

THALES



LIBERTY™
Multiband Land Mobile Radio



LIBERTY™
LAND MOBILE RADIO
PRC7332
USER'S GUIDE

APRIL 2009

!	<p>NOTE</p> <p style="text-align: center;">LIBERTY™ RADIOS</p> <p>Please use the following field support contact information:</p> <p><u>Contact Info:</u> Bob DiDonato, Thales Communications, Inc. Mobile: 1-410-908-7678 Email: Bob.DiDonato@thalescomminc.com</p> <p>Scott Glazer, Thales Communications, Inc. Mobile: 1-240-422-2612 Email: Scott.Glazer@thalescomminc.com</p>
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!	<p>NOTE</p> <p>This manual contains information that is current as of the date shown below. Additional functionality is being developed for the radio and the appearance of operating screens is subject to change from those shown herein.</p> <p style="text-align: center;">Thales Part 84382 Rev 2 April 2009</p>
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CONFIGURATION NOTICE: This document contains technical information pertinent to the Liberty™ Radio. The information contained herein is for the support of the Liberty™ Radio.

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RADIO FREQUENCY ENERGY SAFETY INFORMATION


This THALES transceiver has been evaluated and complies with the standards listed below, in regards to Radio Frequency (RF) energy and electromagnetic energy (EME) generated by the transceiver.

- FCC RF exposure limits for Occupational Use Only. RF Exposure limits adopted by the FCC are generally based on recommendations from the National Council on Radiation Protection and Measurements, & the American National Standards Institute.
- FCC OET Bulletin 65 Edition 97-01 Supplement C
- American National Standards Institute (C95.1 . 1992)
- American National Standards Institute (C95.3 . 1992)

	<p>WARNING:</p> <p>This THALES transceiver generates RF EME while transmitting. RF EME (Radio Frequency Electric & Magnetic Energy) has the potential to cause slight thermal or heating effects to any part of your body less than the recommended distance from this radio transmitter's antenna. RF energy exposure is determined primarily by the distance to and the power of the transmitting device. In general, RF exposure is minimized when the lowest possible power is used or transmission time is kept to the minimum required for consistent communications, and the greatest distance possible from the antenna to the body is maintained. The transceiver has been designed for and is classified for <i>Occupational Use Only</i>. Occupational/ controlled exposure limits are applicable to situations in which persons are exposed to RF energy as a consequence of their employment, and such persons have been made aware of the potential for exposure and can exercise control over their exposure. This means you can use the transceiver only if you are aware of the potential hazards of operating a transceiver and are familiar in ways to minimize these hazards. This transceiver is not intended for use by the general public in uncontrolled environments. Uncontrolled environment exposure limits are applicable to situations in which the general public may be exposed to RF energy, or in which the persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.</p>
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The following list provides you with the information required to ensure that you are aware of RF exposure and of how to operate this transceiver so that the FCC RF exposure limitations are not exceeded.

- Do not transmit for more than 50% of the total transceiver use time; transmitting over 50% of the total use time may exceed the limits in accordance to the FCC RF exposure requirements. Nominal transceiver operation is 10% transmission time, 10% reception time, and 80% stand-by time.
- Use only the specified antenna for this transceiver; this may be either the antenna provided with the transceiver or another antenna authorized by THALES.

	<p>CAUTION</p> <p>To ensure that your exposure to RF EME is within the FCC limits for occupational use, you must observe and adhere to the above points.</p>
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RF EXPOSURE GUIDELINES

To ensure that exposure to RF electromagnetic energy is within the FCC allowable limits for occupational use, always adhere to the following guidelines:

- DO NOT operate the radio without a proper antenna attached, as this may damage the radio and may cause the FCC RF exposure to be exceeded. A proper antenna is the antenna supplied with the radio or an antenna specifically authorized by Thales Communications Inc. (Refer to Table 6-1, Antenna Versions)
- ALWAYS use Thales authorized accessories (antenna, batteries, speaker/mic, etc...). When worn on the body, always place the radio in a Thales recommended clip or holster meant for this product. The use of other than recommended or approved body-worn accessories may result in RF exposure levels which exceed the FCC Occupational/Controlled environment RF exposure limits. (Refer to Chapter 6 for a complete listing of Available Accessories and Ancillary Equipment authorized for use on the Liberty™ Radio.
- ALWAYS keep the radio and its antenna away from the body and face when transmitting to ensure FCC RF exposure compliance requirements are not exceeded:

Face with NO Accessory	Radio: 2.5 cm	Antenna: 5.5 cm
Body worn using belt clip	Radio: 1.6 cm	Antenna: 2.0 cm
Body worn using belt holster	Radio 2.0 cm	Antenna: 2.2 cm

ELECTROMAGNETIC INTERFERENCE COMPATIBILITY

Electronic devices are susceptible to electromagnetic interference (EMI) if they are not adequately shielded or designed for electromagnetic compatibility. Because this transceiver generates RF energy, it can cause interference to such equipment.

- Turn OFF your transceiver where signs are posted to do so. Hospitals and health care facilities use equipment that is sensitive to electromagnetic radiation.
- Turn OFF your transceiver while on board an aircraft when so instructed. Use of the transceiver must be in accordance with airline regulations and/or crew instructions.

“OCCUPATIONAL USE ONLY” RADIO

The Liberty™ Radio generates RF electromagnetic energy during transmit mode of operation. This radio is designed and classified for “Occupational Use Only”, meaning it must be used only during the course of employment by individuals aware of the hazards and the ways to minimize such hazards. This radio is NOT intended for use by the General Population in an uncontrolled environment.

LIBERTY™ RADIO COMPLIANCE WITH FCC PART 15 RULES

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

SAFETY SUMMARY

The following are general safety precautions that are not related to any specific procedure, and do not appear elsewhere in this manual. These Safety Summaries are recommended precautions that all personnel must understand and apply during any given phase of operation and maintenance. Each chapter has other specific warnings and cautions.

KEEP AWAY FROM LIVE CIRCUITS

Personnel must at all times observe all safety regulations. Do not replace components or make adjustments inside equipment with power turned on. Under certain conditions, dangerous voltages may exist when the power switch is in the off position due to charges retained by capacitors. To avoid injury, always remove power and discharge and ground a circuit before touching it.

VOLTAGES WITHIN THIS EQUIPMENT ARE HIGH ENOUGH TO ENDANGER LIFE.

(Applies to battery chargers only)

Covers are *not* to be removed except by persons qualified and authorized to do so and these persons should always take extreme care once the covers have been removed.

HAZARDS OF ELECTROMAGNETIC RADIATION TO ORDNANCE (HERO)

DO NOT operate the radio within 27 feet (8 meters) of any type of fuzed ordnance. Operating the radio in close proximity to ordnance MAY induce or otherwise couple currents and/or voltages of magnitudes large enough to initiate electro-explosive devices or other sensitive explosive components of weapon systems, ordnance, or explosive devices.

CAUTION - LITHIUM ION BATTERIES


Li-ion batteries have a very high energy density. Exercise precaution when handling and testing. Do not short circuit, overcharge, crush, mutilate, nail penetrate, apply reverse polarity, expose to high temperature or disassemble. High case temperature resulting from abuse could cause physical injury.


REPAIRS, ALTERATIONS TO EQUIPMENT


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

NOTATIONS USED IN THIS MANUAL

Throughout this manual, there are WARNING, CAUTION, or NOTE Statements that emphasize safety hazards, or care that should be observed.

	<p>WARNING: A WARNING Statement is an operation procedure, practice, or other condition that might result in injury or death if not carefully observed. Do not proceed beyond a WARNING symbol until the conditions identified are fully understood or met.</p>
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	<p>CAUTION A CAUTION Statement indicates an operational procedure, practice or other condition, which, if not performed correctly or adhered to, could result in a risk of danger, damage to the equipment, or severely degrade equipment performance.</p>
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	<p>NOTE A NOTE Statement that calls attention to supplemental information that may improve system performance or clarify a process or procedure.</p>
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FOREWORD

!	NOTE The radio operation (man-machine interface) shown in this manual reflect Radio Software Version 70 and PC Programmer Version 00.00.01.14. Some screens do not correspond to those in earlier radio software or PC Programmer versions.
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The organization of the Liberty™ User's Guide is as follows:

- a. Chapter 1 Getting to Know the Radio. This chapter provides general information for the Liberty™ Radio including equipment description and purpose.
- b. Chapter 2 Display / Menu Screens – This chapter covers information covering the various displays / menu screens that can be found on the radio.
- c. Chapter 3 Operating Instructions – This chapter describes the operating instructions for the radio.
- d. Chapter 4 Maintenance - This chapter provides instructions required for on-equipment and off-equipment preventive and corrective maintenance of the Liberty™ Radio.
- e. Chapter 5 Battery Chargers – This chapter provides a brief overview on the operation of the chargers .
- f. Chapter 6 Accessories / Ancillaries – This chapter provides a complete listing of accessories and ancillaries used with the Liberty™ Radio.
- g. Chapter 7 Glossary - The glossary provides a definition of the special terms and acronyms used in this document.
- h. Index
- i. Attachments –
 Quick Reference Guide (QRG)



Figure 1-1 Liberty™ Radio

CHAPTER 1 GETTING TO KNOW THE RADIO

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GENERAL INFORMATION

The Liberty™ Multi-Band Radio is a portable, hand-held, battery operated transceiver capable of providing both secure and non-secure communications.

The radio is software upgradeable in the field, and selected features are capable of being enabled and disabled on a per radio basis. In addition, multiple software loads will be available with encryption support added or removed.

The Liberty™ Multi-Band radio is designed to provide Public Safety communications, both voice and data, in the following frequency bands

- VHF (136-174 MHz),
- UHF (380-520 MHz),
- 700 MHz (763-775/793-805 MHz), and
- 800 MHz (806/851-824/869 MHz)

The Liberty™ Radio is designed to be extremely easy-to-use and programmable intuitively via either Keypad or PC.

The Liberty™ Radio consists of the following items:

- Liberty™ Multi-band portable radio
- Multi-band Antenna
- Lithium-Ion Battery

- Standard Battery Charger
- Belt Clip

EQUIPMENT CHARACTERISTICS

Table 1- 1 Equipment Characteristics

Characteristics	Specification
Modes of Operation	<ul style="list-style-type: none"> • Analog 12.5/25 kHz • P25 Digital (12.5 kHz), Conventional • P25 Trunking (Future)
Channel Spacing	<ul style="list-style-type: none"> • 12.5 / 25 kHz channels • 2.5 / 3.125 kHz Frequency Increments
Frequency Stability	<ul style="list-style-type: none"> • 1.5 ppm (-30°C (22°F) to + 60°C (140°F))
Interoperability	<ul style="list-style-type: none"> • Legacy Analog FM Radios • P25 Digital Radios • P25 Trunking Systems (Future)
Programmable Channels	
Initial Release	<ul style="list-style-type: none"> • 1 banks (Groups of Zones) • 16 Zones (up to 256 Channels) • User Programmable from <ul style="list-style-type: none"> ○ Front Panel Menu ○ PC Programmer
Production Release	<ul style="list-style-type: none"> • Up to 2608 Conventional Channels or Trunked Talkgroups (Any Combinations) • 10 banks (Groups of Zones) • 175 Zones (up to 16 channels / talkgroups each) • 3 additional event zones with up to 16 channels / talkgroups each) • User Programmable from <ul style="list-style-type: none"> ○ Front Panel Menu ○ PC Programmer ○ Radio to Radio Cloning • Clear / Encrypted Selection on a Channel-by-Channel or Talkgroup Base • Password Protected to Limit Access

TECHNICAL CHARACTERISTICS*Table 1- 2 Technical Characteristics*

Characteristics	Specification
Weight	Liberty™ Radio including battery ~28 ounces (794 grams)
Dimension	2.5" W x 1.9" D x 7" L (excluding antenna and knobs) 6.4cm W x 4.8cm D x 17.8 cm L (excluding antenna and knobs)
Operating Temperature	(-30°C* (22°F) to + 60°C (140°F)) (*cold starts below -25°C may require a 3 minute warm-up for full specification compliance)
Storage Temperature	Low Temperature – minimum of -40°C (-40°F) for 24 hours High Temperature -- maximum of 85°C (+85°F) for 24 hours
Operational Low Pressure	15,000 feet operational
Storage Low Pressure	Exposure to storage at 30,000 ft.
Charging Temperature	0°C (32°F) to + 45°C (113°F)
Rechargeable Battery Operating Temperature Range	-20°C (-4°F) to + 60°C (140°F)
Rated Power	UHF – 5W VHF – 5W 700 MHz – 2.5W 800 MHz – 3.0W

LIBERTY™ RADIO – LOCATION OF CONTROLS AND INDICATORS

The Liberty™ Radio Physical Features are as shown in the figure below.



