

MT1000

Operating Instructions



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INTRODUCTION

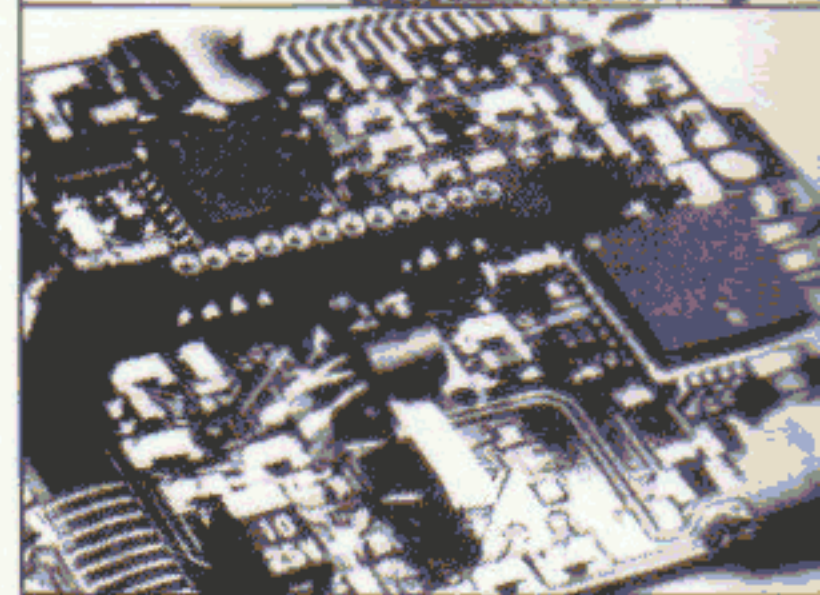
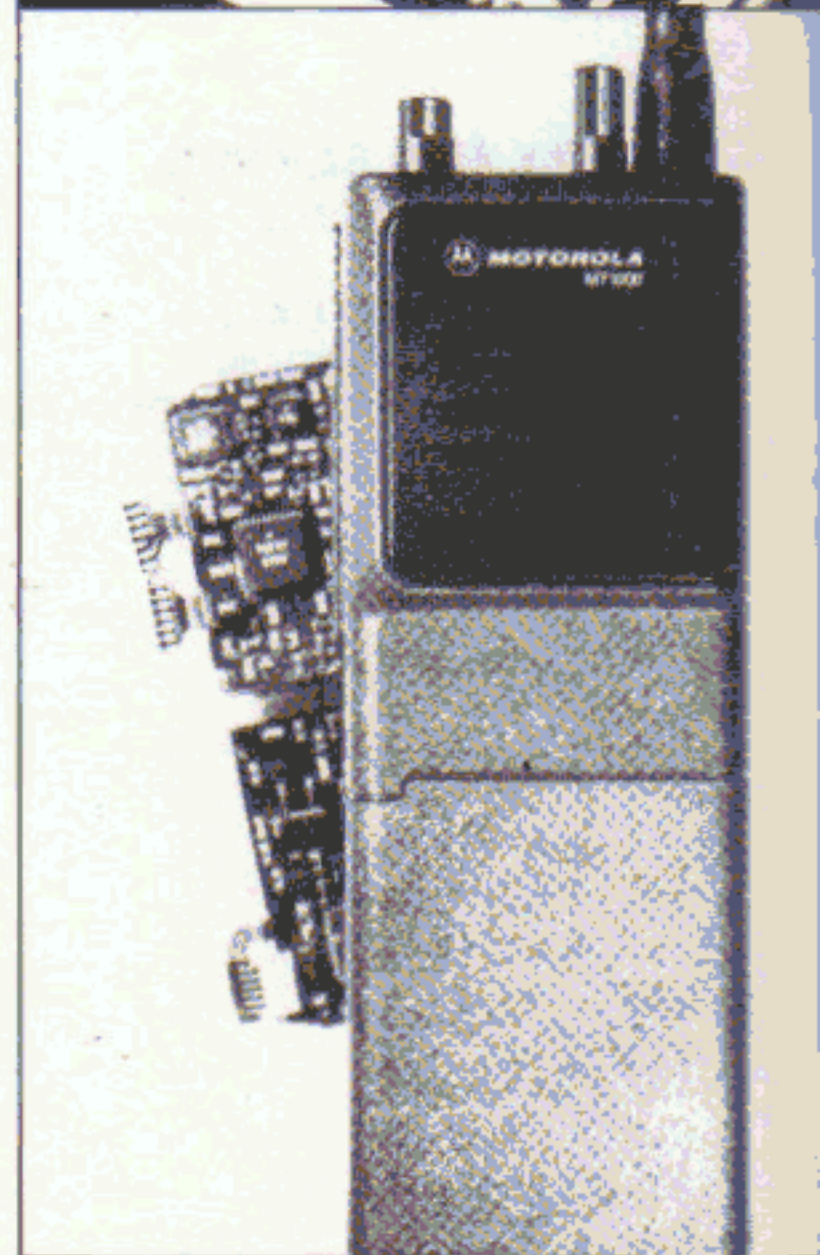
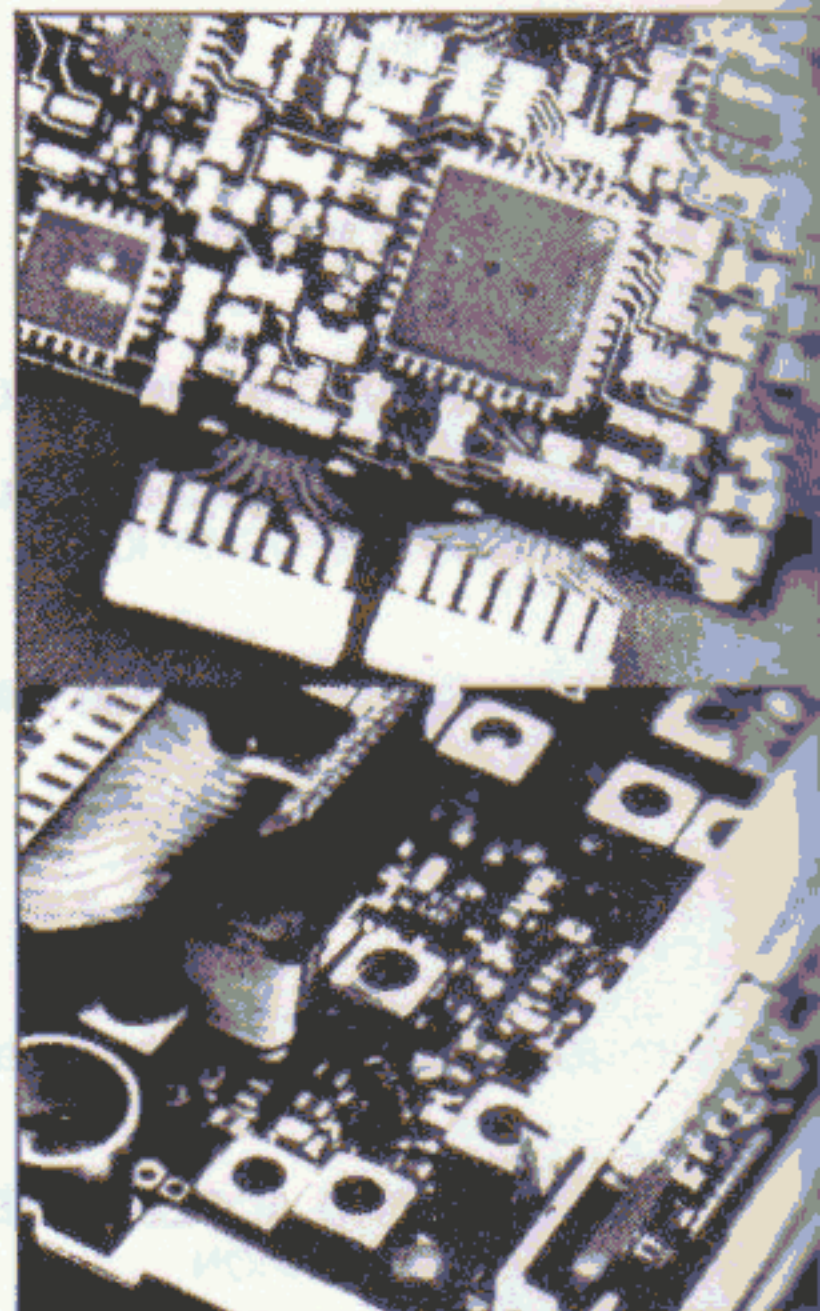
WELCOME TO THE MOTOROLA MT1000 RADIO

The MT1000 "Handie-Talkie" Portable Radio is a sophisticated state of the art unit. It incorporates the latest technology available in two-way radio communications.

The use of microcomputer technology makes changing radio characteristics such as operating frequencies and squelch codes both economical and fast. Any computer-equipped authorized service facility can easily reprogram your radio's operating characteristics, or your radio can be "cloned" from a radio already programmed to your desired frequencies and codes.

