During auto-power off operation
Short beep ..... Improper operation
Pi ..... Proper key entry

To mute the buzzer, hold down the FUNCTION button while you press the #/ BZ S.C button.

To re-enable the buzzer, hold down the FUNCTION button and press the #/ BZ S.C button again.



NOTES:

1. The display does not indicate whether the buzzer is on or off. To check it, simply press one of the buttons and listen for one of the sounds listed above.

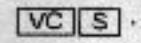
2. The auto-power alarms will always sound, even if they are muted.

VACANT CHANNEL SEARCH (VCS)

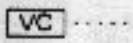
[C/ BAND VCS]

The VCS feature allows you to switch from a dial frequency or memory recalling mode to an automatic unused channel-search mode. When the Transceiver finds an unused frequency, it displays it. You can then press the C/ BAND VCS button to return to the previous frequency or you can use the new frequency

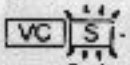
During VCS operation, your Transceiver may display the following:



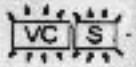
..... Can operate with new frequency.



..... Can operate with previous frequency.



..... Operating and displayed frequencies are different.



..... Searching vacant channels.

NOTES:

1. Press the #/ BZ S.C button during VCS operation to return to the previous mode.

2. You can use the numeric buttons to select a new frequency during VCS operation. You cannot, however, change the previous frequency.

The example on the next page shows you the proper way to switch from one frequency to another one.

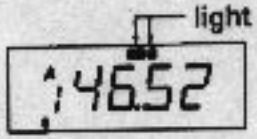
STATION A

1. Station A is communicating with station B on 146.46 MHz (dial-frequency mode).

2. Station A's operator presses the C/ BAND VCS button to begin a vacant channel search.

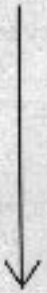
3. Station A's operator tells station B to switch to 146.52 MHz. While he does this, the transmit and receive frequencies are still 146.46 MHz.

4. Station A's operator press the C/ BAND VCS button to switch to 146.52 MHz.



STATION B

1. Station B is communicating with station A on 146.46 MHz (dial-frequency mode).



2. Station B is still communicating on 146.46 MHz, but he now uses the numeric buttons or the Rotary Channel Selector to switch to 146.52 MHz. Station B now communicates with station A on 146.52 MHz.

Now assume that station A wants to return to the previous frequency:

STATION A

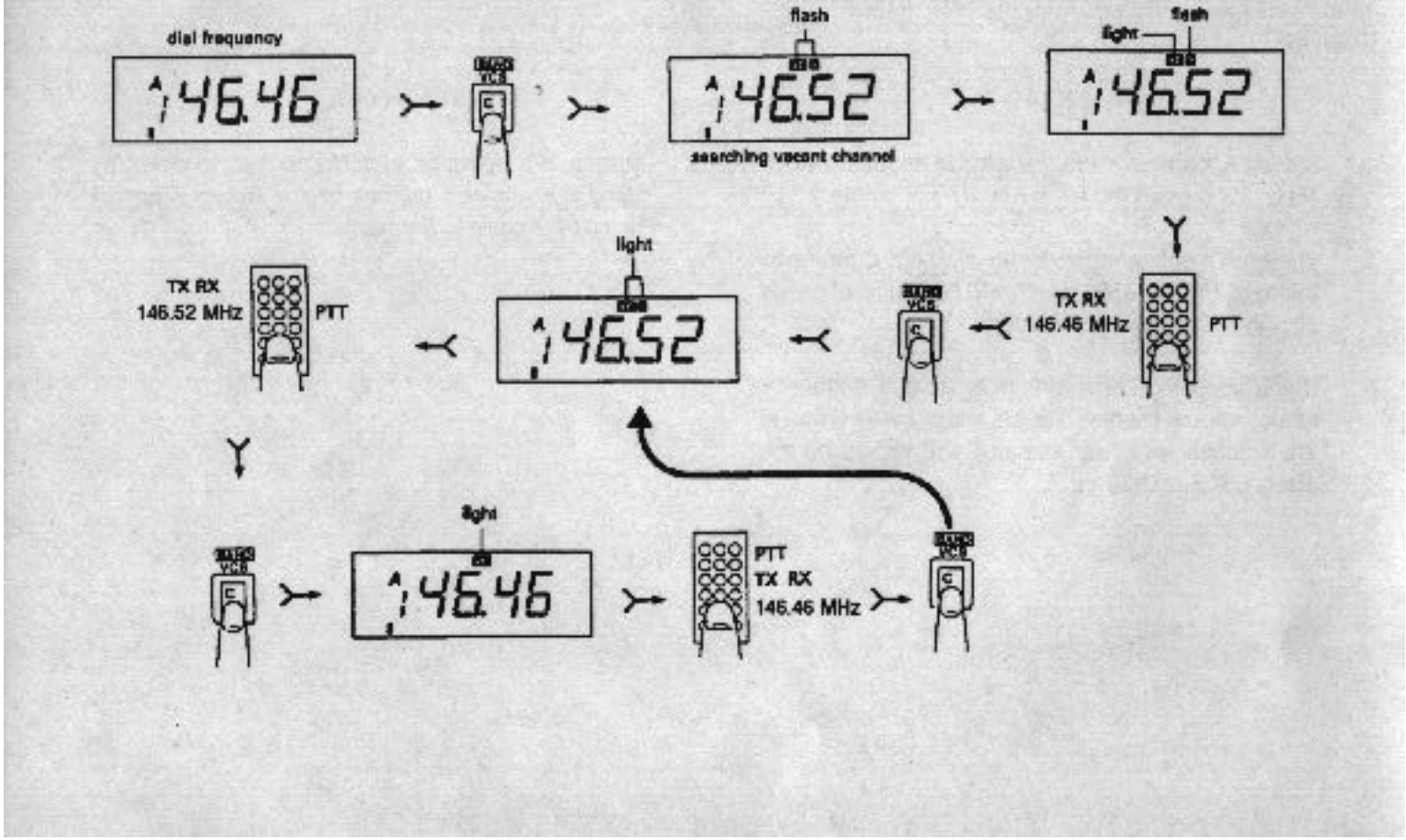
4. Station A's operator tells station B to return to 146.46 MHz and presses the C/ BAND VCS button.