Figure 2-1 Liberty™ Radio Physical Characteristics

Table 1-3 Physical Description

<i>Item No.</i>	<i>Description</i>	<i>Programmed by PC Programmer</i>
1	Channel Switch – This switch can be programmed to select any 16 settings, (not all positions need be programmed).	✓
2	2-Position Programmable Switch – Although often referred to as the “Encryption Switch”, this switch is actually a programmable switch. This switch can be programmed to select any two settings. There is no “typical” setting for this switch. Current Version -- EXT/INT Audio (“ϕ” EXT and “0” INT)	✓
3	Antenna connector – Antenna connects to the radio here for TX and RX of RF signals.	
4	Status LED – Used to visually indicate various states of the radio. May be solid RED , GREEN , or YELLOW-ORANGE , or flashing individual colors or combinations of colors, depending on the radio state.	
5	Speaker – radio internal speaker	
6	Programmable Soft-key Button 1 – This button activates the feature or function displayed immediately above it on the color display. Additional entries are accessed by scrolling through the selections using the left/right navigation buttons. The features on the display can be programmed to select any programmable function of the radio.	✓
7	Programmable Soft-key Button 3 – This button activates the feature or function displayed immediately above it on the color display. Additional entries are accessed by scrolling through the selections using the left/right navigation buttons. The features on the display can be programmed to select any programmable function of the radio.	✓
8	Programmable Soft-key Button 2 – This button activates the feature or function displayed immediately above it on the color display. Additional entries are accessed by scrolling through the selections using the left/right navigation buttons. The features on the display can be programmed to select any programmable function of the radio. Current Version – Locked to PRIV Call on P25	✓
9	Keypad – Used to enter alpha-numeric and symbols similar to a cell phone.	
10	4-Way Navigation Buttons with Enter – UP/DOWN/LEFT/RIGHT/ENTER buttons used to navigate around the Color Display and highlight displayed icons or fields. The ENTER button is used to “enter” the feature highlighted, which may be a menu, a programming option, or other function as programmed into the radio.	
11	Microphone – radio internal microphone	
12	Color Display – Color LCD for the display of radio status and other information.	

<i>Item No.</i>	<i>Description</i>	<i>Programmed by PC Programmer</i>
13	3-Position Programmable Switch – This switch can be programmed to select any three settings. Typically, this switch is programmed for 3-different Zones/Groups. Current Version – Locked to Zones 1, 2, and 3.	✓
14	ON/OFF/Volume Control Knob – Used to turn the radio ON & OFF, and to control the volume level for the internal speaker when the radio is on. The most counter-clockwise position, (first position), is radio OFF; the next clockwise position, (second position), is radio ON with the internal speaker muted; the next 14 clockwise positions, (positions 3 through 16), are radio ON while sequencing through the lowest to highest volume settings on the internal speaker.	
15	Side Button 1 – This button can be programmed to select any feature. Current programmable functions are : Disabled, Ni/Low Power, Monitor, Scan, Priority Scan, and Talkaround.	✓
16	Side Button 2 – This button can be programmed to select any feature. Current programmable functions are : Disabled, Ni/Low Power, Monitor, Scan, Priority Scan, and Talkaround.	✓
17	Side Button 3 – this button can be programmed to select any feature. Current programmable functions are : Disabled, Ni/Low Power, Monitor, Scan, Priority Scan, and Talkaround.	✓
18	PTT (Push-to-Talk) Button – Press and Hold button used to initiate a call, i.e., transmit on a channel.	
19	Battery – Provides DC power to the radio.	
20	Emergency Button – Although commonly referred to as the “Emergency Button”, this PRESS & Hold button is actually a programmable button. This button can be programmed to cause the radio to enter any radio feature/state. Typically, this button is programmed to cause the radio to enter into an “Emergency” mode of operation.	✓
21	Side Connector – Used to connect to accessories and devices, PC Programmer (i.e., PC), KFD, etc.	

Note: A “✓” indicates that this function is programmable via the PcProgrammer.

CONTROLS AND INDICATORSCONTROLS

The keypad (Refer to *Figure 1-2*) for the radio provides an interface to the radio's features. The keypad functions are similar to a standard cell phone or telephone keypad when entering numeric digits.



Figure 1-2 Keypad

When the keypad is used to edit a list, each key can generate different characters of the alphabet (refer to Table 1-4 or a complete list of keypad characters.) By default, the first letter in each word will automatically be capitalized; the remaining letters in the word will automatically be lower case.

However, the user may override this by pressing * to switch between upper case, lower case, and automatic case. To select the case of an individual letter, press * before pressing the key. If the entry being edited is a numeric, such as frequency, then the keypad will generate only numbers.

For example:



Table 1-4 Keypad Characters

Key	Number times the key is pressed								
	1	2	3	4	5	6	7	8	9
0	Space	0	!	?	,	;	:	()
1	.	1	/	-	+	<	=	>	
2 abc	A	B	C	2					
3 def	D	E	F	3					
4 ghi	G	H	I	4					
5 jkl	J	K	L	5					
6 mno	M	N	O	6					
7 pqrs	P	Q	R	S	7				
8 tuv	T	U	V	8					
9 wxyz	W	X	Y	Z	9				
*	Switches letter case								
#	#	*	&	"	'	%	\$		

Special “Hot Keys”



Figure 1-3 Liberty Special “Hot Keys”

ENT Button

While on the **MAIN** Screen – and only on this screen – the **ENT** button (refer to *Figure 1-3*) on the Navigation keypad acts as a hotkey to display the **SELECT MENU** screen.

- Pressing and holding the **ENT** hotkey button for more than ½ second displays the **SELECT MENU** Screen.

Four-Way Navigation Buttons with Enter Button

The Navigation, (Left/Right/Up/Down) (refer to *Figure 1-4*), buttons are used to scroll through the radio’s lists, or items in the display, or both.

When an item/icon is highlighted, the **ENT** button – in the center of the Navigation buttons – is used to enter the highlighted function or screen.

!	<p>NOTE When the OPERATING/MAIN Screen is displayed, the ENT button functions as a “hotkey” short-cut to the SELECT MENU Screen.</p>
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!	<p>NOTE The screen names “MAIN” and “OPERATING” and “HOME” are used interchangeably throughout this document.</p>
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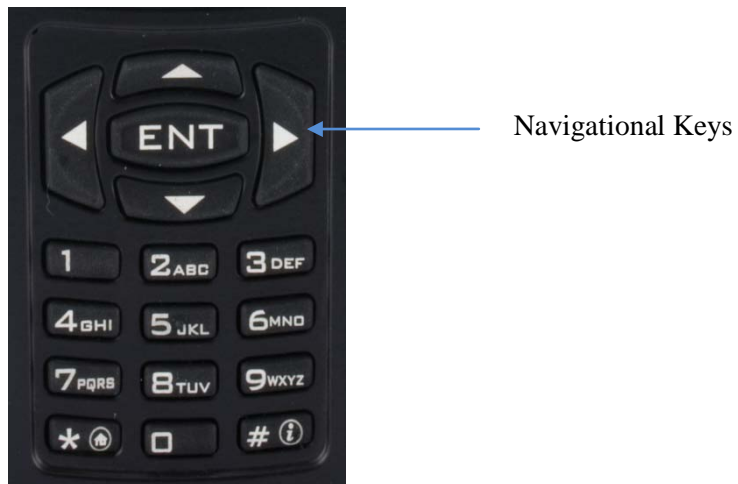


Figure 1-4 Four-Way Navigation Buttons with Enter Button

Side-Buttons

The three (3) side buttons (refer to *Figure 1-5*), can be preprogrammed to select variety of features. Programming is achieved using the PcProgrammer. Currently, these buttons can each be set for Hi/Low Power, Monitor, Scan, Priority Scan, or Talk Around.



Figure 1-5 Programmable Side Buttons

INDICATORS

LCD and Keypad Backlight

The user may turn on the backlighting for the display, keypad, and channel numbers (around the 16-position Select knob), by pressing any key or button. These lights will remain on for a pre-determined time period before they turn off automatically.

LED Indicators

The LED on the top of the radio indicates the radio’s operating status.

Table 1-5 LED Indicators

<i>LED Indicator</i>	<i>What it Means</i>
RED	Radio Transmitting
Flashing RED	Low Battery (while transmitting)
GREEN	Receiving/Busy Channel Indication
OFF	Standby



Figure 1-6 Location of LED

Connectors

Side Connector

The side connector (Refer to Figure 1-7) is a 20-pin connector located on the right side of the radio. This connector is used for multiple functions, including interfacing with the Radio Programmer, Accessories, Cloning and Data Mode cables.



Figure 1-7 Side Connector

Antenna Connector

The antenna connector (Refer to Figure 1-8) is a male type connector on the top of the radio. It is recommended that an antenna ALWAYS be connected to the radio when transmitting, even though the radio includes protective circuits to prevent damage from transmitting without an antenna. An antenna should be connected whenever the radio is immersed.

!	NOTE It is recommended that an antenna ALWAYS be connected to the radio when transmitting.
----------	--



Figure 1-8 Antenna Connector

Battery Connector

The battery connector is a 4-pin connector located on the back of the radio. The battery is connected to the radio by inserting the top of the battery under the flap at the top of the radio and snap down into place.



Figure 1-9 Battery Connector

CHAPTER 2 DISPLAY / MENU SCREENS

GENERAL INFORMATION

This section describes the Display / Menu Screens of the radio. This chapter contains the following:

Description	Page Number
General Information	2-1
Display / Menu Screens	2-2
SPLASH Screen	2-2
HOME Screen	2-3
MENU Screen Display	2-6
SELECT Menu Screen	2-7
VIEW Menu Screen	2-8
PROGRAM Menu Screen	2-9
Channel Type - P25	2-9
Channel Type – Analog Narrowband (AN)	2-12
Channel Type – Analog Wideband (AW)	2-14
RADIO INFORMATION Menu Screen	2-18
MAINTENANCE Menu Screen	2-19

DISPLAY/ MENU SCREENS

The Liberty™ radio display consists of a color QVGA liquid crystal display (LCD). After the initial power-up sequence, the overall display is shown in Figure 2-1. It is divided into three distinct regions as shown in

Figure 2-1.



Figure 2-1 Liberty™ Home Screen Display (Sample)

SPLASH Screen

Immediately upon powering on the radio, a **SPLASH** screen (Figure 2-2) is displayed. The **SPLASH** screen appears, or “fades in”, first the picture, followed by the “THALES” logo, followed by the “Slogan”, and finally the Version. This screen is displayed while the radio is executing its Power-Up sequence.



Figure 2-2 Default “Splash” Screen

The makeup of this screen is:

- Status Area – displays the Thales Logo horizontally centered in the center of the Status Area on a **DARK BLUE** Background.
- Context Area – displays a “Power-Up” picture.
- Softkeys Area – displays a Thales inspired slogan, such as “GIVE ME LIBERTY™” and the Liberty™ Version information.

HOME Screen

The Home Screen (refer to Figure 2-3) is the first screen that is displayed after the radio has completed its Power-Up Sequence.

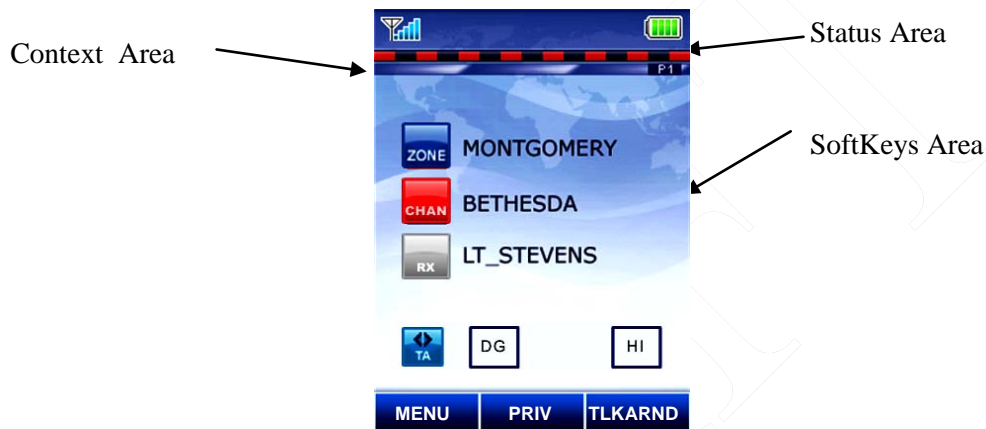


Figure 2-3 Liberty™ Home Screen Display (Sample)

The operating screen contains three separate areas –

Status Area– The area contains symbols that indicate various radio operating conditions. Refer to Table 2-1 for a complete breakdown of these symbols and their meanings.

