

SHOUT nano User Guide

Version A

March 28, 2022



LEGAL DISCLAIMER AND CONDITION OF USE

This document contains information for the SHOUT nano personal satellite tracking device and accompanying accessories (“Product”), which are provided “as is.” Reasonable effort has been made to make the information in this document reliable and consistent with specifications, test measurements and other information. However, NAL Research Corporation and its affiliated companies, directors, officers, employees, agents, trustees or consultants (“NAL Research”) assume no responsibility for any typographical, technical, content or other inaccuracies in this document. NAL Research reserves the right in its sole discretion and without notice to you to change Product specifications and materials and/or revise this document or withdraw it at any time. User assumes the full risk of using the Product specifications and any other information provided.

NAL Research makes no representations, guarantees, conditions or warranties, either express or implied, including without limitation, any implied representations, guarantees, conditions or warranties of merchantability and fitness for a particular purpose, non-infringement, satisfactory quality, non-interference, accuracy of informational content, or arising from a course of dealing, law, usage, or trade practice, use, or related to the performance or nonperformance of any products, accessories, facilities or services or information except as expressly stated in this guide and/or the Product and/or satellite service documentation. Any other standards of performance, guarantees, conditions and warranties are hereby expressly excluded and disclaimed to the fullest extent permitted by the law. This disclaimer and exclusion shall apply even if the express limited warranty contained in this guide or such documentation fails of its essential purpose.

In no event shall NAL Research be liable, whether in contract or tort or any other legal theory, including without limitation strict liability, gross negligence or negligence, for any damages in excess of the purchase price of the Product, including any direct, indirect, incidental, special or consequential damages of any kind, or loss of revenue or profits, loss of business, loss of privacy, loss of use, loss of time or inconvenience, loss of information or data, software or applications or other financial loss caused by the Product (including hardware, software and/or firmware) and/or the Iridium satellite, or arising out of or in connection with the ability or inability to use the Product (including hardware, software and/or firmware) and/or the Iridium satellite to the fullest extent these damages may be disclaimed by law and whether advised of the possibilities of such damages. NAL Research is not liable for any claim made by a third party or made by you for a third party.

REVISION HISTORY

Revision	Date	Description
1.5.2	05/28/2014	Initial version
1.6	06/10/2021	Updated to new template
Rev A	03/28/2022	Formal initial release; editorial update

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]	AT Commands for SHOUT nano	Version 1.5.2 28 May 2014
[2]	PECOS 200708-001	Version 1.3

TABLE OF CONTENTS

1	INTRODUCTION.....	12
2	USING THE SHOUT NANO	14
2.1	Device Description	14
2.2	Charging the Battery	15
2.3	Basic Navigation	16
2.4	Using the Keyboards	17
2.5	Network Operation Center (NOC).....	18
2.6	Server for Trackers Software.....	18
2.7	SatTerm Software.....	18
2.8	Mapping NOC Server	19
3	HOME SCREEN	20
3.1	Status Symbols	20
3.2	Date/Time.....	21
3.3	Home Icons.....	21
3.4	Last Report	22
3.5	Check-In (Soft Key)	23
3.6	Way Point (Soft Key)	23
4	QUICK START.....	24
5	MESSAGING MENU	25
5.1	Address Book.....	25
5.2	Compose.....	26
5.2.1	Choose Canned Msg.....	26
5.2.2	Enter Text	28
5.2.3	Send Message	29
5.3	Inbox.....	29
5.4	Drafts	30
5.5	Outbox.....	30
5.6	Sent.....	31
5.7	Check Mailbox (Soft Key)	32
6	TRACKING MENU	34
6.1	Tracking On/Off.....	34

6.2	Report Rate	35
6.3	Cancel 911	36
6.4	Stats.....	36
6.5	Accuracy	37
6.6	Format	37
7	UTILITIES MENU	39
7.1	Check GPS.....	39
7.2	Check Iridium.....	40
7.3	Test Report	41
7.4	Check Mailbox	41
7.5	Check-In.....	41
7.6	Way Points.....	41
7.7	Security.....	42
8	SETTINGS MENU.....	43
8.1	Audio	43
8.2	Contrast	43
8.3	Backlight	43
8.4	LED.....	44
8.5	Include GPS.....	44
8.6	GPS	44
8.7	Time and Date	44
8.8	Soft Keys	45
8.9	User Info	45
8.10	Unit Info.....	45
8.11	Memory	45
8.12	Reset.....	45
9	ADDITIONAL FEATURES	46
9.1	Emergency (911) Button	46
9.2	Status LED.....	46
9.3	Powering Down	47
	APPENDIX A: PMS FEATURES	48
A.1	Tracking	48

A.2	Brevity Code	48
A.3	Soft Keys	49
A.4	Cancel 911 with Soft Keys	50
APPENDIX B: UPGRADING THE FIRMWARE		51
APPENDIX C: POWER CONSUMPTION		52
APPENDIX D: DESIGN SPECIFICATIONS		54
D.1	Mechanical Specifications	54
D.2	Electrical Specifications	54
D.3	Environmental Specifications	55
APPENDIX E: TECHNICAL SUPPORT		57
APPENDIX F: STANDARDS COMPLIANCE.....		58
APPENDIX G: EXPORT COMPLIANCE.....		59
APPENDIX H: MECHANICAL DRAWING		60

TABLE OF FIGURES

Figure 1: SHOUT nano Buttons, LED, and USB Port	14
Figure 2: Keyboard to Enter Waypoint Labels	17
Figure 3: Screens Displayed When Device is Powered Up	20
Figure 4: Home Icons	22
Figure 5: Last Report Information.....	22
Figure 6: Messaging Menu.....	25
Figure 7: Address Book Contact.....	26
Figure 8: Canned Message Examples.....	27
Figure 9: Canned Message Selected	28
Figure 10: Enter Text.....	28
Figure 11: Send Message or Save as Draft.....	29
Figure 12: Outbox	31
Figure 13: Check Mailbox.....	33
Figure 14: Tracking Menu	34
Figure 15: Tracking On	35
Figure 16: Stats	37
Figure 17: Utilities Menu	39
Figure 18: Reset Ephemeris Key	40
Figure 19: Settings Menu	43
Figure 20: Emergency (911) Button Feature.....	46
Figure 21: Power Down Screen.....	47
Figure 22: Format Menu	48
Figure 23: Brevity Code	49
Figure 24: Soft Keys.....	50
Figure 25: Cancel 911 with Soft Keys.....	50
Figure 26: NAL USB Bootloader	51
Figure 27: SHOUT nano Mechanical Drawing.....	60

TABLE OF TABLES

Table 1: Status Symbols	20
-------------------------------	----

ACRONYM LIST

AES	Advanced Encryption Standard
AT	ATtention (from the original Hayes modem AT Command set)
BIS	Bureau of Industry and Security
C/A.....	Coarse/Acquisition
CE	Conformité Européenne
CEP	Circular Error Probable
DISA.....	Defense Information Systems Agency
DoD	Department of Defense
EAR	Export Administration Regulations
EMI	Electromagnetic Interference
EMSS	Enhanced Mobile Satellite Services
ETSI.....	European Telecommunications Standards Institute
FCC	Federal Communications Commission
FDMA	Frequency Division / Multiple Access
GPS	Global Positioning System
HACC	Horizontal Accuracy
HDOP	Horizontal Dilution of Precision
IC	Industry Canada
IMEI	International Mobile Equipment Identification
IP	Internet Protocol
LCD	Liquid Crystal Display
LED	Light Emitting Diode
Li-ion.....	Lithium-ion
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
SatTerm	Satellite Terminal Emulator software
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
USB	Universal Serial Bus
UTC.....	Coordinated Universal Time
Vvel.....	Vertical Velocity
VDC.....	Volts (Direct Current)
VDOP	Vertical Dilution of Precision

1 INTRODUCTION

The SHOUT nano is a handheld, global, two-way satellite messaging and personal tracking device. It utilizes Iridium's Short Burst Data (SBD) service to provide location information determined by a Global Positioning System (GPS) receiver, two-way inbound and outbound status, text messaging, and emergency/alert notifications. The SHOUT nano 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. The SHOUT nano is 100% backward compatible with the SHOUT.

The SHOUT nano is designed with ultra-low power consumption electronics drawing less than 35 μ A during sleep. With an internal 1.95 Ah rechargeable Li-ion battery and 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 nano is equipped with a high-resolution color Liquid-Crystal Display (LCD) 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. A 911 button is used for immediate emergency/alert notifications. Data are packaged in either standard or 256-bit Advanced Encryption Standard (AES) encrypted format.