The MT1000 radio meets tough environmental demands while providing cost effective, reliable communications. It meets the U.S. Government Military Standards 810C and 810D for low pressure, high pressure, low temperature, temperature shock, solar radiation, rain, humidity, salt, fog, dust, vibration, and shock. The MT1000 radio meets the Electronic Industry Association RS316B electrical and mechanical specifications. The radio also meets extensive laboratory testing provided by Motorola, the Accelerated Life Test (ALT), which includes tough specifications for mechanical and electrical stress, temperature cycling (hot and cold), drop tests, and more. The Motorola Accelerated Life Test assures that possible failures brought on by field stress and abuse are identified and designed out of your radio before it reaches your hands.

All of these features provide for better, yet more cost effective communications for you.



INSPECTION

When you receive your packaged MT1000 Radio, inspect the shipping carton for any signs of damage. Next, remove and check the contents of the packing case to be certain that all items ordered have been included. Contents in the packing case may be different from those listed if optional accessories were ordered.

Packaged Model Contents

- MT1000 Radio
- Heliflex Antenna (VHF Models) or Flexible Whip Antenna (UHF Models)
- Standard Nickel-Cadmium Battery (medium capacity for low power models; high capacity for high power models)
- Leather Carry Case
- Operating Instructions Manual
- Help Card
- Radio Information Sheet

Inspect the equipment thoroughly. If any part of the equipment has been damaged in transit, report the extent of the damage to the transportation company immediately.

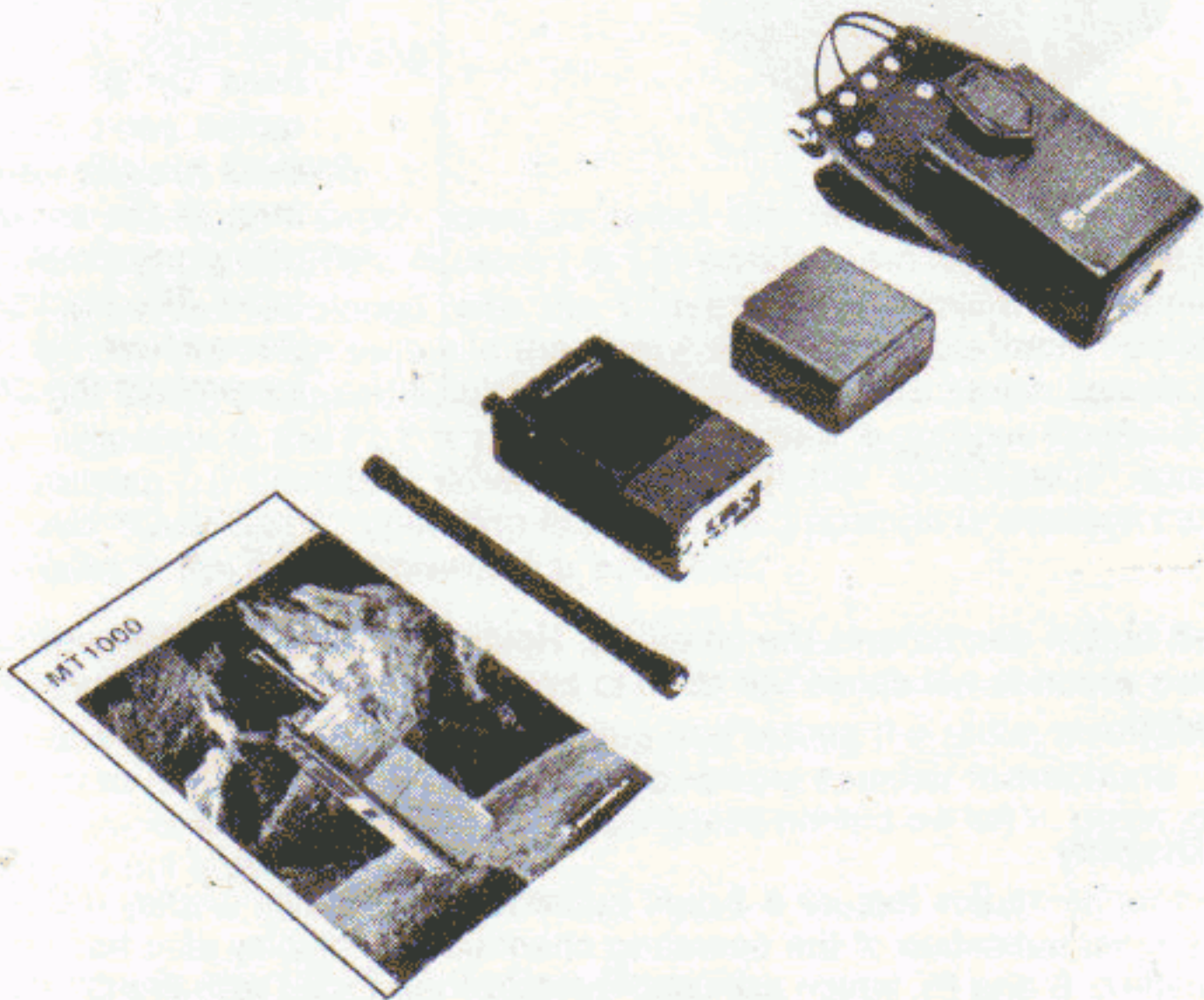


Figure 1

CONTROLS, SWITCHES, INDICATORS, AND CONNECTORS

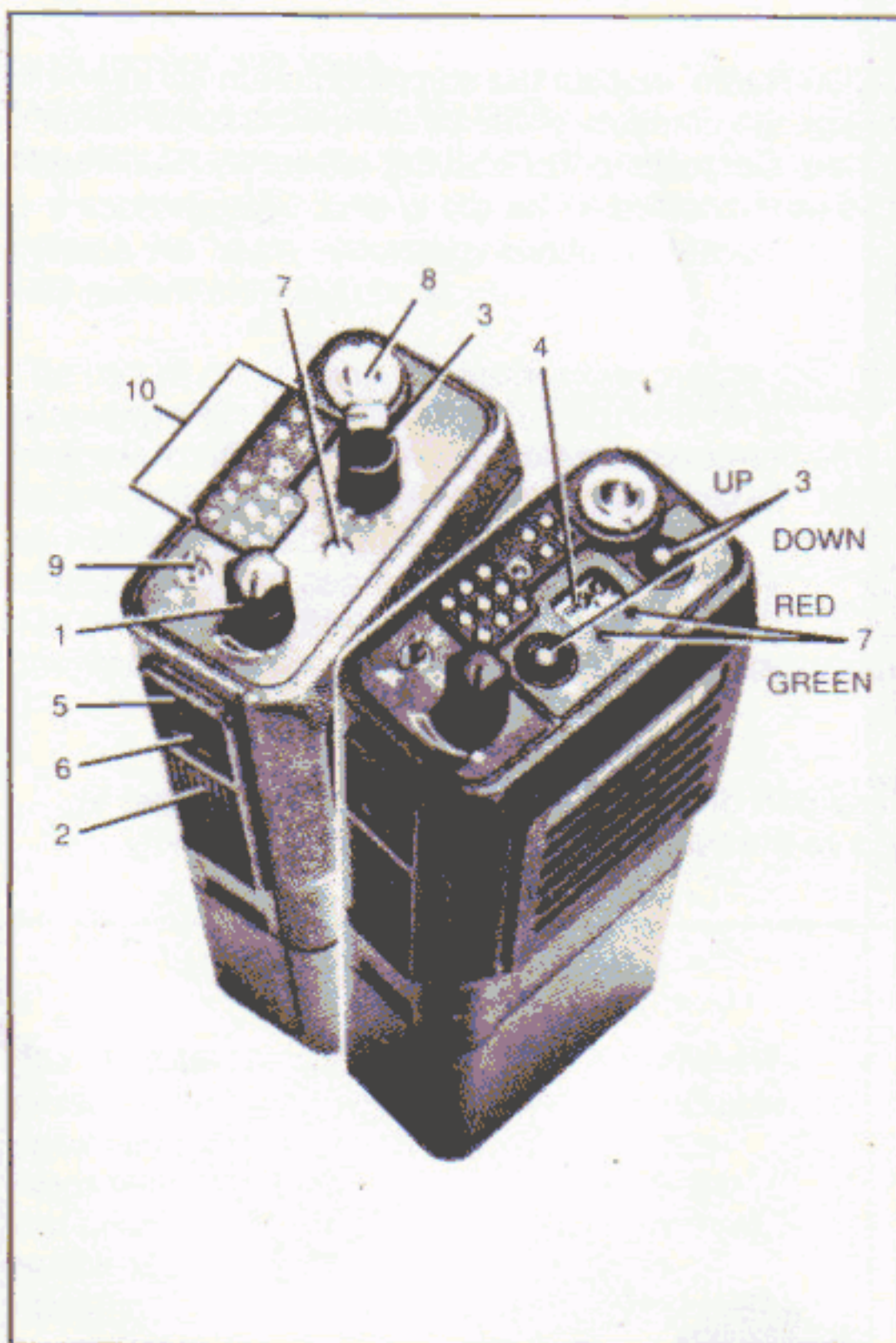


Figure 2

- 1. On-Off/Volume Control**
Turns the radio on and off and adjusts the volume level.
- 2. Push-To-Talk (PTT) Switch**
When depressed, puts radio in the transmit mode. When released, the radio operates in the receive mode. This switch is also used with the Channel Scan option (see Channel Scan option, Programming).
- 3. Channel Selector Controls**
Selects the operating channel. On 16-channel radios, this rotary switch will stop at any of the 16 channel positions. On 99-channel radios, two buttons are used to cycle up or down through the available channels programmed into the radio. The right button (as viewed from the front), increments the channels.

