Operator's Manual

EDACS® M-RK I PORTABLE RADIO

ERICSSON ⊻

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SAFETY INFORMATION

The Federal Communications Commission (FCC), with its action in General Docket 79-144, March 13, 1985, has adopted a safety standard for the human exposure to radio frequency (RF) electromagnetic energy emitted by FCC regulated equipment. Proper operation of this radio will result in user exposure far below the Occupational Safety and Health Act and Federal Communication Commission limits.

DO NOT hold the radio in such a manner that the antenna is close to, or touching, exposed parts of the body -- especially the eyes or face -- while the radio is transmitting.

DO NOT operate the radio near unshielded electrical blasting caps or in an explosive atmosphere, unless it is a type specifically designed and qualified for such use.

DO NOT operate the radio unless the antenna connector is secure and any open connectors are properly terminated.

DO NOT allow children to operate transmitter-equipped radio equipment.

This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference.

BATTERY CHARGING AND CARE

⚠ **WARNING** ⚠

Do not dispose of the battery pack in fire - it may explode, causing injury or death.

Do not replace the battery in hazardous atmosphere locations.

Do not carry battery loose in your pocket or purse.

Do not attempt to repair battery.
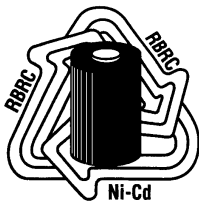
The product you have purchased contains a rechargeable, recyclable battery. At the end of its useful life under various state and local laws it may be illegal to dispose of this battery into the municipal waste stream.

Check with your local solid waste officials for details concerning recycling options or proper disposal in your area. Call Toll Free 1-800-8-BATTERY for information and/or procedures for returning rechargeable batteries in your state.

Your radio comes supplied with a Ni-Cd battery pack which can be recharged from 500 to 1000 times before requiring replacement. The actual number of charge/recharge cycles vary depending upon usage. We recommend that the battery be charged 14 to 16 hours on the first charge cycle and then in accordance with the charger model instructions thereafter.

To remove the battery pack, push up on the battery latch and slide the battery pack to the right. To replace the battery, align the battery on the track and slide to the left until a click is heard, indicating the battery is correctly installed.
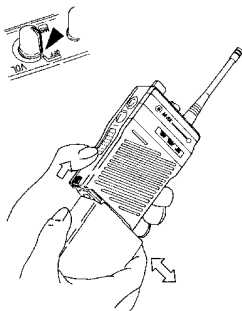
Figure 1 - Installing and Removing the Battery Pack

If the battery is to be charged on the radio, turn the power switch on the radio to the off position before charging. Failing to turn the power switch to off during the charge cycle will result in a less than full charge condition, which will noticeably reduce the operating time between charges!

Normal battery operation time is 8 hours. This may vary depending upon how much the receiver audio is present and how much you transmit. The actual time may vary from day to day depending upon operational requirements.

FOR BEST PERFORMANCE

1. Charge battery to full capacity, 14 hours at the standard C/10 rate (capacity X .10). For "rapid" chargers, allow additional time (2-3 hours) for "topping off" the charge after it switches from "fast" to "slow".

2. Use the battery soon and use as much of the battery capacity as possible or practical. A battery that is charged and discharged completely will maintain the longest running time capacity. Also, several charge/discharge cycles are recommended to bring a new battery up to its rated capacity.

3. Store and charge the batteries at room temperature 65°F to 75°F. Batteries that have been stored for over a month should be recharged before putting into service due to chemical self-discharge which occurs at a rate of approximately 1% per day. Do not charge cold batteries (40°F or below).

4. Reduced capacity or "memory effect" may result from repeated identical shallow discharge/full recharge cycles. If such a condition is suspected, run the battery until the instrumentation loses all power, then fully recharge and discharge again. Repeat this cycle 3-4 times.

EXTENDED OPERATIONS

When operating in "Fringe Areas" at some distance from the System, the other party may not receive your transmission clearly. Also, you may notice that the background noise will increase on received signals. Moving to higher ground or moving closer to the System will help alleviate these problems. If moving closer to the System is not practical, communication may be improved by moving away from shielding structures. If you are in a building interior, move closer to a window (preferably one generally in the direction of the System). At 800 MHz the wave length is very short, sometimes moving a few inches to a few feet can make significant signal strength changes. Finding the best location can also be done while listening to the background noise while moving about. Attempt to find a spot where the background noise is reduced to a minimum or eliminated entirely. This may make the difference from not being heard, to being heard loud and clear when operating in the fringe areas of your System coverage.

The fringe distance will vary greatly from plains areas, hilly terrain and mountain top sites.

FCC LICENSING

This unit may or may not require a specific FCC license to operate. The FCC requires all transmitters in the conventional and some Trunked Systems to be licensed by the Federal Communications Commission. Some Trunked operations are now exempt from individual licensing requirements but must be operated in a licensed System.

Consult your dealer regarding specific licensing information, or contact the Federal Communications Commission.

For more information regarding the FCC license application (Form 571), call 717-337-1212, or contact the FCC District Office nearest your location.

TRANSCEIVER SERVICE

There are no user serviceable components inside the radio. Altering the internal components or adjustments may result in illegal emissions, including off-frequency operation, or damage to the radio.

Should any of the indicators fail to light, turn the POWER ON-OFF/VOLUME control OFF then ON to reset the microprocessor. Ensure that the battery is fully charged and check that the antenna is securely tightened.

If the unit still fails to operate properly, refer to an Authorized Service Center for servicing.

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INTRODUCTION

This manual describes the operation of the EDACS M-RK I Portable Radio. The M-RK I is a synthesized, microprocessor-based, high-performance portable FM radio providing reliable two-way communications for Enhanced Digital Access Communications System (EDACS) trunking environments and conventional communication systems.

In the EDACS or trunked system mode the user selects a communications system and group. In this mode, radio channel selection is transparent to the user; it is controlled by digital communication with the EDACS site equipment. This provides advanced programmable features and fast access to communication channels.

In conventional mode, the user selects a radio channel and directly communicates on that channel. In this mode, a system refers to a set of channels. A channel is a transmit/receive radio frequency pair.

The radio's exact operation will depend on its current operating mode, its programming, and the particular radio system. Many features described in this manual can be enabled or disabled through programming. Consult the system administrator for the particular features that are programmed into the M-RK I.
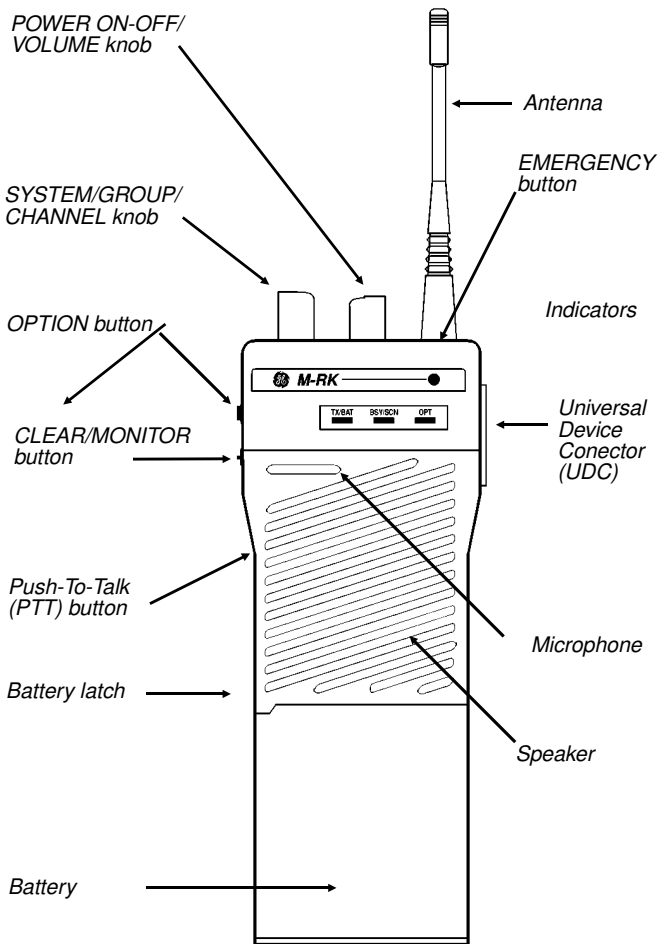
Figure 2 - EDACS M-RK 1 Portable Radio

POWER ON-OFF/ VOLUME knob

Antenna

SYSTEM/GROUP/ CHANNEL knob

EMERGENCY button

Indicators

OPTION button

CLEAR/MONITOR button

Universal Device Conector (UDC)

Push-To-Talk (PTT) button

Battery latch

Microphone

Speaker

Battery

USER INTERFACE

M-RK I operating controls are located on the top and side panels of the radio. The top panel houses a rotary SYSTEM/GROUP/CHANNEL knob, a POWER ON-OFF/VOLUME control knob and a protected red EMERGENCY button. Controls located on the left side panel (viewed from front) include an OPTION button, a CLEAR/MONITOR button and a Push-To-Talk (PTT) button. The Universal Device Connector (UDC) is located on the right side panel (viewed from front). This connector is utilized for accessory connections. Maintenance personnel also use the UDC to program the radio.