The SHOUT nano is capable of sending position reports in PECOS Message Structure (PMS). The PMS complies with the Blue Force Tracking Data Format Specification. The SHOUT nanos are 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: PMS Features**.

The SHOUT nano offers a variety of services including:

- Normal Tracking — The SHOUT nano can be programmed to automatically wake up and send a position report at a set interval ranging from once every minute to once a day.
- Emergency Alert — When the emergency 911 button is pushed, the SHOUT nano immediately sends alerts to a designated corporate email, home email, and/or monitoring center. The home base and the user can then communicate to define further specifics of the situation and a response to the emergency.
- Free-Text Messaging — The SHOUT nano allows users to send free-text via three different sets of on-screen keyboards.
- Canned Text Messaging — The SHOUT nano allows users to send canned (predefined) messages. Up to 600 predefined messages stored in memory can be retrieved and sent. 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 nano lets users send and/or save 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 SHOUT nano allows a quick check-in message to be sent using a single soft key.

IMPORTANT: NAL Research can enable the SHOUT nano for use on the Department of Defense (DoD) Enhanced Mobile Satellite Services (EMSS) Gateway. However, accessing the EMSS Gateway is not authorized until the SHOUT nano 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. Please see webpage <https://sbd.pac.disa.mil> for more information regarding DoD EMSS service provisioning. This is a U.S. Government Information System website, and can only be accessed by authorized users with a valid certificate.

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

2 USING THE SHOUT NANO

2.1 DEVICE DESCRIPTION

The SHOUT nano has eight buttons, one Light-Emitting Diode (LED), and a Universal Serial Bus (USB) port (see **Figure 1**). The buttons are used to power up the device, access the menus for parameter setting, initiate Check-In and Way Point functions, and activate emergency notification. The USB port is for charging, firmware update, and parameter setting.



Figure 1: SHOUT nano Buttons, LED, and USB Port

1. Power/Enter:
 - a. Turns device on or off when held down for two seconds or
 - b. Selects highlighted item on a menu.
2. Arrows:
 - a. Up/Down/Right: Navigates the cursor.
 - b. Left:
 - i. Navigates the cursor or
 - ii. Returns to the previous menu.
3. Check-In Soft Key: Accesses the Check-In feature.
4. Way Point Soft Key: Accesses the Way Point features.

5. USB Port: Charges the battery, updates firmware, and sets up operating parameters using a computer.
6. Emergency: Sends an emergency 911 alert/notification.
7. Guard: Protects emergency button from being accidentally activated.
8. LED: Displays tracking and emergency statuses.
9. Antenna: Embedded GPS antenna (DO NOT BLOCK).
10. Antenna: External Iridium antenna* (DO NOT BLOCK).

*IMPORTANT: For best performance, NAL Research only recommends the use of the Maruwa decafilary antenna. Performance degradation, including dropped coverage and shortened battery life, can occur if a different antenna is used. NAL Research will void the warranty if the SHOUT nano is replaced with a non-Sarantel antenna.

2.2 CHARGING THE BATTERY

The SHOUT nano package includes an AC wall adapter and a standard USB-to-mini USB cable. The SHOUT nano is shipped with its internal lithium-ion battery partially charged. Fully charge the SHOUT nano before use.

There are two ways of charging the SHOUT nano.

- Use the supplied AC wall adapter. The charging time is approximately five hours.
- Connect to a standard USB device—make sure to use the USB cable provided with the SHOUT nano. Charging time using a USB port depends on the type of USB port.
 - USB 1.0 should be able to charge the SHOUT nano in about a day, assuming the port is capable of producing an output current of 100 mA.
 - USB 2.0 can charge the SHOUT nano battery in about four hours, assuming a current output of 1.5 A.


NAL Research offers 12 Volts (Direct Current) (VDC) and 24–36 VDC chargers sold as separate items. While using the SHOUT nano, a low-battery warning message appears when remaining power is less than 10%.








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 a pocket, purse, or other container with metal objects.

Do not disassemble the SHOUT nano to replace the battery. Return it to NAL Research for services.

The SHOUT nano has a battery status icon  at the top-right corner of its LCD screen indicating the charging status. When charging is complete, the icon shows five bars (not counting the last battery icon). The device can be safely operated and does not need to be turned off while charging, but the charging cycle completes quicker when the device is turned off.

2.3 BASIC NAVIGATION

- Turn on the SHOUT nano by holding down the power/enter  button for approximately two seconds.
- Once the device is on, use the arrow   buttons to position the cursor over menu icons.
- Use the enter  button to select the highlighted icon.
- Each menu has a BACK  button, which returns the device to the previously accessed screen.

On most menus, frequently used options are programmed into two soft keys, allowing quick and easy access. The SHOUT nano can be turned off (completely off with no tracking and no text messaging) at any time by holding down the power/enter button for approximately two seconds. The device automatically “goes to sleep” after 90 seconds of inactivity.

2.4 USING THE KEYBOARDS

Some options require the use of on-screen keyboards to enter information. Three different keyboards are available. **Figure 2** is an example of a keyboard to enter waypoint labels.







- The up  key can be pressed repeatedly to switch between the keyboards.
- The four arrow     buttons on the SHOUT nano are for navigating around the keyboards.
- The enter  button is for selecting a highlighted character.
- While entering text, the position of the cursor in the text box is shown as a thin, solid rectangular block.
- The entered text can be edited by pressing the up arrow button until the cursor exits the keyboard into the text box and begins to blink.
- The four arrow buttons can again be used to navigate and to place over a character to be corrected.
- Pressing the enter button takes the user back to the keyboard and exits the text box.
- The number displayed on the right corner of the LCD indicates the remaining allowable number of characters that can be entered into the text box.



Figure 2: Keyboard to Enter Waypoint Labels

2.5 NETWORK OPERATION CENTER (NOC)

The SHOUT nano comprises a 9602 transceiver board capable of 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). It can be provisioned by NAL Research or any certified Iridium airtime service provider, including the DoD Defense Information Systems Agency (DISA) EMSS office, to send messages and reports to five different destinations (a combination of email addresses, Internet Protocol (IP) addresses, and other mobile devices). While in the field, the SHOUT nano can also accept real-time text messages and commands from a NOC.

A NOC could be a sophisticated central monitoring center equipped with servers connected to high-speed networks. A NOC could also be as simple as a tablet, a laptop, or a desktop attached to the internet, to an Iridium transceiver, or to any wireless device. A NOC is required to receive and implement the logic necessary for analyzing the SHOUT nano messages and determine the appropriate response.

2.6 SERVER FOR TRACKERS SOFTWARE

Upon request, NAL Research provides the Server for Trackers software for users to install on their NOCs to retrieve NAL Research's formatted GPS reports from the remote SHOUT nano. In addition, the program lets a NOC communicate with modems attached to its serial ports, Post Office Protocol (POP)3/ Simple Mail Transfer Protocol (SMTP) servers, 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 nano. Under special cases, NAL Research releases our proprietary GPS report formats for developers to implement into their own tracking software.

2.7 SATTERM SOFTWARE

Along with the Server for Tracker software, SatTerm software is included for users to set up the SHOUT nano operating parameters, address book, and canned messages. Most of the operating parameters can be set using the SHOUT nano on-screen menus. However, more sophisticated features such as encryption must be carried out via SatTerm and a connected computer to the

SHOUT nano. For address book and canned messages, the SHOUT nano sends only short codes instead of the message body to a NOC server. Short codes are then mapped to the real addresses or canned messages with a lookup table saved on the NOC server during setup. Therefore, when the Satellite terminal emulator software (SatTerm) is used to enter address book and canned messages, SatTerm synchronizes short codes between the SHOUT nano and the NOC server.

2.8 MAPPING NOC SERVER

NAL Research also makes available a mapping NOC server to our customers only for demonstration purposes. Application developers can call to ask how to set up a free demo account. The server implements Google Earth to display the 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

Immediately after it's powered up, the SHOUT nano momentarily displays the NAL Research logo followed by the home screen, as shown in **Figure 3**. Device status symbols are shown along the top of the home screen. Some symbols do not appear until an event is initiated, such as sending or receiving a message.



Figure 3: Screens Displayed When Device is Powered Up

3.1 STATUS SYMBOLS

Table 1: Status Symbols












	Denotes the Iridium transceiver is off. The Iridium transceiver is always kept off to preserve battery life until a message is required to be transmitted.
	Denotes: (1) the Iridium transceiver is on with real-time signal strength represented by the number of vertical bars and (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 nano cannot send 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, and four bars represent 3D fix with HDOP less than 2.0. Although the SHOUT nano 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 and attain better position accuracy.

