



S320 GNSS Receiver
Quick Reference Guide
Part No. 875-0300-000 Rev A1

Hemisphere
GPS

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.

Environmental

Temperature – operating	-30C to +65C
Temperature – storage	-40C to +85C
Humidity	MIL-STD-810F Method 5-74
Vibration	MIL-STD-810F FIG. 514.5C-1
Loose cargo	MIL-STD-810F FIG. 514.5C-5

Regulatory Compliance

CE Compliance

- EN 301 489-1 v1.8.1
- EN 301 489-3 v1.4.1
- EN 301 489-7 v1.3.1

FCC Compliance

- FCC Part 15 Subpart B
- FCC Part 22
- FCC Part 24

IC Compliance

- RSS210
- RSS132 Issue 2
- RSS133 Issue 5

Certifications

- FCC ID: ZC8S320
- IC: 9586A-S320

Contains Bluetooth Module:

- FCC ID: ED9LMX9838
- IC: 1520A-LMX9838

Contains UHF radio module:

- If 900MHz
FCC ID: NS908P24IC: 3143A-08P24
- If 400MHz
FCC ID: NS909P30IC: 3143A-09P30

USA- Federal Communication Commission (FCC)

Radiofrequency radiation exposure Information:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

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

Modifications not expressly approved by Hemisphere GPS could void the user's authority to operate the equipment.

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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of 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. If not installed and used in accordance with the instructions, it 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 tuning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

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

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

Caution: Exposure to Radio Frequency Radiation.

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

Canada - Industry Canada (IC)

This device complies with RSS 210 of Industry Canada. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

L' utilisation de ce dispositif est autorisée seulement aux conditions suivantes : (1) il ne doit pas produire d'interférence et (2) l' utilisateur du dispositif doit être prêt à accepter toute interférence radioélectrique reçue, m?me si celle-ci est susceptible de compromettre le fonctionnement du dispositif.

Caution: Exposure to Radio Frequency Radiation.

The installer of this radio equipment must ensure that the antenna is located or pointed such that it does not emit RF field in excess of Health Canada limits for the general population; consult Safety Code 6, obtainable from Health Canada's website <http://www.hc-sc.gc.ca/rpb>.

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Hemisphere GPS Precision GPS Applications

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The Outback S™ and S-Lite™ automated navigation and steering guide systems are covered by U.S. Patents No. 6,539,303 and No. 6,711,501. The Outback Hitch™ automated hitch control system is covered by U.S. Patent No. 6,631,916. The Outback eDriveTC™ GPS assisted steering system is covered by U.S. Patent No. 7,142,956. Hemisphere GPS products may be covered by one or more of the following U.S. Patents:

6,111,549	6,397,147	6,469,663	6,501,346	6,539,303
6,549,091	6,631,916	6,711,501	6,744,404	6,865,465
6,876,920	7,142,956	7,162,348	7,277,792	7,292,185
7,292,186	7,373,231	7,400,956	7,400,294	7,388,539
7,429,952	7,437,230	7,460,942		

Other U.S. and foreign patents pending.

Notice to Customers

Contact your local dealer for technical assistance. To find the authorized dealer near you, contact us at:

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Calgary, Alberta, Canada T2G 3C4
Phone: 403-259-3311
Fax: 403-259-8866
precision@hemispheregps.com
www.hemispheregps.com

Technical Support

For product-related questions contact Technical Support at:

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Scottsdale, AZ 85258 USA
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Fax: (480) 348-6370
techsupport@hemispheregps.com

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What's In This Guide?

This quick reference guide provides information to get you up and running quickly with your S320™ GNSS Receiver. For more detailed information on using the S320 refer to the S320 GNSS Receiver User Guide available at www.hemispheregps.com.

This guide consists of the following sections:

- “Product Overview and Features” below provides a brief description of the S320
- “Additional Documentation” below provides a link to additional S320 documentation
- “What’s Included” on page 2 describes the parts in your S320 kit
- “Ports and Connections” on page 3 provides a detailed overview of the physical specifications of the S320
- “Installing/Connecting the S320” on page 4 includes such information attaching the antenna and connecting to a power source
- “Basic S320 Setup and Configuration” on page 6 describes how to set up and configure the S320 and how to perform such basic tasks as using the control panel and swapping and charging the batteries
- “GSM Functionality” on page 19 provides information on NTRIP and SMS
- “Troubleshooting” on page 22 provides possible solutions for issues

Product Overview and Features

The S320 is an integrated GNSS survey and mapping device for mobile data collection providing differential GPS (DGPS) accuracy in a rugged, all-in-one enclosure.