Table 2-1 Status Area Symbols

Symbol	Indication
	Received Signal Strength Indication (RSSI) (FUTURE)
	Battery Conventional => flashes when battery is low Smart => the number of bars shown indicate the charge remaining in the battery, flashes when the battery is low. The color also changes to indicate general state: <ul style="list-style-type: none"> • GREEN – Good to Full Charge • YELLOW – Marginal charge • RED – little if any charge left
	Monitor (CSQ) - The selected channel is being monitored during conventional operation only.
	Battery – No Connection with Radio
	HI = High TX power setting (Default)
	LO = Low TX power setting

Context Area – The Context Area of the Operating screen provides the status of the radio’s current operation, including:

- Current Zone Name
- Current Channel Name
- Zone and Group information
- Communication Mode (Talk Around or Repeater)
- Channel Type (AN, AW, P25)

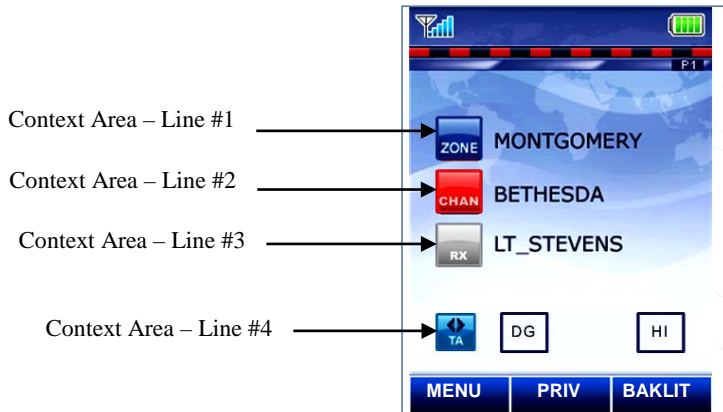


































Figure 2-4 Operating Screen – “Home” Sample Screen

Table 2-2 Context Area Descriptions




Context Area	Details
Line #1	Indicates the current selected ZONE name. <ul style="list-style-type: none"> • A  icon is displayed at the beginning of this line to indicate the current zone.
Line #2	Indicates the current selected Channel/Talkgroup Name. <ul style="list-style-type: none"> • A  icon is displayed at the beginning of this line to indicate the current channel. • A  icon indicates that the channel is operating in UHF frequency range. • A  icon indicates that the channel is operating in VHF frequency range. • A  icon indicates that the channel is operating in the 700 MHz frequency range. • A  icon indicates that the channel is operating in the 800 MHz frequency range. The user may toggle this zone channel scan selection using the softkeys.

Context Area	Details						
Line #3	Indicates the presence of an active received channel. The icon  shall appear when an active receive carrier is detected and received. This entire row text string is also held for 5.0 seconds after the RX carrier is removed while the radio returns to standby state. If a new call is received, this line is updated to reflect the new receive channel. If the user PTT's the radio, this line is cleared.						
Line #4	<p>This line contains four (4) symbols</p> <table border="1" data-bbox="358 562 1438 1121"> <tr> <td data-bbox="358 562 537 678">  </td> <td data-bbox="537 562 1438 678"> Indicates the following:  = Talk-around Mode </td> </tr> <tr> <td data-bbox="358 678 537 947">  AN AW </td> <td data-bbox="537 678 1438 947"> Indicates the following:  = P25 Mode AN = Analog Narrowband AW = Analog Wideband </td> </tr> <tr> <td data-bbox="358 947 537 1121">   </td> <td data-bbox="537 947 1438 1121"> Indicates the following:  = HI TX power setting (Default)  = Low Tx power setting </td> </tr> </table>		Indicates the following:  = Talk-around Mode	 AN AW	Indicates the following:  = P25 Mode AN = Analog Narrowband AW = Analog Wideband	 	Indicates the following:  = HI TX power setting (Default)  = Low Tx power setting
	Indicates the following:  = Talk-around Mode						
 AN AW	Indicates the following:  = P25 Mode AN = Analog Narrowband AW = Analog Wideband						
 	Indicates the following:  = HI TX power setting (Default)  = Low Tx power setting						
	 Individual Call or Page/call Alert Call Received. Flashes when an individual call is received.						

SoftKeys Area – The Softkeys Area of the “OPERATING”, shall display one row of softkeys situated directly above the 3 softkey button as shown in Figure 2-5 .



Figure 2-5 Operating Screen – Softkeys Menu

The left  and right  arrows indicate that there are more softkey selections programmed that can be displayed by scrolling left or right. If there are no more softkey selections available, the left and right arrows do not appear; instead a  symbol appears.


	<p>NOTE The BOLD values in the parentheses are the defaults for each softkey.</p>
---	--

Table 2-3 Softkey Menu Options

Softkey Option	Description
MENU	Changes the display to the SELECT Menu Screen
PRIV	Changes the display to the P25 Individual Call Contact List in order to make or to cancel an P25 Individual Call. It can also be used to make a Unit to Unit Call.
BAKLIT	Turns backlight -- (ON/OFF)

MENU Screen Displays

Once you hit the MENU and the SELECT menu screen appears, the left (◀) and right (▶) arrows allows navigation between each screens, by paging left or right.

Table 2-4 Functional Category Options

Functional Category	Description
Programming	PROGRAM – RED
Information/Maintenance	VIEW, INFORMATION, MAINTENANCE – BLUE
Selection	SELECT – GREEN

The Softkey Menu entry SAVE is used to save the changes made on any selection or programming screen. If the softkey below SAVE is pressed, the current changes are saved and displayed. If the softkey below SAVE is *pressed and held for 2.0 seconds*, the current data is saved and the curser returned to the top tab so that the menu screens may be scrolled without scrolling to the top.

The Softkey Menu entry EXIT is used to return to the MAIN OPERATING / HOME Menu Screen.

SELECT Menu Screen

When highlighted on the Menu Screen, the **SELECT** Menu Screen is displayed as a window selection list as shown in Figure 2-6. The Up/Down Navigation Keys are used to scroll through the available selections.



Figure 2-6 SELECT Menu Screen

!	<p>NOTE Currently, the Channel List and Talk Groups on this screen are grayed out. To change channels, use the Channel Knob located on top of the radio.</p>
----------	---

Table 2-5 SELECT Menu Options

Channel Parameters	Description of function
BANK	This election allows the user to select a Bank from a drop down list as the active Bank. The Bank selection reverts to the default Bank if the battery is removed for an extended time. When BANK is selected and ENT is pressed, a drop down list appears will appear containing a listing of the BANK selections.
ZONE	This selection allows the user to select a Zone corresponding to the active/selected Bank. The Zone selection replaces the toggle switch setting if programmed for zone switching. When ZONE is selected and ENT is pressed, a drop down list appears containing the list of ZONE selections.
CHAN LIST	Lists the current channel name.
TALKGRPS	Displays the current talk group.
TLKARND	This selection allows the user to turn ON or OFF talk-around.

VIEW Menu Screen

The **VIEW** Menu Screen allows the user to view the parameter settings for the selected channel or Talkgroup. Reprogramming is not permitted on this screen. The channel is determined by the channel knob on the top of the radio. While in this screen, changing the channel knob position changes the displayed parameters to reflect the settings for the selected channel. The displayed parameters are shown in Figure 2-7.

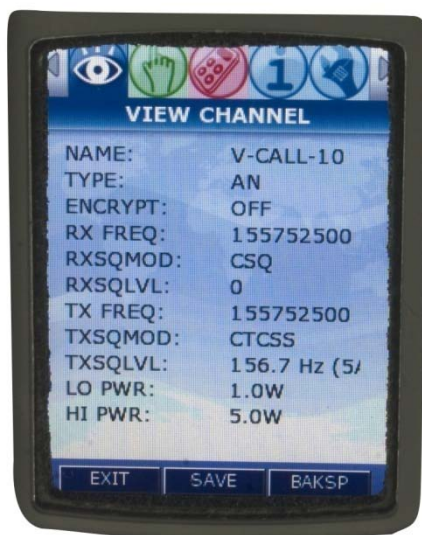


Figure 2-7 VIEW Menu Screen

The displayed channel parameters are defined as follows:

Table 2-6 View Channel Parameters

Channel Parameters	Description
Name	Channel / Talk-Group Name
Type	Waveform (AN/AW/P25)
Encrypt	OFF / AES / DES
RX Freq	xxx.xxxxx
RX SQ Mode	Receive Squelch Mode
RX SQ Level	Receive Squelch Level
TX Freq	xxx.xxxxx
TX SQ Mode	Transmit Squelch Mode
TX SQ Level	Transmit Squelch Level
LO PWR	Displays Power Level
HI PWR	Displays Power Level

PROGRAM Menu Screen

The **PROGRAM** Menu Screen (Figure 2-8) allows the user to program the parameter settings for the selected channel.

The Up/Down Navigation Keys are used to scroll through the available selections. The displayed parameters are shown in Figure 2-8 for P25, Figure 2-9 for Analog Narrowband (AN) and Figure 2-10 for Analog Wideband (AW).

The Channel is selected by using the channel knob on the top of the radio. While in this screen, changing the channel knob position changes the displayed parameters to reflect the parameter settings for the channel selected by the channel knob.

Channel Type - P25

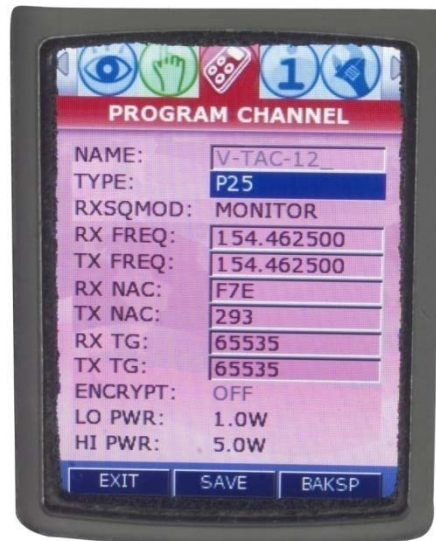


Figure 2-8 PROGRAM Menu Screen – P25 Channel Type

!	<p>NOTE</p> <p>Only the parameters that are programmable for the selected TYPE are displayed. For example, ENCRYPT has no meaning for Analog; therefore, ENCRYPT is not displayed if the TYPE is either AN (Analog Narrowband) or AW (Analog Wideband).</p>
----------	--

Table 2-7 PROGRAM Menu – P25 Channel Type

Channel Parameters	Description
NAME	Displays the Channel Name.
TYPE	This selection provides the user with the ability to select the waveform type. When TYPE is selected and ENT is pressed, a drop down list will appear with P25/ AN / AW as the other available options.
RX SQ MODE	<p>RX SQ MODE is used to set the receive squelch mode and level. For P25, the desired receive NAC and Talkgroup value, as appropriate for the selected P25 squelch mode, is entered in an entry box.</p> <p>When the radio is set for P25, the available selections are as follows:</p> <p>P25 Monitor Normal (NAC) Selective (NAC/Talkgroup)</p>
Rx FREQ	<p>This selection allows the user to enter the Receive Frequency in MHz as: XXX.XXXXX</p> <p>For RX FREQ, the radio checks the frequency entered versus the band limits, (UHF, VHF, 700 MHz, 800 MHz). The four band limits are as follows:</p> <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz • 800 MHz: 851–869 MHz
TX FREQ	<p>This selection allows the user to enter the Transmit Frequency in MHz as: XXX.XXXXX</p> <p>For TX FREQ, the radio checks the frequency entered versus the band limits, (UHF, VHF, 700 MHz, 800 MHz). The four band limits are as follows:</p> <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz/793–805 MHz • 800 MHz: 806–824/851–869 MHz <p>For the 700 MHz and 800 MHz bands, the radio also checks the frequency separation of TX and RX for valid values; i.e., for the 700 MHz band, the separation is 30 MHz with Receive the lower RF, while for the 800 MHz band, the separation is 45 MHz with Receive the higher RF. (In the 700/800 bands, the radio can automatically set the second frequency once the first frequency, (typically RX), is entered.) Also, since frequency is in steps of 3.125 and 2.5 kHz only, the radio rounds each entered frequency to the nearest acceptable value.</p>
RX NAC	P25 NAC RX: 1 – 0xFFF Hex (1 - 4095 Decimal). Excluding the reserved value of 0xF7F (3967) used for repeater functionality.
TX NAC	P25 NAC TX: 1 – 0xFFF Hex (1 – 4095 Decimal). Excluding the reserved values of 0xF7E (3966) and 0xF7F (3967).
RX TG	1 – 65535 Decimal (1 – 0xFFFF Hex).