Table 1: Status Symbols

	Denotes tracking mode is off when the tracking symbol is dimmed blue.
	Denotes tracking mode is on when the tracking symbol is bright white. Next to the tracking symbol is the countdown timer to the next report.
	Denotes all the audio alerts are off.
	Denotes the 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.
	The battery indicator with five bars denotes it's fully charged.



3.2 DATE/TIME


The current time and date are displayed with the formats defined using the Settings > Time and Date menu. The GPS receiver has an internal clock, and as long as the battery is not depleted and a valid position fix was previously acquired, the SHOUT nano can recall the correct date and time. The message “Date/Time unavailable” is displayed when the SHOUT nano is unable to restore information from the GPS receiver.

3.3 HOME ICONS

Immediately below the date and time, the SHOUT nano displays four main icons, each representing a menu option—Messaging, Tracking, Utilities, and Settings (see **Figure 4**).

Detailed descriptions of each of these menu options are included in the next sections. Use the

arrow   buttons to place the cursor over an icon. The perimeter of an icon lights up and a

label appears underneath it when the cursor is placed over it. Use the enter  button to select the menu option.

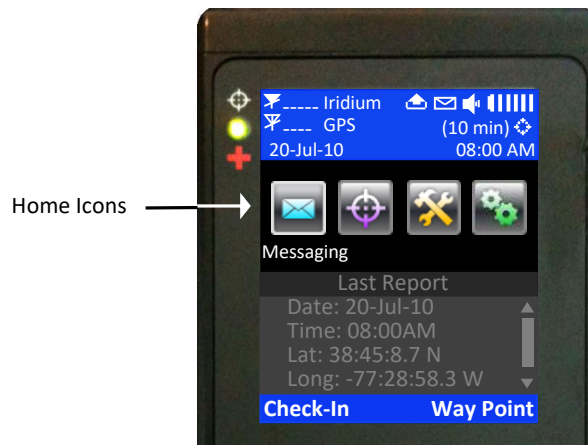


Figure 4: Home Icons

3.4 LAST REPORT

The last successful report sent by tracking or emergency notification is displayed in the text box below the Home icons (see **Figure 5**). Check-In, Way Point, free-text, and canned messages are not considered “reports,” and therefore are not displayed on the home screen even if a message was sent successfully. With limited space on the LCD screen, only date, time, latitude, longitude, and altitude are visible in dimmed gray text. Additional information can be seen by pressing the arrow down button. After the arrow button is pressed, the text changes from gray to bright white for better readability. Displayed text can be changed back to gray by repeatedly pressing the left arrow button. The Last Report information is saved on the SHOUT nano’s nonvolatile memory. Even if battery power is removed, the information can still be restored. All displayed GPS parameters are self-explanatory except Vvel, which stands for Vertical Velocity.

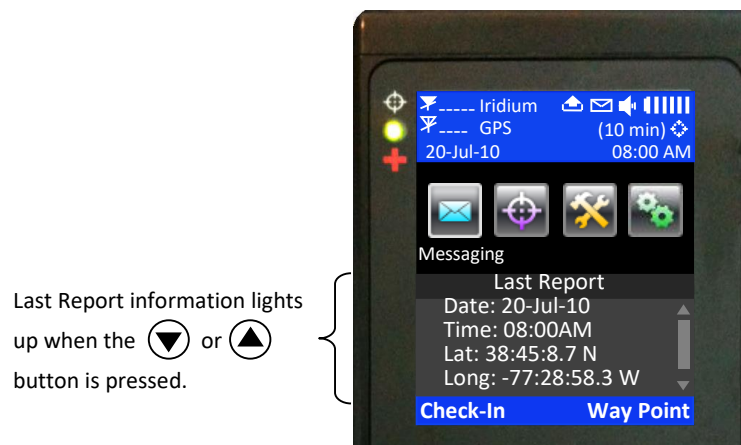


Figure 5: Last Report Information

3.5 CHECK-IN (SOFT KEY)

The *Check-In* soft key (see **Figure 5**) allows sending a quick message with a single, easily accessed button. When the Check-In button is pressed from the home screen, a second screen appears requesting confirmation. Once confirmed, the SHOUT nano sends out a short code representing a Check-In message. If the Settings > Include GPS option is enabled, the GPS location will be attached to the Check-In message. Check-In messages with GPS location take longer to complete because the SHOUT nano has to acquire a GPS fix first. Depending on the validity of the stored ephemeris data or the *Accuracy* setting, it could take an additional 29 seconds. The Check-In message uses the same canned message's short code format.

3.6 WAY POINT (SOFT KEY)

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




1. Press the *Way Point* soft key from the home screen (see **Figure 5**). The SHOUT nano immediately turns the GPS receiver on to acquire a fix.
2. Select one of the following options.
 - a. Go back to the home screen without further action.
 - b. Reacquire a new GPS fix.
 - c. Save the waypoint.
 - i. Select Next to open a full keyboard in order to enter the waypoint label.

Note: Use the  key to toggle between the keyboards.

A waypoint label can have up to 309 characters. As each character is entered, the remaining allowable number of characters for the label is displayed at the top of the LCD. The *Add* option saves the waypoint into the SHOUT nano's nonvolatile memory for later retrieval. The SHOUT nano can store up to 1,000 waypoints. The oldest point is overwritten as the memory becomes full. After saving a waypoint, you can also send it to a NOC server. The server differentiates a Way Point report from a normal tracking report by their short codes.

4 QUICK START

Before use, airtime must first be purchased from NAL Research or from any of Iridium certified airtime resellers. The SHOUT nano's International Mobile Equipment Identification (IMEI) number must be registered by an airtime reseller to "point" to a NOC server. To learn how to operate the SHOUT nano as a messaging device, read the entire user guide. However, as a tracking device, you can quickly set up the SHOUT nano with just three simple steps:

1. Turn the SHOUT nano on by holding down the Power/Enter button  for about two seconds.
2. Go to the *Report Rate* menu to set the reporting frequency. 
3. Go to the *Track On/Off* menu  to enable tracking. The SHOUT nano is now in tracking mode and is ready to send position reports at the rate chosen in step 2. No further action is required. The unit automatically goes to "sleep" in between reports.

IMPORTANT: NAL Research can enable the SHOUT nano for use on the DoD EMSS Gateway. However, accessing the EMSS Gateway is not authorized until the SHOUT nano 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. Please see webpage <https://sbd.pac.disa.mil> for more information regarding DoD EMSS service provisioning.

5 MESSAGING MENU



Use the *Messaging* menu to compose, save, view, and send canned or free-text messages. There are six options under the *Messaging* menu, including *Address Book*, *Compose*, *Inbox*, *Drafts*, *Outbox*, *Sent*, and a *Check Mailbox* soft key (see **Figure 6**).



Figure 6: Messaging Menu

5.1 ADDRESS BOOK



The Address Book lists contacts created and saved into the SHOUT nano's memory using NAL Research's SatTerm software. During setup, SatTerm requires connectivity between the SHOUT nano 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.

The SHOUT nano can save 1,200 contacts in memory with a maximum contact name of 30 characters long. Each contact has its data stored in a three-line format. The first line can have up to 30 characters, the second can have 50 characters, and the third can have 30 characters. The information contained in each line is defined by developers.

Figure 7 displays an example of the formatted Address Book contact defined by the NAL Research's NOC server. The first line has the contact phone number, the second line has the email address, and the third line has the home address. Upon receiving a free-text or canned message from the SHOUT nano referenced to a specific Address Book contact, the NAL Research's NOC server forwards the message to the email address listed on the second line of

the Address Book contact. Application developers can define their own set of rules with information contained in the Address Book contact so that their NOC servers can use them to determine the appropriate response.

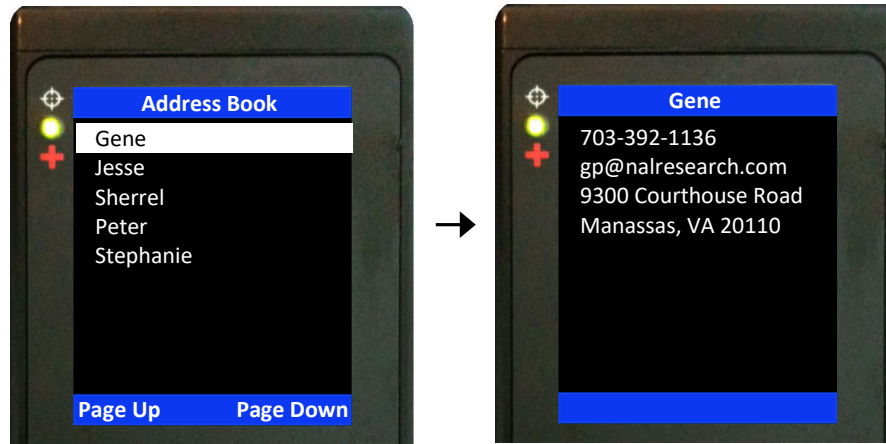



Figure 7: Address Book Contact

5.2 COMPOSE



Use the *Compose* menu to edit and send canned messages, free-text messages, or a combination of canned and free-text messages to a NOC server. Three on-screen keyboards are available for information to be entered or modified. The up  key can be pressed repeatedly to switch between the keyboards. When *Compose* is selected, the *Message* menu appears with three options—*Choose Canned Msg*, *Enter Text*, and *Next*.