The speaker, microphone and three (3) illuminating indicators are located on radio's front panel. These indicators light-up to show various operating conditions such as transmitter on, channel busy, scanning, or a low battery.

SYSTEM/GROUP/
CHANNEL knob

POWER ON-OFF/
VOLUME knob

Antenna
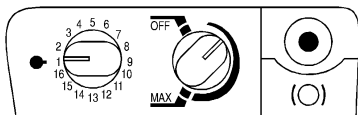
OPTION button

CLEAR/
MONITOR button

Push-To-Talk
(PTT) button

Battery latch
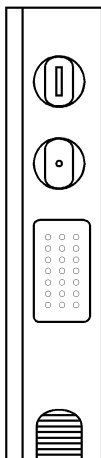
EMERGENCY
button

Figure 3 - Top and Side Panel Views

BUTTONS AND KNOBS

This section describes the basic functions of the button and knob controls.

SYSTEM/ GROUP/ CHANNEL KNOB — This 16-position rotary control is primarily used to select the systems and groups or conventional radio channels programmed into the radio. If the radio is programmed to make special calls, this knob is also used to select the programmed special calls. Special calls include trunked mode individual calls and telephone interconnect calls. See the 'OPERATION' section for specific details.

POWER ON-OFF/ VOLUME KNOB — Applies power to the radio and adjusts the receiver's volume. Rotating the control clockwise out of detent applies power to the radio. A single alert tone sounds (if enabled through programming) to indicate the radio is operational.

Rotating the control clockwise increases the volume level. Minimum volume levels may be programmed into the radio to prevent missed calls due to a low volume setting. While adjusting the volume, the display will momentarily indicate the volume level (i.e., **VOL=31**). The volume range is from a minimum programmed level of zero (displayed as **OFF** in the display) up to 31 which is the loudest level.

EMERGEN-CY/ HOME BUTTON The EMERGENCY/HOME button is used to automatically select a desired Group and/or System by pressing and holding the button for a pre-programmed duration. The EMERGENCY/HOME button is also used to declare emergencies by pressing and holding the button for a pre-programmed duration. Emergency messages may only be issued on EDACS systems.

OPTION BUTTON This button can be programmed to provide a toggle feature or to enable special call mode.

If the OPTION button is programmed for a toggle feature, pressing it will toggle the programmed feature between two different states (for example: on and off). The toggle features that can be programmed are: scan on/off, system/group/channel bank 1/2, repeater talkaround on/off, data on/off, Private/clear, status on/off, message on/off, P1 Conv. Scan on/off, and transmit output power high/low. **The button can only toggle one feature.**

Trunked mode individual calls, and telephone interconnect calls are special calls that can be programmed into the radio. If the OPTION button is programmed to enable special call mode,

the particular special call must first be selected using the SYSTEM/ GROUP/ CHANNEL knob. The special call is then initiated by pressing the OPTION button and then the PTT button.

CLEAR/ MONITOR BUTTON The CLEAR/MONITOR BUTTON serves several purposes depending on the operating mode.

In the trunked mode, the CLEAR/MONITOR BUTTON exits the current operation and removes all displays associated with it. The radio and display then return to the group receive state. In conventional mode, pressing this button unmutes the receiver so activity on the selected channel can be monitored. When pressed and held for approximately 3 seconds, this button toggles conventional channel decoding/encoding (Channel Guard, Digital Channel Guard, T99) on and off, if programmed, for the selected channel.

PUSH-TO-TALK BUTTON Pressing this button enables the radio's (PTT) transmitter. Releasing PTT returns the radio to the receive mode.

INDICATORS

The three (3) indicators on the front panel of the radio light-up to show various operating conditions such as transmitter on, channel busy, scanning, or a low battery. Each indicator can flash or light continuously (not flash) in different color combinations to indicate various modes as defined in Table 1.

TABLE 1 - Indicators

OPERATING CONDITION	INDICATOR	CONDITION	COLOR
Transmitting	TX/BAT	Continuous	Red
Battery Low Warning	TX/BAT	Flashes	Red
Busy	BSY/SCN	Continuous	Green
Call Queued*	BSY/SCN	Flashes	Green
Scanning	BSY/SCN	Flashes	Red
BankSelect Enabled	OPT	Flashes	Green
Talkaround Enabled	OPT	Flashes	Green
Special Call Enabled*	OPT	Continuous	Green
High Power Transmit On	OPT	Flashes	Green
Emergency Transmit Enabled*	OPT	Flashes	Green
Emergency Receive Enabled*	OPT	Flashes	Red
Private	OPT	Flashes	Red
No Data*	OPT	Flashes	Green
Status/Message	OPT	Flashes	Green
Conv. P1 Scan	OPT	Flashes	Green

*Trunked Mode Only

UNIVERSAL DEVICE CONNECTOR (UDC)

The UDC provides connections for external accessories such as a headset or a speaker-microphone. When the radio is locked in a vehicular charger/repeater, the UDC provides the audio and control connections between the radio and the vehicular charger/repeater. The UDC is also used to program and service the radio.

ALERT TONES

The M-RK I radio also provides audible alert tones or "beeps" to indicate various operating conditions. Alert tones can be enabled or disabled through programming.

Call Originate

A short mid-pitched alert tone sounds after keying the radio (after pressing the PTT button). At this time, the **TX/BAT** indicator lights red and, in trunked mode, the **BSY/SCN** indicator lights green. This indicates the radio has been assigned a working channel or that the radio is transmitting on a conventional channel and voice communication can begin immediately. In conventional mode, this alert tone may be delayed slightly after the PTT button is pressed due to GE-STAR signalling (if GESTAR is enabled through programming).

Autokey (Trunked Mode Only)

After being placed in queue or releasing the PTT button prior to a working channel assignment, the site calls the radio when a channel becomes available. At this

point, the radio automatically keys the transmitter (autokey) for a short period to hold the channel. The radio sounds a mid-pitched tone when it is clear to talk; immediately press the PTT button to keep the assigned channel.

Call Queued (Trunked Mode Only)

A high-pitched tone will sound and the **BSY/SCN** indicator will flash green if a call request is placed in queue after PTT activation. The receiving unit(s) also hear(s) the tone to notify them that a call should be received shortly. If the PTT button is released when a call is queued, the radio will autokey whenever a channel becomes available (see **"Autokey"**).

System Busy (Trunked Mode Only)

Three low-pitched beeps will sound if the radio is keyed when the system is busy, if: 1) no channels are available for sending the message; 2) if the call queue is full; or 3) an individual call is being attempted to a radio that is transmitting. Release the PTT button and re-key the radio to initiate a new channel request.

Call Denied (Trunked Mode Only)

If the radio is keyed and a low-pitched tone is heard, then the radio is not authorized on the system that has been selected.

Carrier Control Timer

If the programmed time for continuous transmission is exceeded, five short high-pitched warning tones followed by a long low-pitched tone will sound. The transmitter will shut down shortly after hearing the alert tones. The **TX**/**BAT** indicator will turn off, and communication is interrupted. Release and re-key the PTT button to maintain communications. This will reset the carrier control timer and turn the transmitter back on.

