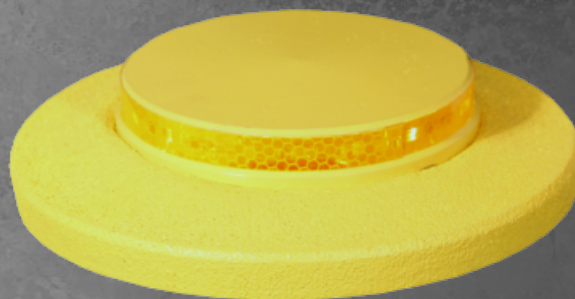




**Xeos**  
*Technologies Inc.*

# OSKER User Manual

**IRIDIUM SURFACE TRACKING SYSTEM**



**Version 1.0**  
**November 2015**

## Shipped From



## Contact Us

**Email:** [sales@xeostech.com](mailto:sales@xeostech.com)

**Phone:** 902 444 7650

**Fax:** 902 444 7651

**Web:** [www.xeostech.com](http://www.xeostech.com)

# Table of Contents

|                                              |           |
|----------------------------------------------|-----------|
| <b>Shipped From</b>                          | <b>1</b>  |
| Contact Us . . . . .                         | 1         |
| <b>Table of Contents</b>                     | <b>2</b>  |
| <b>Version History</b>                       | <b>5</b>  |
| <b>Overview</b>                              | <b>5</b>  |
| General Description . . . . .                | 5         |
| Setting up your Iridium Account . . . . .    | 5         |
| Quickstart . . . . .                         | 6         |
| <b>Operating Instruction</b>                 | <b>6</b>  |
| Using the Magnets . . . . .                  | 6         |
| LED Notes . . . . .                          | 7         |
| <b>Installation and Maintenance</b>          | <b>7</b>  |
| Pre-deployment Storage . . . . .             | 7         |
| Power Consumption and Battery Life . . . . . | 7         |
| Current Draw . . . . .                       | 8         |
| Battery Life Estimates . . . . .             | 8         |
| <b>Communicating with the OSKER</b>          | <b>9</b>  |
| Using Xeos Online . . . . .                  | 9         |
| Adding your device to Xeos Online . . . . .  | 10        |
| Tracking your OSKER . . . . .                | 10        |
| Sending Commands . . . . .                   | 12        |
| <b>Understanding Position Information</b>    | <b>13</b> |
| Iridium Doppler Position . . . . .           | 13        |
| Global Positioning System Position . . . . . | 13        |

|                                            |           |
|--------------------------------------------|-----------|
| <b>The Osker's Timers</b>                  | <b>13</b> |
| Timer Types . . . . .                      | 13        |
| SBD . . . . .                              | 13        |
| GPS . . . . .                              | 13        |
| OSKER Timer Modes . . . . .                | 14        |
| Start-up Mode . . . . .                    | 14        |
| Inverted Mode . . . . .                    | 14        |
| Normal Mode . . . . .                      | 14        |
| Watch Circle Mode . . . . .                | 14        |
| No GPS Fix Mode . . . . .                  | 15        |
| Default Settings . . . . .                 | 15        |
| Changing the Timers . . . . .              | 15        |
| <b>Additional Settings and Commands</b>    | <b>16</b> |
| Watch Circle . . . . .                     | 16        |
| Settings . . . . .                         | 16        |
| Version . . . . .                          | 17        |
| Timer . . . . .                            | 18        |
| Lifetime Stats . . . . .                   | 18        |
| Stats . . . . .                            | 19        |
| Message Enable . . . . .                   | 19        |
| <b>Appendix A: Technical Specification</b> | <b>21</b> |
| Mechanical OSKER . . . . .                 | 21        |
| Electrical . . . . .                       | 21        |
| Power Supply . . . . .                     | 21        |
| Electronics . . . . .                      | 21        |
| Environmental . . . . .                    | 22        |

Engineering Diagrams . . . . . 23

OSKER . . . . . 23

**Warranty, Support, and Limited Liability 24**

## Version History

| Version | Date     | Description   |
|---------|----------|---------------|
| 1.0     | Nov 2015 | Base document |

## Overview

### General Description

Reliable, continuous information from the ocean's surface can be difficult to gather. The OSKER provides global communications via the Iridium satellite system in a small, rugged package with sophisticated on-board programming.

The OSKER makes use of the bi-directional, global, real time Iridium satellite Short Burst Data (SBD) network in combination with GPS position location. Inside the OSKER is a 9603 Iridium Satellite Short Burst Data core radio transceiver, a specialized low power Xeos digital controller with GPS, Iridium antenna, GPS antenna and battery package.

When deployed in a group, the OSKERs provide accurate real time tracking over an area of the surface, mapping currents, oil spills, or other phenomenon. Users can set the Watch Circle with a radius of up to 5km to get automatic notification if any of the units travel outside of the designated area.

See [xeostech.com](http://xeostech.com) for details or call (902) 444-7650.

### Setting up your Iridium Account

The OSKER makes use of the [Iridium satellite systems'](#) Short Burst Data (SBD) service for the 9603 transceiver. 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.

