



Sable User Manual

Iridium Satellite Beacon with GPS location

LEGACY PRODUCT



Version 3.0

July 2025

Shipped From



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Specifics

This manual version is written with respect to Sable firmware build 12785, available on the [Firmware Repository](#). This version accounts for the January 2026 Iridium epoch, which can impact older firmware versions after that time. It is strongly recommended to update to the latest version.

Version History

Version No.	Date	Description
2.0	September 2010	Base document
2.5	October 2017	Document overhaul
2.6	April 2018	Rewrote Understanding Position Information, formatting
3.0	July 2025	End of support message

Regular checks for the latest manual are suggested. Be sure to check [Xeos Technologies' manuals page](#) to compare versions and download the latest version.

End of Life



The Sable is now a legacy product with support discontinuing effective January 2026 for repairs; applications can be upgraded to the [Apollo-X](#) or [XMI-X](#).

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Overview

General Description

The Sable Subsurface Iridium Satellite Mooring Location Beacon continuously monitors for unplanned or accidental release of subsurface instrument moorings. Sable makes use of the bi-directional, global, real time Iridium Satellite Short Burst Data (SBD) network in combination with GPS position location. Sable's sleek tubular design allows it to be easily retrofitted into subsurface flotation such as syntactic foam.

The Sable consists of an aluminum chassis, 9602 Iridium Satellite Short Burst Data core radio transceiver, a specialized low power Xeos digital controller with GPS, Iridium antenna, GPS antenna and an alkaline battery package.

Sable is intended for subsurface deployments. Xeos Technologies Inc. (Xeos) manufactures other specific products for surface applications.

Theory of Operation

The Sable is intended for instantly and accurately locating and recovering high value, free drifting assets at sea. After being activated, the Sable is submerged (to a maximum depth of 5000 meters), where it enters an 'Underwater Mode'. Here, it monitors water conductivity between the top disk and the bulkhead for up to 2 years. Shortly after reaching the surface, the Sable can then report its GPS location for a further year.

Upon surfacing, the Sable will enter 'Surfaced Alarm Mode,' transmitting notification of surfacing as well as its current position. The Sable will transmit a position message every 10 minutes for 1 hour. After the 1 hour 'Alarm Mode', the Sable will enter 'Normal Mode', where it will transmit its position based on the timing settings. The Sable can also be configured to enter an accelerated 'Watch Circle Alarm' mode if it is configured with a circle to monitor, and it leaves said zone.

Operators can communicate with the surfaced Sable via Iridium using email commands. Status information can be obtained, including the health of the GPS system and battery voltage. It is recommended to change settings within the first hour of power-up or surfacing to have a lower latency in command responses, but commands can be sent at any time.

A surfaced Sable will continue to send position messages based on the timings, until it is manually turned off, the battery pack drops below the minimum voltage requirement of 7V, or the Sable is re-submerged.

Operating Instructions

Setting up your Iridium Account

The Sable makes use of the Iridium satellite system's Short Burst Data (SBD) service for the 9601, and later, 9602 transceivers. This service is a global, two-way, real-time, email-based data delivery service that has a maximum outbound (from beacon) message size of 340 bytes and a maximum inbound (to beacon) message size of 270 bytes.

End users must set up an Iridium subscription for each Sable with their preferred Iridium service provider, of which Xeos is one. Subscription creation requires sharing the Equipment Identity (IMEI) number of the device, along with up to five (5) unique message destinations. Please contact activations@xeostech.com with any questions regarding modem activation.

The Sable sends and receives data in text format via the Iridium satellite gateway. Any email application can be used to send and receive messages to/from the Sable. In addition, XeosOnline can be utilized to log this same data and send commands, along with mapping interfacing for visual aid.

On/Off Modes and Testing

The Sable beacon is turned **ON** and **OFF** using an external magnet near an internal magnetic reed switch, and operation can be identified by viewing an LED at the top of the device.

To turn on the Sable, swipe the magnet along the SWIPE ON/OFF HERE label vertically until the **GREEN LED** on the top of the device remains **SOLIDLY ON**. The green LED will flash again while the device completes power-up.

To turn the Sable off, repeat the above procedure until the **SOLIDLY ON RED LED** is shown.

At any time, the magnet can be placed against the location of the reed switch once to see which mode the beacon is currently in; green for on, red for off.



Operational Tips

- It is important that the beacon has a good view of the sky during any test, so it is necessary to test the beacon outside of a building.
- It is important to let all LEDs stop illuminating before initiating another action.

- Cycling power for any reason, for example by using the switch to turn OFF/ON or by removing battery power, will cause the beacon to lose its existing configuration and return to the default configuration. It will also start the above-water Alarm Mode.

