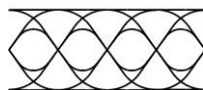
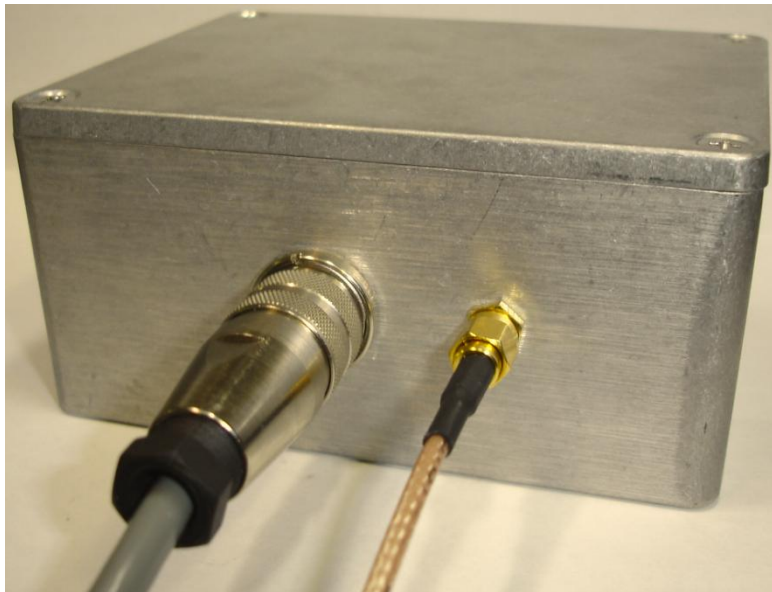


# User Manual

**GL2100**

**Communication Conduit**

**Document # GL10U**



**Cutting Edge Industrial Design**

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## Reference Documents

Document #	Description

## Service Bulletin List

Service Bulletin #	Subject	Manual Revision	Revision Date

## Table of Illustrations

Section #	Description	Page #

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# GL2100

## Communication Conduit

### 1.0 General Information

#### 1.1 Introduction

This manual contains information on the correct use of the Cutting Edge Industrial Design Ltd. GL2100. Also included are the physical and electrical characteristics of the unit.

#### 1.2 Purpose of the Equipment

- 1.2.1 Cutting Edge Industrial Design 's GL2100 is a communication conduit designed to minimize effort to send data from the field to your computer.
- 1.2.2 Simple design allows for versatile connections options. The GL2100 has a variety of daughter cards that allow various sensors to be connected to the unit.

#### 1.3 Optional Equipment

- 1.3.1 CEID offers a comprehensive family of plug in modules. These modules provide convenient solutions for a variety of frequently encountered interfacing needs or special requirements and are an important part of CEID's "building block" system for configuring for data communications.

### 2.0 Application

#### 2.1 Introduction

The GL2100 is a complete communication solution using the Globalstar network. Data is received from a field device and is processed by a daughter card attached to the unit. The main board handles all associated communication tasks. The data is then sent through the Globalstar network to CEID's database where the data is pushed to the client's location. The GL2100 consists of two distinct parts, hardware and database. The hardware is the device mounted in the field while the database resides on a CEID server.

