LBI-39125A

Operator's Manual

EDACS®
M-RK-II SCAN
PORTABLE RADIO

ERICSSON

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NOTE!

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INTRODUCTION

This manual describes how to use the EDACS M-RK II Scan Portable Radio. The M-RK II Scan is a synthesized, microprocessor-based, high performance portable FM radio providing reliable two-way communications in both the Enhanced Digital Access Communications System (EDACS) trunking environment and conventional communication systems.

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

In the conventional mode, the user selects a 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 exact operation of the radio will depend on the operating mode, the radio's programming, and the particular radio system. Most features described in this manual may be enabled or disabled through programming. Consult the system administrator for the particular features that are programmed into the M-RK II Scan.

USER INTERFACE

The M-RK II Scan operating controls are located on the radio's front, top and left panels. A 6-button keypad, liquid crystal display (LCD) for radio status information, microphone and speaker are on the front panel. The top panel houses a rotary SYSTEM/GROUP/CHANNEL knob, POWER ON-OFF/VOLUME control knob and a protected red EMERGENCY button. An OPTION button, CLEAR/MONITOR button and the Push-To-Talk (PTT) button are all located on the left side panel. The Universal Device Connector (UDC) is located on the right panel and is used while programming the radio and for accessory connection.

The keypad is used for activation of various EDACS or conventional features such as menu selection or scan operations.

The display has two, eight-alphanumeric-character lines used to show the operational mode of the radio. 15 status indicators, used to indicate various operating conditions such as transmitter on, channel busy, scanning, or low battery, are located above and to the right side of the character lines within the display. A back light illuminates the display and the keypad for nighttime use.

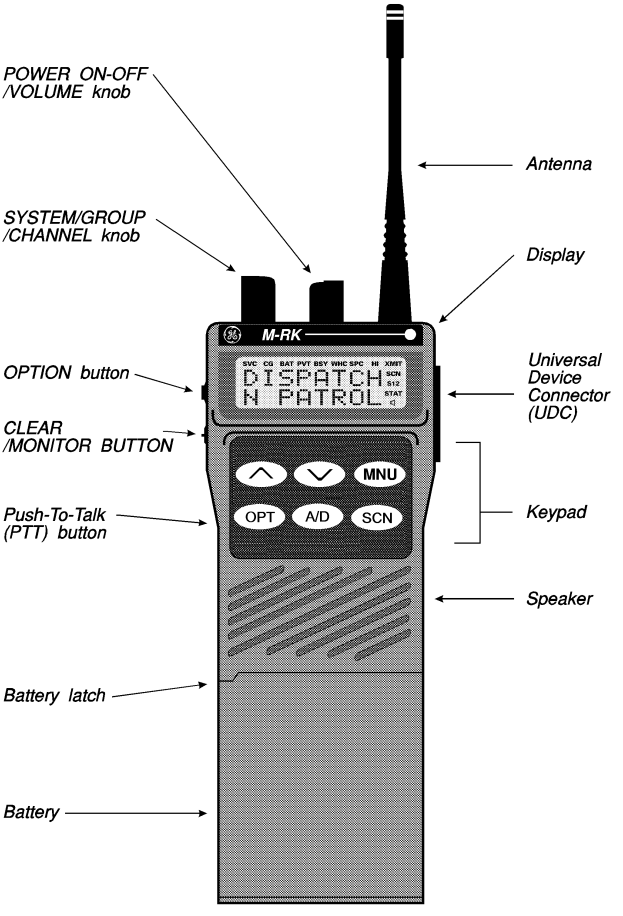


Figure 1 - M-RK II Scan Portable Radio

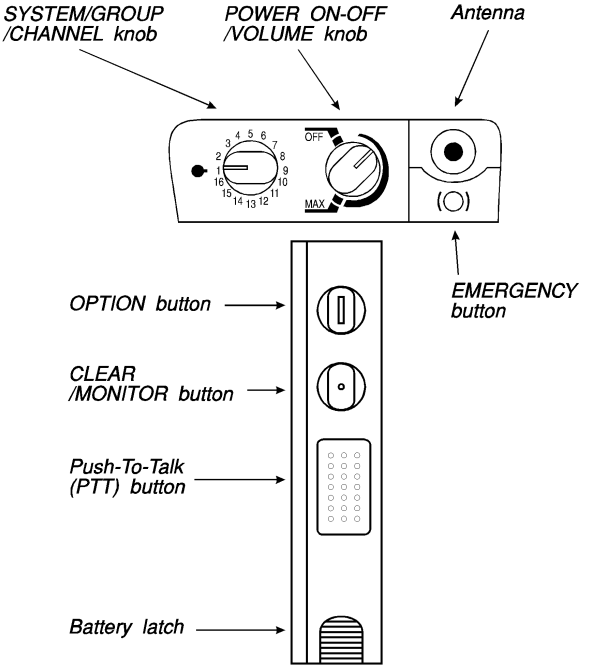


Figure 2 - Top And Partial Left Panel Views

BUTTONS AND KNOBS

This section describes the primary function of the button and knob controls. Other functions associated with these controls are detailed in later sections.

SYSTEM/ GROUP/ CHANNEL KNOB

Selects systems or groups/channels (depending on programming). This is a 16 - position rotary knob. See SYSTEM/ GROUP/CHANNEL SELECTION for 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.*

EMERGENCY BUTTON	*Provides single button emergency channel access. See the EDACS and conventional emergency sections for more details.*
OPTION BUTTON *(Side)*	*Programmable per system.*
CLEAR/ MONITOR BUTTON	*Serves several purposes depending on the operating mode. In 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 and scan disabled.*
PUSH-TO-TALK BUTTON (PTT)	*Enables the radio's transmitter. Releasing PTT returns the radio to the receive mode.*

KEYPAD

The keypad layout has a total of 6 keys. The keys have special functions and are labeled as such using a symbol or abbreviated word describing its primary function. Numeric entry is a secondary function of the keys. Each key is described below.