OSKER end users must set up an approved data delivery account with their preferred service provider. This can only be done once Xeos has provided the user with an International Mobile Equipment Identity (IMEI) number. Each 9603 modem has a unique IMEI number that must be registered with the preferred service provider. For a list of service providers in your area please contact Iridium for recommendations. Xeos Technologies is also able to provide Iridium SBD data service and accounts. Please contact [activations@xeostech.com](mailto:activations@xeostech.com) for more information or use the online form on our website: [xeostech.com](http://xeostech.com)

For each IMEI number it is possible to associate up to five (5) unique email addresses. This may vary between service providers. When registering your IMEI number, please provide the service provider with a temporary Xeos testing account email address.

This account is: [xeosbeaconb@gmail.com](mailto:xeosbeaconb@gmail.com)

This temporary email testing account can be deleted or replaced at any time after delivery of the OSKER. Once the SBD account has been activated, please contact your Xeos representative and confirm this.

## Quickstart

There are only a few steps required to begin using the OSKER:

1. Contact Xeos Technologies to provision your OSKER and set-up a Xeos Online account. Make sure to have your OSKER's IMEI number on hand.
2. Add your OSKER to [Xeos Online](#)
3. Turn the OSKER on with a magnet
4. Deploy the OSKER in a location with a clear view of the sky

## Operating Instruction

### Using the Magnets

A magnet is used to operate the OSKER, possible actions include:

- Checking the OSKER's status
- Turning the OSKER on or off

The OSKER's magnetic switch is located at the top of the unit, under the **X** of the Xeos sticker. To check the status of the OSKER, hold the magnet up to the magnetic switch.

- A solid **Red LED** indicates that the OSKER is off.
- A solid **Green LED** indicates that the OSKER is on.

To turn the OSKER on or off, swipe the magnet repeatedly over the magnetic switch. The LED will blink **red** or **green**. The LED will blink 10 times, keep swiping until you get a solid color.

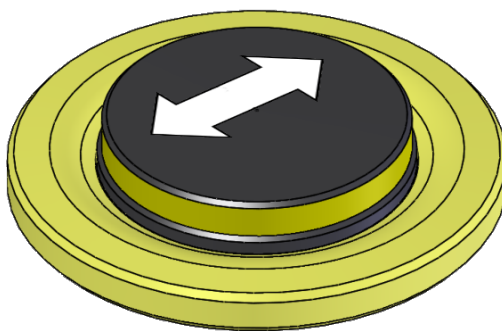


Figure 1: Osker Magnetic Switch

## LED Notes

- It is important to let all LEDs stop illuminating before initiating another action.
- Cycling power for any reason, such as using the switch to the unit OFF/ON or inserting new batteries, will initiate the **Start-up mode**.
- The beacon requires a good view of the sky for any test, therefore it is necessary that any tests be done outside of a building.

## Installation and Maintenance

### Pre-deployment Storage

The OSKER is shipped in an off state to preserve battery power. The unit's batteries cannot be changed, so turning it off after any test is necessary to preserve battery life.

### Power Consumption and Battery Life

The OSKER has an internal battery pack. The batteries should be replaced after any deployment exceeding 2 months.

## Current Draw

Current draws are as follows (12V nominal):

|                             |                              |
|-----------------------------|------------------------------|
| <b>Sleep current</b>        | 100uA                        |
| <b>Iridium transmission</b> | 36mA (approx. 30s duration)  |
| <b>GPS Acquisition</b>      | 14.6mA (approx. 1m duration) |

## Battery Life Estimates

The following charts give battery life estimates for a range of use cases. These are calculated lifespans and not testing results. Environmental factors including temperature will affect these calculations.