5. Station A's operator presses the #/ BZ S.C button to return to 146.46 MHz, which will be indicated on his display (dial-frequency mode).

6. If you select VCS operation from the dial-frequency mode, vacant channel search starts automatically. The frequencies being searched will appear on the display. Return to Step 3.

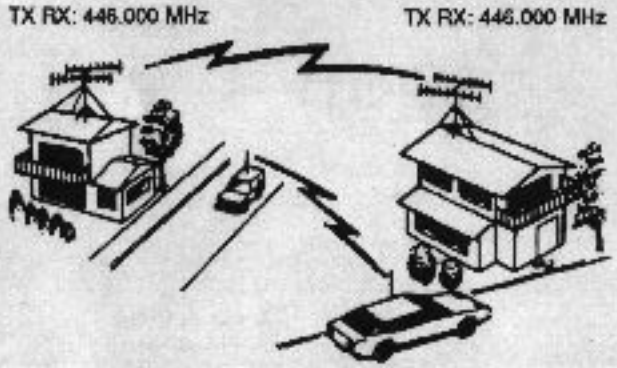
STATION B

3. Station B's operator switches to 146.46 MHz by using the numeric buttons or the Rotary Channel Selector. Return to Step 2.

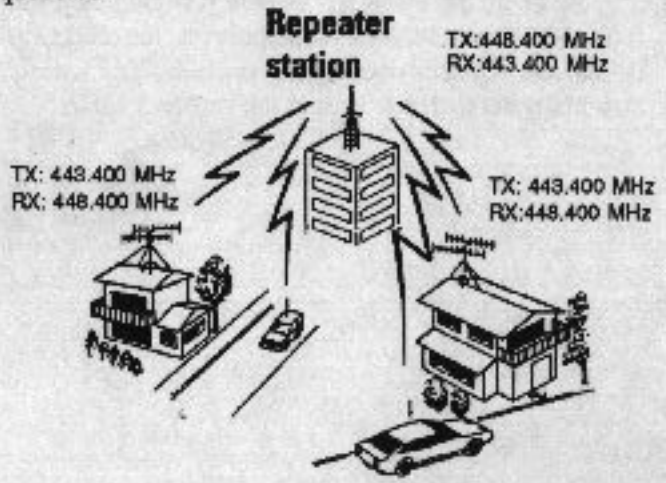

dial frequency
146.46
flash
146.52
searching vacant channel
light
flash
146.52
TX RX
146.52 MHz
PTT
light
146.52
TX RX
146.46 MHz
PTT
light
146.46
PTT
TX RX
146.46 MHz

USING YOUR TRANSCEIVER WITH A REPEATER

In a normal simplex (nonrepeater) communication, the your receiver and transmitter are set to the same frequency.