The left button decrements the channels. Holding the button depressed for more than two seconds will cause the radio to cycle through the channels at an increasing speed.

4. LCD Display

All 99-channel radios feature a 2-digit numeric liquid crystal display (LCD), which gives a clear indication of the operating channel. The display also has two annunciators (letters S and P), which are used by radios equipped with the Channel Scan option. The 2-digit display can be inverted so as to be right side up and easily readable when the radio is worn on the belt. The inverted display is accomplished by holding down the two channel selector buttons (up/down) simultaneously for approximately two seconds (radio turned on, mode select switch **not** in the scan position). Return the display to its normal state by again holding down the two channel selector buttons simultaneously for approximately two seconds. Also, each time the radio is turned off and back on, the display is reset to its normal state.

5. Monitor Button

When depressed, places the radio in the unsquelched mode, i.e., noise will be heard from the radio, monitoring the channel.

6. LCD Backlight/Channel Scan Program Button

This button is used with the Channel Scan option (see Channel Scan option, Programming) on both 16- and 99-channel radios. Also, on 99-channel radios, when the button is depressed the LCD display illuminates.

7. LED Indicators

On 16-channel radios, a single **bi-color** light emitting diode (LED) is provided. On 99-channel radios, two LEDs are provided. On both model radios, a red LED indicates normal transmission (continuous red), or low battery (flashing red). The green LED is active on PL receive channels with the Channel Busy option, and indicates channel busy (flashing green).

NOTE

The LED(s) may be disabled via factory or field programmed options.

8. Antenna Connector

Threaded antenna bushing.

9. Mode Select Switch

Is a three-position switch used to select the receive mode of operation, carrier squelch (\triangleright), or PL/DPL squelch (\blacktriangleright) in standard models, and scanning (\geq) in models equipped with the Channel Scan option. On non-channel scan radios, with the mode switch in the scan (\geq) position, the radio operates carrier squelch. When equipped with the PAC-RT position, this switch selects portable-to-base operation in the PL (\blacktriangleright) position or portable-to-portable operation in the carrier squelch (\triangleright) position. When equipped with the "Quik-Call II" option, the switch enables "Quik-Call II" operation in the PL (\blacktriangleright) position or enables carrier squelch operation in the carrier squelch (\triangleright) position.

10. Universal Connector

Provides accessibility for programming and testing the radio; also allows for connection to remote accessories such as a remote speaker-microphone. The universal connector is fitted with a protective cap which should be left in place when the connector is not being used.

11. Program Button (DTMF Option Radios)

When depressed and held, this programs and stores telephone numbers in locations 1 thru 9. To store a number, press and hold the program button, enter the telephone number via the "Touch-Code" keypad, press the "*" key, and then enter the memory location number (1 thru 9).

ALERT TONE INDICATORS

NOTE

Alert tones may be disabled via factory or field programmed options. Two options are available; a field option to disable only the power-up alert, and a factory or field option to disable all alert tones except "Quik-Call II" alerts.

Power-Up

Each time the radio is turned on, a microcomputer self-test occurs. An alert tone is generated for approximately 1/2 second to indicate that the microcomputer is functioning properly. Following the microcomputer self-test, a synthesizer self-test occurs. A continuous alert tone is generated if the synthesizer test is **not** successful.

Transmit On Receive-Only Channel

Pressing the PTT switch while tuned to a **receive-only** channel will cause an alert tone. The tone will continue as long as the PTT switch is depressed. The radio transmitter is not enabled.

Transmit Inhibit On Busy Channel (optional)

This option is applicable to only those channels equipped with PL receive. Depressing the PTT switch during a busy channel condition, generates a continuous alert tone that lasts as long as the switch is depressed.

Time-Out-Timer (optional)

Transmission time is limited to a preset length of time, normally 60 seconds. At the end of this time an alert tone indicates that your transmission has been cut off. The alert will continue as long as the PTT switch is depressed.

"Quik-Call II"


An interrupted alert tone is generated whenever a page is received, the radio unsquelches, and the caller's message is heard.

MULTIFUNCTION LED INDICATORS

Transmit Mode (PTT Switch Depressed)

- Continuous red light- Normal Transmission
- Flashing red light- Low battery

Receive Mode (PTT Switch Not Depressed)

- Flashing green- Channel-Busy LED (optional), indicates the presence of activity on the operating channel when the radio is in the PL squelch () mode.

RADIO MODEL INFORMATION

Radio Model Number (EXAMPLE: H43GCU7100A)

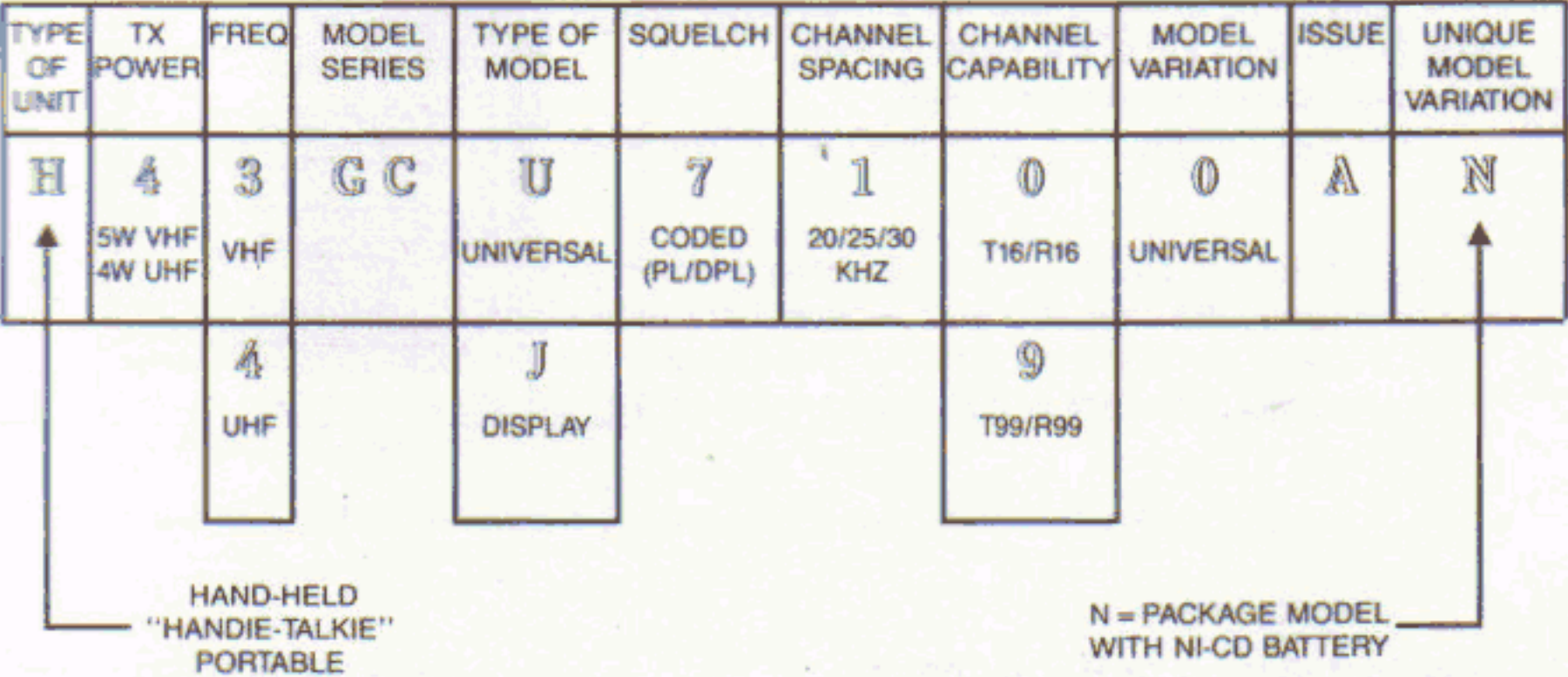


Figure 3

The model number, serial number, and Motorola DOC designation number are all on a label attached to the back of your radio. The rf output power, frequency band, type of squelch, and number of channels can be determined from the model number, as illustrated in Figure 3.

The MT1000 radio is available in two configurations, 16-channel or 99-channel. Both versions are synthesized units that come standard with tone Private-Line (PL) or Digital Private-Line (DPL) coded squelch, which may be enabled/disabled on a per channel basis at time of order. Programming changes can be made by your local Motorola service shop. All models include a high capacity standard rate nickel-cadmium battery, antenna, and a leather carry case.

