SHOUT ts User Guide

Version B

March 11, 2022

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REVISION HISTORY

Revision	Date	Description
2.1.1	2/7/15	Updated content to match firmware version 2.1.1
A	6/10/20	Added revision history Updated address Updated document number Updated content to match firmware version 2.2.3 • Contact grouping (v2.1.5) • Map screen (v2.2.0) • Motion tab on Report Rate screen (v2.2.0)
B	03/11/2022	• Updated to new template • Performed editorial update • Updated Reference table and links • Updated Appendix D to reflect device current specifications

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 Manual for SHOUT ts	Version 8.8.0 April 7, 2015

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ACRONYM LIST

A-Hr ....Amp-Hour

ACL ....Access-Control List

AES ....Advanced Encryption Standard

BIS..........................Bureau of Industry and Security

CE ....Conformité Européenne

CEP ....Circular Error Probability

DISA ....Defense Information Systems Agency

DoD..........................Department of Defense

EAR ....Export Administration Regulations

EMI ....Electromagnetic Interference

EMSS ....Enhanced Mobile Satellite Services

FCC ....Federal Communications Commission

FDMA........................Frequency-division multiple access

GMT ....Greenwich Mean Time

GNSS ....Global Navigation Satellite System

GPS..........................Global Positioning System

HACC........................Horizontal Accuracy

HDOP ....Horizontal Dilution of Precision

IC ....Industry Canada

IMEI ....International Mobile Equipment Identification

LCD ....Liquid-crystal display

LED ....Light-Emitting Diode

Li-ion.......................Lithium-ion

mA-Hr ....milliAmp-Hour

NDA ....Non-Disclosure Agreement

NOC ....Network Operation Center

OFAC........................Office of Foreign Asset Controls

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

PIN..........................Personal Identification Number

PMS.........................PECOS Message Structure

POP ....Post Office Protocol

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

SBAS.......................Satellite-based Augmentation System

SBD.........................Short-Burst Data

SMTP..........................Simple Mail Transfer Protocol

TBR ....Time-Between-Reports

TDD..........................Time-Division Duplex

TDMA ....Time-Division Multiple Access

VDOP.........................Vertical Dilution Of Precision

USB..........................Universal Serial Bus

UTC..........................Coordinated Universal Time

1 INTRODUCTION

The SHOUT ts is a handheld satellite messaging and personal tracking device. It is designed to operate with the Iridium satellite network utilizing Short Burst Data (SBD). It can transmit location information determined by a highly sensitive Global Navigation Satellite System (GNSS) receiver, inbound and outbound status, text messaging, and emergency/alert notifications.

The SHOUT ts significantly improves service reliability over existing tracking products by allowing two-way communication, 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. The SHOUT ts protocol is 100% compatible with the SHOUT, SHOUT nano, and SHOUT gsm (when using the Iridium link). In this document, the terms SHOUT ts and ts are used interchangeably.

The SHOUT ts is designed with ultra-low power consumption electronics drawing less than 110 µA during sleep. With an internal 1.95 A-Hr rechargeable Li-ion battery, depending on the environmental conditions, it can send a position report every ten minutes for more than ten days (more than 1,500 reports). Read **Appendix C: Power Consumption** to learn about the impact of blocked antennas on the number of reports. The SHOUT ts 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 command center. An Emergency 911 button is available for immediate emergency/alert notifications. Data are packaged in either standard or 256-bit Advanced Encryption Standard (AES) encrypted format.

The SHOUT ts 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 SHOUT ts 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: PCOS Message Structure.**

The SHOUT ts offers a variety of services including:

- **Normal Tracking** — The SHOUT ts can be programmed to automatically wake up and send a position report at a set interval ranging from once every minute to once every seven days (at one-minute increments).

- **Emergency Alert** — Pushing the Emergency 911 button immediately sends alerts 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 SHOUT ts supports sending free-text via three different sets of touchscreen keyboards.

- **Canned Text Messaging** — The SHOUT ts supports sending canned (predefined) 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 SHOUT ts supports sending and/or saving waypoints for later retrieval. A waypoint is a GPS location that you can identify and mark with a specific name tag for future reference.

- **Check-In** — The SHOUT ts supports sending a quick check-in message using a single key.

- **Man Down** — The SHOUT ts has an integrated motion sensor used to activate a man-down situation.

- **Geofencing** — The SHOUT ts accepts multiple fences defined as polygons (50 fences with up to 50 points each fence). The SHOUT ts can be activated based on conditions set by these fences.

- **Data Logger** — The SHOUT ts 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 ts for use on the Iridium Department-of-Defense (DoD) Enhanced Mobile Satellite Services (EMSS) Gateway. However, accessing the EMSS Gateway is not authorized until the SHOUT ts 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://emss.pac.disa.mil/ for more information regarding DoD EMSS service provisioning.

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

2 USING THE SHOUT TS

2.1 DEVICE DESCRIPTION

The SHOUT ts comprises a touchscreen, a power/back button, a status Light-Emitting Diode (LED), a guarded Emergency button, and a Micro-B Universal Serial Bus (USB) port.

- The touchscreen provides easy access to the device features.
- The button turns on the device and can also be used as a back key.
- The LED displays device status during emergencies and tracking.
- The guarded emergency button activates a dedicated emergency message sequence until cancelled by the user.
- The USB Micro-B port is for charging, firmware updates, and setting parameters.

Important: The SHOUT ts must have full view of the sky during transmission.

Figure 1: SHOUT ts Exterior Components

2.2 ACCESSORIES

The following accessories are included with the SHOUT ts.

AC Wall Adapter   USB-A to USB Micro-B cable

Figure 2: SHOUT ts Accessories

Manuals and software for the SHOUT ts may be found on the NAL website.

2.3   CHARGING THE BATTERY

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

- Use the supplied AC wall adapter.
  - o   The charging time is approximately five hours.
- Connect to a standard USB device.
  - o   The charging time depends on the type of USB port.
    - USB 1.0 should be able to charge the SHOUT ts in about a day, assuming the port is capable of producing an output current of 100 mA.
    - USB 2.0 can charge in about 12 hours, assuming the current output of 0.5 A.

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 ts 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 (ts) according to local, state, and federal regulations or laws.

The ts has a battery symbol ⬛ at the top-right corner of its screen 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 SHOUT ts, 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%.

Important: The SHOUT ts must be kept in environments between 0°C (32°F) and 45°C (113°F) when charging.

2.4 TOUCHSCREEN

The SHOUT ts 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 devices, be careful not to damage it with a sharp object. Unlike a capacitive touchscreen on most cellular phones where a slight tap of the finger is required, a resistive touchscreen requires a 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
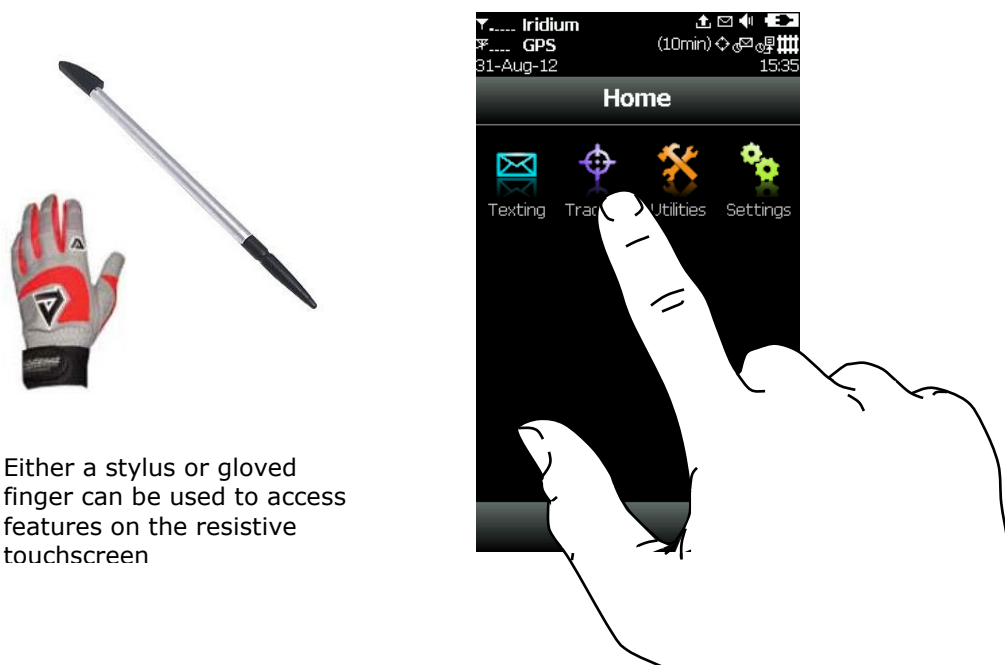
Figure 3: Resistive Touchscreen

2.5 BASIC NAVIGATION

- **Turn on** the SHOUT ts by holding down the Power/Back button for approximately two seconds.
  Note: A delay in displaying time and date is normal because the unit first has to check its internal clock against the GNSS 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 a little more than a slight touch.
- Press the **Back button** at any time to return to the previous screen.
- Frequently used icons can be configured to appear on the bottom of the *Home* menu using **Settings** > **Favorites**.

