

SECTION 3 OPERATION

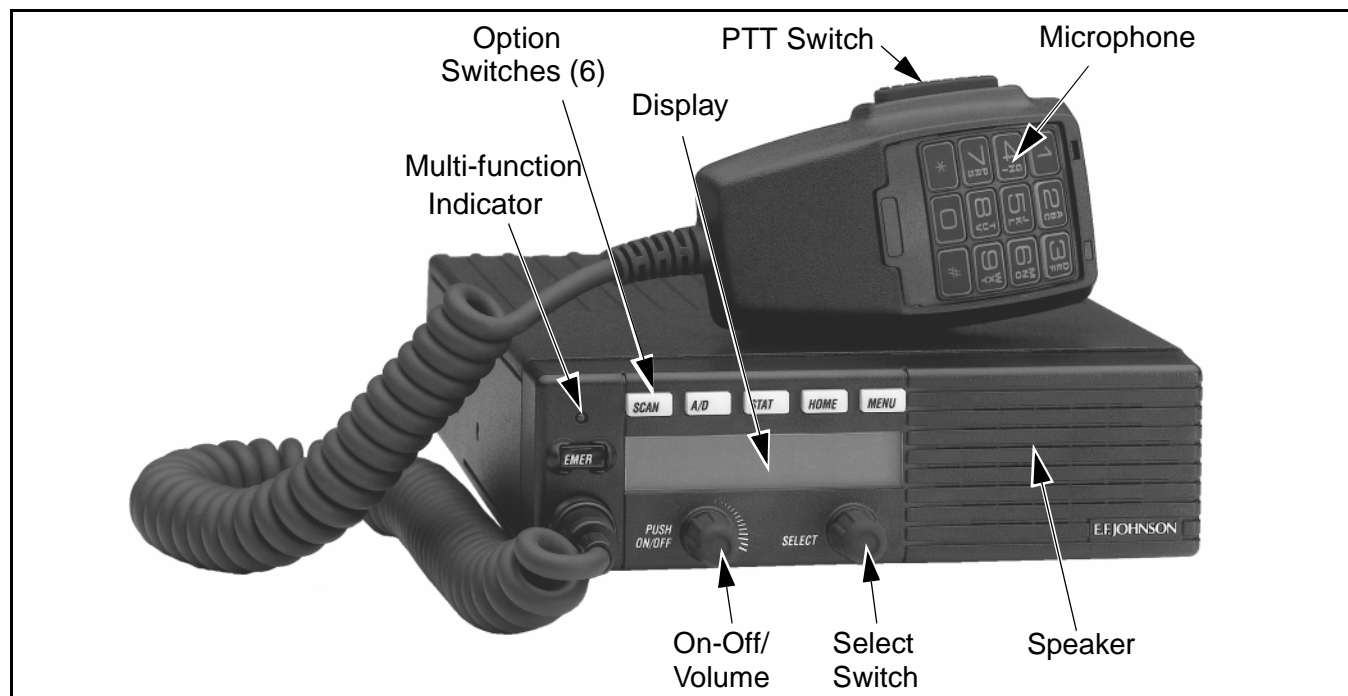


Figure 3-1 Front Panel Controls

3.1 FEATURES

3.1.1 GENERAL FEATURES

- □ Each channel programmable for one of the following operating modes:
 - Conventional analog or Project 25 (digital)
 - SmartNet™/SmartZone™ trunked analog or Project 25 (digital)
- □ Up to 16 zones with up to 16 channels each programmable (256 channels total)
- □ Large liquid crystal display (LCD) with backlight
- □ Six option switches that can be programmed with a different function for each operating mode (conventional and SmartNet)
- □ Standard and radio-wide scan modes
- □ Operation on both narrow and wideband channels
- □ Time-out timer

3.1.2 CONVENTIONAL FEATURES

- □ Each channel selects a different radio channel and squelch coding
- □ Repeater talk-around

- □ Normal/Selective squelch selected by microphone hanger or option switch.
- □ Carrier, tone (CTCSS), or digital (DCS) controlled Call Guard® squelch on analog channels or NAC on Project 25 channels
- □ Penalty and conversation timers
- □ Priority channel sampling when scanning
- □ Busy channel lockout (Transmit Disable On Busy)
- □ ANI (Automatic Number Identification)
- □ SecureNet™ or 460 secure communication available on analog channels or DES-OFB on Project 25 channels
- □ User selectable high and low power output
- □ Individual ID calls on Project 25 channels
- □ Emergency switch

3.1.3 SMARTNET/SMARTZONE FEATURES

- Channels select talk groups
- Unit-to-unit and telephone calling
- Emergency alarms to alert dispatcher of emergency conditions
- Emergency calling for high priority system access
- Failsoft operation on a predefined conventional channel if trunked system fails

- Priority group calls detected while listening to other group calls
- Call alert (send and receive pages)
- Predefined messages (up to 16) can be sent to a dispatcher
- Predefined status conditions (up to 8) can be sent to a dispatcher
- Dynamic regrouping (dispatcher can automatically gather users on a channel to receive a message)
- Roaming (SmartZone only)
- SecureNet™ or 460 secure communication available on analog channels, DES-OFB available on Project 25 channels

NOTE: The availability of many of the preceding features is controlled by transceiver programming (see Section 4) and the capabilities of the radio system being accessed.

3.2 CONTROLS AND DISPLAY

NOTE: The controls and indicators described in the following information are shown in Figure 3-1.

3.2.1 FRONT PANEL CONTROLS

On-Off/Volume - Pressing this control turns power on and off, and rotating it sets the volume level.

Select Switch - Selects zones/channels and is also used for other functions such as selecting names from a call list. When selecting zones/channels, a bar above the zone or channel display indicates which is currently being changed (see Figure 3-3). To switch this bar between displays, press this switch, and to select zones or channels, rotate it (see Section 3.3.5).

Multi-function Indicator - This is a two-color LED that indicates the following:

Red (constant) - Transmitter keyed (PTT switch pressed).

Green (constant) - Busy condition (carrier detected in receive mode).

Option Switches - Each of the six options switches on the front panel (including the one located to the left of the display) can be programmed to control a function. Different functions can be programmed for each operating mode (conventional and SmartNet). Therefore, up

to 12 different functions can be programmed. Refer to Section 3.4.1 for more information.

Speaker - An internal 16-ohm, 5-watt speaker is located behind the grille. An optional 4-ohm, 12-watt external speaker may be used if desired. The internal speaker is disabled when an external speaker is used.

PTT Switch - This push-button switch on the microphone is pressed to talk (key the transmitter) and released to listen.

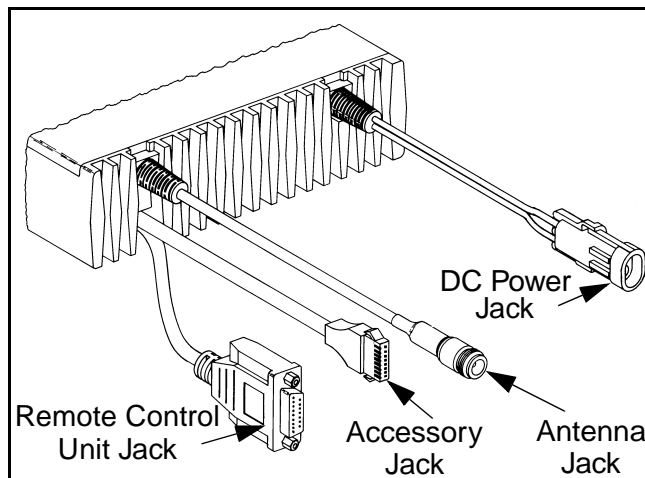


Figure 3-2 Rear Panel Jacks

3.2.2 REAR PANEL JACKS

DC Power Jack - Connection point for a nominal 12-volt, negative ground power source (see Figure 3-2).

Antenna Jack - Type N jack for connecting the 50-ohm antenna.

Accessory Jack - Connection point for optional accessories such as an external speaker, horn alert, and ignition sense line (see Section 2.4).