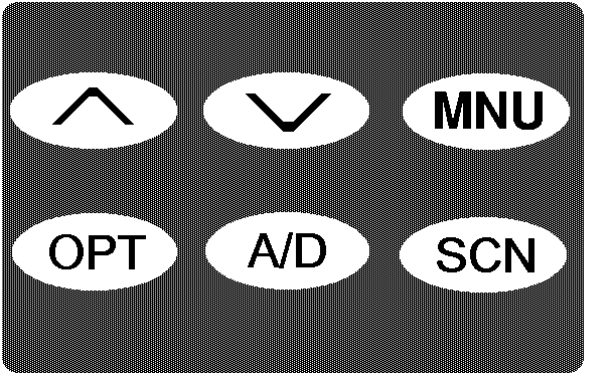


Figure 3 - M-RK II Scan Keypad

Primary function - changes the system or group/channel (depending on programming); secondary function - changes to a selection for items within a list. Press  *to scroll in increasing order,*  *to scroll in decreasing order. To auto-ramp press and hold the key.*

(MNU) *Primary function - accesses the menu list. This is a list of additional features that are not available directly from the keypad. See MENU for details. Secondary function - activates a selected item within a list. After the menu list is accessed, select a menu item from the list via*  *or*  *and activate it with this key. Once activated,* (MNU) *continues its secondary function for activating a selected parameter setting until the radio returns to its normal receive state. This is similar to an enter key.*

(OPT) *Programmable per system.*

(A/D) *Adds or deletes selected groups or channels from the scan list of the currently selected system. See trunked and conventional scan section for details.*

(SCN) *Toggles scan operation on and off. When the radio is scanning,* ***SCN*** *is on and all groups or channels in the scanlist of the currently selected system are scanned.*

DISPLAY

The radio's display is shown below. The two character lines are used to display system, group and channel names and also operational messages to the user. Each line contains eight alphanumeric character blocks. The 15 status indicators are used to show the various operating conditions of the radio. If the display back-lighting is programmed on, the display will illuminate for a short period when any of the controls are operated.

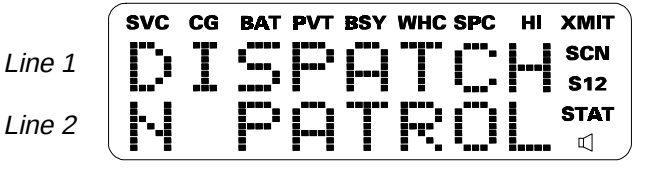


Figure 4 - M-RK II Scan Display

The two display lines can be inverted to permit easy viewing if the radio is worn on a belt or placed into a vehicular charger. Refer to the MENU section to change the display (invert or contrast).

Messages

During radio operation, various messages are displayed on either line one or line two. Typical messages include control channel status information, such as system busy or call denied, or messages associated with the radio's operation, (i.e. volume or contrast adjust). These messages are described below.

Message	*Name*	*Description*
QUEUED	*Call Queued*	*- Trunked mode only. Indicates the system has placed the call in a request queue.*
SYS BUSY	*System Busy*	*- Trunked mode only. Indicates the system is busy, no channels are currently available, the queue is full or an individual call is being attempted to a radio that is currently transmitting.*
DENIED	*Call Denied*	*- Trunked mode only. Indicates the radio is not authorized to op-*

erate on the selected system

CC SCAN *Control Channel Scan - Trunked mode only. Indicates the control channel is lost and the radio has entered the Control Channel Scan mode to search for the control channel.*

WA SCAN *Wide Area Scan - Trunked mode only. Indicates the control channel is lost and radio has entered the Wide Area Scan mode to search for a new system (if enabled through programming).*

TALKARND *Talk-around - Conventional mode only. Indicates the radio is operating on conventional channels in talk-around mode (no repeater).*

RXEMER	*Receive Emergency*	*- Trunked mode only. Indicates an emergency call is being received. This message will be flashing on line two.*
TXEMER	*Transmit Emergency*	*- Trunked mode only. Indicates an emergency call has been transmitted. This message will be flashing on line two.*
VOL = 31	*Volume Level*	*- Indicates the current volume level. The volume level display ranges from OFF (silent) to 31 (loudest).*
LOW BATT	*Battery Low*	*- Indicates the battery level is too low for transmission. This message displays when pressing PTT and transmitting is disabled due to the low battery condition.*

UNKNOWN	*Unknown ID*	*- Trunked mode only. Indicates an individual call is being received by an unknown radio ID. This bypasses when the call is updated.*
TX DATA	*Transmit Data*	*- Trunked mode only. Indicates when a data call is being transmitted. Displayed on line one.*
RX DATA	*Receive Data*	*- Trunked mode only. Indicates when a data call is being received. Displayed on line one.*
DATA OFF	*Data Off*	*- Trunked mode only. Indicates when radio is in data disable state. Displayed on line one.*
DATA ON	*Data On*	*- Trunked mode only. Indicates when radio is toggled to data enable state. Dis-*

played on line one for two seconds.

KEY ZERO	*Key Zero*	*- Indicates that cryptographic keys have been erased from radio memory.*
PVT DIS	*Private Disabled*	*- Indicates that the group or channel is not programmed for private mode operation.*
FRCD PVT	*Forced Private*	*- Indicates that group or channel is pre-programmed for private mode operation and clear mode is not possible.*
NO KEY #	*No Key Number*	*- Indicates that the correct cryptographic key is not loaded for the selected group or channel.*

Status Indicators

The 15 status indicators show the various operating characteristics of the radio. The indicators show operating modes and conditions as follows:

SVC *Trunked mode only.*
ON - indicates the radio is in an EDACS service area and is in communication with the site controller via the control channel (CC).
FLASHING - indicates the EDACS is in the failsoft mode (if enabled through programming).
OFF - indicates the radio is out of range or the control channel is not available.

CG *Conventional mode only.*
ON - indicates Channel Guard encode/decode is enabled on the selected conventional channel.

BAT *ON - indicates the battery pack's charge is low and needs recharging.*

PVT *Private*
ON - indicates the group or channel is enabled to receive encrypted messages.
FLASHING - indicates an encrypted transmission is being received.

BSY *Channel Busy -*
In trunked mode:
ON - indicates the radio is transmitting or receiving a call on the working channel.
FLASHING - indicates a call has been queued.
In conventional mode:
ON - indicates a call is being received.

WHC *Who Has Called (trunked mode only)*
ON - indicates an individual call has been received, but not responded to. The indicator turns OFF if the individual call mode is entered, the system is changed or the radio is turned off and back on.

SPC *ON - indicates the radio is in the special call select/entry mode (Individual or Telephone Interconnect).*

HI *ON - indicates the selected group or channel is selected to transmit at high power.*
OFF - indicates the selected group or channel is selected to transmit at low power.