Powered by Hemisphere GPS’ powerful dual-frequency Eclipse™ II OEM board, the S320 is suitable for GIS, mapping, land surveying, and construction with the following features:

- Can be mounted on a range pole or tripod and carried by a single worker
- Small and lightweight with good pole balance
- Rugged construction
- Integrated battery
- Data storage
- Radio communications
- Fully functional without the need for external cables

Additional Documentation

For more in-depth information on the S320 you can download the S320 User Guide from the Hemisphere GPS website at www.hemispheregps.com.

What's Included

The S320 is available as a single unit or two units (base/rover setup). Figure 1 shows the parts included in the single unit kit and Table 1 lists the parts included in both kits.



Figure 1: S320 single unit kit

Table 1: S320 parts list

Diagram Letter	Item	Qty (1 Unit)	Qty (2 Units)	Part Number
A	S320	1	2	804-0079-000 (400 MHz) 804-0090-000 (900 MHz)
B	Antenna bracket (for upward vertical antenna mounting)	1	2	602-1096-000
C	Antenna (model/type depends on region of use)	1	2	150-0021-000 (400 MHz) 150-0022-000 (900 MHz)
D	Power cable, external, 2-pin circular, 3 m (for base station unit)	N/A	1	054-0119-000
E	Data cable, 9-pin to 9-pin serial, USB connector, and USB receptacle	1	2	051-0258-000
F	Battery charger	1	2	427-0044-000
G	Batteries (rechargeable lithium-ion)	2	4	427-0043-000
H	SD card	1	2	750-1099-000

Table 1: S320 parts list (continued)

Diagram Letter	Item	Qty (1 Unit)	Qty (2 Units)	Part Number
Not shown	Pelican case	1	1	002-0083-000
Not shown	Quick Reference Guide (this document)	1	1	

Ports and Connections

All connections and ports are located on the bottom of the unit, as shown in Figure 2. Table 2 provides additional information about each port/connection.



Figure 2: S320 ports and connectors

Table 2: S320 ports and connections

Port	What to connect
Antenna port	External antenna (Item F in Table 1 on page 2)
Serial port	External serial devices
Data port	Data cable (Item C in Table 1 on page 2)
Power port	External power cable (Item H in Table 1 on page 2)
Mounting hole	Pole or tripod mount

Installing/Connecting the S320

This section describes how to connect the following:

- Attaching the antenna (see below)
- Connecting to a power source (see page 5)
- Setting up the unit (see page 5)

Attaching the Antenna

You can attach the antenna in one of two ways:

- Attaching the antenna directly to the antenna port on the bottom of the unit with the antenna vertical and pointing downward (left photo in Figure 3)
- Attaching the antenna bracket to the unit and then attaching the antenna to the port at the end of the bracket with the antenna vertical and pointing upward (right photo in Figure 3)



Figure 3: Antenna installation options

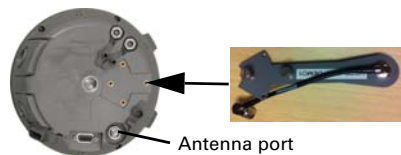
Note: The antenna bracket offers an alternative solution in situations where installing the antenna on the bottom of the unit may not provide suitable reception, such as where a small increase in antenna height has a noticeable effect on reception.

To install the antenna directly into the unit:

1. On the bottom of the unit remove the rubber cap covering the antenna port.
2. Screw the antenna into the antenna port until snug. Do not overtighten.

To install the antenna using the antenna bracket:

1. Align the bracket to fit into the recessed area on the bottom of the unit (as shown at right).
2. Using the two thumbscrews on the bracket secure the bracket to the unit. Do not overtighten.
3. Attach the bracket's antenna cable to the unit's antenna port.
4. Screw the antenna into the bracket's antenna port until snug. Do not overtighten.



Connecting to a Power Source

The S320 power cable has a two-pin circular connector at one end and two clamps at the other end (red clamp positive and black clamp negative).

Note: The power cable is included with the two-unit base/rover kit; it is not included in the single-unit kit. See Table 1 on page 2 for more information on the parts included in each kit.

