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SHOUT 3G User Guide

Version B

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Powered by iridium

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REVISION HISTORY

Revision	Date	Description
1.0.0	5/16/2017	Draft
A	9/10/2019	Initial released version
B	03/16/2022	Updated to new template Performed editorial review

REFERENCE DOCUMENTS

The latest revisions of the NAL documents are available from the NAL Research website at https://www.nalresearch.com/support/documentation-downloads/.

Reference	Title	Revision/Date
[1]	PECOS Message Definition Specification, 200907-001	Version 1.7 July 29, 2009
[2]	SatTerm for SHOUT 3G	Version 8.8.6, May 9, 2017

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GLOSSARY

3G .....Third generation

ABS .....Acrylonitrile Butadiene Styrene

AES .....Advanced Encryption Standard

BIS .....Bureau of Industry and Security

CE .....Conformité Européenne

CEP .....Circular Error Probable

DCS .....Distributed Control Systems

DISA .....Defense Information Systems Agency

DoD .....Department of Defense

EAR .....Export Administration Regulations

EDGE.....Enhanced Data rates for GSM Evolution

EMI .....Electromagnetic Interference

EMSS .....Enhanced Mobile Satellite Services

FCC .....Federal Communications Commission

FDMA .....Frequency-Division Multiple Access

GMT.....Greenwich Mean Time

GPRS .....General Packet Radio Service

GPS .....Global Positioning System

GSM.....Global System for Mobile Communications

HACC .....Horizontal Accuracy

HDOP.....Horizontal Dilution of Precision

HSPA.....High-Speed Downlink Packet Access

HSUPA .....High-Speed Uplink Packet Access

IC .....Industry Canada

IMEI .....International Mobile Equipment Identification

IP .....Internet Protocol

LCD .....Liquid-Crystal Display

LED .....Light-Emitting Diode

Li-ion.....Lithium-ion

LTE.....Long-Term Evolution

NDA.....Non-Disclosure Agreement

NOC.....Network Operation Center

OFAC.....Office of Foreign Asset Controls

PCS.....Process Control Systems

PDOP.....Position (3D) Dilution of Precision

PIN.....Personal Identification Number

PMS.....PECOS Message Structure

POP.....Post Office Protocol

RF.....Radio Frequency

RUDICS.....Router-Based Unrestricted Digital Internetworking Connectivity Solution

SBAS.....Satellite-Based Augmentation System

SBD.....Short-Burst Data

SIM.....Subscriber Identification Module

SMS.....Short Message Service

SMTP.....Simple Mail Transfer Protocol

TBR.....Time-Between-Reports

TDD.....Time Division Duplex

TDMA.....Time-Division Multiple Access

TTKT.....Time To Keep Trying

UMTS.....Universal Mobile Telecommunications System

USB.....Universal Serial Bus

UTC.....Coordinated Universal Time

VDOP.....Vertical Dilution of Precision

WCDMA.....Wideband Code Division Multiple Access

1 INTRODUCTION

The SHOUT Third Generation (3G) is a handheld satellite/cellular messaging and personal tracking device. It is designed to operate in one of three modes; single-mode with the Iridium satellite network, single-mode with any cellular network including AT&T and T-Mobile, or in Iridium/cellular dual-mode. It can transmit location information determined by a highly sensitive Global Positioning System (GPS) receiver, inbound and outbound status, text messaging, and emergency/alert notifications.

The SHOUT 3G significantly improves service reliability over existing tracking products by allowing two-way communications and confirmation of the nature of the distress to the first responder community. This reduces false alerts; helps identify the nature of the emergency so that the correct assets can be deployed, thereby reducing search and rescue costs; and provides communications feedback capability to the user to assist in rescue efforts. When using the Iridium link, the SHOUT 3G protocol is 100% backward compatible with the SHOUT, SHOUT nano, SHOUT ts, and SHOUT gsm. In this document, the terms SHOUT 3G and 3G are used interchangeably.

The SHOUT 3G is designed with ultra-low power consumption electronics drawing less than 70 µA during sleep. With an internal 2.15 Ah rechargeable Lithium-ion (Li-ion) battery, depending on the environmental conditions, it can send a position report every ten minutes for more than ten days (more than 1,600 reports). Read **Appendix C: Power Consumption** to learn about the impact of blocked antennas on the number of reports. The 3G is equipped with a high-resolution color touchscreen and on-screen keyboards, allowing transmission of free-text, canned messages, and a combination of free-text and canned messages. The menu options are displayed as icons for quick access. The device can periodically wake up from sleep to send its position report to a network operation center. A 911 button is used for immediate emergency/alert notifications. Data are packaged in either standard unencrypted or 256-bit Advanced Encryption Standard (AES) encrypted format.

The SHOUT 3G is capable of sending position reports and text messages in PECOS Message Structure (PMS). The PMS complies with the Blue Force Tracking Data Format Specification as defined in the document PECOS 200907-001 Version 1.7 [1]. The 3G is shipped without PMS

features activated and can only be enabled by NAL Research at the request of an authorized user. Functions related to PMS are described in **Appendix A: PMS Features**.

The SHOUT 3G offers a variety of services including:

- **Normal Tracking Reports —** The 3G can be programmed to automatically wake up and send a position report at a set interval ranging from once every minute to once every forty-five days (at one-minute increments).
- **Emergency Alert Reports —** Pushing the Emergency 911 button immediately sends alert reports to a designated monitoring center(s). The home base and user can then communicate to define further specifics of the situation and a response to the emergency.
- **Free-Text Messaging —** The 3G supports sending free-text messages via three different sets of touchscreen keyboards.
- **Canned Text Messaging —** The 3G supports sending canned (pre-defined) messages stored in its memory. Sending canned messages saves bandwidth (effectively cost), because only short codes are transmitted to the server instead of the entire message body.
- **Waypoint Tracking —** The 3G supports sending and/or saving waypoints for later retrieval. A waypoint is a GPS location that a user wants to identify and mark with a specific name tag for future reference.
- **Check-In —** The 3G supports sending a quick check-in message using a single key.
- **Man Down —** The 3G has an integrated motion sensor used to activate alerts in a man-down situation.
- **Geofencing —** The 3G accepts multiple fences defined as polygons (50 fences with up to 50 points each fence). The 3G can be activated based on conditions set by these fences.
- **Data Logger —** The 3G has a circular buffer and can be programmed to store up to 4,000 positions for later retrieval.

Important: NAL Research can enable the SHOUT 3G for use on the Department of Defense (DoD) Enhanced Mobile Satellite Services (EMSS) Iridium Gateway (only for the Iridium network

and not cellular networks). However, accessing the EMSS Iridium Gateway is not authorized until the SHOUT 3G is provisioned (signed up for airtime). Unauthorized attempts to access the EMSS Gateway will result in immediate disabling of the offending device, which must then be returned to NAL Research for repair. See https://emss.pac.disa.mil/home.shtml for more information regarding DoD EMSS service provisioning.

Important: Do not disassemble the 3G for repairs or service. The warranty is voided if the 3G is disassembled. Return it to NAL Research for services by calling 703-392-1136 x203 or emailing contact@nalresearch.com.

2 USING THE SHOUT 3G

2.1 DEVICE DESCRIPTION

The SHOUT 3G comprises a touchscreen, a Power/Back button, a status LED, a guarded Emergency 911 button, and a USB Micro-B port.

- The touchscreen provides easy access to the device features.
- The Power/Back button turns on the device and can also be used as a back key.
- The Light-Emitting Diode (LED) displays device status during emergency and tracking.
- The guarded Emergency 911 button activates a dedicated emergency message sequence until cancelled by the user.
- The Universal Serial Bus (USB) Micro-B port is for charging, firmware updates, and setting parameters using the NAL Research SatTerm application.

Important: Unlike the cellular link that can be used indoors, the SHOUT 3G must have full view of the sky when the Iridium link is used.

Figure 1: SHOUT 3G Exterior Components

2.2 ACCESSORIES

The SHOUT 3G includes the following accessories.

AC Wall Adapter

USB-A to USB Micro-B Cable

Figure 2: SHOUT 3G Accessories

2.3 CHARGING THE BATTERY

The SHOUT 3G is shipped with its internal Li-ion battery partially charged. Fully charge the 3G before use. There are two ways to charge the 3G:

- Use the supplied AC wall adapter.
  - The charging time is approximately five hours.
- Connect to a standard USB device.
  - The charging time depends on the type of USB port.
    - USB 1.0 should be able to charge the 3G in about a day, assuming the port is capable of producing an output current of 100 mA.
    - USB 2.0 can charge in about 8 hours, assuming the current output of 0.5 A.

A common 2 amp USB wall adapter can fully charge the device in under 3 hours. NAL Research offers 12 VDC and 28 VDC chargers sold as separate items.

WARNING!

All batteries can cause property damage, injury, or burns if a conductive material, such as jewelry or keys, touches exposed terminals. The material may complete an electrical circuit and become extremely hot. To protect against such unwanted current drain, exercise care in handling any charged battery, particularly when placing it inside your pocket, purse, or other container with metal objects.

Do not disassemble the SHOUT 3G for battery replacement. Return it to NAL Research for services. Risk of explosion if battery is replaced with an incorrect type. Dispose of the batteries (3G) according to local, state, and federal regulations or laws.

The 3G has a battery status symbol  at the top-right corner of its touchscreen indicating the battery is being charged. A message appears when charging is complete. The device can be safely operated and does not need to be turned off while charging. The charging cycle completes quicker when the device is turned off. While using the 3G, the battery symbol turns red when the remaining power is less than 20%. A warning message appears when the remaining power is less than 10%.

2.4 CELLULAR SIM CARD

The SHOUT 3G has a cellular micro- Subscriber Identification Module (SIM) card slot on the side of the chassis next to the USB Micro-B port. For cellular services, the SHOUT 3G accepts any cellular micro-SIM with services on a network that supports 2G Global System for Mobile Communications (GSM)/GPRS and 3G Universal Mobile Telecommunications System (UMTS)/ High-Speed Downlink Packet Access (HSPA) services. A 4G LTE-only network will not support the SHOUT 3G. NAL has validated SHOUT 3G operation on both AT&T and T-Mobile networks. Due to network device requirements, the Verizon network is not supported. Request an account that supports SMS service, packet switch data service, or both.

2.5 TOUCHSCREEN

The SHOUT 3G has a resistive touchscreen. Use either a finger or a stylus to select options displayed on the screen. Resistive touchscreens offer consistent and durable performance in harsh environments. However, as with any touchscreen device, be careful not to damage it with a sharp object. A plastic stylus with a rounded tip is recommended. Unlike a capacitive touchscreen found on most cellular phones where a slight tap of the finger is required, a resistive touchscreen requires more moderate finger pressure. Resistive touchscreens drift slowly over time and need to be recalibrated periodically. To do this, open the **Setting** > **Calibrate** menu.

Either a stylus or gloved finger can be used to access features on the resistive touchscreen

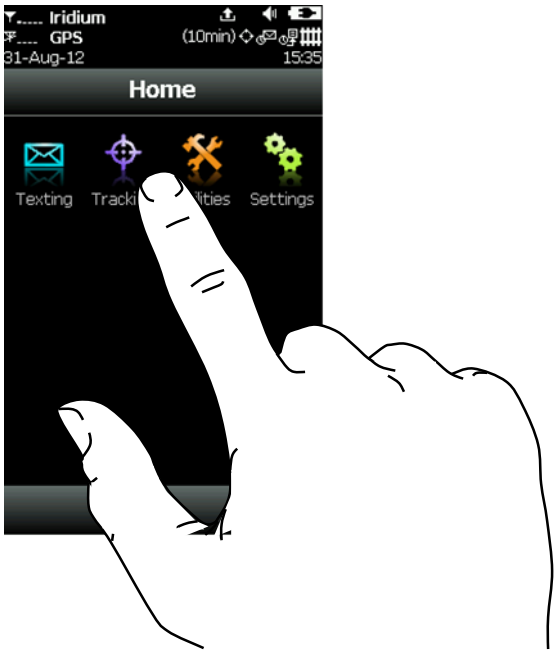

Figure 3: Resistive Touchscreen

2.6 BASIC NAVIGATION

- **Turn on** the SHOUT 3G by holding down the Power/Back button for approximately two seconds.

  Note: A delay in displaying time and date is normal because the unit must first check its internal clock against the GPS receiver.
- Once the device is on, touch any icon to **access device features**.