Low Battery Warning

If the battery pack's charge is/becomes low, a low-pitched tone will sound and the **TX**/**BAT** indicator will flash red. The radio will continue to receive and transmit normally; however, the battery pack should be charged or replaced as soon as possible. If the radio is keyed during this time, the **TX**/**BAT** indicator will light continuously (not flash) to indicate the radio is transmitting.

Low Battery Alert (Transmit Lockout)

If the radio is keyed and the user hears either a low-pitched tone or two tones and the **TX**/**BAT** indicator flashes, the battery is discharged and the radio will not transmit. Pressing the PTT or CLEAR button will reset the **TX**/**BAT** indicator if either is pre-programmed to perform this function. The radio will still be able to receive calls until the battery is discharged beyond the point of operation, after which the battery will need to be recharged to resume normal operation.

Low Battery Alert

If the battery pack's charge is too low to allow the radio to transmit (usually after a low battery warning), the radio will sound a low-pitched tone, (continue to) flash the **TX/BAT** indicator red and disable any transmission. The radio will continue to receive calls until the battery pack is discharged beyond the point of operation.

Key Press Alert

A short low-pitched alert tone will sound if no action is taken when a button is pressed. For example, if the currently selected conventional channel has the channel busy transmit lockout feature enable and the radio is keyed when the channel is busy, the radio will sound this low-pitched alert tone to warn the operator that no transmission is occurring.

OPERATION

TURNING ON THE RADIO

Rotate the POWER ON-OFF/VOLUME knob clockwise, out of detent to turn the radio on. (Ensure the antenna and battery pack are properly connected prior to power on.) A short beep (if enabled through programming) indicates the radio is ready for operation. The display indicates, if programmed, the last selected system name on line one and the last selected group or channel name on line two.

SYSTEM/GROUP/CHANNEL SELECTION

The M-RK I is programmed with <u>one</u> of the following system/group/channel selection methods:

- The radio is programmed with up to 16 different system/group or channels that are selected with the SYSTEM/GROUP/CHANNEL knob. Radios programmed in this manner use the OPTION button to provide a toggle feature <u>or</u> to enable special call mode.

- The radio is programmed with up to 32 different system/group or channels selected in two (2) different banks of 16. If programmed in this manner, the OPTION button is used to toggle between the two banks and then the SYSTEM/GROUP/CHANNEL knob is rotated to select the system/group or channel. No special calls can be initiated by a radio programmed in this manner.

BUTTON REASSIGNMENT

Pre-programming the radio using the PC Programming Software permits the reassignment of button and keypad key functions. The EMERGENCY, OPTION, CLEAR/MONITOR and PTT buttons, along with the front panel keypad keys, can be reassigned different functions.

The operating procedures that follow assume the buttons and keypad keys operate as marked. If they have been reassigned, Table 2 should be completed to show the new function(s). Substitute the new assigned keys when using the operating procedures.

Table 2 - Button and Key Assignments

STANDARD ASSIGNMENTS	REASSIGNMENT
OPTION (Side)	
CLEAR/MONITOR	
PTT	
EMERGENCY	

EMERGENCY/HOME BUTTON DEFINITION

The EMERGENCY/HOME button can be programmed in one of the following conditions:

1. Emergency Enabled and Home Enabled - The radio will switch to the programmed home System and/or Group and send an emergency transmission.

2. Emergency Enable and Home Disabled - The radio will send an emergency transmission on the current System/Group.

3. Emergency Disabled and Home Enabled - The radio will switch to the home System and/or Group.

4. Emergency Disabled and Home Disabled - the button is not active.

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Home

The radio can be programmed to automatically switch to a home System and/or Group by pressing and holding the EMERGENCY/HOME button for the pre-programmed duration. The radio will also transmit an emergency message on the home System and/or Group if programmed (see the **Emergency Operation** section)**.**

AEGIS AND VOICE GUARD OPERATION

Voice Modes

Each system (trunked or conventional) in the radio is programmed for either Aegis or Voice Guard communications. Aegis programmed systems have three (3) different voice modes: clear (analog), digital, and private. Voice Guard systems have two (2) voice modes: clear (analog) and private. The voice modes are programmed on a per-group basis within each trunked system and on a per-channel basis within each conventional system. A radio must be equipped with the encrypt/decrypt option before it will operate in Aegis or Voice Guard modes.

TRANSMIT/RECEIVE MODE COMPATIBILITY FOR AEGIS OPERATION

GROUP/CHANNEL PROGRAMMING (TRANSMIT)	CLEAR RECEIVE	DIGITAL RECEIVE	PRIVATE RECEIVE
CLEAR	Yes	No	No
DIGITAL	Yes	Yes	No
PRIVATE	Yes	No	Yes*

*assumes the proper cryptographic key is loaded

TRANSMIT/RECEIVE MODE COMPATIBILITY FOR VOICE GUARD OPERATION

GROUP/CHANNEL PROGRAMMING (TRANSMIT)	CLEAR RECEIVE	PRIVATE RECEIVE
CLEAR	Yes	No
PRIVATE	Yes	Yes*

*assumes the proper cryptographic key is loaded

NOTE

Conventional Aegis or encrypted channels require Channel Guard on the channel to operate correctly.

Clear Modes

Aegis clear and Voice Guard clear modes are identical voice modes in which the radio transmits and receives only clear (analog) voice signals. These analog signals are non-digitized and non-encrypted. Clear mode transmissions can be easily monitored by unauthorized persons. Groups or channels programmed for clear operation cannot transmit or receive Aegis digital or private messages.

Aegis Digital Mode

Aegis digital mode allows the radio to transmit and receive digitized voice signals. Aegis digital signals provide improved weak signal performance and they cannot be easily monitored with a standard receiver. Groups and channels programmed for Aegis digital operation transmit only digital signals. Private calls cannot be received or transmitted when the radio is in the Aegis digital mode because the radio does not know the cryptographic key used. Message trunked group calls and individual calls will be answered back in the mode they were received, assuming the call or hangtime is still active. Individual, phone, all and emergency calls will be transmitted clear if digital mode is disabled or inoperative.

1. If receiving an analog message trunked call, the radio will respond in analog mode during the hang time on the working channel.

2. If receiving an analog I-Call, the radio will respond in analog mode during the hang time.

AEGIS PRIVATE AND VOICE GUARD PRIVATE MODES

The Aegis private and Voice Guard private modes allow the radio to transmit encrypted messages and receive clear or private transmissions. The radio will transmit private if the group/channel is programmed for private operation and forced operation is pre-programmed. If autoselect operation was pre-programmed and the radio is in private mode, the radio will transmit in the mode of the received call if the hang time is active. If no hang time is active, the radio will transmit private.

Aegis transmissions cannot be received by a radio set to receive a Voice Guard transmission. Accordingly, a Voice Guard transmission cannot be received by a radio set to receive an Aegis transmission.

Cryptographic keys are transferred to the radio using a cryptographic Keyloader. Up to seven (7) different cryptographic keys, numbered 1-7, can be transferred from a Keyloader and stored in the radio. An individual key is automatically selected on a per-group/channel basis according to the radio's programming. Groups and channels within Aegis systems can be programmed for keys 1-7. Groups and channels within Voice Guard systems can be programmed for keys 1-7. Up to 8 banks of 7 keys can be stored for Aegis (DES and VGE) systems and up to 4 banks of 7 keys for Voice Guard systems. The bank is specified per system.

DES radios require a DES Keyloader (Option V4025 with software version 3.N or later). VGE radios require a

VGE Keyloader (Option V4028 with software Version 2.N or later).

When operating on a group or channel programmed for private mode, all transmissions will be private transmissions and the radio will receive clear and private signals. The **OPT** indicator flashes green when the private mode is enabled. If the selected group or channel is programmed for autoselect capability, the mode may be toggled between private and clear with the OPTION button. Radios programmed for forced private operation do not allow a change of the transmit mode; therefore, the OPTION button has no effect.