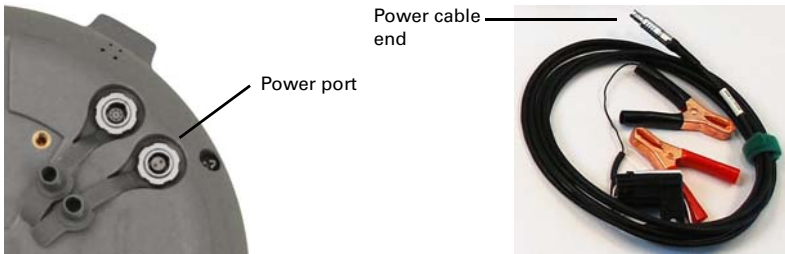


Figure 4: Connecting the power cable

To connect the power cable:

- Line up the red dot on the power cable end with the red dot on the power port and press into place.

Note: Applying external power does not charge the Li-ion batteries in the battery trays. You must use a suitable battery charger to charge the batteries.

Setting Up the Unit

Figure 5 shows a typical setup for both a base station unit and a rover unit (tripod and pole mount not included, data collector optional).

The antenna in Figure 5 is connected to the bottom of the unit; you have the option of attaching the antenna to the antenna bracket so the antenna faces upward. See "Attaching the Antenna" on page 4 for more information on attaching the antenna.



Figure 5: Typical base and rover setup

Basic S320 Setup and Configuration

This section describes how to operate the S320.

Basic operation topics are:

- "Control Panel Overview" on page 7
- "Powering the S320 On and Off" on page 8
- "Modes of Operation" on page 9
- "Displaying Current Module Status" on page 10
- "Changing Module Status" on page 11
- "Tilt Function Control" on page 12
- "Alarm/Buzzer" on page 12
- "Power and Battery Status/Charge" on page 13
- "Replacing/Swapping a Battery" on page 14
- "Removing/Inserting the SD Card / SIM Card" on page 15
- "Bluetooth Communication" on page 16
- "Upgrading S320 Firmware" on page 17

Control Panel Overview

You operate the S320 using the control panel shown in Figure 6.

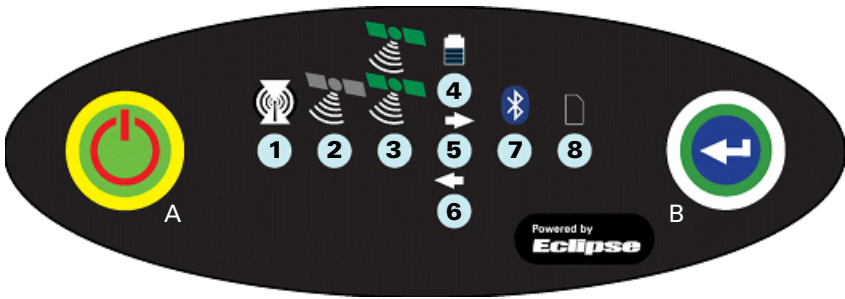


Figure 6: S320 control panel

The S320 beeps on any keypress. Table 3 describes the each button and LED of the control panel.

Table 3: S320 control panel items

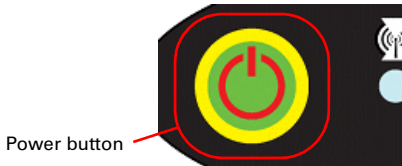
Diagram Item	Name	Description
A	Main power button	<ul style="list-style-type: none"> If unit is Off, press and hold until unit powers up (until you hear one beep) If unit is On, press and hold for approximately 3 seconds (until you hear three beeps) to turn unit off
B	Select button (for Bluetooth/UHF/GSM/SD modules)	<p>Allows you to review module status or change the status (power on/off) of a module</p> <p>See “Displaying Current Module Status” on page 10 and “Changing Module Status” on page 11 for more information on the Select button.</p>
1	UHF/GSM radio status	<ul style="list-style-type: none"> Off – UHF radio or GSM module is OFF; or no RTK position computed On (yellow) – floating point RTK position achieved On (green) – fixed ambiguity RTK position achieved Blink (green) – UHF radio or GSM module transmitting/receiving data Pulse (red) – error condition with UHF radio or GSM module
2	GPS position indicator	<ul style="list-style-type: none"> Off – no position On (yellow) – valid position Blink (yellow) – operating as a base station and converging on reference coordinates
3	DGPS position indicator	<ul style="list-style-type: none"> Off – no differential corrections available On (green) – differentially corrected position computed