  Note: Remember to apply moderate pressure with a fingertip. Resistive screens require more pressure than a slight touch.
- **Press** the **Power/Back button** at any time to return to the previous screen.
- Frequently used icons can be configured to appear at the bottom of the *Home* menu in the *Favorites* bar using **Settings** > **Favorites**.
- **Turn off** the 3G (completely off with no tracking or text messaging) at any time by holding down the Power/Back button for approximately two seconds. The device automatically "goes to sleep" after 90 seconds of inactivity.

2.7 USING THE KEYBOARDS

Some menu options require the use of on-screen keyboards to enter information. Three different keyboards are available in landscape orientation—lower case, upper case, and number/special characters. Switch between keyboards with special designated keys next to the *Done* key. The keyboard screen is divided into three sections as shown in **Figure 4** below: (1) header bar, (2) text box, and (3) keyboard.

The number displayed on the far right-hand side of the header bar indicates the remaining allowable number of characters that can be entered into the text box.

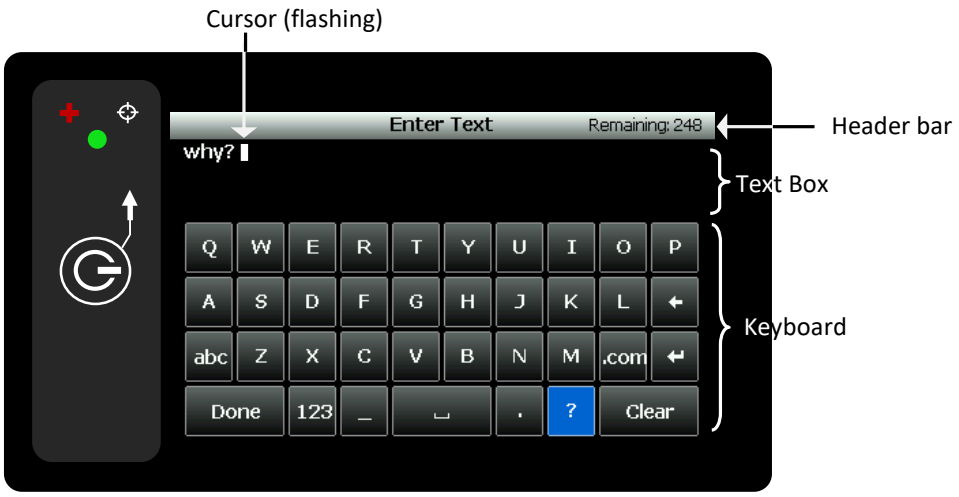

Figure 4: Keyboard Screen

Use the keyboards to enter text inside the text box. The recommended hand-position is shown in **Figure 5** below utilizing two thumbs to tap the keyboard. While entering text, the position of the cursor in the text box is shown as a flashing white block. The block turns red when the maximum limit is reached (Remaining: 0). An alert sounds when the maximum number of characters is exceeded and additional text is entered.

You can hold down any key while sliding around the keyboard. The key is not entered until the finger is lifted. Moving the finger away to the top or bottom of the screen cancels this option. The entire text box can be erased with the *Clear* button. *Unclear* reverses the process. Tap *Done* to accept entered text and return to the previous screen. Press the Power/Back key to return to the previous screen without saving any changes—all the changes will be lost.

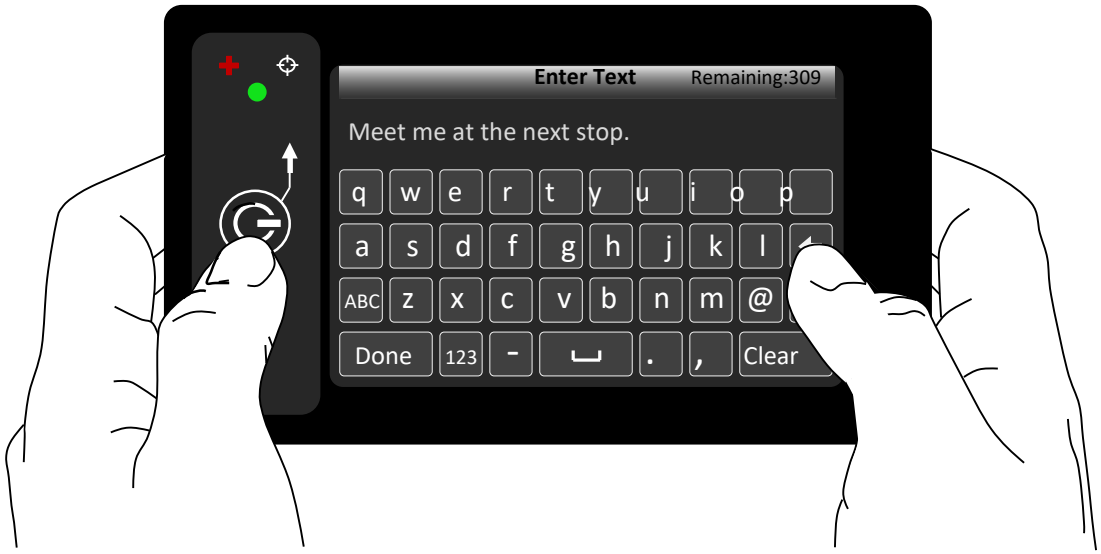

Figure 5: Keyboard Hand-position

Edit entered text by tapping anywhere inside the text box. It is much easier to use a fingernail or a stylus to accurately position the cursor over the character to be edited. Holding and sliding a finger inside the text box prompts the device to display a segment of the text in the header bar as shown in **Figure 6** below. The position of the cursor is displayed in red character. A space and enter key will appear as ␣ and ↵, respectively.

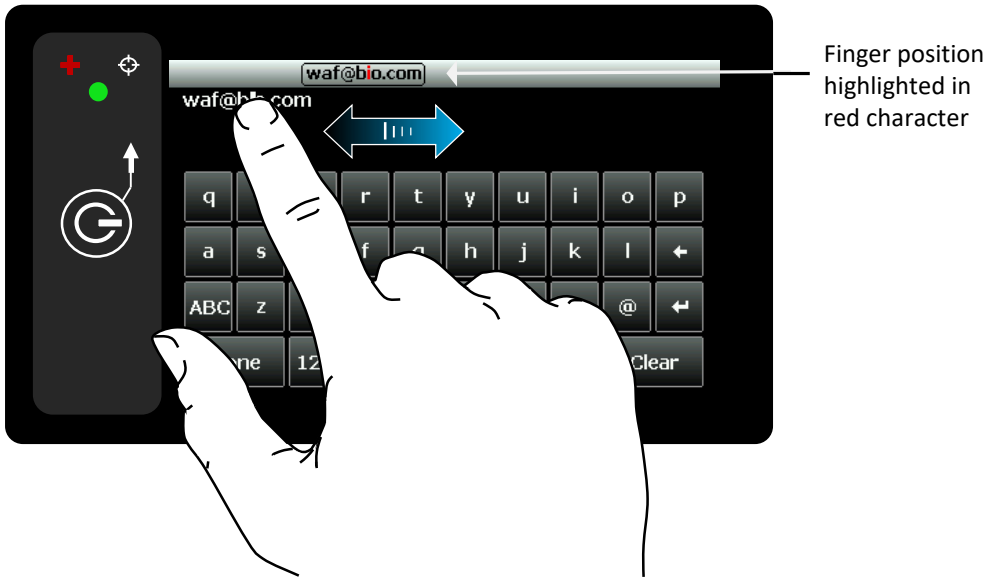

Figure 6: Hold and Slide on Keyboard

2.8 USING THE SEARCH BOX

Some menu options have a *Search* box to search for specific keywords or phrases. The search parameters are defined using **Settings** > **Search** menu. Touching the Search box opens a keyboard to enter the search item.

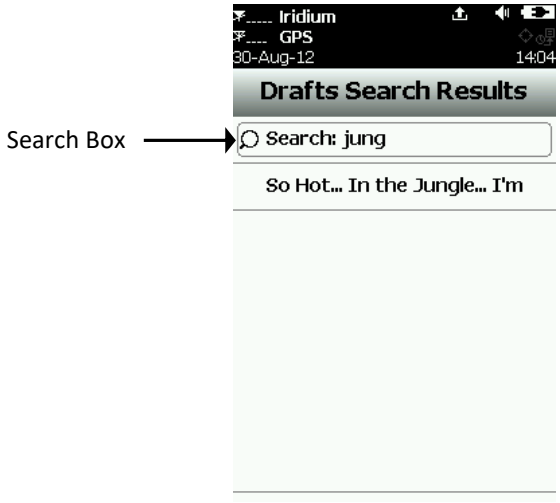

Figure 7: Search Box

2.9 USING THE SLIDER BAR

For menus with options longer than the screen can display, a slider bar appears on the right side of the screen. Hold and drag the slider with a fingertip to quickly scroll the list. A slight finger movement either up or down makes the 3G scroll one line at a time.

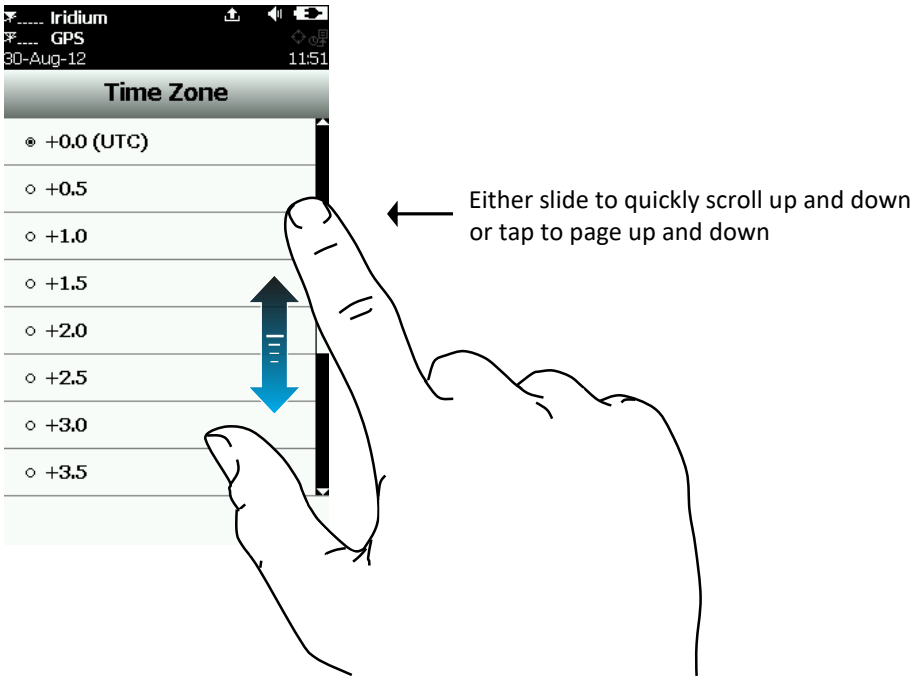

Figure 8: Slider Bar

Tapping above the slider prompts the screen to page up and tapping below the slider prompts the screen to page down. The active area or detection region of the slider bar is wider than the slider bar itself. Thus, it is possible to place a finger slightly away from the right edge of the screen to give a more comfortable feel.

2.10 NETWORK OPERATION CENTER (NOC)

The SHOUT 3G comprises a 9603 module capable of Short-Burst Data (SBD) connectivity to the Iridium satellite network and a 2G/3G cellular module capable of Short Message Service (SMS) and Internet Protocol (IP) connections. As a messaging and tracking device, its function is to send GPS reports and text messages to a Network Operation Center (NOC). While deployed in the field, the 3G can also accept real-time text messages and commands from a NOC. For Iridium services, the SHOUT 3G can be provisioned by NAL Research or any certified Iridium airtime service provider including, DoD Defense Information Systems Agency (DISA) EMSS office. For cellular services, the SHOUT 3G accepts any cellular micro-SIM, including AT&T and T-Mobile.

A NOC can be a sophisticated central monitoring center equipped with servers connected to high-speed networks. A NOC can also be as simple as a handheld mobile device, a laptop, or a

desktop attached to the internet, to an Iridium transceiver, or to any wireless network. A NOC is required to implement the logic necessary to receive and analyze messages from the SHOUT 3G and determine the appropriate response, as well as to formulate and transmit messages to the SHOUT 3G.

2.11 SERVER FOR TRACKERS SOFTWARE

Upon request, NAL Research provides *Server for Trackers* software, which you can install on your NOC to retrieve NAL Research's formatted GPS reports from the remote SHOUT 3G. In addition, the program lets a NOC communicate with modems attached to its serial ports, communicate with Post Office Protocol 3 (POP3)/ Simple Mail Transfer Protocol (SMTP) servers, communicate with Iridium SBD DirectIP servers, and/or act as a Router-Based Unrestricted Digital Internetworking Connectivity Solution (RUDICS) server/client to support incoming and outgoing communications with the 3G. Under special cases and with a signed Non-Disclosure Agreement (NDA), NAL Research will release our proprietary GPS report formats for developers to implement into their own tracking software.