XMIT *ON - indicates the radio is transmitting.*

When operating in a trunked system, the radio may be programmed to automatically transmit (without pressing PTT) to maintain digital communication with the

site controller. ***XMIT*** *will turn on whenever the radio is transmitting.*

SCN *ON - indicates the scan mode is enabled.*

S *ON - indicates the selected group or channel is in the scan list.*

1 *ON - (conventional mode only) indicates the selected channel is designated as the priority-one scan channel.*

2 *ON - (conventional mode only) indicates the selected channel is designated as the priority-two scan channel.*

 *ON - (conventional mode only) indicates that the selected channel has T99 decode option enabled.*

UNIVERSAL DEVICE CONNECTOR (UDC)

The Universal Device Connector (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 II Scan radio also provides audible alert tones or "beeps" to indicate the various operating conditions. These alert tones can be enabled or disabled through programming.

Call Originate

A short mid-pitched alert tone sounds after keying the radio (Push-To-Talk button is pressed). This indicates the radio has been assigned a working channel or that the radio is transmitting on a conventional channel and voice communication may begin immediately. In conventional mode, this tone may be delayed after the PTT button is pressed due to GE-STAR signalling (if 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 after pressing the PTT button indicates the system has placed the call request in the queue. The receiving unit(s) also hear the tones, indicat-

ing they will receive a call shortly. If the the PTT button is released, the radio will autokey whenever a channel becomes available (see Autokey).

System Busy (Trunked Mode Only)

Three low-pitched beeps will be heard if the radio is keyed when the system is busy, if no channels are available for sending the message, if the call queue is full, or if an individual call is being attempted to a radio that is transmitting. Releasing the PTT button and re-keying initiates 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 be heard. The transmitter will shut down shortly after hearing the alert, interrupting communications. 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

A low-pitched tone is heard and **BAT** *comes on indicating that the battery voltage is low. The radio will continue to receive and transmit.*

Low Battery Alert (Transmit Lockout)

If the radio is keyed and a low-pitched tone or two tones repeated until PTT or CLEAR button is pressed (either condition is pre-programmable) is heard and LOW BATT is displayed, the battery is discharged and the radio will not transmit. 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 re-charged to resume normal operation.

Key Press Alert

A short tone or "beep" sounds to indicate a key has been pressed. A short low-pitched tone indicates no action was taken because the key is not active in the current mode.

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.

In the EDACS trunked environment, upon acquisition of the control channel, ***SVC*** *will come on. If communication with the system's control channel cannot be es-*

tablished, ***SVC*** *will not turn on. This may occur if, for example, the radio is out of range of the trunking site. It may be necessary to move to another location or select another trunking system to reestablish the control channel link for trunked mode operations.*

SELECTION MODE RULES

Many operations require selection from a list such as system, group or phone number. This selection process is handled in the same manner for all lists.  ,  , (MNU), (OPT), *and the CLEAR/MONITOR button are used during the selection process. The following example systems list is used to explain the process:*

SYSTEM

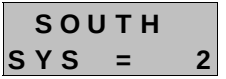
1	*NORTH*
2	*SOUTH*
3	*EAST*
4	*WEST*

After entering a selection mode, the following generic display format will appear.

```
X X X X X X X X
Y Y Y   = Z Z Z
```

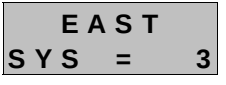
Line one shows the currently selected item name (XXXXXXXX) from the list. Line two indicates the list (YYY) that the selection is to be made from and the number of the selected item (ZZZ) within the list. (In some cases the information on lines 1 and 2 will be the opposite

of this example.) If SYSTEM 2 is the current selection, the display appears as follows:



*Line one contains the current system name, **SOUTH**, and line two, **SYS = 2**, indicates that selection is from the system list and it is the second system within the list.*

A new system from the list is selected by using  *and*  *to scroll through the list in increasing and decreasing order respectively. In the previous example, pressing*  *selects the EAST system as shown in the next display.*



The radio may be programmed to wrap around from one end of a list to the other end or to stop at the ends.

NOTE

While in system, group or channel selection mode, the radio continues to receive calls normally and continues scanning if it is enabled. If a call is received during the selection mode process the radio will return to the normal receive mode display. Continuing with the selection process will return the display to the same point in the selection process if the selection mode time out has not yet expired. Any press of the PTT button during the selection mode process will initiate transmission and exit the selection mode.

To exit the selection mode, press the CLEAR/MONITOR button or wait for the timeout.

MENU

The menu function accesses features that are not available directly from the keypad. The order and specific number of menu items available is configurable through programming. Upon radio power up, the menu item that is at the beginning of the menu list will always be displayed first. Subsequent access to the menu function will return the last menu item that was shown in the display. To enter the menu mode, press (MNU). (MNU), (^), (v), *and the CLEAR/MONITOR button are used during the selection process. All of the selection mode rules previously detailed apply to the menu item selection process with the exception of direct access. The radio will continue to receive and transmit normally while in the menu function.*

A new item is displayed by using (^) *and* (v) *to scroll through the list in increasing and decreasing order respectively. The displayed menu item is made active by pressing* (MNU) .

After entering the menu selection mode, the following generic display format will appear.

M E N U
Y Y Y Y Y Y Y Y

Line one indicates the radio is in the menu selection mode. Line two indicates the menu item (YYYYYYYY) that is to be viewed or changed (some menu items

provide radio information and do not have changeable parameters).

An example of the menu item selection process and menu item parameter change is detailed below for the backlight menu item.

PRESS: (MNU)
The menu mode is entered.

PRESS: (∧) *or* (∨) *until the display shows:*

```
   M E N U
B C K   L G H T
```

PRESS: (MNU)
The backlight menu item is activated and the display will be similar to the following:

```
B C K L = X X X
Y Y Y Y Y Y Y Y
```

Line one shows the active menu item and its current parameter setting (XXX). Line two shows the currently selected system or group name (YYYYYYYY).

The menu item's parameter setting shown in the display can now be changed by using (∧) *or* (∨) *to scroll through the list of parameter values. Once the desired setting is reached press* (MNU) *to store the value and return the normal display. For menu items that display radio information pressing* (∧) *or* (∨) *will scroll*

through a list of informational displays. The menu items are listed Table 1.