Table 3: S320 control panel items (continued)

Diagram Item	Name	Description
4	External power status	<ul style="list-style-type: none">• Off – external power not present• On (red) – external power present and in use
5 and 6	Battery status	<ul style="list-style-type: none">• Off – battery not present• On (green) – battery charge full• On (yellow) – battery charge < 50%• On (red) – battery charge depleted• Blink – battery in use
7	Bluetooth status	<ul style="list-style-type: none">• Off – Bluetooth inactive• On (blue) – active Bluetooth connection• Blink (blue) - Bluetooth active and transmitting/receiving data
8	SD logging status	<ul style="list-style-type: none">• Off – SD card not inserted• On (yellow) – SD card inserted, not logging data• Blink (yellow) - SD card inserted and reading/writing data to SD card• Pulse (yellow) at 5 Hz - SD card inserted and low free space

Powering the S320 On and Off

Use the Power button to power the S320 on and off.



To power on the S320:

- Press and hold the power button until the S320 powers up (until you hear one beep)

To power off the S320:

- Press and hold the power button for 3 seconds (until you hear 3 beeps)

Note: When you power on the S320 the LEDs go through a 'heartbeat' sequence (each LED lights up in succession); during this time the modules power up and the devices initialize.

Modes of Operation

Table 4 lists the modes of operation for the S320.

Table 4: S320 modes of operation

Mode Description	Eclipse Software	GSM Mode	UHF Mode	Bluetooth Mode
OmniSTAR rover	SBASRTKB	OFF	OFF	ON or OFF
Single point data collection for post processing	SBASRTKB	OFF	OFF	ON or OFF
RTK Base Station	SBASRTKB	OFF	ON	ON or OFF
RTK Rover - UHF	RTK	OFF	ON	ON or OFF
RTK Rover - GSM	RTK	ON	OFF	ON or OFF
RTK Rover - External corrections via Bluetooth	RTK	OFF	OFF	ON (both ports - one monitor, one diff input)
RTK Rover - External serial corrections	RTK	OFF	OFF	ON or OFF

You can quickly review and/or change the GSM, UHF, and Bluetooth states using the Power and Select buttons.

Displaying Current Module Status

The S320 allows you to quickly review the status of each module (UHF/GSM, mode of operation, Bluetooth, and SD card logging).
















To display current module status:

- Press the Select button

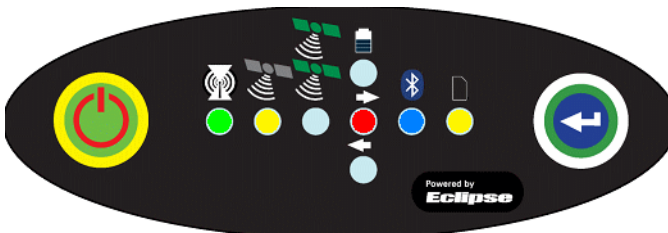
The LED of each module will be either OFF (module powered off) or ON (LED illuminated, module powered on).

Table 5 illustrates the colors of the LEDs for each module.

Table 5: Module status LED color descriptions

LED	LED Color	S320 Operation
 UHF/GSM	 Off	UHF radio and GSM module both off
	 Green	UHF radio on
	 Yellow	GSM module on
 GPS and DGPS position indicators	 Off (both)	OmniSTAR
	 GPS Yellow DGPS None	RTK rover
	 GPS None DGPS Green	RTK base
	 GPS Yellow DGPS Green	e-Dif
 Bluetooth	 Off	Bluetooth off
	 Blue	Bluetooth on
 SD card logging	 Off	SD card logging off
	 Yellow	SD card logging on

For example, in the figure below the UHF radio is on, the unit is in RTK Rover mode, Bluetooth is active, and SD card logging is on.



Changing Module Status

You change module status by using the Select button to select the module and the Power button to change the module status.

To change module status:

1. Press the Select button to display the status of all modules (if the LED is on, the module is on; if the LED is off, the module is off).
2. Press Select again to select the first module (UHF/GSM).

Note: When you press the Select button the LED (for the module status you are changing) remains illuminated for 5 seconds, during which time you can use the Power button to change the module status in step 3.

3. If you want to change the current module's status, press the Power button.

Note: When you press the Power button the LED (for the module status you are changing) blinks 5 times to indicate a status change.