Repeaters (automatic relay stations), which are usually located on a high building or tower, allow you to communicate over longer distances than you can during simplex operation. This is particularly true when either your station or the other station (or both) are mobile stations. One of the major differences from your Transceiver's standpoint is that the transmitter and receiver are set to different frequencies.

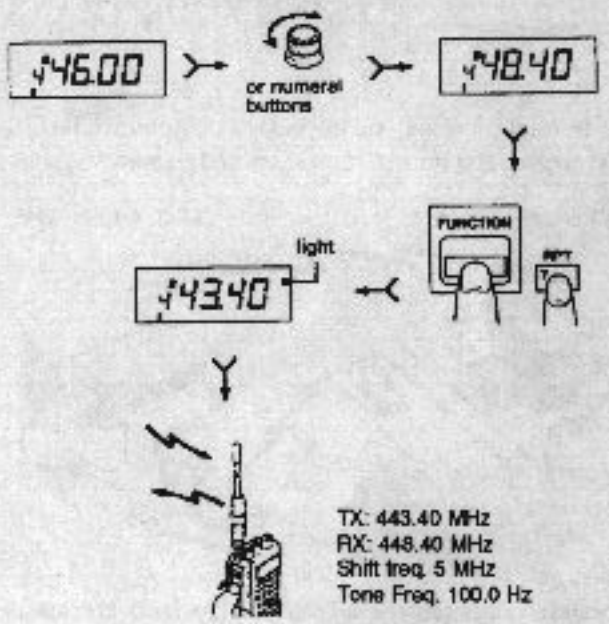


To set up your Transceiver for repeater operation on the UHF band (VHF works the same way):

1. Set your Transceiver to the B-VFO.

2. Set your Transceiver to the output frequency of the repeater you desire to use.

3. Hold down the FUNCTION button while you press the RPT/7 button. A "-" will appear on the display to indicate repeater operation is enabled. The tone is initially set to 100.0 Hz and the shift is 5 MHz.

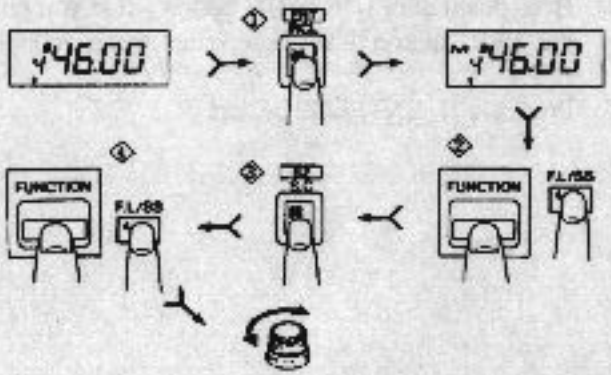


HELPFUL HINTS

CHANGING FREQUENCY WHILE IT'S LOCKED

Even through you may have the frequency locked, you can still use the Rotary Channel Selector to change frequencies. To do this:

1. Press the */ ENT RCL button. An "M" will appear on the display.
2. Hold down the FUNCTION button while you press the 4/F.L/SS button. You will hear a short beep, but this does not indicate an improper entry.
3. Press the #/ BZ S.C button.
4. Hold down the FUNCTION button while you press the 4/F.L/SS button.
5. You can now use the ROTARY CHANNEL SELECTOR to change the frequency.



6. Repeat steps 1 through 3 to release the Rotary Channel Selector.

CHANGING BETWEEN SEMI-DUPLEX AND FULL-DUPLEX

You Transceiver was initially set for full-duplex operation. To switch between full- and semi-duplex:

1. Hold down the FUNCTION button while you press the 7/RPT button to select repeater operation.
2. Press the */ [ENT] RCL button.
3. Hold down the FUNCTION button while you press the 8/+/- button. You may hear a short beep, but this does not indicate improper operation.
4. Press the #/ [BZ] S.C button.
5. Repeat steps 1 through 3 to return to full-duplex.

ABOUT THE BATTERY

Your Transceiver contains an internal battery (separate from the external battery pack) that preserves the contents of the memory, even when the Transceiver is turned off.

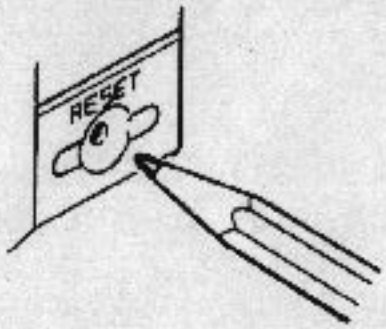
Typically, a new battery will last about five years, depending upon how often you use your Transceiver.