2.12 SATTERM APPLICATION

Use the included SatTerm application to set up the SHOUT 3G operating parameters, geofences, contacts, and canned messages. Most of the operating parameters can be set using the 3G on-screen menus. However, if multiple changes must be made, SatTerm is a more efficient means to achieve this. SatTerm configuration files can be saved for loading into multiple devices. Also, more sophisticated features such as encryption and geofence must be carried out via SatTerm and a computer connected to the 3G. For contacts and canned messages, the 3G sends only short codes instead of the message body to a NOC server. Short codes are then mapped to the real addresses and/or canned messages with a lookup table saved on the NOC server during setup. Therefore, when SatTerm is used to enter contacts and canned messages, SatTerm synchronizes short codes between the 3G and the NOC server. Email addresses, on the other hand, can be entered on the fly.

2.13 NAL VUE MANAGEMENT TOOL

NAL Vue is a web-based locating, tracking, and communication management system that provides your team with situational awareness and control to make timely and effective mission decisions. NAL Vue is an integrated system bringing satellite, cellular, and other data together into a single and simple-to-manage display and control platform. NAL Vue tracks your assets by location and movement (position, speed, altitude, and heading) in real-time via GPS updates from your NAL Research devices and other compatible tracking devices.

The flexibility of the NAL Vue Asset Management System offers awareness of position over your global inventory of trackable assets such as the SHOUT ns. Whether you are tracking personnel, vehicles, shipping containers, etc., your designated system administrator maintains control and has the ability to communicate with any number of assets simultaneously. Conversely, NAL Vue does not allow others to see the location or movement of your assets unless you authorize it.

3 HOME SCREEN

1. Immediately after turning on the device, select the **Press To Unlock** bar located at the bottom of the screen.

   Note: A delay in displaying time and date is normal because the unit has to check its internal clock against the GPS receiver.

2. Enter a Personal Identification Number (PIN), if the device is set up with password protection.

   Note: NAL Research ships the 3G without password protection. However, if a PIN is factory-set, it should be 1111.

   The *Home* screen appears. Device status symbols are displayed along the top three lines of the home screen. Some symbols will not appear until an event is initiated, such as sending or receiving a message.

Splash Screen with *Press To Unlock* Button

Home Screen

Figure 9: Open Home Screen

3.1 STATUS SYMBOLS

Table 1: Status Symbols

	Denotes the primary network used to transmit reports/messages. Either Iridium or GSM label appears. To preserve battery life the Iridium transceiver and cellular module are only turned on when transmitting a message or position report; thus, a diagonal line is drawn over the symbol when off.
	Denotes either: (1) the Iridium transceiver or cellular module is on with real-time signal strength represented by the number of vertical bars or (2) SBD/SMS/IP message transmission is in progress. The signal strength can range from the lowest of zero to the highest of five bars. During transmission and with the Iridium link, the antenna must have a clear view of the sky. The SHOUT 3G cannot send messages or reports via the Iridium network from inside a building.
	Denotes the GPS receiver is off. The GPS receiver is always kept off to preserve battery life until time, date, or position information is needed.
	Denotes the GPS receiver is on with real-time satellite acquisition status represented by the number of vertical bars. • One bar represents valid time and date fix. • Two bars represent 2D fix or dead reckoning. • Three bars represent 3D fix with HDOP higher than 2.0. • Four bars represent 3D fix with HDOP less than 2.0. Although the SHOUT 3G's GPS receiver can often obtain a location fix when the antenna is partially blocked (near buildings, in a room next to a window, etc.), the antenna must have a clear view of the sky to minimize acquisition time, provide better position accuracy, and reduce power consumption.
	Battery charge indicator.
	Denotes the battery is being charged by an external power source.
	Denotes all audio alerts are off.
	Denotes audio alert is on.
	Denotes an unread message(s) is in the Inbox.
	Denotes a message(s) is in the Outbox ready to be sent or a message(s) in queue failed to send.

Table 1: Status Symbols

	Denotes *Mailbox Check* has been enabled when the symbol is bright white. The symbol turns dimmed gray when Mbox Check is off.
	Denotes *Geofences* has been enabled when the symbol is bright white. The symbol turns dimmed gray when geofence tracking is off. The geofence symbol does not appear when there are no fences saved into the device.
	Denotes *Call Out* has been enabled when the symbol is bright white. The symbol turns dimmed gray when Call Out is off. The Call Out symbol does not appear when there are no Call Out times saved into the device.
	Denotes tracking (standard tracking, geofence tracking, etc.) has been enabled when the symbol is bright white. When standard tracking is on, a countdown timer to initiation of the next report appears beside the tracking symbol. The symbol turns dimmed gray when tracking is off.
	Denotes *Man Down* has been enabled.

3.2 DATE/TIME

The current date and time are displayed in formats set by the **Settings** > **Time** > **Date** option. The GPS receiver has an internal clock; as long as the battery is not depleted and a valid position fix was previously acquired, the SHOUT 3G can recall the correct date and time. The message “Date/Time unavailable” is displayed when the 3G is unable to restore information from the GPS receiver.

3.3 HOME ICONS

The SHOUT 3G displays four main icons on its home screen (as shown in **Figure 10** below), each representing a menu option—**Texting**, **Tracking**, **Utilities**, and **Settings**. Detailed descriptions of each of these menu options and their submenus are included in the next section.

3.4 FAVORITE ICONS

The bottom of home screen has a favorites bar to provide quick and easy access to the most frequently used options. You can configure any of the menu icons to appear on the favorites bar using **Settings** > **Favorites**. A maximum of four favorite icons is allowed. The icons appear in the order of selection from left to right, as shown in **Figure 10** below.

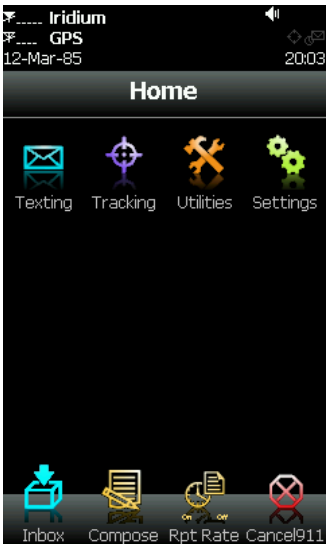

Figure 10: Home Screen with Four Favorites Bar Icons

4 QUICK START

Airtime services must first be purchased for Iridium, cellular, or both before use. Purchase Iridium airtime directly from NAL Research or from any of Iridium certified airtime resellers. A cellular micro SIM card, including prepaid SIM cards, on a network that supports 2G GSM/GPRS and 3G UMTS/HSPA services is required for the SHOUT 3G. A 4G LTE-only network will not support the SHOUT 3G. NAL has validated SHOUT 3G operation on both AT&T and T-Mobile networks. Due to network device requirements, the Verizon network is not supported. Request an account that supports SMS service, packet switch data service, or both.

Reading the entire manual is helpful to learn how to operate the 3G as a messaging device. As a tracking device, you can quickly set up the 3G with just a few simple steps shown below. However, a server is required to receive tracking reports.

1. Turn the 3G on by holding down the Power/Back button  for about two seconds.
2. Go to the **Tracking** > **Format** menu  to set the report format.
3. Go to the **Tracking** > **Links** menu  to select a network(s).
4. Go to the **Tracking** > **Rpt Rate** menu  to set the reporting rate and turn tracking on. The 3G is now in tracking mode and ready to send position reports. No further action is required. The unit automatically goes to “sleep” in between reports.

Important: NAL Research can enable the SHOUT 3G for use on the DoD EMSS Iridium Gateway (only for the Iridium network, not the cellular network). However, accessing the EMSS Iridium Gateway is not authorized until the SHOUT 3G is provisioned (signed up for airtime). Unauthorized attempts to access the EMSS Gateway will result in immediate disabling of the offending device, which must then be returned to NAL Research for repair. See webpage https://sbd.pac.disa.mil for more information regarding DoD EMSS service provisioning.

5 TEXTING MENU

Use the *Texting* menu to compose, save, view, and send canned or free-text messages, check the mailbox for incoming messages, and set up an automatic mailbox check frequency.

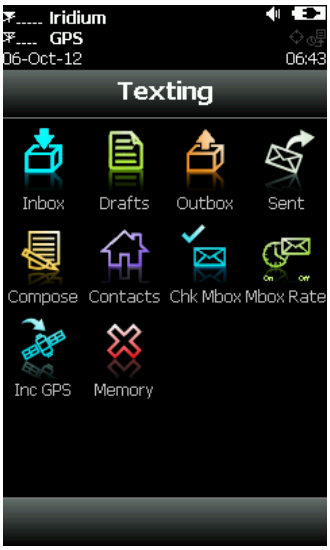

Figure 11: Texting Menu

5.1 INBOX

The *Inbox* folder contains all incoming read and unread messages with the newest at the top of the list. Read messages have a white opened envelope symbol next to them. Unread messages have a green closed envelope symbol next to them. A closed envelope symbol appears at the top of the screen when one or more unread messages are in the Inbox. Go to the **Settings** > **Audio** menu to enable the speaker, which provides an audible alert for all new incoming messages.

5.2 DRAFTS

The *Drafts* folder contains draft messages saved under the *Compose* menu. The 3G stores the newest message at the top and the oldest message at the bottom of the list.

1. Select a draft message to open the *Compose* screen.
2. Select **Send**. A *Confirm* and then a *Success* box appear to indicate that the message has been added to the Outbox.

Note: If the *Inc GPS* option is enabled, then GPS location will be attached to a message. Messages with GPS location attached can take longer to send because the 3G has to acquire a GPS position.

5.3 OUTBOX

The *Outbox* folder contains either messages waiting to be sent or messages that failed to send. A message in the process of being sent has a **<<** symbol next to it. A message that failed to send has a red **X** symbol. A message in queue waiting to be sent has no symbol. For each message queued in the Outbox waiting to be sent, the 3G has a two-minute window to transmit. Then the message will be dequeued to avoid draining the battery.

Messages that failed to send remain in the Outbox sorted in the order of priority and then by the oldest to the newest messages. The symbol appears at the top of the screen when there is a queued or dequeued message(s) in the Outbox.

Failed messages can be deleted or resent (enqueue). However, if you resend a failed message and if the failed message is successfully retransmitted, the SHOUT 3G automatically attempts to resend as many remaining failed messages in the Outbox as possible in the following order of priority.

Category 1 (highest priority):

- Callout
- Cancel Emergency
- Geofence Arrive/Depart
- Man Down

Category 2:

- Check-In
- Queued Tracking Report

Category 3:

- Motion Start/End Report
- Statistics Report
- Test Report

Category 4 (lowest priority):

- Remote Update Response
- Poll Report
- Text Message
- Waypoint

If there are multiple items in the same category, the oldest will be sent first. The SHOUT 3G automatically resends failed messages in the order stated above after a successful transmission (by accessing the network through methods such as Tracking, Test Report, Waypoint, etc.). To avoid draining the battery, maintain the Outbox frequently and delete unwanted failed reports.

5.4 SENT

The *Sent* folder contains messages successfully sent to a NOC server. A message can be resent, forwarded, or deleted.

- *Resend* moves a message to the bottom of the Outbox folder's sending queue.
- *Forward* opens the *Compose* menu to enter additional information. You can then resend the message after modifying it or cancel the process.
- *Delete* permanently removes the message from the *Sent* folder.

The 3G stores messages in the *Sent* folder with the newest message displayed at the top of the list.

5.5 COMPOSE

The *Compose* menu provides options to enter, edit, and send canned messages, free-text messages, or a combination of canned and free-text messages to: (1) a NOC server, (2) a predefined list of email addresses, and/or (3) any email addresses entered via the keyboards.

SatTerm software creates and saves predefined email addresses onto the SHOUT 3G's contact list. During setup SatTerm requires connectivity between the 3G and a NOC server to synchronize the lookup table of short codes. As with canned messages, short codes map the actual email addresses to a lookup table located at a NOC.

To compose a message:

1. Select the **Compose** menu. A screen appears with two distinct regions: "To: Server" and "Canned Message."
2. Hold a finger inside the *To: Server* region. The SHOUT 3G displays two options, *Choose Contacts* and *Enter Emails*, as shown in **Figure 12** below.