4. Repeat steps 2 and 3 for each remaining module (if desired).

After a status change, the function of the LEDs return to normal mode.

Tilt Function Control

The S320 includes tilt control functionality that allows you to level your unit based using five of the LED indicators.

To activate tilt control functionality:

- Press the Power button and Select button at the same time. The tilt of the unit is displayed for a period of 1 minute or until you deactivate tilt control functionality

To deactivate tilt control functionality (return to normal operation):

- Press the Power button and Select button at the same time.

When tilt control functionality is activated:

- X-axis tilt is displayed along three horizontal LEDs
- Y-axis tilt is displayed along three vertical LEDs
- Each LED shows a 0.5° tilt (user-configurable)

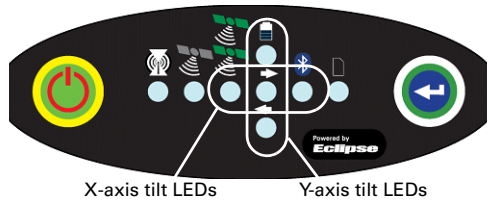


Table 6 illustrates the colors of the LEDs depending on the tilt direction of the unit.

Table 6: Tilt control LED colors

LED Colors	Meaning
<p>Left LED is green Right LED is green</p>	<p>Unit is off level to the left Unit is off level to the right</p>
<p>Left LED is green and middle LED is red Right LED is green and middle LED is red</p>	<p>Unit is off level to the left by more than twice the configurable amount Unit is off level to the right by more than twice the configurable amount</p>
<p>Top LED is red Bottom LED is red</p>	<p>Unit is tilted backward Unit is tilted forward</p>

Alarm/Buzzer

The S320 beeps under the following conditions:

- Whenever you press a button
- Position is lost
- Differential position is achieved
- Bluetooth device is connected/disconnected
- Low memory for data storage (SD card almost full)
- Both batteries are very low

If an alarm is sounding, you can silence the alarm by pressing the Power button.

Power and Battery Status/Charge

LEDs on the console provide power and battery status/charge information based on the color of the LEDs. For example, Figure 7 indicates there is no external power, the right battery is fully charged, and the left battery is not present (not in the unit).

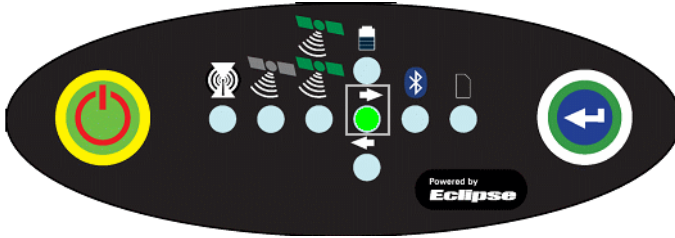











Figure 7: No external power, right battery full, left battery not present

Table 7 describes what the power/battery LED colors indicate. The S320 prioritizes power usage to use external power when available, regardless of the status of the internal batteries.

Table 7: Power/battery LED color descriptions

LED	LED Color	Meaning
 Power	 Off	No external power
	 Red	External power present and in use
 Left battery	 Off	Battery not present
 Right battery	 Red	Battery very low or fully discharged (unit will beep when both batteries are very low)
	 Yellow	Battery less than 1/2 charged
	 Green	Battery fully charged
Note: A blinking battery light indicates that battery is in use.		

Replacing/Swapping a Battery

If the S320 is off you can replace both batteries at one time. If you want to keep the unit running while replacing the batteries you must replace them one at a time to ensure the unit is receiving power from at least one battery.

To replace/swap a battery:

1. For the battery you want to replace remove the battery tray by squeezing the thumb lever and pulling.



2. Remove the battery from the tray.



3. Insert the new battery.

Note: When inserting the battery make sure the end with the leads (on top) points away from the tray.



4. Replace the tray, making sure the tray snaps into place.

Removing/Inserting the SD Card / SIM Card

The SD card and the SIM card are only accessible by first removing the appropriate battery tray, where the:

- Left tray is labeled "SD"
- Right tray is labeled "SIM"



To remove the SD card or SIM card:

1. Remove the left battery tray.
2. Place the S320 upside down (on its top) to get a better view of the card.



3. Gently push the card in; it will then snap back and slightly out.
4. Remove the card.




To insert the SD card or SIM card:

1. Place the card in its appropriate card slot.
2. Gently push the card in until it clicks.
3. Replace the battery tray.

Bluetooth Communication

If you have a Bluetooth-enabled device, such as a data collector, you can wirelessly communicate with the S320. Table 8 describes the Bluetooth status LED options.