> ***NOTE***
>
> *The TX POWER menu item, when selected, toggles HI/LO power. It does not use ∧ or ∨ to scroll nor an additional press of the MNU button.*

Table 1 - Menu Item Information

FEATURE	***DISPLAY***
Keypad Lock	*KEY LOCK*
Backlight Adjust	*BCK LIGHT*
Contrast Adjust	*CONTRAST*
Transmit Power Select	*TX POWER*
Radio Revision	*REVISION*
Invert (View) Display	*INVERT*
Toggle Scan On/Off	*SCAN*
Toggle Private Mode On/Off	*PRIVATE*
Display Current AEGIS Encryption Key	*DISP KEY*
Display Current Home Group/Channel	*HOME*
Select Desired System	*SYS SEL*
Add Group/Channel to Scan List	*SCAN ADD*
Delete Group/Channel From Scan List	*SCAN DEL*
Add/Delete Scan List	*SCAN A/D*
Select Telephone Numbers From Phone List	*PHN CALL*
Toggle Data Operation On/Off	*NO DATA Trunked Only*
Toggle Conv P1 Scan On/Off	*ECP1SCAN Trunked Only*
Select Individual Call from IC List	*IND CALL Trunked Only*
Select Status Message	*STATUS 0 - STATUS 9 Trunked Only*
Select Group	*GRP SEL Trunked Only*
Toggle Talkaround Feature On/Off	*TALKARND Conventional Only*
Select Channel	*CHN SEL Conventional Only*

BUTTON AND KEYPAD 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. For Example, the (MNU) key could be assigned as the HOME key, the (OPT) key could be assigned as the VIEW key, etc.

The operating procedures that follow assume that 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	
	
	
(MNU)	
(OPT)	
(A/D)	
(SCN)	

SYSTEM/GROUP/CHANNEL SELECTION

In the following description of SYSTEM/GROUP/CHANNEL SELECTION, the term group is used for both group and channel.

The M-RK II Scan SYSTEM/GROUP/CHANNEL knob and the ⌒,⌣ pair are programmable for maximum flexibility. If the SYSTEM/GROUP/CHANNEL knob is assigned to select groups, then the ⌒, ⌣ keys are assigned to select systems. If the SYSTEM/GROUP/CHANNEL knob is assigned to select systems, then the ⌒, ⌣ keys are assigned to select groups. System, group and channel selection is the primary function for these controls.

Either systems or groups can also be selected by entering the select mode and following the selection mode rules described earlier. Only the selection assigned as the primary function of the ⌒, ⌣ pair will be available for this method of direct selection. For example, if system selection is the primary function of the ⌒, ⌣ pair then only the system select mode will be usable and direct group select will be unavailable. The system select or group select modes are entered by pressing MNU from the standard receive mode. Using ⌒, ⌣ after entering a particular selection mode in this manner is the secondary function of this key.

System Selection

Several methods, some of which depend on programming, can be used to select a new system. These proce-

dures are presumed to be starting from the normal receive display.

METHOD 1: If system selection is programmed to the SYSTEM/GROUP/CHANNEL knob, select a system by turning the SYSTEM/GROUP/CHANNEL knob to the desired system number position (1-16). The display registers the new system name on line one. If the knob is moved to a position greater than the number of programmed systems, the highest programmed system will remain selected.

METHOD 2: If system selection is programmed as the primary function of  *and*  *, select a system by pressing* *or* *to scroll through the system list. The display registers the new system name on line one.*

METHOD 3: Press (MNU) *to enter the system select mode and follow the selection mode rules detailed earlier. If system selection is programmed to the SYTEM/GROUP/CHANNEL knob, direct access to systems will not be available. Presses of* *or* *will scroll through different sets of 16 systems each (banks) if more than 16 systems are programmed into the radio. The systems within each bank are then selectable via the SYSTEM/GROUP/CHANNEL knob as described previously in METHOD 1.*

Group And Channel Selection

Several methods, some of which depend on programming, can be used to select a new group or channel. These procedures are presumed to be starting from the normal receive display.

METHOD 1: If group selection is programmed to the SYSTEM/GROUP/CHANNEL knob, select a group by turning the SYSTEM/GROUP/CHANNEL knob to the desired group number position (1-16). The display registers the new group name on line two. If the knob is moved to a position greater than the number of programmed groups, the highest programmed group will remain selected.

METHOD 2: If group selection is programmed as the primary function of ⌃ and ⌄ select a group by pressing ⌃ or ⌄ to scroll through the group list. The display registers the new group name on line two.

METHOD 3: Press (MNU) to enter the group select mode and follow the selection mode rules detailed earlier. If group selection is programmed to the SYSTEM/GROUP/CHANNEL knob, direct access to groups will not be available. Presses of ⌃ or ⌄ will scroll through different sets of 16 groups each (banks) if more than 16 groups are programmed into the radio. The groups within each bank are then se-

lectable via the SYSTEM/GROUP/CHANNEL knob as described previously in METHOD 1.

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 or working channel (WC) is allocated through digital signalling with the site.

Receiving A Call

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

2. *The display shows the last selected or the power up (depending on programming) system and group names and indicates if the radio has acquired the system control channel by turning on* ***SVC****. If the radio is unable to obtain a control channel, line two shows CC SCAN and* ***SVC*** *will remain off.*

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

4. *Select the desired system and group. The display indicates the current system and group names.*

5. *The radio is now ready to receive calls.*

6. *GROUP CALL - When the radio receives a group call, it unmutes on the assigned working channel and **BSY** comes on. Line one shows GR followed by the logical ID number (if received) of the unit sending the message, or the associated name if the ID number is found in the individual call list.*

7. *INDIVIDUAL CALL - When the radio receives an individual call (a call directed only to the user's radio), it unmutes on the assigned working channel and turns on **BSY** and **WHC**. Line one shows ID followed by the logical ID number of the unit sending the message, or the associated name if the ID number is found in the individual call list.*

   Responding to the call prior to the programmed call-back time-out will automatically direct the call to the originating unit. If the caller's ID is not received, UNKNOWN will display and there will be no call-back hangtime.

Sending A Call

1. *Turn on the radio and set the POWER ON-OFF/VOLUME knob to the desired volume level. Select the desired system and group.*

2. *Press and hold the PTT button. The radio will display **XMIT**, the system and group names and perform the necessary signalling required to obtain a communication channel.*

3.