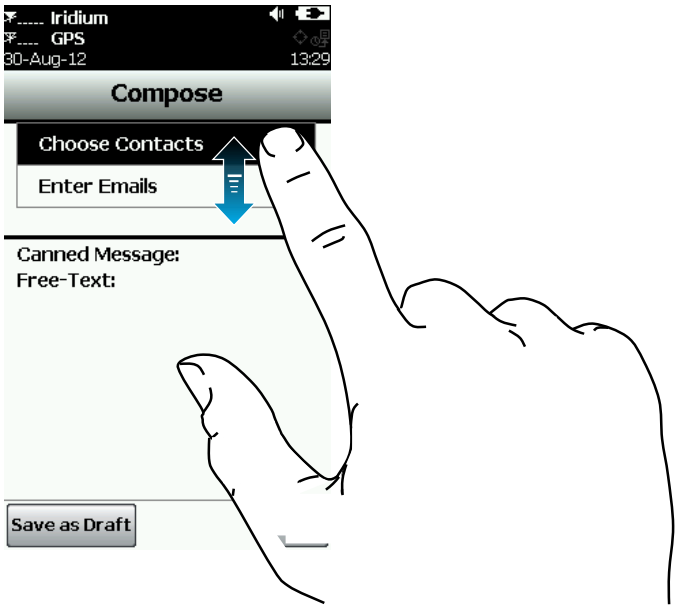

Figure 12: Choose Contacts or Enter Emails

- You can slide a finger back and forth between these two options.
- Remember to apply moderate pressure on the touchscreen while sliding the finger. DO NOT lift the finger until the right choice is selected.
- Sliding the finger away to the top of the screen or bottom of the screen cancels this option.

3. Choose Contacts

   a. If *Choose Contacts* is selected and if contacts were entered with SatTerm, a list of contacts appears in alphabetical order.

   b. Select a single contact or multiple contacts on the list and tap **Add** to accept.

   c. Remove a contact by going back to *Choose Contact*, unselecting the contact, and tapping **Add**.

      Note: Pressing the back key instead of *Add* after selecting or unselecting a contact cancels the choice(s).

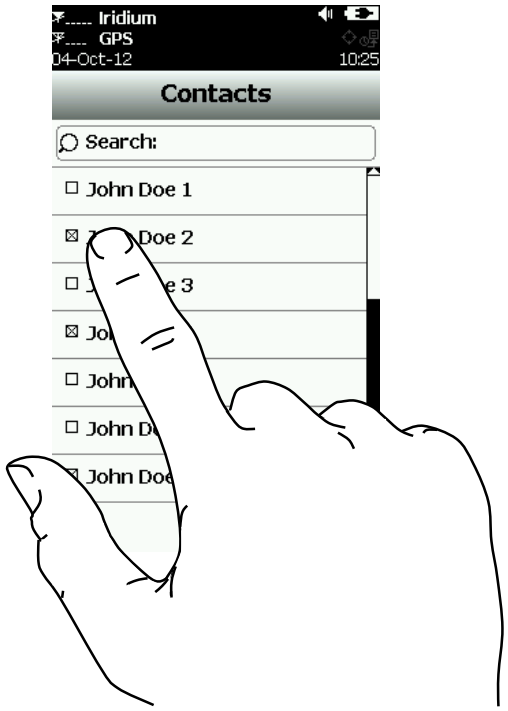

Figure 13: Choose Contacts

4. Enter Emails

   a. If *Enter Emails* is selected, a keyboard appears.

   b. Multiple email addresses can be entered separated by a comma.

      Note: All email addresses, including the commas, must be a total of 255 characters or less. The SHOUT 3G keeps track of the limit and prevents entering email addresses longer than allowed. Email addresses and free-text messages share the same memory space with a maximum allowable length of 309 characters. Long email addresses or multiple email addresses reduce the number of characters available for a free-text message.

      Note: The 3G sends short codes representing the contacts listed under *To*; however, the 3G sends the actual email addresses listed under *Emails*. Any email addresses entered under *Enter Emails* can be removed by going back to the keyboard under the *Enter Emails* pop-up menu.

5. Hold a finger inside the *Canned Message* region to view two options—*Choose Can'd Msg* and *Enter Text*.

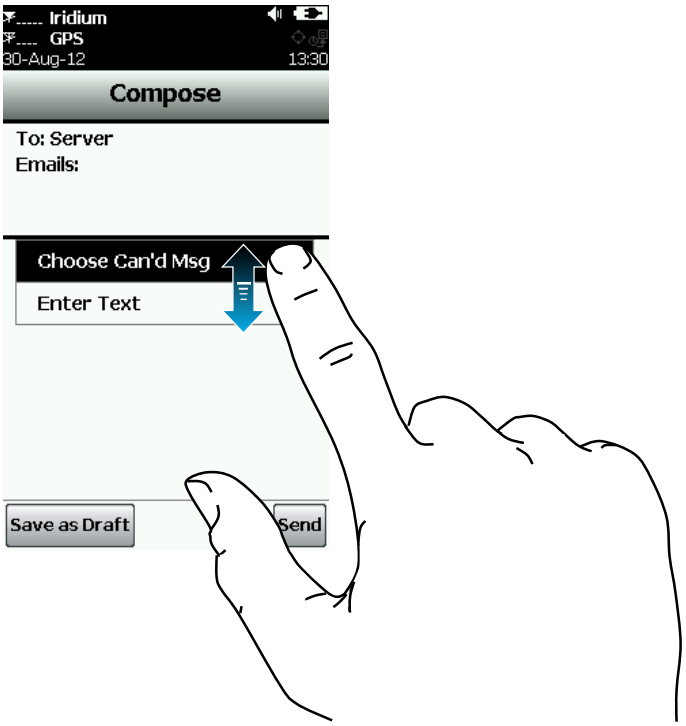

Figure 14: Choose Can'd Msg and Enter Text Options

6. If *Choose Can'd Msg* is selected and if canned messages were entered with SatTerm, a list of canned messages appears in the order they were entered with SatTerm.

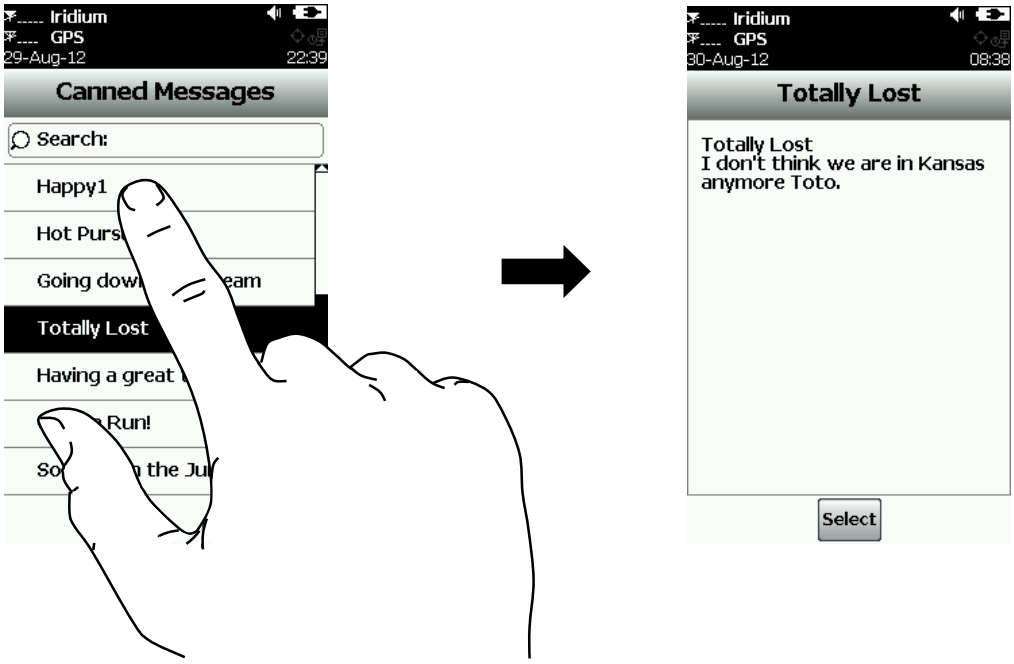

Figure 15: Select a Canned Message

a. Tap a canned message to view the complete canned message.

b. Tap **Select** to choose the message.

c. Hold a finger inside the *Canned Message* region to view the *Remove Can'd Msg* option. Select **Remove Can'd Msg** to remove the selected canned message at any time, even after free-text has been entered.

Note: As with the contact list, SatTerm is used to create and save canned messages into the SHOUT 3G's memory. During setup, SatTerm requires connectivity between the 3G and a NOC server to synchronize the lookup table of short codes. Sending canned messages saves bandwidth and airtime cost because only short codes are being transmitted instead of the entire message body. The short codes are defined by application developers and not by the 3G.

7. Enter Text

   a. Use the *Enter Text* option to create free-text messages with three on-screen keyboards (see the **Using the Keyboards** section). If a canned message is previously selected, then the entered free-text will be appended to the canned message.

8. Send the message or save as a draft.

   a. If *Send* is selected, a *Success* screen appears to indicate that the message has been added to the Outbox. Hold the 3G with the antennas having an unobstructed view of the sky if using the Iridium link.

      i. If *Inc GPS* option is turned on, then GPS location will be added to the message. Messages with GPS location take longer to send because the 3G has to acquire a GPS fix.

5.6 CONTACTS

The *Contacts* option is an address book with a list of contacts created and saved into the SHOUT 3G's memory using NAL Research's SatTerm software. During setup, SatTerm requires connectivity between the 3G and a NOC server to synchronize the lookup table of short codes. As with canned messages, short codes are used to map real addresses to a lookup table located at a NOC.

Figure 16 below displays an example of the formatted contact defined by the NAL Research's NOC server. The first line has the contact name, the second line has the email address, the third line has the phone number, and the fourth line has the home address.

Each contact is stored in a four-line format. The first line can have up to 30 characters, the second can have 50 characters, the third can have 30 characters, and the fourth can have 30 characters. The information contained in each line is defined by developers and not by the 3G.

Upon receiving a free-text or canned message from the 3G that is referenced to a specific contact, the NAL Research's NOC server forwards the message to the email address listed on the second line of the contact. Application developers can define their own set of rules with information contained in the contact so that their NOC servers can use them to determine the appropriate response.

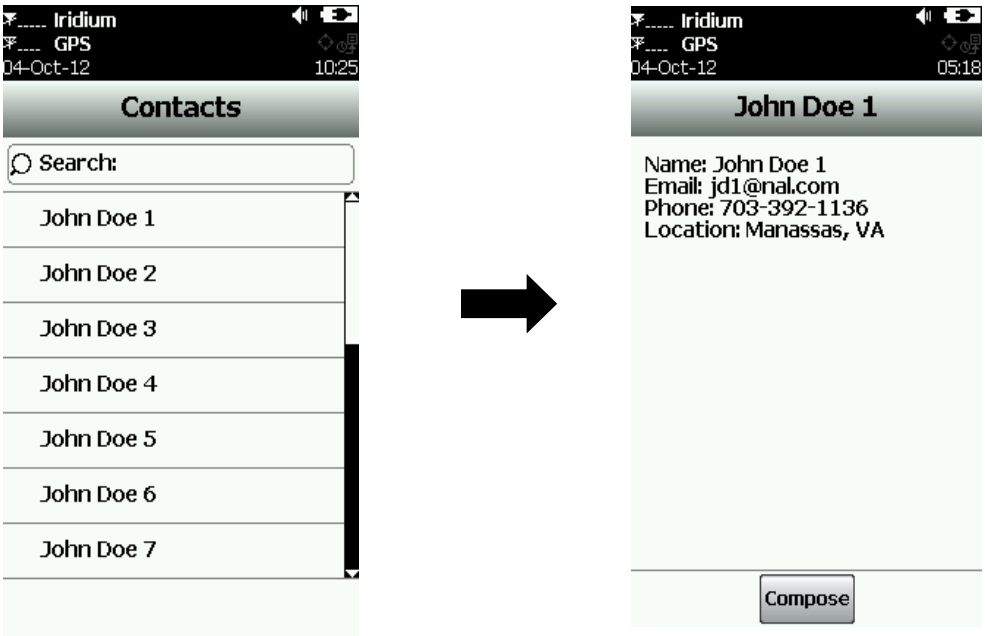

Figure 16: Formatted Contact

5.7 CHK MBOX

The Check Mailbox [*Chk Mbox*] option is available ONLY when the Iridium link is enabled. There are three ways the SHOUT 3G can initiate a mailbox check for any pending messages at the Iridium gateway:

- Manually force the 3G to check the mailbox at any time using *Chk Mbox* menu.