## 2.2 Block Diagram

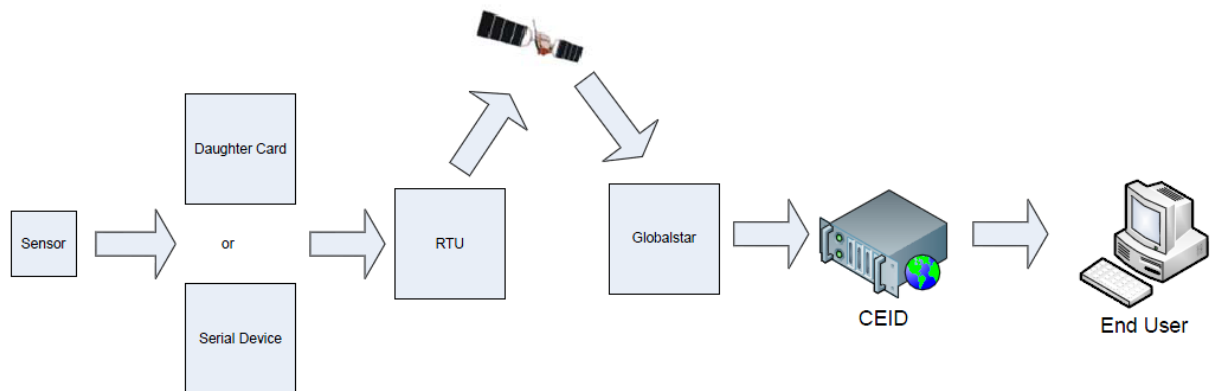


Figure 1.  
Block Diagram

## 2.3 Typical Application

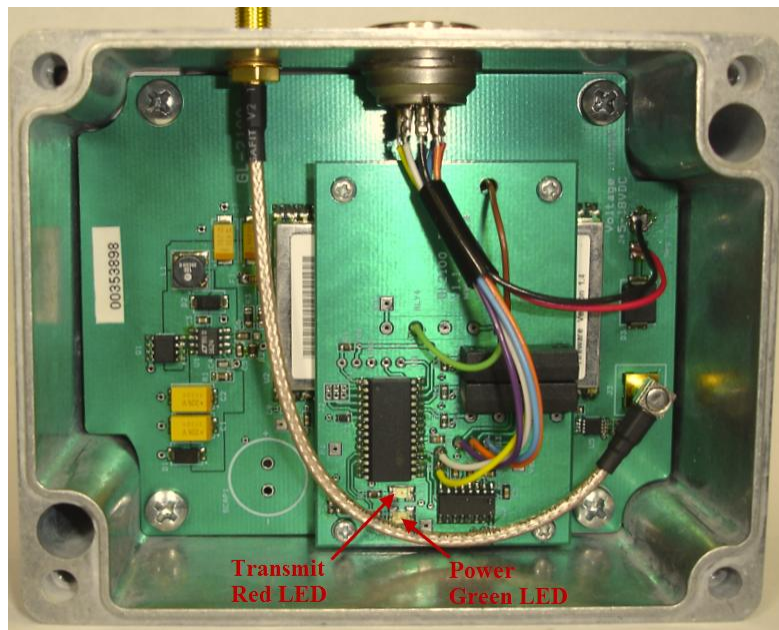
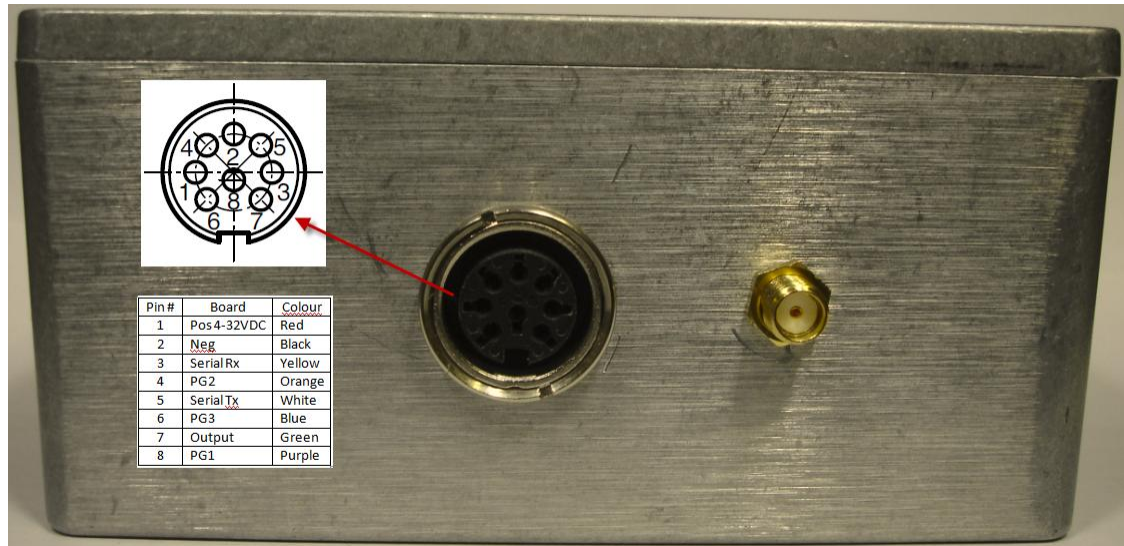
- 2.3.1 Careful consideration must be paid to the location of the GL2100 in respect to antenna placement. The antenna must be in full view of the sky to work correctly.