- **Turn off** the SHOUT ts (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.

2.6   USING THE KEYBOARDS

Some 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.
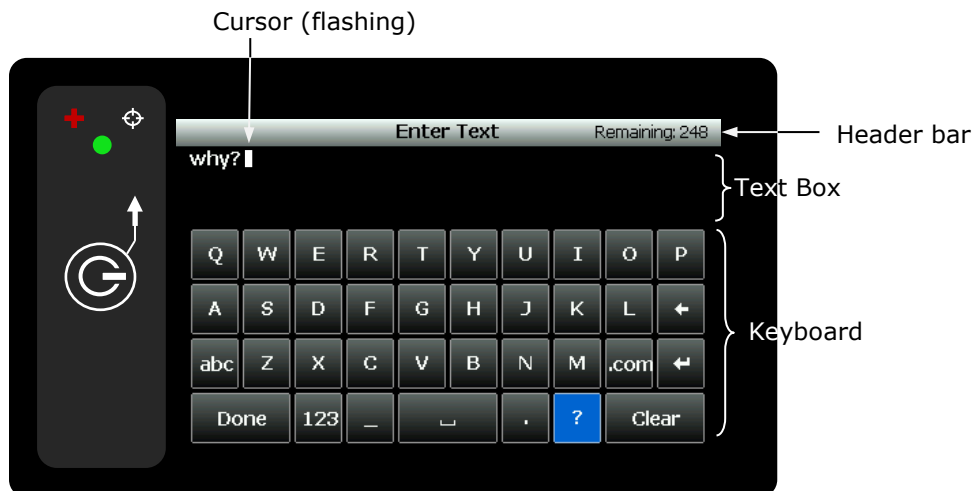

Figure 4: Keyboard Screen

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. 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 back key   to return to the previous screen <u>without</u> all the changes—all the changes will be lost.
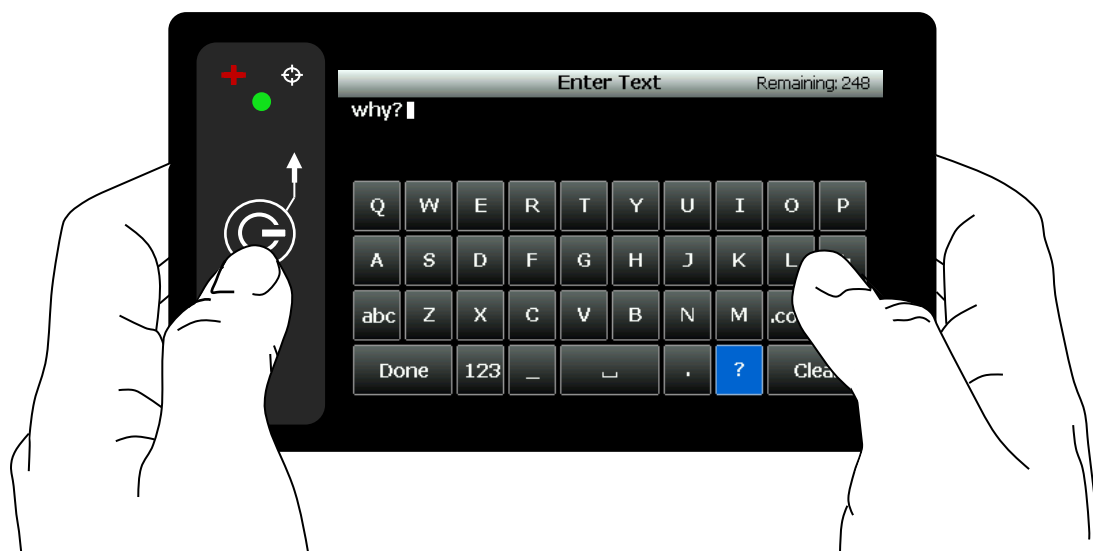
Figure 5: Keyboard Hand-position

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 appear as ⎵ and ↵ , respectively.

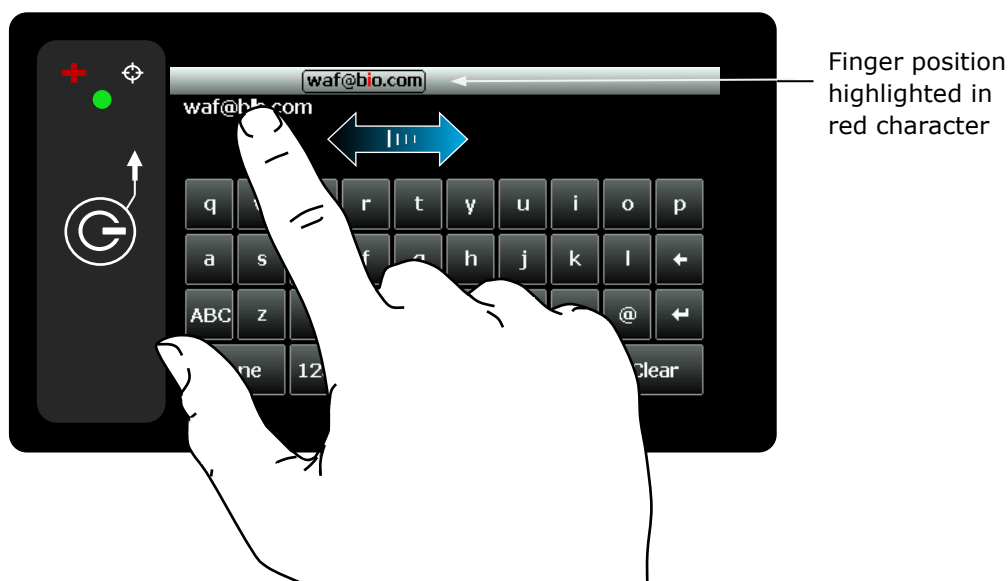Finger position highlighted in red character

Figure 6: Hold and Slide on Keyboard

2.7   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.
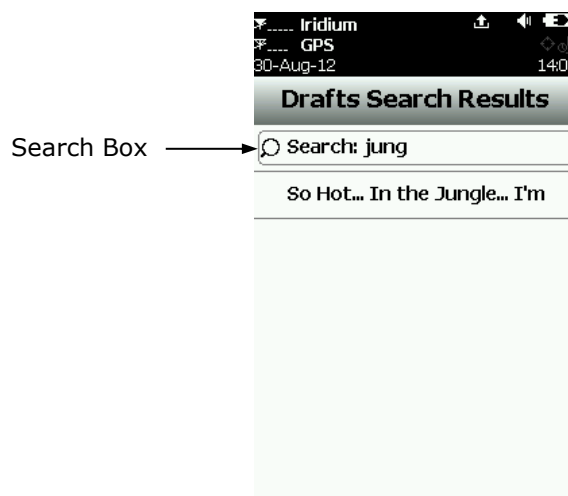
Search Box