5.2.1 CHOOSE CANNED MSG

The *Choose Canned Msg* option lists canned messages you can select to send to a NOC. Sending canned messages saves bandwidth and airtime cost because it is only short codes that are being transmitted instead of the entire message body. SatTerm is used to create and save canned messages into the SHOUT nano's memory. During setup SatTerm requires connectivity between the SHOUT nano and a NOC server to synchronize the lookup table of short codes. As with the Address Book, short codes are used to map the actual canned messages to a lookup table located at a NOC. The short codes are defined by application developers and not by the SHOUT nano.

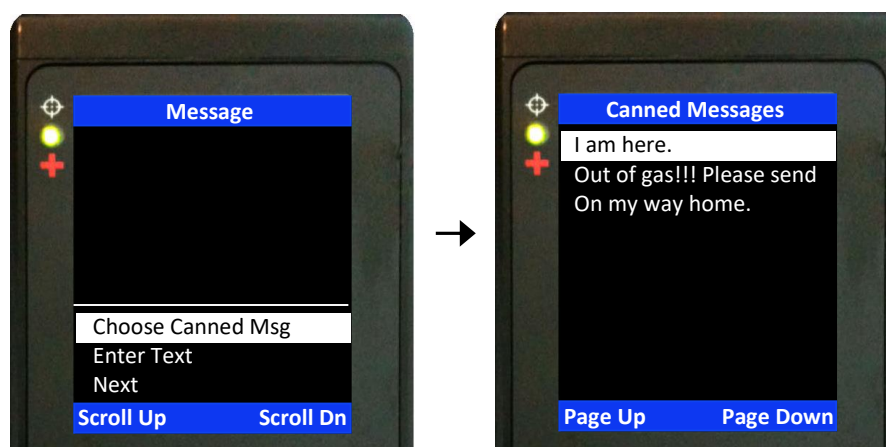




Figure 8: Canned Message Examples

The SHOUT nano can store up to 600 canned messages. **Figure 8** displays examples of a few canned messages entered using SatTerm. Each message is shown on a single line. Some canned messages are too long and can only be partially displayed on the LCD screen. Navigate by pressing the up and down arrow  buttons and by pressing the enter  button to show the entire message on the *Details* screen.



When a canned message is selected from the list, for example, 'Out of gas!!! Please send,' as shown in **Figure 9**, the *Details* screen appears to show the complete message. Select a canned message by pressing the enter  button or press the BACK  button to go back to the original list of canned messages. If the enter button is pressed, the *Message* menu reappears with the selected canned message displayed in the text box. Use the *Scroll Up* and *Scroll Dn* soft keys to view part of the canned message that does not fit inside the text box. *Remove Canned Msg* deletes the message from the text box at any time even after free-text is entered.



Figure 9: Canned Message Selected

5.2.2 ENTER TEXT

Use the *Enter Text* option to create free-text messages with three on-screen keyboards. Each free-text message is allowed to have up to 309 characters (the Iridium 9602 limits outbound messages to 340 characters). These 309 characters are shared between a free-text message and any additional email addresses attached to it (including the semicolon or space used as an email address separator). Long email addresses or multiple email addresses reduce the number of characters available for the free-text message (see detailed description in the next section, **Send Message**). If a canned message is previously selected and appears in the text box, then the entered free-text is appended to the canned message.

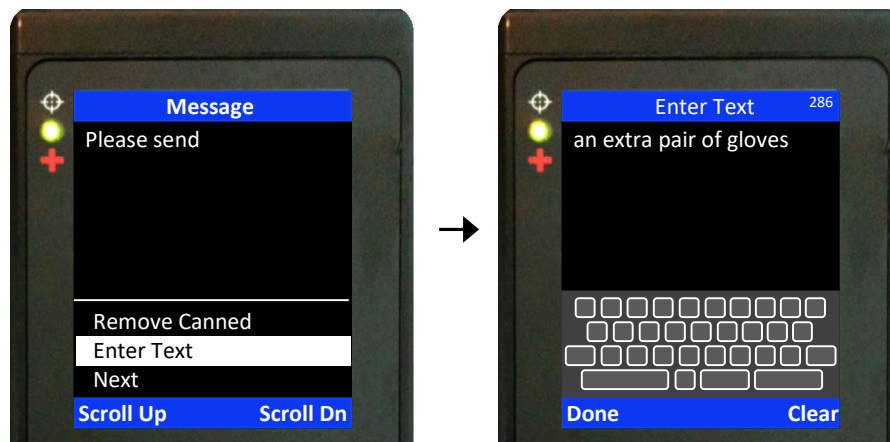


Figure 10: Enter Text

5.2.3 SEND MESSAGE

After composing a message, select **Next** to send the message to a NOC server. A contact selected from the Address Book and email addresses to whom the message is destined must be entered through the *Choose Contact* and *Enter Emails* options. Choose Contact opens the *Address Book* screen. Enter Emails opens on-screen keyboards to enter email addresses separated by a semicolon. The total number of characters of all email addresses including the semicolons must be less than the difference between 309 and the number of characters in the free-text message. The SHOUT nano keeps track of the limit and prevents entering email addresses longer than allowed.

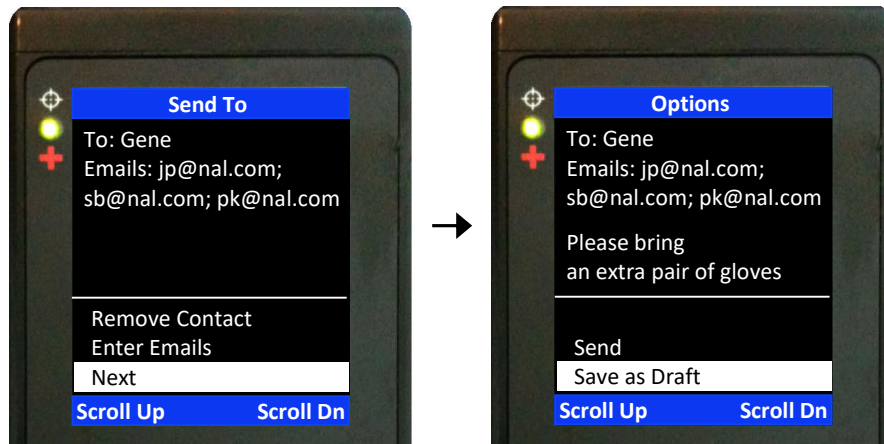


Figure 11: Send Message or Save as Draft


Once all required information is entered, either *Send* the message or *Save as Draft*. If *Send* is selected, a *Success* screen appears to indicate that the message has been added to the Outbox. The SHOUT nano must be held with the antennas having full view of the sky. If the Settings > Include GPS option is turned on, then GPS location is added to the message. Messages with GPS location take longer to complete because the SHOUT nano has to acquire a GPS fix.

5.3 INBOX



The *Inbox* folder contains all incoming read and unread messages with the newest message at the top of the list.

- Read messages have a white opened envelope icon next to them.
- Unread messages have a green closed envelope icon next to them.
- The arrow buttons are used to place the cursor over a message.

- The enter button is used to read a highlighted message.
- The message icon  appears at the top of the home screen when one or more unread messages are in the Inbox.
- The speaker provides an audible alert for all new incoming messages.
- The SHOUT nano can store up to 690 messages in the Inbox.

5.4 DRAFTS



The *Drafts* folder contains draft messages saved under the *Compose* menu. The SHOUT nano can store approximately 190 draft messages with the newest message displayed at the top and the oldest message displayed at the bottom of the list.

- The arrow up/down buttons place the cursor over a draft message.
- The enter button recalls and displays the highlighted message content.
- Options > Edit returns to the *Compose* menu for editing.
- Options > Delete removes the message from the *Drafts* folder.
- If *Send* is selected, a *Success* screen appears to indicate that the message has been added to the Outbox. The SHOUT nano must then be held in a position with the antennas having full view of the sky.
 - If the Settings > Include GPS option is turned on, then GPS location is attached to the message. Messages with GPS location can take longer to complete because the SHOUT nano has to acquire a GPS position.