Transferring Keys Into The Radio

The following procedure outlines basic key transferring steps.

1. Turn the radio off.

2. Plug the modular connector of the Keyloader cable into the Keyloader modular jack.

3. Connect the Keyloader cable to the UDC on the radio.

4. Press the PWR button on the Keyloader and wait for the Keyloader to display "MASTER MODE".

5. Press the TRN button on the Keyloader. If necessary, select a different cryptographic key to be transferred into the radio.

6. Turn the radio on. A beep will indicate that the Keyloader is connected.

7. Press the EXE button on the Keyloader to transfer the key. The Keyloader will display "GOOD 1.x TRANSFER" where "x" is the selected cryptographic key number.

8. Disconnect the cable from the radio's UDC. The radio will change to the selected group or channel as indicated in the display.

Key Zero

All cryptographic keys can be zeroed (erased from radio memory) by pressing the MONITOR/CLEAR button and while still pressing this button, press and hold the OPTION button. Press both buttons for 2 seconds. A series of beeps will begin at the start of this 2 second period and then switch to a solid tone after the keys have been zeroed. The display will indicate "KEY ZERO."

If the cryptographic key(s) are zeroed, one or more keys must be transferred from the Keyloader into the radio before private communications may continue.

PRIVATE OPERATION

Receiving An Encrypted Call

When receiving, the radio automatically switches between clear or private operation. If the transmission being received is an encrypted transmission, it will be decrypted, the **OPT** indicator will flash green, the receiver will unsquelch and the message will be heard in the speaker. For this to occur, the selected group or channel must be programmed for private operation and the correct cryptographic key must be loaded into the radio.

Transmitting An Encrypted Call

1. Select the desired group or channel.

2. Place the radio in private mode by pressing the OPTION button. When private mode is enabled, the **OPT** indicator will flash green.

   If the last state of the radio was private mode, the private mode will be enabled on power up. Also, the private mode will be enabled if forced operation has been programmed in the radio.

   If the radio does not have the correct encryption key loaded, "NO KEY " repetitive tone will sound and the call will not be transmitted.

3. Continue with standard transmission procedures. A private mode access tone will be heard when the PTT button is pressed.

Scanned Group Calls

Receiving a scanned group call is the same as receiving a selected group call. During the scan hang time, if the radio was programmed for autoselect, it will transmit back in the same mode it received the call. For example, if a clear group is entered in the scan list, it will only receive clear calls. If the same group was available in private and entered in the scan list, it can receive clear and private calls, provided autoselect was programmed in the radio. The user can select transmitting on the scanned or selected group. If a group is entered in the scan list more than once and in different modes (clear, digital, private), only the first occurrence of the group will be used.

LAST SYSTEM/GROUP OR CHANNEL RECALL (SUPERVISORY RADIO UNITS ONLY)

This feature enables the user to recall the last selected system/group after an EDACS emergency or home function, a conventional emergency or home function or system/group key function. This feature must be pre-programmed as "Enabled" to function. For example, if the Home button (pre-programmed) is pressed, the radio will go to the designated Home system/group or channel. If the Home button is pressed again, the radio returns to the previous system/group or channel. At this time the user can toggle between the Home system/group or channel and the previous system/group or channel.

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EDACS TRUNKED MODE OPERATION

Digital trunking provides fast communication access at all times, even during busy hours. In this mode the operator selects a communications system and group, and the audio communication channel (working channel) is automatically allocated digital signalling with the site.

RECEIVING A CALL

1. Turn the radio on by rotating the POWER ON-OFF/VOLUME knob clockwise (out of the detent). A short alert signal (if enabled through programming) indicates the radio is ready to use.

2. Adjust the POWER ON-OFF/VOLUME knob to the desired volume level.

3. Select the desired system and group. The radio is now ready to receive group and individual calls.

4. When a Call is received, the radio will unmute (unsquelch) on the assigned working channel and the **BSY/SCN** indicator will light-up green. Adjust the volume as necessary.

5. GROUP CALL - If the call is a group call and a reply is necessary, follow the instructions outlined in the section entitled "**Sending A Call**" (Steps 2 - 3).

6. INDIVIDUAL CALL - An individual call is a call directed to only one radio. The radio may be programmed to ring when it receives a call of this type. If

not answered, the ring will continue until the call-back hangtime (programmable) expires.

Responding to an individual call prior to the call-back hangtime time-out will automatically direct the call to the originating unit on an individual basis. The **OPT** indicator lights green during the call-back hangtime. See the section entitled **"SPECIAL CALLS"** for additional details on individual calls.

SENDING A CALL

1. Turn the radio on and set the desired volume level. Select the desired system and group.

2. Press and hold the PTT button. The radio will perform signalling required to obtain a working channel. When transmitting, it will light the **TX/BAT** indicator red.

3. When the working channel is assigned, the radio will sound the short mid-pitched call originate alert tone and light the **BSY/SCN** indicator green.

--- **NOTE** ---

If two or more tones, or a high pitched tone is heard, the system may be busy and the call request has been placed in queue or the request has been denied for some reason. Refer to the **"ALERT TONES"** section for more details.

4. After the call originate alert tone sounds, hold the radio approximately three inches from the mouth and speak in a normal voice into the microphone.

5. Release the PTT button when the transmission is complete and listen for a reply.

CONVENTIONAL FAILSOFT

In the unlikely event of a failure of the EDACS system, communications may take place in conventional failsoft mode. The radio will be automatically directed to a communications channel set up for this purpose. An increase in activity on the channel during conventional failsoft operation may be noticed, so be careful not to transmit until the channel is clear.

Operation during conventional failsoft will be the same as operation on a conventional system, except that it will not be possible to select a communications channel, or use emergency and special call. When trunking is restored, the radio will automatically be returned to normal operation.

--- NOTE ---

Emergency and Special Call are not operational during conventional failsoft. Also, the **GROUP** control will not operate.

SCAT OPERATION

A SCAT(Single Channel Autonomous Trunking) System operates with the same set of features as a standard EDACS system. The only significant user change relates to the **BSY/SCN** indicator. Since only one channel, operating as both control and working channel, exists in a SCAT System, the **BSY/SCN** indicator will be ON when the SCAT channel is in the working channel mode. When the transmission on the channel is completed, the indicator turns OFF and indicates the return of SCAT control channel signaling.

EMERGENCY OPERATION

The radio's ability to declare an emergency, clear an emergency and remain locked on an emergency system and group can each be enabled or disabled through programming. When an emergency is declared, scanning will stop and restart only after the emergency has been cleared.

Receiving An Emergency Call

The radio will sound an alert beep and flash the **OPT** indicator red when an emergency call on the selected system and group is received. Follow standard emergency procedures.

Declaring An Emergency Call

To declare an emergency call on the selected system and group (or on a pre-programmed [optional] emergency group), proceed as follows:

1. Press and hold the red EMERGENCY button that is on top of the radio in front of the antenna, for approximately one second. This time is programmable and, therefore, could be longer or shorter; check with the system administrator. The radio will transmit an emergency call request with the radio ID until an emergency channel assignment is received.

2. When the working channel is assigned, the radio sounds a single beep (Autokey alert tone), the **OPT** indicator lights red, the **TX/BAT** indicator lights red and the **BSY/SCN** indicator lights green. This indicates the radio is ready for voice transmissions. The **OPT** indicator will remain lit until the emergency is cleared.

3. Press the PTT button and speak into the microphone in a normal voice. The **TX/BAT** indicator will continue to light red as the radio is transmitting.

4. Release the PTT button when the transmission is complete and listen for a reply.

Clearing An Emergency Call

If the radio has supervisor privileges (enabled through programming) an emergency can be cleared by

pressing and holding the CLEAR/MONITOR button followed by pressing the EMERGENCY button, and then releasing both buttons.

SCANNING TRUNKED SYSTEMS

The following features allow interaction with systems other than the selected system to meet specific customer needs. Wide Area System Scan and ProSound are mutually exclusive options; however, Priority System Scan will operate while ProSound is active.