Figure 7: Search Box

2.8   USING THE SLIDER BAR

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

Either slide to quickly scroll up and down or tap to page up and down
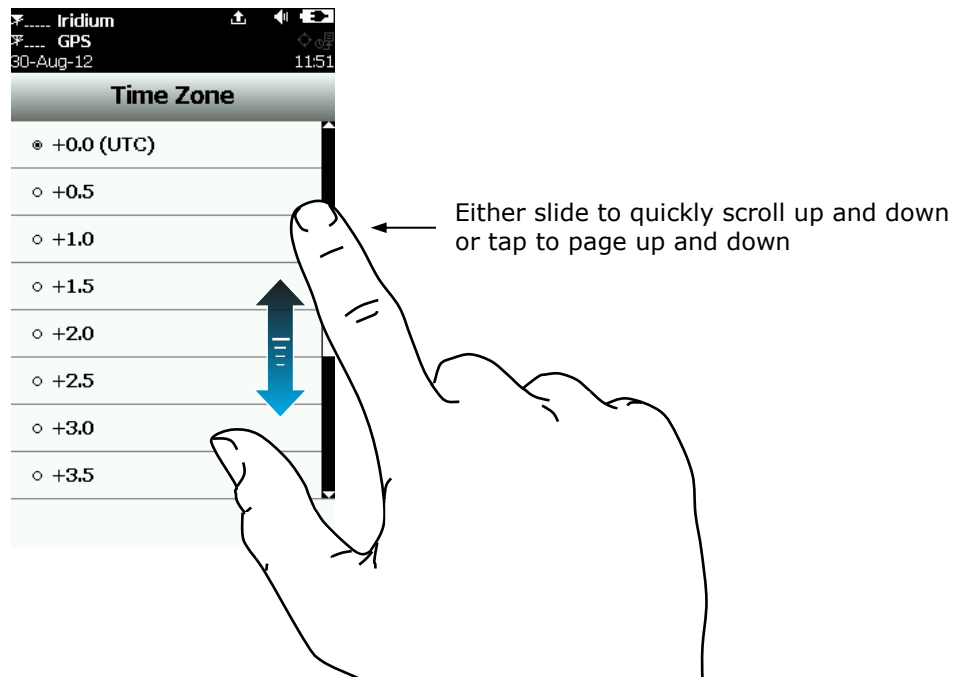
Figure 8: Slider Bar

2.9   NETWORK OPERATION CENTER (NOC)

The SHOUT ts comprises a 9602 module capable of Short-Burst Data (SBD) connectivity to the Iridium satellite network. 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 SHOUT ts can also accept real-time text messages and commands from a NOC. For Iridium services, the SHOUT ts can be provisioned by NAL Research or any certified Iridium airtime service provider, including DoD Defense Information Systems Agency (DISA) EMSS office.

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 receive and implement the logic necessary for analyzing the SHOUT ts messages and determine the appropriate response.

2.10 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 ts. In addition, the program lets a NOC communicate with modems attached to its serial ports, communicate with Post Office Protocol (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 SHOUT ts. 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.

2.11 SATTERM SOFTWARE

Use the included SatTerm software to set up the SHOUT ts operating parameters, geofences, contacts, and canned messages. Most of the operating parameters can be set using the SHOUT ts on-screen menus. However, more sophisticated features such as encryption and geofence must be carried out via SatTerm and a computer connected to the SHOUT ts. For contacts and canned messages, the SHOUT ts 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 SHOUT ts and the NOC server. Email addresses, on the other hand, can be entered on the fly.

2.12 MAPPING NOC SERVER

NAL Research provides a mapping NOC server to our customers for demonstration purposes ONLY. Application developers can call for instructions to set up a free demo account. NAL Research's NOC server implements Google Earth to display tracking information. NAL Research assumes no responsibility for any claims or damages arising out of the use of our server. NAL Research makes no warranties on the performance or the availability of our server.

3 HOME SCREEN

1. Immediately after turning on, press the 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 PIN if the device is set up with password protection.
   Note: NAL Research ships the SHOUT ts without password protection. However, if the Personal Identification Number (PIN) is factory-set, it should be 1111.

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

Figure 9: Home Screen

3.1 STATUS SYMBOLS

Table 1: Status Symbols

⊁	Denotes the Iridium transceiver is off. To preserve battery life, the Iridium transceiver is 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 is on with real-time signal strength represented by the number of vertical bars or (2) SBD message transmission is in progress. The signal strength can range from the lowest of zero to the highest of five bars. During transmission the antenna must have a clear view of the sky. The SHOUT ts cannot send messages or reports 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 ts' 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 indicator.
🔋	Denotes the battery is being charged by an external power source.
🔇	Denotes all audio alerts are off.
🔊	Denotes audio alert is on.
✉	Denotes one or more unread messages are in the Inbox.
⬆	Denotes one or more messages are in the Outbox ready to be sent or one or more messages in queue failed to send.
⊞	Denotes *Geofences* is on 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* is on 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.

Table 1: Status Symbols

✉	Denotes *Mailbox Check* is on when the symbol is bright white. The symbol turns dimmed gray when Mbox Check is off.
✛	Denotes tracking (standard tracking, geofence tracking, etc.) is on when the symbol is bright white. When standard tracking is on, a countdown timer to the next report appears beside the tracking symbol. The symbol turns dimmed gray when tracking is off.
📶	Denotes *Man Down* is on.

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 ts can recall the correct date and time. The message "Date/Time unavailable" is displayed when the SHOUT ts is unable to restore information from the GPS receiver.

3.3 HOME ICONS

The SHOUT ts displays four main icons on its home screen, each representing a menu option—**Texting** Menu, **Tracking** Menu, **Utilities** Menu, and **Settings** Menu. Detailed descriptions of each of these menu options 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.

4 QUICK START

Airtime services must first be purchased for Iridium before use. Purchase Iridium airtime directly from NAL Research or from any of Iridium certified airtime resellers.

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

1. Turn on the SHOUT ts 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** > **Rpt Rate** menu to set the reporting rate and turn tracking on. The SHOUT ts 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 ts for use on the Iridium DoD EMSS Gateway. However, accessing the EMSS Gateway is not authorized until the SHOUT ts 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.
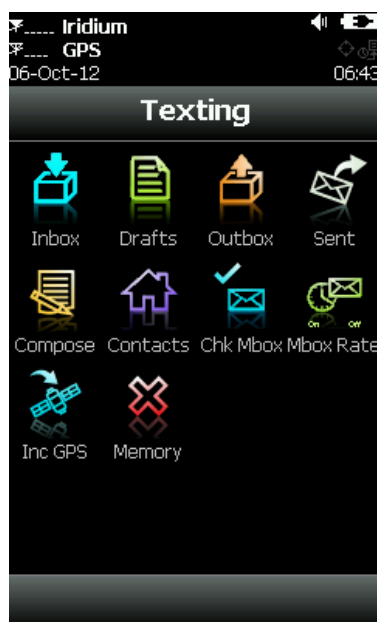
Figure 10: Texting Menu

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. A closed envelope symbol ✉ appears at the top of the screen when an unread message(s) is 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 SHOUT ts 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 the message. Messages with GPS location attached can take longer to complete because the SHOUT ts 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 is marked with a **<<** symbol. 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 SHOUT ts 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 ts 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 ts 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 SHOUT ts 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.

The SatTerm software creates and saves predefined email addresses onto the SHOUT ts' contact list. During setup SatTerm requires connectivity between the SHOUT ts 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 ts displays two options, *Choose Contacts* and *Enter Emails*, as shown in **Figure 11** below.
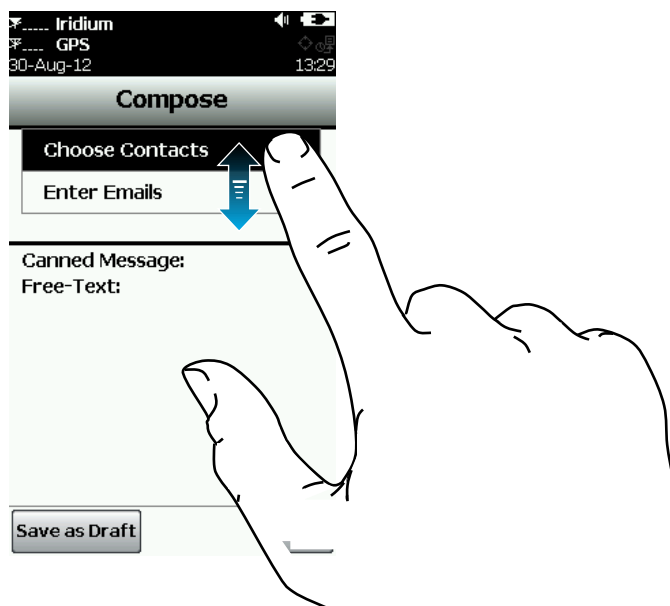
Figure 11: Choose Contacts or Enter Emails