5.5 OUTBOX



The *Outbox* folder contains either messages in the queue ready 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 failed to send has an X symbol.
- A message in queue waiting to be sent has no symbol.

Once a message has failed to send, it can stay in the Outbox until you decide to either resend (Enqueue) or delete. The Outbox can store approximately 170 messages with the oldest message at the top of the list.

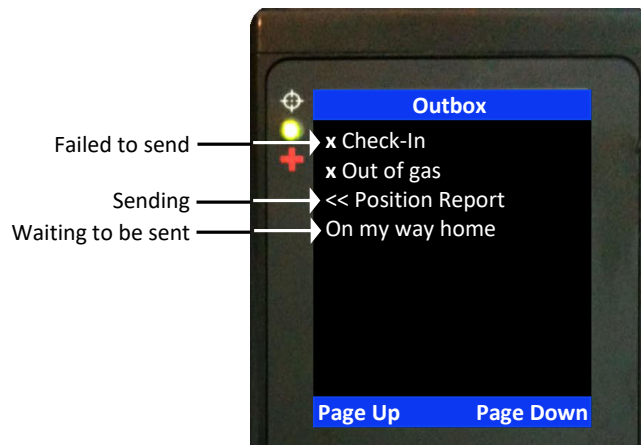



Figure 12: Outbox

For each message queued in the Outbox, the SHOUT nano attempts to transmit up to three times. After three failures, the message is dequeued to avoid draining the battery. You have to manually requeue a message. If the SHOUT nano is at a location not suited for transmission, monitor the Outbox and repeatedly requeue until the message is successfully transmitted. The  symbol appears at the top of the home screen when there is a queued or dequeued message(s) in the Outbox.

Note: The SHOUT nano will NOT resend “failed messages” even after the Iridium signal becomes available. You have to manually requeue one or more failed messages in order to resend. This is to prevent unintentional depletion of battery power in case there is a large number of failed messages in the Outbox. A failed Cancel 911 message also needs to be requeue.

5.6 SENT



The *Sent* folder contains messages successfully sent to a NOC server. When the enter button is pressed on a highlighted message, detailed information about the message appears.

- The *Delete* soft key deletes the message.
- Select the *Options* soft key to resend, forward, or delete the message.
 - *Resend* puts the message back at the bottom of the Outbox folder’s sending queue.
 - *Forward* opens the *Compose* menu for additional information to be entered. Either resend the message after modifying it or cancel the process.

- *Delete* permanently removes the message from the *Sent* folder (same as the *Delete* soft key in the header menu).

The SHOUT nano can store approximately 580 messages in the *Sent* folder with the newest message displayed at the top of the list.

5.7 CHECK MAILBOX (SOFT KEY)

There are four ways the SHOUT nano initiates a mailbox check for any pending messages at the Iridium gateway:

- Manually force the SHOUT nano to check the mailbox at any time by pressing the Check Mailbox soft key (see **Figure 6**) under the *Messaging* menu.
- Manually force the SHOUT nano to check the mailbox at any time using the Utilities > Check Mailbox menu.
- When tracking mode is enabled, the SHOUT nano automatically checks the mailbox each time it wakes up to send a position report.
- When tracking mode is enabled and in addition to checking the mailbox each time it wakes up to send a report, the SHOUT nano also automatically wakes up and checks the mailbox at a preset mailbox check rate. Set the mailbox check rate using the Report Rate menu option. A position report will not be sent when the SHOUT nano 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 SHOUT nano shows the number of *Unread* messages in the Inbox and the number of messages still *Queued* at the Iridium gateway to be downloaded.

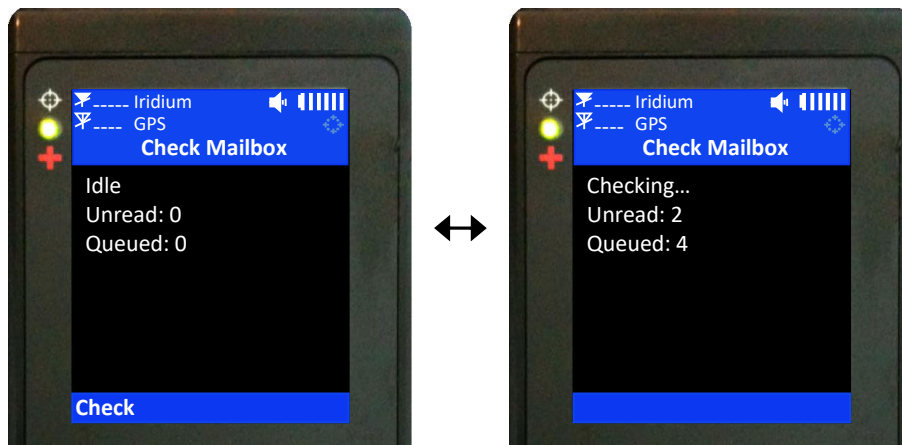


Figure 13: Check Mailbox

6 TRACKING MENU





Use the *Tracking* menu (see **Figure 14**) to enable the SHOUT nano tracking mode, disable the tracking mode, set the reporting rate, set the mailbox check rate, cancel the emergency 911 signal, view the unit reporting data, set GPS location accuracy, and set the position report format.



Figure 14: Tracking Menu

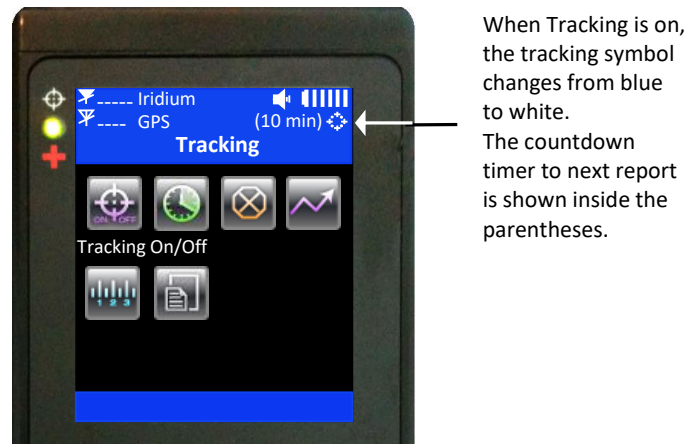
6.1 TRACKING ON/OFF



Use the *Tracking On/Off* option to set the SHOUT nano tracking mode. When *Enable Tracking* is selected, the tracking symbol  changes from dimmed blue to bright white (see **Figure 15**). The SHOUT nano 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 set under the *Report Rate* option. A countdown timer to the next report is displayed inside the parentheses next to the tracking symbol (see **Figure 15**). When tracking is enabled and the SHOUT nano sleeps in between 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 option. The emergency 911 button can be activated at any time during tracking mode or non-tracking mode. The SHOUT nano can also be powered up at any time and be used as a messaging device.


When waking up to transmit a location report, the SHOUT nano antennas must have full view of the sky; it will otherwise fail to send. A missed report will not be resent. 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 (approximately 29 seconds). As a result, the SHOUT nano will consume more battery power and the total number of reports is significantly reduced. Read **Appendix C: Power Consumption** for more information.



When Tracking is on, the tracking symbol changes from blue to white. The countdown timer to next report is shown inside the parentheses.

Figure 15: Tracking On

Note: When the SHOUT nano is in the middle of sending a report and a user forces it to power off by holding down the power  button, the SHOUT nano attempts to complete sending the report before shutting down. A warning message appears on the LCD screen and remains until either a position report is sent or fails to send. Go back to the home screen by pressing the BACK button.

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

6.2 REPORT RATE






Use the *Report Rate* option to set the report frequency (time between reports) when *Tracking On/Off* is enabled. Once a report rate is selected, a new menu appears requesting the mailbox check rate. The mailbox check rate can be the same as the report rate.


In this case, the SHOUT nano checks the mailbox each time it wakes up to send a report. If the mailbox check rate is different than the report rate, the SHOUT nano wakes up in between reports to check the mailbox without sending a position report. The SHOUT nano only offers the mailbox check rates that are evenly divisible to the report rate.

IMPORTANT: The total number of reports the SHOUT nano can send with a fully charged battery depends on three settings—the report rate, the mailbox check rate, and the accuracy. Read **Appendix C: Power Consumption** for details on how these settings can affect the SHOUT nano performance.


6.3 CANCEL 911

 After pressing the red emergency  button on the back of the SHOUT nano (see **Figure 1**), you can deactivate the emergency alert by selecting the *Cancel 911* option. A screen appears with two options: (i) With Gateway Ack or (ii) Without Gateway Ack.