Table 8: Bluetooth LED status

LED Colors	Meaning
 Off	Bluetooth inactive
 Blue	Active Bluetooth connection
 Blue blinking/pulsing	Active Bluetooth connection and transmitting/receiving data

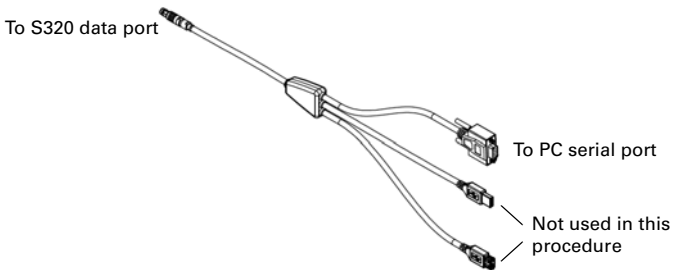
Upgrading S320 Firmware

You can upgrade S320 firmware via serial port or SD card.

Upgrading S320 Firmware via Serial Port

Before you upgrade verify the S320 is powered off and, if you will not be using external power, both Li-ion batteries are fully charged and inserted into the S320.

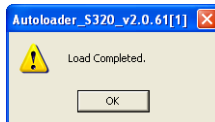
1. Download the Autoloader_S320 executable (.exe file) for the most recent version from the Hemisphere GPS website at www.hemispheregps.com and save it to your PC.
2. Using the data cable included in your S320 kit, connect the DB9 serial port end of the cable to your PC and connect the other end of the cable to the data port on the S320 (see below):



3. Power on the S320.
4. Double-click the Autoloader_S320 file you download in step 1 to start the Autoloader program.
5. In the Com Port drop-down box select the appropriate COM port on your PC and then click **Load**.



The Status area shows the load progress. When loading is complete the following message appears.



6. Click **OK**.
7. In the Autoloader window click **Exit**.

Upgrading S320 Firmware via SD Card

Before you upgrade verify the S320 is powered off and, if you will not be using external power, both Li-ion batteries are fully charged and inserted into the S320.

1. Download the S320_Upgrade.zip file from the Hemisphere GPS website at www.hemispheregps.com and save it to your PC.
2. Unzip the file and extract the contents to the root folder of the SD card, ensuring the same folder structure of the contents on the SD card.
3. Remove the SD card from the PC.
4. If necessary remove the left battery tray from the S320 (the left tray is labeled SD).



5. Insert the SD card into the S320 (see “Removing/Inserting the SD Card / SIM Card” on page 15).
6. Replace the battery tray.
7. Power on the S320.
 - a. The LEDs cycle from left to right while the receiver is reading the upgrade file.
 - b. After the file has passed all internal verifications, the bottom battery LED illuminates green.
 - c. The LEDs cycle from left to right while the file is copied.
 - d. All the LEDs flash quickly to indicate the new firmware file is being committed to the receiver.
 - e. After committing the new file to internal flash, the LEDs cycle from left to right one more time before resetting the receiver and returning to the heartbeat sequence.

The upgrade is complete.

GSM Functionality

This section provides advanced GSM information that requires connection to a PC running either Hemisphere GPS' PocketMax utility or a terminal program such as HyperTerminal.

This section covers the following topics:

- GSM overview
- GSM modes
- Configuring GSM for NTRIP
- SMS messaging

GSM Overview

Global System for Mobile Communications (GSM) is a network technology for mobile phone communications. The GSM modem in the S320 is what allows you to connect to a GSM carrier.

The Access Point Name (APN) is a protocol that allows the S320 to access the internet using the mobile phone network. It is a configurable network identifier used when connecting to a GSM carrier. The default APNCFG value is "internet.com". The specific APN required by the S320 depends on your mobile carrier. Check with your mobile provider for details.

GSM Modes

The GSM module operates in three modes:

- IDLE - Default mode for the module. In this state, the GSM module only attempts to register on the network.
- DIRECT IP - For users who have direct access to a server providing differential corrections.
- NTRIP - Used to provide differential correction information to the GPS receiver.