Remote Control Unit Jack - Connection point for a remote control unit (if used). This cable is optional with front-mount models.

3.2.3 DISPLAY

Zone Number - Indicates the currently selected zone from 1 up to 16 (see Figure 3-3). A zone is a collection of channels that can be any combination of the conventional and SmartNet/SmartZone types (see Section 1.2.4).

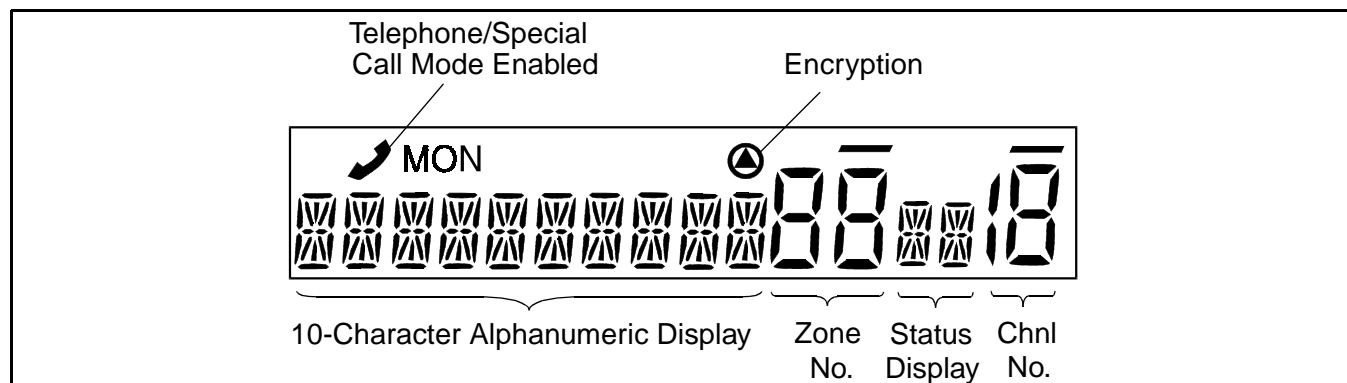




Figure 3-3 Front Panel Display


Channel Number - Indicates the currently selected radio channel (conventional) or talk group (SmartNet).


Alphanumeric Display - This 10-character area of the display indicates the alias (alpha tag) for the selected channel. It may also display other information such as the channel frequency (conventional) if certain option switches are programmed. It also displays various status and error messages.

Status Display - These two characters indicate the following status information:


 - This rotating clock-like symbol in the left position indicates that scanning is occurring.

 - This symbol in the right position indicates that the displayed channel is in the scan list (scanned normally).

 - Indicates that the telephone call mode or other special call modes are selected.

 - Indicates that voice encryption is enabled.

MON - Indicates that the conventional monitor mode is enabled by taking the microphone off-hook or pressing the MON switch (if available). This mode disables squelch control features so that all messages are heard on the channel (see Section 3.5.3).

 - The lines above the zone and channel displays indicate which display is changed if the Select switch is turned. To switch between displays, press the Select switch (see Section 3.3.5).

3.3 GENERAL OPERATION

3.3.1 TURNING POWER ON

Turn power by pressing the On-Off/Volume knob. The multi-function indicator then flashes green, a series of beeps sound, and an initial greeting is indicated by the alphanumeric display. The zone and channel displays then indicate the currently selected zone and channel. Programming determines if the last selected or home zone is selected at power up.

3.3.2 BACKLIGHT

The backlight for the display and option keys can be programmed to automatically turn on with transceiver power or it can be disabled. If the Backlight option switch is programmed, the user can manually turn the backlight on and off.

3.3.3 SETTING VOLUME LEVEL

The relative volume setting can be determined by noting the index on the On-Off/Volume knob. Otherwise, a reference tone can be enabled as follows:

- If the key press tones are enabled (see Section 3.4.5), a short tone sounds when an option switch is pressed or the Select switch is pressed or rotated.
- If a conventional channel is selected, take the microphone off-hook and if someone is talking, voice is heard. If the Monitor option switch is programmed (see Section 3.5.3), pressing it un-squelches the transceiver and either voice or background noise is

heard. If a SmartNet/SmartZone channel is selected, the transceiver cannot be manually unsquelched.

3.3.4 ZONE/CHANNEL DISPLAY

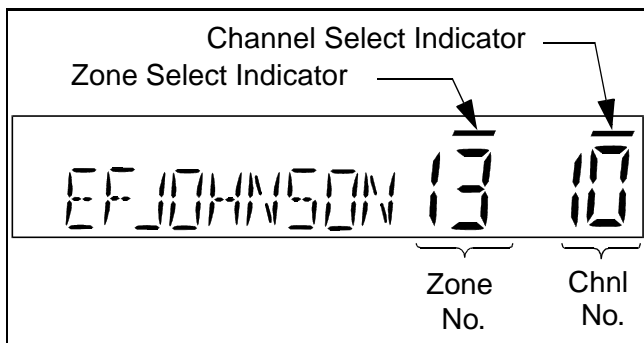
The selected zone and channel are displayed by the zone and channel displays shown in Figure 3-3. In addition, the unique alphanumeric identification (alias) programmed for the channel is displayed in the alphanumeric display area. With conventional operation, the channel frequency may be displayed (see Section 3.5.10). Refer to Section 1.2.4 for more information on zones and channels.

3.3.5 ZONE/CHANNEL SELECT

The front panel Select switch is used to change the zone and channel. Pressing this switch toggles between the zone and channel select modes, and rotating it changes the zone or channel.

The current select mode is indicated by the bar over the zone or channel display (see below). For example, when the bar is over the zone display, the zone select mode is enabled. Rotating the Select switch clockwise increases the zone or channel and rotating it counterclockwise decreases the zone or channel number. After the highest zone or channel is displayed, wrap-around to the lowest zone or channel occurs and vice versa.

NOTE: When an unprogrammed channel is selected, "UNPROGRAMD" is displayed and a tone sounds.



Select Mode Indicators

The transceiver can be programmed so that the bar defaults to either the zone or channel display when power is turned on and after a change is made. The delay that occurs before it returns is programmable for

1-15 seconds or infinite ("infinite" causes it to remain in the last selected mode).

3.3.6 SETTING SQUELCH

This transceiver does not have a squelch control. The squelch level is preset during alignment and does not require readjustment by the user.

3.3.7 TRANSCEIVER OPERATING MODES

Each selectable channel can be programmed for any of the following modes. For example, Zone 1/Channel 1 could be a conventional channel, Zone 1/Channel 2 a SmartNet channel, and so on. Refer to Section 1.2.4 for more information on systems, channels, and zones.

Conventional - This is a non-trunked operating protocol which accesses independent radio channels (there is no automatic access to several channels). Selecting a conventional channel selects a transmit and receive frequency and other channel parameters such as squelch control coding.

Conventional channels can be either standard (analog) or Project 25 (digital). With digital operation, the DSP (Digital Signal Processor) converts the audio signal to digital data which is sent over the air as complex tones. Another difference is that analog channels use Call Guard (CTCSS/DCS) squelch control and Project 25 channels use a NAC (Network Access Code). With NAC, a number similar to an ID code is transmitted, and for communication to occur, it must match one programmed in the base equipment and the mobile(s) being called.

With conventional operation, a busy channel condition is detected automatically if the busy channel lockout (transmit disable on busy) feature is programmed. Otherwise, it must be detected manually. An out-of-range condition is not indicated by special tones or messages as with SmartNet operation because there is no initial data exchange with the repeater that allows this condition to be detected. Operating features unique to conventional channels are described in Section 3.5.

SmartNet/SmartZone - This is a Motorola trunked protocol. Talk group ID codes are used to select what

mobiles are being called and what calls are received. Monitoring is also performed automatically and special messages and tones indicate busy and out-of-range conditions.

SmartNet and SmartZone operation and programming is very similar. Basically, SmartNet operation is limited to a single repeater site and SmartZone operation allows automatic roaming between sites.