When *With Gateway Ack* is selected and confirmed, the cancellation message is queued in the Outbox to be transmitted. If the cancellation message is successfully transmitted and acknowledged by the Iridium gateway, the emergency mode ends, the emergency LED  is turned off, and the top and bottom bars turn from red to blue. Powering the SHOUT nano off does not cancel the emergency mode. You MUST select *Cancel 911* to cancel the emergency.

When *Without Gateway Ack* is selected and confirmed, the cancellation message is queued in the Outbox to be transmitted. The emergency mode ends immediately, the emergency LED  is turned off, and the top and bottom bars turn from red to blue.

6.4 STATS

 When *Tracking On/Off* is enabled, the SHOUT nano monitors useful statistics, which are displayed under the *Stats* screen. Data are cumulative over all tracking cycles.

- Manually reset displayed data at any time using the *Clear Stats* soft key.
- A countdown timer to the next report is shown beside *Time to Next* and is replaced with *Off* when *Tracking On/Off* is disabled.
- The number of *Successes* represents the total number of position reports successfully transmitted to the Iridium network both with valid and invalid position fix.

- The number inside the parentheses next to *Successes* represents the number of position reports successfully transmitted but with invalid GPS fix.
- The number of *Fails* represents the total number of valid position reports that failed to send to the Iridium network.

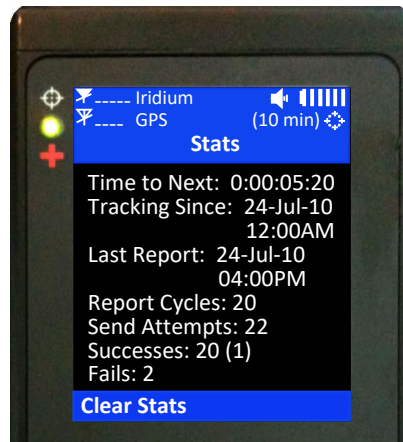


Figure 16: Stats

6.5 ACCURACY



Use the *Accuracy* option to select either *Standard* or *Best* accuracy when acquiring a 3D GPS fix. For Standard setting, the SHOUT nano acquires 3D fix using saved ephemeris data in its nonvolatile memory. The ephemeris is updated only when it becomes invalid. For Best setting, the SHOUT nano always updates the ephemeris data first before attempting to obtain a 3D fix. The Best setting takes longer for a 3D fix. However, the probability of obtaining position accuracy to within 2.5 meters is much higher than for the Standard setting. Best setting is not recommended when operated in environments with limited view of the sky, such as under heavy foliage. Choosing Best accuracy setting can significantly reduce the total number of reports on a fully charged battery due to longer GPS acquisition time. Choosing Best accuracy is the same as setting the report rate to more than two hours. For both cases, the SHOUT nano has to update the ephemeris data. Refer to **Appendix C: Power Consumption**.

6.6 FORMAT



The SHOUT nano can transmit position reports in either 30-byte or 10-byte format. 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). The latitude and longitude are recorded with approximately 0.18 meters' resolution.

The 10-byte format includes UTC time, latitude, longitude, and Position (3D) Dilution of Precision (PDOP). With UTC date omitted, the SHOUT nano relies on the NOC server to record the date. Encryption cannot be used with the 10-byte format. Latitude and longitude are recorded with approximately 1.1 meters' resolution. Even though the message length is shorter, a 10-byte format message consumes the same amount of power to transmit as a 30-byte format. It is to be selected strictly for the purpose of airtime cost-saving.

7 UTILITIES MENU



The *Utilities* menu provides six options used mainly to check for proper hardware and network setup, as shown in **Figure 17**. These include *Check GPS*, *Check Iridium*, send *Test Report*, *Check Mailbox*, *Check-In*, and *Way Points*.



Figure 17: Utilities Menu

7.1 CHECK GPS



The *Check GPS* option forces the SHOUT nano to turn on its GPS receiver and to continuously update and display GPS data in real-time whether there is a valid fix or not. The GPS receiver remains on until you leave this screen by pressing the BACK button. Use the *Reset Ephemeris* soft key (see **Figure 18**) to force the SHOUT nano 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.



Figure 18: Reset Ephemeris Key

The accuracy of the position can be monitored by observing the (Horizontal Accuracy) HACC. The 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 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. HACC can be monitored in real-time to make sure it converges to a small and stable value (usually less than 30 meters). At that 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 stops at a value of 4294967.500. This indicates that the surrounding obstructions prevent the GPS receiver from obtaining a fix and you should move on to a different location.

7.2 CHECK IRIDIUM



The *Check Iridium* option forces the SHOUT nano to turn on its Iridium transceiver and continuously update and display signal strength information 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 REPORT



When the *Test Report* option is selected, the SHOUT nano immediately turns the GPS receiver on to refresh 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 Check GPS option, HACC can be monitored to see 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 the *Send* soft key. 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 Report 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 CHECK MAILBOX



A detailed description of this option can be found in section **5.7 Check Mailbox** (Soft Key) on page **32**.

7.5 CHECK-IN



A detailed description of this option can be found in section **3.5 Check-In** (Soft Key) on page **23**.

7.6 WAY POINTS



The *Way Points* menu is used to acquire, view, save, delete, and send a waypoint to a NOC. Choosing the *New* option is the same as pressing the *Way Point* soft key on the home screen (see section **3.6 Way Point** (Soft Key) on page **23** for a detailed description). A list of saved waypoints can be displayed and viewed by selecting the *List* option. After selecting the *List* option, any saved waypoint label can be edited, sent/resent, or erased. The SHOUT nano can save up to 1,000 way points in its circular memory. SatTerm can be used to retrieve waypoints saved on the SHOUT nano.

7.7 SECURITY



Use the *Security* menu to set the menu lock Personal Identification Number (PIN).

8 SETTINGS MENU




Use the *Settings* menu to view and configure the SHOUT nano hardware settings. There are twelve options available (see **Figure 19**).



Figure 19: Settings Menu

8.1 AUDIO



Use the *Audio* option to change the alert frequency and tone, mute incoming message alerts, and mute all audio feedback. The  icon appears on the home screen if *Mute All* is on. You can test the audio volume and sound before selecting by using the *Preview* soft key.

8.2 CONTRAST



Use the *Contrast* option to change the LCD contrast by pressing the arrow up and down buttons. Press the enter button to select the setting and press the BACK button to go back to the Settings menu without change.


8.3 BACKLIGHT



Use the *Backlight* option to set the period of inactivity after which time the SHOUT nano turns the LCD backlight off. The SHOUT nano consumes approximately 40 mA less with the LCD backlight set to *Always Off*. Setting the backlight to *Always On* is recommended for nighttime use.

8.4 LED



The SHOUT nano has a single status LED  at the top-left corner to alert you whether the device is in tracking mode or emergency mode. The LED flashes once every five seconds when *Tracking On/Off* is enabled and the device sleeps (in between tracking reports). The LED turns solid green when emergency mode is enabled regardless of whether the device is on or off. The LED can be turned off for either of these two cases to save battery power using the LED option. The SHOUT nano consumes approximately 3 mA less with the LED disabled during emergency and 125 μ A less with LED disabled during tracking mode.

8.5 INCLUDE GPS



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

8.6 GPS



The *GPS* option gives access to the *Position Format* and *Position Model* settings.

Use the *Position Format* option to select one of three 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 a position report to be transmitted to a NOC.

The *Position Model* option allows the GPS receiver to be more accurate by telling the unit what its environment is like. For applications operating below 12 km, the *Portable* setting is sufficient. If operation above 12 km is required, refer to the “AT Commands for SHOUT nano” [1] document for details.

8.7 TIME AND DATE



Use the *Time and 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.

8.8 SOFT KEYS



When tracking mode is enabled and the SHOUT nano is off (sleeps between reports), either Check-In or Way Point can be activated by pressing one of these two soft keys without first pressing the power on button. This feature can be disabled by using the *Soft Keys* option to prevent accidental power up, thus forcing you to first turn the SHOUT nano on by pressing the power button before activating the Check-In or Way Point soft key.

8.9 USER INFO



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

8.10 UNIT INFO



The *Unit Info* option displays the internal 9602 module's IMEI number, Iridium FCC ID, Iridium IC ID, and the SHOUT nano's firmware version.

8.11 MEMORY



Use the *Memory* option to clear messages in all mail boxes or clear messages in each individual mail box—Drafts, Inbox, Outbox, and Sent.



8.12 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 asks for confirmation to reset the current settings back to the manufacturer's default settings.

