



**LTR<sup>®</sup> 98xx SERIES  
HIGH TIER  
OPERATING MANUAL**





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**LAND MOBILE PRODUCT WARRANTY** - The manufacturer's warranty statement for this product is available from your product supplier or from the E.F. Johnson Company, 299 Johnson Avenue, Box 1249, Waseca, MN 56093-0514. Phone (507) 835-6222.



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The E.F. Johnson Company, which was founded in 1923, designs, manufactures, and markets radio communication products, systems, and services worldwide. E.F. Johnson produces equipment for land mobile radio and mobiletelephone services which include business, industrial, government, public safety, and personal users.

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## **SAFETY INFORMATION**

The FCC has adopted a safety standard for human exposure to RF energy. Proper operation of this radio under normal conditions results in user exposure to RF energy below the Occupational Safety and Health Act and Federal Communication Commission limits.

### ***WARNING***

**DO NOT** allow the antenna to touch or come in very close proximity with the eyes, face, or any exposed body parts while the radio is transmitting.

**DO NOT** operate the transmitter of a mobile radio when a person outside the vehicle is within one (1) meter of the antenna.

**DO NOT** operate the transmitter of a stationary radio (base station or marine radio) when a person is within one (1) meter of the antenna.

**DO NOT** operate the radio in explosive or flammable atmospheres. The transmitted radio energy could trigger blasting caps or cause an explosion.

**DO NOT** operate the radio without the proper antenna installed.

**DO NOT** allow children to operate or play with this radio.

*NOTE: The above warning list is not intended to include all hazards that may be encountered when using this radio.*

This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference. In addition, changes or modifications to this equipment not expressly approved by the E.F. Johnson Company could void the user's authority to operate this equipment (FCC rules, 47CFR Part 15.19).

## FCC EXPOSURE LIMITS

This mobile radio transceiver was tested by the manufacturer with an appropriate antenna in order to verify compliance with Maximum Permissible Exposure (MPE) limits set under Section 2.1091 of the FCC Rules and Regulations. The guidelines used in the evaluation are derived from Table 1 (B) titled “Limits For General Population/Uncontrolled Exposure” which is from FCC report OET bulletin #65.

**Table 1**  
**FCC Limits for Maximum Permissible Exposure (MPE)**

### (A) Limits For Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> , S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6

### (B) Limits For General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> , S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	f/1500	30
1500-100,000	--	--	1.0	30

f = Frequency in MHz

\*Plane-wave equivalent power density

Table 2 lists the antenna whips and bases recommended for use in each frequency range. Each model of this radio was tested with the appropriate antenna listed. The antenna was mounted in the center of the roof

## SAFETY INFORMATION

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of a domestically manufactured 4-door passenger sedan. The radio manufacturer has determined that the user and service personnel should remain one (1) meter in distance away from the antenna when transmitting. By maintaining this distance, these individuals are not exposed to radio frequency energy or magnetic fields in excess of the guidelines set forth in Table 1.

*NOTE: If the installer or user changes the type or location of the antenna, they should be aware of the MPE guidelines shown in Table 1 and take measures to comply with those guidelines.*

**Table 2**  
**Recommended Antenna Whips and Bases**  
**(Antenna Manufacturer - Antenna Specialists)**

<b>Frequency</b>	<b>Whip Model No.</b>	<b>Base Model No.</b>
136-144 MHz	ASPJ1415	KM220
144-152 MHz	ASPA1415	KM220
152-162 MHz	ASPB1415	KM220
162-174 MHz	ASPC1415	KM220
400-430 MHz	ASPE1615	KM220
430-470 MHz	ASPD1615	KM220
470--512 MHz	ASPF1615	KM220
806-869 MHz	ASPA1855	KM220
890-960 MHz	ASPG1865	KM220

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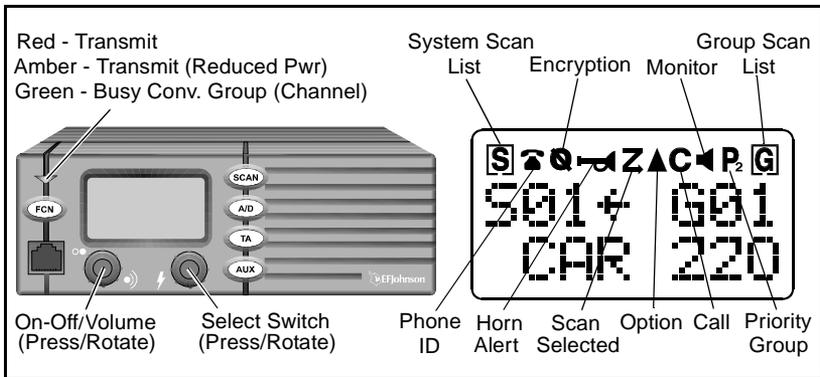
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# QUICK REFERENCE GUIDE



**Power On/Off** - Press on-off/volume control.

**Set Volume Level** - Rotate on-off/volume control.

**Change System or Group** - Press Select switch to enable system or group select mode (indicated by  $\leftarrow/\rightarrow$  or  $\underline{\quad}$ ). Then rotate Select switch to select desired system or group (see page 17).

**Select Menu Mode** - Press FCN twice then rotate/press Select switch as required to display/select desired parameter (see page 30).

**Select Home System/Group** - Press FCN then the Select switch.

**Scan On/Off** - Press SCAN switch. Scan on = **Z**, Scanning occurring = scrolling underline (see page 33).

**Program System or Group Scan List** - Press Select switch to enable system or group programming mode (same as when changing system or group), then press A/D switch. System in list = **S**, Group in list = **G** (see page 35).

**Set Squelch Level (Conv. Only)** - Press FCN, then rotate Select switch with conventional system selected (see page 18).

**Monitor Before Transmitting (Conv. Only)** - Take microphone off-hook to enable monitor mode (indicated by  $\blacktriangleleft$ ). Channel is busy if indicator is green or someone is talking (see page 39).

# FEATURES

### General Features

- Up to approximately 100 1-group or 40 16-group systems programmable
- LTR® and conventional operation
- Unique 8-character system and group identification tags
- System and group scan
- User programmable system and group scan lists
- Menu mode to control various functions
- Five programmable option switches
- Up to 16 banks selectable
- Proceed (clear-to-talk) tone
- Call indicator
- Time-out timer
- Horn alert
- Emergency switch
- Receive-only groups
- Companding and encryption (optional)

### LTR Features

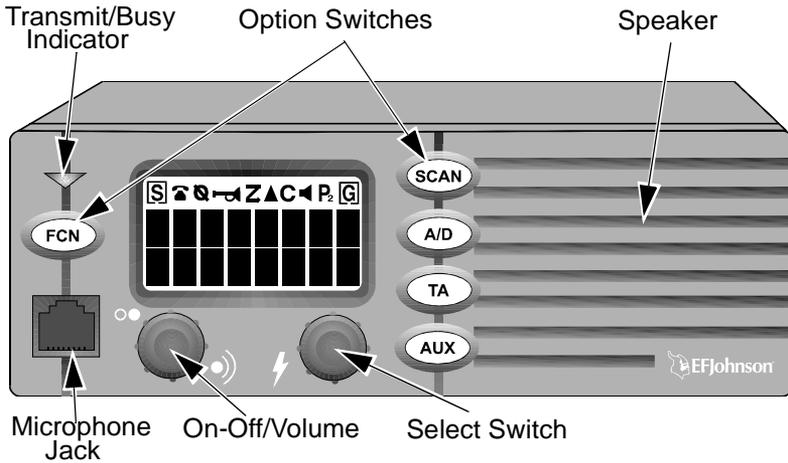
- Busy queuing (telephone calls only)
- System search (telephone calls only)
- Transpond
- Transmit inhibit
- Receive priority calls

### Conventional Features

- Busy indicator
- Talk-around
- User-adjustable squelch level
- Call Guard® squelch control
- First and second priority channel sampling
- Monitor mode and Transmit disable on busy

*NOTE: Dealer programming determines the availability of many of the preceding features.*

# CONTROLS AND DISPLAY



## Front Panel Controls

**On-Off Volume** - Pressing this knob turns power on and off. The vehicle ignition switch may also control power as described in “Power Turn-Off Delay” on page 27. Rotating this knob sets the speaker volume (see page 15).

**Select Switch** - This switch changes the selected system or group and is also used for other functions such as selecting parameters in the menu mode. To change the system or group, press this knob to switch between the system and group select modes, and then rotate it to increase or decrease the system or group. Refer to “Selecting the System and Group” on page 17 for more information.