### Battery Life

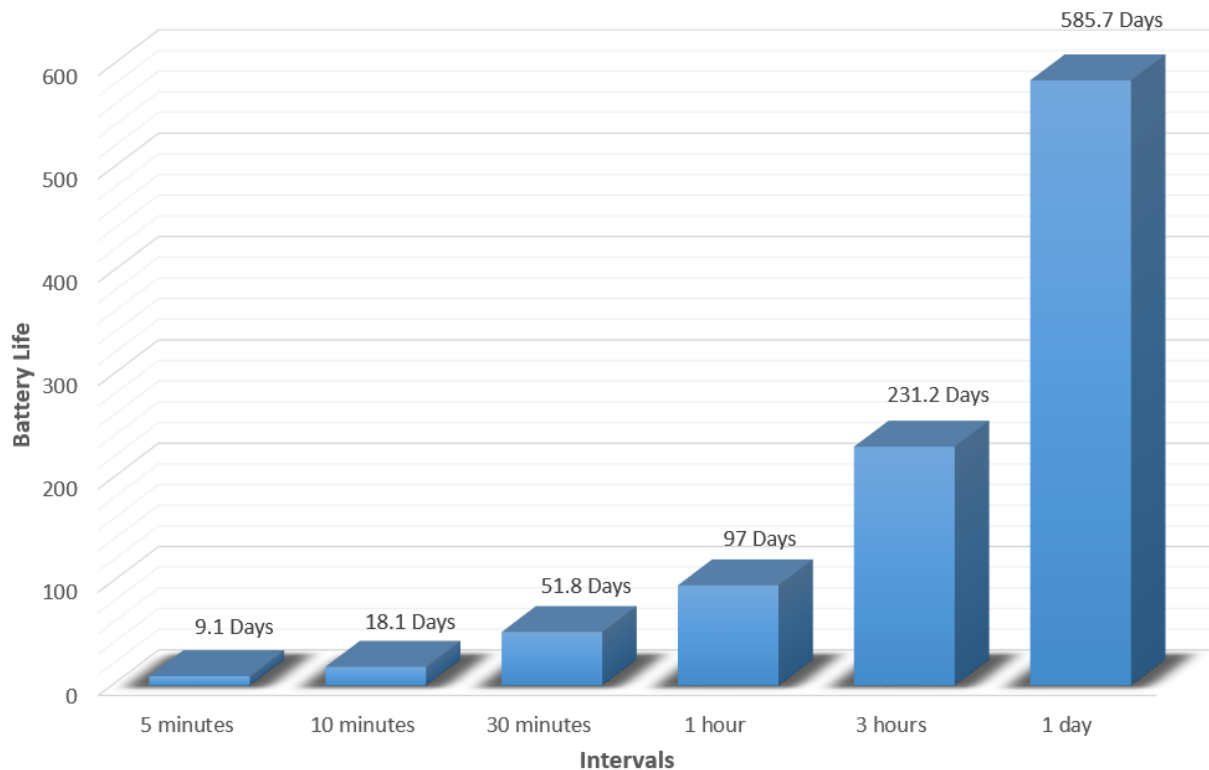


Figure 2: Battery Life Chart

## Total Messages

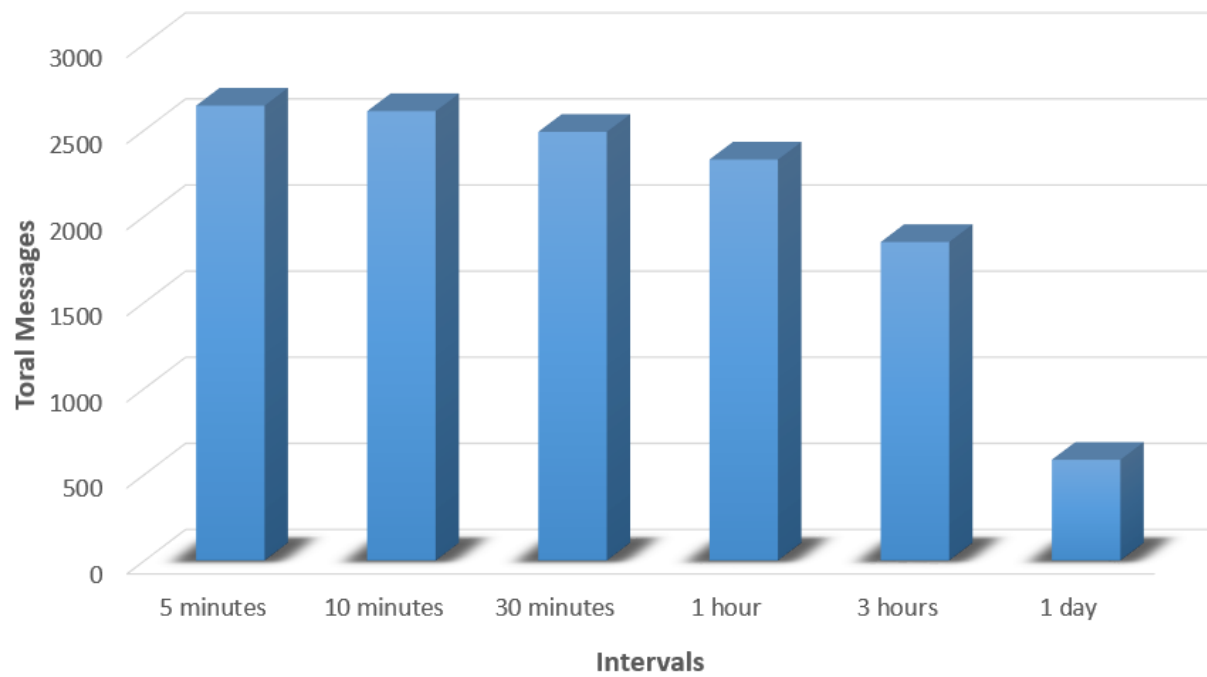


Figure 3: Total Messages Chart

## Communicating with the OSKER

### Using Xeos Online

Before using [Xeos Online](#) make sure that your account has been setup and your OSKER added to your organization. Contact [support@xeostech.com](mailto:support@xeostech.com) for more information.

In a web-browser, navigate to [Xeos Online](#) and login with your username and password.

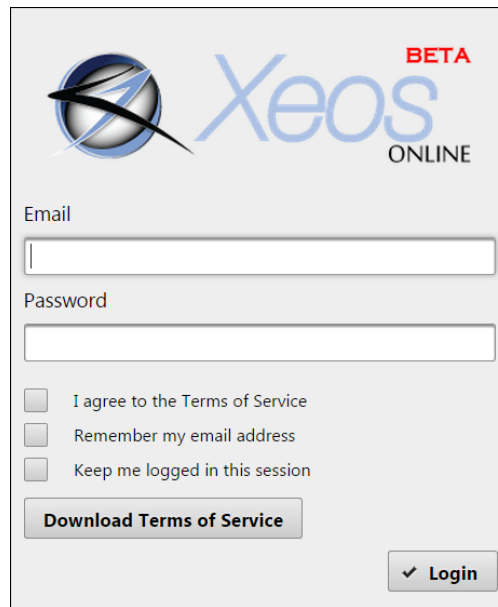
The image shows the Xeos Online login page. At the top left is a logo consisting of a blue sphere with a black swoosh. To its right is the text 'Xeos' in a large, light blue font, with 'ONLINE' in a smaller, black font below it. Further right is the word 'BETA' in red. Below the logo and text are two input fields: 'Email' and 'Password'. Under the 'Password' field are three checkboxes with labels: 'I agree to the Terms of Service', 'Remember my email address', and 'Keep me logged in this session'. Below these checkboxes is a button labeled 'Download Terms of Service'. At the bottom right is a button labeled 'Login' with a checkmark icon.