Configuring GSM for NTRIP

NTRIP (Networked Transport of RTCM via Internet Protocol) is the protocol for transmitting GNSS data over the internet.

Note: To configure NTRIP you must connect the S320 to a PC running either Hemisphere GPS' PocketMax utility or a terminal program such as HyperTerminal.

To configure NTRIP send the following command:

```
$GSMCFG,NTRIP,[remote host name or IP address],[port number],[mount point name],[[username],[password]]
```

where,

- Remote host name - server name (such as www.igs-ip.net) or an IP address
- Mount point name - caster stream name from NTRIP Caster Source Table (you can download a sample source table from <http://www.igs-ip.net:2101/>). If you leave this field blank, the S320 will fetch the caster source table and select the mount point closest to its current position.

- User name and password - authentication with a user name and password is required for most NTRIP casters. You can leave both blank to specify that no authentication is required. The user name and password are case sensitive.

For example, to connect to the CALG0 stream on igs-ip.net send the following command:

```
$GSMCFG,NRTIP,www.igs-ip.net,2101,CALG0,Usrnam,passwd
```

Configuring SMS Messaging

The S320 supports Short Message Service (SMS) configuration and event updates for both base and rover operations.

Note: The GSM module must be powered on for SMS commands to work correctly.

You can send SMS messages to the S320 from up to three numbers and these numbers must be added to S320 approved numbers list.

Note: By default the approved numbers list is comprised of the first three entries in the SIM card address book. However, for a typical data-only SIM card, the address book of the SIM card will be empty.

Adding or Overwriting a Number on the Approved Number List

You can add a number to an empty slot or overwrite an existing number using the following command:

```
$JSMS,CONFIG,[slot number 1/2/3],[number],[name],[status messages ON | OFF]
```

For example, to add "Service" (999-555-1212) to slot 1 with status messages OFF (or to replace the current number in slot 1) send the following command:

```
$JSMS,CONFIG,1,9995551212,Service,OFF
```

The status message state (ON or OFF) allows the S320 to send an SMS back to the number to report information and events on the operation of the unit.

Displaying the Current List of Approved Numbers

To display the current list of approved numbers send the following command:

```
$JSMS,CONFIG
```

The reply below contains all information on the configured numbers and may include SIM card address book defaults that you can overwrite with your own information.

```
$>JSMS,CONFIG,1,1,9995551212,Service,OFF
```

The format of the reply is:

```
$>JSMS,CONFIG,[number of approved numbers],[slot number 1/2/3],[number],[name],[status messages ON | OFF]
```

Note: The reply contains one line for each number. For example, if there are two approved numbers then the reply will contain a "\$>JSMS,CONFIG" line for each number.

Deleting a Number from the Approved Number List

To delete a number from the approved number list, send the following command:

```
$JSMS,CONFIG,[1/2/3 or keyword ALL],DELETE
```

For example, to delete the number in slot 2 send the following command:

```
$JSMS,CONFIG,2,DELETE
```

And to delete all numbers from the list, send the following command:

```
$JSMS,CONFIG,ALL,DELETE
```

Sending an SMS Message to an Approved Number

To send an SMS message to an approved number, send the following command:

```
$JSMS,SEND,[name or phone number or slot number],[message]
```

For example, to send a "This is a test" message to Customer Support (phone number 480-348-9919, slot number 2) you can send either of the following commands:

```
$JSMS,SEND,SERVICE,This is a test
```

```
$JSMS,SEND,4803489919,This is a test
```

```
$JSMS,SEND,2,This is a test
```

Note: For more information on SMS capabilities, refer to the S320 User Guide available from the Hemisphere GPS website at www.hemispheregps.com.

Troubleshooting

Table 9 provides troubleshooting tips for the S320.