Enhanced features available with this protocol include telephone, unit-to-unit, and emergency calls, call alert, messaging, and emergency calls. Either analog or digital (Project 25) signaling may be selected for each talk group. SecureNet™ or 460 secure communication is available with analog channels, and DES-OFB is available with digital channels. Operating features unique to SmartNet/SmartZone channels are described in Section 3.6.

3.4 RADIO-WIDE FEATURES

3.4.1 OPTION SWITCHES

The six option switches on the front panel (including the one to the left of the display) can be programmed to control different functions for each operating mode. Therefore, up to 12 different functions can be controlled by these switches (six each for conventional and SmartNet/SmartZone channels) The functions controlled in each mode and the section in which the function is described are as follows:

Conventional Option Switches

- Backlight (Section 3.3.2)
- Clear/Secure (Section 3.4.7)
- Digital TG Select (Section 3.5.14)
- Displayed Information (Section 3.5.10)
- Emergency (Section 3.5.11)
- Hi/Lo Power (Section 3.5.9)
- Home Zone (Section 3.4.3)
- Individual ID List (Section 3.5.14)
- Monitor (Section 3.5.3)
- Normal/Selective (Section 3.5.5)
- Priority (Section 3.5.12)
- Radio Wide Scan (Section 3.4.6)
- Repeater Talk-Around (Section 3.5.8)
- Scan (Section 3.4.6)
- Tones On/Off (Section 3.4.5)

SmartNet/SmartZone Option Switches

- Backlight (Section 3.3.2)
- Call Alert (Section 3.6.7)
- Call Response (Section 3.6.5)
- Clear/Secure (Section 3.4.7)
- Emergency (Section 3.6.10)
- Home Zone (Section 3.4.3)
- Message (Section 3.6.8)
- Phone (Section 3.6.6)
- Private Call (Section 3.6.5)
- Radio Wide Scan (Section 3.4.6)
- Scan (Section 3.4.6)
- Site Lock Function (Section 3.6.14)
- Site Search (Section 3.6.14)
- Status (Section 3.6.9)
- Tones On/Off (Section 3.4.5)

3.4.2 TIME-OUT TIMER

The time-out timer disables the transmitter if it is keyed for longer than the programmed time. It can be programmed for 15 sec to 3 min, 45 sec or it can be disabled. If the transmitter is keyed for longer than the programmed time, the transmitter is disabled, a continuous tone sounds, and “TX TIMEOUT” is displayed. Five seconds before time-out occurs, a warning beep sounds to indicate that time-out is approaching. The timer and tone are reset by releasing the PTT switch. A different time can be programmed for each system, and the timer can be enabled or disabled on each channel.

3.4.3 HOME ZONE SELECT

If the HOME zone option switch is programmed, it can be used to quickly select the preprogrammed home zone. The transceiver also can be programmed so that when power is turned on, either the home or last selected zone is automatically selected.

3.4.4 POWER TURN-OFF DELAY

The transceiver can be installed so that the vehicle ignition switch as well as the front-panel power switch controls transceiver power. This is done by connecting the accessory ignition switch wire to a power source switched by the ignition switch (see Section 2.4.3). Power off delays of 0-254 minutes or Forever can then be programmed. This delay can be over-

ridden at any time by turning power off using the front-panel power switch or turning the ignition switch back on.

A turn-off delay allows features such as the horn alert and call indicator to remain active for the programmed delay time after the ignition switch is turned off. At the same time, advantages of ignition switch control can be utilized such as preventing battery discharge that may occur if the transceiver is accidentally left on for an extended period.

3.4.5 TONE SELECT

The various alert tones that sound are described in Section 3.7. To toggle all these tones on and off, press the TONE option switch. When all tones are off, "TONE OFF" is momentarily displayed, and when all tones are on, "TONE ON" is momentarily displayed. If this switch is not programmed, tones are fixed in the on or off mode by programming.

3.4.6 SCANNING

Introduction

Scanning monitors the channels in the scan list for messages that the transceiver is programmed to receive. When a message is detected, scanning stops and the message is received. Shortly after the message is complete, scanning resumes (unless it has been disabled). Scanning occurs with the microphone off-hook. However, on conventional channels, selective squelch (such as CTCSS/NAC) is then disabled, so any call occurring on a scanned channel is detected.

There are two basic scan modes available: Standard and Radio Wide. The operation of the standard type is unique to the type of channel selected, and the operation of Radio Wide type is the same regardless of the type of channel selected. More information on these types of scanning follows.


Standard Scanning

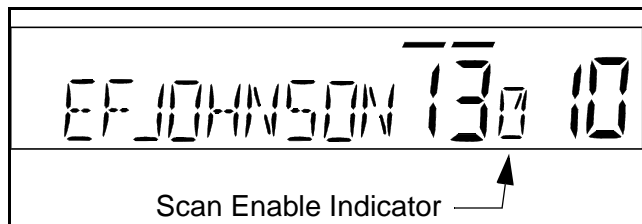
Standard scanning monitors only channels that are the same type as that currently selected (see "Scan Lists" which follows). More information on this type of scanning is located in the individual operating mode descriptions as follows:


Conventional Mode Scanning - Section 3.5.12

SmartNet Mode Scanning - Section 3.6.12

Standard scanning is turned on and off as follows:



- Briefly press the SCAN option switch. Scanning is enabled when "SCAN ON" is briefly displayed and a rotating  is indicated in the left status display as shown below.



- To turn scanning off, briefly press the SCAN option switch again. Scanning is disabled when "SCAN OFF" is briefly displayed and  is no longer indicated in the status display.
- If the zone or channel is changed while scanning is selected, scanning continues on the scan list programmed for the new channel.

Radio Wide Scanning

Radio wide scanning monitors the channels in the radio-wide scan list. This scan list can include up to 16 channels of any type and assigned to any zone (see "Scan Lists" which follows). Radio wide scanning is turned on and off by the RWD option switch as follows. If this switch is not programmed, radio wide scanning is not available.

- To turn radio wide scanning on, press the RWD option switch and "RWD ON" is briefly displayed. In addition,  is displayed the same as with standard scanning.
- Only one type of scanning can be enabled. Therefore, it standard scanning is enabled when the RWD switch is pressed, it is automatically disabled and vice versa.
- To turn radio wide scanning off, press the RWD option switch again and "RWD OFF" is briefly displayed and  is no longer displayed.

- If the zone or channel is changed while radio wide scanning, scanning continues normally.

Scan Resume Delay

When a message is received or transmitted while scanning, there is a delay before scanning resumes. The delay after receiving a call prevents another message from being received before a response can be made, and the delay after transmitting a call ensures that a response is heard instead of another message occurring on some other channel.

With conventional systems, a delay of 0-7.5 seconds in 0.5-second steps can be programmed. With SmartNet/SmartZone systems, the delay is determined by the hangtime of the system. This delay is also used by other features such as to determine if a response occurs in the secure mode.

Transmitting in the Scan Mode

If the transmitter is keyed while scanning is enabled, transmissions occur on various channels as follows.

Conventional Operation - Transmissions can occur on the priority, selected, or receive channel. Refer to Section 3.5.12 for more information.

SmartNet/SmartZone Operation - If scanning is halted to receive a message, transmissions occur on the channel of the call. Transmissions made at other times occur on the selected channel.

Standard Mode Scan Lists

NOTE: The selected channel is always scanned.

Conventional Operation - Up to three scan lists, each containing up to 256 conventional channels, can be programmed for conventional operation. The list that is scanned is selected by the Scan option switch (see Section 3.5.12). Selecting another conventional channel does not change the scan list.

SmartNet/SmartZone Operation - Each SmartNet and SmartZone system can be programmed with up to three scan lists that can contain any combination of the possible 16 talk groups assigned to that sys-

tem. Each SmartNet/SmartZone channel is then programmed to select one of these lists.

Radio Wide Mode Scan List

With radio wide scanning, there is only one scan list available regardless of the type of channel selected. This scan list can contain up to 16 channels of any type. For example, it could include six conventional channels and ten SmartNet/SmartZone channels.