- o You can slide a finger back and forth between these two options.
- o Remember to apply moderate pressure on the touchscreen while sliding the finger. DO NOT lift the finger until the right choice is selected.
- o 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 in the list and tap **Add** to accept.

   c. Remove a contact by going back to *Choose Contact*, unselecting the contact checkbox, and tapping **Add**.
   Note: Pressing the back key instead of *Add* after selecting or clearing a contact checkbox cancels the choice(s).
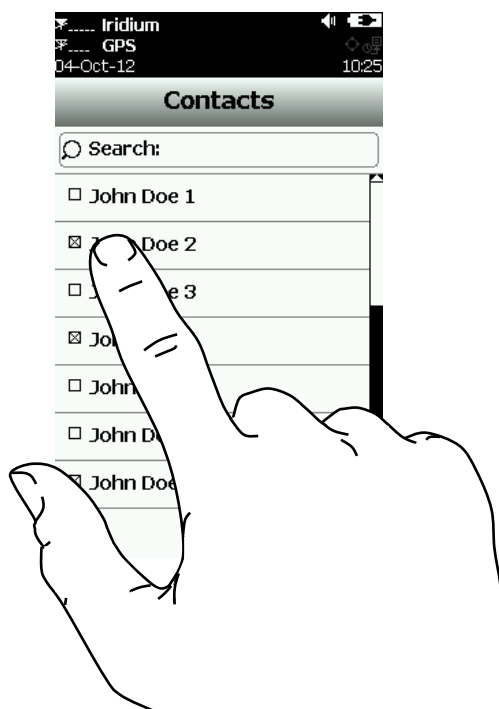
Figure 12: Choose Contacts

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 ts 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 and multiple email addresses reduce the number of characters available for a free-text message.
        Note: The SHOUT ts sends short codes representing the contacts listed under *To*; however, the SHOUT ts 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*.
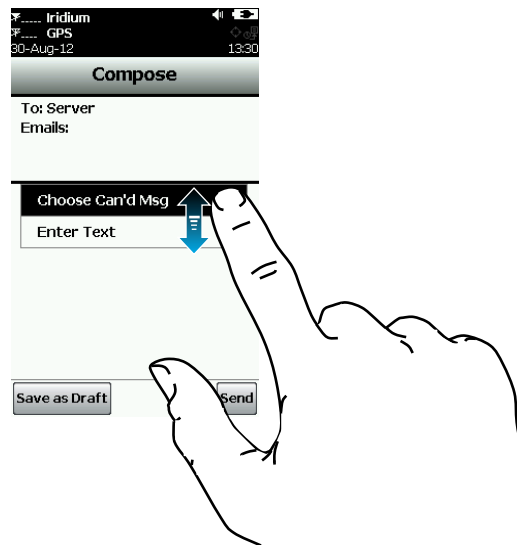
Figure 13: Choose Can'd Msg and Enter Text Options

6. Can'd Msg

   a. 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.
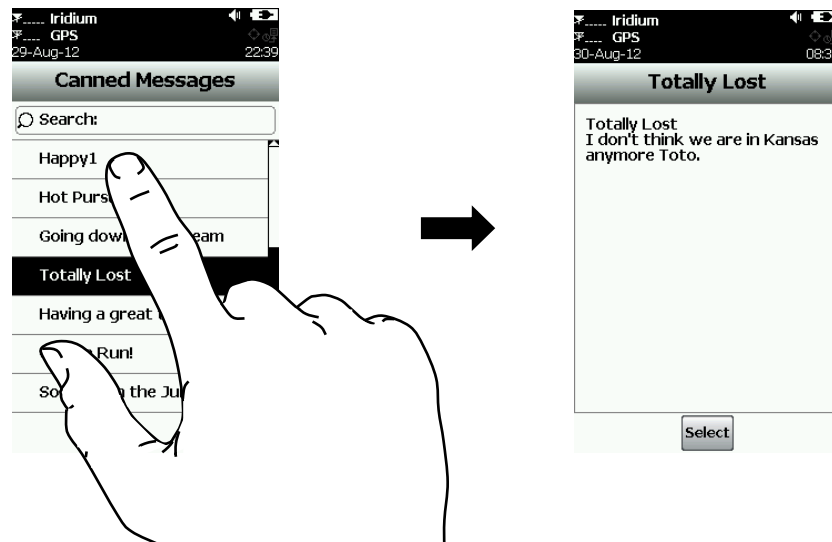
Figure 14: Select a Canned Message

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

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

   d. 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 ts' memory. During setup, SatTerm requires connectivity between the SHOUT ts 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 SHOUT ts.

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 is 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 SHOUT ts with the antennas having full view of the sky if using the Iridium link.

      i. If the *Inc GPS* option is turned on, then GPS location will be added to the message. Messages with GPS location takes longer to complete because the SHOUT ts has to acquire a GPS fix.

5.6 CONTACTS

Contacts is an address book with a list of contacts created and saved into the SHOUT ts' memory using NAL Research's SatTerm software. During setup, SatTerm requires connectivity between the SHOUT ts 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.

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

Figure 15 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 group name, the third line has the email address, the fourth line has the phone number, and the fifth line has the home address.

You can assign contacts to specific groups to organize the address book. The group field arranges the contacts based on the group name, in alphabetical order. The groups are first sorted by alphabetical order. Following that, the contacts are then sorting inside each group in the same manner. If there are contacts that do not contain a group, they are sorted above of the list of groups alphabetically. Tap on a group header to expand and condense each of the groups for better viewing.

Upon receiving a free-text or canned message from the SHOUT ts 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.
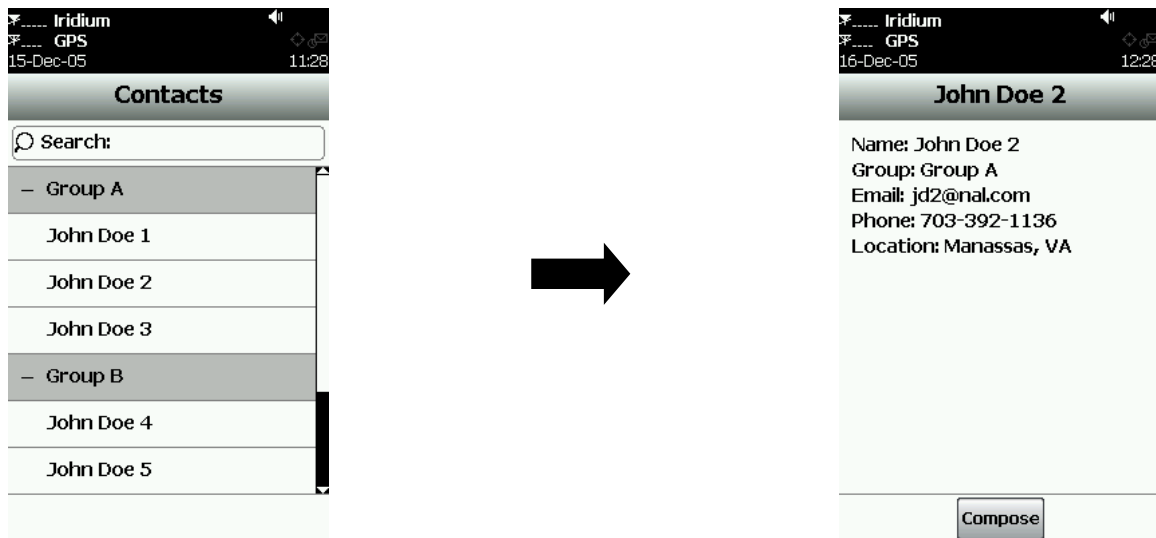
Figure 15: Formatted Contact

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 ts can initiate a mailbox check for any pending messages at the Iridium gateway:

1. Manually force the SHOUT ts to check the mailbox at any time using the *Chk Mbox* menu.

2. When tracking mode is enabled, the SHOUT ts automatically checks the mailbox each time it wakes up to send a position report.

3. Using the *Mbox Rate* menu (see below for detailed description), the SHOUT ts can be set to automatically wake up and check the mailbox at a preset frequency. A position report will not be sent when the SHOUT ts wakes up to check the mailbox unless the mailbox check rate coincides with the tracking report rate.