Table 9: S320 troubleshooting

Issue	Possible Resolution
Receiver fails to power	<ul style="list-style-type: none"> • External Power is low • Check charge on external battery and the fuse on the power cable if applicable • Internal Power: Check charge on internal batteries • Check all power cables and pins • Try other batteries or cables • Make sure to hold the power button down for a minimum of one full second to turn on • Ensure batteries are installed with contacts pointed in the correct direction
No data logged 1. No communication 2. No valid data	<ul style="list-style-type: none"> • (1) Check receiver power status • (2) Verify it is locked to a valid DGPS signal • (2) Verify that it is locked to 4 or more GPS satellites • (2) Check integrity and connectivity of power and data cable connections • Verify that the baud rate settings match • If trying to connect over Bluetooth, ensure Bluetooth module is powered ON and device is paired prior to opening the port
Random binary data from Eclipse OEM board	<ul style="list-style-type: none"> • Verify that the RCTM or the Bin messages are not being accidentally output (send a \$JSHOW command) • Verify that the baud rate settings match • Potentially, the volume of data requested to be output could be higher than the current baud rate supports. Try using a higher baud rate for communications
Radio Internal/External	<ul style="list-style-type: none"> • Verify antenna's view of the sky, especially toward that SBAS satellites, south in the northern hemisphere • Verify the bit error rate (BER) and lock status of SBAS satellites (this can often be done on the receiving device or by using SLXMon - monitor BER value) • Verify that the proper application is running on the Eclipse (SBASRTKB) • Set the satellite selection to automatic mode \$JFREQ,AUTO • Set the differential mode to \$JDIFF,WAAS • Ensure there is SBAS coverage in your area

Table 9: S320 troubleshooting

Issue	Possible Resolution
No DGPS position in external RTCM mode	<ul style="list-style-type: none">• Verify that the baud rate of the RTCM input port matches the baud rate of the external source• Verify the pinout between the RTCM source and the RTCM input port (the "ground" pin and pinout must be connected, and from the "transmit" from the source must connect to the "receiver" of the RTCM input port)
Non-DGPS output	<ul style="list-style-type: none">• If using RTK, ensure the receiver is properly authorized for RTK.

Technical Specifications

The following tables provide information on the technical specifications of the S320.

Table 10: GPS receiver specifications

Item	Specification
Receiver type	Dual frequency GNSS
Channels	All in view 12 L1CA GPS 12 L1P GPS 12 L2P GPS 12 L2C GPS 12 L1 GLONASS 12 L2 GLONASS 3 SBAS or 3 additional L1CA GPS 1 L-Band (OmniSTAR) Note: Some options may require a subscription.
Positioning modes	RTK, OmniSTAR (VBS/HP/XP/G2), ROX, SBAS, External RTCM, Autonomous
RTK formats	CMR, CMR+, RTCM3
OmniSTAR formats	VBS/HP/XP,G2
Update rate / recording interval	Selectable from 1, 2, 4, 5, 10 Hz (20 Hz available)
Static performance	Horizontal 5 mm + 0.5 ppm
Cold start time	< 60 s typical (no almanac or RTC)

Table 11: Performance specifications

Item	Specification
Static performance	Horizontal 5 mm + 0.5 ppm
DGPS performance	< 0.3 m

Table 12: Horizontal accuracy specifications

Item	Description	
	RMS (67%)	2DRMS (95%)
RTK ^{1,2}	10 mm + 1 ppm	20 mm + 2 ppm
OmniSTAR HP ^{1,3}	0.1 m	0.2 m
SBAS (WAAS) ¹	0.3 m	0.6 m
Autonomous, no SA ¹	1.2 m	2.5 m

Table 13: Communication and port specifications

Item	Description
Bluetooth	Dual port
Radio GSM options	Integrated 1 x GSM/GPRS 1 x SS (900 MHz or UHF range: 400 MHz) CDMA capable
Baud rates	4800 - 115200
Serial ports	1 x RS-232 (9-pin circular, multi use) 1 x RS-232 (9-pin DSUB)
Power port	1 x Power input (2-pin circular)
USB	1 USB Host 1 USB Device (9-pin circular)

Table 14: Environmental specifications

Item	Specification
Operating temperature	-30°C to +65°C (-22°F to +149°F)
Storage temperature	-40°C to +85°C (-40°F to +185°F)
Humidity	Up to 100% condensing
Enclosure	IP67
Shock	EP455, 2 m (6.56 ft) pole drop

Table 15: Power specifications

Item	Specification
Battery	2 x lithium ion, 2.6 Ah each, 5.2 Ah total, 7.2 V
External voltage	9 to 32 VDC

Table 16: Mechanical specifications

Item	Description
Dimensions	114 H x 197 D mm (4.49 H x 7.76 D in)
Weight	1.51 kg (3.33 lb)
Material	Plastic

¹ Depends on multipath environment, number of satellites in view, satellite geometry, and ionospheric activity.

² Depends also on baseline length.

³ Requires a subscription from OmniSTAR.

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