NOTES:

1. If the display does not indicate correctly when you turn the Transceiver on, the battery needs to be replaced.

2. After you replace the battery, turn the Transceiver on and use a sharp, nonmetalic object to press the RESET button.

3. Do not dispose of the battery in fire.



IN CASE OF DIFFICULTY

CONDITION	POSSIBLE CAUSE
Entire display flashes.	1. Weak lithium (internal) battery.
Incorrect frequency display.	1. Turn the unit on and use a slender, nonmetalic object to press the Reset button.
Frequency display changes when you turn the unit off and on.	1. Weak batteries.
Cannot receive any signals.	1. The receiver circuits are not operating. Press the SQL OFF button to check the receiver circuits. 2. SQL control is set too far clockwise.. 3. Tone squelch is enabled. 4. VOL control is fully counterclockwise.
Can only receive strong signals.	1. RF ATT button is depressed. 2. Antenna is incorrectly installed. 3. SQL control is set too far clockwise.

CONDITION	POSSIBLE CAUSE
Cannot transmit.	1. PTT switch is locked off. 2. Weak batteries.
Transmitter operates at the display frequency.	1. Hold down the Function button while you press the C/BAND VCS button so a flashing "S" appears on the display.
Cannot change the frequency.	1. Hold down the Function button while you press the 4/F.L/SS button to release the frequency lock. 2. Press the #/BZ S.C button to release memory calling.
No buzzer sounds.	1. Hold down the Function button while you press the #/BZ S.C button to unmute the buzzer.
The displayed frequency is incorrect, even after a reset.	1. Weak lithium (internal) battery.

YOUR HEATH ASSEMBLED PRODUCT ONE-YEAR LIMITED WARRANTY

Welcome to the Heath family. We believe you will be pleased with the performance of your new Heath assembled product. Please read this Consumer Protection Plan carefully. It is a "LIMITED WARRANTY" as defined in the U.S. Consumer Product Warranty and Federal Trade Improvement Act. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH'S RESPONSIBILITY

SERVICE — For a period of one year from the date of purchase, any malfunction caused by factory defective parts or workmanship will be corrected at no charge to you. Heath Company reserves the right to repair or replace the product, at their option. You must deliver the unit at your expense to the Heath factory, or any Heath/Zenith Computers and Electronics center (units of Vertechnology Electronics Corporation), or any of our authorized overseas distributors.

TECHNICAL CONSULTATION — You will receive free consultation on any problem you might encounter in the use of your Heath product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

NOT COVERED — Repair service, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Unauthorized modification of the product or of any furnished component will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, set-up time, or unauthorized service.

This warranty covers only Heath assembled products and is not extended to other equipment or components that a customer uses in conjunction with our products.

SUCH REPAIR AND REPLACEMENT SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE.

Some states do not allow the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