Channel Parameters	Description																																
TX TG	1 – 65535 Decimal (1 – 0xFFFF Hex).																																
ENCRYPT	Not enabled this release																																
LO TX PWR	<p>This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type:</p> <table border="1" data-bbox="568 451 1088 714"> <thead> <tr> <th><u>(VHF)</u></th> <th><u>(UHF)</u></th> <th><u>(700)</u></th> <th><u>(800)</u></th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.1</td> <td>0.1</td> <td>0.1</td> </tr> <tr> <td>0.5</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr> <td>3.0</td> <td>3.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td>4.0</td> <td>4.0</td> <td></td> <td></td> </tr> <tr> <td>5.0</td> <td>5.0</td> <td></td> <td></td> </tr> </tbody> </table>	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.5	3.0	4.0	4.0			5.0	5.0		
<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>																														
0.1	0.1	0.1	0.1																														
0.5	0.5	0.5	0.5																														
1.0	1.0	1.0	1.0																														
2.0	2.0	2.0	2.0																														
3.0	3.0	2.5	3.0																														
4.0	4.0																																
5.0	5.0																																
HI TX PWR	<p>This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type:</p> <table border="1" data-bbox="568 787 1088 1050"> <thead> <tr> <th><u>(VHF)</u></th> <th><u>(UHF)</u></th> <th><u>(700)</u></th> <th><u>(800)</u></th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.1</td> <td>0.1</td> <td>0.1</td> </tr> <tr> <td>0.5</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr> <td>3.0</td> <td>3.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td>4.0</td> <td>4.0</td> <td></td> <td></td> </tr> <tr> <td>5.0</td> <td>5.0</td> <td></td> <td></td> </tr> </tbody> </table>	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.5	3.0	4.0	4.0			5.0	5.0		
<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>																														
0.1	0.1	0.1	0.1																														
0.5	0.5	0.5	0.5																														
1.0	1.0	1.0	1.0																														
2.0	2.0	2.0	2.0																														
3.0	3.0	2.5	3.0																														
4.0	4.0																																
5.0	5.0																																

!	<p>NOTE The decimal point is automatically display/entered by the radio as the user types in the frequency value.</p>
----------	--

Channel Type – Analog Narrowband (AN)

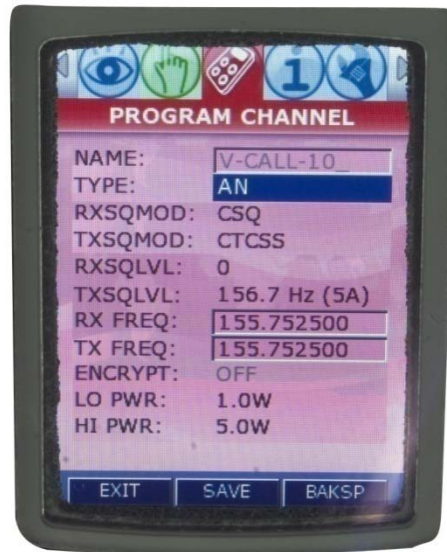


Figure 2-9 PROGRAM Menu Screen – Analog Narrowband (AN)

Table 2-8 PROGRAM Menu – Analog Narrowband (AN)

Channel Parameters	Description
NAME	Displays the Channel and Channel name.
TYPE	This selection provides the user with the ability to select the waveform type. When TYPE is selected and ENT is pressed, a drop down list will appear with P25/ AN / AW as the available options.
RX SQ MODE	<p>RX SQ MODE is used to set the receive squelch mode and level. For Analog mode, the desired receive CTCSS or CDCSS value, as appropriate, is entered in an entry box, while the squelch NOISE level contains a drop down selection list with ranges of 0-16, with 0 being open squelch.</p> <p>When the radio is set for AN, the available selections are as follows: RX SQ MODE is selected and ENT is pressed, a drop down list with the Analog selections.</p> <p>Analog CSQ CTCSS Tone (Refer to Table 3-7) CDCSS Code (Refer to Table 3-8)</p>
TX SQ MODE	<p>TX SQ MODE is used to set the transmit squelch mode and level. For Analog mode, the desired receive CTCSS or CDCSS value, as appropriate, is entered in an entry box, while the squelch NOISE level while the squelch NOISE level contains a drop down selection list with ranges of 0-16, with 0 being open squelch.</p> <p>When the radio is set for AN, the available selections are as follows: TX SQ MODE is selected and ENT is pressed, a drop down list with the either</p>

Channel Parameters	Description																												
	Analog selections. <u>Analog</u> OFF CTCSS Tone (Refer to Table 2-10) CDCSS Code (Refer to Table 2-11)																												
RXSQLVL	This selection allows the user to enter the desired receive squelch level. The available options are 0-16, with 0 being open squelch.																												
TXSQLVL	This selection allows the user to enter the desired transmit squelch level when CTCSS or CDCSS squelch mode is selected.																												
Rx FREQ	This selection allows the user to enter the Receive Frequency in MHz as: XXX.XXXXX For RX FREQ , the radio checks the frequency entered versus the band limits, (UHF, VHF, 700 MHz, 800 MHz). The four band limits are as follows: <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz • 800 MHz: 806–824/851–869 MHz 																												
TX FREQ	This selection allows the user to enter the Transmit Frequency in MHz as: XXX.XXXXX For TX FREQ , the radio checks the frequency entered versus the band limits, (UHF, VHF, 700 MHz, 800 MHz). The four band limits are as follows: <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz/793–805 MHz • 800 MHz: 806–824/851–869 MHz <p>For the 700 MHz and 800 MHz bands, the radio also checks the frequency separation of TX and RX for valid values; i.e., for the 700 MHz band, the separation is 30 MHz with Receive the lower RF, while for the 800 MHz band, the separation is 45 MHz with Receive the higher RF. (In the 700/800 bands, the radio can automatically set the second frequency once the first frequency, (typically RX), is entered.) Also, since frequency is in steps of 3.125 and 2.5 kHz only, the radio rounds each entered frequency to the nearest acceptable value</p>																												
ENCRYPT	Not enabled this release.																												
LO TX PWR	This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type: <table border="1" data-bbox="568 1617 1088 1850" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><u>(VHF)</u></th> <th><u>(UHF)</u></th> <th><u>(700)</u></th> <th><u>(800)</u></th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.1</td> <td>0.1</td> <td>0.1</td> </tr> <tr> <td>0.5</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr> <td>3.0</td> <td>3.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td>4.0</td> <td>4.0</td> <td></td> <td></td> </tr> </tbody> </table>	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.5	3.0	4.0	4.0		
<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>																										
0.1	0.1	0.1	0.1																										
0.5	0.5	0.5	0.5																										
1.0	1.0	1.0	1.0																										
2.0	2.0	2.0	2.0																										
3.0	3.0	2.5	3.0																										
4.0	4.0																												

Channel Parameters	Description			
	5.0	5.0		
HI TX PWR	This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type:			
	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>
	0.1	0.1	0.1	0.1
	0.5	0.5	0.5	0.5
	1.0	1.0	1.0	1.0
	2.0	2.0	2.0	2.0
	3.0	3.0	2.5	3.0
	4.0	4.0		
	5.0	5.0		

Channel Type – Analog Wideband (AW)

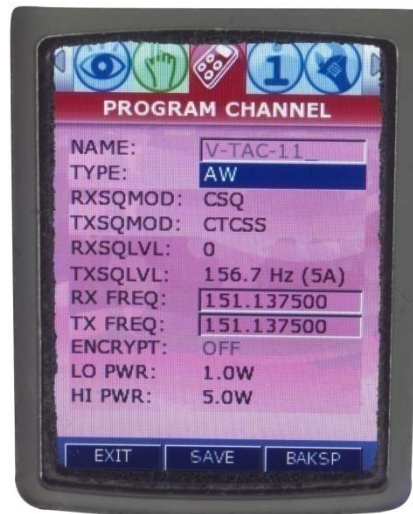


Figure 2-10 PROGRAM Menu Screen – Analog WideBand (AW)

Table 2-9 PROGRAM Menu – Analog Wideband (AW)

Channel Parameters	Description
NAME	Displays the Channel and Channel name.
TYPE	This selection provides the user with the ability to select the waveform type. When TYPE is selected and ENT is pressed, a drop down list will appear with P25/ AN / AW as the available options.
RX SQ MODE	<p>RX SQ MODE is used to set the receive squelch mode and level. For Analog mode, the desired receive CTCSS or CDCSS value, as appropriate, is entered in an entry box, while the squelch NOISE level while the squelch NOISE level contains a drop down selection list with ranges of 0-16, with 0 being open squelch.</p> <p>When the radio is set for AN, the available selections are as follows: RX SQ MODE is selected and ENT is pressed, a drop down list with the Analog selections.</p> <p>Analog CSQ CTCSS Tone (Refer to Table 3-7) CDCSS Code (Refer to Table 3-8)</p>
TX SQ MODE	<p>TX SQ MODE is used to set the transmit squelch mode and level. For Analog mode, the desired receive CTCSS or CDCSS value, as appropriate, is entered in an entry box, while the squelch NOISE level while the squelch NOISE level contains a drop down selection list with ranges of 0-16, with 0 being open squelch.</p> <p>When the radio is set for AN, the available selections are as follows: TX SQ MODE is selected and ENT is pressed, a drop down list with the either Analog selections.</p> <p>Analog OFF CTCSS Tone (Refer to Table 2-10) CDCSS Code (Refer to Table 2-11)</p>
RXSQLVL	This selection allows the user to enter the desired receive squelch level. The available options are 0-16, with 0 being open squelch.
TXSQLVL	This selection allows the user to enter the desired transmit squelch level when CTCSS or CDCSS squelch mode is selected.
Rx FREQ	<p>This selection allows the user to enter the Receive Frequency in MHz as: XXX.XXXXX</p> <p>For RX FREQ, the radio checks the frequency entered versus the band limits, (UHF, VHF, 700 MHz, 800 MHz). The four band limits are as follows:</p> <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz • 800 MHz: 851–869 MHz
TX FREQ	<p>This selection allows the user to enter the Transmit Frequency in MHz as: XXX.XXXXX</p> <p>For TX FREQ, the radio checks the frequency entered versus the band limits, (UHF,</p>

Channel Parameters	Description																																
	<p>VHF, 700 MHz, 800 MHz). The four band limits are as follows:</p> <ul style="list-style-type: none"> • VHF: 136–174 MHz • UHF: 380–520 MHz • 700 MHz: 763–775 MHz/793–805 MHz • 800 MHz: 806–824/851–869 MHz <p>For the 700 MHz and 800 MHz bands, the radio also checks the frequency separation of TX and RX for valid values; i.e., for the 700 MHz band, the separation is 30 MHz with Receive the lower RF, while for the 800 MHz band, the separation is 45 MHz with Receive the higher RF. (In the 700/800 bands, the radio can automatically set the second frequency once the first frequency, (typically RX), is entered.) Also, since frequency is in steps of 3.125 and 2.5 kHz only, the radio rounds each entered frequency to the nearest acceptable value</p>																																
ENCRYPT	Not enabled this release.																																
LO TX PWR	<p>This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type:</p> <table border="1" data-bbox="568 840 1088 1102"> <thead> <tr> <th><u>(VHF)</u></th> <th><u>(UHF)</u></th> <th><u>(700)</u></th> <th><u>(800)</u></th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.1</td> <td>0.1</td> <td>0.1</td> </tr> <tr> <td>0.5</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr> <td>3.0</td> <td>3.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td>4.0</td> <td>4.0</td> <td></td> <td></td> </tr> <tr> <td>5.0</td> <td>5.0</td> <td></td> <td></td> </tr> </tbody> </table>	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.5	3.0	4.0	4.0			5.0	5.0		
<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>																														
0.1	0.1	0.1	0.1																														
0.5	0.5	0.5	0.5																														
1.0	1.0	1.0	1.0																														
2.0	2.0	2.0	2.0																														
3.0	3.0	2.5	3.0																														
4.0	4.0																																
5.0	5.0																																
HI TX PWR	<p>This selection allows the user to set the low transmit power setting to any of the values in the following table with default values in bold underlined type:</p> <table border="1" data-bbox="568 1176 1088 1438"> <thead> <tr> <th><u>(VHF)</u></th> <th><u>(UHF)</u></th> <th><u>(700)</u></th> <th><u>(800)</u></th> </tr> </thead> <tbody> <tr> <td>0.1</td> <td>0.1</td> <td>0.1</td> <td>0.1</td> </tr> <tr> <td>0.5</td> <td>0.5</td> <td>0.5</td> <td>0.5</td> </tr> <tr> <td>1.0</td> <td>1.0</td> <td>1.0</td> <td>1.0</td> </tr> <tr> <td>2.0</td> <td>2.0</td> <td>2.0</td> <td>2.0</td> </tr> <tr> <td>3.0</td> <td>3.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td>4.0</td> <td>4.0</td> <td></td> <td></td> </tr> <tr> <td>5.0</td> <td>5.0</td> <td></td> <td></td> </tr> </tbody> </table>	<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>	0.1	0.1	0.1	0.1	0.5	0.5	0.5	0.5	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	3.0	3.0	2.5	3.0	4.0	4.0			5.0	5.0		
<u>(VHF)</u>	<u>(UHF)</u>	<u>(700)</u>	<u>(800)</u>																														
0.1	0.1	0.1	0.1																														
0.5	0.5	0.5	0.5																														
1.0	1.0	1.0	1.0																														
2.0	2.0	2.0	2.0																														
3.0	3.0	2.5	3.0																														
4.0	4.0																																
5.0	5.0																																

If CTCSS is chosen, a drop down list will be made available that contains the 42 valid CTCSS tones and codes as listed in Table 2-10. The CTCSS tones are either provided as the actual audio tone (i.e. 127.3 Hz) or the Code (i.e. 3A). The drop down list provides both – select the required tone. The default value is 67.0 Hz (XZ) (in bold).