This switch also has two alternate functions that are selected by first pressing the FCN switch. Refer to the FCN switch description which follows for more information.

**Option Switches** - The five front panel option switches can be programmed by your system operator for the functions which follow. Refer to the section indicated for more information on a function. The key cap usually indicates the function controlled by the switch.

- A/D** - Scan list add/delete (see page 35)
- CG** - Call Guard squelch disable (see page 46)
- EMER** - Emergency switch (see page 24)
- ENCPT** - Encryption on-off (see page 24)
- FCN** - Function select (see following description)
- HORN** - Horn alert on-off (see page 26)
- MON** - Monitor mode on-off (see page 39)
- AUX** - Option select (see page 27)
- PRI** - Priority sampling on-off (see page 46)
- SCAN** - Scan on-off (see page 33)
- STLH (AUX)** - Stealth mode select (see page 29)
- TA** - Talk-around on-off (see page 45)
- (Blank)** - Not used (disabled)

**FCN (Function) Switch** - This switch (if programmed) selects the following functions:

- Menu Mode Select - Press FCN twice (see page 30)
- Home Sys/Grp Select - FCN/press Select switch (see page 26)
- Conv Squelch Set - FCN/rotate Select switch (see page 18)

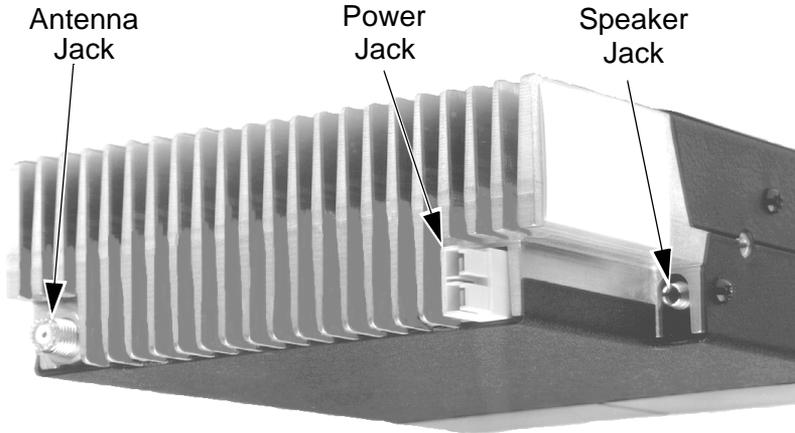
**Transmit/Busy Indicator** - Indicates the following conditions:

- Red - Transmitter keyed, normal power output
- Orange - Transmitter keyed, power reduced because internal temperature is high
- Green - Busy conventional group (channel). Refer to “Conventional Operation” on page 38 for more information.

**Microphone Jack** - Connection point for the microphone.

**Microphone Push-To-Talk (PTT) Switch (Not Shown)** - Push-button on the microphone which is pressed to key the transmitter.

**Speaker** - The internal speaker is located behind the grille. An optional speaker can be connected to the external speaker jack located on the back. See “Speaker Jack” description which follows.



### Rear Panel Jacks and Connectors

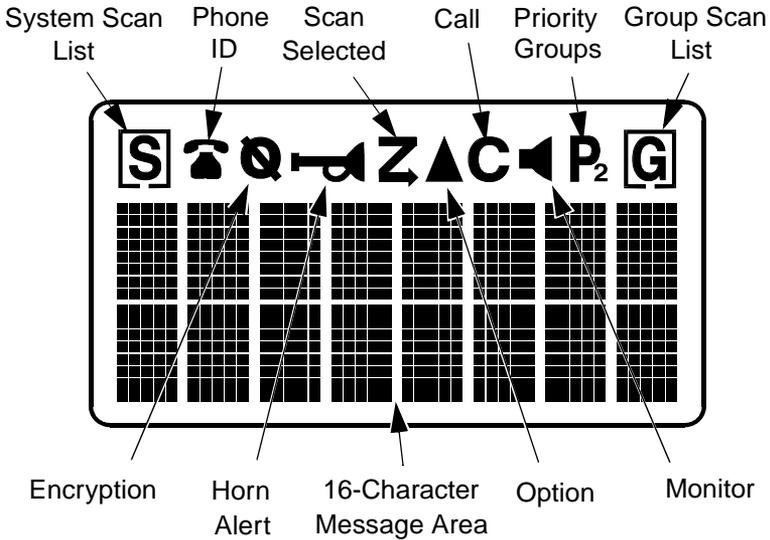
**Antenna Jack** - Miniature UHF jack for connecting the 50-ohm antenna.

**Power Jack** - Connection point for the power cable which attaches to the vehicle battery. A nominal 12-volt DC, negative ground power source is required.

**Speaker Jack** - Connection point for an optional external 4.7-ohm, 5-watt speaker. The internal speaker is automatically disabled when a speaker is plugged into this jack.

**Accessory Cable (Not Shown)** - This optional cable is used to connect functions such as ignition switch sense and horn alert to the transceiver.

**Data Cable (Not Shown)** - This optional cable is used to connect data equipment such as modems and data terminals to the transceiver.



### Display Description

**16-Character Message Area** - Indicates the selected system and group (see page 16) and also error conditions and status information.

**S** - Indicates that the displayed system is in the scan list and scanned normally (see page 35).

**G** - Indicates that the displayed group is in the scan list and scanned normally (see page 35).

 - Indicates that the selected group is programmed for telephone calls (see “TELEPHONE CALLS” on page 21).

**Q** - Indicates that optional encryption is enabled (see page 24).

 - Indicates that the horn alert is enabled (see page 26).

**Z** - Indicates that scanning is enabled (see page 33).

 - Indicates that an option controlled by the AUX switch is enabled (see page 24).

**C** - Indicates that a call has been received on a group programmed for a call indicator (see page 24). To turn this indication off, press any key.

 - Indicates that the monitor mode is enabled. This mode disables Call Guard squelch and other squelch control features so that all messages are heard on conventional systems (see page 44).

**P<sub>2</sub>** - When only **P** is displayed, the selected or displayed group is scanned as a first priority group. When **P<sub>2</sub>** is displayed, it is scanned as a second priority group (see page 46).

## GENERAL OPERATION

### Power-Up Sequence

When power is turned on, the backlight turns on, all segments in the display are momentarily enabled, and the last seven digits of the transceiver part number are very briefly displayed. A beep then sounds (if tones are enabled) and the transceiver is ready to be used.

### Determining Volume Level

The relative volume setting can be determined by noting the position of the index on the volume knob. You may also be able to enable a reference tone or background noise for use in setting the volume. Proceed as follows:

- If key press tones are enabled, a short tone sounds when an option switch is pressed or the Select switch is pressed or rotated.
- If a conventional system is selected, take the microphone off-hook and if someone is using the channel, voice is heard. If no one is using the channel, the squelch control can be adjusted counterclockwise as described in “Setting Squelch Control” on page 18 and noise is heard. It is not possible to unsquelch the transceiver in this manner when an LTR system is selected.

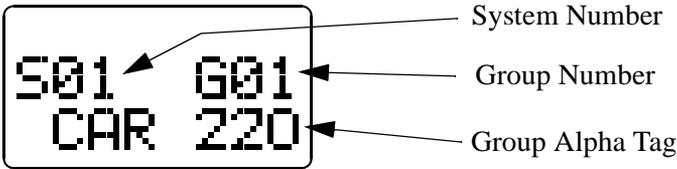
## **Backlight Operation**

The display and keypad backlight can be controlled by the BACK-LIGHT menu parameter (see page 38). The three states that can be selected are Bright, Dim, and Off. If this menu parameter is not selectable, the backlight is fixed in one of these states by programming.

## **System/Group Display Information**

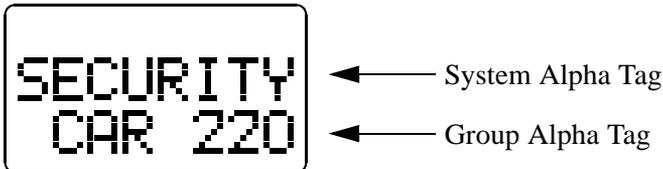
The currently selected system and group are displayed using either a Numeric or Alpha Tag display mode. The display mode is selectable if the S/G DISPL menu parameter is available (see page 32). Otherwise, it is fixed in one of these modes by programming. These modes function as follows:

Numeric Mode - In the numeric mode, the selected system and group numbers are displayed on the top line as Sxx and Gxx, and the group alpha tag is displayed on the bottom line. For example, System 1, Group 2 (CAR 220) is displayed as follows. The system alpha tag is not displayed in this mode.