Scan List Channel Add/Delete

All scan lists are preprogrammed and new channels cannot be added by the user. However, channels can be temporarily deleted from a scan list. For example, a channel may be deleted if the messages on it become annoying. Proceed as follows:

NOTE: The selected channel and also conventional priority channels cannot be deleted from the scan list.


1. While receiving a message on the channel to be deleted, press and hold for approximately 2 seconds the option switch used to enable scanning (SCAN or RWD).
2. After the channel is deleted, scanning of the remaining channels in the scan list resumes.
3. Deleted channels are added back into the scan list if any of the following occur:
 - Scanning is turned off and then on again using the scan switch.
 - Transceiver power is turned off and then on again.
 - When standard scanning, if another scan list is selected such as by changing channels (SmartNet/SmartZone) or using the Scan List Select switch (conventional).

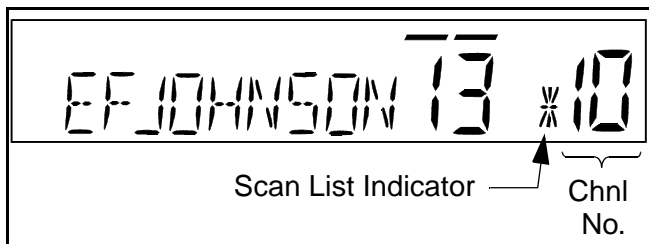
Determining Which Channels are in Scan List

The channels in the radio-wide and conventional scan lists are indicated as follows. Channels in the SmartNet/SmartZone lists are not indicated.

1. To view the conventional scan list, enable standard scanning by pressing the Scan switch. Likewise, to view the radio wide scan list, enable radio wide


scanning by pressing the RWD switch. With conventional scanning which can have up to three lists, also select the scan list if applicable (see Section 3.5.12).

2. Select the desired zone and then scroll through the channels by rotating the Select switch. When the displayed channel is in the scan list (scanned normally), the  symbol is displayed next to the channel number as follows.



3.4.7 SECURE COMMUNICATION

This transceiver may be equipped to provide secure communication on some or all channels. This feature encrypts your voice so that it can be understood only by someone using a transceiver equipped with a similar encryption device and encryption codes.

When a secure call is received or transmitted,  is indicated in the display. If equipped with the Clear/Secure option switch and the current channel is programmed to allow switch selection, secure communication can be manually enabled and disabled by that switch. Secure communication can be programmed on a per channel basis to operate in various ways. Refer to the following sections for more information:

- Conventional Mode** - Section 3.5.15
- SmartNet/SmartZone Mode** -Section 3.6.15

3.5 CONVENTIONAL MODE FEATURES

3.5.1 INTRODUCTION

An overview of the conventional and SmartNet/SmartZone operating modes is located in Section 3.3.7. The following information describes the features unique to conventional operation (both analog and Project 25 (digital). Refer to the preceding section (3.4) for information on features common to all operating modes.

3.5.2 MONITORING BEFORE TRANSMITTING

With conventional operation, you may need to manually monitor the channel before transmitting to make sure that it is not be used by someone else. With SmartNet/SmartZone operation, monitoring is always performed automatically. Monitor conventional channels automatically or manually as follows:

Automatic Channel Monitoring

If the selected channel is programmed with the Busy Channel Lockout (Transmit Disable On Busy) feature, monitoring is performed automatically. Refer to Section 3.5.4 for more information on this feature.

Manual Channel Monitoring

The automatic monitoring just described may occasionally disable the transmitter when the channel is not in use, such as if the repeater has extended hang time. In this case, you may not want to use it and the channel must then be monitored manually as follows:

Busy Indicator - With scanning disabled, note if the multi-function indicator on the front panel is steady green (see Figure 3-1). If it is not, the channel is not being used and a call can be transmitted. If it is green, a carrier is being detected.

Monitor Mode - If the busy indication is displayed, the channel can be monitored to see if someone is actually using it (see next section).

3.5.3 MONITOR MODE

Taking the microphone off-hook disables Call Guard squelch (or NAC with Project 25 channels) so that all messages occurring on the channel are heard (unless off-hook detection is disabled by programming). In addition, if the Normal/Selective option switch is programmed, it can be used to monitor the channel. Refer to Section 3.5.5 for more information on this switch. When monitoring is enabled by either of these methods, the receiver unsquelches only if a carrier is present.

If the Monitor option switch is programmed, pressing it unsquelches the receiver so that all traffic on the channel can be monitored. Pressing this switch

briefly monitors the receive frequency, and pressing it for at least 2 seconds monitors the transmit frequency. To re-enable normal operation, briefly press the Monitor switch again. When monitoring is enabled by this switch, "MON" is indicated in the display and scanning is disabled.

3.5.4 BUSY CHANNEL LOCKOUT

The Busy Channel Lockout (also called Transmit Disable on Busy) feature automatically disables the transmitter if the channel is busy when the PTT switch is pressed. When the transmitter is disabled by this feature, "BUSY" is displayed, a busy tone sounds, and the transmitter is disabled.

The Busy Channel Lockout feature can be programmed to operate as follows. Each conventional channel can be programmed differently.

Off - Busy channel lockout is disabled and the transmitter keys even if the channel is busy.

Noise - If a carrier is detected on the channel, the transmitter is disabled when the PTT switch is pressed.

Tone (NAC) - If an incorrect Call Guard (CTCSS/DCS) or NAC code (see Section 3.5.14) is detected, the transmitter is disabled when the PTT switch is pressed. An incorrect code is any code other than the one programmed for the current channel.

Tone (NAC) w/Lockout - Like "Tone" above except transmitting is permitted if the "Normal" condition is selected by the Normal/Selective option switch (see next section).

3.5.5 CALL GUARD SQUELCH

Introduction

Tone or digital Call Guard squelch (also called CTCSS/DCS signaling) can be programmed on each conventional analog transmit and receive channel in any order desired. The reverse burst and turn-off code are always transmitted and also detected on channels programmed with Call Guard squelch.

The Call Guard squelch feature eliminates distracting messages intended for others using the chan-

nel. This is done by using a subaudible tone or digital code to control the squelch. This tone or code is unique to a user or a group on that channel. This tone or code is transmitted with the voice signal but is not heard because it is in the subaudible range and is attenuated by a filter. Call Guard squelch must be used in both the transmitting and receiving transceiver to be functional.

Call Guard Squelch Enable/Disable

The Normal/Selective option switch (if programmed) can be used to temporarily disable receive Call Guard squelch on the current channel. When Call Guard squelch is disabled, "NORMAL" is flashed in the display. Conversely, when it is enabled, "SELECTIVE" is flashed. It is automatically re-enabled on the channel when another channel is selected or transceiver power is turned off and on.

Tone Call Guard Squelch

Tone-type Call Guard squelch utilizes subaudible CTCSS tones from 67-254.1 Hz. Although there are 42 tones assigned, those above 33 (210.7 Hz) are normally not used because of their close proximity to the voice band which starts at 300 Hz. In addition, tones 11 (97.4 Hz), 39 (69.3 Hz), 40 (206.5 Hz), 41 (229.1 Hz), and 42 (254.1 Hz) are normally not used because they may cause interference with adjacent tones.

A reverse burst is transmitted when the push-to-talk switch is released and also detected when calls are received. It is a 180-degree phase reversal for a period of time determined by the tone frequency, and it eliminates the squelch tail (noise burst) in the receiving transceiver. Both the transmitting and receiving transceiver must be equipped with this feature for it to be utilized.

Digital Call Guard Squelch

Digital Call Guard squelch (CDCSS) uses digital data instead of subaudible tones to control the squelch. This data consists of continuous repetitions of 23-bit words. No bit or word synchronization information is used. When the push-to-talk switch is released, a turn-off code is transmitted which eliminates the squelch tail similar to the reverse burst.

Although there are thousands of possible code combinations with 23 bits, only 83 are unique with the data scheme used. The number specified when the code is programmed is actually a seed for a special algorithm used to generate the 23-bit data word. The data is transmitted at a rate of 134.4 bits per second. Therefore, approximately six words are transmitted each second. When the data is decoded, 23-bit samples are taken and then the bits are rotated to determine if a valid code was received.