OWNER'S RESPONSIBILITY

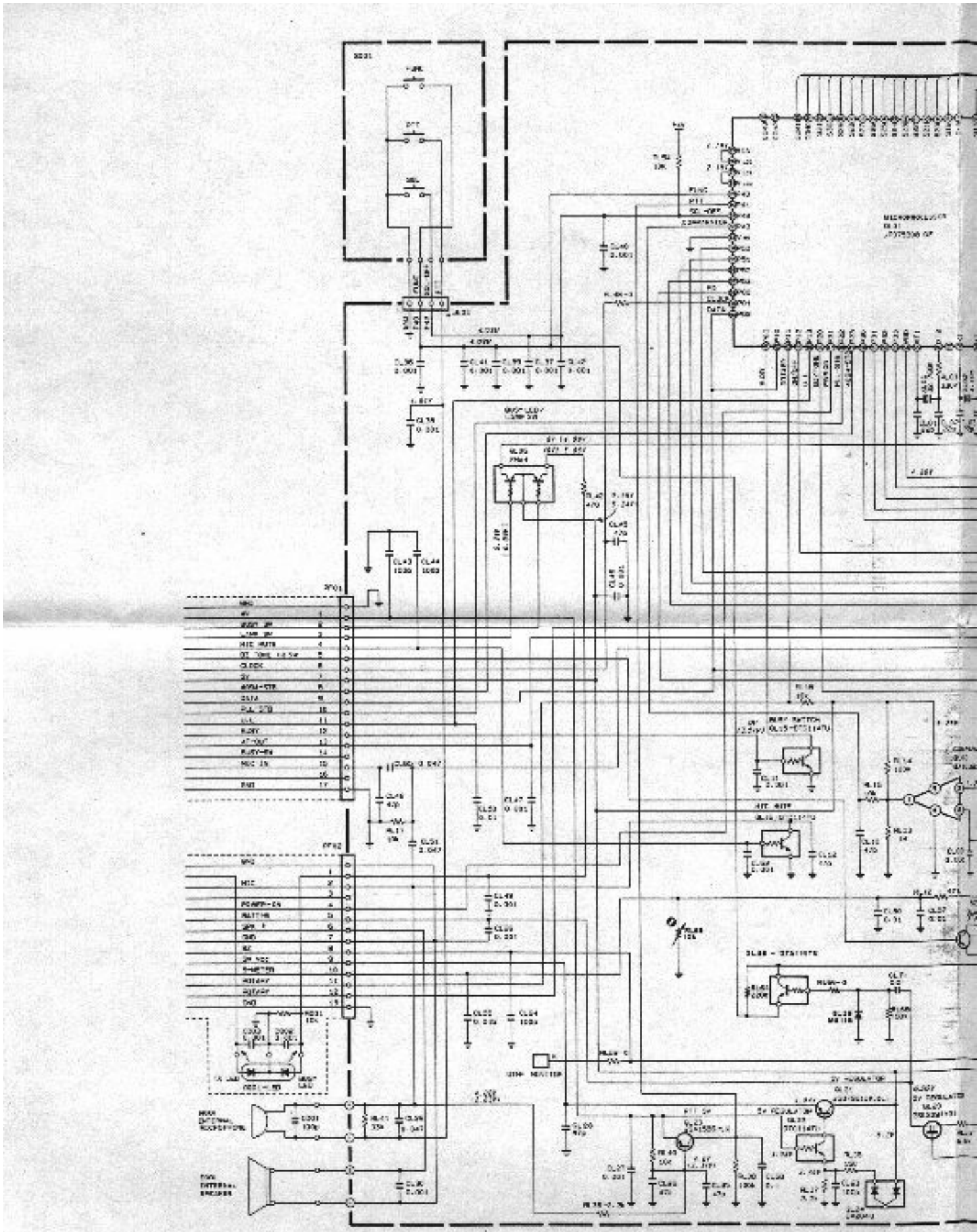
EFFECTIVE WARRANTY DATE — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service.

OPERATING MANUAL — Read your operating instructions carefully so that you will fully understand the proper operation and function of your product.