### 3.0 Hardware

#### 3.1 GL2100 device

The GL2100 is a simple module to use. Install the unit as per directed in the installation manual. Ensure the antenna has a clear view of the open sky.

External inputs are through the front the device

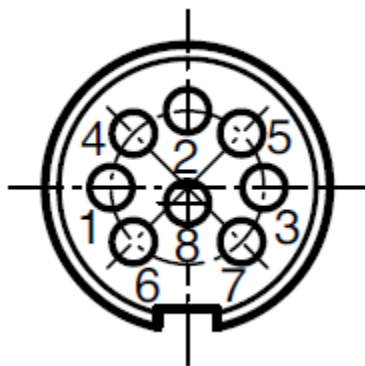


- 3.1.1 Pin 1 is the input power for the device must be between 4-32VDC and capable of supplying 1.5A.
- 3.1.2 The first LED is to verify that it has passed the self diagnostics and power is applied to the board. The LED will turn green after a few seconds if the unit passes the self diagnostics.

3.1.3 The second LED is lit when there is a pending transmission.

3.1.4 The external serial port is where the device receives its data. This port requires a RS232 signal.

### 3.2 Pin out Assignment and Description



Pin #	Board	Colour
1	Pos 4-32VDC	Red
2	Neg	Black
3	Serial Rx	Yellow
4	PG2	Orange
5	Serial Tx	White
6	PG3	Blue
7	Output	Green
8	PG1	Purple

3.3 The Globalstar antenna is attached by the SMA connector located at the front of the unit.

3.3.1 Ensure the antenna has a clear view of the sky.

### 3.4 Cautions and Warnings

- 3.4.1 It is important to ensure that the correct polarity is observed when powering up the GL2100. Ensure that all power and grounds are applied only where specified. Damage to the unit may result if power or ground is applied to the wrong junction.
- 3.4.2 DO NOT remove factory installed screws. Damage to the units may result and void any warranties.
- 3.4.3 DO NOT install near heat sources such as direct sunlight, warm air exhausts, or heaters
- 3.4.4 NO scheduled maintenance is required to ensure continued functionality.
- 3.4.5 ESD (Electro Static Discharge) guidelines shall be followed.



### **3.5 FCC Information to Users**

#### **Federal Communication Commission Interference Statement**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures;

- Reorient or relocate the receiver antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experience radio /TV technician for help

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment

#### **IMPORTANT NOTE:**

FCC Radiation Exposure Statement:

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

Some equipment in hospitals and aircraft are not shielded from radio frequency energy. Do not use the device onboard aircraft, or in hospitals, without first obtaining permission.

Do not use near pacemakers. The GL-1000 may affect the operation of some medically implanted devices such as pacemakers, causing them to malfunction. Avoid placing your GL-100 next to such devices. Keep a minimum distance of 20 cm between the medical device and the GL-2100 to reduce the risk of interference. If you have any reason to suspect that interference is taking place, turn off the GL-2100 and contact your medical specialist for assistance.

#### **Emissions Information For Canada**

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.



### 3.6 Electrical Characteristics

#### 3.6.1 Electrical Specifications:

Electrical Supply	4-32VDC at 1.5A

#### 3.6.2 Overview of all Electrical connections

The GL2100 utilizes (1) 8-pin connector. The signals interfaced through this connector are power, RS232 and (4) I/O.

### 3.7 Mating Connector Information

All wiring harnesses to the unit shall be supplied and fabricated by the installing agency.