GETTING STARTED

Antenna Installation

Fasten the antenna to the radio by placing the threaded end of the antenna into the threaded antenna bushing on top of the radio. Rotate the antenna clockwise until hand tight.



Battery Installation or Replacement

1. To install the new or freshly charged battery, mate the notched end of the battery with the grooved base plate, and slide the battery, from right to left, onto the base plate until engaged by the battery latch.
2. To replace the battery, turn off the radio and hold it in the left hand with the front of the radio facing up.
3. Disengage the battery latch from the battery by pushing and holding the latch towards the top of the radio.
4. With the battery latch disengaged, slide the battery, from left to right to remove it from the base plate on the bottom of the radio housing.

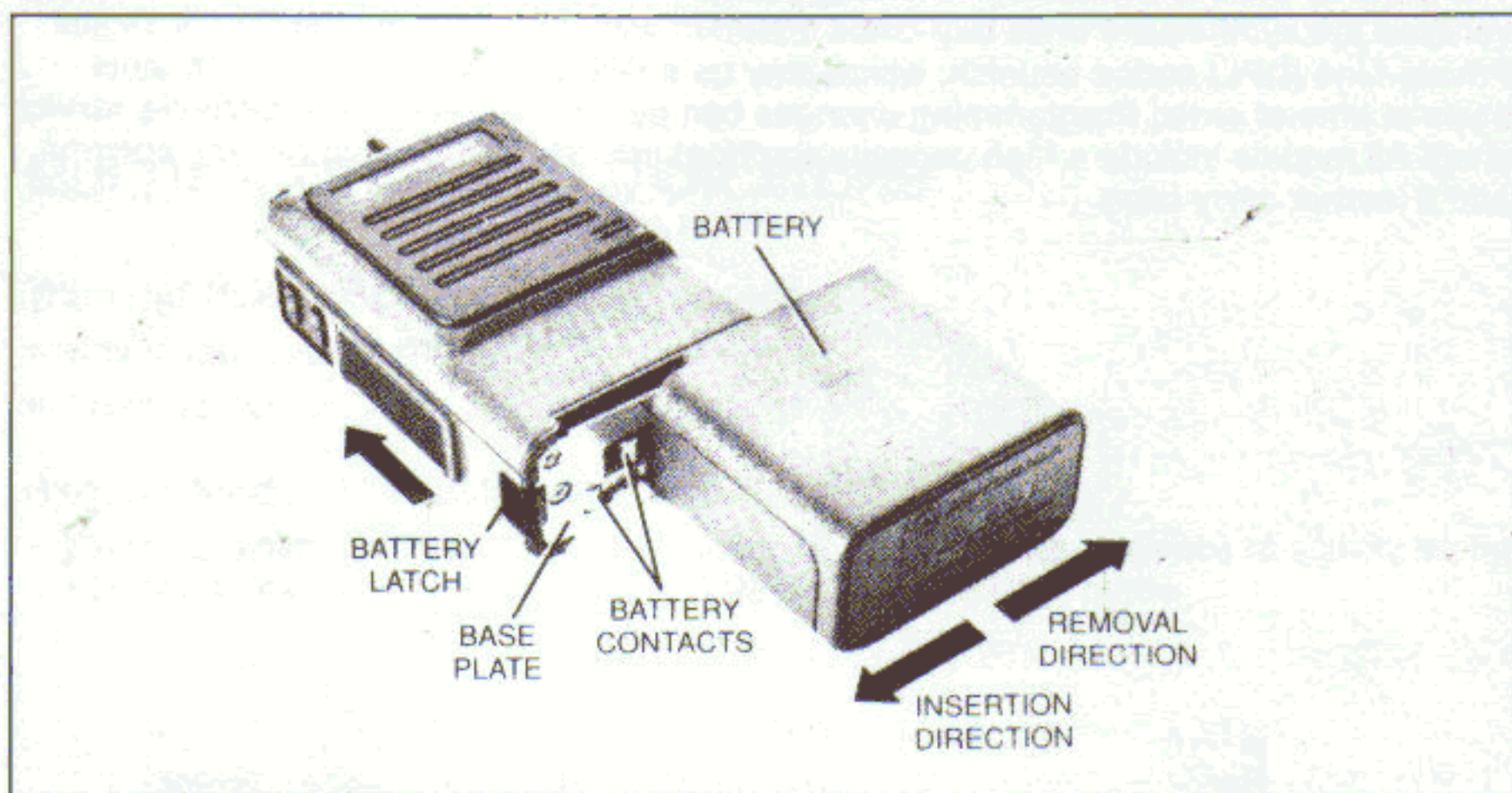


Figure 4

NOTE: Nickel-cadmium batteries should be fully charged before using.

RADIO ON / OFF, POWER-UP

1. Turn the radio on by rotating the volume control 1/2 turn clockwise. A power-up alert tone is generated for approximately one half second to indicate that the radio has passed a self test of the microcomputer.

NOTE

A power-up alert tone is not generated if the Omit Alert Tone option has been enabled.

If the short power-up alert tone is not generated, or if a continuous alert tone is generated (indicating a synthesizer malfunction), turn the radio off, check the battery (charge or replace if necessary), and turn the radio back on again. If the power-up alert tone is still not generated, a fault exists in the radio. Contact your nearest Motorola Service Shop.


2. Turn the radio off by rotating the volume control fully counterclockwise.

RECEIVING A CALL


1. Turn the radio on and set the frequency switch to the desired channel position. On 99-channel radios, channel selection is accomplished using the channel selector controls (up/down buttons) for scrolling and the LCD for viewing the channel number.
2. Listen for a transmission and adjust the volume control for a comfortable listening level. If no transmission is heard, depress and **hold** the monitor button to unsquelch the radio, and adjust the background noise to a comfortable listening level.

NOTE

All MT1000 radios have an internal squelch setting which is adjusted at the factory. The squelch level setting is not a user-operated control; however, it may be reprogrammed at an authorised service facility.

3. Your radio is now set to receive calls on the selected frequency.
4. For PL receive operation, place the mode select switch in the PL () position, and the unit will respond to only those calls with the proper PL code.

NOTE

Channel Busy LED only operates on channels programmed for PL receive when the mode select switch is in the PL () position.

TRANSMITTING

1. Turn the radio on and set the frequency switch to the desired channel position. On 99-channel radios, channel selection is accomplished using the channel selector controls (up/down buttons) for scrolling and the LCD for viewing the channel number.
2. Listen for a transmission and adjust the volume control for a comfortable listening level. If no transmission is heard, depress and **hold** the monitor button to unsquelch the radio, and adjust the background noise to a comfortable listening level.

3. Do not interrupt another user. If the channel on which you are transmitting is programmed to receive PL, ensure that the channel is not in use by:
 - placing the mode select switch in the carrier squelch (\triangleright) position to listen for activity, or
 - depressing the monitor button on the side of the radio to listen for activity.
4. Hold the radio in a vertical position with the speaker/microphone grille 2 to 3 inches from your mouth.
5. When the channel is clear, press and hold down the PTT switch on the side of the radio and speak slowly and clearly into the grille area. When you have finished talking (transmitting), release the PTT switch to listen (receive).

NOTE

When the push-to-talk switch is depressed, the red LED turns on, remains on for the entire length of the transmission, and turns off when the PTT switch is released.

Low Battery Check- When the PTT switch is depressed, and as long as the PTT switch remains depressed, the battery voltage is automatically monitored. If the battery condition is found low, the red LED flashes (unless the Omit LED option is enabled).

Receive Only Channel Alert- If the channel selected is a receive only channel (no transmitter frequency assigned), when the push-to-talk switch is depressed, a continuous alert tone is generated (unless an Omit Alert Tone option is enabled).

OPTIONS

A number of options can be ordered to enhance the operation of your MT1000 "Handie-Talkie" radio. These options are described for you in this section.

"PAC-RT" TRANSMIT ONLY

Radios equipped with this option are used with the PAC-RT Portable/Mobile Vehicular Repeater System. When the mode select switch is in the PL (\triangleright) position, the radio operates in the portable-to-base mode. This results in all messages from the portable radio being transmitted through the PAC-RT Vehicular Repeater (at a greatly increased power level) to the base station. When the mode select switch is in the carrier squelch (\triangleright) position, the radio operates in the portable-to-portable mode and does not activate the PAC-RT Vehicular Repeater.

CHANNEL SCAN

This option allows you to monitor a number of channels; the receiver checks each channel in a continuous cycle for activity. The channels to be scanned are user programmable. Channel scan is offered in two modes of operation, non-priority and priority scan. Both modes of channel scan are available with PL.

The Scan option is available for both 16- and 99-channel radio models, and scan operation is a little different for the two radios. The 16-channel model has a rotary switch for scanning selection, and the 99-channel model has up/down buttons and display for scanning selection.

NOTE

Both model radios use the same procedure for entering the scan mode, but because there is no display on 16-channel radios to review the scan list, when entering the scan program mode (16-channel radios), the entire stored scan list is erased and a new list must be entered.