Installation

When installing the Sable there are several factors that can influence performance.

- The top of the Sable must be pointing toward the sky.
- Iridium and especially GPS performance may suffer if large angles of the horizon are blocked, such as if the Sable is next to a wall.
- The very top of the Sable (antenna) serves as a component of the water sense circuit in conjunction with the main chassis. Do not connect both sections with conductive material. This can cause an inability to detect a surfacing event.

Communicating with the Sable

Commands can be sent to communicate with the Sable when it is above water. These commands are sent as email attachments, or through XeosOnline. Commands can configure the Sable before deployment and can also be used to remotely reconfigure or update status with Sable. All commands are given through the Iridium network and the Sable must have a good view of the sky to receive these commands.

The Sable will always initiate the Iridium connection to transmit and receive data. Therefore, commands are read and implemented on the Sable's internal Iridium transmission (SBD) schedule.

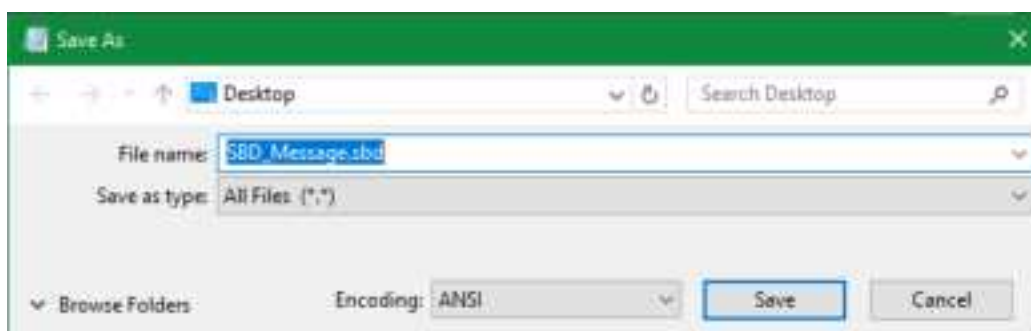
Sending Commands via Email

To receive commands from the Iridium network, the device in use must have a clear view of the sky. If the device is unable to communicate with the Iridium network, commands will remain queued for five days.

Command Format

CREATING THE FILE

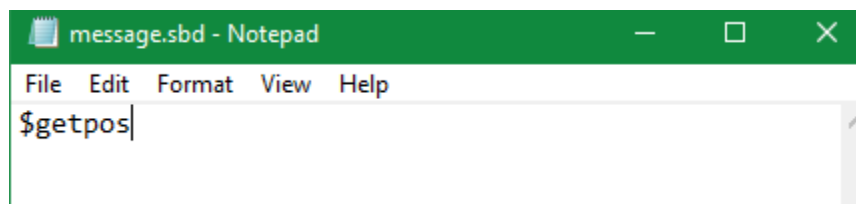
To create an SBD command, open a new file in a text editor (ex. Notepad) and save it using the **.sbd** extension. Make sure the **Save as type** option is set to **All Files** to achieve this.



Command Structure

Commands must be structured in the following way:

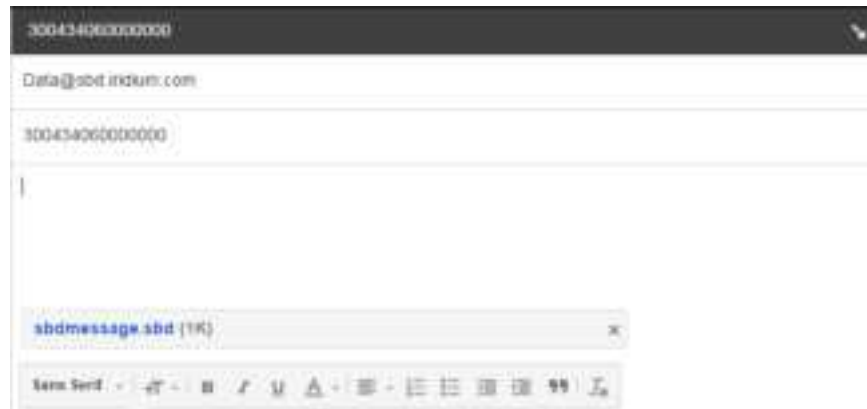
1. Each command **MUST** have a dollar sign (\$) before each command.
2. A list of commands, one command per line.



Sending the Command

To send your sbd command, create a new email message with the following fields:

To	data@sbd.iridium.com
Subject	The device's IMEI
Body	Empty
Attachments	The .sbd file



A confirmation will be immediately returned from the Iridium Gateway from the address **sbdservice@sbd.iridium.com** indicating that your message is now in the message queue. It will be delivered to the device during its next Iridium check.