**Numeric Display Mode**

Alpha Tag Mode - In the alpha tag mode, the system alpha tag is displayed on the top line and the group alpha tag is displayed on the bottom line. For example, a “SECURITY” system and “CAR 220” group are displayed as follows. The system and group numbers are not displayed in this mode.



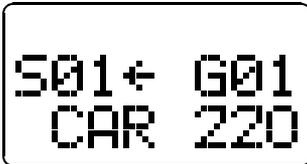
**Alpha Tag Display Mode**

## Selecting the System and Group

The front panel Select switch is used to change the system and group. Pressing this switch toggles between the system and group select modes, and then rotating it increases or decreases the system or group.

In the Numeric display mode (see preceding description), the system select mode is indicated when the arrow points to “Sxx”, and the group select mode is indicated when it points to “Gxx” (see following diagram).

System Select  
Mode



Group Select  
Mode



Select Mode Indication With Numeric Display

In the Alpha Tag display mode, the system select mode is indicated by an underline in the left-most character position of the system alpha tag. Likewise, the group select mode is indicated by an underline in the left-most position of the group alpha tag (see following diagram).

System Select  
Mode



Group Select  
Mode



Select Mode Indication With Alpha Tag Display

The transceiver can be programmed so that after a change is made, the current select mode remains enabled or a default mode is selected after a delay of up to 15 seconds. This programming also controls the mode that is selected when power is turned on.

### Setting Squelch Control

*NOTE: This procedure sets the squelch level used for conventional calls only. The squelch level for LTR calls is preset and not affected by this adjustment. For more information on the various operating modes, refer to page 38.*

If conventional systems are programmed, the squelch level can be set if the FCN option switch is enabled. Proceed as follows:

1. Select a conventional system and then a group that is not busy. Take the microphone off-hook to enable monitoring.
2. Press the FCN switch and then rotate the Select switch as you would a normal squelch control. Rotate it counterclockwise until receiver noise is heard and then clockwise slightly past the point where the noise mutes. The squelch adjust mode is indicated by “SQUELCH” on the upper line of the display, and the relative squelch level is indicated by a bar graph on the bottom line.
3. To select the current level and exit this mode, press the Select switch. This also occurs automatically 2 seconds after no change is made or 8 seconds after no activity.
4. If both narrow and wide band channels are used, perform this adjustment on both types because separate settings are maintained.

*NOTE: Some readjustment may be required if weak messages are not heard or unsquelching occurs when no messages are present.*

# STANDARD CALLS

## Introduction

Most calls you make are probably the standard type described in this section. These calls are between you and another mobile or control station. The main difference between these calls and the other type that can be placed (telephone calls) is that no number is dialed using a keypad. The following procedure applies to both LTR and conventional operation.

## Placing a Standard Call

1. Turn transceiver power on and set the volume as described starting on page 15. With conventional operation, also set the squelch as described on page 18.
2. Select the system and group of the mobile being called as described in “Selecting the System and Group” on page 17.
3. If a conventional call is being placed, monitor the channel manually or automatically as described on page 39.
4. Press (and hold) the microphone PTT (push-to-talk) switch to talk and release it to listen. Operation with LTR and conventional systems is as follows:

### LTR Operation

- If the proceed tone is enabled (see page 28), it sounds shortly after the PTT switch is pressed to indicate that the radio system was successfully accessed. If the proceed tone is not enabled, no tone sounds when the system is successfully accessed. The proceed and other tones can be disabled as described in “Tone Select” on page 30.
- If the radio system is busy, the busy tone sounds (see page 47) and “BUSY” is indicated on the lower line of the display. If you continue pressing the PTT switch, the system is accessed when it becomes available.

- If an out-of-range condition exists, the intercept tone sounds (see page 47) and “OUT-RNGE” is indicated on the lower line of the display. No more access attempts are made once this indication appears. Release the PTT switch and drive closer to the radio system or away from shielding structures and try again.

### **Conventional Operation**

- If the channel is busy and the Transmit Disable On Busy feature is programmed, “DSBL BSY” is indicated on the lower line of the display, the busy tone sounds, and the transmitter is disabled (see page 44).
  - Otherwise, busy and out-of-range conditions are not indicated and speaking can begin when the PTT switch is pressed after monitoring the channel. If the proceed tone is enabled on conventional systems, it indicates when speaking can begin but does not indicate that the radio system has been successfully accessed.
5. When the call is complete, place the microphone back on-hook.

### **Receiving a Standard Call**

1. Turn transceiver power on and set the volume as described starting on page 15. With conventional operation, also set the squelch as described on page 18.
2. Select or scan the system and group programmed for the call you want to receive (see page 33 for scan information).
3. When the message is received, the display usually changes to the system and group of the call. Take the microphone off-hook and press the PTT switch to talk and release it to listen. If scanning, a response may not automatically occur on the group of the call (see page 36).

# TELEPHONE CALLS

## Placing Telephone Calls

*NOTE: Telephone calls can be placed and received only if that service is available to you and your transceiver has been programmed appropriately. A microphone equipped with a telephone keypad is required to dial the telephone number.*

The telephone calling feature allows you to place and receive telephone calls using your transceiver. The following information describes how these calls are made with LTR operation. If you can make telephone calls with conventional operation, the procedure may be somewhat different and your system operator will then provide additional information. Proceed as follows:

1. Turn transceiver power on and set the volume as described starting on page 15.
2. Select the system and group programmed for telephone calls. When a telephone group is selected,  is displayed.
3. To obtain the dial tone, briefly press the PTT switch. If the proceed tone is used, press the PTT switch until a beep sounds. If a dial tone is then heard, proceed to step 4.

## Busy and Out-Of-Range Conditions

Busy and out-of-range conditions are indicated the same as with LTR standard calls described on page 19. The following additional features may be available with telephone calls:

**Busy** - If Busy Queuing is programmed (see page 42), the call is automatically placed in a queue when the PTT switch is released. The Busy Queuing mode is indicated by “IN QUEUE” in the display.

**Out-of-Range** - If the System Search feature is selected (see page 42), that feature is automatically selected when the PTT switch is released. The System Search mode is indicated by “SYS SRCH” in the display.

4. With the dial tone sounding, dial the number using the 0-9 keys on the microphone keypad. If the microphone has a memory, you may also be able to recall the number from memory. The PTT switch does not need to be pressed while you are dialing if the transmitter automatically keys. If too much time elapses between digits, the call is terminated.
5. After the number is dialed, release the PTT switch (if it was pressed). Landside ringing (or a landside busy condition) should then be heard.
6. When the other party answers, press the PTT switch and respond. The PTT switch must be pressed to talk and released to listen (the same as with mobile-to-mobile calls).
7. When the call is finished, it should be terminated. This is usually done by pressing the # key, and termination is indicated by three beeps. Terminating the call in this manner prevents extra billing that may occur while the system automatically detects the end of the call.

### Receiving a Telephone Call

1. Turn transceiver power on and set the volume as described starting on page 15.
2. Select or scan the system and group programmed for telephone calls. When a telephone group is selected,  is displayed.
3. When “ringing” is heard, press the PTT switch and respond. The PTT switch must be pressed to talk and released to listen the same as with standard calls.
4. When the call is finished, it should be terminated as in step 7 of the preceding section.

### Landside-Originate Calls

Calls can be placed from a landside telephone to your transceiver if the radio system and transceiver have that capability. With most systems, a mobile can be called directly (each has a unique telephone number). With others, a mobile may be called as follows:

1. Dial the number of the radio system in which the mobile is operating.
2. When the system answers, a short tone sounds to indicate that the number of the mobile should be dialed. This number is usually five digits long and is supplied by your system operator. The first two digits are the home repeater number and the other digits are the group ID of the mobile being called. This number must be dialed using a tone-type telephone. If too much time elapses before dialing is started or between dialed digits, the call is terminated.
3. Ringing is then heard by the landside caller while the mobile is being rung.

## GENERAL FEATURES

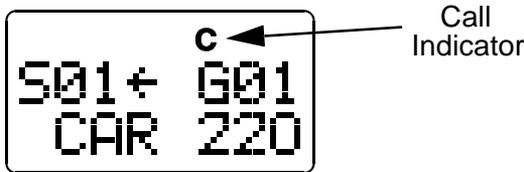
### Bank Select

A bank is a collection of selectable systems that have been set up for a specific application. For example, one bank could be programmed for operation in Minneapolis and another for operation in Milwaukee. Each bank is identified by a unique alpha tag, and up to sixteen banks can be programmed.