<b><u>Part</u></b>	<b><u>Mating Connector</u></b>
Female 8 Position Amphenol - C091 31G008 100 2	Plug 8 Position Amphenol - C091 31H008 100 2

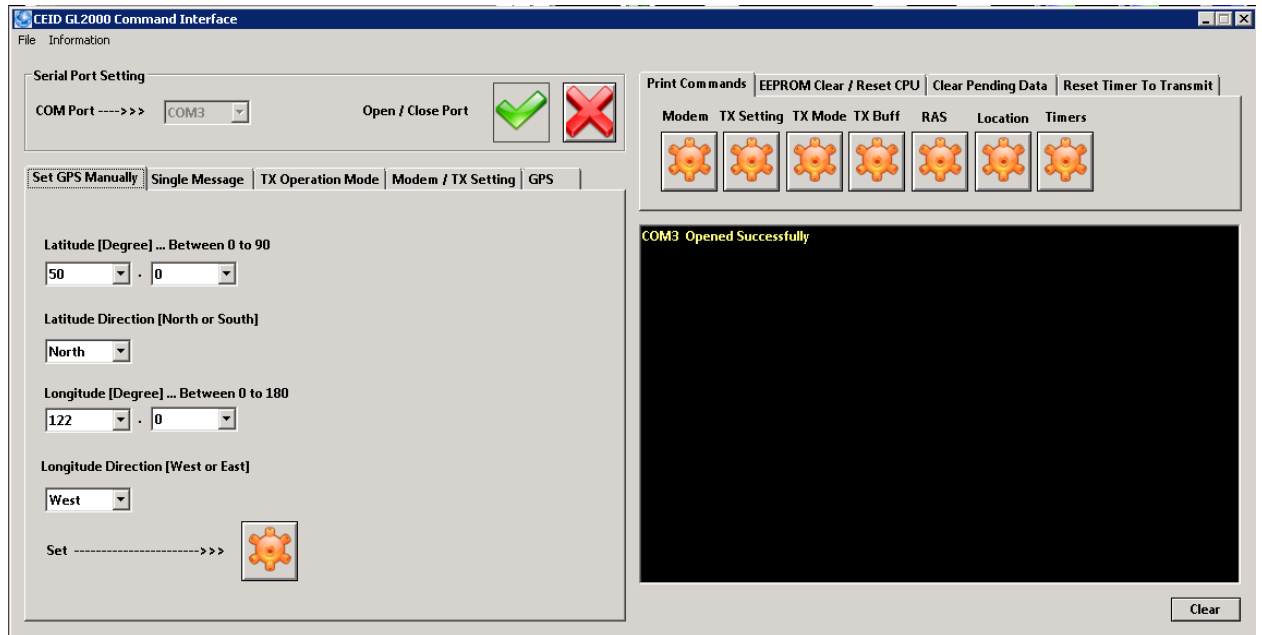
### 3.8 Post-Installation Test

Once the GL2100 is properly installed, connect the satellite antenna with a clear view of the sky and power the unit up. Verify that first LED (Green) lights up. This led proves the unit is working correctly.

## 4.0 Installation Software

### 4.1 GL2100 Command Interface

Parameter setting for the device is done through the Command Interface.



The display is broken into 4 parts.

	Com port setup.
	Parameter settings
	Parameter read / parameter reset



#### 4.2 Com Port setup

Before setting parameters on the device you must open a connection to the device. Select the appropriate Com Port and select Open. The dialogue box will respond with **COM5 Opened Successfully** if successful. (Depending on available Com ports)

To end a session with the device click the close port and the dialogue box will respond with **COM5 Closed Successfully** (Depending on available Com ports)

## 4.3 Parameter Set

### 4.3.1 Set GPS Manually (if no GPS is present)

The next step required to set up the device is to manually set the GPS coordinates. Select the Set GPS Manually tab and enter the coordinates where the device is to be installed. The correct coordinates need to be entered for where the device will be installed. This is required because the device must switch to channel C if close to a Radio Telemetry site.

Enter the desired coordinates and click the Set button.