Wide Area System Scanning

The M-RK I may be programmed for wide area system scan operation for multi-site applications. Upon the loss of the currently selected system's control channel, the radio can be programmed to automatically scan the control channels of other systems. If a new control channel is found, the radio will switch to the new system and sound an alert tone. If the radio is programmed for wide area system scan operation, the SYS-TEM/GROUP/ CHANNEL knob is normally programmed to select only groups and channels, not systems.

ProSound™

The radio may be programmed for ProSound system scan operation for muti-site applications. ProSound scanning is an enhanced replacement for wide area system scanning. This algorithm ensures that the radio continually receives high quality audio. When the selected system degrades to a pre-programmed level, the

radio changes to the new system and sounds a tone. Should the control channel be lost completely, the radio will scan the adjacent systems until a suitable one is found.

Priority System Scan

The radio may also be programmed for priority system scan. A priority system may be assigned among the systems programmed into the radio. Radios programmed in this manner will check for the priority trunked system's control channel at a programmable rate ranging from one to 16 minutes. This priority scan timer is reset each time the PTT button is pressed or when a call is received. If the priority system control channel is found, the radio will automatically switch to the priority system.

SCANNING TRUNKED GROUPS

If the radio is programmed to scan, each system will normally be programmed with a fixed scan list that consists of some or all of the selectable groups in the radio (16 maximum if one bank, 32 maximum if two banks). However, each system in the radio can be programmed with a fixed scan list of up to 64 groups. The following rules apply to trunked mode scanning:

- The **BSY/SCN** indicator flashes red when the radio is scanning.

- The operator cannot add groups to or delete groups from the fixed scan list(s).

- The OPTION button may be programmed to toggle scan on and off.

- The radio will continue scanning if a new group is selected when scan is on.

- The currently selected group has priority over the groups being scanned. Therefore, if the radio detects a call on the selected group, it will switch to this group for the duration of the call. After the call is completed, the radio will resume scanning.

- Depending upon programming, pressing the PTT button when the radio is scanning will cause it to transmit on the currently selected group <u>or</u> on the scanned group (during the scan hangtime).

- When a group call is received on one of the groups being scanned, the radio will stop scanning, unmute on the assigned channel, and alternately flash the **BSY/SCN** indicator green and green/red. If the radio is programmed to transmit on scanned groups, the operator can respond (transmit) to the scanned group call before the scan hangtime (programmable) expires by pressing the PTT button.

- If a particular system is programmed to scan groups that are not selectable from the SYS-TEM/GROUP/CHANNEL knob, it will only be possible to transmit on these groups before the scan hangtime expires.

PROGRAMMABLE ENTRIES

Individual call ID numbers, telephone numbers and other number sequences for overdialing are stored in the special call lists when programming the radio.

SPECIAL CALLS

Individual calls and telephone interconnect calls are handled using the radio's special call mode. An individual call is directed to only one radio. Individual calls are always handled when the radio is in trunked mode. The radio can be programmed to handle telephone interconnect calls when it is in trunked mode and when it is in conventional mode. A conventional channel must be equipped for telephone interconnect capability before a telephone interconnect call can be placed on the channel.

Receiving And Responding To A Special Call

The radio may be programmed to ring when it receives a special call. If not responded to (answered), the radio will continue ringing until the call-back hangtime (programmable) expires. After time-out the radio will return to group receive operation.

When a special call is received, the **BSY/SCN** indicator will light green and the **OPT** indicator will light green. The **OPT** indicator will remain lit until the call-back hangtime expires or the operator clears the special call mode by pressing the CLEAR/MONITOR button or by changing the system or group.

To respond to a special call, press the PTT button before the call-back hangtime expires and then use standard transmission procedures. The call will be automatically directed to the originating unit on an individual basis. When the call is completed, momentarily press the CLEAR/MONITOR button to hang-up or simply wait for the hangtime to expire.

Initiating And Sending A Special Call

The radio can be programmed with up to 16 special calls (individual calls and telephone interconnect calls). Special calls can only be initiated by the radio if the OPTION button is programmed to enable special call mode. The following procedure outlines procedures necessary to initiate and send a special call.

1. Each position of the SYSTEM/GROUP/CHANNEL knob can be programmed with a different special call. Rotate the knob to the position that corresponds to desired special call.

2. Press the OPTION button to place the radio in the special call mode. The **OPT** indicator will light green to indicate the radio is in the special call mode.

3. Press and release the PTT button.

4. INDIVIDUAL CALL - When the signalling is complete and it is clear to transmit, the radio will sound the call originate alert tone. With the PTT button depressed, speak into the microphone in a normal voice. Continue with standard transmission procedures.

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TELEPHONE INTERCONNECT CALL - The telephone rings will be heard until the called party answers, continue with standard transmission procedures.

5. When the call is completed, momentarily press the CLEAR/MONITOR button to hang-up or simply wait for the hangtime to expire.

NOTE

The M-RK I radio is capable of simplex communications only. The callee can only hear the radio if the PTT button is pressed (the radio is transmitting) and the callee can only be heard when PTT is released (the radio is receiving).

PORTABLE DATA OPERATION

When operating in the EDACS configuration, M-RK radios permit either voice or data calls to be transmitted or received. The radio can handle only one type of call at a time; however, selection of either data or voice is selected transparently by the operator through normal usage of the radio. Data communications is not supported in the conventional mode. DATA, RS2-Type DATA, and ProFile are EDACS enhanced, separately purchased features that when turned on can be used to configure M-RK radios.

"Data" now applies to two classes of data: External Device Data Applications (Mobile Data Terminals) and Radio Destined Data Applications (ProFile). For

External Device Data Applications, both destination and source are from applications external to the radio. For Radio Destined Data Applications (ProFile) one side of the conversation is an external device (i.e., ProFile Manager), but the other side is now an application internal to the radio. Data applications can be common between both application classes, or specific to a data application. Each programmable data option is organized as the following:

- Universal Options - Apply to ALL data applications.
- Specific Options - Apply only to either ProFile or MDT.

The radios can be connected to Mobile Data Terminals (MDT) or to a host computer/radio. A host radio routes all data (MDT and ProFile) externally. Any RS-232 compatible device that supports the Radio Data Interface (RDI) protocol (Version 1.91 or higher) may be connected to the radio. Support for MDT's or host computers is a programmable option per radio. Additionally, radios programmed for host computers may also be programmed for data only operation (no voice calls transmitted or received).

Data Off Operation

DATA OFF suspends TX/RX data activity until it is re-enabled via DATA ON. When the data state is disabled, the radio beeps and the **OPT** indicator will flash green.

The radio can be placed in the data disabled state by any of the following methods:

- Declaring an emergency (not to be used unless an actual emergency condition exists). Alert tone will sound.

- Pressing the OPTION button (if pre-programmed as a no data button). Alert tone will sound.

NOTE

If DATA OFF is active, neither Profile nor MDT will function.

- Pressing the no data (ND) key (pre-programmed).

Data On Operation

DATA ON/OFF applies to all radio data (i.e., MDT and Profile). The data state is enabled by one of the following (depending on how it was disabled):

- Pressing the OPTION button (if pre-programmed as a no data button) toggles data state on or off.

- Clearing an emergency (valid only if emergency caused data off operation).

Exiting Data Calls

Under normal conditions, the radio enters the scan lockout mode and returns to the control channel after

completion of a data call (transmit or receive). If during a data call one of the following conditions occurs, the data call is immediately terminated and the radio performs the desired function:

- PTT activated**.**

- Emergency declared by pressing the pre-programmed emergency button.

- A group or system change.

Scan Lockout Mode

Following the transmission or reception of a data call, if scan is enabled, scanning will stop temporarily [two independent pre-programmed times (after receive data call and after transmit data call)]. During this time the **BSY/SCN** indicator will flash to indicate that scan is enabled but temporarily suspended. This mode is normally exited when the pre-programmed time expires; however, the following actions will terminate the scan lockout mode before the time-out is completed.

- The clear button is pressed.
- The PTT is pressed.
- A group or system change.
- Phone call mode is entered.
- Individual call mode is entered.
- A new emergency assignment has been received.
- An emergency declared or cleared.
- An individual or phone call is received.