3.5.6 PENALTY TIMER

A penalty timer may be programmed on conventional systems to prevent transmissions for the programmed time after the time-out timer disables the transmitter (see Section 3.4.2). The penalty timer can be programmed for the same times as the time-out timer, and timing starts when the PTT switch is released. If the PTT switch is pressed during the penalty time, the time-out indication occurs again. When the penalty timer expires, a beep sounds and the transmitter can be keyed.

3.5.7 CONVERSATION TIMER

A conversation timer that can be programmed on conventional systems in addition to the time-out timer (see Section 3.4.2). This timer limits that total length of a conversation rather than just the length of each transmission as with the time-out timer. The following is more information on this timer.

- It can be programmed for times up to 7.5 minutes.
- It is reset when the time between transmissions exceeds the time programmed for the penalty timer.
- A warning beep sounds 5 seconds before this timer disables the transmitter.
- When this timer disables the transmitter, a continuous tone sounds and the red transmit indicator turns off. The PTT switch must then be released until the penalty timer expires (indicated by a beep).

3.5.8 REPEATER TALK-AROUND

Normally, all transmissions go through a repeater which usually increases range. However, there may be times when a mobile is out of range of the repeater and therefore unable to talk to anyone even though the mobile being called is only a short distance away. To

allow communication in this situation, repeater talk-around can be selected. Transmissions then occur on the receive frequency which permits direct mobile-to-mobile communication.

Repeater talk-around can be selected if the RTA option switch is programmed. When talk-around is enabled by this switch, "RTA ON" is flashed in the display, and when it is disabled, "RTA OFF" is flashed. This feature remains enabled during scanning, but changing channels or turning power off causes it to revert to the off condition. Talk-around is available on conventional channels only.

3.5.9 POWER OUTPUT SELECT

Each conventional channel can be programmed for high, low, or switchable power. If the High/Low Power option switch is programmed and selectable power is programmed on the current channel, high and low transmitter power can be selected. All models support high/low power.

Pressing this switch toggles the power setting. The new level is flashed in the display when this switch is pressed as either "HIGH POWER" or "LOW POWER". If selectable power is not permitted on the current channel, the programmed power level is flashed and no power change occurs.

3.5.10 DISPLAYING TX/RX FREQUENCY

If the Displayed Information option switch is programmed (see Section 3.4.1), it can be used to display the channel frequency in megahertz. Pressing this switch toggles between displaying the standard channel alias and the channel frequency. The receive frequency is displayed when receiving and the transmit frequency is displayed when transmitting. This feature is available on conventional channels only.

3.5.11 EMERGENCY MODE

An Emergency option switch may be programmed on conventional channels to alert a dispatcher or someone else of an emergency condition.

When this switch is pressed with an analog channel selected, a Transcript emergency packet (SC-460

emergency) is sent up to 20 times or until an acknowledgment is received.

When this switch is pressed with a Project 25 (digital) channel selected, all transmissions have the emergency flag set. Scanning is disabled and the transceiver remains in the emergency mode until power is cycled.

3.5.12 CONVENTIONAL MODE SCANNING

General

Channel scanning features common to all operating modes are described in Section 3.4.6. The following information describes features unique to conventional operation.

Scan Lists

Up to three scan lists are selectable when standard scanning with a conventional channel selected. The channels in these lists can be programmed only by the programming software, and each list can include up to 256 conventional channels. Scan lists are selected by repeatedly pressing the Scan option switch. For example, the first press of the Scan switch activates scan list 1, the second press activates scan list 2, the third press activates scan list 3, and the last press disables the scan mode. The currently selected scan list is flashed in the display as "SCAN x", where "x" is the scan list number.

Transmitting in Scan Mode

Each conventional scan list can be programmed for one of the following modes. These modes determine if priority sampling occurs and also the channel on which transmissions occur while scanning. Refer to "Priority Channel Sampling" which follows for more information.

No Priority - No priority channel sampling occurs when the list is selected. The radio transmits on the selected channel.

Priority/Tx Priority - Priority sampling occurs and the priority channel is the one programmed in the selected scan list. The radio transmits on the priority channel.

Priority/Tx Selected - Priority sampling occurs and the priority channel is the one programmed in the selected scan list. The radio transmits on the selected channel.

Priority on Selected - The priority channel is always the selected channel. The radio transmits on the selected channel.

Talkback - No priority sampling occurs. The radio transmits on the channel of a call while scanning is halted. Then once scanning resumes, it transmits on the selected channel.

Priority Channel Sampling

The priority channel sampling feature ensures that messages on the priority channel are not missed while listening to a message on some other channel. The transceiver can be programmed as just described so that the priority channel is a fixed channel programmed in the current scan list, the currently selected channel, or not used.

Priority channel sampling occurs only with standard conventional scanning. It does not occur with radio-wide scanning, when listening to any type of SmartNet/SmartZone call, or when transmitting. A series of "ticks" may be heard when the priority channel is sampled while listening to a message on some other conventional channel.

The priority sampling times are programmed by the following parameters:

Lookback Time A - This time determines how often the priority channel is checked for activity. Times of 0.25-4.00 seconds in 0.25-second steps can be programmed.

Lookback Time B - This time determines how often the priority channel is checked once an incorrect Call Guard (CTCSS/DCS) or NAC code is detected. Since it takes much longer to detect an incorrect Call Guard signal than a carrier, this time should be relatively long to prevent the interruptions from making a message difficult to understand. Times of 0.5-8.0 seconds can be programmed in 0.5-second steps.

3.5.13 PLACING AND RECEIVING CONVENTIONAL CALLS

NOTE: A DTMF microphone is required to place conventional mode telephone calls.

Placing a Standard Conventional Call

1. Turn power on and set the volume as described in Sections 3.3.1 and 3.3.3. Select the channel programmed for the mobile you want to call as described in Section 3.3.5.
2. Monitor the channel automatically or manually as described in Section 3.5.2.
3. Press the PTT switch and the call proceeds as follows:
 - If the Busy Channel Lockout feature is programmed on the channel (see Section 3.5.4), the transmitter is automatically disabled if the channel is busy.
 - Otherwise, busy and out-of-range conditions are not indicated and speaking can begin after monitoring the channel.
4. Press (and hold) the PTT switch to talk and release it to listen. When the call is finished, place the microphone back on-hook.

Receiving a Standard Conventional Call

1. Select or scan the channel programmed for the call you want to receive (refer to Sections 3.4.6 and 3.5.12 for more scanning information).
2. When the call is received, take the microphone off-hook and press the PTT switch to talk and release it to listen. If scanning, responses may occur on the priority, selected, or receive channel as described in Section 3.5.12.
3. When the call is finished, place the microphone back on-hook.

3.5.14 PROJECT 25 MODE FEATURES

Individual, Group, and NAC Codes

Individual ID - Each transceiver that operates on Project 25 (digital) channels is programmed with an 8-digit individual ID. This ID is unique for each transceiver and can be any number from 1-16777216. When power is turned on with a Project 25 channel selected, this ID is briefly displayed.

Group ID - Each Project 25 channel is programmed with a group ID that determines which group of mobiles will receive the call. A call is received if any Project 25 channel is programmed with that group and the correct NAC is detected (see following description). Group IDs can be any number from 0-4095.

NAC - Project 25 conventional channels use a NAC (Network Access Code) instead of Call Guard squelch coding (see Section 3.5.5) to control which calls are received on a channel. The NAC can be 0-4095, and each transmit and receive channel can be programmed for a different code. Other operation, such as monitoring before transmitting, is similar to that of standard analog channels.

To receive a Project 25 group call, the talk group programmed with the group ID being transmitted must be selected or scanned. In addition, the receive NAC programmed for that channel must be detected. An exception is if the receive NAC in the receiving radio is 659 (293 hex). The receiving radio then basically ignores the NAC so that all NACs can be received on a talk group.