Commands can be sent from any email address, but responses will be returned **only** to email addresses on the unit's forwarding list.

Sending Commands Using XeosOnline

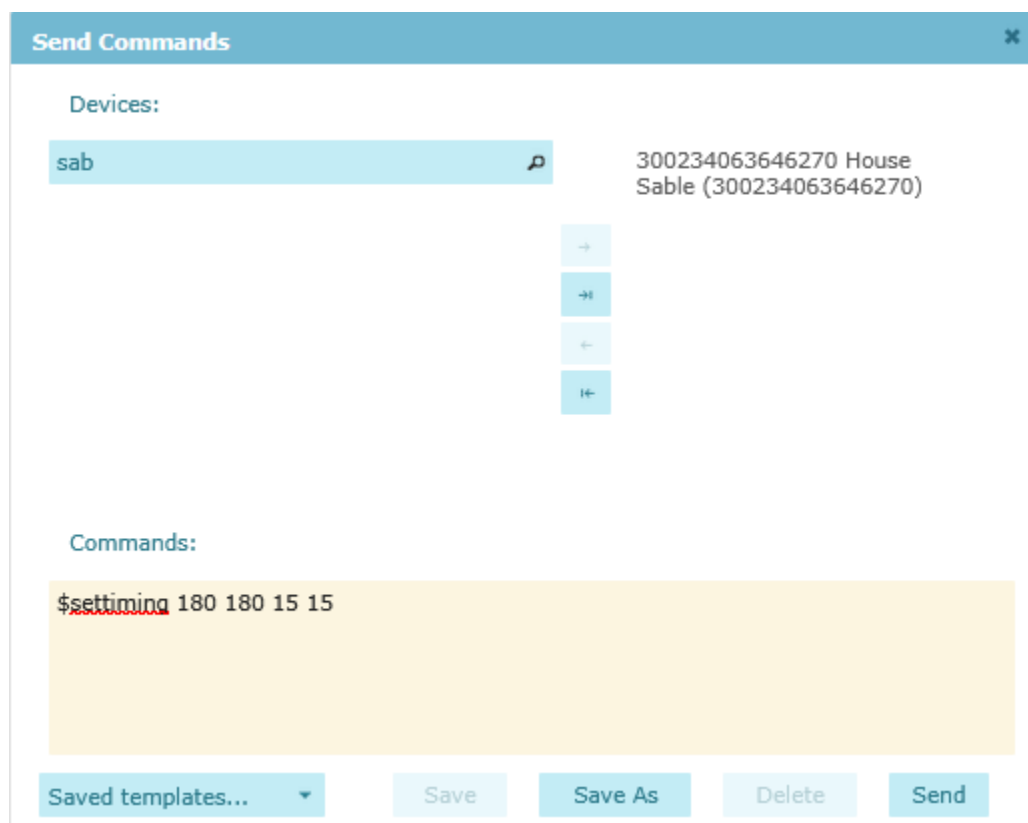
Before using XeosOnline make sure that your account has been set up and your device added to your organization. Contact activations@xeostech.com for more information.

Setting up to Send

- Navigate to the Send Command window.
- From the Home Tab, choose **Menu > Send Command**
- Select the device(s) to target with commands and move it to the right-hand target list using the -> button.
- Type the command(s) into the lower command box and press **Send**.

Remember to include the dollar sign (\$) ahead of each command and enter each command on a separate line.

Outgoing messages will appear in the Message Log for the commanded device.



Send Commands [X]

Devices:

sab [icon] 300234063646270 House Sable (300234063646270)

[→] [→+] [←] [←+]

Commands:

\$settiminq 180 180 15 15

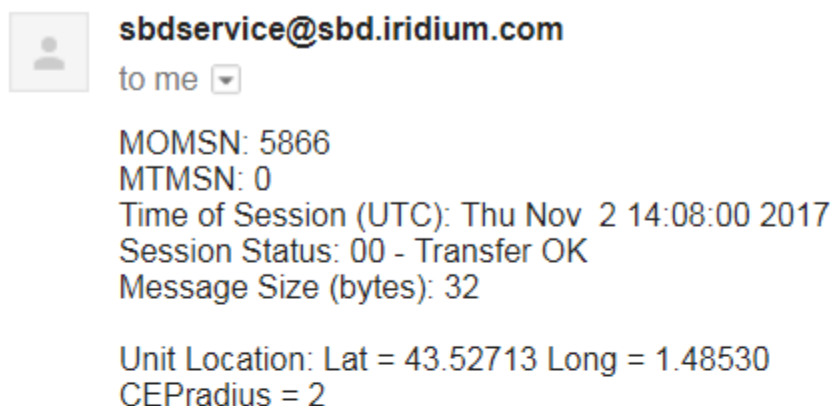
Saved templates... [v] [Save] [Save As] [Delete] [Send]

Understanding Position Information

There are two types of position information which will be sent via the Iridium Gateway.