9 ADDITIONAL FEATURES

9.1 EMERGENCY (911) BUTTON

The red emergency 911 button  is located underneath a rotating guard on the back of the SHOUT nano (see **Figure 1**, callout 6). It can be used at any time regardless of the tracking status (enabled or disabled) or the device's power status (on or off). When pressed, the emergency LED  immediately turns solid green to indicate that the device is in emergency mode. The LED can be deactivated to extend the battery life by using the Settings > LED > Power LED emergency option. If the LCD screen is on during emergency activation, the blue bars across the top and bottom of the screen turn red. The device sends three consecutive reports to a NOC as quickly as possible. After sending the first three emergency reports, the SHOUT nano reverts back to the default emergency Time-Between-Reports (TBR) of two minutes. During emergency a NOC can send an acknowledgement back to the SHOUT nano.

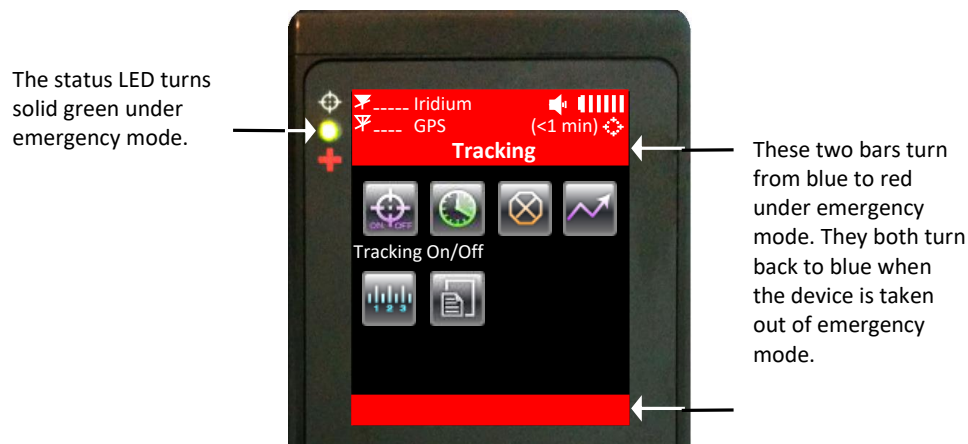



Figure 20: Emergency (911) Button Feature

9.2 STATUS LED

There is one status LED on the top-left of the SHOUT nano (see **Figure 1**). The LED turns solid green when the SHOUT nano is in emergency mode, which can be deactivated to save power using the Settings > LED > Power LED Emergency option. It flashes once every five seconds when the SHOUT nano is off and tracking is enabled. It can be deactivated to save power using Settings > LED > Power LED Tracking option.

9.3 POWERING DOWN

The SHOUT nano can be powered down by holding the power  button (see **Figure 1**) 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 shutting down. Press the *Turn Off* soft key on the left to turn off the SHOUT nano immediately or *Cancel* shutdown by pressing the right soft key.

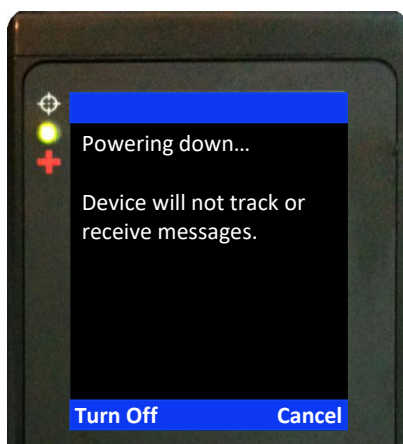


Figure 21: Power Down Screen

APPENDIX A: PMS FEATURES

A.1 TRACKING



The SHOUT nano is capable of sending position reports in PECOS Message Structure (PMS). The PMS complies with the Blue Force Tracking Data Format Specification as defined in the document PECOS 200708-001 Version 1.3 [2]. The SHOUT nano 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 22**.



Figure 22: Format Menu

A.2 BREVITY CODE



With PMS enabled, you can select any one of sixteen Brevity Codes (0000 through 1111) to be included in the tracking reports. There are two ways to set the Brevity Code:

1. Under the Tracking > Brevity Code menu, the ↓ and ↑ soft keys can be pressed repeatedly to browse through the list of codes. The code appearing on the screen will be automatically used by the SHOUT nano to include in the tracking reports. No further action is needed to select the brevity code.

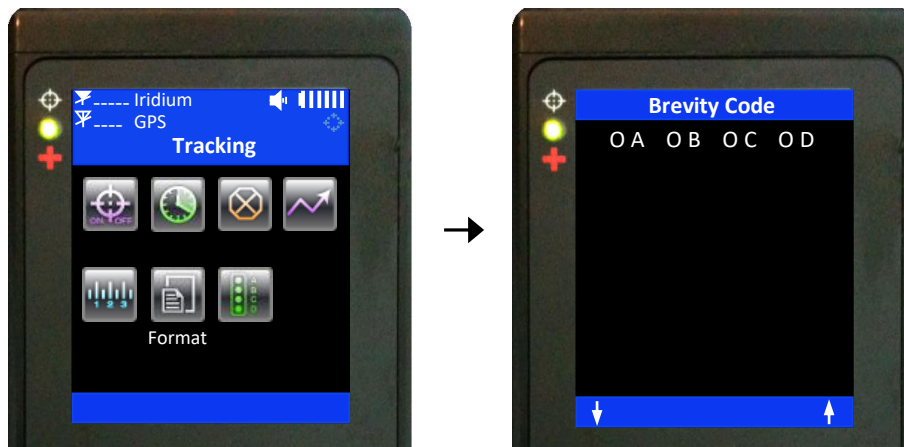


Figure 23: Brevity Code

2. When the PECOS format is selected using the Tracking > Format menu, the default Brevity Code setting appears at the bottom of the home screen, replacing Check-In and Way Point. The ↓ and ↑ soft keys can be pressed repeatedly to browse through the list of Brevity Codes. The code appearing on the screen will be automatically used by the SHOUT nano to include in the tracking reports. No further action is needed to select the brevity code.

A.3 SOFT KEYS



When the PECOS format is enabled using the Tracking > Format menu, the Check-In and Way Point features are replaced with the Brevity Code at the bottom of the home screen. You can override the Brevity Code soft keys and revert back to the Check-In and Way Point soft keys by going to the Settings > Soft Keys > PECOS menu to turn off the PECOS soft keys (see **Figure 24**). After turning off the PECOS soft keys, the Brevity Code setting can only be configured through the Tracking > Brevity Code menu.

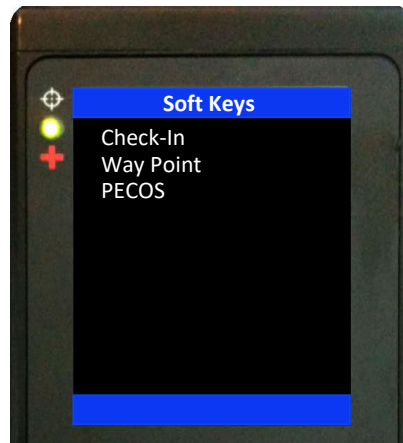


Figure 24: Soft Keys

A.4 CANCEL 911 WITH SOFT KEYS

When the PECOS format is enabled and after the emergency button is pressed, the soft keys on the home screen are replaced with “X Emr w/” and “X Emr w/o”, as shown in **Figure 25**. As an alternative to using the Cancel 911 menu, these two soft keys can also be used to deactivate the emergency alert. Pressing the “X Emr w/” soft key is the same as selecting *With Gateway Ack* under the Cancel 911 menu. Pressing the “X Emr w/o” soft key is the same as selecting *Without Gateway Ack* under the Cancel 911 menu.

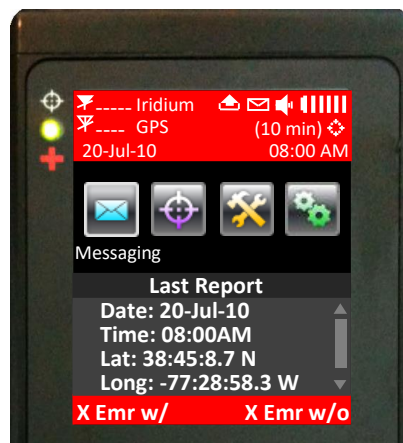


Figure 25: Cancel 911 with Soft Keys

APPENDIX B: UPGRADING THE FIRMWARE

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

1. Run the NAL USB Bootloader program.

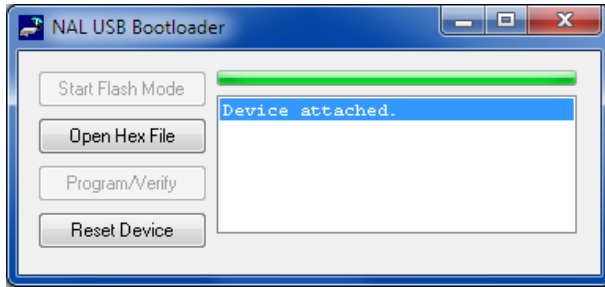


Figure 26: NAL USB Bootloader

2. With a USB cable attached to a computer and the device, select the Start Flash Mode button.
3. Wait until it activates and then select Open Hex File.
4. Browse and select a valid NAL device BIN file. NAL Research makes the BIN file available upon request.
5. Once the BIN file is loaded, select Program/Verify.
6. Wait for the programming to complete.
7. Select Reset Device. The new firmware is now loaded on the device.