Table 2-10 CTCSS Tones and Codes

67.0 Hz (XZ)	97.4 Hz (ZB)	141.3 Hz (4A)	203.5 Hz (M1)
69.3 Hz (WZ)	100.0 Hz (1Z)	146.2 Hz (4B)	206.5 Hz (8Z)
71.9 Hz (XA)	103.5 Hz (1A)	151.4 Hz (5Z)	210.7 Hz (M2)
74.4 Hz (WA)	107.2 Hz (1B)	156.7 Hz (5A)	218.1 Hz (M3)
77.0 Hz (XB)	110.9 Hz (2Z)	162.2 Hz (5B)	225.7 Hz (M4)
79.7 Hz (WB)	114.8 Hz (2A)	167.9 Hz (6Z)	229.1 Hz (9Z)
82.5 Hz (YZ)	118.8 Hz (2B)	173.8 Hz (6A)	233.6 Hz (M5)
85.4 Hz (YA)	123.0 Hz (3Z)	179.9 Hz (6B)	241.8 Hz (M6)
88.5 Hz (YB)	127.3 Hz (3A)	186.2 Hz (7Z)	250.3 Hz (M7)
91.5 Hz (2Z)	131.8 Hz (3B)	192.8 Hz (7A)	254.8 Hz (07)
94.8 Hz (2A)	136.5 Hz (4Z)		

If CDCSS is chosen, a drop down list will be made available that contains the 83 valid CDCSS codes as listed in Table 2-11. The default value is **023** (in bold).

Table 2-11 CDCSS Codes

023	114	174	315	445	631
025	115	205	331	464	632
026	116	223	343	465	654
031	125	226	346	466	662
032	131	243	351	503	664
043	132	244	364	506	703
047	134	245	365	516	712
051	143	251	371	532	723
054	152	261	411	546	731
065	155	263	412	565	732
071	156	265	413	606	734
072	162	271	423	612	743
073	165	306	431	624	754
074	172	311	432	627	

RADIO INFORMATION Menu Screen

When highlighted on the Menu Screen, the **RADIO INFORMATION** Menu Screen is displayed as a window select list as shown in Figure 2-11. This screen is for information only. The user cannot change any parameter, including the enabled options on this screen.

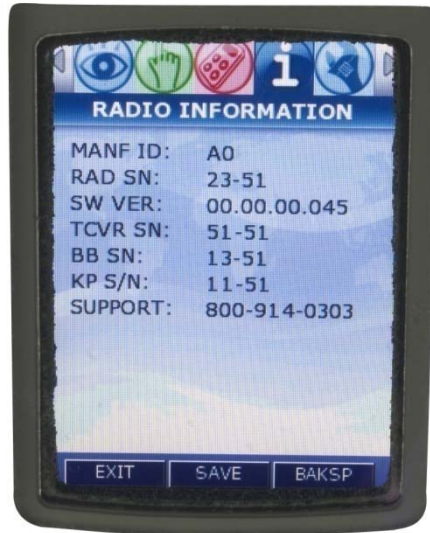


Figure 2-11 RADIO INFORMATION Menu Screen

!	<p>NOTE Please use the following support contacts:</p> <p>Bob DiDonato, Thales Communications, Inc. Mobile: 1-410-908-7678 Email: Bob.DiDonato@thalescomminc.com</p> <p>Scott Glazer, Thales Communications, Inc. Mobile: 1-240-422-2612 Email: scott.glazer@thalescomminc.com</p> <p>For support on any other Thales Equipment, please call 1-800-914-0303.</p>
----------	---

MAINTENANCE Menu Screen

When highlighted on the Menu Screen, the **MAINTENANCE** Menu Screen is displayed as a window select list as shown in *Figure 2-12*. The Up/Down Navigation Keys are used to scroll through the available selections.

!	<p>NOTE For additional information relating to Maintenance, refer to Chapter 4 of this manual.</p>
----------	---

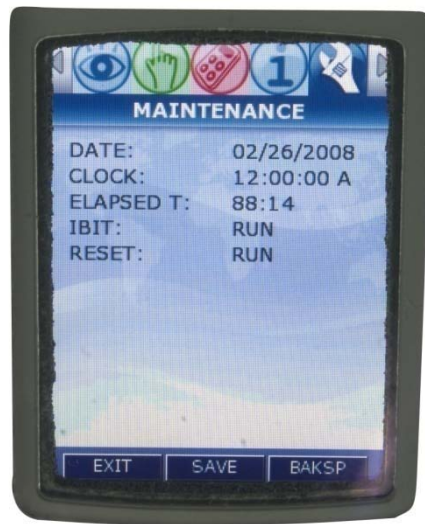


Figure 2-12 MAINTENANCE Menu Screen

!	<p>NOTE This screen is temporarily being used for Downloading Radio configuration file to radio (puts radio in program mode by being on this screen) – for future releases of the radio – this will be automatic.</p>
----------	--

!	<p>NOTE The radio does not transmit or received while on the Maintenance Screen.</p>
----------	---

Table 2-12 MAINTENANCE Menu Options

Channel Parameters	Description of Function
DATE	This selection displays the date in mm/dd/yyyy.
CLOCK	This selection displays the time in hours:minutes:seconds:tenths of seconds. A Global Setting determine whether a 24 hour or a 12 hour (with AM or PM) time is displayed.
ELAPSED TIME	This selection displays the total time the radio has been in Transmit mode (PTT pressed), Receive mode (actively receiving radio signals with audio output), and Standby mode (powered on but neither transmitting nor receiving). The time is shown in hours:minutes.
IBIT	FUTURE -- The IBIT (Initiated Built-In-Test) function runs self-test of the primary radio boards and functions. If there is a failure, the screen will show the test results (PASS or FAIL) for each test.
RESET	FUTURE -- The RESET function provides a means for the user to “reset” the radio by initiating a “Warm Boot” of the radio. A “Warm Boot” is a restart of the radio by resetting the radio configuration parameters and executing POST, but not performing a battery authentication or powering down the radio. Selecting “ OK ” and pressing ENT resets the radio by initiating the “Warm Boot”.

CHAPTER 3 OPERATING INSTRUCTIONS

GENERAL INFORMATION

This section describes the operating procedure for the radio. This chapter contains the following:

Description	Page Number
General Information	3-1
Operating Instructions	3-1
Connecting the Battery	3-1
Connecting the Antenna	3-1
Radio Programming	3-1
Turning on the Radio	3-2
Menu Access	3-3
Transmitting	3-4
Receiving	3-4
P25 Unit to Unit Call	3-5
SCAN – Conventional and Priority	3-5
Using the Programmable Side Buttons	3-8
Squelch Monitor	3-8
Hi/Low Power	3-8
Talk Around	3-8
Modifying Menu Selections – SELECT Menu or PROGRAM Menu	3-9
Changing ZONES	3-9
Screen Saver	3-10

OPERATING INSTRUCTIONS

Connecting the Battery

The battery is connected to the radio by inserting the top of the battery under the flap at the top of the radio and snap down into place.

Connecting the Antenna

The antenna is connected to the radio through a connector on top of the radio. Screw the antenna clockwise onto the connector until it is fully seated.

Radio Programming

Prior to operation for the first time, the radio should be programmed via the PC Programmer. For help in programming a radio using the PC Programmer see the MA6941U PC Programmer's User Manual, Thales part number 84404.

Turning on the Radio

Turn on the radio using the On/Off/Volume knob. The radio will go through a boot-up sequence, displaying a blank screen, the Thales Screen, the Liberty Screen and an Operating Screen.

The radio has a Power-On-Self-Test (POST) function that checks basic radio functions every time the radio is powered up.

Use the switch to set the volume to a comfortable level. Select the desired channel using the Channel Select Switch. The radio is now ready for operation.



Figure 3-1 Radio ON/OFF/Volume Knob and ZONE Select

Menu Access

!	NOTE Refer to Chapter 1 for additional information relating to the navigation keys.
----------	---

!	NOTE When the HOME Screen is displayed, the ENT button functions as a “hotkey” short-cut to the MENU Screen.
----------	--

- Press the MENU softkey or the ENT button to access menus
- Once in the MENU's, the user uses the left (◀) and right (▶) arrows allows navigation between each screens, by paging left or right to the applicable Menu.
- Press EXIT to return to the HOME Screen.



Figure 3-2 Menu Access

Transmitting

!	<p>NOTE</p> <p>Prior to transmitting, verify that the LED is NOT lit Green (solid or flashing) as this indicates RF traffic on that channel. Wait for it to clear.</p>
----------	---

- **To Transmit:**
 - Push the PTT button
 - Speak into microphone (3-6 inches away)
- **LED Transmit Indications:**
 - OFF – Not Transmitting or Receiving
 - RED - Transmitting
- **Transmitting with Speaker/Mic:**
 - Push PTT on Speaker/Mic
 - Speak into Speaker/Mic



Receiving

- **Conventional Channels Talkgroups:**
 - Verify PTT is NOT pressed
 - Audio will come through the Speaker or Speaker/Mic.
- **LED Receive Indications:**
 - OFF – Not Transmitting or Receiving
 - GREEN – Receiving Signal
- **Transmitting with Speaker/Mic:**
 - Push PTT on Speaker/Mic
 - Speak into Speaker/Mic

Figure 3-3 Radio ON/OFF/Volume Knob and ZONE Select

P25 Unit to Unit Call

To place a call within your unit,

1. Press the PRIV Softkey from the HOME screen.
2. Enter the Unit ID number.
3. Press enter, then press PTT to initial the call. The Unit ID will be active until a different channel is selected, or the user presses EXIT.


!	NOTE The Individual Call or Page icon () will appear on the Operating Screen.
----------	--



Figure 3-4 P25 Unit to Unit Call

Scanning – Conventional and Priority

!	<p>NOTE Selection of Channels for scanning is preprogrammed through the PcP. Up to 16 channels can be scanned at a time.</p>
----------	---

!	<p>NOTE Scanning can be performed by pressing one of the pre-programmed side buttons.</p>
----------	--

Enable SCAN

1. Press one of the side buttons that has been pre-programmed to SCAN.

!	<p>NOTE A scan bar on the main screen will provided indication that the radio is scanning the channels in the SCANLIST.</p>
----------	--

!	<p>NOTE If the SCAN list is empty or there is no scan list, the user will not be able to select SCAN ON.</p>
----------	---

Priority Scan

To enable priority scan, press the pre-programmed side button. When the radio is in Priority Scan, the main screen will show the scan bar, plus any of the following:

- “P1” if no priority channels are defined (current channel will become P1)
- “P1” if only P1 was defined or only P2 was defined (1 priority channel)
- “P2” if P1 and P2 were both defined.

The radio will continue to scan using the P1/P2 priority channels, alternating between P1 and P2.

1. If one of the side button has been enabled for Priority Scan , press the side button to enable Priority Scan.

!	<p>NOTE If SCAN is not ON, than pressing the programmed “Priority Scan” button just sets the mode to priority scanning. Scanning does not actually turn on until SCAN is set ON.</p>
----------	---

!	<p>NOTE If no priority channels are defined the radio includes the current channel as the priority (P1) channel.</p>
----------	---

Table 3-1 Scan and Priority Scan Side Button Options

Side Buttons	Comment
PSCAN->SCAN	Priority scanning is alternately enabled/disabled on PSCAN press.
SCAN->PSCAN-SCAN	When priority scanning is running and the SCAN side button is pressed the radio will stop scanning. The next SCAN button press will resume priority scanning (priority scanning persists until power down)

Receiving a Voice Call on a Channel in the Scan List

If a voice call is received on a channel that is in the scan list, the radio will break squelch on the channel when the call is received. The main screen will “temporarily change to the scan Rx channel, indicating which ZONE, SCAN Channel, frequency, and ID information.