Iridium Doppler position

The Iridium Gateway calculates the Iridium transceivers' position on earth when it receives a transmission, using Doppler technology. As a result, it is often very inaccurate. This location is only visible to users getting emails directly from the device, as opposed to emails forwarded by XeosOnline. An example of a "raw" Iridium message via email is below and will always have the IMEI of the device in the subject line, regardless of its name on XeosOnline.



sbdservice@sbd.iridium.com	All messages from Iridium devices come from this address.
MOMSN: 5866	Mobile Originating Message Serial Number; each individual message has its own incrementing serial number. A mobile originating message is one that comes from the Iridium device.

MTMSN: 0	Mobile Terminating Message Serial Number; like the MOMSN, messages to Iridium devices (like commands) also have an incrementing serial number. Since the message in the example is from an Iridium device, the MT number is zero.
Time of Session (UTC)	The time the message arrived at the Iridium Gateway
Session Status	Each message will have a code determined by how well the message was received; codes 00, 01 and 02 are acceptable and will always have their code name (ex. Transfer OK) next to this number.
Message Size (bytes)	The size of the actual message sent by the Iridium device, which is in the attachment in the email.
*Unit Location	The Doppler position of the device as estimated by Iridium's network. It is NOT the GPS position measured by the device.
*CEPradius = 2	The numerical value of how accurate the above position is; with a value of 2, This means that using the Lat/Long that the body has supplied, Iridium is 80% confident (always 80%) that the device sending the message is within a circle, 2 kilometers in radius, with the Lat/Long given as the center of that circle. The higher the CEPradius value, the larger the circle and therefore the less accurate that position.

*These items can be enabled/disabled by your Iridium provider if desired.

Global Positioning System

Location information generated by the device itself is embedded in the SBD attachment sent via the Iridium Gateway and can be viewed by downloading the attachment and viewing the information via a text editor (Notepad). This position information is accurate to within several feet of the true position.

Sable Commands

Commands will be displayed in this section as Email attachments, but the same content can be sent over XeosOnline. Ensure that you adhere to the instructions in the [previous sections](#) when sending commands.

Set Timing

The set timing command (**\$settiming**) is used to set four timer parameters in Sable in this order:

- GPS rate while in Normal Mode
- Iridium rate in Normal Mode
- GPS rate in Watch Circle Alarm
- Iridium rate in Watch Circle Alarm

The default timing settings are 180 minutes (3 hours) in Normal Mode, and 15 minutes in Watch Circle Alarm mode.

The timing intervals for the one-hour periods that occur immediately after power-on/reset as and immediately after surfacing are locked to 10 minutes for both Iridium and GPS.



Timer Limits	Min	Max
GPS	15	360 (3 Hours)
Iridium (SBD)	15	43200 (30 days)

Values set outside these limits will be ignored.

Once the Sable receives a set timing command, it will change the timing configuration and send back a status message, indicating the new timing configurations.



Status

The status command (**\$scm**) is used to retrieve Sable's current settings and beacon status.



When received, the Sable will send back a status message.



The example above contains the following information:

08271305	Date and time (UTC) in MMDDhhmm (M=Month, D= Day, h= hour, m=min). This will be the date and time of the most recent GPS fix, if time has been acquired.
S	Signifies the message is a 'Status Message'
gps = 3Hrs	GPS Acquisition Rate
ird = 3Hrs	Iridium transmission rate for sending messages and receiving commands.
lat=44.72571	Latitude of the latest recorded GPS position in decimal degrees.
lon=-63.70707	Longitude of the latest recorded GPS position in decimal degrees.

There are several cases in which the Sable will transmit a status message:

- Upon initial power-up of the device
- When the timer intervals are changed due to changing from one mode to another (ex. Watch Circle, Normal Mode)
- If the command for a status message is received.

Position

The position command (**\$GetPos**) file is a request for an immediate GPS location, which is answered by the Sable on its next Mail Message Check. The position command message should look like the one below.



Once the Sable has received a get position command, it will return a standard position message:



Reset

The reset command (**\$ResetNow**) does a full software reset of the Sable. This effectively will recycle the power of the beacon. The unit will return to its default timing intervals.

Watch Circle

The watch circle functionality allows users to monitor the position of their mooring by receiving alarm messages when it exits the circle. This feature aids in the recovery of moorings that could break free from their planned position.