- Agency, Fleet or System All Call is received.
- The OPTION button is pressed to turn scan on or off.

Data Lockout Mode

During the voice call scan hang time (pre-programmed) the radio will not receive data calls.

ProFile Select Option

The ProFile Select Option enables/disables all ProFile reading and writing functions. ProFile Select can be mapped to a key on the radio.

NOTE

ProFile Off terminates any ongoing conversation(s) with ProFile Manager. If this occurs, ProFile Manager must restart communication with the radio from the beginning - it does NOT restart where it was interrupted as DATA OFF does.

If the MDT cable is not attached when ProFile On is selected, the radio is now capable of receiving ProFile data - calls.

Option Availability

If the ProFile Select Option is not mapped to a key, or part of a macro, the option will not be available. Also, if

the radio is in one of the following modes, ProFile is not available:

- Radio Disabled
- Conventional Failsoft
- Transmitting Voice
- Diagnostic/Test Keyload
- All Conventional Modes
- PA is PTT'd

STATUS/MESSAGE OPERATION

Status and message operation is possible with the M-RK radio unit. The radio OPTION button must be reconfigured and pre-programmed for status/message operation. The radio can operate in either status or message but not both and can only transmit one status condition or one message text.

Status Operation

Status operation permits the transmission of a pre-programmed status condition to the EDACS site.

To send a status condition, press the OPTION button to select the pre-programmed status. After the time-out expires, the status will be transmitted to the site or stored in the radio memory where it can be polled by the site at a future time. If the site does not receive the status properly, the radio will sound a low-pitched tone.

The status selection can also be cancelled by pressing the CLEAR button prior to the time-out period.

Message Operation

Message operation permits the transmission of a pre-programmed message text to an EDACS site.

To send a message, press the OPTION button to select the pre-programmed message text. After the time-out expires, the message text will be transmitted to the site. If the site does not receive the message properly, the radio will sound a low-pitched tone.

The message text selection can also be cancelled by pressing the CLEAR button prior to the time-out period.

EDACS CONVENTIONAL P1 SCAN

This feature permits the radio user to scan a pre-programmed conventional system Priority 1 (P1) channel while the radio is selected for EDACS trunked system. If activity is detected on the conventional P1 channel, the radio will unmute and remain on this conventional channel for the programmable hang time.

The radio must be pre-programmed to designate a key for scan on/off operation. In addition the scan condition must be programmed to unmute on squelch only clear voice (quick check mode) or unmute for both clear and digital voice (complete check mode).

DYNAMIC REGROUP OPERATION

Dynamic regroup operation permits multiple talk groups (up to eight) to be added to a radio via the system manager. The radio must be pre-programmed to respond to regrouping. Dynamic regrouping will not be activated in a radio until an activation message is sent by the system manager. Each radio that receives and acknowledges the regrouping instructions is successfully regrouped.

Pressing and holding the CLEAR/MONITOR button for 2.5 seconds toggles the user into and out of the dynamic regroup groupset. A double beep will sound for entry or exit. The **TX/BAT** indicator will flash to indicate that dynamic group is active. The double beep and lack of the periodic low battery audible alarm will be a sign that the **TX/BAT** indictor is showing dynamic regroup is active.

Also, when Systems and Groups are pre-programmed on the knob as in the M-RK I, the knob becomes a group only knob when in dynamic regroup. This permits the user to get to all eight groups. To change systems, dynamic regroup must be exited by holding the CLEAR/MONITOR button for 2.5 seconds.

Emergency Operation

If the pre-programmed groupset on the currently selected system contains an EMER/HOME group and the radio is in dynamic regroup, the radio will exit dynamic regroup and declare the emergency on the HOME group.

If no EMER/HOME group is present, the radio will declare the emergency on the currently selected dynamic regroup group.

MACRO KEY OPERATION

Macro key operation permits the user to accomplish a series of key strokes with a single "macro" key stroke. Up to 10 macro keys can be defined, each capable of executing up to 20 key strokes, to any pushbutton input (i.e., keypad buttons, OPTION button, etc.). Each macro keys can be pre-programmed to activate when pressed or when released.

A macro key may also be pre-programmed to change the key stroke sequence the next time the macro key is activated. A macro key function will be aborted if the user changes a button or knob position.

For detail operation and assignment of macro keys, contact your communications supervisor or administrator.

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CONVENTIONAL MODE OPERATION

The radio operates in the conventional mode (non-trunked mode) when a conventional channel is selected. Each channel consists of a preset transmit/receive frequency pair for repeater operation or a common transmit/receive frequency for talkaround (no repeater) operation. Each conventional channel can have one or more features, such as Channel Guard, programmed when the channel is selected.

The CLEAR/MONITOR button unmutes (unsquelches) the receiver so activity on the selected channel can be monitored. When pressed for approximately 3 seconds this button toggles conventional channel decoding (Channel Guard, Digital Channel Guard or Type 99) on and off if programmed for the selected channel. Selecting a new conventional channel will turn the decode function on if it was previously turned off.

RECEIVING A CALL

1. Turn the radio on by rotating the POWER ON-OFF/VOLUME knob clockwise out of the detent position.

2. Adjust the knob to an approximate desired volume level.

3. Select the desired conventional system and channel.

4. The radio is now ready to receive calls.

5. The **BSY/SCN** indicator will light-up green when the radio receives any signal on the selected channel. The radio will unmute (unsquelch) when it receives a signal (if the correct Channel Guard signal is decoded, programmed, and enabled).

SENDING A CALL

1. Turn the radio on by rotating the POWER ON-OFF/VOLUME knob clockwise out of the detent position.

2. Adjust the knob to an approximate desired volume level.

3. Select the desired conventional system and channel.

4. The radio is now ready to send calls.

5. Verify the channel is not busy by observing that the **BSY/SCN** indicator is not lit-up green or by momentarily pressing the CLEAR/MONITOR button to unsquelch the radio.

6. Press and hold the PTT button. The **TX/BAT** indicator will light-up red and the short mid-pitched call originate alert tone will sound (if programmed). If the channel busy transmit lockout feature is enabled for the selected channel, the radio will not transmit if the channel is busy at PTT. In this case, the radio will sound a low-pitched alert tone when the PTT button is pressed to indicate it is not transmitting.

7. Hold the radio approximately 3 inches from the mouth and speak in a normal voice into the microphone.

8. Release the PTT button when the transmission is complete and listen for a reply.

EMERGENCY OPERATION

If enabled, GE-STAR emergency signalling can be transmitted when operating in the conventional mode. GE-STAR emergency signalling will transmit 5 times with a delay between each transmission. GE-STAR is programmed to transmit in one of the following methods:

METHOD 1:GE-STAR emergency signal is transmitted on the selected channel. If the channel is changed, the emergency signalling will continue to be transmitted on the newly selected channel.

METHOD 2: Same as Method 1 but the radio will lock onto the selected channel. Any attempts to change the channel will be disabled.

METHOD 3: GE-STAR is transmitted on a pre-programmed conventional emergency system and channel regardless of the selected channel. In this case, the selected channel is available for voice transmission and the radio will periodically "jump" to the pre-programmed emergency system and channel to send the emergency signalling and then "jump" back to the selected channel for voice transmissions.

METHOD 4: Same as Method 3, but the radio will lock on to the pre-programmed conventional emergency system and channel for GE-STAR emergency and voice transmissions. The channel cannot be changed until the emergency is cleared.

If the radio is programmed to transmit GE-STAR emergency signalling, press and hold the red EMERGENCY button on the top of the radio for approximately one second. This time is programmable and, therefore, could be longer or shorter - check with the system administrator. Follow standard emergency procedures.

The emergency state can be cleared by turning the radio off and then back on or by changing systems. System changes are always allowed during GE-STAR emergency transmissions; however, if a new system is selected, GE-STAR signalling will be cleared (stopped).

Using 5-Tone Signalling For Emergency Declaration

If 5-Tone signalling is defined for emergency declaration in place of GE-STAR emergency signalling, a pre-programmed tone sequene will be transmitted instead of the GE-STAR sequence. This emergency declaration functions as the GE-STAR emergency in all other respects.