All scan alert tones will be disabled if the omit alert tone option is enabled.

- **Non-priority Channel Scan**

With this type of scan operation, up to eight channels can be scanned. No one scan channel has priority over another. The scanner stops on the first scan channel with activity, and when the activity is over and a 3-second dwell time has expired, proceeds to the next scan channel.

- **Priority Channel Scan**

Any one of the radio's programmed channels may be designated as the priority channel, making a total of nine (maximum) scan channels, one priority channel and eight non-priority channels. Whenever activity occurs on the priority channel, the scanner will automatically stop there, even if the radio had been locked on to a non-priority scan channel signal.

- **PL Channel Scan**

Private-Line operation is offered with priority and non-priority channel scan. With this mode of scanning operation, the scanner stops on only those scan channels coded with the proper PL tone. However, on a priority channel scan radio, the priority channel is scanned for carrier activity only.

NOTE

When transmit or receive activity ceases on a scan channel, a dwell time of approximately 3 seconds occurs prior to the radio resuming scan for other channel activity. This dwell time gives you time to receive or respond to a call before scanning resumes. The dwell time is programmable through the Radio Service Software available at your local Motorola Service Shop.

If the monitor button is depressed (while scanning), the channel displayed by the LCD prior to entering the channel scan mode will be monitored and displayed by the LCD.

The procedure for **programming channel scan** is as follows:

1. Turn the radio on.
2. To enter the program mode, press and hold the LCD Backlight/Channel Scan program button (L/S button), and while keeping this button depressed, place the mode select switch (3-position switch) in the scan (Σ) position. A continuous alert tone will be generated and remain alerting until the L/S program button is released. This alert tone indicates that the radio is in the program mode and that all transmit and receive functions are inhibited.
- 3A. **(99-Channel Radio, for 16-channel radios, go to step 3B)** One at a time, each of the eight scan program positions can now be assigned a channel. To do this:
 - Locate a blank (unprogrammed) scan position (LCD display "00") by pressing and releasing the L/S program button a number of times until "00" is displayed. Release the L/S program button.

NOTE

If all scan positions already have a channel assigned, i.e., there are no blank ("00") scan positions, refer to **revise the scan list** section.

- Select the desired channel to be assigned at this program position. This is done using the channel selector controls, cycling through the channels (up or down), and stopping when the desired channel is displayed on the LCD.
 - Program this channel into the scan list by pressing the PTT switch. A momentary alert tone will be generated to indicate that the scan program accepted the entry.
- 3B. **(16-Channel Radios)** All scan positions are now blank. One at a time, each of the eight scan program positions can now be assigned a channel. To do this:
- Select the channel to be scanned by rotating the channel selector switch to the channel number desired.
 - Program this channel into the scan list by pressing the PTT switch. A momentary alert tone will be generated to indicate that the scan program accepted the entry.
4. Repeat step 3A or 3B until all desired channel scan positions are programmed into the scan list. A maximum of eight channel scan positions are available.

NOTE

MT1000 radios ordered with the scan option are not shipped programmed with scan channels. The scan list is programmed by the user. The user programming feature may be disabled and programming allowed through the radio service software.

Exit from the channel scan program mode by placing the mode select switch in either the carrier squelch (\triangleright) or the PL squelch (\triangleright) position. A momentary alert tone will be generated to indicate that the scan program mode has been exited.

To revise the scan list: On 16-channel radios, the scan list is erased each time the scan program is enabled. A new list must be entered. For 99-channel radios, revise the scan list as follows:

- Enter the program mode as described in step 2 (programming channel scan).
- Press the L/S program button and monitor the LCD display. Each time the L/S program button is depressed, the channel stored in that position will be displayed (a maximum of eight different channels). Select the channel to be removed or changed.
- Remove the channel from the scan list by pressing the PTT switch. A momentary alert tone will be generated and the LCD will display "00". Program a new channel in this position as described in step 3 (programming channel scan).
- Exit the program mode by placing the mode select switch in either the carrier squelch (\triangleright) or the PL squelch (\triangleright) position.

Non-priority channel scan operation is initiated by turning the radio on and placing the mode select switch in the scan (∇) position. The LCD (99-channel radios) will display "s - -". Scanning will stop when activity on one of the scan channels is detected. The LCD will display "s" and the active channel number. When activity on this channel ceases, scanning restarts and the LCD again displays "s - -". Depressing the PTT switch (**transmitting**) when in the channel scan mode, transmits on the channel:

1. Displayed by the LCD prior to entering the scan mode (99-channel radios), or the channel selected by the position of the channel selector switch (16-channel radios), if the radio is scanning.
2. Locked on to (displayed by the LCD), if the radio is active on a scan channel.

Priority channel scan operation is the same as non-priority channel scan operation, except that one of the radio's programmed channels may be designated as the priority channel, making a total of nine (maximum) scan channels, one priority channel and eight non-priority channels. The priority channel is designated as the channel displayed by the LCD (99-channel radios) or the channel selected by the rotary channel selector switch (16-channel radios) prior to entering the scan mode. Once in the channel scan mode, the priority channel can be changed using the channel selector buttons (selecting and displaying a different channel) or the channel selector switch. Scanning operation differs, such that the priority channel takes precedence over the non-priority channels. If the radio is locked on a non-priority channel and activity is detected on the priority channel, a momentary alert tone will be generated and the radio will lock on the priority channel. The LCD will display "s" and "p" (indicating priority call) and the priority channel number. Transmitting is the same as that described for non-priority channel scan operation.


NOTE



If the monitor button is depressed (while scanning), the priority channel will be monitored and displayed by the LCD.

PL channel scan operation is the same as that described for priority and non-priority channel scan operation, except that the radio will only lock on a channel and unsquelch if the signal carries the correct PL tone. However, on a priority channel scan radio, the priority channel is scanned for carrier activity only.

"QUIK-CALL II"

The "Quik-Call II" option provides the user with the talk-back pager feature. As in a standard radio, when the unit is turned on, a short power-up alert is generated. The radio then operates in the carrier squelch mode as described in the basic operating procedure.

To put the radio in the "Quik-Call II" (paging) mode, set the mode select switch to the enable () position, then momentarily depress the monitor button. When paged, an interrupted alert tone is generated, the radio is put in the Carrier Squelch mode, and the caller's message is heard. The radio will remain in the Carrier Squelch mode for six seconds after the loss of carrier. If the carrier is lost, but for less than 6 seconds, an auto timer will reset, which permits normal transmit and receive operation as described in the basic operating procedure. If no transmission is made within 6 seconds, the radio will automatically revert to the "Quik-Call II" (paging) mode.

To initiate a transmission (radio not paged), set the mode select switch to the carrier squelch () position. Then transmit and receive as described in the basic operating procedure. The radio does not automatically reset to the paging mode at the end of the conversation. To reset the radio to the paging mode, set the mode select switch to the enable () position and then momentarily depress the monitor button.

NOTE

Even in the carrier squelch mode the "Quik-Call II" decoder is active and will respond to a valid "Quik-Call II" code. The radio will emit an interrupted alert tone on receiving a valid code.

"TOUCH-CODE" DUAL TONE MULTIPLE FREQUENCY (DTMF)

Manual Dialing (Encoding)

Turn the radio on, depress and hold the PTT switch down, and press the appropriate "Touch-Code" key buttons.

Storage of "Touch-Code" Numbers in Memory (Program Mode)

Press and hold the program button firmly (see photo). Then push the "Touch-Code" key buttons that correspond to the numbers to be stored. A beep tone should be heard with each keystroke. After the entire number sequence to be stored has been entered, press the "*" key button followed by the number of the memory location (1-9). Continue to hold down the program button for one second after the memory location has been entered to allow time for memory storage. A maximum of sixteen characters can be stored in each memory location.



NOTE

To store the "Touch-Code" tones for "*" or "#" in memory the corresponding button ("*" or "#") must be pushed twice ("*" or "##").

It is necessary to hold the program button for one second after the storage command, otherwise an error may occur.

Last Number Redial Memory

Automatically stores the numbers last entered in manual dial or program mode. To automatically dial this number, depress and hold the PTT switch down and press "*", then "0". Release the PTT switch after the last tone is heard.

Scratchpad Memory

Feature gives you the ability to store a number in the **last number redial memory** or in standard memory while receiving someone else on the radio. For example, you are communicating with John (portable to portable) and he gives you a phone number to call later. Scratchpad memory lets you store the number immediately by simply entering the numbers from the keypad. When the phone number is entered, it is automatically stored in the **last number redial memory** (location 0). To store the number in another location, press the program button and press "*" followed by the desired memory location. After entering the storage command, hold down the program button for one second and then release.

NOTE

The **last number redial memory** will be altered by pushing "Touch-Code" key buttons whenever the radio is on.

To Automatically Dial Numbers Stored in Memory

Depress and hold the PTT switch down and press "*" followed by the number corresponding to the desired memory location (0-9). For example, to dial the number stored in location 5, depress and hold the PTT switch down, press "*", then press "5". Release the PTT switch after the last tones are heard.