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

5.8   MBOX RATE

The Mailbox 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 check 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.
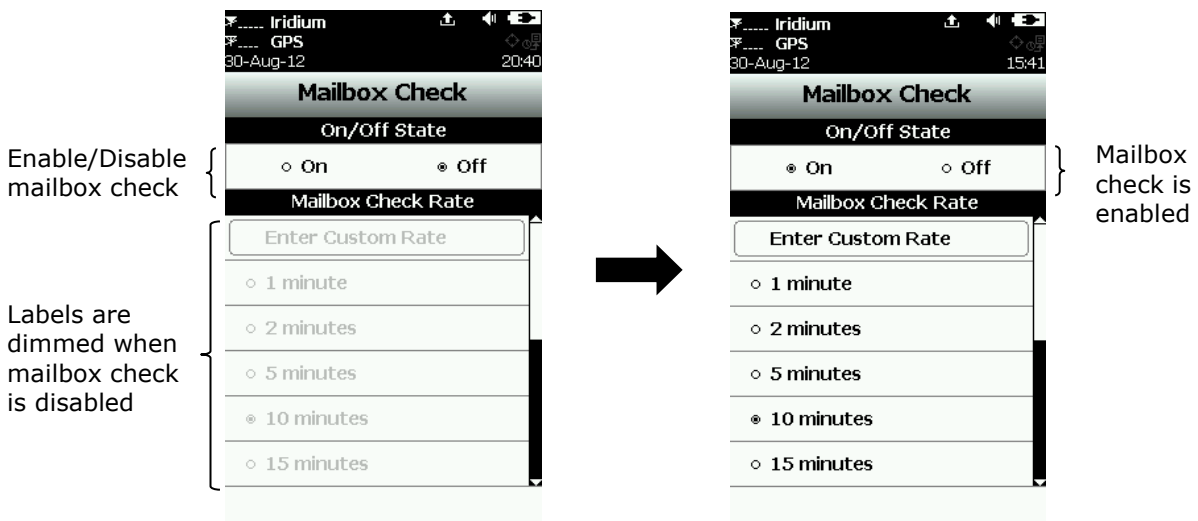
Figure 16: Mailbox Check Rate

When mailbox check is enabled, the symbol ⌖✉ lights up from dimmed gray to bright white at the top of the screen. The SHOUT ts checks the Iridium gateway automatically for any pending messages at the next scheduled time. When mailbox check is enabled and the SHOUT ts 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 ts to attach GPS location to Check-In and canned and free-text messages. Under default setting, these messages do not have GPS information included. Messages with GPS location attached can take longer to complete because the SHOUT ts has to acquire a GPS fix first. Depending on the validity of the stored 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

The *Tracking* menu for the SHOUT ts is shown below. Some options are very complex, including Geofences and Call Out, which require SatTerm to set up. For these options, refer to the "SatTerm for SHOUT ts" manual [2].
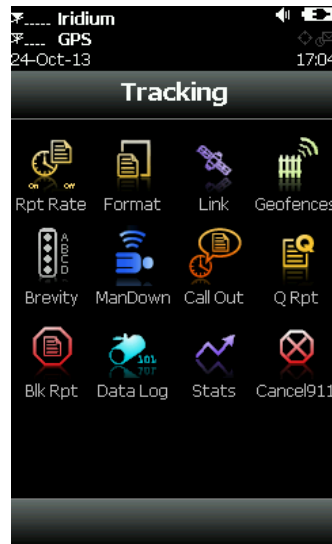
Figure 17: Tracking Menu

6.1 RPT RATE

The Report Rate [*Rpt Rate*] is used to set the tracking report rate (time between tracking reports) and to enable tracking. You can set the reporting rate for standard or motion reporting through the two different tabs. Choose from either a predefined rate or a user-defined rate with an on-screen keypad. The *Reporting Rate* menu is dimmed for both tabs 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 ts tracking mode. When tracking is on, the tracking symbol ⬥ at the top of the screen changes from dimmed gray to bright white. The SHOUT ts 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 SHOUT ts 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 SHOUT ts 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 SHOUT ts antennas must have a full view of the sky; otherwise, it will 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** section).

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. Report rate (time between reports) set to more than two hours forces the GPS receiver into either a warm-start or cold-start fix (~29 seconds). As a result, the SHOUT ts consumes more battery power and the total number of reports is reduced. For more information, see **Appendix C: Power Consumption**.

Important: The SHOUT ts <u>automatically resends</u> all failed messages in the Outbox after a successful position report transmission. To avoid draining the battery unintentionally, carry out frequent maintenance on the Outbox and delete unwanted failed messages.

The SHOUT ts 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 SHOUT ts.

6.2　FORMAT

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

The 30-byte format includes Coordinated Universal Time (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 UTC time, latitude, longitude, and Position (3D) Dilution Of Precision (PDOP). With UTC date omitted, the SHOUT ts 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 strictly for the purpose of Iridium airtime cost-saving.

The SHOUT ts can also send position reports and text messages in PMS. The PMS complies with the Blue Force Tracking Data Format Specification. The SHOUT ts 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 can be found in **Appendix A: PECOS Message Structure**.

6.3 LINK

The SHOUT ts' default setting is *Yes* to allow the Iridium link to be used to transmit reports and messages. If the Iridium link is not allowed to be used (radio silence), set the *Allowed* setting to *No*. If *Tracking* is on, *Data Logging* is on, and Iridium link is set to *No*, tracking reports are saved in its circular memory.
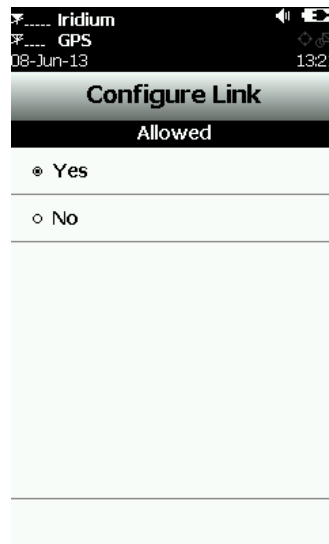
Figure 18: Iridium Link Allowed

6.4 GEOFENCES

In addition to "standard" tracking enabled through the *Rpt Rate* menu, *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®. You can also enter a sequence of latitude and longitude pairs to define a fence using just SatTerm. Refer to the "SatTerm for SHOUT ts" manual [2].

A geofence is 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 three coordinates and a maximum of 50. Each fence has a unique tracking profile that triggers the SHOUT ts to change its tracking behavior while inside a specific fence; e.g., it allows the SHOUT ts to turn off the Iridium link for regions that require radio silence. A geofence can be configured to send special arrival/departure reports upon entering and/or exiting the fence.

Labels are dimmed on fences that are disabled

Enabled fences

Enable/Disable a fence
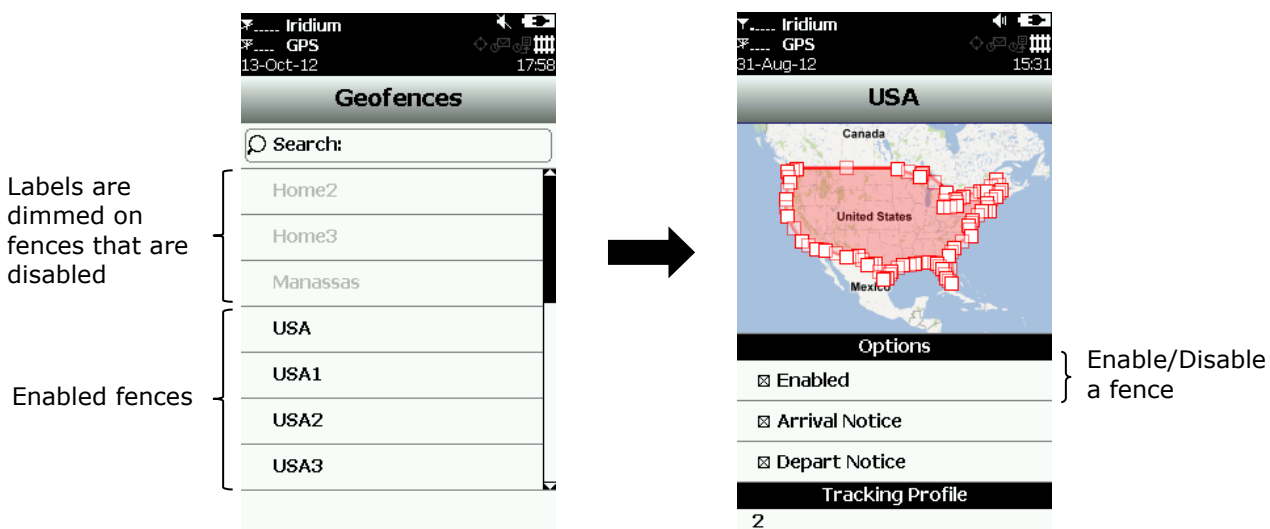
Figure 19: Geofences Enabled/Disabled