- When tracking mode is enabled, the 3G automatically checks the mailbox each time it wakes up and successfully sends a position report.
- Using the Mbox Rate menu (see below for detailed description), the 3G can be set to automatically wake up and check the mailbox at a preset frequency. A position report will not be sent when the 3G wakes up to check the mailbox unless the mailbox check rate coincides with the tracking report rate.

The *Check Mailbox* menu can either be *Idle* or *Checking* the Iridium gateway for any pending messages to be downloaded. As the messages are being downloaded, the 3G shows the number of unread messages in the Inbox and the number of messages still queued at the Iridium gateway to be downloaded, as shown in the figure below.

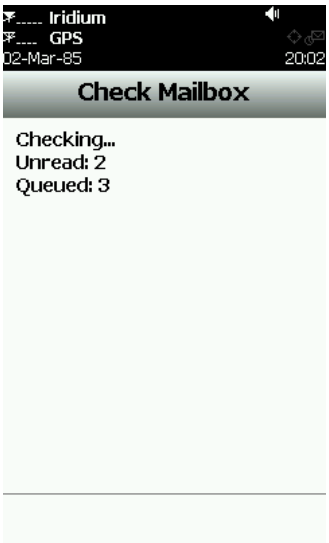

Figure 17: Check Mailbox Menu

5.8 MBOX RATE

The Mailbox Check Rate [*Mbox Rate*] option is available ONLY when the Iridium link is enabled.

The Mbox Rate is used to set mailbox check rate (time between mailbox checks) and to enable mailbox checks automatically. Select either a predefined rate or a user-defined rate with an on-screen keypad. The *Mailbox Check Rate* menu is dimmed when mailbox check is disabled. However, even when mailbox check is disabled and the labels are dimmed, you can still enter the rate.

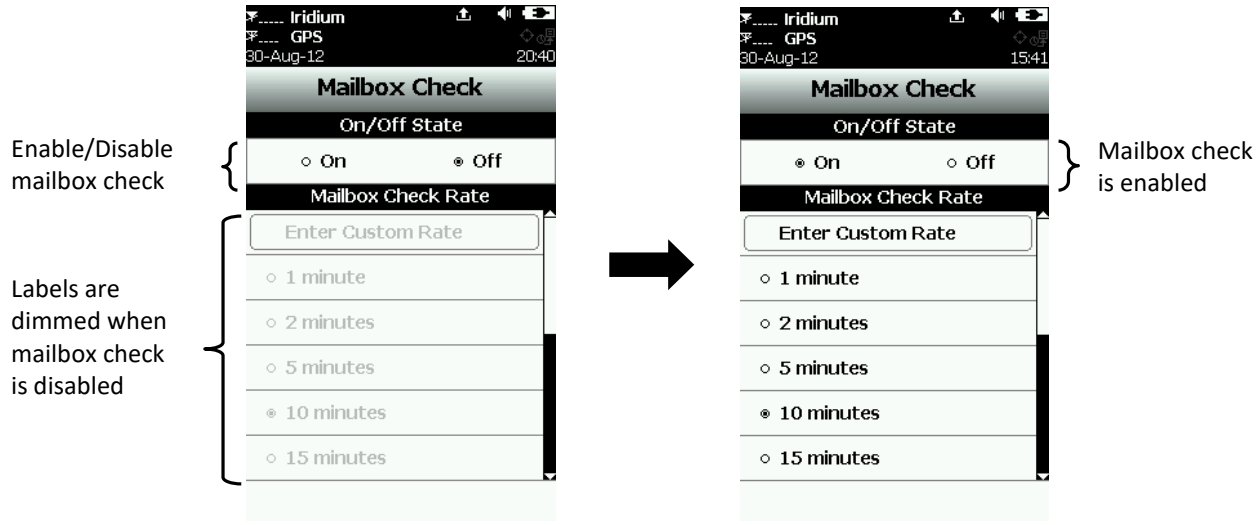

Figure 18: Mailbox Check Rate

When mailbox check is enabled, the symbol lights up from dimmed gray to bright white at the top of the screen. The 3G checks the Iridium gateway automatically for any pending messages at the next scheduled time. When mailbox check is enabled and the 3G sleeps in between checks, the status LED flashes once every five seconds. The status LED can be turned off during sleep to reduce power consumption by using the **Settings** > **LED** menu.

5.9 INC GPS

The Include GPS [*Inc GPS*] option forces the SHOUT 3G to attach GPS location to Check-In and canned and free-text messages. Under the default setting, these messages do not have GPS information included. Messages with GPS location attached can take longer to complete because the 3G has to acquire a GPS fix first. Depending on the validity of the stored satellite ephemeris data, it could take up to an additional 29 seconds.

5.10 MEMORY

Memory is used to clear messages in all mailboxes or clear messages in each individual box—Drafts, Inbox, Outbox, and Sent.

6 TRACKING MENU

6.1 TRACKING

The *Tracking* menu for the SHOUT 3G is shown in **Figure 19** below. Some options are very complex and require SatTerm to set up, including Geofences, cellular IP routing, and Call Out. For these options, refer to the "SatTerm for SHOUT 3G" manual [2].

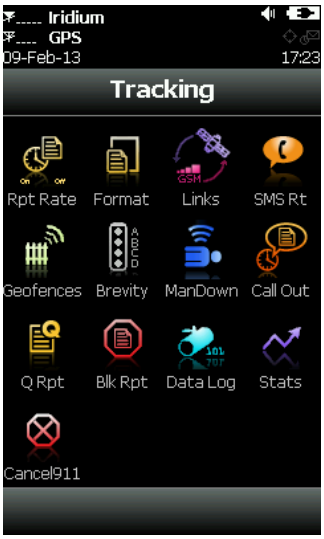

Figure 19: Tracking Menu

6.2 RPT RATE

The Report Rate [*Rpt Rate*] is used to enable tracking and to set the tracking report rate (time between tracking reports). You can select either a predefined rate or a user-defined rate with an on-screen keypad. The *Reporting Rate* menu is dimmed when tracking is disabled. However, even when tracking is disabled and the labels are dimmed, you can still enter the report rate.

The On/Off buttons enable/disable the SHOUT 3G tracking mode. When tracking is on, the tracking symbol ⁘ at the top of the screen changes from dimmed gray to bright white. The 3G immediately turns the GPS receiver on to acquire a GPS fix and then attempts to transmit a position report. The next position report is sent automatically based on the reporting rate. The countdown timer to the next report is displayed inside the parentheses next to the tracking symbol. When tracking is enabled and the 3G sleeps in between position reports, the status LED

flashes once every five seconds. It can be turned off during sleep to reduce power consumption by using the **Settings** > **LED** menu. Activate the Emergency 911 button at any time during tracking mode or non-tracking mode. The 3G can also be turned on at any time and used as a texting device.

When waking up to transmit a location report and the Iridium link is used, the 3G antennas must have an unobstructed view of the sky; otherwise, it may fail to send. By default, a failed report will not be resent. Using the *Q Rpt* menu, failed reports can be forced to stay in the Outbox awaiting to be resent (see the **Outbox** description).

The entire reporting duration can take up to two minutes depending on the Iridium satellite visibility and the validity of the GPS ephemeris data. Ephemeris data saved on the GPS receiver is valid for approximately two hours, allowing the receiver to obtain a hot-start fix with a less than 1 second hot start delay. Report rate (time between reports) set to more than two hours forces the GPS receiver into a cold-start fix (~29 seconds). As a result, the 3G consumes more battery power and the total number of reports is reduced. For more information, see **Appendix C: Power Consumption**.

Important: The SHOUT 3G automatically resends all failed messages in the Outbox after a successful position report transmission. To avoid draining the battery unnecessarily, carry out frequent maintenance on the Outbox and delete unwanted failed messages.

The 3G logs and saves all position reports in its circular memory. When its memory is full, the oldest report is overwritten. SatTerm can be used to retrieve all position reports saved on the 3G.

6.3 FORMAT

The SHOUT 3G can transmit position reports in either 30-byte format or 10-byte format. Both of these formats are backward compatible with the SHOUT nano and SHOUT ts.

The 30-byte format includes UTC date, UTC time, latitude, longitude, altitude, speed, course, vertical velocity, number of satellites used to obtain 3D fix, Horizontal Dilution of Precision (HDOP), and Vertical Dilution of Precision (VDOP). Latitude and longitude are recorded with about 0.18 meters in resolution.

The 10-byte format includes Coordinated Universal Time (UTC) time, latitude, longitude, and Position (3D) Dilution of Precision (PDOP). With UTC date omitted, the 3G relies on the NOC server to stamp the date as the report arrives. Encryption is not available with the 10-byte format. Latitude and longitude are recorded with about 1.1 meters in resolution. The 10-byte format is selected solely for the purpose of Iridium airtime cost-saving.

The 3G can also send position reports in PECOS Message Structure (PMS). The PMS complies with the Blue Force Tracking Data Format Specification. The 3G is shipped without PMS features activated and can only be enabled by NAL Research at the request of an authorized user. For Functions related to PMS, see **Appendix A: PMS Features**.

6.4 LINK

The *Link* option assigns the network(s) used to transmit reports and messages. Three options are available—Iridium network only, cellular network only, or both. If both networks are allowed, another menu appears requiring you to select a primary network. The SHOUT 3G always uses the primary network to transmit reports and messages. The secondary network is only used if the primary network is not available. Switching between primary and secondary networks is managed by the SHOUT 3G automatically. The SHOUT 3G's default link setting is both, with the Iridium network as the primary link. Some options are available only on one network but not the other.

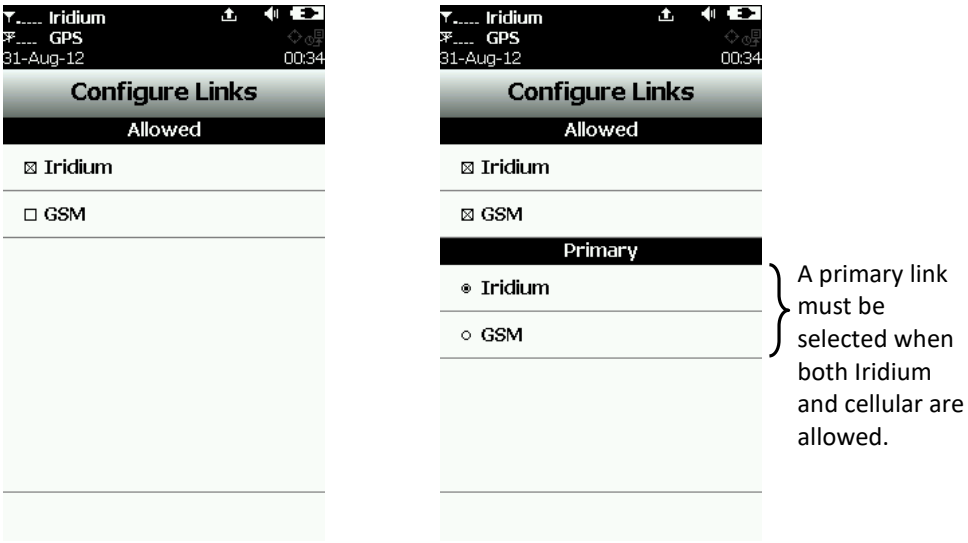

Figure 20: Configure Links

6.5 SMS Rt

The SMS Routing [*SMS Rt*] option is ONLY applicable to the cellular network. Two options are available in routing reports/messages to an end destination (or a NOC server) when using the cellular network—SMS and IP. When configured for SMS, the SMS Rt menu provides options for routing to either an SMS phone number or an email address. The phone number should be the number for a phone or a device (specific to the cellular carrier) capable of receiving SMS messages. When selecting a phone number, select **national** or **international** to specify the format of the phone number. If the format is unknown, choose **national**. If email address routing is desired, provide a routing phone number (e.g., T-Mobile routes SMS emails with phone number 500 and AT&T routes SMS emails with phone number 121) along with the email address. Messages and reports can also be routed to an IP address. The IP option is only configurable through SatTerm. Refer to the "SatTerm for SHOUT 3G" manual [2].

6.6 Geofences

In addition to "standard" tracking enabled through the *Rpt Rate* menu (refer to section **6.2**), *Geofences* is another tracking option tailored for specific applications. Geofence tracking works independently as a separate tracking mode or can be implemented along with standard tracking. Setting geofence parameters is complex. NAL Research recommends the use of both SatTerm and Google Maps®. However, you can also enter a sequence of latitude and longitude pairs to define a fence. Refer to the "SatTerm for SHOUT 3G" manual [2].