When the working channel is assigned, ***XMIT*** *and* ***BSY*** *are turned on and a short beep sounds indicating that communication can begin.*

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. *Hold the radio approximately three inches from the mouth and speak in a normal voice into the microphone (located between*  *and*  *on the keypad).*

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

Emergency Operation

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

Receiving An Emergency Call

When receiving an emergency call from the selected group and system, an alert beep is heard and ***BSY*** *comes on. The message* ****RXEMER**** *flashes in the display on line two until the emergency condition is cleared. Follow standard emergency procedures.*

Declaring An Emergency Call

To send an emergency call to the selected system and group (or on an optionally preprogrammed 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 assignment is received, the radio sounds a single beep (Autokey alert tone) indicating it is ready for voice transmission.* ****TXEMER**** *flashes on line two in the display until the emergency is cleared.*

3. *Press PTT and speak into the microphone in a normal voice.* ***BSY*** *turns on.*

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

5. *The emergency can be cleared by pressing and holding the CLEAR/MONITOR button followed by pressing the EMERGENCY button then releasing both buttons.*

Wide Area System Scanning

The M-RK II Scan radio may be programmed for wide area system scan operation for multi-site applications. Upon the loss of the currently selected system's control channel, radios may 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.

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 1 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.

ProSound™

The radio may be programmed for ProSound system scan operation for multi-site applications. ProSound scanning is an enhanced replacement for wide area system scanning. This algorithm insures 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.

Scanning Trunked Groups

Groups which have been previously added to the scan list on a per system basis may be scanned. Each system's group scan list is retained in memory when the radio is turned off or when the battery pack is removed.

The following procedures outline scan operations for trunked groups. See the conventional mode operating procedures for specific procedures on conventional channel scanning.

Adding and Deleting Groups on Scan List

1. *Scan must be off to add or delete groups from scan list. If the* ***SCN*** *status flag is on, press* (SCN) *key to turn scan off.*

2. *Select the desired group using the SYSTEM/GROUP/CHANNEL knob and/or* ⌒ ⌒ *keys. If the selected group is currently on the list, the* ***S*** *status flag will be on.*

3. *Press the* (A/D) *key repetitively until the desired priority indicator appears:* ***S*** *for non-priority,* ***2*** *for priority two,* ***1*** *for priority one, or no indicator to remove the group from the scan list. If a new priority group is selected, the previous corresponding priority group will become a lower priority scan group. One of the following messages may be momentarily displayed:*

SCAN DIS *The radio is not programmed to scan.*

FIXED P1 *A priority one group has been pre-programmed into the radio. A new priority one group cannot be selected.*

FIXD LST *A fixed scan list has been pre-programmed into the radio. It is not possible to change the list without reprogramming the radio.*

4. *To add or delete additional groups, repeat steps 2 and 3.*

A group can also be deleted from the scan list, if it is not the currently selected group, by pressing (A/D) *during scan operation while the radio is displaying the unwanted group. The group will be deleted from the system's group scan list in the same manner as if done using the steps above. Deletions done in this manner will not remain deleted if the radio is turned off and then back on.*

Turning Scan On

1. *Toggle scan operation on by pressing* (SCN). ***SCN*** *will turn on when the radio is scanning.*

2. *When a group on the scan list receives a channel assignment, the radio unmutes on the assigned channel and* ***BSY*** *comes on. Line one shows* ***GR*** *followed by the logical ID number (if received) of the unit sending the message, or the associated name if the ID number is found in the individual call list. The group name displays on line two.*

- *If the radio detects a call from the currently selected group, it has priority and the radio will switch to the selected group call.*

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

- *Pressing the PTT button when scan is on will cause the radio to transmit on the displayed group or to the currently selected group (depending on programming).*

Turning Scan Off

Toggle scan operation off by pressing (SCN) *. The radio will resume operation on the selected group.*

INDIVIDUAL CALLS

Receiving And Responding To An Individual Call (Trunked Mode Only)

When the radio receives an individual call (a call directed only to the user's radio), it unmutes on the assigned working channel and turns on ***BSY*** *and* ***WHC****. Line one shows ID followed by the logical ID number of the unit sending the message, or the associated name if the ID number is found in the individual call list. The radio can be programmed to ring when an individual call is received. If enabled, the ring begins five seconds after the caller unkeys and will continue until the PTT button, the CLEAR/MONITOR button or the individual call mode is entered when the* (MNU) *button is pressed.*

If a response is made to the call prior to the programmed call-back time-out, the call will automatically be directed to the originating unit. If a response is not made before the call-back time-out, the radio will return to normal receive display, but ***WHC*** *will remain on. If the caller's ID is not received, UNKNOWN will display for the duration of the call and there will be no call-back hang-time.*

To respond after the call-back time-out, press (MNU) *key then* ⌒ *or* ⌣ *while* ***WHC*** *is on and the display will show the caller's ID. The individual call selection mode is now active and the selection mode rules apply. The caller can be responded to by pressing the PTT button if no other selection is made. Because the latest caller's ID is stored in location 0 and the radio is now in the individual selection mode, the caller can be selected directly by pressing* (MNU) *. If the caller is selected in this manner proceed with the call by pressing the PTT button.*

Sending An Individual Call (Trunked Mode Only)

The following procedures describe how to initiate and complete an individual call.

1. *To select a previously stored individual, enter the individual call mode using the* (MNU) *key feature followed by* ⌒ *or* ⌣ *to scroll through the list of stored individuals.* ***SPC*** *turns on. The selection mode rules apply.*

2. *Press the PTT button; the radio performs the necessary signalling to obtain a communication channel. When the signalling is complete and the radio is clear*

*to transmit, **XMIT** turns on, **SPC** turns off and the channel access tone sounds. Line one shows the called individual's name if found in the list of stored individuals or **ID** followed by the logical ID number of the unit being called. The message ***INDV*** displays on line two. Proceed with the message.*

TELEPHONE INTERCONNECT CALLS

Receiving A Telephone Interconnect Call (Trunked Mode Only)

Receiving a telephone interconnect call is identical to receiving an individual call. See the DTMF Overdial Operation section if access to services requiring "overdial" is needed. Overdial operations are available for any special call whether it is an individual call or a telephone interconnect call.