The *Geofences* menu limits you to a just 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 SHOUT ts immediately checks the GPS receiver to determine whether the device is inside an enabled fence. If the SHOUT ts 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 SHOUT ts 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.
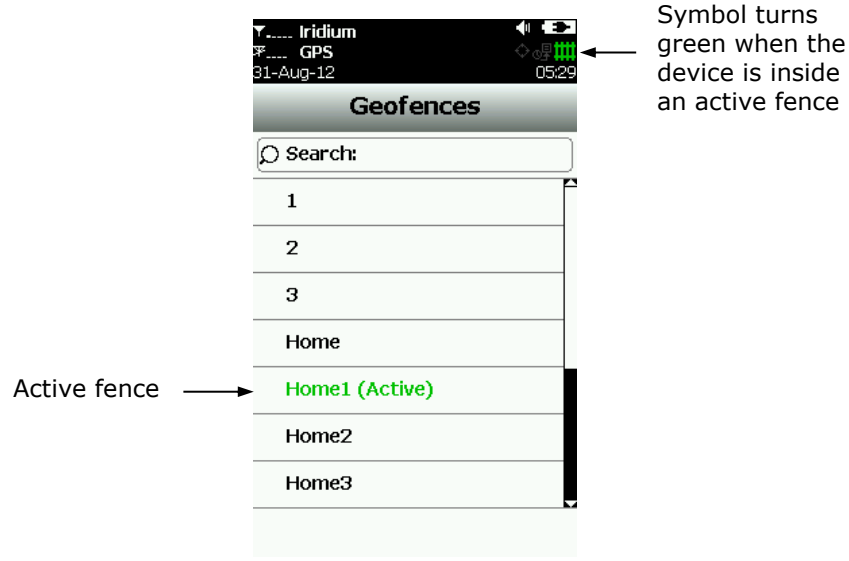
Figure 20: Geofences Green When Active

6.5   BREVITY

The *Brevity* code is part of the PMS format. The SHOUT ts 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: PECOS Message Structure**.

6.6   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 ts 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 menu. After Man Down begins alerting, you can cancel it by selecting the **Cancel 911** menu or selecting **Off** from the Man Down menu. The following settings are configurable through this menu:

Symbol is shown when Man Down is enabled
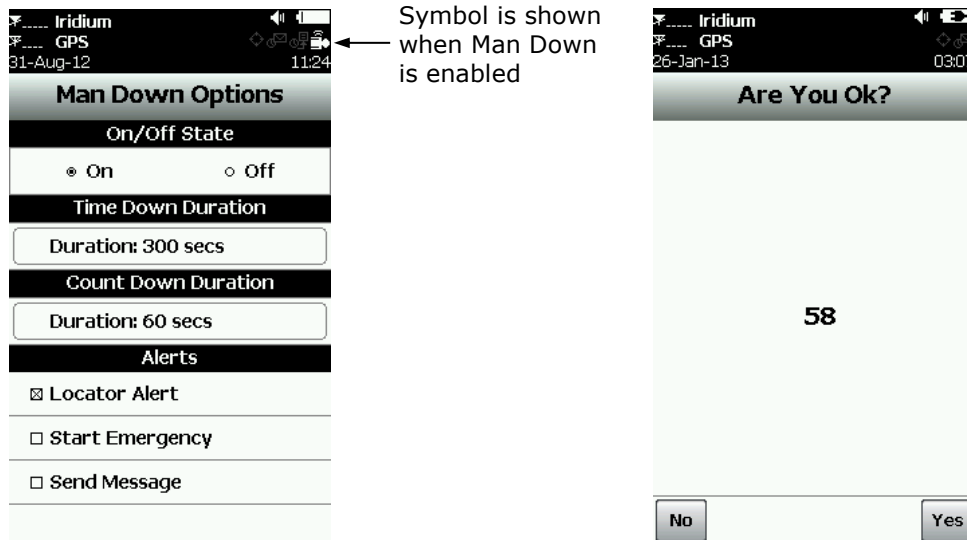
Figure 21: Man Down Options

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 button were pressed.

Send Message   Sends a text message with a Man Down short code and GPS location information.

6.7   CALL OUT

The *Call Out* allows the SHOUT ts 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 at the 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 ts" manual [2].

6.8   Q RPT

The SHOUT ts' 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 for a description of when failed tracking reports are resent.

6.9   BLK RPT

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

6.10 DATA LOG

The SHOUT ts' 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 SHOUT ts' memory is full, the oldest reports are overwritten. You can use SatTerm to retrieve all position reports saved on the SHOUT ts.

6.11 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, Way Point, free-text, and canned messages are not considered as "reports," and therefore are not displayed even if a message was sent successfully.

6.12 CANCEL 911

After pressing the red emergency button ● on the back of the SHOUT ts, 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 SHOUT ts 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.
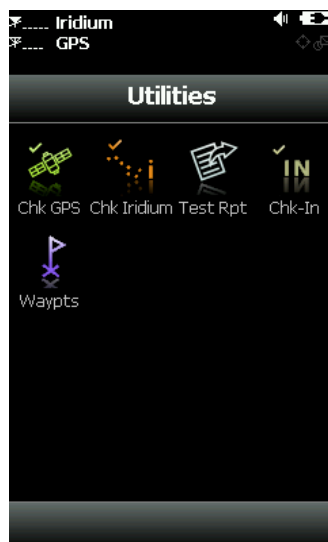
Figure 22: Utilities Menu

7.1 CHK GPS

The Check GPS [*Chk GPS*] option forces the SHOUT ts 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 to force the SHOUT ts to erase saved ephemeris in its memory and download a new set of ephemeris data. Be careful not to deplete the battery power by staying on this option for too long.

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 Check GPS option is a good indicator of whether or not the GPS receiver has sufficient signal to initiate a Way Point 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 25 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 ts 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   TEST RPT

When the Test Report [*Test Rpt*] option is selected, the SHOUT ts 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 does 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 and the Iridium 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."

7.4   CHK-IN

Use the Check-In [*Chk-In*] to send a quick message with a single, easily accessed button. When you press the Chk-In button, a second screen appears requesting confirmation. Once confirmed, the SHOUT ts 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 SHOUT ts has to acquire a GPS fix first.

7.5   MAP

The *Map* screen allows you to view locations received from other trackers. The locations are shown relative to your current position. Normally, north is aligned to the top of the screen; however, if the device is able to accurately determine the heading, the map rotates to orient to the direction of travel.

Below the map is a list of the points from the map with labels to match the letter shown on the map. With the ⚙ icon, you can clear the map of points. The 🔍 icon allows you to scale the zoom of the map, ranging from 40 m to 20 km. There is also a Best Fit zoom, which scales the map to fit the points on the screen. The maximum zoom for this is limited to 5,000 km.
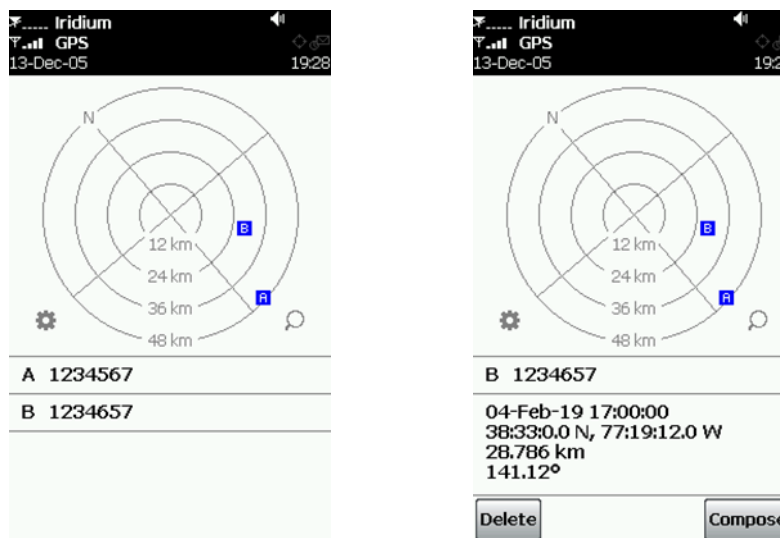
Figure 23: Map

You can select a point from the list to view more detailed information. From there, delete individual points by selecting pressing **Delete**. You can compose a message through the *Compose Screen* by selecting **Compose**. Pressing the back button reopens the list of points.