A geofence is a polygon defined by a set of connected latitude and longitude coordinates that defines a region or zone of interest. A geofence must be bounded by a minimum of 3 coordinates and a maximum of 50. Each fence has a unique tracking profile that triggers the SHOUT 3G to change its tracking behavior while inside a specific fence; e.g., it allows the SHOUT 3G to use Iridium, cellular, both Iridium and cellular, or to turn off all transmitting radio links (Iridium and cellular) for regions that require radio silence. A geofence can be configured to send special arrival/departure reports upon entering and/or exiting the fence.

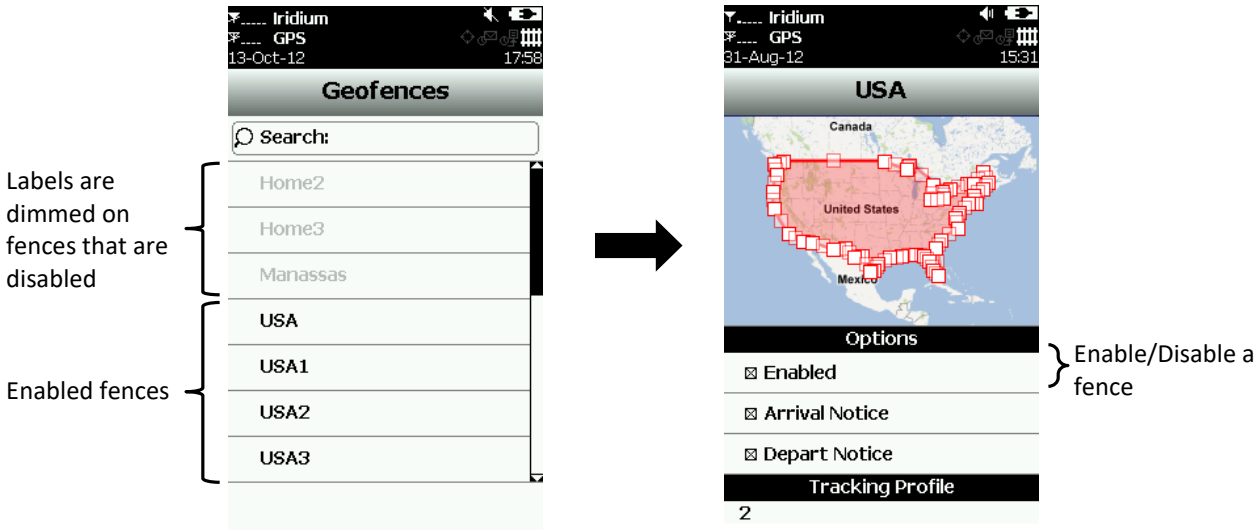

Figure 21: Geofences Enabled/Disabled

The *Geofences* menu provides a few options including: (1) browsing a list of fences loaded into the device through SatTerm, (2) viewing the map of each fence and its type of notification (arrival or departure), and (3) enabling/disabling a fence. Enter other geofence features through SatTerm.

When a fence or fences are enabled, the Geofences symbol at the top of the screen changes from dimmed gray to bright white. The 3G immediately checks the GPS receiver to determine whether the device is inside an enabled fence. If the 3G is inside an enabled fence, the Geofences symbol turns green and the fence label also turns green with the word *Active* attached to it. When a fence(s) is enabled and the 3G sleeps, the status LED flashes once every five seconds. You can turn it off during sleep to reduce power consumption by using the **Settings** > **LED** menu.

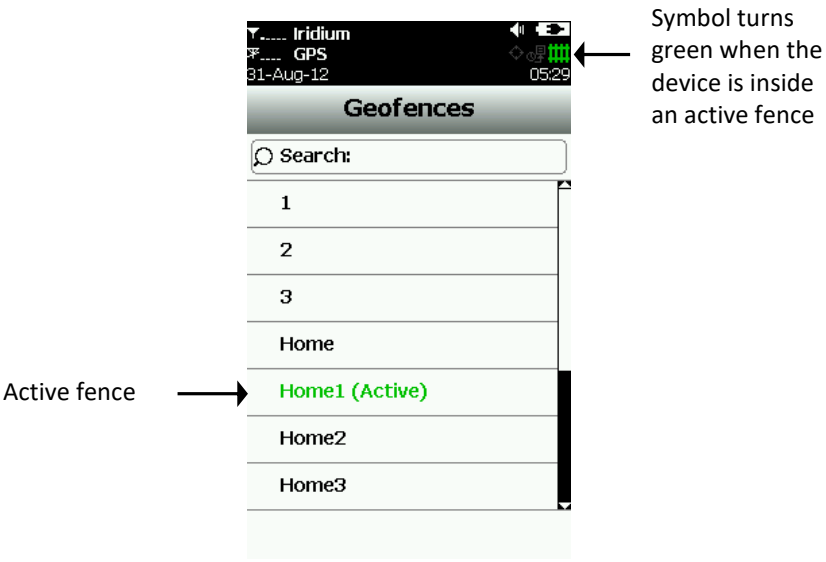

Figure 22: Geofences Green When Active

6.7 BREVITY

The *Brevity* code is part of the PMS format. The 3G ignores the Brevity code settings, if the PMS/PECOS format is not activated and not selected. View functions related to Brevity code in **Appendix A: PMS Features**.

6.8 MAN DOWN

The *Man Down* option allows you to set the options used by the *Man Down Alert* feature. The Man Down Alert detects when the SHOUT 3G is motionless for a configurable amount of time and triggers up to 3 different alerts if you do not respond affirmatively to an "Are You OK?" pop-up window. Once Man Down begins alerting, you can cancel it by selecting the **Cancel 911** menu or selecting **Off** in the Man Down menu. The following settings are configurable through this menu:

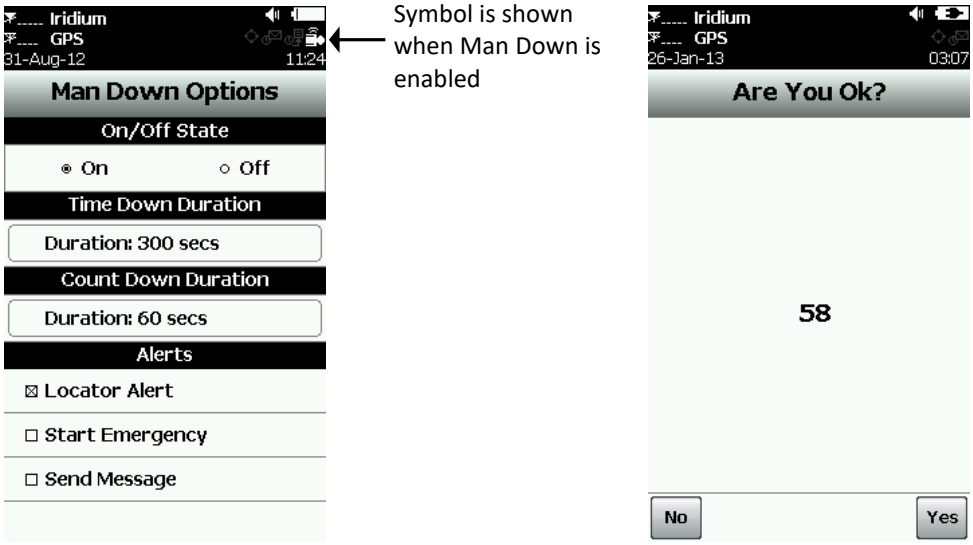

Figure 23: Man Down Options

Time Down Duration — the amount of time the device must remain motionless before the "Are You OK?" menu displays. Whether the SHOUT ts is "Motionless" depends on a set of motion parameters configured using the SatTerm software.

Count Down Duration — the amount of time for you to respond to the "Are You OK?" pop-up menu. If the countdown expires or you select *No*, the selected Man Down Alerts will trigger.

Alerts — any combination of the following three alerts can be selected.

Locator Alert	Configurable audio alert that sounds until the Man Down Alert is disabled. You can set the alert type from the *Audio* menu.
Start Emergency	Starts emergency mode as if the red Emergency 911 button were pressed.
Send Message	Sends a text message with a Man Down short code and GPS location information.

6.9 CALL OUT

The *Call Out* option allows the SHOUT 3G to send a scheduled daily tracking report at a defined Greenwich Mean Time (GMT) time using a specific link. Scheduled times are entered via SatTerm software, and are listed under the *Call Out* menu. When a Call Out time is selected, the symbol lights up from dimmed gray to bright white on top of the screen.

The Call Out option is useful when you need the device to transmit at a specific time and/or want to generate a daily heart beat message for each link. Refer to the "SatTerm for SHOUT 3G" manual [2].

6.10 Q Rpt

The SHOUT 3G's default setting is to discard all tracking reports that failed to transmit because of poor signal quality. Use Queue Report [*Q Rpt*] to force failed tracking reports to stay in the Outbox and wait to be resent at a later time. Refer to the **Outbox** section on description of when failed tracking reports get resent.

6.11 Blk Rpt

The SHOUT 3G's default setting is to send all tracking reports, even those with an invalid GPS position. Use Block Report [*Blk Rpt*] to configure the SHOUT 3G to send only tracking reports with a valid GPS position.

6.12 Data Log

The SHOUT 3G's default setting is to log and save all position reports in its circular memory. You can turn off this feature with the *Data Log* menu. When the 3G's memory is full, the oldest reports are overwritten. You can use SatTerm to retrieve all position reports saved on the 3G.

6.13 Stats

The *Stats* menu has a countdown timer to the next report at the top of the screen and is replaced with *Off* when tracking is disabled. The bottom half of the screen displays the last successful report sent by tracking or emergency notification. Check-In, Waypoint, free-text, and canned messages are not considered as "reports," and therefore are not displayed even if a message was sent successfully.

6.14 Cancel 911

After pressing the red Emergency 911 button on the back of the 3G or activating the Man Down, you can deactivate the emergency alert by selecting the *Cancel 911* option. The cancellation message is then queued in the Outbox to be transmitted. The emergency

mode ends immediately. The emergency LED ✚ is turned off and the top bar turns from red back to black.

Turning the 3G off does not cancel the emergency mode. You MUST select the **Cancel 911.** option to cancel the emergency.

7 UTILITIES MENU

The *Utilities* menu provides six options used mainly to check for proper hardware operation and network setup.

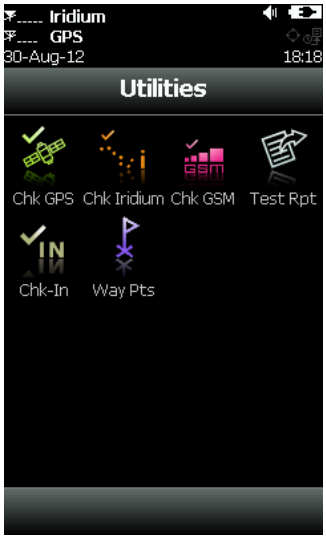

Figure 24: Utilities Menu

7.1 CHK GPS

The Check GPS [*Chk GPS*] option forces the SHOUT 3G to turn on its GPS receiver and to continuously update and display GPS data in real-time. The GPS receiver remains on until you leave this screen by pressing the back button. Use the *Reset Ephemeris* key (shown in **Figure 25**) to force the 3G to erase saved ephemeris in its memory and download a new set of ephemeris data from the satellites. Be careful not to deplete the battery power by staying on this option for too long.

Figure 25: **Reset Ephemeris *Key***

Monitor the accuracy of the position by observing the Horizontal Accuracy (HACC). HACC is measured in meters. HACC is defined as the radius of a circle centered on the true value that contains the GPS measurement. Thus, a position fix with ten meters' HACC accuracy indicates that it is within ten meters of the true position—the higher the HACC value, the less accurate the GPS measurement.

The Chk GPS option is a good indicator of whether or not the GPS receiver has sufficient signal to initiate a Waypoint or a Test Report when located in a challenging environment, e.g., in dense foliage or around urban settings with tall buildings. You can monitor HACC in real-time to ensure it converges to a small and stable value (usually less than 30 meters). At which point, it is certain that a 3D fix can be obtained with the most current ephemeris data being updated and saved. You can then go back to the *Utilities* menu to send a test report. When the GPS receiver cannot acquire a fix, HACC gradually increases and at some point stops at a value of 4294967.500. It is an indication that the surrounding obstructions prevent the GPS receiver from obtaining a fix and you should move on to a different location.

7.2 CHK IRIDIUM

The Check Iridium [*Chk Iridium*] option forces the SHOUT 3G to turn on its Iridium transceiver and continuously update and display signal strength in real-time. The Iridium transceiver remains on until you leave this screen by pressing the back button. Be careful not to deplete the battery power by staying on this option for too long.