Changing Talk Group Assigned To A Channel

Group calls are placed by simply selecting the channel programmed for the desired group, monitoring the channel if required, and transmitting. If the Digital TG Select option switch is programmed, the talk group assigned to a channel can be permanently changed by the user. Therefore, the new talk group continues to be assigned to the channel even after radio power is cycled or another channel is selected. To change a channel talk group, proceed as follows:

1. Select the channel to be changed and then press the Digital TG Select option switch.
2. Rotate the Select switch until the alias (alphatag) of the desired talk group is displayed.
3. To select that talk group and return to normal operation, press the TG Select option switch again or press the Select switch. If talk group selection has been disabled on the channel by programming, "NO LIST" is displayed and a tone sounds.

Individual Calls

Individual calls can be placed to a specific radio on Project 25 channels if the Individual Call option switch is programmed. With these calls, only the individual ID of the target radio is sent (a talk group ID is not sent). When this call is received, the individual ID of the calling radio is transmitted back. Responses can be made without changing the selected channel as long as they are made before the call timer times out (set by programming) or the channel is changed. To place an individual call, proceed as follows:

1. Press the Individual ID List option switch and the alias (tag) of the last individual call is displayed.
2. If required, rotate the Select switch to display the desired number. The alias (alphatag) of each number is displayed.
3. Press the PTT switch and begin talking.

The transceiver can be programmed to display the following when an individual call is received (see Section 3.3.4).

- Alias (or freq) of the currently selected talk group
- Alias of the talk group on which the call is being received
- ID of the mobile placing the call

3.5.15 CONVENTIONAL SECURE COMMUNICATION

Introduction

There are two different protocols that can be used to provide secure communication on conventional ana-

log channels: SecureNet™ and 460 scrambling. More information on these protocols follows.


SecureNet

SecureNet is a proprietary Motorola protocol that digitizes the voice and then encrypts it using the DES algorithm. It provides the highest level of security. There are two DES protocols:

- DES (CFB) uses cipher feedback DES encryption. A disadvantage of this type is reduced communication range when compared to clear voice.
- DES-XL uses counter addressing feedback DES. It provides better range but at lower voice quality.

The transmission mode (DES or DES-XL) is selected by the programming software for each SecureNet analog channel. If a channel is programmed for DES-XL, it will also receive DES, but transmissions always occur in DES-XL.

Each SecureNet capable channel is assigned an encryption number from 0-15. The key corresponding to this number is loaded into the radio using the Motorola key loader. There is a maximum of 16 keys that can be loaded into the radio at one time.

Transmissions on an analog channel are in the clear mode if the channel has been strapped to the clear mode by programming, and in the SecureNet mode if it has been strapped to SecureNet. If the channel has been strapped to "switched", the mode is selected by the Clear/Secure option switch. When a message is received or transmitted in the secure mode,  is displayed.

If an attempt is made to transmit a secure message without loading the corresponding key, "KEY-FAIL" is displayed. The message must then be transmitted in the clear mode (this is possible only if the channel is strapped to "switchable") or the key must be loaded.

460 Scrambling

The 460 Scrambling protocol is a proprietary Transcrypt protocol that is compatible with the stand-alone scrambling option from Transcrypt. If

equipped with the 460 Scrambler, a Clear/Secure option switch may be programmed. Pressing this switch changes the transmission mode for the selected channel and momentarily displays either “CLEAR” or “SECURE”.

In the coded mode, transmissions are in scrambled voice on any 460-enabled channel and the mobile receiving the call automatically responds in the scrambled mode because the receiver automatically switches between the clear and coded modes.

Although 16 generic codes are loaded, only one is active and all 460-enabled channels use this code. The 460 scrambling option also provides several other signaling enhancements including Digital ID, Automatic Status and Location Update, Individual and Group ID calling, and Emergency.

Transmit Mode Options

Either the SecureNet or 460 protocol can be selected, and then the following transmit options are available for each:

Clear - All calls are in the clear mode unless responding to a secure call. If the response is then made within the delay time (see Section 3.4.6), it occurs in the secure mode.

Coded - All calls are made in the selected secure mode.

Switched - The mode is selected by the Clear/Secure switch. With 460 scrambling, if responding to a secure call, the secure mode is automatically selected if the response occurs within the delay time. When the clear mode is selected by this switch, “CLEAR” is flashed, and when the secure mode is selected, “SECURE” is flashed.

Receive Mode Options

With 460 scrambling, clear and scrambled signals are always autodetected. In addition, the user can switch between the clear and secure mode at any time using the Clear/Secure option switch. SecureNet signals are unintelligible when 460 scrambling is used and vice versa.

With the SecureNet protocol, the following receive options can be programmed:

No Autodetect - Only signals coded like the transmit signals are received.

Secure Autodetect - Both clear and SecureNet signals are automatically detected. This mode is automatically selected if the transmit mode is switch selectable.

Proper Key Autodetect - An incoming SecureNet call is compared against all of the available keys programmed into the radio. If a match is found, the call is decrypted using matched key.

Project 25 (Digital) Channels

Project 25 digital channels use the DES-OFB protocol. Using this protocol on digital channels does not result in the degraded range that occurs with analog channels. The same transmit mode options are available as with the preceding analog operation. In the receive mode, clear and secure messages are always automatically detected.

3.6 SMARTNET/SMARTZONE FEATURES

3.6.1 INTRODUCTION

An overview of the SmartNet/SmartZone operating mode is located in Section 3.3.7. The following information describes the features unique to the SmartNet and SmartZone modes of operation. Refer to Section 3.4 for information on features common to all operating modes.

3.6.2 ANALOG AND DIGITAL OPERATION

Either analog or Project 25 (digital) operation can be selected for communication on SmartNet traffic channels. Each talk group can be programmed for either type of operation.

3.6.3 VIEWING UNIT ID

When power is turned on with a SmartNet/SmartZone channel selected, the six-digit Unit ID is briefly displayed as IDxxxxxx.

3.6.4 GROUP CALLS

Placing a Group Call

1. Turn power on and set the volume as described in Sections 3.3.1 and 3.3.3. Select the channel programmed for the talk group you want to call (see Section 3.3.5). A regular or announcement talk group can be selected.
2. If the talk group is not strapped to Clear or Coded, select the desired mode by pressing the Clear/Secure option switch. The status of that switch is ignored if the talk group is strapped to Clear or Coded. Refer to Section 3.6.15 for more information.
3. Press the PTT switch and begin talking. A talk permit tone may sound to indicate when talking can begin. Events that may occur are as follows:
 - If in the secure mode and your transceiver is not programmed with the proper encryption key, “KEYFAIL” is displayed and the call must be made in the clear mode or the proper key must be programmed.
 - If the busy tone sounds and “BUSY” is displayed, the system is busy. Release the PTT switch and wait for the call back tone to sound. Then press the PTT switch within 3 seconds.
 - If a continuous tone sounds and “NO SYS” is displayed, you may be out-of-range. Drive closer or away from shielding objects and try again.
 - If your unit ID is invalid, the call is being made to an invalid group ID, group calls are not enabled, or the selected talk group is not programmed for the selected secure mode, “DISABLED ID” is displayed and an alert tone sounds.
 - If an attempt is made to change an analog call from the clear to secure mode and there is no available secure channel, “NO SEC” is flashed and the call continues in the clear mode.
 - If an attempt is made to change an analog channel from the secure to clear mode, “SEC ONLY” is displayed and the call continues in the secure mode. (Calls on digital channels can be changed if not strapped.)

Receiving a Group Call

Group calls are automatically received if a Smart-Net/SmartZone channel is selected. The display alternates between the selected channel alias (alphanum) and the received talk group alias.