7.6   WAYPTS

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

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 ts 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.

    d. Save the waypoint.

3. Select the **Label** option to open a full keyboard to enter the waypoint label.

4. Select **Add** to save the waypoint into the SHOUT ts' nonvolatile memory for later retrieval.

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 customize the SHOUT ts hardware settings.
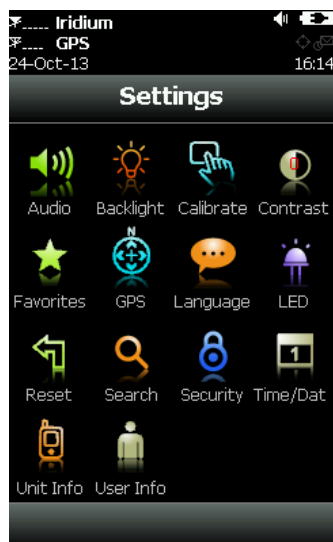
Figure 24: Settings Menu

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 alerts. In addition to the individual settings, all audio 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 ts turns the Liquid-Crystal Display (LCD) backlight off. Set the backlight to *Always On* for nighttime use.

8.3 CALIBRATE

A resistive touchscreen drifts slowly over time and needs to be recalibrated once in a while. The *Calibrate* option allows you to either reset the calibration back to factory settings or to recalibrate specifically to the condition of the touchscreen. If the SHOUT ts is accidently recalibrated with erroneous settings and you are unable to use the touchscreen to recalibrate or reset to factory settings, with the SHOUT ts turned off, hold the power

button for ~7 seconds or until the reset calibration screen opens. DO NOT connect the SHOUT ts' 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 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, *Portable* model is used; this 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; 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; 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; maximum vertical velocity of 15 m/sec; sanity check type: altitude and velocity; 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; 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; maximum vertical velocity of 100 m/sec; sanity check type: altitude; 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; maximum vertical velocity of 100 m/sec; sanity check type: altitude; 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; maximum vertical velocity 100 m/sec; sanity check type: altitude; maximum position deviation: large.

8.7 LANGUAGE

Only English is available for this firmware version.

8.8 LED

The SHOUT ts 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 INFO

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

8.14 USER INFO

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

9 ADDITIONAL FEATURES

9.1 EMERGENCY (911) BUTTON

The Emergency 911 button ● is located underneath a rotating guard at the back of the SHOUT ts. 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 SHOUT ts 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 SHOUT ts.

This bar turns from black to red under emergency mode. It turns back to black when the device is taken out of emergency mode.

The status LED turns solid green under emergency mode.
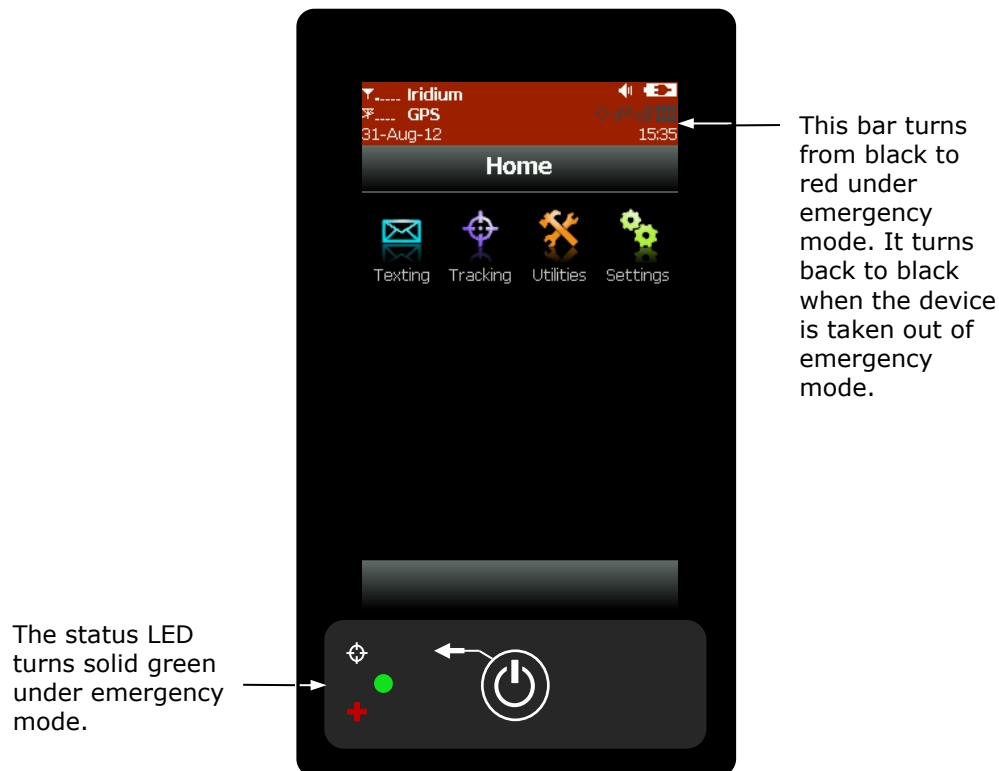
Figure 25: Emergency Mode Display

9.2 STATUS LED

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

9.3 TURNING OFF

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

APPENDIX A: PECOS MESSAGE STRUCTURE

TRACKING

The SHOUT ts is capable of sending position reports in PMS. PMS complies with the Blue Force Tracking Data Format Specification as defined in the document PECOS Message Definition Specification, 200907-001 Version 1.7 [1]. The SHOUT ts 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 26** below.
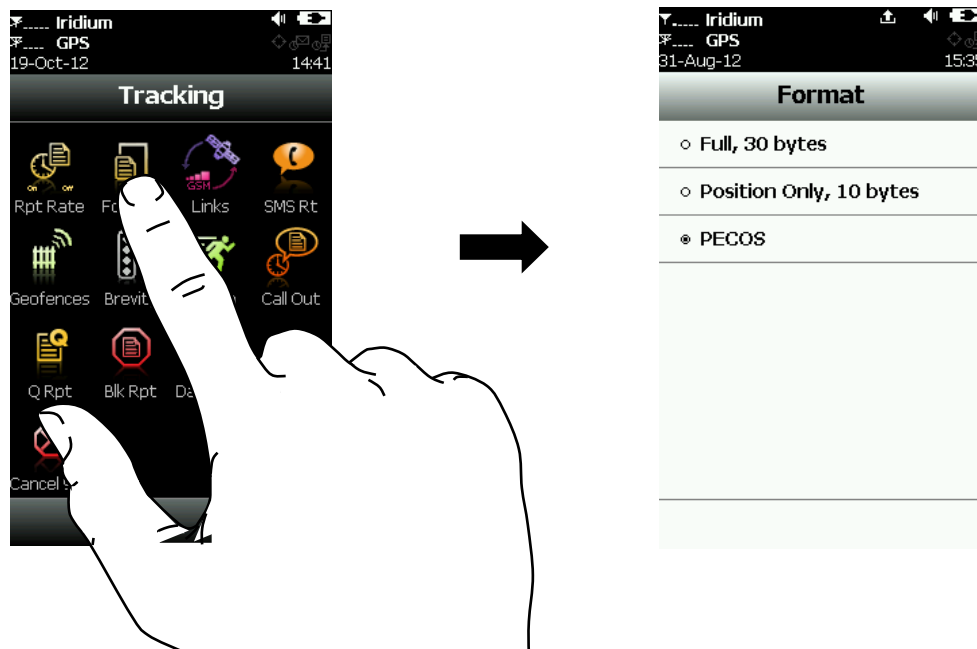
Figure 26: PECOS Option in Format Menu

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.