Figure 4: Xeos Online login page

## Adding your device to Xeos Online

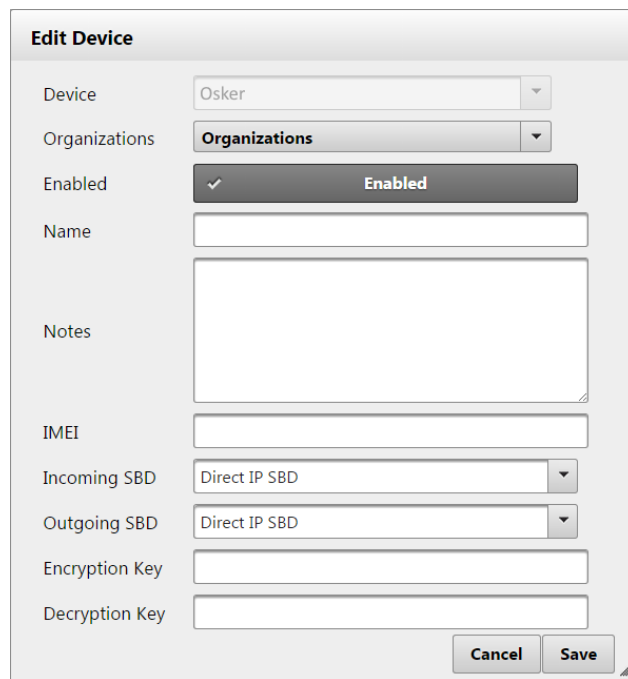
If you have not already setup your OSKER as a device in [Xeos Online](#), click on the **Admin** tab and then **Devices** to proceed. Select the New Device button and choose OSKER from the device list.

| Name         | Description                                 |
|--------------|---------------------------------------------|
| Device       | Device type                                 |
| Organization | Select any available organizations          |
| Enabled      | Enable or disable the device                |
| Name         | Give your OSKER a descriptive name          |
| Notes        | Any additional details related to the OSKER |
| IMEI         | Copy and paste your OSKER's IMEI            |
| Other        | Leave all other options as is               |

## Tracking your OSKER

Now that the OSKER has been added to [Xeos Online](#), the user can send commands and track location and event data. First, make sure you have the right organization selected from the menu at the top-right of the screen.

Click the **Home** button at the top of the screen to get back to the main page of [Xeos Online](#). Select your device from the right-hand device area. Multiple devices may be selected.



**Edit Device**

Device: Osker

Organizations: Organizations

Enabled: ☒ Enabled

Name:

Notes:

IMEI:

Incoming SBD: Direct IP SBD

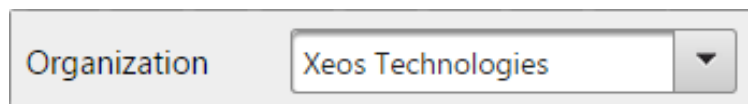
Outgoing SBD: Direct IP SBD

Encryption Key:

Decryption Key:

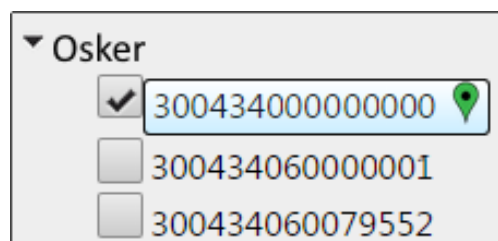
Cancel Save

Figure 5: Osker Device Dialog



Organization: Xeos Technologies

Figure 6: Organization Menu

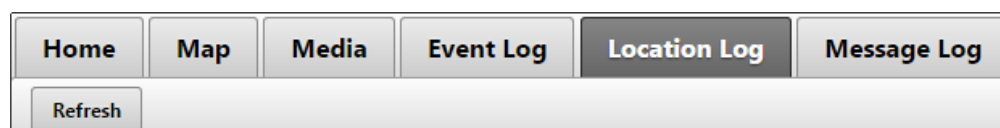


▼ Osker

- ☒ 3004340000000000 
- ☐ 3004340600000001
- ☐ 300434060079552

Figure 7: Device Selection

Select **Map** to view the current location of your OSKER, past GPS fixes and messages can be viewed at the **Location Log**, and **Message Log** tabs. **Xeos Online** does not refresh new messages and locations automatically, an indicator will appear on the refresh button when new messages are available.



Home Map Media Event Log **Location Log** Message Log

Refresh

Figure 8: Home Tabs

## Sending Commands

To Send commands through [Xeos Online](#), click on the **Options** button and select **Send Manual SBD**.

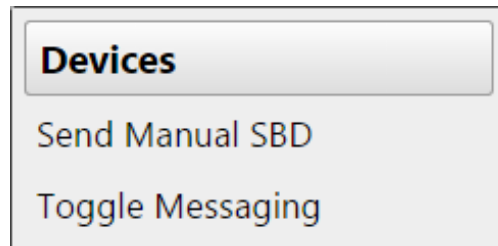


Figure 9: Send Manual SBD

The **Send SBD Dialog** will appear. Select the units you wish to target with commands and move them over to the right-hand target list. Type your command(s) into the command box and press send.