IMPORTANT

Numbers in memory will be erased if the battery is removed from the radio and left off for more than two minutes.

Indefinite Pause

May be programmed in memory to allow for storage of more than one number sequence per memory location. For example, if you want to store a repeater access code and phone number in the same memory location, depress and hold the program button while you do the following:

1. Enter the access code
2. Press "*"
3. Press "#"
4. Enter the phone number
5. Press "*" and the desired memory location (1-9).

To dial this sequence, depress and hold the PTT switch down, press "*", then press the proper memory location (1-9). The access code will be transmitted followed by a pause. The pause gives the system time to check the access code and send out a dial tone. After you receive the dial tone, the phone number may be dialed by holding the PTT switch down again and pressing any digit (not "*" or "#").

TRANSMIT INHIBIT ON BUSY CHANNEL

This option applies only to radios programmed with PL receive. The mode select switch and monitor button are non-functional. Depression of the PTT switch when the channel is busy, generates a continuous alert tone that lasts as long as the switch remains depressed, and transmission is not possible. Transmitting is enabled on a channel if no carrier is being received, or if the carrier being received is modulated with the correct PL tone (as programmed for that PL channel).

TIME-OUT-TIMER

60-Second

The Time-Out-Timer (TOT) option disables the transmitter if a single transmission (uninterrupted depression of the PTT switch) exceeds a predetermined period of time, 60 seconds. This minimizes channel occupancy and battery drain. The radio reverts to the receive mode, even with the PTT switch remaining depressed. After the time-out period, a continuous alert tone is generated that lasts until the PTT switch is released.

Another transmission may be initiated immediately after releasing the PTT switch by depressing the PTT switch again. If the PTT switch is released before the predetermined time out, the radio operates as normal (reverts to the receive mode with no alert tone).

Non-Standard

Radios with this option function exactly the same as radios with the 60-second TOT option, except that the 60-second single-transmission limitation can be set anywhere between 1 and 255 seconds.

OMIT ALERT TONES

Transmit and receive functions are normal. All alert tones, except the "Quick-Call II" alerts, can be disabled. The power-up alert tone can be disabled separately.

LED DISABLE

Transmit and receive functions are normal, except that the low battery and normal transmission LED indications are disabled.

BATTERY INFORMATION

The MT1000 radio is powered by a (10.0 Vdc) rechargeable nickel-cadmium battery. The battery is a safe, dependable power source designed specifically for your radio. Proper care of the battery will ensure its effectiveness and allow peak performance of the radio.

RECHARGING BATTERIES

WARNING

Take care to avoid external short-circuiting of the battery. A sustained high-rate of discharge (for example, a paper clip placed accidentally across the battery terminals or contacts) could permanently damage the battery, void the battery warranty, and create a **burn or fire hazard**.

The battery should be fully charged before use to ensure optimum capacity and performance.

Charging temperature of the battery should be at about 77°F (room temperature) whenever possible. Charging a cold battery (below 50°F) may result in leakage of electrolyte, and, ultimately, in failure of the battery. Charging a hot battery (above 95°F) results in reduced discharge capacity, affecting performance of the radio. MT1000 rapid rate battery chargers contain a temperature sensing circuit to ensure the battery is charged within these temperature limits. For additional information on batteries and battery charging, refer to the relevant battery charger manual.

Memory Effect. A Ni-Cd battery may exhibit a phenomenon known as memory effect (reduced capacity). This is caused by either continuous overcharge for long periods, or repetitive shallow cycling.

If the battery is lightly or infrequently used, and is allowed to charge over a long period of time (30-60 days), it may develop memory effect; that is, the voltage may be sufficiently lowered on the first discharging cycle to reduce the battery's useful service hours.

A more common type of memory effect is induced by uniform shallow cycling. For example, if the battery is operated so that it repeatedly delivers 50% of its full capacity, it can temporarily become inactive, and, when current demand is increased, it may show a sharp decrease in its ability to deliver full capacity.

Any nickel-cadmium battery which shows early signs of reduced capacity should be checked for memory effect before it is returned under warranty or is discarded. If the battery is exhibiting memory effect, an effective reconditioning method is a complete discharging of the battery (deep discharge), followed by a recharge. One or two deep discharge/charge cycles are usually sufficient to restore the battery.

WARNING

**DO NOT DISPOSE OF ANY BATTERIES IN A FIRE
AS THEY MAY EXPLODE.**

ACCESSORIES

Motorola offers several accessories to increase communications efficiency. Many of the accessories available are listed below, but for a complete list, consult your Motorola sales representative.

Antennas:

NAD6282A	Heliflex (136-150.799 MHz)
NAD6283A	Heliflex (150.8-161.999 MHz)
NAD6284A	Heliflex (162-174 MHz)
NAE6232A	Heliflex (438-470 MHz)
NAE6350A	Flexible Whip (403-512 MHz)

Batteries:

NTN4822A	Nickel-Cadmium Medium Capacity, Rapid Charge
NTN4824A	Nickel-Cadmium High Capacity, Rapid Charge
NTN4868A	Nickel-Cadmium Medium Capacity, Standard Charge
NTN4869A	Nickel-Cadmium High Capacity, Standard Charge

Nickel-Cadmium Battery Chargers:

NTN4633A	Single-Unit Desk-Top (Rapid Rate 117V)
NTN4635A	Single-Unit Desk-Top (Standard Rate 117V)
NTN4666A	Compact (110V)
NTN4668A	Multi-Unit Desk-Top (Rapid Rate 117V)

Carrying Accessories:

NTN4655A	Leather Swivel Case w/T-Strap (Medium and High Capacity Battery)
NTN4758A	Leather Case w/T-Strap (Medium and High Capacity Battery)
NTN4814A	Belt-Clip Carry Holder
NTN4916A	Belt-Clip
NTN4924A	Belt-Clip – Public Safety Size
NTN4879A	T-Strap (nylon) for leather cases
NTN4998A	T-Strap (urethane) for carry holder
NTN4529A	Swivel Belt Loop 2 1/2"
NTN4365A	Swivel Belt Loop 3"
NTN6042A	Belt, Black
NTN6349A	Carrying Strap, Black

Audio Accessories:

NKN6376A	Cloning Cable
NLN8410A	Velcro Patch Pin Attachment
NMN6127A	Remote Speaker/Microphone with Coil Cord
NTN4812A	European Jack Adapter
NTN5050A	Public Safety Remote Speaker/Microphone (requires antenna)
NAE6132A	S.M.A. Antenna (440-470 MHz)

TROUBLESHOOTING

If you experience difficulty, check the following items before requesting service.

1. Review steps under GETTING STARTED, RADIO ON/OFF POWER-UP, RECEIVING A CALL, and TRANSMITTING.
2. Be sure the radio is set to the correct channel.
3. Replace or recharge the battery.
4. If reception is poor, check the antenna. It must be undamaged and operated in the vertical position for best reception.
5. Try several different operating locations, especially when operating the radio inside buildings.
6. Check transmitter by transmitting to another portable radio or communications receiver. If the receiver has a signal strength ('S') meter, make comparison readings against another portable radio. Also, check the antenna.

SERVICE

If any operational difficulties should arise, report them to authorized maintenance personnel. Proper repair and maintenance procedures will assure efficient operation and long life for this radio. A Motorola maintenance agreement will provide this at a minimum cost. Motorola will provide expertly trained personnel to keep all your two-way radio equipment in perfect operating condition.

GENERAL RADIO CARE

1. Avoid physical abuse of the radio such as carrying it by the antenna.
2. Wipe the battery contacts with a lint-free cloth to remove dirt, grease, or other material which may prevent good electrical connections.
3. The universal connector is fitted with a protective cap which should be left in place when the connector is not in use.
4. Clean the radio exterior using a cloth moistened with water, mild dishwashing liquid, or isopropyl alcohol.

CAUTION

USE OF CHEMICALS SUCH AS DETERGENTS, ALCOHOL (except isopropyl), AEROSOL SPRAYS, AND/OR PETROLEUM PRODUCTS MAY BE HARMFUL AND MAY DAMAGE THE RADIO HOUSING.

SAFETY INFORMATION

DO NOT hold the radio with the antenna close to, or touching, exposed parts of the body, especially the face or eyes, while transmitting. The radio will perform best if the microphone is 2 to 3 inches away from the lips and the radio is vertical.

DO NOT hold the transmit (PTT) switch on when not actually desiring to transmit.

DO NOT allow children to play with any radio equipment containing a transmitter.

DO NOT operate a transmitter near unshielded electrical blasting caps or in an explosive atmosphere unless it is a type especially qualified for such use.



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TEPF-11413-B

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* COVERS LABOUR & PARTS – 1 YEAR/365 DAYS *

Motorola Canada Limited shall bear responsibility for all Motorola product labour & repair or replacement part(s) costs in connection with defects in design, materials and workmanship.