Note: Watch circle is not ready for use if the device is not up to date with version 12785 and the power-up message displaying the firmware version does not have the **W** value present.

Setting the Watch Circle

Watch Circle Functionality must be enabled with the following command:

\$wcenable 1

The watch circle parameters can be set (or edited if already set) by using the **\$setcircle** command:

\$setcircle Latitude Longitude Radius

The minimum radius is 50 meters, while the maximum is 15000 meters.

Example:

\$setcircle 47.56989 -53.55682 100

- a) **\$setcircle** is the command
- b) Latitude is set to **47.56989** degrees
- c) Longitude is set to **-53.55682** degrees
- d) Radius is set to **100** meters

Upon implementing the watch circle, the Sable will return a Status message to confirm the configuration.

Recognition of a watch circle exit is tied to the GPS interval of the device. Once a GPS position is logged that shows the device is outside the circle, the device immediately transitions to Watch Circle Alarm mode and transmits according to the set timer intervals of that mode until the unit re-enters the watch circle, the radius is expanded or edited with **\$setcircle**, or the watch circle is disabled with **\$wcenable 0**.

Additional Watch Circle Information

- The watch circle's details are **not** saved between power cycles.
- The settings of the watch circle can be queried with the **\$scm** command
- The Watch Circle's radius can be adjusted without changing the position of the center by setting the latitude and longitude parameters to **0**, followed by the new radius.

Power Supply and Consumption

The Sable has an internal battery pack consisting of two independent strings of nine alkaline C cells for a total of 18 cells. The nominal voltage of each string is 13.5V. The internal battery pack is not rechargeable and should be replaced whenever the Sable is recovered.

The Sable incorporates a power supply that uses steering diodes. It will draw power from the string with the higher voltage, alternating until they both fall below 7 Volts. The battery voltage can be monitored with the Status command and is also displayed with every position transmitted.

Typical sleep current drawn between higher power tasks is <150 μ A. The device has a life time of 2 years while submerged.

Testing the Sable

1. Once the Sable firmware has been updated and the device reassembled, please test its ability to transmit.
2. Make sure the Sable has an active Iridium account. Xeos can set up an account for you if you do not currently have one. Ensure you have access to one of the email addresses to which messages are sent.
3. Place the Sable outside in a location where it has a clear view of the sky.
4. Turn it ON.
5. Check the email account to see if a transmission has been received. If no message is received within 20 minutes, please check operating manual to ensure it is setup as required.
6. If no message is received, please contact Xeos for assistance in troubleshooting.
7. DO NOT redeploy the Sable until you have confirmed Iridium transmission.

Field Installation

The Sable is intended for use on marine flotation devices. It is important that the top of the Sable is located as high above the surface of the water as possible, with as clear a view of the sky as possible. Both the Iridium and GPS antennas are located at the top of the unit.

Care should be taken when installing to avoid putting metal bands close to the top of the unit where the antennas and water sense mechanism are located.

Opening the Housing

The Sable can be opened from the bottom to unmount the bottom of the internal assembly, before removing the electronics and battery through the top of the main enclosure.

Inset into the bottom of the Sable's titanium case is a titanium screw-plug with two O-rings. After removing the plug with a flat edge, a hex socket head of a stainless #8-32 screw is visible. This screw holds the internal assembly to the bottom endcap. Remove this screw and replace it with a #8-32 screw that is 2 inches long so that it protrudes out of the titanium enclosure.