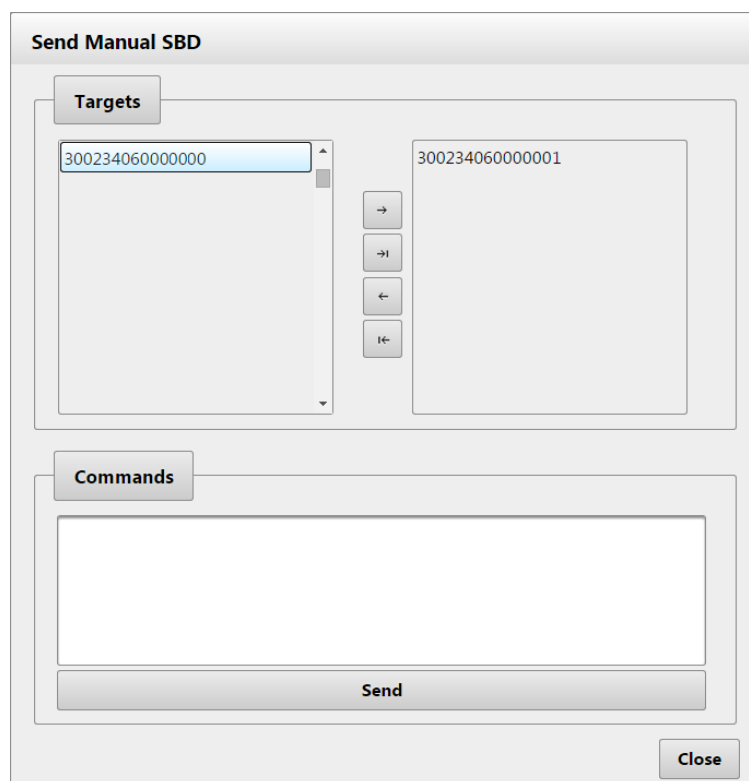


Figure 10: Send SBD Dialog

For more information on available commands, see [Timers and Settings](#)

## 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 the transmission, using Doppler technology. As a result, it is often very inaccurate. This location is only visible to users getting emails directly from the OSKER, as opposed to emails forwarded by Xeos Online.

### Global Positioning System Position

The location information is embedded in the SBD attachment sent via the Iridium Gateway. Users of the Xeos Online system will only see this location. The GPS fix is much more accurate than the Doppler position provided by Iridium.

## The Osker's Timers

### Timer Types

The OSKER's behavior is based on multiple timed events. Understanding how these events interact is necessary to properly using the OSKER in the field. There are two major timed events:

### SBD

The OSKER will attempt to communicate with the Iridium Gateway based on this interval. If the OSKER successfully registers with the Iridium Satellite Constellation, it will receive any queued messages from the Iridium Gateway. Once this is finished and the received messages have been implemented, the OSKER will transmit any messages queued for transmission.

### GPS

The OSKER will try to communicate with the GPS network and get a location fix based on this

interval. Any successful GPS fixes will be queued for the next Iridium transmission. The OSKER's clock will also be set and adjusted based on the GPS network. The GPS interval will execute before the SBD interval if they are scheduled for the same time.

## OSKER Timer Modes

### Start-up Mode

**Start-up mode** (Timer 1) will begin when the OSKER is turned on using magnet swipes, if power is applied to the OSKER such as after a magnet power-up, or if the OSKER is reset by an SBD command. This mode will last for one hour, after which the OSKER will enter either **Normal mode** or **Inverted mode**.

**Start-up mode** will always last for 1 hour. This duration cannot be changed, however the GPS and SBD intervals can be set by the user. With default settings, the OSKER will attempt 6 successful GPS and Iridium transmissions at 10 minute intervals during **Start-up mode**.

### Inverted Mode

**Inverted Mode** will begin when the OSKER checks its orientation before an Iridium transmission. When it enters **Inverted mode** the OSKER will transmit according to timer 2. The OSKER will exit inverted mode when it detects that it has returned to normal orientation.

### Normal Mode

Once Start-up mode has finished, the OSKER will enter **Normal mode**. This is the default timer mode of the OSKER and will be used if no other modes apply. At default settings, the OSKER will transmit 1 GPS fix every 3 hours. If no other modes are engaged, the OSKER will continue in **Normal mode** until its batteries are depleted or the unit powered off.

### Watch Circle Mode

If a watch circle has been set, the OSKER will enter **Watch Circle Mode** when it exits the set radius. While in **Watch Circle Mode**, the OSKER will send information pertaining to the Watch Circle with each message, such as distance from center.

## No GPS Fix Mode

If the OSKER is unable to get a GPS fix, it will enter a slower timer mode to conserve battery power. This mode uses Timer 4 and will only be activated after multiple GPS failures.

## Default Settings

| Mode | Timer 0 | Timer 1 | Timer 2 | Timer 4 |
|------|---------|---------|---------|---------|
| SBD  | 1h      | 10m     | 1h      | 3h      |
| GPS  | 1h      | 10m     | 1h      | 3h      |

The default timer settings of the OSKER are suitable for most use cases.