Banks are selected by the BANK SEL menu parameter (see page 32). Rotate the Select switch to display “BANK SEL” on the top line and the current bank is then displayed on the bottom line. Press the Select switch to change the bank. If this menu parameter is not available, banks are not selectable.

### Call Indicator

The call indicator is “C” in the upper part of the display as shown in the following illustration. The purpose of this indication is to show that a call was received while you were away from the vehicle. Individual groups can be programmed for this feature and it then turns on when a call is received on one of those groups.



This indicator is turned off by pressing any button or turning transceiver power off and then on. If scanning and the “last received” configuration is programmed (see “Transmitting In The Scan Mode” on page 36), the system and group of the last call are displayed. Otherwise, the currently selected system/group is displayed.

### Emergency Switch

If the EMER option switch is programmed (see page 30), it is used to set up a high priority call. When this switch is pressed, “EMERGENCY” is displayed on the lower line (unless this message has been disabled by programming) and a preprogrammed emergency system/group is selected. However, no call is automatically placed. This access mode minimizes, as much as possible, the chance that the system will be busy when the call is placed by pressing the PTT switch. If you have an EMER switch, consult your system operator for more information on how to use it.

### Encryption

Voice encryption is an optional feature that prevents conversations from being monitored by casual eavesdropping and analog scanners. It does this by encrypting your voice so that it can be understood only by someone using a transceiver equipped with similar encryption device.

Each group can be programmed so that when it is selected, encryption is automatically enabled. When encryption is enabled, **Q** is indicated in the display as shown below.



If you have the ENCRYPT menu parameter or ENCPT option switch, the encryption group programming can be temporarily overridden. Selecting another system or group causes encryption to revert to the status programmed for that group.

Encrypted calls are received even if encryption is not enabled. However, encryption must be enabled to transmit an encrypted call. When transmitting an encrypted call, wait approximately 1 second before speaking. This gives the receiving encryption device time to establish synchronization which ensures that all of the first word is received. If the proceed tone is used (see page 28), speaking can begin as soon as it sounds because it is delayed for the required time.

## Function (FCN) Switch

If an option switch is programmed for FCN (function), it performs the following functions. If this switch is not programmed, these functions are not available. When the function select mode is active, “FCN” is displayed on the lower line of the display. The function mode is automatically exited after 8 seconds of no activity.

Menu Mode Select - Pressing FCN twice selects the menu mode as described on page 32.

Home System/Group Select - Pressing FCN and then the Select switch selects the home system/group as described in the next section.

Squelch Adjust - Pressing FCN and then rotating the Select switch with a conventional system selected sets the squelch level as described on page 18.

### Home System/Group Select

To select the preprogrammed Home system/group, simply press the FCN switch and then the Select switch. The Home system/group is then displayed and it becomes the selected system/group. If no home group has been programmed, the last selected group of the home system is selected. If you do not have a FCN switch, or if no Home system is programmed, this feature is not available.

### Horn Alert

If this feature has been installed by your system operator, it activates an external alert such as the vehicle horn or lights when a call is received on a group programmed for horn alert. When the horn alert is enabled,  is displayed as shown in the following illustration.



When enabled, the horn alert pulses on and off for 1-8 cycles and then goes back to the disabled state. To change the currently selected horn alert mode, the HORN option switch or HRN ALRT menu parameter can be used if available (see page 30).

The horn alert is programmed to operate in the manual or automatic mode (see descriptions which follow). If the ignition switch does not control transceiver power, only the front panel power switch affects operation when applicable. Refer to “Power Turn-Off Delay” on page 27 for more information.

### Manual Off/On Mode

The horn alert mode does not change when power is turned on and off by either the ignition switch or power switch. Therefore, the horn alert is entirely controlled by either the HORN option switch or menu parameter.

### Auto Off/On Mode

Ignition Switch - The horn alert always turns off when the ignition switch is turned on, and always turns on when the ignition switch is turned off (if there is a turn-off delay).

Power Switch - The horn alert always reverts to the off condition when power is turned on by the power switch.

*NOTE: The preceding automatic operation overrides any mode that may have been selected by the HORN option switch or HRN ALRT menu parameter.*

## **Option Select**

The AUX option switch or OPTION menu parameter can be used to control an accessory that may have been installed by your system operator. If the switch is used, the enabled condition is indicated by ▲ in the display.

## **Power Turn-Off Delay**

Your transceiver may have been installed so that the vehicle ignition switch as well as the front-panel power switch control transceiver power. If this is the case, both the ignition switch and the front panel power switch must be on for transceiver power to turn on.

When the ignition switch controls power, turn-off delays of Immediate, 10, 20, 30, 40, or 50 minutes, 1, 2, 4, 8, 10, 12, or 16 hours or Forever can be programmed. The delay can be overridden at any time by turning power off using the front-panel power switch or turning the ignition switch back on.

A power turn-off delay allows features such as the horn alert and call indicator to remain active for a time after the ignition switch is turned off. At the same time, advantages of ignition switch control are utilized such as preventing battery discharge that may occur if the transceiver is accidentally left on for an extended period (see page 54).

### **Proceed (Clear-To-Talk) Tone**

This is a short tone that sounds shortly after the PTT switch is pressed to indicate that the radio system has been accessed and speaking can begin. This tone can be programmed so that it sounds on LTR systems but not conventional systems. In addition, this and other tones can be disabled on all systems by the TONES menu parameter (see “Tone Select” on page 30) or system operator programming. Either a standard or loud (two-pitch) tone can be programmed.

On LTR systems, if the radio system is busy when making a call, the busy tone sounds instead of the proceed tone and “BUSY” is indicated on the bottom line of the display. If the PTT switch is held down, the system is accessed and the proceed tone sounds when it is no longer busy. If an out-of-range condition occurs, the intercept tone sounds and “OUT-RNGE” is indicated in the display. The PTT switch must be released to make another call attempt. Refer to page 47 for more information on the busy and intercept tones.

On conventional systems, the Transmit Disable On Busy feature can be used to automatically perform monitoring (see page 44). The proceed tone then does not sound if the channel is busy. Otherwise, the proceed tone (if enabled) sounds on conventional systems even if the channel is busy.

With all operating modes, if encryption is used, a 0.9-second delay occurs before this tone sounds and two beeps are heard instead of one. A short delay may also occur with conventional calls. These delays ensure that the radio path is complete before you begin talking so that part of your first word is not lost.

## Receive-Only Groups

Any group can be programmed for monitoring only (transmitting is disabled). If the PTT switch is pressed with one of these groups selected, the intercept tone sounds and “TX DSBL” is displayed.

## Stealth Mode

The stealth mode disables the following tones and indicators so that they do not reveal that you are transmitting or otherwise indicate your presence. The speaker audio and display remain enabled in this mode.

- All tones (see “Tone Select” on page 30)
- The front panel transmit/busy indicator (see page 16)
- Display backlight

The stealth mode can be selected by an option switch or the STEALTH menu parameter (see page 32), or is fixed in the on or off mode by programming. There is no special indication that this mode is selected except “On” is displayed under “STEALTH” in the menu mode.

## Time-Out Timer

The time-out timer disables the transmitter if it is keyed continuously for longer than the programmed time. It can be programmed for 0.5 - 5.0 minutes or disabled entirely. If the transmitter is keyed continuously for longer than the programmed time, the transmitter is disabled, “TIMEOUT” is indicated on the lower line of the display, and the intercept tone sounds. The timer and tone are reset by releasing the PTT switch. Ten seconds before time-out occurs, a beep sounds to indicate that time-out is approaching. There is also a timer that can be programmed to prevent transmitting for up to one minute after time-out occurs.

One use of the time-out timer feature is to prevent a repeater from being kept busy for an extended period by an accidentally keyed transmitter. It can also prevent possible damage to the transmitter caused by transmitting for an excessively long period.

### Tone Select

If the TONES menu parameter is selectable, the tones that sound can be selected. Otherwise, the tones that sound are fixed by programming. The following choices are available. Refer to page 32 for more information on using the menu mode.