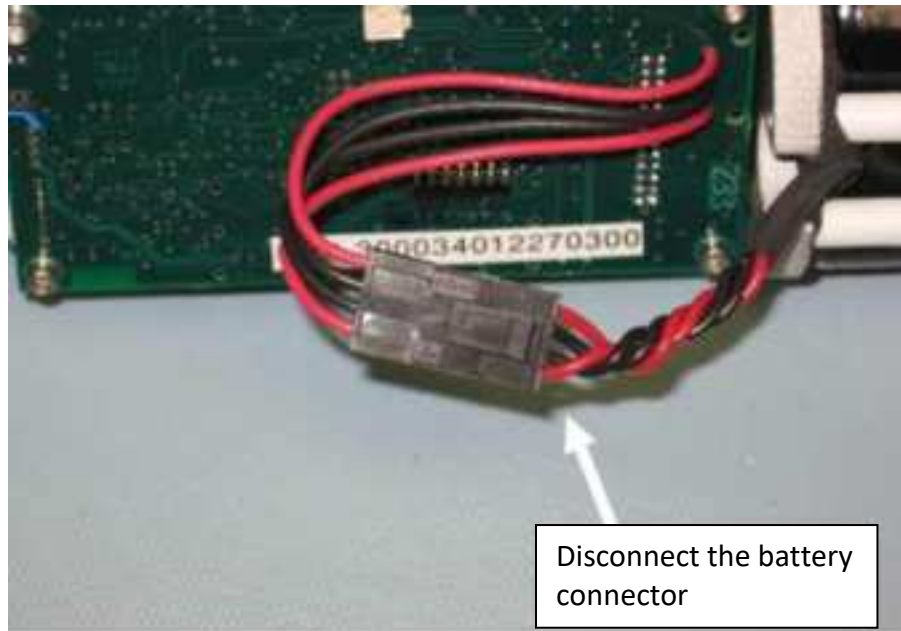


Gently tap on the protruding screw with a rubber mallet. The internal assembly will begin to exit the top of the tube. Continue until there is enough of the head of the Sable exposed to remove the assembly with your hands. The screw on the bottom will need to be removed to complete this step. Pull the internal chassis out horizontally, making an effort to avoid scratching the inside of the titanium case where the O-rings seat.

When originally packaged at the factory, the chassis is stabilized in place using foam strips placed vertically along the battery pack that grip the inside wall of the housing. This may cause some minor resistance while pulling the electronics from the tube.

Once the electronics are removed, the bottom endcap can be removed by knocking it down and out from the inside of the tube with a long pipe, if replacing O-rings.

Replacement Battery Pack

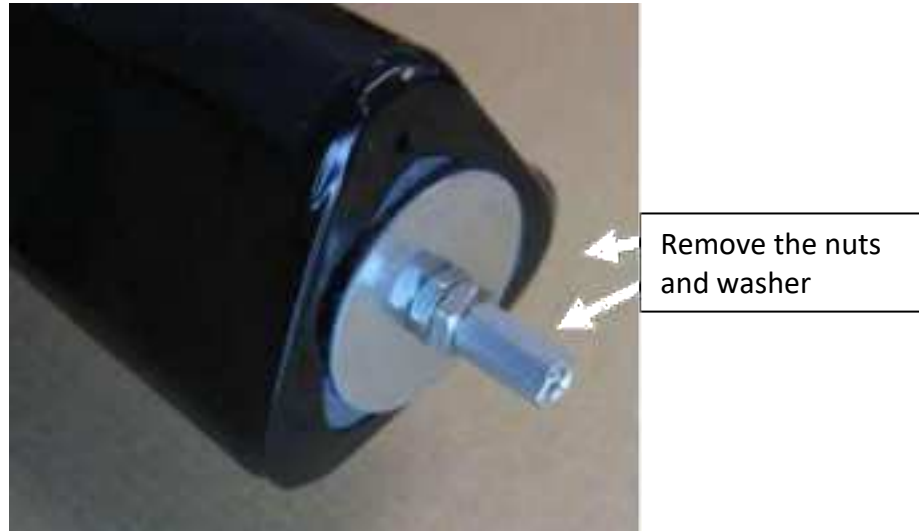


Remove the nuts and plate washer from the bottom of the battery pack, and carefully slide the battery pack off the center retaining rod.

Some wiring may be held more tightly to the electronics with elastic bands to prevent damage during reassembly. Replace any bands that may have aged and resecure the wiring.

Add the new battery to the Sable in opposite order. Watch the LED indicator (on top of the cap) after reconnecting the battery connector to confirm power-up. A magnet will be required to turn off the Sable until ready for use.

Reassembly of the Sable can be done in the opposite order of disassembly by pushing the electronics back into the tube by hand. Ensure no wiring is caught between the mechanical pieces.



O-rings

O-rings should be replaced at the same time as battery replacement. The top of the Sable's head as well as the bottom endcap have two O-rings:

- Parker #N0300 8-143 (flat)
- Parker #N1490 2-143 (round)

Set into the bottom of the Sable's titanium case is a titanium screw-plug with two more O-rings

- Parker #N1470 2-013
- Parker #N1470 2-017

Remove the old rings, clean away the old ring lube from the groove and the tube's inner surface with a lint-free cloth and rubbing alcohol, and apply a thin layer of fresh O-ring lubrication to the new O-rings (Molykote 111).

- Add the flat O-ring (flat side toward the electronics) to the groove. Push this O-ring to the electronics side of the groove.
- Add the round O-ring to the same groove, closer to the antenna.

Carefully slide the Sable battery pack and chassis into the case, but don't close it up yet.