## Changing the Timers

The length of the OSKER's various modes cannot be altered. **Start-up mode** is fixed at 1 hour. However, the Iridium and GPS intervals can be changed to suit the user's requirements.

The GPS and Iridium interval timers can be set independantly of each other, but there are several things to keep in mind. The OSKER has a limit of 24 GPS fixes per Iridium message and will retain a maximum of 40 unsent fixes. This puts a practical limit on the ratio of GPS fixes to Iridium checks.

Regardless the method being used to communicate with the OSKER, timer commands are always the same format:

|                   | Command | Timer | Mode | Interval |
|-------------------|---------|-------|------|----------|
| <b>Example 1:</b> | \$timer | GPS   | 0    | 1h       |
| <b>Example 2:</b> | \$timer | GPS   | 2    | 5m       |
| <b>Example 3:</b> | \$timer | SBD   | 0    | 6h       |

**Example 1** would change the GPS interval of Normal mode to every hour, while **Example 3** would change the SBD message interval to 6 hours. After sending the commands from both **Example 1** and **Example 3**, the user would receive 1 message every 6 hours containing 6 GPS fixes. These messages would be sent at approx 00:00 UTC, 06:00 UTC, 12:00 UTC and 18:00 UTC.

## Additional Settings and Commands

There are a number of commands that can be sent to the OSKER, in addition to changing timers. Modifying these settings **will** affect the performance of the OSKER. The following is a summary of remote commands:

### Watch Circle

To use the watch circle functionality the watch circle must first be enabled. This is done with the command **\$switch c 1**. After which you will get the following reply:

```
Ascii: Switch: Y = GC, N = MO
```

**Figure 11:** Xeos Online Watch Circle Response

The response indicates that C (watch circle) is now enabled.

To set the circle, use the command **\$setcircle lat lon radius**. The radius must be in meters. For example, the following command: **\$setcircle 44.714413 -63.604915 300** would set a watch circle at 44.714413, -63.604915 of 300 meters.

If the Watch Circle is turned on, but no circle is set, the OSKER will average its locations over the next 48 hours and create a Watch Circle of 100 meters with the result as its center.

### Settings

The **\$settings** command will return a truncated list of important OSKER settings aside from timers.

```
Ascii: T/A:Td=0;Ts=100 GPS:MxOn=100;MxPr=30;Tmn=-30;Vmn=6.000;gBlk0=0,0;gBlk1=0,0;gRtyQ=2;gRtyD=20;gFRst=50;gBL=40;gFQ=24 ...  
Sys:PB=2788;BtP=n;BtT=5;BtN=;LL=0;UC=0;aes=n;rHr=0;rMn=2 Ird:iBlk0=0,0;iBlk1=0,0;iRtyQ=2;Smx=8;MxLn=330;iWR=Y Tilt:Tt=5;Secs=120;Usec=120
```

**Figure 12:** Xeos Online Settings Response

### System Settings

|              |                                               |
|--------------|-----------------------------------------------|
| <b>MxOn</b>  | Maximum GPS session length in seconds         |
| <b>MxPr</b>  | Maximum GPS session length in poor conditions |
| <b>Tmn</b>   | Temperature minimum                           |
| <b>Vmn</b>   | Voltage minimum                               |
| <b>gBlk0</b> | Unused                                        |
| <b>gBlk1</b> | Unused                                        |
| <b>gRtQ</b>  | GPS retry quantity                            |
| <b>gRtyD</b> | GPS retry delay in seconds                    |
| <b>gFRst</b> | Number of GPS failures for GPS reset          |
| <b>gBL</b>   | Maximum saved GPS fixes                       |
| <b>gFQ</b>   | Maximum GPS fixes per message                 |

### System Settings

|            |                                          |
|------------|------------------------------------------|
| <b>PB</b>  | Firmware Build                           |
| <b>BtP</b> | Bluetooth on or off                      |
| <b>BtT</b> | Bluetooth Timeout in minutes             |
| <b>BtN</b> | Bluetooth Name                           |
| <b>LL</b>  | Diagnostic Log detail level              |
| <b>UC</b>  | Unlock Code                              |
| <b>aes</b> | Unused by the OSKER                      |
| <b>Hr</b>  | Hour on which timings are based(24h UTC) |
| <b>rMn</b> | SBD hour offset in minutes               |

### Iridium Settings:

|              |                                  |
|--------------|----------------------------------|
| <b>iBlk0</b> | Iridium Blackout, Unused         |
| <b>iBlk1</b> | Iridium Blackout, Unused         |
| <b>iRtyQ</b> | SBD Retry Quantity               |
| <b>Smx</b>   | Maximum SBD attempts per session |
| <b>MxLn</b>  | Maximum message length (bytes)   |
| <b>iWR</b>   | Wait for registration            |

Tilt functionality is not used by the OSKER.