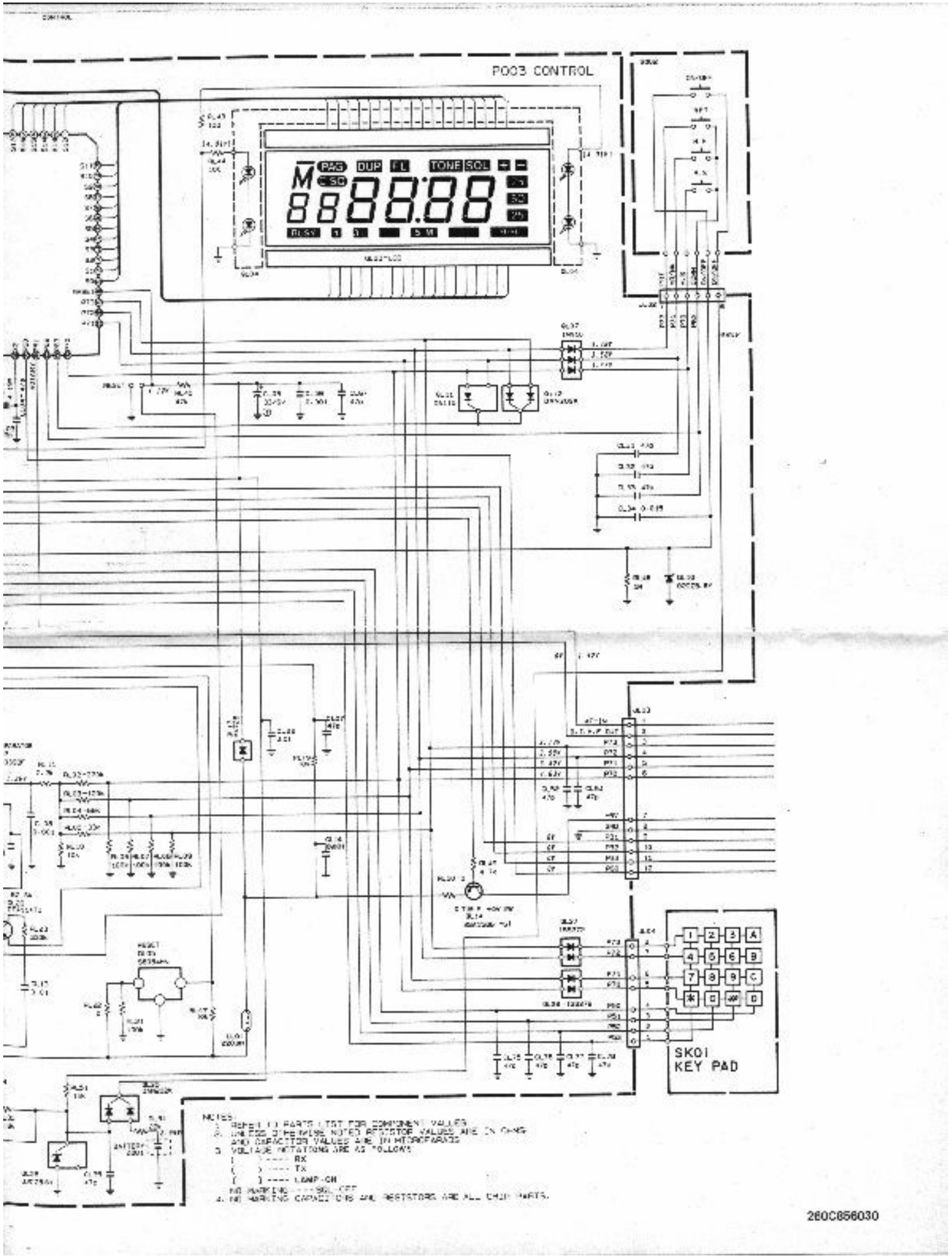
ACCESSORY EQUIPMENT — Performance malfunctions involving connections to (or interfacing with) other non-Heath equipment are not covered by this warranty and are the owner's responsibility.

SHIPPING UNITS — Follow the packing instructions published in your manual. Damage due to inadequate packing cannot be repaired under warranty.

If you are not satisfied with our service (warranty or otherwise) or our products, write directly to our Director of Customer Service, Heath Company, Benton Harbor MI 49022. He will make certain your problems receive immediate, personal attention.



Printed in Japan


P003 CONTROL
M
SC
P25
DUP
TONE
SCL
BUSY
SKO1
KEY PAD
NOTES:
1. REFER TO PARTS LIST FOR COMPONENT VALUES.
2. UNLESS OTHERWISE NOTED RESISTOR VALUES ARE IN OHMS AND CAPACITOR VALUES ARE IN MICROFARADS.
3. VOLTAGE MEASUREMENTS ARE AS FOLLOWS
( ) ---- RX
( ) ---- TX
( ) ---- LAMP-ON
NO MARKING ---- SQL OFF
4. NO MARKING CAPACITORS AND RESISTORS ARE ALL CHIP PARTS.

Instructions

for the

Heath

Programmable Tone Squelch Unit

Model HWA-402

597-5500

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

Printed in Japan 3310821010

( ) Position the Transceiver as shown below. Then place a book or other suitable object about 3/4" thick under the unit's rear panel to prevent you from putting strain on the flat cables inside the unit.

( ) Refer to the inset drawing and pull out the lock on the indicated Transceiver socket.

( ) Position the Tone Squelch Unit next to the Transceiver as shown and insert the free end of the Tone Squelch Unit's flat cable all the way into the socket. Then push the socket lock in to secure the flat cable.

NOTE: The output level of the Tone Squelch Unit was adjusted for the appropriate deviation (±500 Hz to ±800 Hz) at the factory. Do not attempt to adjust the deviation unless you have the proper equipment. If you need to readjust it, use the following procedure:

1. Replace the object under the rear panel with the battery pack.
2. Connect a 22 kΩ resistor to a 1/8" phono plug and plug this "dummy load" into the "M" (external microphone) jack on top of the Transceiver.
3. Temporarily remove the whip antenna and connect a 50 Ω dummy load and a deviation meter to the Transceiver.

SPECIFICATIONS

Ref. Oscillator Frequency . . . 3.579545 MHz.

Output Freq. Options . . . . . 38 (67.0 to 250.3 Hz).

Output Level . . . . . 900 mV (22 kΩ load).

Tone Distortion . . . . . 10% or less.