!	<p>NOTE When a call is received, the scan function will stop. And when the call has ended, the radio will resume scanning.</p>
----------	---

Monitor Timer

The Monitor Timer is the amount of time the radio will sample a channel picked up during a scan before the radio returns to scan operation. At the end of the monitor period, the radio will break reception and continue with the scan sequence. If the signal is still there during the next scan cycle, it will be picked up again. The Monitor Timer is pre-programmed by the PcP.

SCAN Hold Timer

If Talkback is disabled, the Scan Hold Timer allows a user to monitor a channel that was picked up while scanning prior to re-entering the scan sequence. In addition, if Talkback is disabled, the Talkback Scan Timer is not used. This is required to hear both sides of a conversation for example.

Using the Pre-Programmed Side Buttons

The side buttons have been pre-programmed using the PcP. The following information provides a quick summary on how to use each of the buttons.

!	<p>NOTE</p> <p>The following information assumes that the side buttons have been pre-programmed using the PcProgrammer. Currently the side buttons can be programmed for HI/Low Power; Monitor, Scan, Priority Scan, and Talk-Around</p>
----------	---



Squelch Monitor Side Button

1. Select an analog channel that has a RX squelch setting of anything other than “0”.
2. Press the Monitor side button.
3. The radio will immediately breaks squelch on the current channel. The channel will remain “open squelch” indefinitely in this mode.
4. To stop monitoring on this channel, press the monitor side button.
5. The radio reverts to its current squelch mode setting. If squelch signal is present on the channel the radio will remain open squelch, otherwise it will close squelch.

If a channel or Zone is changed with Monitor Enabled:


1. If a channel or zone is changed on the radio, the radio will immediately open squelch on the new channel (monitor mode remains on).
2. Once the Monitor side button is pressed, the radio will close squelch.
3. The user may change back to the original channel.
4. The original channel is operating with normal squelch settings.

HI/LO Power Side Button

The Hi/Low Power Side Button provides the user with the capability to switch power setting on any given channel. The main menu will either display a HI or LO icon ( or ) depending on the particular channel power settings.

Talk Around

!	<p>NOTE</p> <p>The following information assumes that the channel has Talk-Around option has been enabled and that one of the side buttons has been pre-programmed by the PcProgrammer.</p>
----------	--

1. The user selects a channel that has been programmed for Talk Around.
2. Press the Talk Around side button. When the radio is in Talk-Around, the main screen will display the TA icon ().
3. The radio transmits and receives on the same frequency.

Modifying Menu Selections – SELECT Menu or PROGRAM Menu

!	NOTE Unless otherwise noted, the following “hints” apply to each menu: <ul style="list-style-type: none">• If an entry is grayed out – it cannot be changed by the user.• If a drop down menu appears after ENT is pressed, the user may select from this drop-down menu.• If no drop down screen appears, the user may use the numeric keypad to enter the required information, such as frequency range, RX/TX NAC, RX/TX TG using the numeric keypad.
----------	--

- 1) Press the MENU Softkey or press ENT from the HOME screen to enter the menus.
- 2) Using the left / right arrow keys scroll to the applicable menu.
- 3) To edit an entry in that menu, press either the up (▲) or down (▼) arrows to scroll to desired line item. The user may either select from drop-down menus or enter data directly using the numeric keypad.
- 4) After the changes have been completed, hit the SAVE softkey.
- 5) To move to the next menu, press the up arrow until you reach the top of the menu, then use the left (◀) and right (▶) arrows to move to the next menu.

!	NOTE If you click EXIT after you have save your changes, you will be returned to the HOME Screen.
----------	---

Changing ZONES

The first three (3) zones can be selected by the 3-position switch (FIXED at Zone Select for Initial Release) (Refer to Figure 3-1). Additional zones can be accessed by going to SELECT Menu (as described in Chapter 2).

Screensaver

The Liberty™ Radio is equipped with a screensaver that turns the color display OFF after a period of inactivity (similar to cell-phones) to conserve battery life.

The color screen can be re-activated by any of the following actions:

- Received call
- Press PTT
- Change volume or channel
- Press any key

**NOTE**

The ENTER Light stays ON, but maybe difficult to see in bright light.

CHAPTER 4 MAINTENANCE

GENERAL INFORMATION

This chapter provides operator maintenance instructions for the Liberty™ Radio. This includes operational checkout, inspection and preventive maintenance, troubleshooting, and removal/replacement procedures.

This chapter contains the following:

Description	Page Number
General Information	4-1
Operational Checkout	4-2
Radio Preventative Maintenance	4-2
Inspection and Cleaning	4-2
External Battery Preventative Maintenance	4-2
Troubleshooting	4-3
Removal/Replacement Procedures - Operator	4-4
Audio Removal/Replacement	4-4
Antenna Removal/Replacement	4-4
Battery Removal/Replacement	4-5
Radio Disassembly	4-5



Figure 4-1 Maintenance Menu Screen

OPERATIONAL CHECKOUT

The Liberty™ radio provides three types of BIT:

- **POST** – Power On Self Test (POST) function that checks the basic radio functions every time the radio is powered up.
- **CBIT** – Continuous Built In Test (CBIT); this series of radio self tests are run in the background during normal operation
- **IBIT** – Initiated Built In Test (IBIT); this series of radio self tests are run when requested by the user (**FUTURE**)

RADIO PREVENTIVE MAINTENANCE

Inspection and Cleaning

The radio should be occasionally inspected for external damage, such as bent connectors, and wear items, such as loose attaching hardware (screws and setscrews). The radio should be cleaned periodically, particularly after exposure to salt water, sand, or mud. The user should wipe exposed contacts, such as the side connector, battery connector, and audio connector with fresh water and then dry with low pressure air, if available. Small pieces of dirt and debris may infiltrate the grill of the internal speaker and should be cleaned out with a soft brush or blown out with low pressure air (if available) to remove any particles

EXTERNAL BATTERY PREVENTIVE MAINTENANCE

Lithium-ion batteries will self-discharge over time. If not periodically recharged, the voltage level can get so low that the maximum potential capacity is reduced or the battery may not accept a recharge. In order to prevent the effect of excessive self-discharge, it is recommended that lithium-ion batteries that are not in regular use (e.g., in storage) be regularly recharged to full capacity. However, the Liberty™ Battery has an 18 month shelf life. In ideal situations, it is recommended that the battery be stored at room temperature and low humidity.

TROUBLESHOOTING

There are only a limited number of equipment failures that can be corrected by the operator. The following table describes them.

Table 4-1 Operator Troubleshooting Guide

Symptom	Probable Cause	Corrective Action
Radio does not operate	• Battery not properly connected	• Before removing battery from the radio, make sure the radio is turn-off first. • Remove and re-install battery – be sure to clean the battery contacts before re-installing the battery.
	• Battery dead	• Either Charge or Replace battery
Screen Blank	• Radio in screen saver mode	• To re-activate the screen – press PTT, change the volume or channel, or press any key. The screen will also be re-activated when a call is received.
Cannot communicate with other radio users	• Radios set to different frequencies	• Set all radios to the same frequency (can be accomplished by loading from PC Programmer).
	• Radios are set with different CTCSS tones	• Set receive and transmit CTCSS tones the same in all radios
	• Radios set to different modulation types	• Set radios to same modulation type
External Speaker/Microphone not working (no audio)	• External Speaker/Mic not properly installed	• Verify speaker / mic is attached correctly.
	• No audio	• Remove and replace the external audio speaker/microphone.
		• Check the INT/EXT Audio Switch - Current Functionality – EXT/INT Audio (“ϕ” EXT and “0” INT)
Radio does not scan	• SCANLISTS not programmed into radio.	• Set SCANLISTS in the PcP and download to the radio.
Radio does not communicate with PcProgrammer	• PcProgrammer not installed correctly.	• Refer to PcProgrammer manual for installation instructions of the software.
	• PcProgrammer Cable not connected properly	• Check cable connections, remove and re-attach PcProgramming cable.

REMOVAL/REPLACEMENT PROCEDURES - OPERATOR

The first step for any remove/replace procedure is to power down the equipment. Prior to removing or installing any Liberty™ assembly, remove all accessories (antenna, microphone, etc.).

Removal/replacement procedures that are authorized to be performed by the operator are given in the following paragraphs.

**CAUTION**

Before performing removal/replacement procedures, make sure the radio is powered down and the battery is removed from the radio.

Audio Accessory Removal/Replacement .

Remove/replace the audio accessory as follows:

- a. Disconnect the audio accessory (e.g., handset), from the audio accessory connector on the side of the radio.
- b. Replace the audio accessory with a known good one.


Antenna Removal/Replacement.


Remove/replace antenna as follows:

- a. Disconnect the antenna from the antenna connector at the top of the radio by first grasping the antenna at the base and turning counterclockwise until unthreaded. Then remove the antenna from the connector.
- b. Replace the antenna with a known good antenna. Turn antenna clockwise to thread it into position. The antenna should be hand-tightened only.

Battery Removal/Replacement.

Remove/replace battery as follows:

	<p>WARNING:</p> <p>The Liberty™ Li-ion Rechargeable Batteries are fully recyclable and should be disposed of using an appropriate system (such as a special recycling center or via your local government waste disposal center).</p> <p>Never throw your battery out with the household waste or attempt to incinerate. Lithium Ion cells contain non-biodegradable components, hazardous chemical and are prone to aggressive explosion under intense heat.</p>
---	--

	<p>CAUTION</p> <p><i>Turn off power before removing the battery</i> by setting the volume switch to the OFF position. Failure to do so may corrupt the programmed configuration and may damage the radio circuitry.</p>
---	--

- a. To disconnect the battery from the radio, press the tabs on both sides to release and lift out from battery.
- b. To replace the battery, insert the top of the battery, under the flap at the top and click tabs in place at the bottom of the radio.

RADIO DISASSEMBLY

The Liberty™ Radio is not authorized for disassembly. If the chassis is inadvertently opened, it **MUST** be returned to Thales Communications Inc for inspection and repair.

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CHAPTER 5 BATTERY CHARGERS

GENERAL INFORMATION

This chapter contains the following:

Description	Page Number
General Information	5-1
Physical Characteristics	5-2
Weight and Dimensions	5-2
Temperature	5-2
Electrical Characteristics	5-2
Performance	5-2
Operating Indications	5-3

For the DHS Initial Pilot Field Trials, only the following chargers will be available:

- Standard Single-Bay Charger (PN 1600682-1)

The single unit charger (P/N 1600682-1) operates on 90 to 260 VAC power only. The battery charger charges the battery to full charge within three hours, automatically adjusting to the appropriate settings when the battery is inserted. The battery chargers communicate with the circuitry in the battery to monitor charge current, temperature, and voltage to prevent improper charging. Indicator LED's on the chargers provide status.



Figure 5-1 Liberty™ Single-Bay Charger

PHYSICAL CHARACTERISTICS

Weight and Dimensions

The charger weights and dimensions are shown below:

Table 5-2 Battery Charger Weights and Dimensions

Charger Configuration	Part Number	Weight (excluding power cord or vehicle adapter)	Size (excluding power cord)
Standard Single Unit Charger	1600682-1	< 2 pounds	Approx. 5.0 inches (W) x 4.0 inches (H) x 4.0 inches (D).

Temperature

The chargers' charging and storage temperature ranges are shown below:

Table 5-3 Charging and Storage Temperatures

Descriptions	Temperature
Charging Temperature Range	-10°C (+14°F) to +55°C (+131°F)
Storage (Non-operational) Temperature Range:	-40°C (-40°F) to +85°C (+185°F)

Attempting to charge batteries outside the operating temperature range can result in damage to both the chargers and batteries.

ELECTRICAL CHARACTERISTICS

Table 5-4 Charging and Storage Temperatures

Charger Type	Electrical Characteristics
Single Unit Charger	90 to 264 VAC, 47-63 Hz

PERFORMANCE

Battery charge time can be affected by various conditions, such as the charger input current. When inserting a battery, make sure it is firmly seated in the charger. The battery chargers communicate with the circuitry in the battery to monitor charge current, temperature, and voltage to prevent improper charging. Indicator LED's on the chargers provide status.