Modem / TX Setting TX Operation Mode GPS Single Message Set GPS Manually

Latitude [Degree] ... Between 0 to 90  
53 · 0.52

Latitude Direction [North or South]  
North

Longitude [Degree] ... Between 0 to 180  
122 · 0.46

Longitude Direction [West or East]  
West

Set ----->>>

The dialogue box will respond with

**CMD ... [PASS]**

### 4.3.2 Modem / TX Setting

You can now set transmission parameters on the GL2100.

Modem

RF Channel  
Channel A

Number of Tries  
2

Minimum Interval Between Transmission  
5 seconds

Maximum Interval Between Transmission  
10 seconds

Set ----->>>

The recommended settings are:

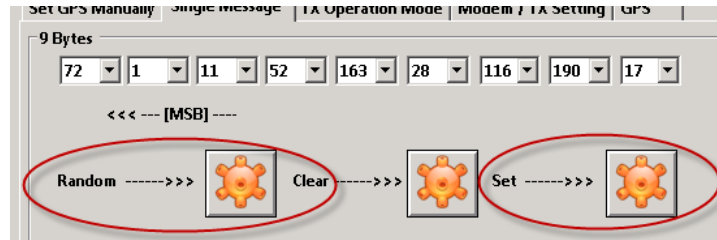
Setting	Recommended
RF Channel	Not changeable. Dependent on GPS Coords
Number of Tries	2
Minimum Interval Between Transmission	5 (mins)
Maximum Interval Between Transmission	10 (mins)

Click the Set button when complete. The dialogue box will respond with **CMD ... [PASS]**

#### 4.3.3 Single Message

To create a message to send click on the Single Message tab. You can enter the message manually or choose a random message. We will use a random generation for this example.

Click the Random button followed by the Set button



The dialogue box will respond with **CMD ... [PASS]**

#### 4.3.4 TX Operation Mode

To send the created message from step 4.3.3 click on the TX Operation Mode tab. From the dropdown menu select Single STU Message



Click the Set button. The dialogue box will respond with

```
CMD ... [PASS]
CMD ... [PASS]
$START_TX @ 1800 (sec) ^
TX ... [IN PROGRESS]
```

The 1800(sec) is the start of the timer countdown to prevent a message being sent within a 30 minute period.

### 4.4 Print Commands

#### 4.4.1 Modem



Clicking on the Modem button will display the current parameters of the device.

```
$=====^
$Modem Configuration: ^
$Modem Init ==> SUCCESS ^
$ID ==> 353544 ^
$RF_CHAN ==> A ^
$NUM_TRIES ==> 3 ^
$MIN_TX_BET_INT [seconds] ==> 300 ^
$MAX_TX_BET_INT [seconds] ==> 600 ^
$=====^
```

#### 4.4.2 TX Setting



Clicking on the TX Setting button will display information about the Tx Configuration.

```
$=====^
$TX Configurations ^
$TX Time [seconds] ==> 1800 ^
$TX Dist [meters] ==> 0 ^
$=====^
```

#### 4.4.3 TX Mode

There are three modes that the GL2100 will be in.



Clicking on the TX Mode will display which of the three modes are active.

Idle mode. No active transmission.

```
$=====^
$Mode: IDLE ^
$=====^
```

Single STU. Transmission of 9 Byte packet.

```
$=====^
$Mode: SINGLE STU [09 BYTES] ^
$=====^
```

GPS. Transmission of GPS coordinates.

```
$=====^
$Mode: GPS ^
$=====^
```

#### 4.4.4 TX Buff



Clicking on the TX Buff will display the contents of the buffer. There will be two possible states. No data in the buffer or data in the buffer.