Re-apply a light layer of O-ring lube to the rings, if needed. Get the bottom retaining screw and plug ready to go, with fresh O-rings (Parker #N1470 2-013 and Parker #N1470 2-017) and lube for the plug. Next, if you have it, flush the Sable's interior air with dry nitrogen, blown in from the bottom plug hole. Push the Sable chassis into place, and screw in the bottom retaining screw and screw-plug.

Note: It is very important to be aware of where the O-ring is sitting on the titanium screw plug. If the O-rings are not sitting perfectly in their O-ring grooves, there will not be a perfect seal and could cause fatal damage to the unit.

Note: Do not over-tighten the bottom screw-plug, as the extra torque will cause the case bottom and battery pack to rotate, which may shear the battery cables.

Set into the bottom of the Sable's titanium case is a titanium screw-plug with two O-rings (Parker #N1470 2-013 and Parker #N1470 2-017).

Appendix A: Firmware

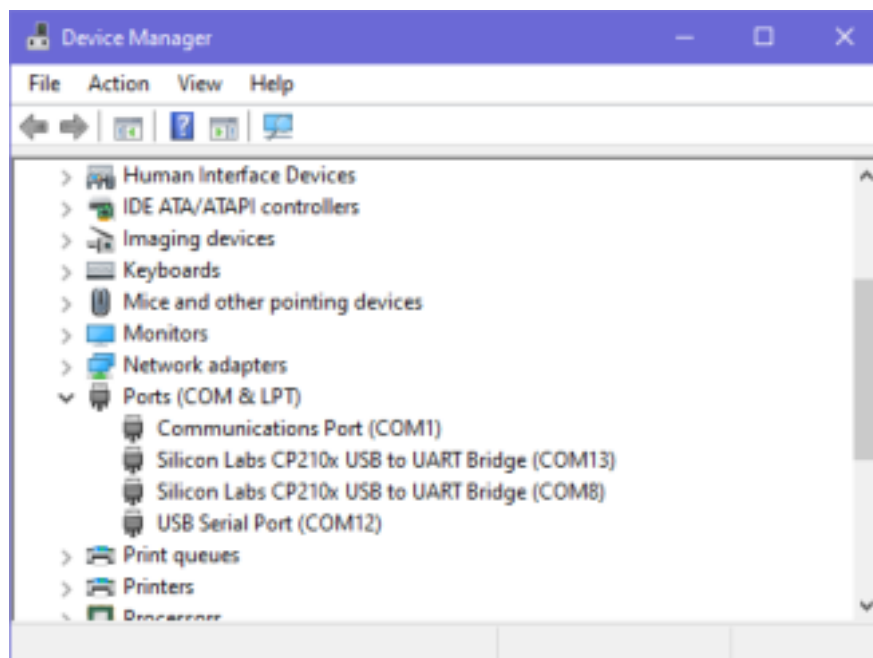
Requirements

- Computer running Windows OS
- USB Programmer from Xeos with Sable programming cable
- Device driver for the USB port (may install on connection); [backup link](#)
- Firmware Update Package
 - Bootloader Console
 - Update.exe
 - Firmware .enc file
- Tools for [disassembly](#)

Loading Firmware onto the Sable

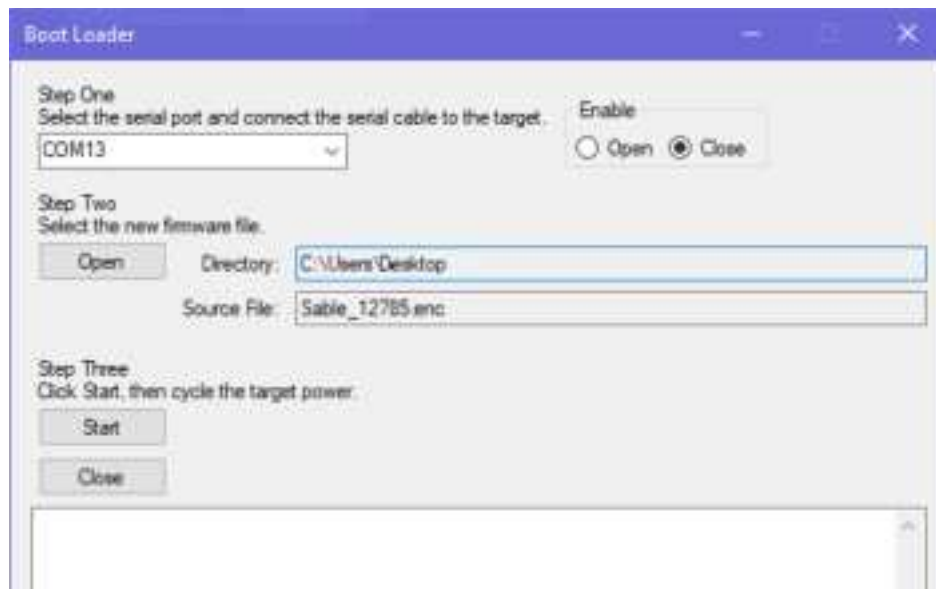
1. Disassemble the Sable in the same manner as the battery pack replacement procedure.
2. Disconnect the battery from the main circuit board. Do not remove the battery from the assembly as it will be used to power the Sable during programming.
3. Unplug the 8-wire connector from the larger controller board, and connect the USB programmer with the Sable programming cable in place of it.
4. Connect the other end of the USB programmer to the computer. Take note of the COM Port number the computer assigns to the programmer.