Sending A Telephone Interconnect Call (Trunked Mode Only)

Use the following procedures to initiate and complete a Telephone Interconnect call:

1. *To select a previously stored phone number, press (MNU) followed by ⌒ or ⌣ to scroll through the list of stored phone numbers. **SPC** turns on. The selection mode rules apply.*

2. *Press and release the PTT button; the radio performs the necessary signalling to obtain a communication channel. When the signalling is complete and*

the radio is clear to transmit, ***XMIT*** *turns on,* ***SPC*** *turns off and the channel access tone sounds. Line one shows the accompanying name selected from the list of stored numbers. The message* ****PHONE**** *displays on line two. The radio then automatically transmits the programmed number stored in the special call queue.*

3. *The telephone ringing will be heard. When someone answers the phone, press the PTT button and speak into the microphone. Release the PTT button to listen to the callee. Unsuccessful interconnect signalling returns the radio to the normal receive mode and the number remains displayed until the special call is cleared or the time-out expires or another group or system is selected. Terminate a call by pressing the CLEAR/MONITOR button.*

> ***NOTE***
>
> *The M-RK II Scan radio is capable of simplex (one way) conversation 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).*

4. *To terminate the call, momentarily press the CLEAR/MONITOR button.*

DTMF Overdial / Conventional Mode Telephone Interconnect

Once the radio has established a connection to the public telephone system, it may be necessary to "overdial" more digits to access banking services, answering machines, credit card calls or other types of systems that require DTMF (Dual-Tone Multi-Frequency) access digits. Overdial operation can also be used to initiate a telephone interconnect call via DTMF signalling if a dial tone has already been accessed on the system. This is the method that is used for making a telephone interconnect call while operating in the conventional mode but will also function in trunked mode if a dial tone is directly accessible. Telephone numbers and other number sequences for overdialing can be stored in the phone list when programming the radio. These numbers are accessed by pressing (MNU), then following the selection mode rules.

The following steps are required to dial these numbers:

1. *Follow the procedure in Sending A Telephone Interconnect Call (Trunked Mode Only) to establish a connection to the telephone system or consult the system administrator for the procedure to access a dial tone on the trunked or conventional system.*

2. *Overdial numbers are transmitted by entering the phone mode using the (MNU) button.*

   Press (MNU) to enter the overdial select/entry mode and follow the selection mode rules to call up a stored number from the phone list. ***SPC*** *turns on. Press*

PTT to send the overdial sequence once. If the number needs to be transmitted again it must be selected or entered again (this prevents unwanted numbers from being sent the next time the PTT button is pressed during the call).

This overdial select/entry mode remains active until the call is dropped, cleared, or (MNU) *is pressed. The overdial select/entry mode can be re-entered if the call is still active by pressing* (MNU)*.*

PORTABLE DATA

The M-RK radios when operating in the EDACS configuration 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.

The radios can be connected to Mobile Data Terminals (MDT) or to a host computer. Any RS-232 compatible device that supports the Radio Data Interface (RDI) protocol (Version 1.91 or greater) 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).

DISPLAYS

The following will be displayed in the display during the various states of data mode of operation.

TX DATA *Displayed on top line of display when the radio is transmitting a data call.*

RX DATA *Displayed on top line of display when the radio is receiving a data call.*

DATA OFF *Displayed on top line of display when the radio is in the data disabled state.*

DATA ON *Displayed for two seconds on top line of display when the radio is toggled to the data enabled state.*

DATA OFF OPERATION

The radio can be placed in the data disabled state by any of the following methods. When the data state is disabled, the display shows "DATA OFF" on the top line.

- *Declaring an emergency (not to be used unless an actual emergency condition exists). Alert tone will sound.*
- *Pressing the OPTION button (if pre-programmed for no data key). Alert tone will sound.*
- *Pressing the no data (ND) key (pre-programmed).*

DATA ON OPERATION

The data state is enabled by one of the following (depending on how it was disabled). "DATA ON" will be displayed on the top line in the display for two seconds then the display returns to normal.

- *Pressing the no data (ND) key toggles data state on or off.*

- *Clearing an emergency but 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 scan 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 timeout is completed.

- *The CLEAR button is pressed.*
- *The PTT is pressed.*
- *A group or system change.*
- *Entering phone call mode.*
- *Entering individual call mode.*
- *A new emergency assignment has been received.*
- *An emergency declared or cleared.*
- *Receiving an individual or phone call.*
- *Receiving Agency, Fleet or System All Call.*
- *Pressing (SCN) 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.

STATUS OPERATION

STATUS OPERATION

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

To send a status condition, press the (MNU) *key followed by*  *or*  *key to select the pre-programmed status. If no status has been programmed for the selected number key, the radio will display "NO ENTRY". A valid selection will permit the status text to appear in the display for a pre-programmed time. After the time-out expires or the* (MNU) *key has been pressed (the* (MNU) *key will override the time-out period), the status is selected and 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.

To view the currently selected status after it has been transmitted, press the (MNU) *key and then the*  *key to ramp to STS, re-press the* (MNU) *key again and then the CLEAR button prior to the time-out period. If the status was not sent successfully to the site, the text associated with the status will flash in the display.*

EDACS CONVENTIONAL P1 SCAN

This feature permits the radio user to scan a pre-programmed conventional system and channel as a 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 P1 scan on/off operation.

DYNAMIC REGROUP OPERATION

Dynamic group 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 display will indicate "REGRP_0x" where "x" is a digit of 1 to 8 indicating the group when dynamic regroup has been enabled by the user. If the radio is in dynamic regroup and the user selects a group that has not been regrouped, the display will show "NO ENTRY". The radio will be prevented from transmitting and receiving calls in this condition except for scanned groups.

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 declare the emergency on the currently selected dynamic group group.

CONVENTIONAL MODE OPERATION

The radio functions in the conventional mode when using conventional communications channels (non-trunked). Each channel consists of a preset frequency pair for transmit and receive during repeater operation, or a single frequency for both transmit and receive during talk-around (no repeater) operation. To use this mode, the operator selects a conventional system which includes one or more conventional channels. Each conventional channel may have one or more features, such as Channel Guard, programmed when the channel is selected.

The CLEAR/MONITOR 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 (Channel Guard, Digital Channel Guard or T99) on and off if programmed for the selected channel and scan disabled.