Table 5-5 Charger Performance


Charger Configuration	Capacity	Charge Time
Single Bay AC	One battery pack	Three hours


OPERATING INDICATIONS


All versions of the chargers use LEDs to indicate the current charging status and/or charging problems. The meanings of the LED's are as follows:

Table 5-6 Single-Bay Charge Status Indicators

Description	Indication
The charger will display a flashing yellow/green LED indication while it attempts to establish communications with the battery.	FLASHING YELLOW/GREEN 
If the battery temperature exceeds its maximum operating temperature the charger shall set the status LED to solid RED	RED 
If the battery status indicates an over-discharged condition, the charger shall set the status LED to flashing RED	FLASHING RED 
If the battery temperature is below 0°C, the charger shall set the status LED to flashing YELLOW.	FLASHING YELLOW 
During charging, the charger shall set the status LED to solid Yellow.	YELLOW 
When charging is > 90%, the charger shall set the status LED to GREEN.	GREEN 
When a battery/charger error is detected, the charger shall set the status LED to flash RED/GREEN.	FLASHING RED/GREEN 
When a Charger error condition is detected, the charger shall set the status LED to flashing YELLOW/RED.	FLASHING YELLOW/RED 

	<p>CAUTION Do not insert a new battery in the charger until the LED is turned off.</p>
---	---

	<p>NOTE If a battery is inserted in the charger while attached to a radio and the radio is ON, the radio fuel gauge may indicate that the battery is fully charged before the charger indicates full charge.</p>
---	---

	<p>NOTE The battery can be charged while attached to a radio.</p>
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CHAPTER 6 ACCESSORIES AND ANCILLARY EQUIPMENT

GENERAL

This chapter provide information concerning the various accessories that can be used with the Liberty™ Radio manufactured by Thales Communications, Inc., Clarksburg, Maryland.

This chapter contains the following:

Description	Page Number
General	6-1
Available Ancillary Equipment for the Liberty™ Radio	6-1
Antennas	6-1
Batteries	6-2
Battery Chargers	6-2
Cases / Holsters	6-3
Audio Accessories	6-3
Cables	6-4
Surveillance Equipment	6-4

AVAILABLE ACCESSORIES AND ANCILLARY EQUIPMENT FOR THE LIBERTY™ RADIO

Antennas

One antenna is supplied for the Liberty™ Radio:

Table 6-1 Antenna Versions

Part Number	Freq Band
1600678-1	136-174 MHz, 380-520 MHz, 763-869 MHz

The antenna is attached via a connector on the top of the radio. A protective screw-on cap is attached to the connector at the base of each antenna to protect the connector from dirt and moisture when the antenna is not attached to the radio.

Batteries

The following batteries are available for the Liberty™ Radio:

Table 6-2 Liberty™ Batteries

Part Number	Description
1600691-1	3-Cell Sealed Rechargeable Lithium Ion Battery Pack, 2400 mAh Capacity
1600691-2	6-Cell Sealed Rechargeable Lithium Ion Battery Pack, 4800 mAh Capacity
4102201-501 (FUTURE)	AA Clamshell – Black, AA battery (12 AA Alkaline Cells) Clamshell Cassette
4102201-502 (FUTURE)	AA Clamshell – Orange, AA battery (12 AA Alkaline Cells) Clamshell Cassette
4102265-501 (FUTURE)	Battery Eliminator, powers the radio from external DC power source, provides reverse polarity as well as over voltage and over-current protection for the radio. Accepts nominal 12V DC input voltage.

Battery Chargers

There are several battery charger options available.

Table 6-3 Liberty™ Battery Chargers

Part Number	Description
1600682-1	Replacement Desktop / Vehicle Charger Unit for PN 6752
1600683-1 (FUTURE)	–Advanced Six Slot Lithium-Ion Rechargeable Battery Charger, 120 V AC only, recommended for desktop use only. Also includes battery diagnostics and charge status LED’s.
1600694-1 (FUTURE)	Volt DC Cigarette Lighter Adapter for MA6752.
1600695-1 (FUTURE)	Replacement 120V AC Power Supply for MA6752.
1600700-1 (FUTURE)	Basic Six-Slot Lithium-Ion Rechargeable batter Charger – 120V AC power only. Recommended for desk-top use only.
1600701-1 (FUTURE)	Basic Single Slot Lithium-Ion Rechargeable batter Charger – 120V AC power only. Recommended for desk-top use only.
MA6752	Desktop/Vehicle DC Lithium Ion Charger Kit, 120 V AC power for desktop use, or 12 VDC vehicle adapter for vehicle charging. Also includes battery diagnostics and charge status LED’s.

Refer to Chapter 5 for additional battery charger information, such as characteristics and operation.

Cases / Holsters

There are several cases / holsters that can be used with the radio:

Table 6-4 Liberty™ Cases / Holsters

Part Number	Description
1600697-1 (FUTURE)	Leather Carry Case, D-Ring for Radio with Rechargeable Battery(swivel D-ring included)
1600697-2 (FUTURE)	Leather Carry Case, Belt-loop for Radio with AA Clamshell
1600702-1 (FUTURE)	Nylon Duty Case for Radio with Rechargeable battery
1600704-1 (FUTURE)	Chest Pack Holster – includes space for radio, spare battery, and map pouch.
40508	Spring Loaded Belt Clip – attaches to the battery for a slim profile

Audio Accessories

There are several cases / holsters that can be used with the radio:

Table 6-5 Liberty™ Audio Accessories

Part Number	Description
1100542-501 (FUTURE)	Earphone Kit for Speaker Microphone, plugs into the ear, connects to the Speaker Microphone and “mutes” its’ speaker.
1600696-1	Speaker Microphone, balanced audio, fits in the palm of the hand or attaches to shoulder strap, has its’ own Press-To-Talk (PTT) switch and volume control .
1600696-2 (FUTURE)	Speaker Mic with Antenna, balanced audio, fits in the palm of the hand or attaches to shoulder strap, has its’ own Press-To-Talk (PTT) switch and volume control . Includes a top mounted antenna.
1600696-3 (FUTURE)	GPS Speaker Mic, balanced audio, fits in the palm of the hand or attaches to shoulder strap, has its’ own Press-To-Talk (PTT) switch and volume control . Also includes GPS receiver.
1600703-1	Audio/Programming Side Connector Adapter, includes 6-pin Hirose connector for audio and keyfill, and USB for programming, cloning, and data transfer.
42803-001 (FUTURE)	Lightweight Headset, contains boom microphone, PTT, and in/near ear headset
42804-001 (FUTURE)	Heavy Duty Headset, contains boom microphone, PTT, and over the ear headset

Cables

The following cables are available for use with the radio:

Table 6-6 Liberty™ Cables

Part Number	Description
1600703-1	Audio/Programming Side Connector Adapter, includes 6-pin Hirose connector for audio and keyfill, and USB for programming, cloning, and data transfer.
1600705-1 (FUTURE)	Universal Cable, cable with flying leads to connect radio to user-specific applications
3100965-501	PC Programming Cable Kit, consists of 1600703-1 Audio / Programming side connector adapter and COTS USB Type A male / Mini-AB cable. Used to connect radio to PC for programming.
3100966-501 (FUTURE)	Radio Cloning Cable Kit, consists of two (2) 1600703-1 Audio / Programming side connector adapters and COTS USB Mini-AB / Mini-AB cable. Used to connect two radios together for channel cloning.

Surveillance Equipment

The following surveillance equipment is available for use with the radio:

Table 6-7 Liberty™ Surveillance Equipment

Part Number	Description
1600497-1 (FUTURE)	Security Harness (3 Wire), Tan in color with wired earpiece. Requires audio / programming Side Connector Adapter, PN 1600703-1.
1600497-2 (FUTURE)	Security Harness (3 Wire), Black in color with wired earpiece. Requires audio / programming Side Connector Adapter, PN 1600703-1.
1600497-3 (FUTURE)	Security Harness (2 Wire), Tan in color with wired earpiece. Requires audio / programming Side Connector Adapter, PN 1600703-1.
1600497-4 (FUTURE)	Security Harness (2 Wire), Black in color with wired earpiece. Requires audio / programming Side Connector Adapter, PN 1600703-1.
1600497-6 (FUTURE)	Wireless Earpiece for Security Harness, requires 1600497-8 neck loop transducer
1600497-8 (FUTURE)	Neck Loop Transducer, for wireless earpiece

CHAPTER 7 GLOSSARY

This glossary contains a listing of Acronyms' and Definitions that are applicable to the Liberty™ Radio.

ACRONYMS'

Term	Description
AES	Advanced Encryption Standard
AN	Analog Narrowband
AW	Annalog Wideband
BIT	Built-In-Test
CDCSS	Continuous Digital Coded Squelch System
CDCSS (also DCS)	Continuous Digital Controlled Squelch System
CTCSS	Continuous Tone-Controlled Squelch System
CTCSS	Continuous Tone Coded Squelch System
DES	Data Encryption Standard
DTMF	Dual-Tone Multi-Frequency (DTMF)
GPS	Global Positioning System
HMI	Human-Machine Interface
IBIT	User Initiated Built-In-Test
KEK	Key Encryption Kay
LCD	Liquid Crystal Display
LMR	Land Mobile Radio
NAC	Network Access Code
OTAP	Over-The-Air-Programming
OTAR	Over-The-Air-Rekeying
OTG	On-The-Go
P25	Project 25 (Digital)
POST	Power-On-Self Test
PTT	Push-to-Talk
QRG	Quick Reference Guide
RF	Radio Frequency
RFSS	RF Sub-System
RSSI	Received Signal Strength Indicator
RX NAC	Receive Project 25 Network Access Code
RX TG	Receive Talk Group
SMS	Short Message Service
TEK	Traffic Encryption Key
TG	Talk Group

Term	Description
TX NAC	Transmit Project 25 Network Access Code
TX TG	Transmit Talk Group
USB	Universal Serial Bus
XCVR	Transceiver

DEFINITIONS

Term	Definition
Active Channel	The Selected Channel is receiving a signal that is of sufficient strength to overcome the programmed squelch level.
Bank	A bank is a group of zones. Zones can be assigned to banks during programming. The radio can store up to sixteen banks consisting of 16 zones each. Banks may be assigned names of up to eight characters
Carrier Squelch (CSQ)	Carrier Squelch (CSQ) is a squelch system based on RF signal present. It is adjustable and is also commonly referred to as Noise Squelch.
Channel	(xx channels) A group of characteristics, such as transmit / receive, radio parameters, encryption coding, Squelch, modulation, and power settings.
Continuous Digital Coded Squelch System (CDCSS)	CDCSS is a 23 bit data stream that is sent at a bit rate frequency of 134.4 Hz. It is also filtered prior to sending audio to the speaker. It is not widely used, but is also known by other names such as DCS, DPL, and others.
Continuous Tone Coded Squelch System (CTCSS)	CTCSS is an audio tone between 67.0 Hz and 254.8 Hz that is attached to the RF signal. It is used to filter out all unwanted communications present on that channel. The tone is filtered out of the signal prior to sending the demodulated audio to the speaker, which is why it is not heard. It is known by several brand names, such as Private Line, PL, Code Guard, and CG amongst others. Typically CTCSS tones are used by repeaters to filter out unwanted signals and also on a direct radio system to enable frequency sharing.
Control Channel	In a trunking system, one of the channels that is used to provide a continuous, two-way / data communications path between the central control and all radios on the system
Conventional	Typically refers to radio-to-radio communications, sometimes through a repeater. The user shares a frequency, or frequencies, with other users without the aid of a central controller to assign communication channels. Therefore, the user should monitor each channel before transmitting to avoid interfering with another user who may be transmitting.
HOME Channel	The Selected Channel when Scan is activated becomes the HOME channel. It is added to the active Scan Plan if not already included.
Initial Synchronization	Initial synchronization controls the length of time that the radio sends out a bit synchronization pattern.