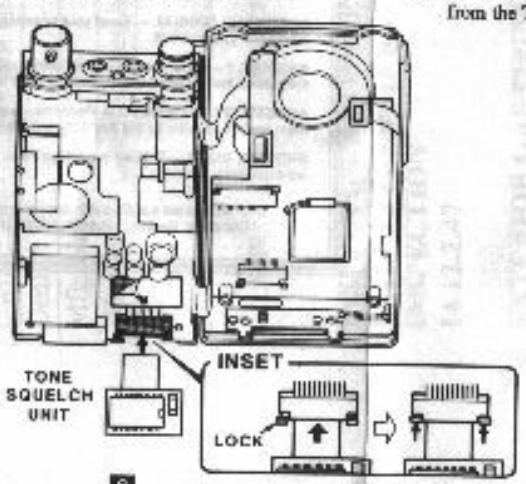
The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate features in products previously sold.

INTRODUCTION

The Heath Programmable Tone Squelch Unit is an optional encoder/decoder circuit board assembly that plugs into your HW-2-P or HW-4-P Transceiver. This allows you access to mobile or base stations (including repeaters) that use tone squelch control. Also, you may set up your Transceiver so that any station that wishes to contact you must transmit a specific, subaudible tone. The same 38 frequency options are available for both functions.

CAUTION: Do not exceed the maximum safe input voltage to the deviation meter.

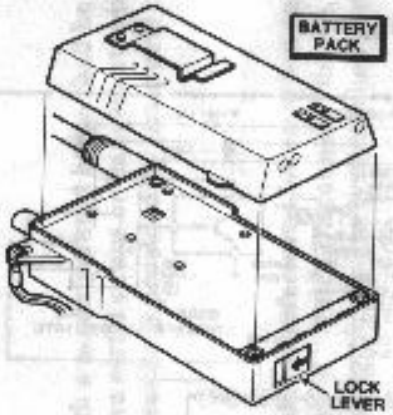
4. Push the ON/OFF button to turn the Transceiver on.
5. Select the tone squelch operating mode as outlined in the Owner's Manual for your Transceiver. Then press the PTT button to transmit.



6. Adjust control R301 (on the Tone Squelch Unit) for a tone deviation of ±700 Hz. NOTE: Be careful not to set the deviation too wide. If you do, the audio signals on the receiving end will be distorted.
7. Push the ON/OFF button to turn the Transceiver off.
8. Remove the dummy loads and deviation meter from the Transceiver.

INSTALLATION

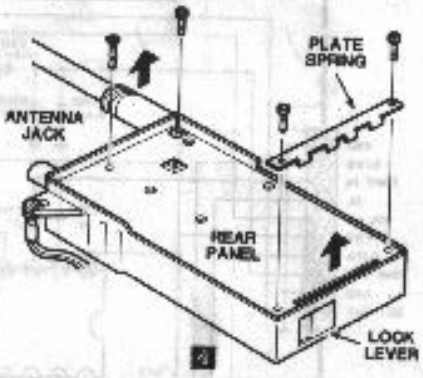
( ) Push the spring loaded lock lever for the battery pack in the direction of the arrow. Then lift up the battery pack and remove it from the Transceiver.



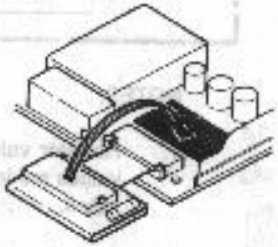
( ) Place the Transceiver front down. Then use a #1 phillips screwdriver to remove the four indicated screws from the unit. Set the screws and plate spring aside.

CAUTION: In the following step, be careful that you do not pull too strongly on the rear panel when you remove it. Otherwise, you may damage the two delicate flat cables inside the Transceiver (on the hand strap side).

( ) Push the lock lever for the battery pack in the direction of the arrow and, while you hold the lever in this position, gently pull on the antenna jack to separate the rear panel from the unit.



( ) Peel off the backing paper from the double-stick tape, as shown. Then attach the Tone Squelch Unit to the tape, as indicated by the arrow.