TONE ENCODE TRANSMISSION

In conventional mode, two keys can be defined to be tone encode triggers. If one of the pre-programmed tone encode triggers is pressed, a pre-programmed tone sequence will be transmitted on the current system and channel. (See **Emergency Operation** if EMERGENCY/HOME button is used.) The **TX/BAT** indicator will light during tone transmission and a beep will sound at the end of the transmission. If enabled, audible side tones will be heard in the radio speaker as well. If PTT is pre-programmed as one of the triggers, the microphone will become active for voice communication after the tone sequence is complete.

Tone encode will be transmitted with Channel Guard, if one is defined, and tones are always transmitted in clear voice mode, even if the channel is set for digital or private (see **VOICE MODES**). Digital or private voice transmission will resume normally after the tone transmission.

SCANNING CONVENTIONAL CHANNELS

If the radio is programmed to scan, each conventional system will normally be programmed with a fixed scan list that consists of some or all of the selectable conventional channels in the radio. However, each conventional system in the radio can be programmed with a fixed scan list of up to 64 channels. The following rules apply to conventional mode scanning:

- The **BSY/SCN** indicator flashes red when the radio is scanning.

- The operator cannot add channels to or delete channels from the fixed scan list(s). In addition to the fixed scan list(s), the radio may also be programmed to scan the selected channel even if it is not on the fixed scan list(s). Priority-one and priority-two scan channels may also be programmed.

- Scan rate will vary depending upon the number of channels on the fixed scan list(s) and whether or not the radio is programmed to scan for Channel Guard.

- The OPTION button may be programmed to toggle scan on and off

- The radio will continue scanning if a new channel is selected when scan is on.

- Depending upon programming, pressing the PTT button when the radio is scanning will cause it to transmit on the currently selected channel or on the scanned channel (during scan hangtime).

- When a call is received on one of the channels being scanned, the radio will stop scanning, unmute on the assigned channel, and the **BSY/SCN** indicator will alternately flash green and green/red. If enabled through programming, the operator may respond (transmit) to the scanned call before the scan hangtime (programmable) expires by pressing the PTT button.

- If priority scan channels are programmed, the radio will periodically monitor these channels for activity. If active, the radio will stay on the priority channel for the duration of the call.

- If a particular conventional system is programmed to scan channels that are not selectable from the SYSTEM/GROUP/CHANNEL knob, it will only be possible to transmit on these scanned channels before the scan hangtime expires. The radio must be programmed to transmit on the scanned channel instead of on the selected channel.

- If the radio is programmed to disable scan operation after transmitting, scan will turn off after transmitting. In this case, scan can only be turned back on if the OPTION button is programmed to toggle scan on and off.

TYPE 99 DECODE (CONVENTIONAL ONLY)

If the Type 99 Decode Option has been pre-programmed, individual selective calling is possible. The radio can now decode individual, group or supergroup paging calls. Two sets of Type 99 paging codes must be pre-programmed into the radio. When the radio decodes an appropriate Type 99 code sequence, an alert tone and visual indicator is provided to the user. The receiver then operates as a noise squelched unit until Type 99 is reset. Type 99 decode continues to operate during this noise squelched period. The appropriate Type 99 alert tone will sound again if it detects a valid two-tone sequence.

Type 99 operation can be pre-programmed to be enabled or disabled using the OPTION button or a selected keypad key. Type 99 operation may be reset manually or automatically (pre-programmed). Manual reset is achieved by briefly pressing the CLEAR button. Automatic reset, if enabled, occurs after a 30 second interval following the most recent decode of a Type 99 tone sequence.

OPERATING RULES AND REGULATIONS

Two-way FM radio systems must be operated in accordance with the rules and regulations of the Federal Communications Commission (FCC). As an operator of two-way radio equipment, the user must be thoroughly familiar with the rules that apply to the intended type of radio operation. Following these rules will help eliminate confusion, assure the most efficient use of existing radio channels, and result in a smoothly functioning radio network.

When using the radio, remember these rules:

1. It is a violation of FCC rules to interrupt any distress or emergency message. In conventional mode, the radio operates in much the same way as a telephone "party line"; therefore always listen to make sure the line is clear -- that no one else is on the air -- before sending any messages. If someone is sending an emergency message -- such as reporting a fire or asking for help in an accident -- KEEP OFF THE AIR!

2. Use of profane or obscene language is prohibited by Federal Law.

3. It is against the law to send false call letters or a false distress or emergency message.

4. The FCC requires that conversations be brief and confined to business. To save time, use coded messages whenever possible.

5. Using the radio to send personal messages (except in an emergency) is a violation of FCC rules. Only those messages essential for the business operation may be sent.

6. It is against the Federal law to repeat or otherwise make known anything overheard on the radio. Conversations between others sharing a communications channel must be regarded as confidential.

7. The FCC also requires that the caller be identified at certain specific times by means of call letters. Refer to the rules that apply to the particular type of operation for the proper procedure.

8. No changes or adjustment shall be made to the equipment except by an authorized or certified electronic technician.

OPERATING TIPS

The following conditions tend to reduce the effective range of two-way radios and should be avoided whenever possible.

- Operating the radio in low areas of terrain or while under power lines or bridges.

- Operating the radio inside of a vehicle or in a metal or steel framed building unless using an outside antenna.

- Obstructions such as mountains or buildings between the sending and receiving parties.

In areas where transmission or reception is poor, some improvements may be obtained by insuring that the antenna is vertical. Moving a few yards in another direction or moving to a higher elevation may also improve communication.

INTRINSICALLY SAFE USAGE

Selected portable radios with appropriate factory installed options are certified as Intrinsically Safe by the Factory Mutual Research Corporation. Intrinsically Safe approval includes Class I, II, Ill, Division 1 hazardous locations in the presence of Groups C, D, E, F and G atmospheres. Non-Incendive approval includes Class I, Division 2 hazardous locations in the presence of Groups A, B, C and D atmospheres.

Hazardous locations are defined in the National Electrical Code. Useful standards NFPA 437A and NFPA 437M for the classifications of hazardous areas can be ordered from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

BATTERY PACKS

Only battery packs identified with a green latch shall be used with a portable radio that is rated and labeled as Factory Mutual Intrinsically Safe. Use of non-specified battery packs voids Factory Mutual approval. The following battery pack options are approved for use in intrinsically safe radios.

PKPA5X   Rechargeable Battery Pack,
          Extra High Capacity (Tall Case)

PKPA5W   Rechargeable Battery Pack,
          High Capacity (Short Case)

ACCESSORIES

The following accessories are approved for use with intrinsically safe radios. Use of accessories other than those listed voids Factory Mutual approval.

PKAE3A   Speaker/Microphone

PKAE1C   Speaker/Microphone/Antenna

PKAC1J   Earpiece Kit

PKHC1C   Belt Clip

PANC1B   Antenna, 136-160 MHz, Helical

PKNC1K   Antenna, 806-870 MHz, Whip

PKNC1L   Antenna, 378-440 MHz, Whip

PKNC1N   Antenna, 440-512 MHz, Whip

GLOSSARY

agency-   - an agency is composed of multiple fleets. units can be programmed to initiate agency calls to access multiple fleets. (Trunked Mode Only).

base/unit operation - a programmed option used in some fleets so units can only hear and talk to a base dispatch unit, not to other mobiles or portable radios in the group. In this mode of operation, when a unit in a particular group is talking to the base dispatch unit, all other mobile and portable radios in that group will receive a "system busy" alert tone if they try to access the system. (Trunked Mode Only).

control channel   - a radio channel in a trunked system that is used to digitally communicate with the radios operating on the system when they are not engaged in active voice communications.

conventional channel - a radio channel (transmit/receive) that is allocated for conventional (non-trunked) use and may be manually selected by the operator.

conventional mode   - communicating on radio channels allocated for conventional use.

CCT-   - Carrier Controlled Timer - a programmable timer that will disable a transmission if the timer length is exceeded.