No data in buffer.

```
$SEND STU ==> [0] ^
$Buff[TX] ==> Empty ^
```

Data in buffer.

```
$SEND STU ==> [9] ^
$Buff[TX] ==> ^
$0x43, ^
$0x91, ^
$0xB0, ^
$0xFE, ^
$0xB4, ^
$0x3D ^
```

#### 4.4.5 RAS



Clicking on the RAS button will list all of the Radio Telemetry sites and the distance from your GPS coordinates to that site.

```
$=====^
$RAS Information : ^
$Location : Green Bank Telescope, WV ^
$Latitude [DEG] : 38.43 ^
$Longitude [DEG] : -79.83 ^
$Distance [KM] : 3891.48 ^
$Distance [Miles] : 2418.05 ^
$=====^
```

#### 4.4.6 Location



Clicking on the Location button will display the current GPS coordinates if a GPS is available

```
$=====^
$GPS DATA      ^
$=====^
$GPGGA,02.4225,000.5352,5997,N,12246.1430,W,1.03,2.9,675.8,M,-14.8,M,.0000^
$Latitude (GPS) : 5352.59912108 ^
$Longitude (GPS) : -12246.14160144 ^
$Latitude (DEG) : 53.87665176 ^
$Longitude (DEG) : -122.76902008 ^
$Height (meters): 675.79998779 ^
$=====^
$Movement (meters): -111059.95 ^
$=====^
```

#### 4.4.7 Timers



Clicking on the Timers button will show how much time before the next transmission is allowed and when the time will be saved to Eeprom.

```
$=====^
$Timer Transmission: 1800 ^
$Timer EEPROM Save: 245 ^
$=====^
```

#### 4.4.8 EEPROM CLEAR / RESET CPU

To reset the parameters or to reset the CPU, click on the EEPROM CLEAR tab and click set.

The device will then clear all parameters from memory and restart the unit. The dialogue box will respond with the initialize screen. (Partial screen shown)

```
CMD ... [PASS]
$
$=====^
$----- CEID -----^
$-----^
$ WELCOME TO GL2000 COMMAND INTERFACE ^
$-----^
$Modem Configuration: ^
$Modem Init ==> SUCCESS ^
$ID ==> 353544 ^
$RF CHAN ==> A ^
$NUM TRIES ==> 3 ^
$MIN TX BET INT [seconds] ==> 300 ^
$MAX TX BET INT [seconds] ==> 600 ^
$-----^
$Mode: IDLE ^
$=====^
```

#### 4.4.9 Clear Pending Data

To clear pending transmission data from the GL2100 go to the Clear Pending Data tab and click the button.

The dialogue box will respond with **CMD ... [PASS]**

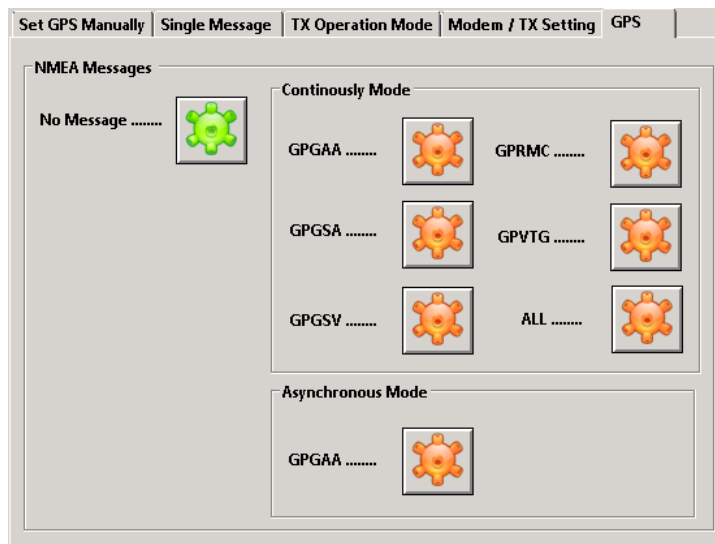
#### 4.4.10 Reset Timer to Transmit

To reset the minimum time between transmission on the GL2100 go to the Reset Timer to Transmit tab and click the button.

The dialogue box will respond with **CMD ... [PASS]**

## 5.0 GPS Tab

There are several modes for receiving GPS data from the GL2100.