**Silent** - All tones are disabled.

**Key Beep** - Only the Select switch and key press tones are enabled.

**Alert** - All tones except the preceding Key Beep tones are enabled.

**All Tones** - Both the Key Beep and Alert tones are enabled.

### Transmitter Thermal Foldback

If the transmitter temperature increases to the point where damage to the transceiver could result, power is automatically cut back. When this happens, the transmit indicator on the front panel is orange instead of red when the transmitter is keyed. After sufficient cooling occurs, power output returns to the normal level and the indicator changes back to red. One time when this indication could occur is if you transmit for an extended period.

# OPTION SWITCHES AND MENU MODE

## Option Switches

All five option switches on the front panel are programmable by your system operator. The available option switch and menu mode functions are shown in the table on page 31. Those which can be assigned to an option switch are indicated by an entry in the “Option Switch” column. Refer to the page listed in this table for a description of the function. If a function is controlled by an option switch, it cannot be controlled by the menu mode and vice versa. Some switches may not be used.

### Menu Mode and Option Switch Functions

Function	Menu Items	Option Switch	See Descrip. on Page
Add/delete (scan list prg)	---	A/D	35
Backlight adjust	BACKLGHT	---	16
Bank select	BANK SEL	---	23
Call Guard Sq. disable	---	CG	46
Emergency	---	EMER	24
Encryption on-off	ENCRYPT	ENCPT	24
Function select	---	FCN	25
Home sys/grp select	---	FCN then press Sel Sw	26
Horn Alert on-off	HRN ALRT	HORN	26
LTR system search	SYS SRCH	---	42
Menu mode select	---	FCN (twice)	32
Monitor mode select	---	MON	44
Option select	OPTION	AUX	27
Priority sampling on-off	PRIORITY	PRI	46
Scan on-off	---	SCAN	33
Scan type select	SCN TYPE	---	33
Scan continue on-off	SCN CONT	---	36
Scan list save mode	SCN SAVE	---	35
Stealth mode select	STEALTH	STLH	29
Squelch adjust	---	FCN then rotate Sel Sw	18
System/group display mode	S/G DISPL	---	16
Talk-around on-off	TALKARND	TA	45
Tone type select	TONES	---	30
<i>NOTE: Parameters left blank are not available.</i>			

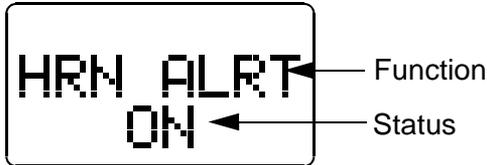
### Menu Mode Introduction

The menu mode is selected by pressing the FCN switch twice. If this switch is not programmed, the menu mode is not available. Functions which can be controlled by the menu mode are indicated by an entry in the “Menu Items” column of the table on page 31. Refer to the page listed in the table for a description of the function. Some functions may not be used, may be in a fixed state, or may be controlled by an option switch. The menu parameter that controls that function is then not displayed.

### Using Menu Mode

To use the menu mode, proceed as follows:

1. To select the menu mode, press the FCN switch twice. The menu display follows. The top line indicates the function being edited, and the bottom line indicates the current status of that function.



2. To display the various functions that are controllable by the menu mode (top line indication), rotate the Select switch. The currently selected status of that function is displayed on the bottom line.
3. To change the selected status, press the Select switch. The selections displayed for each menu function are shown on page 52.
4. To display another menu function, rotate the Select switch. Then change the status if desired as described in the preceding step.
5. The selected status conditions for the various functions are saved when the menu mode is exited in one of the following ways:

- Pressing the FCN switch again
- Pressing the PTT switch
- Automatically when time-out occurs 2 seconds after a change is made or 8 seconds after no changes are made.

*NOTE: Calls cannot be received or transmitted while the menu mode is selected.*

## SYSTEM AND GROUP SCAN

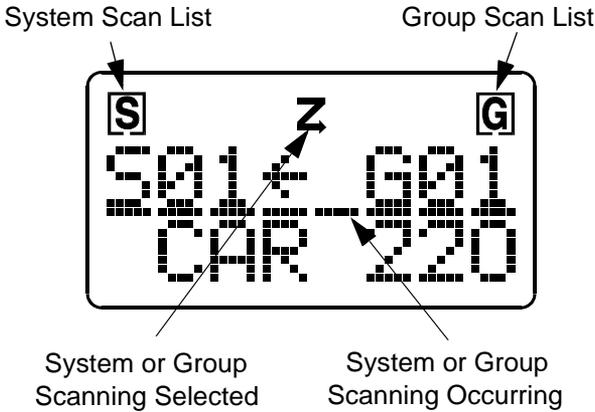
### Introduction

The scan feature monitors, in sequence, the programmed systems and/or groups in the scan list. When a message is detected that the transceiver is programmed to receive, scanning stops and the message is received. Shortly after the message is complete, scanning resumes (unless it has been disabled).

System Scanning - System scanning detects calls on all systems that are in the system scan list. When system scanning is not used, calls are detected on only the currently selected system.

Group Scanning - Group scanning detects calls on all selectable groups in the current or scanned systems that are in the group scan list. When group scanning is not used, calls are detected on only the currently selected group or if system scanning, on the last selected group of each system.

System and/or group scanning are turned on and off by the SCAN option switch. When system and/or group scanning is enabled by this switch, **Z** is indicated in the display (see following illustration). Then when system or group scanning is actually occurring, a scrolling underline is displayed under each character in the upper line of the display. The microphone must be on-hook for scanning to occur (unless off-hook detection has been disabled by programming).



The type of scanning selected is determined by the menu mode SCN TYPE parameter (see page 32). If that parameter is not selectable, the type of scanning is fixed by programming. The available scan types are as follows.

**SYS-GRP** - Both system and group

**GRP ONLY** - Group scanning only

**OFF** - Both types disabled (SCAN switch non-functional)

If the SCAN option switch is not programmed, the selected mode is always enabled. If the switch is enabled but the menu SCN TYPE parameter is not selectable, the scan type is fixed by programming.

Group scanning can be selectively disabled on systems by programming. It then does not occur on those systems even if enabled as just described. The selected system and group can be changed while scanning using the Select switch in the normal manner. Scanning resumes shortly after the change is made.

When a call is received in the scan mode, the display changes to the system and group of the call. Programming determines if this change is temporary (until scanning resumes) or permanent, and if a response occurs on the system/group of the call or the selected system/group. Refer to "Transmitting In The Scan Mode" on page 36 for more information.

## Scan List Programming

### General

*NOTE: The selected (displayed) system and group are always scanned, even if they are deleted from the scan list.*

The system and group scan lists are programmed using the A/D (add/delete) option switch. Pressing this switch changes the status of the displayed system or group. The displayed system is in the scan list and scanned normally when **S** is displayed. Likewise, the displayed group is in the scan list and scanned normally when **G** is displayed (see preceding illustration).

The system/group select mode described on page 17 also controls if the system or group scan list is changed when the A/D switch is pressed. For example, to change the scan list status of the displayed system, press the Select switch if necessary so that the system select mode is indicated and then press the A/D switch.

Deleting a system only temporarily deletes the groups associated with that system. When a system is added back into the scan list, the original group scan list is again active. Systems and groups can be deleted from the scan list while listening to a message on the system or group by pressing the A/D switch in the normal manner. Scanning resumes shortly after the system or group is deleted.

Scan list programming is not available if the A/D switch is disabled. In addition, the group scan list is not programmable if the group scanning is disabled on the current system. If an attempt is made to program the group scan list on one of these systems, a beep sounds, "GSCN DIS" is flashed in the display, and no change occurs in the scan list.

### Saving Scan List

If the menu mode SCN SAVE parameter is available, you can select if scan list changes are saved. If "On" is selected, changes are saved as they are made and the scan list is the same when power is turned on. If

“Off” is selected, they are no longer saved. Therefore, to store a list, select “On”, program the list, then select “Off”. Then when power is turned on, the scan list returns to the state that existed when “Off” was selected.

If the menu SCN SAVE parameter is not selectable, the scan list save mode is fixed by programming. If “On” is programmed, all changes are saved and no change occurs in the scan lists when power is cycled. If “Off” is programmed, they are not saved and the scan list reverts to the default status when power is cycled.

### **Scan Delay and Continue Timers**

When a message is received or transmitted while scanning, there is a short delay before scanning resumes. The delay after receiving a call prevents another message from being received before a response can be made. Likewise, the delay after transmitting a call ensures that you hear a response to your call instead of another message occurring on some other system or group. Note that scanning does not resume if it has been disabled, such as by taking the microphone off-hook.