This Motorola Product Warranty applies from the date of purchase for a 1 YEAR/365 DAY period on LABOUR & REPAIR OR REPLACEMENT PARTS and for 10 YEARS ON CRYSTALS. (This warranty applies to Motorola product replacement parts for the unexpired portion of the warranty period applicable to the original part or parts replaced). This warranty is in effect, provided that written notice is received by Motorola within the applicable warranty period.

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This exception from warranty responsibility shall include installation or maintenance performed by service personnel not qualified and/or equipped (in Motorola's opinion) to perform such services.

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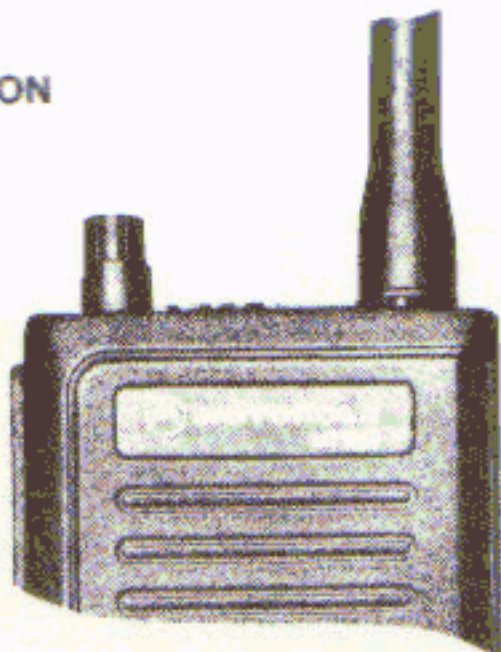


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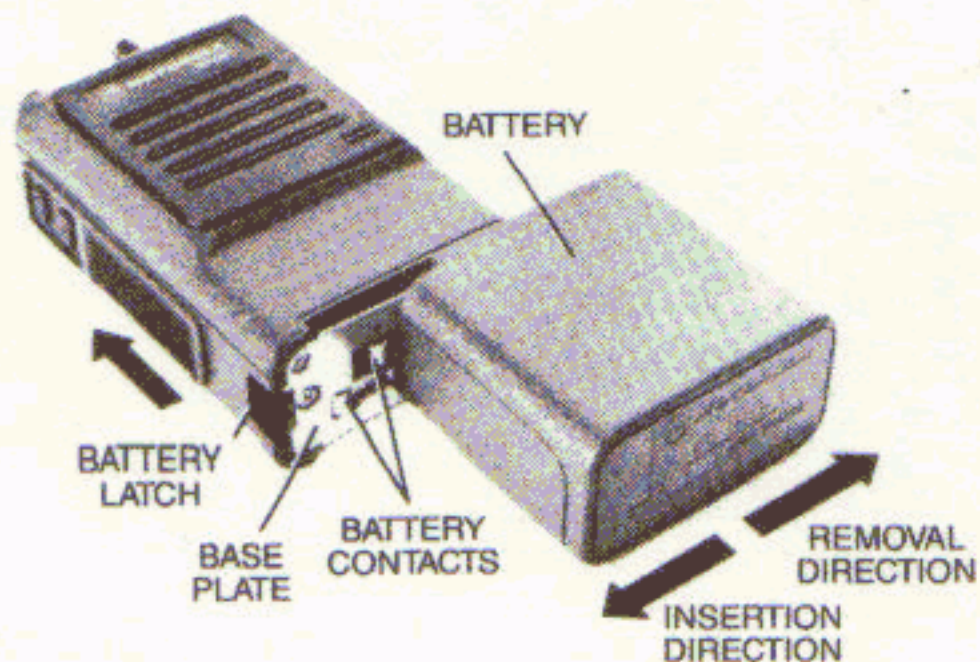
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QUICK REFERENCE CARD

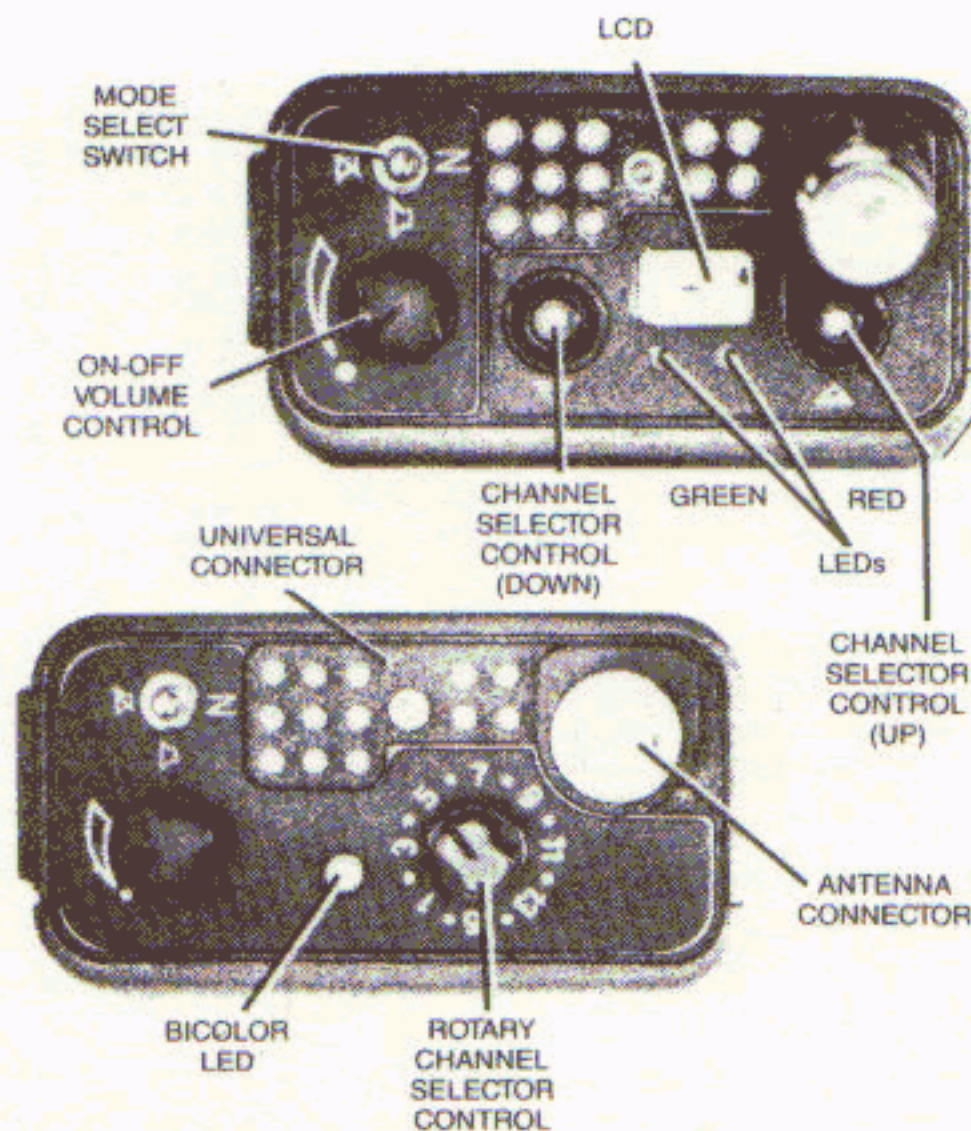
ANTENNA AND BATTERY INSTALLATION



- Attach antenna to radio by screwing it clockwise into the antenna bushing.
- Install battery by mating notched end of battery with grooved base plate on radio. Then slide battery toward battery latch until engaged.
- Remove battery by disengaging battery latch (push and hold latch toward top of radio) and slide battery away from latch.



CONTROLS





TOP VIEW

BASIC OPERATING PROCEDURE

Radio On/Off

1. Turn radio on by rotating volume control clockwise.
2. Turn radio off by rotating volume control anticlockwise.

To receive:

1. Turn radio on and select desired channel using rotary switch (16-channel radios), or channel selector controls (up/down buttons) and LCD display (99-channel radios).
- 2a. For "Private-Line" (PL) squelch operation, place mode select switch in PL position (). With Channel Busy Option, green LED flashes if operating channel is busy.
- 2b. For carrier squelch operation, place mode select switch in carrier squelch position ().

To Transmit:

1. Turn radio on and select desired channel using rotary switch (16-channel radios), or channel selector controls (up/down buttons) and LCD display (99-channel radios).
2. Monitor channel for activity.
3. When channel is clear, press PTT switch and speak slowly and clearly into speaker grille area. When finished transmitting, release PTT switch to receive.

NOTE: LED indicates continuous red for normal transmission. LED flashes red to indicate low battery.