3.6.5 UNIT-TO-UNIT CALLS

Unit-to-unit calls allow calls to be placed to a specific mobile unit. Either the Enhanced Private Conversation™ or Private Conversation II™ modes may be programmed. Operation in each mode is as follows:

Placing a Unit-To-Unit Call (Private Conversation II)

1. Momentarily press the Private Call option switch. The alias of the last called mobile is displayed.
2. If required, select another mobile by rotating the Select switch until the alias for the desired mobile is displayed.
3. Press the PTT switch. Events that may occur are as follows:
 - The called party answers the call.
 - The called party does not answer. Press the Private Call option switch to end the call.
 - If the selected mobile ID is not valid, “INVALID” is displayed and an alert tone sounds.
 - If the call is in the secure mode and the transceiver does not have the proper encryption key, “KEY-FAIL” is displayed and the call must be made in the clear mode by pressing the Clear/Secure option switch (if strapped to switchable). Otherwise, load the correct key.
4. When the call is finished or if it is not answered, end it by pressing the Private Call option switch and placing the microphone on-hook.

Placing a Unit-To-Unit Call (Enhanced Private Conversation)

1. Momentarily press the Private Call option switch. The alias of the last called mobile is displayed.

2. If required, select another mobile by rotating the Select switch until the alias for the desired mobile is displayed.
3. Press the PTT switch. Events that may occur are as follows:
 - If the mobile being called is on the air, “WAIT” is displayed and ringing is heard until the called party answers or for 20 seconds, whichever occurs first. When the call is answered, the voice of the called party is heard.
 - If the called mobile does not answer within 20 seconds, a continuous tone sounds and “NO ANS” is displayed.
 - If the called mobile is not on the air, a continuous tone sounds instead of the ringing tone and “NO ACK” is displayed.
 - If the busy tone sounds and “BUSY” is displayed, the called mobile has answered the call but the system is busy. When the system is no longer busy, the call back tone sounds.
 - If your transceiver or the called transceiver is inhibited or not programmed to make this type of call or for the requested secure mode, “REJECT” is displayed and an alert tone sounds.
 - If your transceiver does not have the proper encryption key, “KEYFAIL” is displayed and the call must be made in the clear mode by pressing the Clear/Secure option switch (if strapped to switchable). Otherwise, load the correct key.
4. When the call is finished or is not answered, end it by pressing the Private Call option switch and placing the microphone back on-hook.

Receiving a Unit-To-Unit Call

1. When a unit-to-unit call is received, “CALL” is displayed and a recurring call tone sounds.
2. To answer the call, press the Private Call option switch and then the PTT switch and begin speaking. The unit ID of the calling mobile is displayed. More information follows:

- If the PTT switch is pressed before the Private Call option switch, the call is transmitted as a group call.
- If unit-to-unit calls are not permitted (the Private Call option switch is not programmed), press the Call Response option switch to answer the call.
- The call must be answered within 20 seconds or it is automatically terminated.
- If the system is busy when a response is made, “BUSY” is displayed and the busy tone sounds.

3.6.6 TELEPHONE CALLS

The telephone call feature allows telephone calls to be placed and received over the public telephone system using your transceiver. The type of call (secure/clear) is determined by the mode selected by the Clear/Secure option switch. Telephone calling is programmed to operate in one of the following modes:

- Disabled
- Answer-only capability
- Telephone numbers can be recalled from memory only

Placing a Telephone Call by Recalling a Number From Memory

1. With a SmartNet/SmartZone channel selected, momentarily press the Phone option switch. The alias of the last called telephone number is displayed.
2. If required, rotate the Select switch to display the desired number. The alias of each number is displayed.
3. Press and release the PTT switch and “DIALING” is displayed. Events that may occur are as follows:

- If the access is successful, a dial tone sounds and the dialed number is displayed and sent. Either ringing or a busy signal is then heard as with a standard telephone call. When the called party answers, press the PTT switch to talk and release it to listen (since the transceiver is half-duplex, it is not possible to talk and listen at the same time).

Each time the PTT switch is released, a go-ahead tone is sent to the landside party to indicate when they can respond. To dial a number after the connection is made, press the PTT switch and dial the number using the microphone keypad.

- If the selected telephone number is not valid, “INVALID” is displayed and an alert tone sounds. Select a valid number.
 - If the system is busy, “BUSY” is displayed and the busy tone sounds. The call will automatically proceed when the system becomes available.
 - If you are out-of-range or the radio cannot be accessed for some reason, “NO PHONE” is displayed and an alert tone sounds.
 - If the interconnect call you are making or the selected secure mode is not authorized, “REJECT” is displayed and an alert tone sounds.
 - If your transceiver does not have the proper encryption key, “KEYFAIL” is displayed and the call must be made in the clear mode (press the Clear/Secure option switch).
4. When the telephone call is finished or if it could not be completed for some reason, end it by pressing the Phone option switch and placing the microphone back on-hook.

Answering a Telephone Call

1. When a telephone call is received, “ringing” similar to a standard telephone is heard and “PHONE” is displayed.
2. To answer the call, press the Phone option switch and press the PTT switch to talk and release it to listen (since the transceiver operates half duplex, it is not possible to talk and listen at the same time).
3. When the call is finished, end it by pressing the PHONE option switch and placing the microphone back on-hook.

3.6.7 CALL ALERT

The call alert feature allows pages to be sent and received. Your transceiver may be programmed to

answer pages in the Private Conversation II™ or Enhanced Private Conversation™ modes. The operation differences are noted in the procedure which follows.

Answering a Page

1. When a page is received, four beeps sound and “PAGE” is displayed. The ID of the mobile paging you is stored as the last ID received.
2. To clear or ignore the page, press any option switch. If the PTT switch is pressed, a group call is placed on the selected channel.
3. To answer the page as a unit-to-unit call (see page 15), press the Private Call option switch and the alias of the mobile paging you is displayed. Press the PTT switch and respond. One of the conditions that follow may also occur:

Private Conversation II Mode

- If the mobile being called is not on the air or does not answer, you will simply not hear a response.

Enhanced Private Conversation

- If the mobile being called is on the air, ringing is heard until the called party answers or for 20 seconds, whichever occurs first. If no answer occurs within 20 seconds, “NO ANS” is displayed.
 - If the mobile being called is not on the air, no ringing is heard and “NO ACK” is displayed.
4. When the call is finished or it could not be completed for some reason, end it by pressing the Private Call option switch and placing the microphone back on-hook.

Initiating a Page

1. With a SmartNet/SmartZone channel selected, momentarily press the Call Alert option switch. The alias of the last ID called is displayed.
2. If required, rotate the Select switch to display the desired mobile. The alias of each number is displayed.

3. Press the PTT switch and one of the following occur:
 - If a continuous tone sounds, the system received the page but the called mobile is not on the air. Try again later or cancel the page by pressing the Call Alert switch again.
 - If the called mobile does not answer within 6 seconds, a continuous tone sounds and “NO ACK” is displayed. Try again later or cancel the page by pressing the Call Alert switch again.
 - If five beeps sound, the system received the page and the paged mobile is on the air and received it. The page mode is automatically exited.

3.6.8 MESSAGING

The messaging feature allows preprogrammed messages to be sent to a dispatcher. Up to 16 messages can be preprogrammed, and they are identified by an alias. If a Message option switch is programmed, messages are sent as follows:

1. Momentarily press the Message option switch. The alias of the last message sent is displayed.
2. If required, rotate the Select switch to display the desired message. Then send the message by momentarily pressing the PTT switch. One of the following events then occurs:
 - If five beeps sound, the message was received and acknowledged by the dispatcher
 - If after 6 seconds, the message is not acknowledged, a tone sounds and “NO ACK” is displayed. Press and release the PTT switch to send it again or press the Message option switch to exit the messaging mode.

3.6.9 SENDING STATUS CONDITIONS

The status feature allows you to manually or automatically send your current status to your dispatcher. Up to eight status conditions can be preprogrammed, and they are identified by an alias. If the Status option switch is programmed, status conditions are sent as follows:

1. Momentarily press the Status option switch. The alias of the current status condition is displayed.
2. To change the current status, rotate the Select switch until the desired status is displayed. Then press the Select switch to accept that status.
3. You can wait to send the current status until polled by the dispatcher or it can be sent immediately by briefly pressing the PTT switch. One of the following events then occurs:
 - If five beeps sound, the status was received and acknowledged by the dispatcher
 - If after 6 seconds, the message is not acknowledged, a tone sounds and “NO ACK” is displayed. Press and release the PTT switch to send it again or press the Status option switch to exit this mode and return to normal operation.