Receiving A Call

1. *Turn on the radio by rotating the POWER ON-OFF/VOLUME knob clockwise (out of 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 conventional system and channel. The display indicates the current conventional system and channel names.*

4. *The radio is now ready to receive calls.*

5. *When the radio receives a call (and the correct encoding is decoded, if programmed and enabled), it unmutes on the channel and* ***BSY*** *comes on.*

Sending A Call

1. *Turn on the radio and set the POWER ON-OFF/VOLUME knob to the desired volume level. Select the desired conventional system and channel.*

2. *Ensure that the channel is not busy by pressing the CLEAR/MONITOR button to momentarily disable any channel decoding and unmute the receiver or observe the display for the absence of* ***BSY****. If the Channel Busy Lockout feature is programmed for the selected channel, the radio will not transmit when the channel is busy.*

3. *Press and hold the PTT button. The radio will display* ***XMIT*** *and a short beep sounds (if programmed) indicating that communication can begin.*

4. *Hold the radio approximately three inches from the mouth and speak in a normal voice into the microphone (located between*  *and*  *on the keypad).*

5. *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. This GE-STAR signalling will transmit 5 times with a delay between each transmission. To send an emergency call on the selected conventional system and channel (or on an optionally preprogrammed conventional emergency system and channel), proceed as follows:

Press and hold the RED EMERGENCY button that is on the 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 displays ***XMIT*** *and proceeds to transmit the pre-programmed GE-STAR emergency signalling sequence.*

GE-STAR is programmed to transmit in one of the following methods:

METHOD 1: GE-STAR 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 on to the currently 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 change to the pre-programmed emergency system and channel to send the emergency signalling and then change back to the selected channel.

METHOD 4: Same as METHOD 3 but the radio will lock on to the pre-programmed emergency system and channel. Any attempts to change the channel will be disabled.

The emergency state can be cleared by turning the radio off and then back on.

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 sequence 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).*** *The* ***XMIT*** *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

Channels which have been previously added to the scan list on a per system basis may be scanned. The selected channel is scanned (if enabled through programming) whether or not it is in the scan list. Each conventional system's channel scan list is retained in memory when the radio is turned off or when the battery pack is removed.

*The scan rate will vary depending upon the number of channels in the scan list and whether or not the radio is programmed to scan for channels with decoding enabled. Fewer channels will result in a faster scan rate. If programmed for dual-priority scan operation, the priority-one, priority-two and the remaining scan list channels are scanned. Once a signal is detected and the correct encoded squelch signal is decoded (if programmed), the radio receives the message and displays the received scan channel. At the same time, scanning continues on the priority-one and priority-two channels. Should the priority-one or priority-two channel carrier, regardless of encoded squelch decoding, be detected while a non-priority channel is being received, the display name is updated, **1** or **2** comes on and the received channel is switched to the priority channel. Scanning of the priority-one channel will continue if a message is being received on the priority-two channel.*

The following procedures outline scan operations for conventional channels.

Adding and Deleting Channels on Scan List

1. *Scan must be off to add or delete channels from scan list. If the **SCN** status flag is on, press (SCN) key to turn scan off.*

2. *Select the desired channel using the SYSTEM/GROUP/CHANNEL knob and/or ( ) ( ) keys. If the selected channel is currently on the list, the **S** status flag will be on.*

3. *Press the (A/D) key repetitively until the desired priority indicator appears:* ***S*** *for non-priority,* ***2*** *for priority two,* ***1*** *for priority one, or no indicator to remove the channel from the scan list. If a new priority channel is selected, the previous corresponding priority channel will become a lower priority scan channel. One of the following messages may be momentarily displayed:*

SCAN DIS *The radio is not programmed to scan.*

FIXED P1 *A priority one channel has been pre-programmed into the radio. A new priority one channel cannot be selected.*

FIXD LST *A fixed scan list has been pre-programmed into the radio. It is not possible to change the list without reprogramming the radio.*

4. *To add or delete additional channels, repeat steps 2 and 3.*

A channel can also be deleted from the scan list, if it is not the currently selected channel, by pressing (A/D) key during scan operation while the radio is displaying the unwanted channel. The channel will be deleted from the conventional system's channel scan list in the same manner as if done using the steps above. Deletions done in this manner will not remain deleted if the radio is turned off and then back on.

Turning Scan On

1. *Toggle scan operation on by pressing (SCN). **SCN**. will turn on when the radio is scanning.*

2. *When a channel on the scan list receives a channel assignment, the radio unmutes on the assigned channel, **BSY** comes on and the received scan channel is displayed.*

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

- *Pressing the PTT button when scan is on will cause the radio to transmit on the displayed channel or to the currently selected channel (depending on programming).*

Turning Scan Off

Toggle scan operation off by pressing (SCN). The radio will resume operation on the selected channel.

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**

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.*

3. *When using the "WHC" feature to respond to an I-Call (after the hang time has expired), the call will be transmitted in the mode defined by the system mode as programmed for the current system if the ID being called is not in the I-Call list. If the ID is in the I-Call list, then the call will be transmitted as defined by the I-Call mode programmed in the list for that ID.*

DTMF

The overdial DTMF tones are not available while in the Aegis Digital Mode.

Error Messages

If either of the following error messages is displayed, the radio was either programmed incorrectly or needs servicing:

DSP ERR **ERR=xxxx**	**DSP ERR**

Power Up Only

If the Aegis circuit board is not responding, the following error message will be displayed and the radio needs servicing:

HARDWARE **ERR= 30**

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). VGE radios require a VGE Keyloader (Option V4028).

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 ***PVT*** *status flag in the display turns on 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* (MNU) *key, then following the selection mode rules. Radios programmed for forced private operation do not allow a change of the transmit mode.*

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. The top line on the radio display will read "KEY LOAD" and the second line will read "BANK = N" where N= keybank number. Press the*  *or*  *button to select the keybank. 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.*

Displaying The Currently Used Cryptographic Key Number

To display the cryptographic key currently in use for either the system encryption key (for special call such as individual, phone, all, agency or fleet) or the group/channel key (for group or conventional calls), perform the following procedure:

1. *Press the*  *button.*

2. *Use the*  *or*  *button to select "DISP KEY".*

3. *Then use the*  *or*  *button to toggle between displaying the system key or the group/channel key.*

ENCRYPTION KEY DISPLAYED	MESSAGE DISPLAYED
System	"SYS KEY" "KEY = 1"
Group/Channel	"GRP KEY" "KEY = 2"

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 ***PVT*** *status flag will flash, 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* (MNU) *key, then follow the selection mode rules. When private mode is enabled, the* ***PVT*** *status flag will be on.*

   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 a group or channel is not programmed for private mode operation, "PVT DIS" will be displayed if an attempt is made to enable private transmit mode. It is not possible to operate on this group/channel in private mode.