OPTIONAL FEATURES CHANNEL SCAN

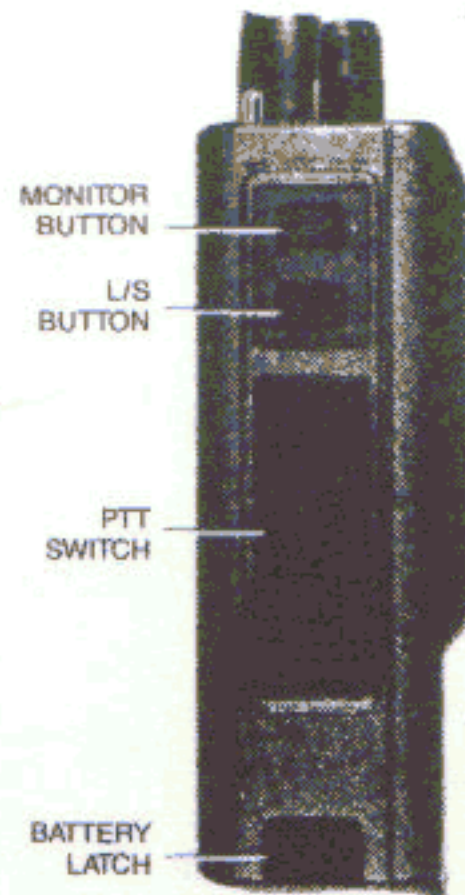
Channel scan is offered in two modes of operation, non-priority and priority. Both modes are available with PL. Channel scan is available for both 16- and 99-channel radios. The 16-channel radio has a rotary dial for scanning selection; the 99-channel radio has up/down buttons and LCD for scanning selection.

• Non-priority Channel Scan

The receiver stops on the first scan channel with activity. When activity is over and after a three second "dwell time", the radio proceeds to next scan channel.

• Priority Channel Scan

Any one of the radio's programmed channels may be designated priority channel. Whenever activity occurs on priority channel, scanning stops there, even if the radio had been locked on a non-priority channel.



SIDE VIEW

• **PL Channel Scan**

Scanning stops on only those scan channels coded with the proper PL tone. However, on a priority channel scan radio, the priority channel is scanned for carrier squelch activity only.

Programming Channel Scan: Since there is not an LCD on 16-channel radios to review the scan list when entering the scan program mode (16-channel radios), the entire stored scan list is erased and a new list must be entered.

1. Turn radio on and **enter scan program mode** by pressing and holding the "LCD Backlight/Channel Scan" program button (L/S button), and placing mode select switch in scan (Σ) position. A continuous alert tone is generated until the L/S program button is released. While the radio is in program mode, all transmit and receive functions are inhibited.

2. Assign channels (one at a time) to program positions (max. eight) as follows:

99-Channel Radios

- Press and release L/S program button until "00" (unprogrammed position) is displayed on LCD. Release L/S program button. **NOTE:** If all eight positions are already programmed, refer to "revise the scan list".
- Using channel selector controls, select the channel to be assigned to this program position.
- Program this channel into the scan list by pressing PTT switch. A momentary alert tone indicates the scan program accepted the entry.

16-Channel Radio All scan positions are now blank. One at a time, each of the eight scan program positions can now be assigned a channel. To do this:

- Select the channel to be scanned by rotating the channel selector switch to the channel number desired. Program this channel into the scan list by pressing the PTT switch. A momentary alert tone will be generated to indicate that the scan program accepted the entry.

3. Repeat step 2 until all desired channel scan positions are programmed into the scan list. A maximum of eight channel scan positions are available.

Exit the program mode by placing mode select switch in either carrier squelch (\triangleright) or PL squelch ($\mathbf{\Delta}$) position. A momentary alert tone indicates the scan program mode was exited.

Priority channel scan operation: One of the radio's programmed channels may be designated "priority channel", making a total of nine (maximum) scan channels, one priority channel and eight non-priority channels. Priority channel is the channel displayed by the LCD (99-channel radios) or the channel selected by the channel selector switch (16-channel radios) prior to entering scan mode. Once in channel scan mode, priority channel can be changed using channel selector buttons. Scanning operation differs, such that the priority channel takes precedence over non-priority channels. If the radio is locked on a non-priority channel and activity is detected on the priority channel, a momentary alert tone is generated and the radio locks on the priority channel. The LCD displays "s" and "p" indicating priority call) and the priority channel number. Transmitting is the same as that described for non-priority channel scan operation.

NOTE

If the monitor button is depressed (while scanning), the priority channel will be monitored and displayed by the LCD.

PL channel scan operation is the same as that described for priority and non-priority channel scan operation, except that scanning stops on only those scan channels coded with the proper PL tone. Priority channel (if available) is scanned for carrier squelch activity only.

"QUIK-CALL II"

This option provides the user with the talk-back feature. To enter the "Quik-Call II" (paging) mode, set the mode select switch to the enable position ($\mathbf{\Delta}$), then momentarily depress the monitor button. When paged, and interrupted alert tone is generated, the radio unsquelches, and the caller's message is heard. If no transmission is made, the radio automatically resets to the "Quik-Call II" (paging) mode.

To initiate a transmission (radio not paged), set the mode select switch to the carrier squelch (\triangleright) position. Transmit and receive as described in the basic operation procedure. The radio does not automatically reset to the paging mode at the end of the conversation. To reset the radio to the paging mode, set the mode select switch to the enable ($\mathbf{\Delta}$) position and then momentarily depress the monitor button.

Scratchpad Memory

Lets you store a number in the **last number redial memory** or in standard memory while receiving someone else on the radio. Simply enter the numbers from the keypad. When the phone number is entered, it is automatically stored in the **last number redial memory** (location 0). To store the number in another location, press the program button and press "*" followed by the desired memory location. After entering the storage command, hold down the program button for one second and then release.

NOTE

The **last number redial memory** will be altered by pushing "Touch-Code" key buttons whenever the radio is on.

To Automatically Dial Numbers Stored in Memory.

Depress and hold the PTT switch down and press "*" followed by the number corresponding to the desired memory location (0-9). Release the PTT switch after the last tones are heard.

To Erase the Last Redial Memory or Standard Memory

The **last number redial memory** may be erased by depressing and holding the program button, pressing the "*" key, and then releasing the program button. A **standard memory** location is automatically erased when a new number is stored in that location.

IMPORTANT

Numbers in memory will be erased if the battery is removed from the radio and left off for more than two minutes.



Indefinite Pause


Allows for storage of more than one number sequence per memory location. For example, you want to store a repeater access code and phone number in the same memory location; depress and hold the program button while you do the following:

1. Enter the access code
2. Press "*"
3. Press "#"
4. Enter the phone number
5. Press "*" and the desired memory location (1-9).

To **revise the scan list**: On 16-channel radios, the scan list is erased each time the scan program is enabled. A new list must be entered. For 99-channel radios, revise the scan list as follows:

- Enter program mode as described in step 1.
- Press and release L/S program button until channel to be changed is displayed.
- Remove channel from the scan list by pressing PTT switch. A momentary alert tone alerts and LCD displays "00". Program a new channel in this position as described in step 2.

- Exit program mode by placing mode select switch in either carrier squelch () or PL squelch () position.

Initiate **non-priority channel scan operation** by turning radio on and placing mode select switch in scan () position. Scanning begins and LCD displays "s - -". Scanning stops when scan channel activity is detected. LCD displays "s" and channel number. Scanning resumes when activity ceases, and LCD again displays "s - -". The **channel transmitted on** when in scan mode is dependent on the scan state. Transmission occurs on:

1. the channel displayed prior to entering scan mode, if the radio is scanning.
2. the channel locked on to (displayed by LCD), if the radio is active on a scan channel.

NOTE

1. A three-second "dwell time" occurs after activity ceases on a scan channel which provides time to receive or respond to a call before scanning resumes.
2. if the monitor button is depressed (while scanning), the channel displayed by the LCD prior to entering the channel scan mode will be monitored and displayed by the LCD.

"TOUCH-CODE" DUAL TONE MULTIPLE

FREQUENCY (DTMF)

Manual Dialing (Encoding)

Turn the radio on, depress and hold the PTT switch down, and press the appropriate "Touch-Code" key buttons.

Storage of "Touch Code" Numbers in Memory

(Program Mode)

Depress and hold the program button. Then push the "Touch-Code" key buttons that correspond to the numbers to be stored. A beep tone should be heard with each keystroke. After the entire number sequence to be stored has been entered, press the "*" key followed by the number of the memory location (1-9). Continue to hold down the program button for one second after the memory location has been entered to allow time for memory storage. A maximum of sixteen characters can be stored in each memory location.

NOTE

To store the "Touch-Code" tones for "*" or "#" in memory, the corresponding button ("*" or "#") must be pushed twice ("*" or "##").

Last Number Redial Memory

Automatically stores the numbers last entered in manual dial or program mode. To automatically dial this number, depress and hold the PTT switch down, press "*", then 0. Release the PTT switch after the last tone is heard.

To dial this sequence, depress and hold the PTT switch down, press "*", then press the proper memory location (1-9). The access code will be transmitted followed by a pause. The pause gives the system time to check the access code and send out a dial tone. After you receive the dial tone, the phone number may be dialed by holding the PTT switch down again and pressing any digit (not "*" or "#").

TIME-OUT-TIMER

Transmission is limited to a predetermined period of time (typically 60 sec.). An alert tone indicates that your transmission is terminated. The alert tone lasts until PTT switch is released.

PAC-RT

Radios equipped with this option are used with the PAC-RT portable/mobile Vehicular Repeater System.