Note: The COM port the programmer is assigned to can be found in Device Manager under Ports (COM&LPT)

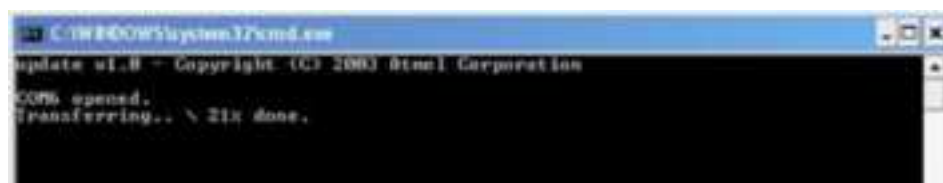


5. The programmer COM Port is listed under **Silicon Labs CP210x USB to UART Bridge** as shown. This example is **COM 13**.

6. Extract the zipped folder of the firmware package.
7. Open the folder extracted to the desktop.
8. Open **BootLoaderConsole.exe**



9. Select the COM port assigned to the USB Programmer. (only COM Ports 1-9 are supported)
10. Click on **Open**
11. Open the **.enc** file corresponding to the firmware to load.
12. Click on **Start**
13. Connect the battery again (quickly)
14. Wait for the programming window to open, and verify that device has been successfully programmed.



15. After programming has successfully completed, unplug the USB programmer from the main board and reconnect the 8-wire cable for the antenna that was previously disconnected.
16. Reassemble the Sable.

Appendix B: Technical Specifications

All Xeos Drawings are hosted in STEP and/or PDF format on drawings.xeostech.com

Mechanical	
Material	Outside Housing: Titanium case
Internal Electronics Chassis	Aluminum
Dimensions	Length 21.34" (542mm) x 2.88" OD (73.15mm)
Mass	Out of water: 4.4kg (9.7 lbs) In water: 2.3kg (5.0 lbs)

O-rings	
Head O-ring	Parker #N1490 2-143 Industry Standard AS568A-143
Head back-up seal	#8-143/N1444 Parker #N0300 8-143
Bottom screw-plug	Parker #N1470 2-013 nitrile rubber Parker #N1470 2-017 nitrile rubber Industry Standard AS568A-013
Seal Lubricant	Molykote 111

Power Supply	
Internal Battery Supply	2 x 9 (18) Alkaline C cells
Voltage	13.5 Volts nominal
Capacity	20 Amp-hours
Life expectancy	2 years sub-surface deployment followed by 1 year surface or 2000 inbound/outbound messages

Electronics	
Iridium Transceiver	Iridium 9601 or 9602
Digital Controller	Xeos IRDC-2B
GPS Receiver	AA003252-G-BLK Jupiter GPS

Environmental	
Operating Temperature	-30° C to +60° C (-22° F to +140° F)
Storage Temperature	-40° C to +80° C (-40° F to +176° F)

Warranty, Support and Limited Liability

Xeos by Satlink warrants the Sable Beacon to be free of defects in material or manufacturing for a period of one year following delivery. Liability is limited to repair or replacement of the defective part and will be done free of charge.

LIMITED WARRANTY: Xeos by Satlink warrants that the product will perform substantially in accordance with the accompanying written materials for a period of one year from the date of receipt.

CUSTOMER REMEDIES: Xeos by Satlink entire liability and your exclusive remedy shall be at Xeos' option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos' Limited Warranty and that is returned to Xeos with a copy of your receipt. This Limited Warranty is void if failure of the product has resulted from accident, abuse, or misapplication. Any replacement product will be warranted for the remainder of the original warranty period or ninety (90) days, whichever is longer.

NO OTHER WARRANTIES: Xeos by Satlink disclaims all other warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the product or the accompanying written materials. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

NO LIABILITY FOR CONSEQUENTIAL DAMAGES: In no event shall Xeos by Satlink or its suppliers be liable for any damages whatsoever (including, without limitation, damages for loss of equipment, for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use this Xeos, even if Xeos has been advised of the possibility of such damages.