COMPOSE

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

CONTACTS

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

MAP

While in PECOS mode, location update points are displayed in blue. There is also an option to add a contact by pressing **Add Contact** on the selected point. You can then enter a name and group for that contact.

Figure 27: Add Contact to Map

APPENDIX B: UPGRADING THE FIRMWARE

The SHOUT ts firmware can be upgraded using a computer connected to the USB port of the device. The device drivers support Windows XP, Windows Vista, and Windows 7.

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/).
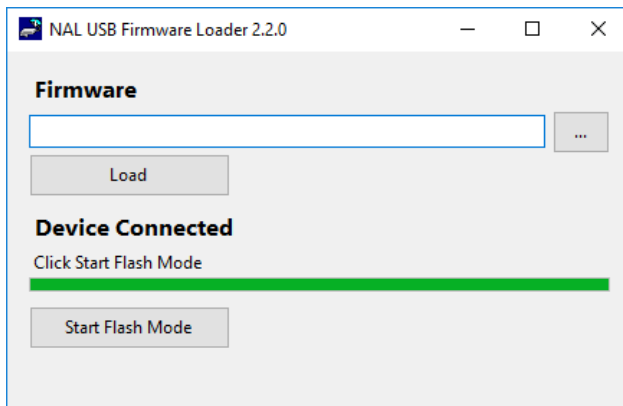
Figure 28: Run Firmware Loader Program

2. With a USB cable attached to a computer and the device, press **Start Flash Mode** as shown in **Figure 28**.

3. Wait until it activates and then press the "**...**" button.

4. Browse and select a valid NAL device BIN file.
   Note: NAL Research makes the BIN file available upon request.
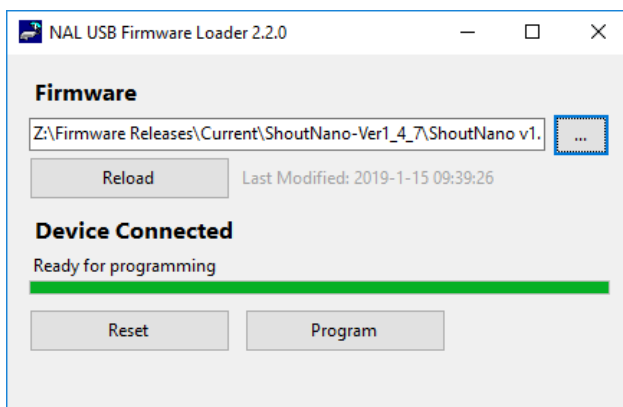
Figure 29: Load BIN File

5. Once the BIN file is loaded, press **Program** as shown in **Figure 29**.

6. Wait for the programming to complete.

7. 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 ts has an internal 1.95 A-Hr Li-ion rechargeable battery. When both the Iridium and GPS antennas have a clear view of the sky and the battery is fully charged, the SHOUT ts is capable of sending more than 1,500 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. Blocked or partially blocked antennas force the SHOUT ts to retry multiple SBD transmissions for each report and, as a result, can significantly reduce the overall number of reporting cycles.

The SHOUT ts 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 two hours (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. As a result, the SHOUT ts configured for report rate of more than two hours can only send ~750 tracking reports.

Important: Data presented here are only <u>estimates</u> and are highly dependent on the operating environment and antenna type. Data are based on measurements made with multiple ts devices placed on the roof of NAL Research's facility with no blockage.

Each time the SHOUT ts wakes up to send a report, it has two minutes to acquire a GPS fix and send an SBD message. Assuming the ephemeris data is valid (less than two hours old or time-between-reports is less than two hours), the GPS receiver takes about 5 seconds for a position fix drawing approximately 55 mA. The Iridium transceiver takes about 15 seconds to transmit an SBD message drawing an average current of 190 mA. The SHOUT ts circuit draws about 60 mA during a 20-second reporting cycle. The entire reporting cycle consumes ~1.12 mA-Hr of battery power. If the Iridium antenna is blocked or an overhead Iridium satellite is not available, the Iridium can potentially stay on for another 100 seconds in attempting to send a report. This results in additional consumption of 9.7 mA-Hr or 11 mA-Hr total. A missed report consumes ~8.5 times more power than a 'normal' transmitted report.

APPENDIX D: DESIGN SPECIFICATIONS

MECHANICAL SPECIFICATIONS

Dimensions: ....104 mm x 58 mm x 23 mm (4.1" x 2.3" x 0.9")

Weight: ....~7.2 oz (204 g)

Enclosure: ....Hard anodized aluminum housing/EMI shielding

Connector: ....USB Micro-B

Antennas: ....Iridium and GPS

Key: ....One button power button

Emergency: ....Guarded button

LED: ....One status LED

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

ELECTRICAL SPECIFICATIONS

Main Input Voltage: ....5.0 VDC

Peak Current: ....1.5 A @ 5.0 VDC

Battery Type: ....Lithium-ion

Battery Capacity: ....1.95 A-Hr

Charging Voltage: ....USB 1.0, USB 2.0 or 5VDC

Rechargeable Cycles: ....500 times

Power Consumption: ....See previous section

IRIDIUM TRANSCEIVER

Operating Frequency: ....1616 to 1626 MHz

Duplexing Method: ....TDD

Multiplexing Method: ....TDMA/FDMA

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

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

GPS RECEIVER

GPS Receiver: ....u-blox NEO-6Q

Receiver Type: ....L1, C/A, 50-channel

Update Rate: ....4 Hz

```
Accuracy: .......................................................2.5 m CEP (position)
                                                               2.0 m CEP (SBAS)
Acquisition: ....................................................29 seconds cold-start
                                                               29 seconds warm-start
                                                               <1 second hot-start
Sensitivity:.....................................................−160 dBm (tracking)
                                                               −160 dBm (reacquisition)
                                                               −147 dBm (cold-start)
```

ENVIRONMENTAL SPECIFICATIONS (ELECTRONICS)

```
Operating Temperature:....................................−20ºC to +60ºC (−4ºF to +140ºF)
Operating Humidity: ........................................≤ 75% RH
Storage Temperature: ......................................−20ºC to +60ºC (−4ºF to +140ºF)
Storage Humidity:............................................≤ 93% RH
```

ENVIRONMENTAL SPECIFICATIONS (BATTERY)

```
Operating Temperature:....................................−20ºC to +60ºC (−4ºF to +140ºF)
Operating Humidity: ........................................≤ 90% RH
Storage Temperature: ......................................−20ºC to +60ºC (−4ºF to +140ºF)
Storage Humidity:............................................≤ 95% RH
Charge Temperature: ......................................0ºC to +45ºC (32ºF to +113ºF)
```

ENVIRONMENTAL SPECIFICATIONS (LCD)

```
Operating Temperature:....................................−20ºC to +55ºC (−4ºF to +131ºF)
Operating Humidity Range: ...............................≤ 90% RH
Storage Temperature Range:.............................−20ºC to +85ºC (−4ºF to +185ºF)
Storage Humidity Range: ..................................≤ 95% RH
```

APPENDIX E: STANDARDS COMPLIANCE

The SHOUT ts has an internal Iridium 9602 transceiver module. The 9602 is tested to the regulatory and technical certifications shown below. It is assigned to the FCC Identifier Q639602.

Table 2: Standards Compliance

Regulatory Approvals	Radio Tests	EMC Tests	Mechanical/ Electrical Tests
CE	ETSI EN 301 441 V1.1.1 (2000-05)	ETSI EN 301 489-1 V1.4.1 (2002-08) ETSI EN 301 489-20 V1.2.1 (2002-11)	EN60950-1:2001 Part 1 UL60950-1 Part 1
FCC	FCC CFR47 Parts 2, 15, and 25	EN61000-4-2: 1995/A2:2001 Part 4.2	
IC	Industry Canada RSS170 Issue 1, Rev 1, November 6, 1999	EN61000-4-3: 2002 Part 4.3 EN61000-4-4: 1995/A1:2001/A2:2001 Part 4.4 EN61000-4-6: 1996/A1: 2001 Part 4.6 EN55022: 1998/A1: 2000/A2: 2003	

APPENDIX F: EXPORT COMPLIANCE

The SHOUT sp 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.