7.3 CHK GSM

The Check GSM [*Chk GSM*] option forces the SHOUT 3G to turn on its cellular transceiver and continuously update and display signal strength in real-time; ensure the device has an active cellular SIM card. The cellular transceiver remains on until you leave this screen by pressing the back button. Be careful not to deplete the battery power by staying on this option for too long.

7.4 TEST RPT

When you select the Test Report [*Test Rpt*] option is selected, the SHOUT 3G immediately turns the GPS receiver on to update its location data. The location information is continuously updated and displayed in real-time whether there is a valid fix or not. Similar to the Chk GPS option, you can monitor HACC to determine if a valid fix is possible. Once a valid fix is obtained, the GPS receiver is turned off and the most recent 3D fix information is displayed on the screen. This information (called test report) can be forced to send to a NOC server by pressing *Send*. A test report has the same format as a regular position report and is treated as such by a NOC. Sending a test report will not disrupt or change the tracking reporting rate.

The *Test Rpt* option is a good diagnostic tool used to ensure proper operation of the GPS receiver, the Iridium transceiver, and the cellular transceiver. It can also be used to manage battery life by turning off tracking mode and strategically sending on-demand location reports. It can be considered as “manual tracking mode.”

7.5 CHK-IN

Use the Check-In [*Chk-In*] option to send a quick message with a single, easily accessed button. You can add the Chk-In icon to the home screen favorites bar for quicker access. When you press the Chk-In button, a second screen appears requesting confirmation. Once confirmed, the SHOUT 3G sends out a reserved canned message code representing a Chk-In message. If the Texting/Inc GPS option is enabled, GPS location is attached to the Chk-In message. Chk-In messages with GPS location take longer to complete because the 3G has to acquire a GPS fix first.

7.6 WAYPTS

Use the Waypoints [*Waypts*] option to acquire, view, save, delete, or send a waypoint to a NOC. The 3G can save up to 1,000 waypoints in its circular memory. SatTerm can be used to retrieve waypoints saved on the 3G.

A waypoint is a GPS location that you want to identify and mark with a specific name tag for future reference.

1. Select **New**. The SHOUT 3G immediately turns the GPS receiver on to acquire a fix.
2. Select one of the following options:
    a. Go back without further action.
    b. Reacquire a new GPS fix.
    c. Label the point.
        i. Select the **Label** option to open a full keyboard to enter the waypoint label.
    d. Save the waypoint.
        i. Select **Add** to save the waypoint into the 3G's nonvolatile memory for later retrieval.
        ii. After saving a waypoint, you can also send it to a NOC server. The server differentiates waypoint reports from normal tracking reports by their short codes.

8 SETTINGS MENU

Use the *Settings* menu to view and configure the SHOUT 3G hardware settings.

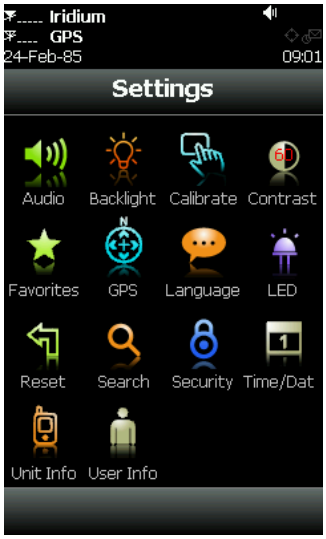

Figure 26: Settings Menu

8.1 AUDIO

Use the *Audio* option to change the frequency, tone, and mute setting of a variety of audio alerts including incoming messages, general error, geofences, and man down locator alert. In addition to the individual settings, all audio settings can be muted through a single setting (except the locator alert). The  icon appears at the top of the screen if *Mute All* is on. Use **Preview** to test the audio volume and sound before selecting.

8.2 BACKLIGHT

Use the *Backlight* option to set the period of inactivity, after which the SHOUT 3G turns the Liquid-crystal display (LCD) backlight off. Set the backlight to *Always On* for nighttime use, but note that it will increase power consumption and reduce battery life.

8.3 CALIBRATE

A resistive touchscreen drifts slowly over time and needs to be recalibrated periodically. The *Calibrate* option allows you to either reset the calibration back to factory settings, or to recalibrate specifically to the current condition of the touchscreen. If the 3G is accidently recalibrated with erroneous settings and you are unable to use the touchscreen to recalibrate

or reset to factory settings, with the 3G powered off, hold the Power/Back button for ~7 seconds or until the reset calibration screen opens. DO NOT connect the 3G's USB port to any device.

8.4 CONTRAST

Use the *Contrast* option to change the LCD brightness. Slide the contrast bar to the desired setting and press back to accept.

8.5 FAVORITES

Use the *Favorites* option to select any icon to appear at the bottom of the home screen. This allows quick and easy access to the most frequently used options. A maximum of four active favorite icons is allowed. The icons appear left to right in the order selected.

8.6 GPS

The *GPS* menu provides access to the *Position Format* and *Position Model* options.

Use Position Format to select one of four different GPS position formats to be displayed on the LCD screen. Do not confuse this option with the *Format* option under Tracking, which defines the format of position report to be transmitted to a NOC.

Use Position Model to formulate the static and dynamic characteristics of the GPS receiver. By default, the portable model is used as it is suitable for most applications. However, for those requiring functionality at high altitudes, speeds, or accelerations, select an alternate model.

- **Portable** (default setting): Suitable for most situations; for applications with low accelerations; maximum altitude of 12 km; maximum velocity of 310 m/sec (1,116 km/h); maximum vertical velocity of 50 m/sec; sanity check type: altitude and velocity; maximum position deviation: medium.
- **Stationary:** Used in timing applications (antenna must be stationary) or other stationary applications; velocity is constrained to 0 m/s; zero dynamics assumed; maximum altitude of 9 km; maximum velocity of 10 m/sec; maximum vertical velocity of 6 m/sec; sanity check type: altitude and velocity; maximum position deviation: small.

- **Pedestrian:** Applications with low acceleration and low speed, as a pedestrian would move; assuming low accelerations; maximum altitude of 9 km; maximum velocity of 30 m/sec; maximum vertical velocity of 20 m/sec; sanity check type: altitude and velocity; and maximum position deviation: small.
- **Automotive:** Used for applications that can be compared with the dynamics of a passenger car; assuming low vertical acceleration; maximum altitude of 6 km; maximum velocity of 84 m/sec (303 km/h); maximum vertical velocity of 15 m/sec; sanity check type: altitude and velocity; and maximum position deviation: medium.
- **Sea:** Recommended for applications at sea; assuming zero vertical velocity; maximum altitude of 500 m; maximum velocity of 25 m/sec; maximum vertical velocity of 5 m/sec; sanity check type: altitude and velocity; and maximum position deviation: medium.
- **Airborne < 1g:** Used for applications that have to handle a higher dynamic range than a car and higher vertical accelerations; no 2D position fixes supported; maximum altitude of 50 km; maximum velocity of 100 m/sec (360 km/h); maximum vertical velocity of 100 m/sec; sanity check type: altitude; and maximum position deviation: large.
- **Airborne < 2g:** Recommended for typical airborne environment; no 2D position fixes supported; maximum altitude of 50 km; maximum velocity of 250 m/sec (900 km/h); maximum vertical velocity of 100 m/sec; sanity check type: altitude; and maximum position deviation: large.
- **Airborne < 4g:** Only recommended for an extreme dynamic environment; no 2D position fixes supported; maximum altitude of 50 km; maximum velocity of 500 m/sec (1,800 km/h); maximum vertical velocity 100 m/sec; sanity check type: altitude; and maximum position deviation: large.

8.7 LANGUAGE

Only English is available for this firmware version.

8.8 LED

The SHOUT 3G has a status LED  at the bottom-left corner to indicate whether the device is in emergency mode, tracking mode, geofence tracking, mailbox check, or call out. Except for the emergency mode, the LED flashes once every five seconds when other modes are enabled and the device sleeps. The LED turns solid green when the emergency mode is enabled. You can turn off the LED for either of these two cases to save battery power using the LED option.

8.9 RESET

The *Reset* option restores all setup parameters back to the manufacturer's settings. When *Reset* is selected, a screen appears with the current settings and a confirmation message asks whether or not to reset these current settings back to the manufacturer's default settings.

8.10 SEARCH

Use the *Search* option to set the search parameters for canned messages, contact list, and mailboxes.

8.11 SECURITY

Use the *Security* option to enable or disable the power-up PIN code and Access Control List PIN code and to set up the Access Control List. The PIN code can be up to a four-digit number.

Use the Access Control List (ACL) to set which menu icons are visible. If a menu option is disabled in the ACL, it is also removed from the favorites.

8.12 TIME/DATE

Use the *Time/Date* option to select UTC time and date formats to be displayed on the LCD screen for all menus. The local time zone can also be set.

8.13 UNIT INFO

The *Unit Info* option displays the model number, Iridium module's International Mobile Equipment Identification (IMEI) number, Iridium FCC ID, Iridium IC ID, GSM FCC ID, GSM IC ID, 3G's firmware version, and 3G's bootloader version.

8.14 USER INFO

The *User Info* option displays the user information entered using SatTerm software.

9 ADDITIONAL FEATURES

9.1 EMERGENCY (911) BUTTON

The Emergency 911 button is located underneath a red, rotating guard at the back of the SHOUT 3G. Use it at any time regardless of the tracking status (enabled or disabled) or power status (on or off). When pressed, the emergency LED immediately turns solid green to indicate that the device is in emergency mode. The device then attempts to quickly send three consecutive reports. Because these reports are sent quickly, a GPS fix may not be immediately available; however, the emergency indication flag will be set. After sending the first three emergency reports, the 3G reverts back to the default emergency Time-Between-Reports (TBR) of two minutes. The LED can be deactivated to extend the battery life by using the **Settings** > **LED** menu. If the LCD screen is on during emergency activation, the black bar across the top of the screen turns red. During emergency a NOC can send an acknowledgement back to the 3G.

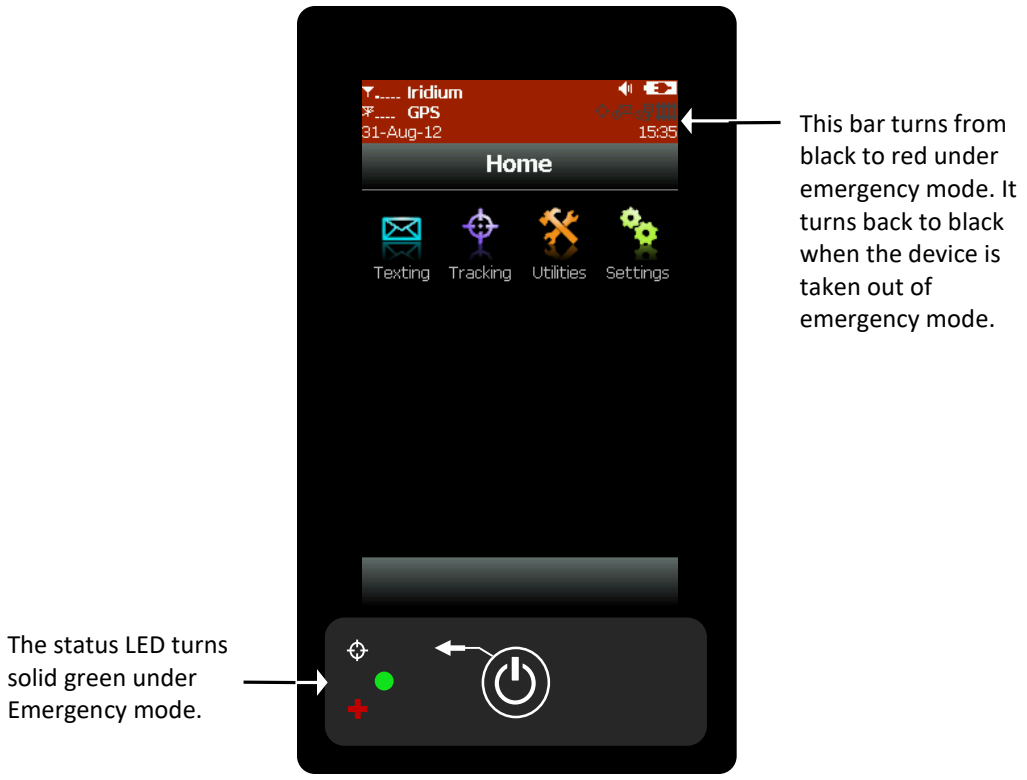

Figure 27: Emergency Mode Display

9.2 STATUS LED

There is one status LED at the bottom-left of the SHOUT 3G. The LED turns solid green when the 3G is in emergency mode, which can be turned off to save power using the **Settings** > **LED** menu, as shown in section **8.8**. During normal tracking, it flashes once every five seconds when the 3G sleeps. It can be turned off to save power using the **Settings** > **LED** menu.