There is also a scan continue timer that may be programmed. This timer controls the maximum time that a call is received before scanning resumes. Times up to 60 seconds can be programmed. This prevents scanning from being delayed for long periods by lengthy calls. If the menu SCN CONT parameter is selectable (see page 32), this feature can be turned on and off.

### **Transmitting In The Scan Mode**

#### General

When a message is received in the scan mode, programming determines if the selected system/group does not change or changes permanently or temporarily to that of the call. This then affects the system/group on which a response to the message occurs and also the system/group that is selected when the scan mode is exited by pressing the SCAN switch. The three programmable configurations are as follows:

**Last Selected** - The selected system/group does not change when calls are received on other system/groups. Therefore, to respond to a message not on the selected system/group, one of the following methods must be used. With this configuration, the display may not indicate the system/group on which the response occurs.

- Select the system/group of the call manually using the Select switch.
- Before scanning resumes, exit the scan mode by pressing the SCAN switch. The system/group of the call then becomes the selected system/group and it is not necessary to change it manually.

**Last Received** - The selected system/group changes to the system/group of a call. Therefore, you can always respond to a call without having to manually change the system/group. To return to the previously selected system/group, manually select it using the Select switch.

**Temporary Last Received** - The system/group changes to the system/group of a call for only the duration of the scan delay period (see page 36.) Then when the delay expires and scanning resumes (if it is not disabled), the selected system/group is again displayed. Therefore, you can respond to a call without changing the selected system/group as long as you do so before scanning resumes.

### Fixed System/Group Transmit in Scan

Each bank can be programmed so that transmissions made in the scan mode while scanning is occurring are on a preprogrammed system/group. Note that scanning must be occurring (scrolling underline displayed) when the transmitter is keyed. Since taking the microphone off-hook normally disables scanning (unless off-hook detection is disabled), the transmitter usually must be keyed with the microphone on-hook.

If a transmission occurs under these conditions, the selected system/group also changes. If the transmitter is keyed with scanning halted, the programming described in the preceding section takes precedence.

# LTR AND CONVENTIONAL MODES

## General

Each selectable system can be programmed for LTR or conventional operation by your system operator. The type or types of operation that are programmed in your transceiver are determined by the type of radio equipment being used in your radio system. The differences in operation are described in the following information and elsewhere in this manual as required.

## LTR Operation

The LTR mode provides automatic channel selection (trunking) and monitoring before transmitting. In addition, special tones and display messages indicate busy and out-of-range conditions. Selecting a system selects a collection of groups and other information such as fixed priority receive ID codes. Selecting a group selects a transmit and receive ID code and other information which controls the mobile or mobiles being called and what calls are received. LTR features are described starting on page 40.

## Conventional Operation

In the conventional mode, selecting a system selects a collection of channels and other information unique to those channels. Selecting a group selects the specific channel and also squelch coding (if any) used on that channel. Conventional features are described starting on page 44.

There are no tones or messages to indicate busy or out-of-range conditions in this mode. A busy channel (group) is detected manually or automatically as described in the following information. An out-of-range condition cannot be detected automatically but may exist if you cannot get a response to any of your messages. Refer to “Operation At Extended Range” on page 54 for more information.

To properly receive calls in the conventional mode, the squelch control must be set as described in page 18. If this control is not set properly, weak messages could be missed or noise could be heard when no message is present. In the LTR mode, the squelch level is fixed and setting this control has no affect.

### Monitoring Conventional Channels Before Transmitting

Regulations require that the channel be monitored before transmitting to make sure that it is not being used by someone else. If you were to transmit when someone else is talking, you would probably disrupt their conversation. As previously stated, monitoring is performed automatically in the LTR mode. In the conventional mode, it must be performed automatically or manually as follows.

#### Automatic Channel Monitoring

If the selected group is programmed for the Transmit Disable On Busy feature, monitoring is performed automatically. Refer to page 44 for more information on this feature.

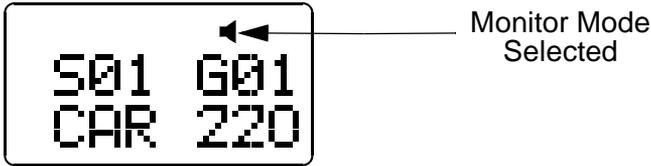
#### Manual Channel Monitoring

If the Transmit Disable On Busy feature is not used, monitoring must be performed manually as follows:

**Busy Indicator** - With scanning disabled and the squelch control adjusted as described on page 18, note if the indicator on the front panel is green. If it is, a signal has been detected on the selected system (channel) and you should not transmit a message until it turns off.

**Monitor Mode** - There may be times when the busy indication is on even though no one is using the channel. Monitoring should then be performed using the monitor mode. This mode is enabled by taking the microphone off-hook (unless off-hook detection has been disabled by programming). The monitor mode temporarily disables Call Guard squelch (see description on page 46) and scanning so that all messages on the channel are heard. The monitor mode is indicated by  in the display as shown in the

following illustration. The monitor mode can also be enabled by the MON or CG option switch if it is programmed. Refer to the monitor mode description on page 44 for more information.



## LTR FEATURES

### Standard and Telephone Calls

Standard calls are between two mobiles or between a mobile and a control station. Telephone calls allow you to place and receive calls over the public telephone system using your transceiver. Standard calls are described starting on page 19, and telephone calls are described starting on page 21.

### Calls on Priority and Block ID Codes

Two fixed priority and a block of receive ID codes can be programmed. These codes are in addition to the receive and transmit ID code selected by the group select function. Calls on the fixed priority and block ID codes are received regardless of which group is selected or group scanning. All that is required is that the system programmed with those codes be selected or scanned.

Calls on the fixed priority ID codes have a higher priority than calls being received on other ID codes. If a call with a higher priority is detected while receiving a call, the current call is immediately dropped and the higher priority call received. Telephone calls are not interrupted by priority calls.

If a call is received on one of the fixed priority ID codes, either “PRIORTY1” or “PRIORTY2” is displayed on the bottom line. The selectable groups are then checked to see if any have the same ID code. If a match is found, the transceiver changes to that group. If no match is found, the group does not change and a response cannot be made on that ID code. The “Transmitting in the Scan Mode” programming described on page 36 determines if a change is temporary or permanent.

When block ID codes are used, calls are detected on entire blocks of ID codes. When a call is received on a block ID code, “BLK CALL” is displayed and the selected group does not change.

## Transmit Inhibit

The Transmit Inhibit feature prevents the transmitter from keying if the mobile you are calling is busy with another call. When the transmitter is disabled by this feature, the intercept tone sounds and “TX INHIB” is displayed (see following illustration). To make another call attempt, the PTT switch must be released and pressed again. However, you may want to wait a few seconds before making another attempt so that the other call can finish.



One use of this feature is to prevent the accidental interruption of a call in progress. This could happen when the other party unkeys or if a higher priority ID is transmitted. It may also be used to provide an indication that the mobile you are calling is busy with another call. A similar Transmit Disable On Busy feature is available on conventional systems (see page 44).

### Busy Queuing

The LTR busy queuing feature places a telephone call in a queue if the radio system is busy when it is placed. Then when the system becomes available, the call is automatically placed. Standard (mobile-to-mobile) calls are not queued by this feature. If queuing is programmed and a busy condition is encountered, the queue mode is entered automatically when the PTT switch is released. The queue mode is indicated by “IN QUEUE” on the bottom line of the display (see following illustration).



When the radio system becomes available, it is automatically accessed. A beep then sounds and a dial tone is heard. The call can then be placed if desired. The queue mode is exited before the call is placed if any of the following occur (exit is indicated when “IN QUEUE” is no longer displayed).

- The PTT switch is pressed
- Any call is received
- Any front panel option switch is pressed
- Power is turned off

Calls are received normally in the queue mode. However, receiving any call causes the mode to be exited as indicated above. Group scanning remains enabled while in the queue mode, but system scanning is temporarily disabled. This feature is enabled on individual LTR systems by dealer programming and is then available with all telephone calls on those systems.

### System Search

If an out-of-range condition exists when attempting an LTR telephone call, the system search feature can be used to automatically search

for a system within range. If enabled, the system search mode is automatically entered when the PTT switch is released. This mode is indicated by a short tone and “SYS SRCH” on the bottom line of the display as shown in the following illustration.



The transceiver then attempts to access, in succession, other systems that have a group programmed for telephone calls. As each system is accessed, a beep sounds. If a system is successfully accessed, the new system/group is selected and a dial tone sounds. The telephone call must then be placed within a few seconds or normal operation resumes. If no system could be accessed, the intercept tone sounds, “NO PHONE” is displayed, the system/group does not change, and the feature deactivates.