Term	Definition
Monitor Time	The Monitor Time is the amount of time the radio will sample a channel picked up during a scan before the radio returns to scan operation. At the end of the monitor period, the radio will break reception and continue with the scan sequence. The Monitor Time can be programmed for OFF (default) or ON.
Network Access Code (NAC)	NAC is a digital code providing filtering of unwanted signals. It is typically used to replace the CTCSS tones used for Repeater Access. There are 4096 possible NACs, which are represented either in hexadecimal format (0-FFF) or decimal (0-4095) or both.
Open Channel	The squelch setting is overridden and the radio is in a constant receive state.
Quick Call	The QUICK CALL screen displays the various call choices for the user.
Radio Set Identifier (RSI)	RSI (Radio Set Identifier) is similar to a UnitID, and is typically set to the same value, although not required. It is used to gain access into a network. RSI's are typically used for network authentication reasons
Scan Hold Timer	If Talkback is disabled, the Scan hold Timer allows a user to monitor a channel that was picked up while scanning prior to re-entering the scan sequence. In addition, if Talkback is disabled, the Talkback Scan Timer is not used.
Selected Channel	The Channel/Frequency currently loaded into the radio for Receiving/Transmitting operations.
Squelch	The muting of audio circuits when received signals levels fall below a pre-determined threshold. With carrier squelch, the user will hear all channel activity which exceeds the radio's preset squelch level.
Standby	An operating condition whereby the radio's speaker is muted but still continues to receive data.
Subscriber Unit (SU)	Subscriber Unit is a generic name used for a mobile or portable radio unit that can terminate voice or data messages in a radio system.
Talk Around	Toggles channels enabled for talk around from talk around mode to repeater mode. Talk Around allows radio users to bypass a repeater and talk direct (DIRECT, CAR-CAR, TAC, etc) on a repeater channel. NOTE that the channels MUST have Talk Around enabled from the PC Programmer for this to have any affect.
Talk-Group (TG)	TG has multiple applications for Project 25. For conventional Project 25 channels, talkgroups are an additional method of breaking up channels, providing a means for several groups to share a repeater without disturbing one another (repeaters can re-transmit only one signal at a time). For trunked channels, talkgroups indicate where the control channel directs the radio. There are 65535 possible TGs, represented in hexadecimal format (FFFFFF) or decimal (0-65535).
Transmit (TX) Timeout	The radio can be programmed to end transmission automatically after a pre-determined length of time in transmit mode. The radio gives a warning tone and visual indication immediately before ending

Term	Definition
	transmission. The visual indication ("TIME" on the front display) continues until the radio exits transmit mode or the radio is unkeyed, whichever comes first.
UnitID	UnitID (Unit Identifier) is a unique parameter that specifies one particular radio. It can be used to identify an incoming call or to initiate a unit-to-unit call. There are over 16,777,215 possible values. Every Project 25 device (handhelds, mobiles, repeaters, base stations, consoles, etc) may be assigned a UnitID
Zone	A zone is a group of channels. Each zone can be assigned up to 16 channels. The radio can store up to 16 zones, or groups of channels.
Zone	A zone is a group of channels. Each zone can be assigned up to 16 channels. The radio can store up to 16 zones, or groups of channels.

APPENDIX A – QUICK REFERENCE GUIDE

Liberty™ Multiband Land Mobile Radio

Quick Reference Guide



APRIL 2009

Refer to the LIBERTY™ User's Guide (PN 84382) for additional detailed information on radio operation.

ANTENNAS

Antenna PN	Frequency Range
1600678-1	136-174 MHz, 380-520 MHz, and 763-869 MHz

INITIAL SET-UP

1. Attach a charged LIBERTY™ rechargeable battery to the radio.
2. Attach the antenna by twisting clockwise until it is secured to the radio antenna connector.
3. Use the ON/OFF/Volume control switch on top of the radio to turn on the radio.
4. Turn the channel select switch on top of the radio to the desired operating channel.
5. Use the ZONE Select (A/B/C) Switch to change zones.

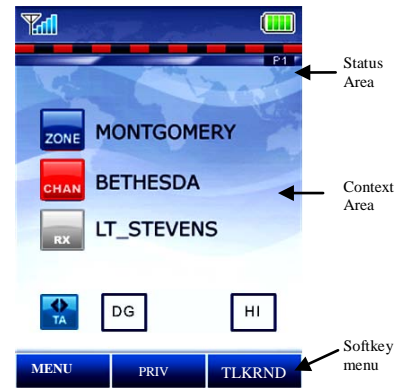
CONTROLS, INDICATORS, and KEYPADS



WHAT IS THE RANGE?

- Range is line of sight. If you can see the antenna location, you are in range.
- On flat land, horizon is the limiting factor – will get 5-6 miles
- Range can be extended by elevating an antenna (or using repeaters)
- Best range when antenna is held vertical and away from body.
- Use maximum RF output for best range (VHF, UHF: 5W, 700 MHz: 2.5W, 800 MHz: 3W)

Operating Screen:



Status Area

- Received Signal Strength
- Battery Charge Status
- High / Low TX Power Settings

Context Area:

- Current Zone Name
- Current Channel Name
- Zone and Group Information
- Communication Mode (Talk-Around or Repeater)
- Channel Type (AN, AW, or P25)
- P25 ID Display (Also see P25 Unit to Unit Call)
- P25 Unit Call Status (Also see P25 Unit to Unit Call)

Softkey Menu


(displays programmed softkeys only)

- Menu
- PRIV (Private Call)
- TLKRND (Talk Around)

LED Indicators:

LED Indicator	What it Means
RED	Radio Transmitting
Flashing RED	Low Battery (while transmitting)
GREEN	Receiving/Busy Channel Indication
OFF	Standby

Programmable Side Buttons:

Side Buttons	Programmable* Options
	Each button can be pre-programmed: <ul style="list-style-type: none"> • Hi/Lo Power • Monitor • Scan • Priority Scan • Talkaround
	*Pre-Programmed via PcProgrammer

Radio Information Menu:



VIEWABLE access to all users for:

- Manufacturer information
- Radio Serial Number (SN)
- Software Version
- Transceiver Serial Number (SN)
- Baseband Serial Number (SN)
- Keypad Serial Number (SN)
- Customer Support phone number

TRANSMITTING / RECEIVING

!	NOTE Prior to transmitting, verify that the LED is NOT illuminated GREEN (solid or flashing). This indicates RF traffic on that channel. Wait for it to clear.
----------	--



Transmitting To Transmit:

- Push the PTT button
- Speak into microphone (3-6 inches)

LED Transmit indications

- OFF – not transmitting or receiving
- **RED** – transmitting

Transmitting with Speaker/Mic

- Push PTT on speaker/mic
- Speak into speaker/mic

Transmitting/Receiving (cont.):

Receiving

Conventional Channels Talkgroups

- Verify PTT is NOT depressed
- Audio will come from speaker (or speaker/mic)

LED Receive indications

- OFF – not transmitting or receiving
- GREEN – receiving signal

P25 Unit to Unit Call

To place a call within your unit,

1. Press the PRIV Softkey from the HOME screen.
2. Enter the Unit ID number.
3. Press enter, then press PTT to initial the call. The Unit ID will be active until a different channel is selected, or the user presses EXIT.



SCAN – Conventional and Priority

Enable SCAN – two (2) options:

1. Press the MENU Key and navigate to the scan menu and select SCAN and set to ON. Scanning will start immediately when ON is selected. Once the SCAN function is set to ON, exit the SCAN Menu Screen.

OR

2. Press one of the side buttons that has been pre-programmed to SCAN.

Enable PRI SCAN – two (2) options:

1. Press the MENU Key and navigate to the scan menu and select SCAN, select PRI SCAN, and set to ON. Scanning will start immediately when ON is selected. Exit the SCAN Menu Screen.

OR

2. Press one of the side buttons that has been pre-programmed to PRI SCAN.

MENU ACCESS:

!	NOTE Some or all menus may not be accessible due to password protection (future).
----------	---



- PRESS MENU softkey or NAV ENTER button to access menus
- Once in MENUS, use the left/right arrow keys to scroll to the desired parameter.
- **To Edit/Modify an entry** -- either press ENT to view the drop down menu. Or use the numeric keypad to enter the required data.
- **To save changes**, first press SAVE, then use the arrow up key to get to the top of the menu, the use the left/right arrows to scroll to the next menu.
- **To EXIT** -- Press EXIT to return to HOME Channel.

LCD and Keypad Backlight/Screen Saver

The user may turn on the backlighting for the display, keypad, and channel numbers (around the 16-position Select knob), by pressing any key, button, or turning any knob. These lights will remain on for a pre-determined time period before they turn off automatically.

!	NOTE Screen Options that are grayed out – are not available this version of software.
----------	---

SELECT Menu

!	NOTE The Channel List and Talk Groups on this screen are currently grayed out and cannot be modified in this version of software. To change channels, use the Channel Knob located on top of the radio.
----------	---



- Select Banks (collection of zones)
- Select Zones (collection of channels/TG's)
- Turn Talk-Around ON or OFF (FUTURE)

VIEW CHANNEL Menu



VIEW access only

- View Channel parameters

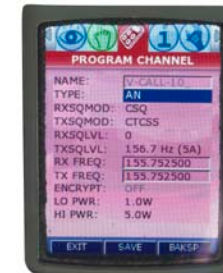
PROGRAM CHANNEL Menu

PROGRAM CHANNEL – P25



- The Channel name is displayed.
- Select the waveform TYPE P25
- Enter the RX/TX Freq
- Enter the RX/TX NAC
- Enter the RX/TX TG
- Turn ENCRYPT ON or OFF
- Adjust the LO/HI Power Setting

PROGRAM CHANNEL – AN



- The Channel name is displayed.
- Select the waveform TYPE AN
- Enter the RXSQMOD (CSQ, CTCSS, CDCSS)
- Enter the TXSQMOD (OFF, CTCSS, CDCSS)
- Enter the RXSQLVL (0-16, 0 is open squelch)
- Enter the TXSQLVL
- Enter the RX/TX Freq ranges
- Adjust the LO/HI Power Setting

PROGRAM CHANNEL – AW



- The Channel name is displayed.
- Select the waveform TYPE **AW**
- Enter the RXSQMOD (CSQ, CTCSS, CDCSS)
- Enter the TXSQMOD (OFF, CTCSS, CDCSS)
- Enter the RXSQLVL (0-16, 0 is open squelch)
- Enter the TXSQLVL
- Enter the RX/TX Freq ranges
- Adjust the LO/HI Power Setting

MAINTENANCE Menu



- View Maintenance Information

! **NOTE**
This screen is temporarily being used for Downloading Radio configuration file to radio (puts radio in program mode by being on this screen) – for future releases of the radio – this will be automatic.

! **NOTE**
The radio does not transmit or receive while on the Maintenance Screen.

RADIO INFORMATION Menu



- View Radio Information

MAINTENANCE

Radio Preventive Maintenance

- Check the radio for external damage, such as bent connectors and possible loose hardware.
- Periodically clean the radio, especially after exposure to salt water, sand, or mud.
- Wipe the exposed contacts (side connector, battery connector) with fresh water and then dry with low pressure air, if available.
- Small particles of dirt and debris may infiltrate the grill of the speaker/microphone and should be cleaned using a small brush or low pressure air, if available.

Battery and Antenna Installation/Removal

ANTENNA

- Twist clockwise until fully seated to install
- Twist counterclockwise to remove
- DO NOT carry radio by antenna.

BATTERY

- Install and Remove by pressing tabs on both sides to release
- To install, insert top of battery under flap at top and click tabs in place at bottom
- To remove, press tabs and lift out from battery (recommend turning radio OFF first)



Troubleshooting

Symptom	Probable Cause	Corrective Action
Radio does not operate	• Battery not properly connected	• Before removing battery from the radio, make sure the radio is turned-off first. • Remove and re-install battery – be sure to clean the battery contacts before re-installing the battery.
	• Battery dead	• Either Charge or Replace battery
Screen Blank	• Radio in screen saver mode	• To re-activate the screen – press PTT, change the volume or channel, or press any key. The screen will also be re-activated when a call is received.
Cannot communicate with other radio users	• Radios set to different frequencies	• Set all radios to the same frequency (can be accomplished by loading from PC Programmer).
	• Radios are set with different CTCSS tones	• Set receive and transmit CTCSS tones the same in all radios
	• Radios set to different modulation types	• Set Radios to same modulation types
External Speaker/Mic not working (no audio)	• External Speaker/Mic not properly installed	• Verify speaker / mic is attached correctly.
	• No audio	• Remove and replace the external audio speaker/microphone • Check the INT/EXT Audio Switch - Functionality – EXT/INT Audio (“φ” EXT and “0” INT)
Radio does not scan	• SCANLISTS not programmed into radio	• Set SCANLISTS in PcP and download to radio
	• SCAN is not set to ON	• Set SCAN to ON via the SCAN Menu
Radio does not communicate with Pc Programmer	• Pc Programmer not installed correctly.	• Refer to Pc Programmer Manual for installation instructions of the software.
	• Pc Programmer Cable not connected properly	• Check cable connections, remove and re-attach Pc Programmer cable. • USB Driver not installed or Network settings not properly configured.

! **NOTE**

LIBERTY™ RADIOS

Please use the following field support contact information:

Contact Info:
 Bob DiDonato,
 Thales Communications, Inc.
 Mobile: 1-410-908-7678
 Email: Bob.DiDonato@thalescomminc.com

Scott Glazer,
 Thales Communications, Inc.
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APRIL 2009

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Multiband Land Mobile Radio



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