3.6.10 EMERGENCY ALARM/CALL

An emergency alarm is a special data transmission to alert the dispatcher of an emergency situation. An emergency call is an urgent request for access to a voice channel. It is placed if the PTT switch is pressed during an emergency alarm condition. The Emergency option switch must be programmed to have these features. Proceed as follows:

1. With a SmartNet/SmartZone channel selected, press and hold the Emergency option switch for at least 2 seconds.
2. The emergency mode is then indicated by a red front panel LED and “EMERGENCY” in the display. The emergency alarm is transmitted on the preprogrammed emergency talk group or announcement group (which can be different for each channel).

NOTE: The transceiver may be programmed for silent emergency. If this is the case, no audio and visual emergency indications occur such as those just described.


3. When the emergency alarm is acknowledged, four beeps sound (unless silent emergency is pro-

grammed) and normal operation resumes. To cancel the emergency alarm before this occurs, press the Select switch.

4. To transmit and emergency call, simply press the PTT switch after pressing the Emergency option switch (but before the acknowledgment is received).

3.6.11 FAILSOFT OPERATION

If a failure occurs in the SmartNet/SmartZone system so that it cannot be used, the transceiver automatically enters the failsoft mode. When in this mode, "FAILSOFT" and the alias of the selected channel are alternately displayed.

When in the failsoft mode, operation is in the conventional mode on the preprogrammed failsoft channel (a different failsoft channel can be programmed on each talk group). If a transmission is attempted before a failsoft channel is located, a continuous tones sounds until the PTT switch is released. When the radio system returns to normal operation, this is automatically detected and normal operation resumes. The secure mode is controlled by the Clear/Secure option switch and indicated by  in the display. Secure calls are always automatically detected.

3.6.12 SMARTNET/SMARTZONE SCANNING

General

Scanning on a SmartNet/Smartzone system is similar to the standard scanning described in Section 3.4.6. Each SmartNet/SmartZone system can be programmed with up to three scan lists with each including up to 15 channels plus a priority channel. One of these lists can then be selected for each SmartNet channel. In addition, autoscanning can be selected on each channel. Scanning then automatically begins on that channel when it is selected. It is not necessary to press the Scan option switch.

Messages on the priority channel are received while listening to lower priority messages. However, unit-to-unit and telephone calls are not interrupted by priority messages. Pages, unit-to-unit calls, and telephone calls are received while scanning.

Nuisance Channel Delete

If messages on a talk group become annoying, that talk group can be temporarily removed from the scan list by pressing the Nuisance Delete option switch. The deleted talk group is added back into the scan list when power is cycled, scanning is turned off, or another channel is selected (see Section 3.4.6). With radio-wide scanning, the RWD option switch is used as described in Section 3.4.6.

3.6.13 DYNAMIC REGROUPING

The dynamic regrouping feature allows a dispatcher to switch mobiles to a predefined regrouping channel to receive an important message. Dynamic regrouping operates as follows:

1. When this command is received, a alternating tones sound for 5 seconds and the transceiver automatically changes to the regrouping channel and the display indicates the alias of the channel.
2. Manually select the channel corresponding to that alias. If this is not done, transmission still occurs on the new channel, but the alternating tones sound each time the PTT switch is pressed.
3. Talk and listen as usual. The dispatcher will cancel dynamic regrouping. If a standard channel is not selected after this occurs, an error tone periodically sounds.

3.6.14 SMARTZONE FEATURES

Introduction

As described in Section 3.3.7, the SmartZone mode provides wide area coverage by allowing roaming between SmartNet and conventional sites. SmartZone operation is the same as SmartNet with the following additional features:

Busy Override

The busy override feature allows a call to be placed even if not all sites you are calling have a free traffic channel. The only sites guaranteed to be included are the Critical Sites and the sites where a

Critical User is located. This feature is enabled and disabled by the system manager, and it operates as follows:

1. Assume that you have attempted to place a call and the system was busy (“BUSY” displayed and busy tone sounded).
2. Release the PTT switch and then press it for 5 seconds or more. If a chirp tone sounds with the PTT switch pressed, busy override is occurring.

NOTE: Remember that not all members of the talk group are receiving your message. Missing members will start receiving your message as channels become available.

Site Trunking

Site trunking occurs when a site can no longer participate in wide area trunking. When site trunking is occurring, the radio searches for other sites that may provide wide area coverage. Site trunking ends when a wide area coverage site is located, the current site is operating again as a wide area coverage site, an out-of-range condition occurs, or the failsoft mode is entered.

Determining Current Site

To determine the current radio site, momentarily press the Search option switch. If currently registered on a site, “SITE xx” is displayed. If the site is locked (see following), “LOCK xx” is displayed.

Searching For a New Site

To search for a new site, press and hold the Search option switch of 2 seconds or more. The display indicates “SEARCH” until a new site is found. The display then indicates “SITE xx”. Press the Search option switch to return to the normal display.

Locking/Unlocking a Site

It is sometimes desirable to stay on a site. To prevent the transceiver from searching for a new site, it can be locked on the current site. To lock on the current site, press the LOCK option switch. The display indicates the first site in the list of SmartZone sites.

Even when locked on a site, searching for a new site can be forced as described in the preceding paragraph.

3.6.15 SMARTNET/SMARTZONE SECURE COMMUNICATION

On analog SmartNet/SmartZone channels, either the SecureNet or 460 protocols can be selected. Operation is similar to conventional channel secure communication described in Section 3.5.15.

On digital SmartNet/SmartZone channels, only the DES-OFB protocol is available. Talk groups can be strapped to Clear, Coded, or Switch selectable, and clear and secure messages are always autodetected.

The following calls require their own encryption key selection: emergency, failsoft, patch, telephone, unit-to-unit, and system-wide.

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3.7 SUPERVISORY TONES

Single Beep (Alert Tone)

- Power was turned on and a successful power-up sequence occurred (Section 3.3.1).
- The time-out timer is about to expire or the penalty timer has expired (Section 3.4.2).
- The conversation timer is about to expire (Section 3.5.7).
- The system received your page but the paged mobile is not on the air (Section 3.6.7).
- Telephone interconnect is not operational (Section 3.6.6).

Continuous Tone (Invalid Condition)

- A transmission is being attempted on a conventional channel programmed as receive-only.
- The transmitter is disabled by the busy channel lockout feature (Section 3.5.4).
- The transmitter has been disabled by the time-out timer feature (Section 3.4.2).
- The transmitter has been disabled by the conversation timer (Section 3.5.7).
- An out-of-range condition exists (SmartNet/SmartZone only).
- A transmission is being attempted before the penalty timer has expired (Section 3.5.6).

- Dynamic regrouping has been exited but the dynamic regrouping channel is still selected (Section 3.6.13).

Single Short Medium-Pitch Tone

- A valid key has been pressed.

Single Short Low-Pitch Tone

- An invalid key has been pressed.

Medium Tone (No Acknowledge)

- The paged mobile did not acknowledge the page (Section 3.6.7).
- The message that was sent has not been acknowledged (Section 3.6.8)
- The status condition that was sent has not been acknowledged (Section 3.6.9).

Five Beeps (Recurring)

- The page was received (Section 3.6.7).

Two Short Tones

- A unit-to-unit call was received (Section 3.6.5).

Five Beeps

- The paged mobile received the page and acknowledged it (Section 3.6.7).
- The message that was sent has been received and acknowledged (Section 3.6.8).
- The status condition that was sent has been received and acknowledged (Section 3.6.9).

Four Beeps

- The emergency alarm condition was acknowledged (Section 3.6.10).

Alternating Tone

- Dynamic regrouping has occurred (Section 3.6.13).
- Dynamic regrouping has occurred but the regrouping channel is not selected (Section 3.6.13).

Busy Signal

- The radio system is busy or a busy condition exists when making a telephone call.

Three Medium Pitch Tones

- A channel is available after a busy condition occurred (SmartNet/SmartZone only).

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