### 5.1 No message.

Clicking this button will disable streaming of NMEA Messages

### 5.2 GPGAA (Updates)

```
$GPGGA,030321.000,5352.5968,N,12246.1456,W,1.05,2.3,662.7,M,-14.8,M,0.0000'
```

### 5.3 GPGSA (Updates)

```
CMD ... [PASS]  
$GPGSA,A,3,04,10,02,12,,,,,,,,,5.3,4.2,3.2'
```

### 5.4 GPGSV (Updates)

```
CMD ... [PASS]  
$GPGSV,3,2,10,10,39,091,22.05,32.139,27.31,24,304,17,04,16,057,36'
```

### 5.5 GPRMC

```
CMD ... [PASS]  
$GPRMC,030802.000,A,5352.5885,N,12246.1392,W,0.39,306.45,100810,,,A'
```

### 5.6 GPVTG

Screen shot of GPVTG

### 5.7 All

This will continuously update all the NMEA messages available to the GL2100.

### 5.8 GPGAA (Asynchronous Mode)

Clicking this button will verify valid GPS data and update the current position in the settings.

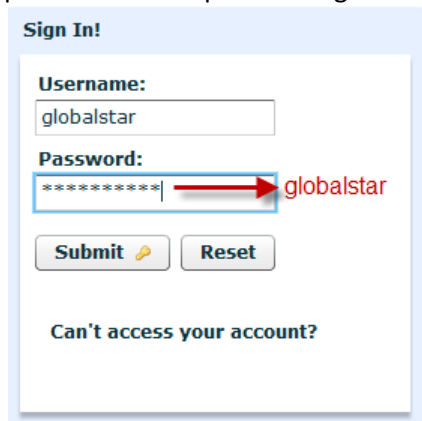
```
CMD ... [PASS]  
GPS ... [VALID GPS DATA]
```



## 6.0 Database

### 6.1 Location


The database is located at <http://174.143.146.92/app/Application.html> A username / password are required to log in. The username and password is globalstar



The image shows a 'Sign In!' form with a light blue border. It contains two input fields: 'Username:' with the text 'globalstar' and 'Password:' with masked characters '\*\*\*\*\*'. A red arrow points from the password field to the text 'globalstar' on the right. Below the fields are 'Submit' and 'Reset' buttons. At the bottom, there is a link that says 'Can't access your account?'.

### 6.2 STU Messages


The STU Messages tab contains the payload data sent from the device

STU Messages		
STU Message Log	Provisioning Messages	Provisioning Message Log
		
ESN	Payload	Time Stamp
0_353988	0xBBBBBBBBBBBBBBBB	2010-02-06 02:52:44

The units Electronic Serial Number, Payload and Time Stamp are all recorded in the database

### 6.3 STU Message Log

The STU Message Log contains the Globalstar Message ID and if the message was successful

STU Message Log				
STU Messages	STU Message Log	Provisioning Messages	Provisioning Message Log	
				
Message ID	Number of STU(s)	Time Stamp	Status (0 - fail, 1 - success)	Error
cc27f248da6a100488e8e83dd945aa16	1	2010-02-06 02:52:44	1	


### 6.4 Provisioning Message

The Provisioning Message tab is the message sent from Globalstar when the device is registered.

Provisioning Message						
STU Messages	STU Message Log	Provisioning Messages	Provisioning Message Log			
						
ESN	tStart	tEnd	txRetryMinSec	txRetryMaxsec	txRetries	rfChannel
0_353988	00:00:00	23:00:00	300	600	2	A

### 6.5 Provisioning Message Log

The Provisioning Message Log tab allows xxx

Provisioning Message Log				
STU Messages	STU Message Log	Provisioning Messages	Provisioning Message Log	
				
Provisioning Message ID	Number of Provisioning Message(s)	Time Stamp	Status (0 - fail, 1 - success)	Error
de8d8800da2c10048311e83dd945aa16	1	2010-02-03 00:59:51	1	

## 7.0 Unit Specifications

Physical Specifications	
<b>Housing</b>	
Dimensions (l x w x h)	4.543" L x 3.559" W x 2.181" H (115.39mm x 90.40mm x 55.40mm)