## Version

The **\$ver** command will return a summary of both firmware and hardware versions.

```
Powerup: true, Firmware Version: XMI-Torch v1.22-2443. dev:4 , Hardware Revision: 2.5-0, Serial: 175, GPS Version: GSD4e_4.1.2-P1 R+ 11/15/2011 319-Nov 15 , ...
Iridium Version: TA13001, Reset Data: Count = 15, Current = (S), Prev = (cleared)
```

**Figure 13:** Xeos Online Version Response

|                          |                                                  |
|--------------------------|--------------------------------------------------|
| <b>Powerup</b>           | Not applicable to \$ver                          |
| <b>Firmware Version</b>  | Major, minor, build of current firmware          |
| <b>Hardware Revision</b> | Hardware revision, set during assembly           |
| <b>Serial</b>            | The unit's serial number                         |
| <b>GPS Version</b>       | Firmware version of GPS chip                     |
| <b>Iridium Version</b>   | Firmware version of Iridium chip                 |
| <b>Reset Count</b>       | The number of resets since firmware was uploaded |
| <b>Current</b>           | Cause of last power off                          |
| <b>Previous</b>          | Cause of previous power off, not used in OSKER   |

## Timer

The **\$timer** command will return the timer intervals of the current mode. This response will also be returned when timers are changed.

```
Ascii: Tmr:SBD,5m,3m,1m,1m,1h,2h,1h,1h Tmr:GPS,5m,3m,20s,20s,2h,2h,1h,1h
```

**Figure 14:** Xeos Online Timer Response

The timer string returned includes a summary of GPS and SBD timers. The first four timers are used by the OSKER:

**Timer 0 (Normal mode), Timer 1 (Start-up mode), Timer 2 (Alert mode), Timer 3 (Underwater mode).**

The last 4 timers are unused by the OSKER and can be ignored.

## Lifetime Stats

The **\$statsl** command will return various performance statistics recorded since the last firmware install as well as current statistics.

```
BatteryV: 11.15, Uptime: 10872, Power Cycle Count: 3, Watchdog Reset Count: 0, Lowest Battery Voltage: 0, ...
Highest Battery Voltage: 13.290000000000001, Iridium Message Count: 14, Iridium Session Count: 12, ...
Iridium On Time: 11, Iridium Send Failures Non18: 18, Iridium Send Failures Type 18: 7, Bytes TX: 962, ...
Iridium Messages Received: 5, Bytes RX: 162, GPS Sessions: 14, GPS On Time: 6, GPS Fix Count: 10, ...
GPS TTFF Average: 9, High Temperature: 0, Low Temperature: 0
```

**Figure 15:** Xeos Online Lifetime Stats Response

|                                      |                                                   |
|--------------------------------------|---------------------------------------------------|
| <b>BatteryV</b>                      | Last measured battery voltage                     |
| <b>Uptime</b>                        | Total unit uptime in minutes                      |
| <b>Power Cycle Count</b>             | Number of power cycles                            |
| <b>Watchdog Reset Count</b>          | Number of errors                                  |
| <b>Lowest Battery Voltage</b>        | Lowest measured battery voltage                   |
| <b>Highest Battery Voltage</b>       | Highest measured battery voltage                  |
| <b>Iridium Message Count</b>         | The number of SBD messages queued for sending     |
| <b>Iridium Session Count</b>         | Total successful Iridium connections              |
| <b>Iridium on Time</b>               | Total successful Iridium connections on first try |
| <b>Iridium Send Failures non18</b>   | Iridium failures, excluding RF drop               |
| <b>Iridium Send Failures Type 18</b> | Iridium failures due to RF drop                   |
| <b>Bytes TX</b>                      | Sum of all data sent in Bytes                     |
| <b>Iridium Messages Received</b>     | Successfully received SBD messages                |
| <b>Bytes RX</b>                      | Sum of all data received in Bytes                 |
| <b>GPS Sessions</b>                  | Total GPS attempts                                |
| <b>GPS On Time</b>                   | Total successful GPS fixes on first try           |
| <b>GPS Fix Count</b>                 | Successful GPS fix count                          |
| <b>GPS TTFF Average</b>              | Average time to fix, in seconds                   |
| <b>High Temperature</b>              | Not used with the OSKER                           |
| <b>Low Temperature</b>               | Not used by the OSKER                             |

## Stats

The **\$stats** command will return performance statistics recorded since the last power-up. The particular statistics are similar to **\$statsl**, but exclude **Power Cycle Count** and **Watchdog Reset Count**.

## Message Enable

The OSKER has several message types that can be enabled for GPS and event messages. At factory defaults, the OSKER will send compressed binary GPS (not human readable) and plain text event (surface and battery) messages. These message formats can be changed using the **\$msgenable** command.

The OSKER has the following message types available:

| Message Number | Message Type                             |
|----------------|------------------------------------------|
| 0              | GPS Plain Text Short                     |
| 1              | GPS Plain Text Long                      |
| 5              | Argos PDR, unused by the OSKER           |
| 6              | Sensor Binary, unused by the OSKER       |
| 7              | Event Data, unused by the OSKER          |
| 8              | Water Sense Hist, water sense event data |
| 10             | GPS Bin Compressed                       |
| 11             | Motion Binary, unused by the OSKER       |

At factory defaults, the following message types are enabled for each mode:

| Timer Mode | Message Types |
|------------|---------------|
| 0          | 8, 10         |
| 1          | 8, 10         |
| 2          | 8, 10         |
| 3          | 8, 10         |
| 4          | 8, 10         |

The **\$msgenable** must be applied to each timer. The message format must be as follows:

#### **\$msgenable timer message types**

So to enable GPS plain text short, GPS Binary Compressed, and Water Sense data on Timer 0 (**Normal mode**) you would send the following command:

**\$msgenable 0 0,10,8**

Any number of message types can be enabled for each timer, but for each additional message type the OSKER will use additional Iridium data.