CG   - Channel Guard - a method of controlling mute with a tone or digital code.

dynamic regrouping - a feature which allows the System Manager to dynamically program new groups into selected radios. The System Manager develops the regrouping plan and directs the site controller to send each radio the regroup information.

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fleet	- a fleet of users consists of multiple groups (sub fleets). Radios can be programmed to make fleet calls to simultaneously access multiple user groups. (Trunked Mode Only).
group or subfleet	- a group of users share the same program group identification number in their mobile and portable radios. All units in the same group will receive a dispatch call placed by any one unit in the group. (Trunked Mode only).
group scan	- programming that allows the radio to monitor up to 64 separate groups simultaneously (multi-group decode), permitting the user to receive calls from these groups. when a radio receives a call from one of these groups, it will "lock-out", and not send or receive calls from other groups for a programmed period of 5, 10 or 15 seconds, permitting the user to respond to the group call. (The radio may also be programmed for no lock-out period.) At the end of the 'lock-out" period, the radio sounds two short low-pitched "beeps" and is again ready to receive a call from any of the programmed groups. (Trunked Mode Only).
hangtime	- the time interval between when a call is initiated and when it will be dropped (cancel) by the system if not responded to by the called party.
individual call	- Every radio in the system is programmed with a unique individual identification code. A mobile or portable radio can be programmed to call another unit by selecting the individual unit based on I0 number. (Trunked Mode Only).
priority group scan	- if enabled by programming, priority group scan allows the user to scan up to 64 separate groups simultaneously, with one level of priority. When the user is receiving a non-priority group call and a call from the priority

	group is detected by the radio, the unit will automatically switch priority group call in process. The priority group call can be defined as either a predetermined group or the currently selected group.
queueing	- the process that occurs when all channels in a trunked system are busy and calls must be addressed on a priority basis.
site controller	- the computer controlled radio equipment at the repeater site that controls a trunking system.
system (area)	- the terms 'system" and "area" are used interchangeably to refer to the particular group of station repeaters currently providing service to the radio.
system manager	- a computer that performs the data basing and system monitoring for the site controller.
system scan	- a programmed feature to scan (monitor activity on) separate trunked systems and receive calls on any of these systems. (Trunked Mode Only).
talk-around mode	- also referred to as "direct mode", talk-around provides a direct unit-to-unit short range communications link. It is intended to maintain communications outside of the main system coverage area.
telephone interconnect	- this feature allows the user to initiate or receive telephone calls through the radio if the system is con figured for this operation. (Trunked Mode Only).
trunked group	- a radio communications path shared by two or more users.
trunked operation	- a set of radio frequency channels used by multiple users. By using high speed digital data the radio goes to an unused channel when a

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call is initiated and will also only respond to calls in the same user group. In this way conversation privacy between user groups is assured.

trunked radio system   - a radio system in which a limited number of radio channels is dynamically allocated to groups of people for communication purposes.

trunked system   - a set of one or more trunked groups.

wide area en code   - a programmed option which ensures all system scanning mobile and portable radios have time to lock onto the call before the initiating unit is allowed to talk.

working channel   - a radio channel (transmit/receive) that is automatically assigned by the site controller for voice or data communications.

RADIO PROGRAMMING

RADIO TYPE: _____

FREQUENCY BAND: _____

OPERATOR'S NAME: _____

EMERGENCY GROUP: _____

EMERGENCY CHANNEL: _____

OPTION BUTTON: _____

KNOB POSITION/ BANK	SYSTEM NAME	TRK/ CONV	GROUP/CHANNEL NAME	USE

WARRANTY

A. Ericsson Inc. (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that Equipment manufactured by Seller shall be free from defects in material, workmanship and title, and shall conform to its published specifications. With respect to any Equipment not manufactured by Seller (except for integral parts of Seller's Equipment to which the warranties set forth above shall apply), Seller gives no warranty, and only the warranty, if any, given by the manufacturer shall apply. Batteries are excluded from this warranty but are warranted under a separate Nickel-Cadmium Battery Warranty.

B. Seller's obligations set forth in Paragraph C below shall apply only to failures to meet the above warranties (except as to title) occurring within the following periods of time from date of sale to the Buyer and are conditioned on Buyer's giving written notice to Seller within thirty (30) days of such occurrence:

1. for fuses, incandescent lamps, vacuum tubes and non-rechargeable batteries, operable on arrival only.

2. for parts and accessories (except as noted in B.1) sold by Seller's Service Parts Operation, ninety (90) days.

3. for all other Equipment of Seller's manufacture, one (1) year.

C. If any Equipment fails to meet the foregoing warranties, Seller shall correct the failure at its option (i) by repairing any defective or damaged part or parts thereof, or (ii) by making available at Seller's factory any necessary repaired or replacement parts. Any repaired or replacement part furnished hereunder shall be warranted for the remainder of the warranty period of the Equipment in which it is installed. Where such failure cannot be corrected by Seller's reasonable efforts, the parties will negotiate an equitable adjustment in price. Labor to perform warranty service will be provided at no change only for the Equipment covered under Paragraph B.3, and only during the first three (3) months following the date of sale to the Buyer. Thereafter, labor will be charged at prevailing rates. To be eligible for no-charge labor, service must be performed by an Authorized Service Center or other Servicer approved for these purposes either at its place of business during normal business hours, for mobile or personal equipment, or at the Buyer's location, for fixed location equipment. Service on fixed location equipment more than thirty (30) miles from the Service Center or other approved Servicer's place of business will include a charge for transportation. Equipment located off-shore is not eligible for no-charge labor.

D. Seller's obligations under Paragraph C shall not apply to any Equipment, or part thereof, which (i) has been modified or otherwise altered other than pursuant to Seller's written instructions or written approval or, (ii) is normally consumed in operation or, (iii) has a normal life inherently shorter than the warranty periods specified in Paragraph B, or (iv) is not properly stored, installed, used, maintained or repaired or, (v) has been subjected to any other kind of misuse or detrimental exposure, or has been involved in an accident.

E. The preceding paragraphs set forth the exclusive remedies for claims (except as to title) based upon defects in or nonconformity of the Equipment, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE SELLER BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.
1-800-528-7711 (Outside USA, 804-528-7711).

ECX-362S

NICKEL-CADMIUM BATTERY WARRANTY

A.   Ericsson Inc. (hereinafter "Seller") warrants to the original purchaser for use (hereinafter "Buyer") that nickel-cadmium batteries supplied by Seller shall be free from defects in material and workmanship, and shall conform to its published specifications for a period of twelve (12) months from the date of purchase.

B.   For purposes of this warranty, batteries shall be deemed defective if (1) the battery capacity is less than 80% of rated capacity, or (2) the battery develops leakage.

C.   If any battery fails to meet the foregoing warranty, Seller shall correct the failure by issuing a replacement battery upon receipt of the defective battery at an Authorized Service Center (ASC). To obtain the name and address of an ASC, ask your salesperson, consult the Yellow Pages, or call the number printed at the bottom of this page.

D.   Replacement batteries shall be warranted only for the remaining unexpired warranty period of the original battery. This warranty becomes void if:

  (1) The battery has been subjected to any kind of misuse, detrimental exposure, or has been involved in an accident.

  (2) The battery is used in equipment or service other than the radio equipment for which it is specified.

E.   The preceding paragraphs set forth the exclusive remedies for claims (except as to title) based upon defects in or non-conformity of any battery, whether the claim is in contract, warranty, tort (including negligence), strict liability or otherwise, and however instituted. Upon the expiration of the warranty period, all such liability shall terminate. The foregoing warranties are exclusive and in lieu of all other warranties, whether oral, written, expressed, implied or statutory. NO IMPLIED OR STATUTORY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE SHALL APPLY. IN NO EVENT SHALL THE COMPANY BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL, INDIRECT OR EXEMPLARY DAMAGES.

This warranty applies only within the United States.
1-800-528-7711 (Outside USA, 804-528-7711).

ECX-841C

EMERGENCY NUMBERS

_____

Police
_____

State Police
_____

Fire
_____

Poison Control
_____

Ambulance
_____

Life Saving and
Rescue Squad
_____