9.3 POWERING

Turn off the SHOUT 3G by holding the Power/Back  button for approximately two seconds. A power-down screen appears with a message indicating tracking and messaging will be completely turned off. The screen stays on for approximately ten seconds before turning off. Press **Turn Off** to turn off the 3G immediately, press **Lock** to go back to the power-up screen, or press **Cancel** to return to the previous screen.

APPENDIX A: PMS FEATURES

A.1 TRACKING

The SHOUT 3G is capable of sending position reports in PECOS Message Structure (PMS). PMS complies with the Blue Force Tracking Data Format Specification as defined in the document PECOS 200907-001 Version 1.7 [1]. The 3G is shipped without PMS features activated and can only be enabled by NAL Research at the request of an authorized user. When PMS is enabled, the *Format* menu has an additional option called PECOS, as shown in **Figure 28** below.

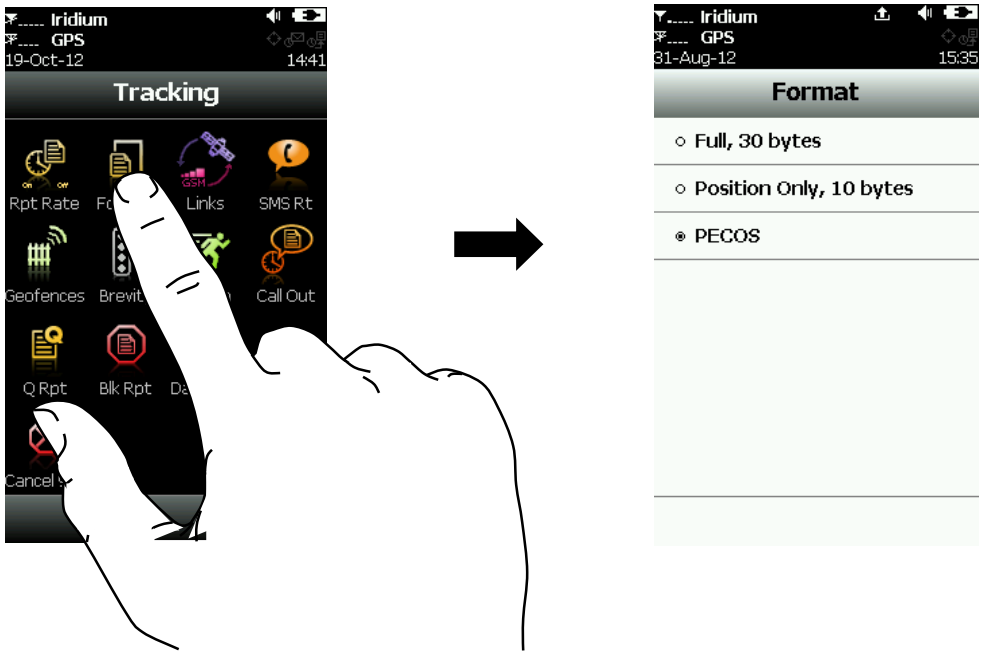

Figure 28: PECOS Option in Format Menu

A.2 BREVITY

With PMS enabled, you have the option to select any one of sixteen brevity codes (0000 through 1111) to be included in the PMS tracking reports. These codes are represented by A(z), B, C(z), and D, and can be selected via the touchscreen. Each code lights up as a green dot inside the *Brevity* icon when selected.

A.3 COMPOSE

With PMS enabled, the *Compose* menu (refer to section **5.5**) does not allow you to enter an email address from the keyboard. The address must be chosen from the contact list.

A.4 CONTACTS

With PMS enabled, use the *Contacts* menu (refer to section **5.6**) to enter and save a contact(s) via the keyboard. The contact(s) can only have two fields—Name and IMEI number.

APPENDIX B: UPGRADING THE FIRMWARE

The SHOUT 3G firmware can be upgraded using a PC connected to the USB port of the device. The device drivers support Windows XP, Windows 7, and Windows 10.

To upgrade the firmware:

1. Run the NAL USB Firmware Loader program provided as part of the firmware download from the NAL Research website (https://www.nalresearch.com/support/documentation-downloads/).

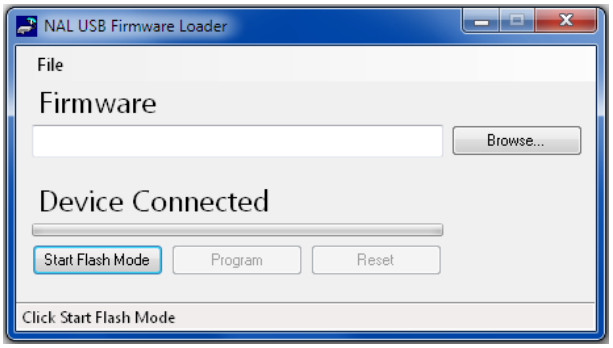

Figure 29: NAL USB Firmware Loader Program

2. With a USB cable attached to a computer and the device, press **Start Flash Mode**.
3. Wait until it activates and then press **Browse**.
4. Browse and select a valid NAL device BIN file.

   Note: NAL Research makes the BIN file available upon request.
5. Once the BIN file is loaded, press **Program**.

   Wait for the programming to complete. A message box pops up, indicating the loading is complete. The new firmware is now loaded on the device. It may take a few moments for the memory to initialize after the upgrade.

APPENDIX C: POWER CONSUMPTION

The SHOUT 3G has an internal 2.15 Ah Li-ion rechargeable battery. When both the Iridium/cellular and GPS antennas have an unobstructed view of the sky and the battery is fully charged, the 3G is capable of sending more than 1,600 tracking reports with the following settings: (1) report rate of less than two hours, and (2) mailbox check rate and the report rate are the same. If the Iridium antenna is blocked or an overhead Iridium satellite is not available (or cellular antenna is blocked by metallic structures), the Iridium/cellular transceiver can potentially stay on for a significant amount of time (depending on the Time-To-Keep-Trying (TTKT) setting) attempting to send a report. This can greatly reduce the expected number of reports transmitted on a single battery charge. In a poor signal environment there is a tradeoff between battery life and the chance that a report will be transmitted for a given report cycle; you may want to do some testing to determine the best TTKT for your application and conditions.

The 3G saves valid ephemeris data after each 3D fix. The data is used to reduce acquisition time in the next reporting cycle from cold-start to hot-start. If the ephemeris data is older than about two hours (that is, time between reports is set for more than two hours), the GPS receiver goes through cold-start each time it wakes up to send a report adding approximately 30 more seconds of non-sleep time to each report cycle. As a result, the 3G configured for report rate of more than approximately two hours can be expected to transmit only approximately 800 tracking reports.

Important: Data presented here are only estimates and are highly dependent on the operating environment and Iridium antenna installed. Data are based on multiple measurements made with SHOUT 3G devices configured with the supplied Iridium antenna, placed on the roof of NAL Research's facility with little to no blockage/shading.

APPENDIX D: DESIGN SPECIFICATIONS

D.1 MECHANICAL SPECIFICATIONS

Dimensions: .....4.97” x 2.51” x 0.88” (126 mm x 64 mm x 22 mm) (not including antenna)

Weight: .....~8.6 oz (244 g)

Enclosure:.....Hard anodized aluminum housing/EMI shielding, ABS plastic radome

Connectors: .....USB Micro-B, Micro SIM reader

Antennas:.....Iridium, GPS, and Cellular

Buttons:.....One Power/Back button

Emergency: .....Guarded button

LED: .....One status LED

Screen: .....3.0” TFT 400 x 240 pixels

D.2 ELECTRICAL SPECIFICATIONS

USB Input Voltage:.....5.0 VDC nominal, 4.4 V to 6.6 VDC

Max USB Current sink: .....1.5 A @ 5.0 VDC

Battery Type:.....Lithium-ion

Battery Capacity:.....2.15 Ah

Recharge Cycles: .....500 cycles

Power Consumption: .....See **Appendix C: Power Consumption**

D.3 IRIDIUM TRANSCEIVER

Operating Frequency: .....1616.0 to 1626.5 MHz

Duplexing Method: .....TDD

Multiplexing Method: .....TDMA/FDMA

Link Margin Downlink: .....13 dB average (free space)

Link Margin Uplink: .....7 dB average (free space)

D.4 CELLULAR TRANSCEIVER

Receiver Type:	u-blox LISA-U230, 3.75G
RF Impedance:	50 Ω
Supported Bands:	UMTS/HSPA: I, II, IV, V, VI, VIII (2100, 1900, 1700, 850, 800, 900 MHz) GSM/GPRS/EDGE: quad band (850/900/1800/1900 MHz)
GSM/GPRS power Class:	Class 4 (33 dBm) for GSM/EGSM (850/900 MHz) Class 1 (30 dBm) for DCS/PCS (1800/1900 MHz)
GPRS data rate:	up to 85.6 kbps down/up (multi-slot class 12)
EDGE power class:	E2 (27 dBm) for 850/900 MHz bands E2 (26 dBm) for 1800/1900 MHz bands
EDGE data rate:	up to 236.8 kbps down/up (multi-slot class 12)
WCDMA/HSPA power class:	Class 3 (24 dBm)
HSUPA cat 6 data rate:	up to 5.76 Mbps up
HSDPA cat 14 data rate:	up to 21.1 Mbps down
WCDMA PS data rate:	up to 384 kbps down/up

D.5 GPS RECEIVER

GPS Receiver:	MAX-6Q
Receiver Type:	L1, C/A, 50-channel
Update Rate:	5 Hz
Accuracy:	2.5 m CEP (position) 2.0 m CEP (SBAS)
Acquisition:	26 seconds cold-start <1 second hot-start

Sensitivity: .....–161 dBm (tracking)

–160 dBm (hot-starts)

–148 dBm (cold-starts)

D.6 ENVIRONMENTAL SPECIFICATIONS

Operating Temperature: .....–4°F to +140°F (–20°C to +60°C)

Charge Temperature: .....32°F to +113°F (0°C to +45°C)

Operating Humidity: .....≤ 75% RH

Storage Temperature: .....–4°F to +140°F (–20°C to +60°C)

Storage Humidity: .....≤ 93% RH

APPENDIX E: STANDARDS COMPLIANCE

The SHOUT 3G has an internal Iridium 9603 transceiver and u-blox LISA-U230 module. The 9603 is tested to the regulatory and technical certifications shown below. It is assigned to the FCC Identifier Q639603. The LISA-U230 is assigned to the FCC Identifier XPYLISAU230.

Table 2: Standard Compliance

Regulatory Approvals	Radio Tests	EMC Tests	Mechanical/ Electrical Tests
CE	ETSI EN 301 441 V1.1.1 (2000-05)	ETSI EN 301 489-20 V1.2.1(2002-11) ETSI EN 301 489-1 V1.8.1(2008-04) EN61000-4-2: 1995/A2: 2001 Part 4.2 EN61000-4-3: 2002 Part 4.3 EN61000-4-4: 2004 EN61000-4-6: 1996/A1: 2001 Part 4.6 EN55022:2006	EN60950-1:2006 Part 1
FCC	FCC CFR47 Parts 2, 15, and 25		
IC	Industry Canada (IC) RSS170 Issue 2, March, 2011		

APPENDIX F: EXPORT COMPLIANCE

The SHOUT 3G is controlled by the export laws and regulations of the United States of America (USA). It is the policy of NAL Research to fully comply with all U.S. export and economic sanction laws and regulations. The export of NAL Research products, services, hardware, software, and technology must be made only in accordance with the laws, regulations, and licensing requirements of the U.S. Government. NAL Research customers must also comply with these laws and regulations. Failure to comply can result in the imposition of fines and penalties, the loss of export privileges, and termination of your contractual agreements with NAL Research.

The export and re-export of NAL Research products and services are subject to regulation by the Export Administration Regulations (15 CFR 730-744), as administered by the U.S. Department of Commerce, Bureau of Industry and Security ("BIS").

See: https://www.bis.doc.gov/index.php/regulations/export-administration-regulations-ear for further information on BIS and the Export Administration Regulations (EAR). Additional export restrictions are administered by the U.S. Department of the Treasury's Office of Foreign Asset Controls ("OFAC"). See: http://www.ustreas.gov/ofac for further information on OFAC and its requirements.