## Appendix A: Technical Specification

### Mechanical OSKER

**Dimensions** 7.8" diameter x 2.3" height

**Weight** 500 g - out of water (Alkaline Batteries)

### Electrical

#### Power Supply

**Supply** 8 AA batteries (Alkaline)

**Sleep Current (12V)** 100uA (avg)

**Iridium Transmit (12V)** 36mA (30s avg)

**GPS Acquisition** 14.6mA (30s avg)

**Voltage** +12 Volts nominal (Standard enclosure 8 AA batteries)

**Battery Capacity** 2.4 Amp Hours (AA Alkaline)

### Electronics

**Digital Controller** Xeos IRDC-3

**GPS Receiver** 48 channel SiRFstarIV, GSD4e GPS chip

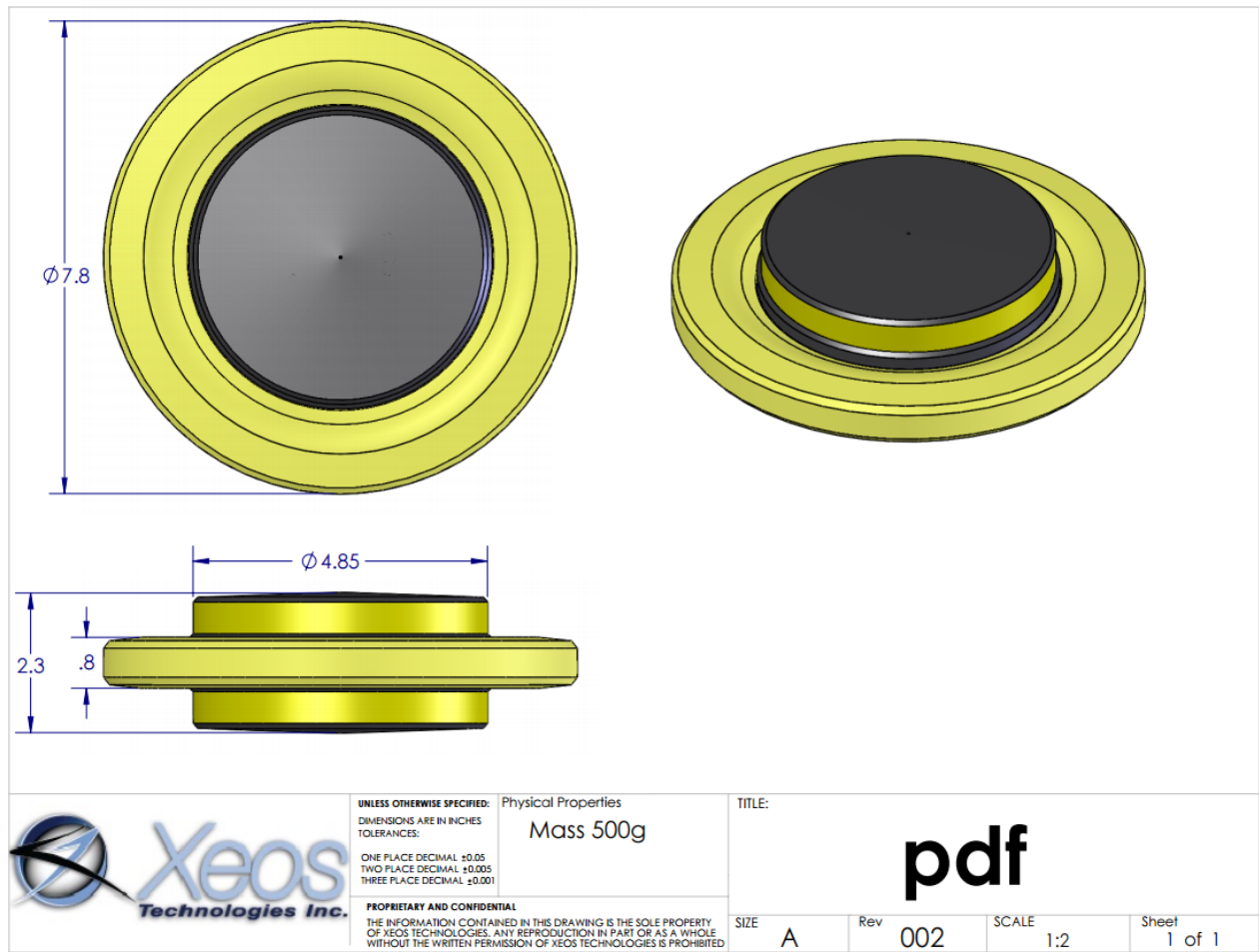
**Iridium Modem** Iridium 9603 modem

**Antenna** Xeos proprietary antenna, designed to withstand high pressure environments

## Environmental

**Operating Temperature** -40° c to +60° c

OSKER



## Warranty, Support, and Limited Liability

Xeos Technologies Inc. warrants the OSKER 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 Technologies Inc. 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 Technologies Inc. entire liability and your exclusive remedy shall be at Xeos Technologies Inc. option, either (a) return of the price paid or (b) repair or replacement of the product that does not meet Xeos Technologies Inc. Limited Warranty and that is returned to Xeos Technologies Inc. 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 Technologies Inc. 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 Technologies Inc. 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 Technologies Inc. product, even if Xeos Technologies Inc. has been advised of the possibility of such damages.