This mode can also be canceled at any time by pressing any front panel option switch. If the menu mode SYS SRCH parameter is selectable (see page 30), this feature can be turned on and off. Otherwise, it is either enabled or disabled on all LTR systems by programming.

## Transpond

The transpond feature indicates if the mobile being called is in service. To be available, it must be programmed in the transceiver you are calling. Each selectable LTR group can be programmed for this feature. If a call is received on one of these groups, the transceiver automatically transmits a response. This causes the transceiver placing the call to briefly unscquelch and the call indicator to turn on (if it is programmed on the selected group).

# CONVENTIONAL FEATURES

## Monitor Mode

The monitor mode is used to monitor a channel before transmitting. When this mode is selected, it temporarily disables Call Guard squelch or other squelch control techniques and also scanning so that all messages occurring on the selected group (channel) are heard. The monitor mode is enabled by taking the microphone off-hook (unless off-hook detection is disabled by programming) or pressing the MON option switch. The monitor mode is indicated by  in the display.

A conventional system must be selected to enable monitoring. If the microphone is taken off-hook with an LTR system selected, scanning halts (unless off-hook detection is disabled) but monitoring is not selected. The MON option switch is not detected when scanning is enabled, and if it is pressed with an LTR system selected, NOT CONV is displayed and monitoring is not selected. This switch must be pressed again to disable the monitor mode.

A CG (Call Guard disable) option switch may also be programmed. This switch disables both receive and transmit squelch control on the selected group (the monitor mode disables only receive squelch control). When squelch control is disabled by the CG switch, “CG OFF” is momentarily displayed. To re-enable squelch control, press the CG switch again, (“CG ON” is displayed), select another system/group, or cycle transceiver power.

If the Transmit Disable On Busy feature is used (see description which follows), monitoring is performed automatically and the monitor mode may not need to be used. Refer to “Monitoring Conventional Channels Before Transmitting” on page 39 for more information.

## Transmit Disable On Busy

The Transmit Disable On Busy feature automatically disables the transmitter if the selected group (channel) is busy when the PTT switch is

pressed. When the transmitter is disabled by this feature, the busy tone sounds briefly and “DSBL BSY” is indicated on the lower line of the display. The monitor mode (see preceding section) is enabled while the PTT switch is pressed so that activity on the channel can be monitored. However, it is not possible to access a channel by holding down the PTT switch (it must be released to make another attempt).

Occasionally, a busy condition may be detected even though no one is talking. To key the transmitter in this case, release the PTT switch and then immediately press it again. There is also a programmable option with this feature to allow transmitting with a busy channel if the correct Call Guard signal is detected. The Transmit Disable On Busy feature is enabled or disabled on each conventional group by dealer programming.

### **Talk-Around**

Normally, all transmissions go through a repeater. Therefore, if you are out of radio range of the repeater, you cannot talk to anyone, even if you are only a short distance away from the mobile you are calling. To allow communication if this occurs, the talk-around feature can be used to enable direct mobile-to-mobile communication without going through a repeater.

Each selectable group can be programmed for talk-around. It is then automatically selected when the group is selected. There is no special talk-around indicator although the group alpha tag on the lower line of the display may be used to indicate this feature.

Talk-around can also be selected by the TALKARND menu parameter (see page 32) or T/A option switch. When talk-around is selected by this switch, “TA ON” is flashed on the lower line of the display. Then when it is disabled, “TA OFF” is flashed. Changing the selected system or group, enabling scanning, or turning power off causes talk-around to revert to the default condition programmed for the selected group.

Conventional systems can be programmed so that talk-around cannot be selected. If an attempt is then made to enable talk-around with the switch, “NO TALK” is flashed on the lower line of the display.

Groups may also be programmed so that talk-around cannot be turned off. If the option switch is then pressed, neither “TA OFF” nor “TA ON” is displayed. If the menu mode is used in these cases, the current mode cannot be changed.

### Call Guard Squelch

The Call Guard squelch feature eliminates distracting messages intended for others using the channel. 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. It is transmitted with the voice signal but is not heard because it is in the subaudible range and attenuated by a filter. Call Guard squelch can be programmed on each conventional group. LTR operation uses ID codes to perform a similar function.

### Priority Group Sampling

The priority group sampling feature ensures that messages on priority conventional groups are not missed while listening to a message on a non-priority conventional group. A fixed first and second priority group can be designated by programming or either priority group can be the selected group. When a first priority group is selected, **P** is displayed, and when a second priority group is selected, **P<sub>2</sub>** is displayed (see following illustration). When scanning, this symbol is displayed only while a call is being received on the particular priority group.



When a message is detected on a first priority group while listening to a non-priority message, a tone sounds, “PRIORITY1” is flashed on the lower line of the display, and the transceiver changes to that system/group to receive the message. Likewise, if a message is received on a second priority group, “PRIORITY2” is displayed. When the priority message is

complete, the transceiver returns to the previous system/group. If a message is still present, it is received.

When a priority system/group is sampled while listening to a message on some other system/group, a series of “ticks” may be heard. These ticks are brief interruptions of the audio signal that occur when sampling takes place.

If the menu mode PRIORITY parameter (see page 32) or the PRI option switch is available, priority sampling can be turned on and off. When it is enabled by the switch, “PRI ON” is flashed, and if it is disabled, “PRI OFF” is flashed. If this menu parameter or switch is not available, priority sampling is either enabled or disabled by programming.

*NOTE: Priority sampling occurs only on conventional systems and only when scanning is enabled by the SCAN switch. It does not occur when listening to an LTR call or when transmitting.*

## MISCELLANEOUS

### Supervisory Tones

The following tones are heard at various times when operating this transceiver. Some or all of these tones can be disabled by the TONES menu parameter or programming. Refer to “Tone Select” on page 30 for more information.

**Busy Tone** - This tone is similar to the standard telephone busy tone, and it indicates that the radio system is currently busy. It sounds with all LTR calls, but not conventional calls. Repeated access attempts are made while the PTT switch is pressed with this tone sounding. Therefore, the PTT switch does not need to be released to access the system. The display indicates “BUSY” while this tone is sounding.

**Intercept Tone** - This is a siren-like tone (alternating high and low tones) which indicates the following out-of-range and error conditions:

- Out-Of-Range - If this tone sounds shortly after pressing the PTT switch and “OUT RNGE” is displayed, the transceiver was unable to contact a repeater. The usual cause for this is an out-of-range condition (see “Operation At Extended Range” on page 54). Once this tone sounds, no more access attempts are made until the PTT switch is released and then pressed again. This condition is not indicated with conventional operation.
- Time-Out Timer - If this tone sounds after the transmitter has been keyed for an extended period and “TIMEOUT” is displayed, the transmitter has been disabled by the Time-Out Timer feature (see page 29). This tone sounds with both LTR and conventional operation. Ten seconds before this tone sounds, a single beep sounds to indicate that time-out will soon occur.
- Transmit Inhibit - If this tone sounds as soon as the PTT switch is pressed with an LTR system selected and “TX INHIB” is displayed, the transmitter has been disabled by the Transmit Inhibit feature (see page 41).
- Transmit Disable On Busy - If this tone sounds as soon as the push-to-talk switch is pressed with a conventional system selected and “DSBL BSY” is displayed, the channel is busy and the transmitter was disabled by the Transmit Disable On Busy feature (see page 44).
- Receive-Only Channel - If this tone sounds as soon as the push-to-talk switch is pressed with a conventional system selected and “TX DSBL” is displayed, the channel is receive-only (see page 29).
- Tx While Receiving Call - If the push-to-talk switch is pressed while receiving a LTR call, this tone sounds and “DSBL BSY” is displayed.

**Proceed (Clear-To-Talk) Tone** - This is a short tone which sounds after the push-to-talk switch is pressed to indicate when talking can begin (see page 28). A loud (two-pitch) tone may also be programmed.

**Key Press Tone** - This is a short tone that indicates when an option switch is pressed (all modes).

**Priority Call Tone** - This is a short tone that sounds when a call is received on a conventional first or second priority channel (see page 46).

**Wrap-Around Tone** - This is a two-pitch tone that indicates that the highest or lowest channel was displayed and that wrap-around has occurred.