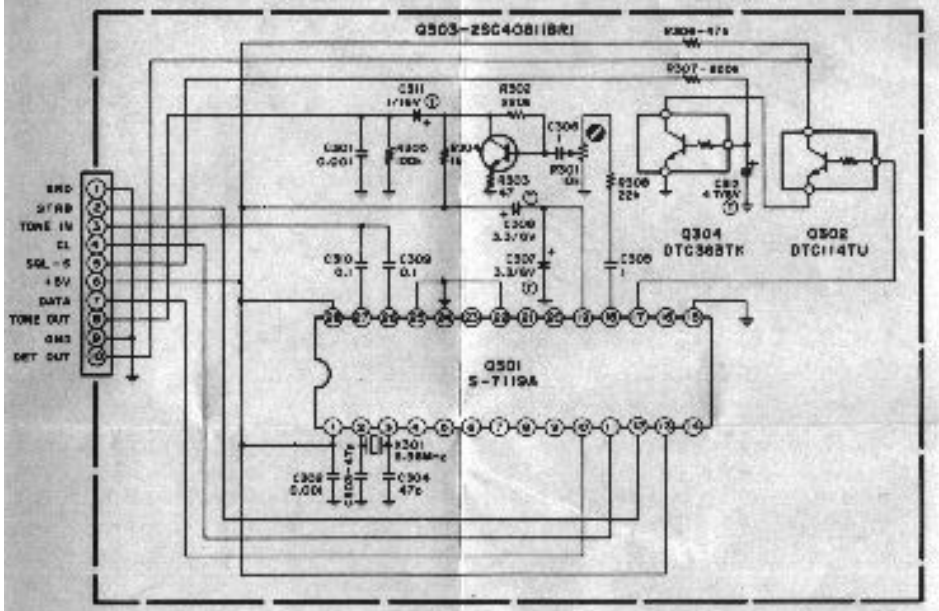
( ) Securely reattach the front and rear panels. Replace the plate spring and screws as they were originally installed.

( ) Reinstall the battery pack onto the rear panel of the Transceiver.

( ) Reinstall the whip antenna onto the top of the Transceiver.

This completes the Installation of your Programmable Tone Squelch Unit.

Schematic Diagram



NOTES:

1. Resistor values are in Ω (ohms) and capacitor values are in microfarads (μF), unless otherwise noted.

2. All components are surface mounted.

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ONE-YEAR LIMITED WARRANTY

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HEATH'S RESPONSIBILITY

PARTS AND LABOR — For a period of one year from the date of purchase, any malfunction caused by defective parts (or defective manufacture, in the case of factory-assembled products) will be corrected at no charge to you. Heath Company reserves the right to repair or replace the product, at its option. You must deliver the product at your expense to the Heath factory, or any Heath/Zenith Computers and Electronics Center (units of Veritechnology Electronics Corporation), or any of our authorized overseas distributors.

REPLACEMENT PARTS — Replacement parts are available for kit products and some Heath factory-assembled products if you wish to correct the malfunction yourself. Replacement parts listed in the manual will be supplied free for one year from date of purchase if they are factory defective. Replacement parts are warranted for the remaining portion of the original warranty period. You can obtain warranty parts direct from Heath Company by writing or telephoning us at (616) 982-3571. And we will pay shipping charges to get those parts to you... anywhere in the world. You may also take advantage of Heath's free technical consultation service, which is described in the manual. Heath reserves the right to require return of the part to be replaced.

NOT COVERED — The correction of assembly errors in kits, adjustments, calibration, and damage due to misuse, abuse, or negligence are not covered by the warranty. Unauthorized service or modification of the product or of any furnished component will void this warranty in its entirety. This warranty does not include reimbursement for inconvenience, loss of use, set-up time, or unauthorized service.

This warranty covers only Heath products and is not extended to other equipment or components that a customer uses in conjunction with our products.

REPAIR OR REPLACEMENT, AS DESCRIBED ABOVE, SHALL BE THE SOLE REMEDY OF THE CUSTOMER AND THERE SHALL BE NO LIABILITY ON THE PART OF HEATH FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO ANY LOSS OF BUSINESS OR PROFITS, WHETHER OR NOT FORESEEABLE. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

OWNER'S RESPONSIBILITY

EFFECTIVE WARRANTY DATE — Warranty begins on the date of first consumer purchase. You must supply a copy of your proof of purchase when you request warranty service.

OPERATING MANUAL — Read your operating instructions carefully so that you will fully understand the proper operation and function of your product.

ASSEMBLY — If your product is a kit, before seeking warranty service, you should complete the assembly by carefully following the manual instructions. Heath Company is not responsible for completing assembly or making adjustments on Heathkit products.

ACCESSORY EQUIPMENT — Performance malfunctions involving connections to (or interfacing with) other non-Heath equipment are not covered by this warranty and are the owner's responsibility.

SHIPPING UNITS — Follow the packing instructions published in your manual. Damage due to inadequate packing cannot be repaired under warranty.

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