   If the radio is programmed for forced private transmit operation, "FRCD PVT" will be displayed if an attempt is made to disable private transmit mode. It is not possible to transmit on this group/channel in clear mode.

   If the radio does not have the correct encryption key loaded, "NO KEY #" will be displayed 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.

MACRO KEY OPERATION

Macro key operation permits the user to accomplish a series of key strokes with a single "macro" key stroke. Up to ten (10) macro keys can be defined, each capable of executing up to twenty (20) key strokes, to any push-button input (i.e., keypad keys, OPTION button, etc.). Each macro key 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.

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

NOTE

Repairs to this equipment should be made only by an authorized service technician or facility designated by the supplier. Any repairs, alterations or substitution of recommended parts made by the user to this equipment not approved by the manufacturer could void the user's authority to operate the equipment in addition to the manufacturer's warranty.

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 to 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 that 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.

BATTERY PACKS

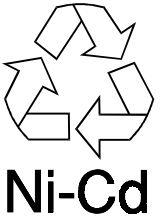
CHARGING THE BATTERY PACK

After receiving a new rechargeable battery pack from the factory, it should be fully charged before placing it into service. This also applies to rechargeable batteries that have been stored for long periods. When the battery pack requires charging the radio will signal the operator with an alert tone and ***BAT*** *will turn on.*

Chargers are available with nominal charge times of 1 hour (rapid) and 14 hours (standard). Combinations include single and multi-position, standard and rapid charge units. In addition, the vehicular chargers/repeaters simultaneously charge the battery packs while the radio is operating. For specific instructions refer to the applicable charger Operating Manual.

The rechargeable batteries used with the radio can develop a reduced capacity condition sometimes called the "Memory Effect". This condition can occur when a battery is continuously charged for long periods or when a regularly performed duty cycle allows the battery to expend only a limited portion of its capacity. The battery pack may show a severe decrease in its ability to deliver full capacity for an extended period. Any rechargeable battery pack showing signs of reduced capacity should be returned to a qualified service center for inspection.

RECHARGEABLE BATTERY PACK DISPOSAL



The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municiple waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal. Call Toll Free 1-800-822-9362 for information and/or procedures for returning rechargeable batteries in your state.

INSTALLING THE BATTERY PACK

1. *Ensure the POWER ON-OFF/VOLUME knob is in the OFF (detent) position.*

2. *Align the battery pack grooves with the battery mounting plate rails on the bottom of the radio.*

3. *Insert the rails into the grooves and slide the battery toward the battery latch until the battery latch clicks into place.*

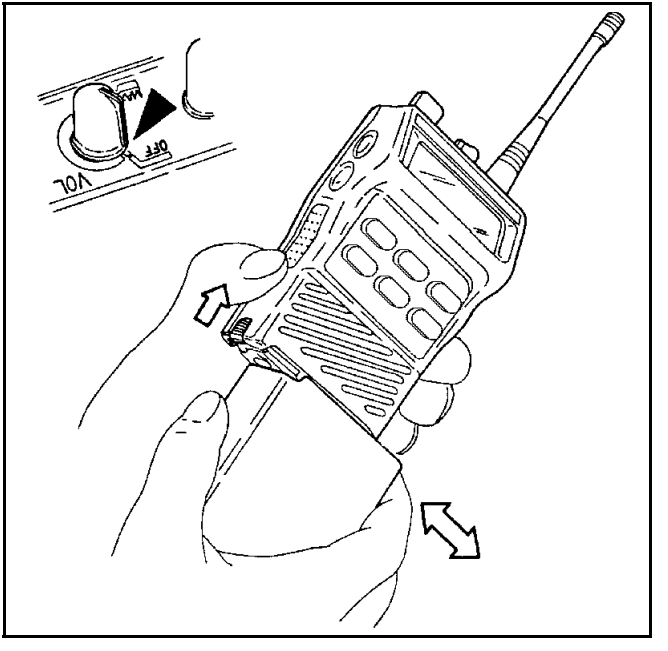


Figure 5 - Installing And Removing The Battery Pack

REMOVING THE BATTERY PACK

1. *Ensure the POWER ON-OFF/VOLUME knob is in the OFF (detent) position.*

2. *Release the battery latch by pushing it upward toward the top of the radio.*

3. *Remove the battery pack by sliding it away from the battery latch until it separates from the radio.*

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 presen ce 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 nonspecified battery packs voids Factory Mutual approval. The follow-

ing 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 accessories that follow are 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 personals 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 personal radios in that group will receive a "System Busy" 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 - *Dynamic Regrouping is 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.*

fleet - *a fleet of users consists of multiple groups (subfleets). 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 personal 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 many groups simultaneously (multi-group decode), permitting the user to both monitor and receive calls from these groups. The radio may be programmed with a scan hang time which causes the radio to remain on the scanned group for a pre-programmed amount of time, responding only to calls of a higher priority such as priority scan group calls, individual calls, fleet calls, agency calls, etc. When activity on the scan group ends, and the pro-programmed time has expired, the radio returns to monitoring multiple groups. (Trunked Mode Only)*

Individual Call - *Every radio in the system is programmed with a unique individual identification code. A mobile or personal unit can be programmed to call another particular unit by selecting the individual by name or ID number. (Trunked Mode Only)*

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 preforms 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 configured for this operation. (Trunked Mode Only)*
trunked group	-	*a radio communications path shared by two or more users.*
Trunked Operation	-	*Trunked Operation refers to the use of a set of radio frequency channels by multiple user groups. By using high speed digital data the radio goes to an unused channel when a 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.*
T99	-	*Type 99 - a method of opening mute for selective page operations using sequential tones.*
Wide Area Encode	-	*a programmed option which ensures all system scanning mobile and personal 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.*

OPERATOR'S RADIO SETUP

RADIO TYPE:

FREQUENCY BAND:

OPERATOR'S NAME:

EMERGENCY GROUP:

SYSTEM NUMBER	*SYSTEM NAME*	*TRK/CNV*	*GRP/CHN NUMBER*	*GRP/CHN NAME*	*USE*

WARRANTY

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.

A.

NICKEL-CADMIUM BATTERY WARRANTY

EMERGENCY NUMBERS

Police
State Police
Fire
Poison Control
Ambulance
Life Saving and Rescue Squad

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