**Error Tone** - This is a two-pitch tone that indicates that an error condition has occurred.

### **LTR Telephone Call Tones**

The following tones are generated by LTR interconnect equipment and are heard when making LTR telephone calls. Therefore, if some other type of interconnect equipment is being used, these tones may vary.

**Reorder Tone** - Three beeps which indicate that the call has been terminated by the system.

**Return Time Warning Tone** - Two beeps which warn that you have not transmitted for an extended period. If you do not transmit within 5 seconds, the call is automatically terminated by the system. The time between transmissions is one of the parameters used by the system to detect the end of a call when the # character is not sent.

**Conversation Time-Out Tone** - Calls are limited to a certain length by the system. Thirty seconds before this time is reached, a “tick” begins sounding each second. When the 30-second time expires, the call is automatically terminated by the system.

**Turn-Around Tone** - This is a single beep which may be used to indicate to the landside party when to respond to your transmission. It sounds when you release the PTT switch, and you may partially hear this tone.

**Proceed Tone** - This tone consists of two beeps and it tells the landside caller when to enter the five-digit number specifying the mobile being called. Dialing of this number must be started within 5 seconds of hearing this tone, and a tone-type telephone must be used.

### Display Messages

The following messages appear on the upper or lower line of the display to indicate various operating modes and error conditions. The group alpha tag appears in this area during normal operation.

**BLK CALL** - Indicates that the call is being received on an LTR block ID code (see “Calls on Priority and Block ID Codes” on page 40).

**BUSY** - Indicates that the LTR radio system is currently busy (see “Busy Tone” on page 47).

**CG ON or OFF** - Indicates that Call Guard squelch was just enabled or disabled by the CG option switch (see “Monitor Mode” on page 44).

**DSBL BSY** - Indicates that the transmitter is disabled by the conventional Transmit Disable On Busy feature (see page 44). It also indicates that the transmitter was keyed while receiving an LTR call.

**EMERGENCY** - Indicates that the emergency switch has been pressed (see “Emergency Switch” on page 24).

**FCN** - Indicates that the function select mode is selected by the FCN option switch (see page 25).

**GSCN DIS** - Indicates that an attempt was made to delete a group from the scan list with group scanning disabled (see “Scan List Programming” on page 35).

**IN QUEUE** - Indicates that the call has been placed in queue by the LTR Busy Queuing feature (see “Busy Queuing” on page 42).

**Model** - The last seven digits of the transceiver part number are indicated very briefly on the top line of the display when transceiver power is turned on. This number indicates such things as frequency band, power output, and tier of the transceiver. The eighth digit is reserved and always “0”.

**NO DT GP** - Indicates that no valid data group could be found for a data transmission.

**NO POWER** - Indicates that the transmitter temperature or supply voltage is excessive and that the transmitter has been automatically shut down. Release the PTT switch and allow the transmitter to cool. If the problem persists, contact your system operator for service.

**NO PHONE** - Indicates that the LTR system search mode could not locate any systems programmed for telephone calls (see page 42).

**NO TALK** - Indicates that talk-around has been disabled on the selected conventional system by programming (see “Talk-Around” on page 45).

**NOT CONV** - Indicates that an attempt was made to enable a conventional mode feature on an LTR system.

**OUT-LOCK** - Indicates that the synthesizer is unlocked. Refer to “Transceiver Service” on page 55 for more information.

**OUT-RNGE** - Indicates that the transceiver was unable to contact a repeater. Once this indication appears, no more access attempts are made until the PTT switch is released and then pressed again. Refer to “Operation At Extended Range” on page 54 for more information.

**PRI ON or OFF** - Indicates that priority sampling was just enabled or disabled by the PRI option switch (see page 46).

**PRIORITY1 or 2** - Indicates that an LTR or conventional call is being received on one of the priority ID codes or groups (see pages 40 and 46).

**PROG ERR** - Indicates an EEPROM read error. Refer to “Transceiver Service” on page 55 for more information.

**SQUELCH** - Indicates that the conventional squelch adjust mode is selected (see “Setting Squelch Control” on page 18).

**SYS SRCH** - Indicates that the LTR System Search mode has been enabled (see page 42).

**TA ON or OFF** - Indicates that talk-around was just enabled or disabled by the TA option switch (see “Talk-Around” on page 45).

**TIMEOUT** - Indicates that the transmitter has been disabled by the Time-Out Timer (see page 29).

**TX DSBL** - Indicates that the selected conventional system is programmed for monitoring only (see “Receive-Only Groups” on page 29).

**TX INHIB** - Indicates that the transmitter has been disabled by the Transmit Inhibit feature (see page 41).

### Menu Mode Messages

The following messages are displayed in the menu mode that is described starting on page 30. “ON” is displayed to indicate enabled or yes, and “OFF” is displayed to indicate disabled or no.

**BCKLHGT** - Backlight control

- BRIGHT
- DIM
- OFF

**BANK SEL** - Bank select

- Bank alpha tag

**ENCRYPT** - Encryption on-off

- ON or OFF

**HRN ALRT** - Horn alert on-off

- ON or OFF

**OPTION** - Option on-off

- ON or OFF

**PRIORITY** - Conventional priority group sampling

- ON or OFF

**SCN CONT** - Scan continue on-off

- ON or OFF

**SCN SAVE** - Scan list save

- ON = save, OFF = not saved

**SCN TYPE** - Selects type of scanning

- **SYS-GRP** - Both system and group
- **GRP ONLY** - Group scanning only
- **OFF** - All scanning disabled

**S/G DISPL** - System/group display mode

- **ALPHATAG**
- **NUMERIC**

**STEALTH** - Stealth mode select

- **ON** or **OFF**

**SYS SRCH** - LTR system search

- **ON** or **OFF**

**TALKARND** - Conventional talk-around on-off

- **ON** or **OFF**

**TONES** - Beep tones select

- **SILENT** - All tones disabled
- **KEY BEEP** - Only Select switch and key press tones sound
- **ALERT** - All tones sound except preceding Key Beeps sound
- **ALL TONE** - All the preceding tones sound

## **System Operator Programming**

As noted several times in this manual, programming determines the availability and specific operation of many features. This refers to the programming performed by your system operator when the radio was set up, not to any programming that you can perform. If a feature is not controlled by a front panel option switch, it is fixed in the mode set by programming or not available. If you require additional information on the operation of a feature, contact your system operator.

## **Speaking Into Microphone**

For best results, hold the microphone about 1-2 inches from your mouth and speak at a normal conversational level. Do not shout since it distorts your voice and does not increase range. Make sure that the PTT (push-to-talk) switch is pressed before you begin to speak and released as soon as the message is complete. If the proceed tone is used, wait for that tone to sound before speaking (see description on page 28).

### **Operation At Extended Range**

When approaching the limits of radio range, the other party may not be able to hear your transmissions and there may be an increase in background noise when messages are received. You may still be out of range even though you can hear a message. The reason for this is that the signal you are receiving is usually transmitted at a higher power level than the one transmitted by your transceiver. Communication may be improved by moving to higher ground or away from shielding objects such as tall buildings or hills.

### **Preventing Battery Discharge**

In the standby mode (power on, not transmitting), transceiver power consumption is relatively low. Therefore, you can probably leave the transceiver on for one or two days without operating the vehicle and the battery should not become seriously discharged. However, if the outdoor temperature is low enough to significantly decrease battery capacity, the transceiver should be turned off when not in use.

Since power consumption is significantly higher when transmitting, it is good practice to have the vehicle running while transmitting. This ensures that optimum power is being delivered to the transceiver and that the battery does not become discharged.

### **Licensing**

A government license is usually required to operate this transceiver on the air. Your system operator will normally handle the licensing requirements.

## Transceiver Service

If your transceiver is not operating properly, “OUT-LOCK” or “PROG ERR” may be displayed. To attempt to clear this condition, turn power off and then on again to reset the control logic. Another indication that could be displayed is “NO POWER”. This indicates that transmitter temperature or supply voltage may be excessive. Release the PTT switch and allow the transceiver to cool, and make sure that the vehicle battery voltage is within the normal range.

Also make sure that the controls are properly set and that the power, external speaker (if used), and accessory (if used), cables are securely plugged into the back of the transceiver. If the transceiver is completely inoperative, check the power cable fuse. If it is blown, remedy the cause if possible and replace it with the same type (15A). If the transceiver still does not operate properly, return it to your system operator for service.

*NOTE: There are no user-serviceable components in the transceiver. Altering internal adjustments can cause illegal emissions, void the warranty, and result in improper operation that can seriously damage the transceiver.*



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