APPENDIX C: POWER CONSUMPTION

The SHOUT nano has an internal 1.95 Ah Lithium-ion (Li-ion) rechargeable battery. When both the Iridium and GPS antennas have clear view of the sky and the battery is fully charged, the SHOUT nano is capable of sending more than 1,500 tracking reports with the following settings: (1) report rate of less than two hours, (2) mailbox check rate and the report rate are the same and (3) Standard Accuracy. Blocked or partially blocked antennas will force the SHOUT nano to retry multiple SBD transmissions for each report, and as a result can significantly reduce the overall number of reporting cycles.

The SHOUT nano 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 will go through cold-start each time it wakes up to send a report. As a result, the SHOUT nano configured for a report rate of more than two hours and Standard Accuracy can only send approximately 750 tracking reports. Setting the Accuracy to Best also reduces the number of tracking reports to approximately 750 regardless of the report rate setting.

IMPORTANT: Data presented here are only estimates and are highly dependent on the operating environment, accuracy setting, and antenna type. Data are based on measurements made with multiple SHOUT nano devices placed on the roof of NAL Research's facility with no blockage.

Each time the SHOUT nano wakes up to send a report, it has two minutes to acquire a GPS fix and send an Iridium SBD message. Assuming the ephemeris data is valid (less than two hours old or time-between-reports is less than two hours) and the Accuracy option is set to Standard, the GPS receiver takes about 10 seconds for a position fix drawing approximately 55 mA. The Iridium transceiver takes about 10 seconds to transmit an SBD message drawing an average current of 110 mA. The SHOUT nano circuit draws about 125 mA during a 25-second reporting cycle. The entire reporting cycle consumes approximately 1.32 mAh of battery power. If the Iridium antenna is blocked or an overhead Iridium satellite is not available, the Iridium transceiver can potentially stay on for another 100 seconds attempting to send a report. This

results in additional consumption of 9.7 mAh or 11 mAh total. A missed report consumes approximately 8.5 times more power than a 'normal' transmitted report.

APPENDIX D: DESIGN SPECIFICATIONS

The SHOUT nano comprises a 9602 Iridium modem, a u-blox GPS receiver, a GPS and an Iridium antenna, a Li-ion battery, an LCD, and an NAL Research controller board. It is designed to operate with the Iridium network using SBD only.

D.1 MECHANICAL SPECIFICATIONS

Dimensions:4.0" x 2.2" x 0.8" (102 mm x 56 mm x 20 mm)
Weight:~6.5 oz (184 g)
Enclosure:.....Hard anodized aluminum housing/EMI shielding
Connector:USB
Antennas:Helix for Iridium and patch for GPS
Keyboard:Seven buttons
Emergency:Guarded button
LED:One status LED (power, tracking, and emergency)

D.2 ELECTRICAL SPECIFICATIONS

Main Input Voltage:3.0 VDC to 5.0 VDC
Peak Current:1.5 A @ 4.2 VDC
Battery Type:.....Lithium-ion
Battery Capacity:.....1.95 Ah
Charging Voltage:.....USB 1.0, USB 2.0 or 4–5 VDC
Rechargeable Cycles:500 times
Power Consumption:See **Appendix C: Power Consumption**

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)

Storage Temperature Range:.....–40°F to +185°F (–40°C to +85°C)

Storage Humidity Range:≤ 95% RH

APPENDIX E: TECHNICAL SUPPORT

For technical support, please contact us at:

Phone: 703-392-1136, x203

Fax: 703-392-6795

Email: contact@nalresearch.com

Technical documents are also available to download on NAL Research's website

www.nalresearch.com in the Support > Documentation & Downloads section.

APPENDIX F: STANDARDS COMPLIANCE

The SHOUT nano has an internal Iridium 9602 transceiver. The 9602 is tested to the regulatory and technical certifications shown below. It is assigned to the FCC Identifier Q639602. The 9602, and therefore the SHOUT nano, must not be readily accessible to human subjects closer than 20 centimeters.

Regulatory Approvals	Radio Tests	EMC Tests	Mechanical/ Electrical Tests
FCC	FCC CFR47 Parts 2, 15, and 25	EN61000-4-2: 1995/A2:2001 Part 4.2	
Industry Canada	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	
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

APPENDIX G: EXPORT COMPLIANCE

The SHOUT nano 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.

APPENDIX H: MECHANICAL DRAWING

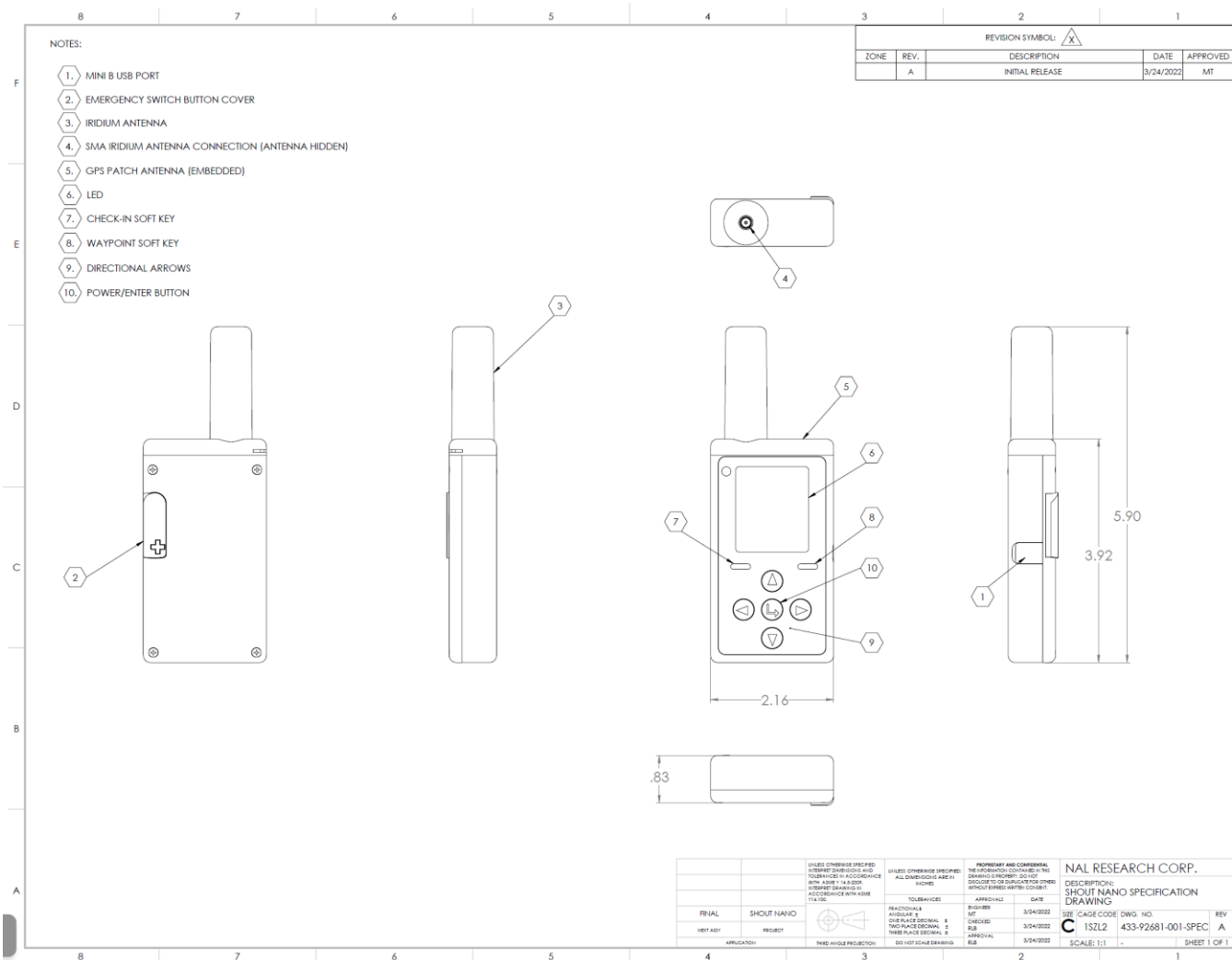


Figure 27: SHOUT nano Mechanical Drawing