A101 Smart Antenna
User Guide
Part No. 875-0324-000 Rev B1
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.

Copyright Notice
Copyright Hemisphere GNSS, Inc. (2013). All rights reserved.

No part of this manual may be reproduced, transmitted, transcribed, stored in a retrieval system or translated into any language or computer language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual or otherwise, without the prior written permission of Hemisphere GNSS.

Trademarks
Hemisphere GPS®, the Hemisphere GPS logo, COAST™, Crescent®, Earthworks®, Eclipse™, e-Dif®, L-Dif®, miniEclipse™, PocketMAX PC™, PocketMAX™, PocketMax3™, S320™, SBX-4™, SureTrack®, Vector™, XF1™, and XF2™ are proprietary trademarks of Hemisphere GNSS, Inc. Other trademarks are the properties of their respective owners.

Patents
Hemisphere GNSS products may be covered by one or more of the following patents:

<table>
<thead>
<tr>
<th>U.S. Patents</th>
<th>Australia Patents</th>
</tr>
</thead>
<tbody>
<tr>
<td>6111549</td>
<td>2002244539</td>
</tr>
<tr>
<td>6397147</td>
<td>2002325645</td>
</tr>
<tr>
<td>6496663</td>
<td>2004320401</td>
</tr>
<tr>
<td>6501346</td>
<td>6271194</td>
</tr>
<tr>
<td>6539303</td>
<td>8307535</td>
</tr>
<tr>
<td>6549091</td>
<td>8311696</td>
</tr>
<tr>
<td>6771501</td>
<td>8334804</td>
</tr>
<tr>
<td>6744404</td>
<td>8341358</td>
</tr>
<tr>
<td>6865465</td>
<td>8190337</td>
</tr>
</tbody>
</table>

Other U.S. and foreign patents pending.

Notice to Customers
Contact your local dealer for technical assistance. To find the authorized dealer near you:
Hemisphere GNSS, Inc.
8444 N 90th Street, Suite 120
Scottsdale, AZ 85258 USA
Phone: (480) 348-9919
Fax: (480) 348-6370
precision@hemispherengps.com
www.hemispherengps.com

Technical Support
If you need to contact Hemisphere GNSS Technical Support:
Hemisphere GNSS, Inc.
8444 N 90th Street, Suite 120
Scottsdale, AZ 85258 USA
Phone: (480) 348-9919
Fax: (480) 348-6370
techsupport@hemispherengps.com

Documentation Feedback
Hemisphere GNSS is committed to the quality and continuous improvement of our products and services. We urge you to provide Hemisphere GNSS with any feedback regarding this guide by writing to the following email address: techsupport@hemispherengps.com.
Contents

Chapter 1  Introducing the A101 Smart Antenna ......... 1
  A101 Overview ............................................. 2
  Key Features ............................................... 3
  Parts List .................................................. 3
  Product Support .......................................... 3

Chapter 2  Installing the A101 ......................... 5
  Ports and Connections ............................... 6
    LED Display ............................................. 6
  Communication ......................................... 7
    Radar-Simulated Pulse Output .................. 7
    CAN ...................................................... 7
  Mounting the A101 ..................................... 8
    Selecting the Proper Antenna Location ........ 8
    Routing and Securing the Cables ............... 8
    Mounting Options .................................... 8
    Magnetic Mount ....................................... 9
    Surface Mount ........................................ 9
    Pole Mount ........................................... 9
  Powering the A101 .................................... 10
    Power Considerations ............................... 10
    Connecting to a Power Source .................... 10
  Connecting to External Devices ................ 11
  Default Parameters .................................... 11
  Configuring the A101 .................................. 12

Chapter 3  GPS Overview ............................... 13
  GPS Operation ............................................ 14
    Automatic Tracking .................................. 14
    Receiver Performance ............................... 14
    Differential Operation .............................. 14
    Automatic SBAS Tracking ......................... 14

Appendix A  Troubleshooting ......................... 15

Appendix B  Technical Specifications ............... 19

Index .......................................................... 23

End User License Agreement ........................ 25

Warranty Notice .......................................... 28
Chapter 1: Introducing the A101 Smart Antenna

A101 Overview
Key Features
Parts List
Product Support
Chapter 1: Introducing the A101 Smart Antenna

A101 Overview

The A101™ Smart Antenna offers an affordable, portable L1 GPS solution with professional level accuracy for agricultural, marine, survey, construction, GIS mapping, and other applications powered by Hemisphere GPS’ Crescent™ receiver technology.

Note: Throughout the rest of this manual, the A101 Smart Antenna is referred to simply as the A101.

The A101 allows you to focus on the job at hand with fast startup and reacquisition times as well as an easy-to-see LED status indicator for power and GPS. With a durable enclosure that houses both antenna and receiver, the A101 can be powered through various sources making it ideal for a variety of applications. Dual-serial, CAN, and pulse output options make this GPS receiver compatible with almost any interface. Mount the A101 on a variety of roving machines and vehicles for kinematic positioning and navigation applications.

The reliable positioning performance of Crescent is further enhanced through RTK and COAST™ DGPS technology. Patented COAST software enables select Hemisphere GPS receivers to utilize aging DGPS correction data during times of interference, signal blockage, and weak signal. The receiver will coast and continue to maintain sub-meter positioning for 40 minutes or more without a DGPS signal.
Chapter 1: Introducing the A101 Smart Antenna

Key Features
Key features of the A101 include:

- Centimeter-level accuracy using Crescent technology in a rugged, all-in-one enclosure
- RTK baselines of up to 5 km
- Supports CAN, NMEA 0183, NMEA 2000*, binary for communication with external devices
  * To use the A101 in a NMEA 2000 network requires NMEA certification and a NMEA2000 adapter cable
- Wide operating voltage range of 7-32 VDC, providing high transient protection for any power source
- Integrated 2D tilt sensor enables offset corrections
- 1 PPS timing output

A101 supports a variety of protocols for communicating with navigation systems, data loggers, CAN systems, and other devices. See Appendix B, “Technical Specifications” for a list of communication protocols supported by the A101 (Table B-3 on page 20) as well other technical specifications.

Parts List
Table 1-1 provides a description, quantity, and part number for each part in your kit.

Table 1-1: A101 parts list

<table>
<thead>
<tr>
<th>Part</th>
<th>Qty</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A101 Smart Antenna</td>
<td>1</td>
<td>804-0107-000</td>
</tr>
<tr>
<td>Mounting adapter (part of kit part no. 710-0111-000#)</td>
<td>1</td>
<td>676-0016-000#</td>
</tr>
<tr>
<td>Mounting adapter, low profile</td>
<td>1</td>
<td>676-0024-000#</td>
</tr>
<tr>
<td>Note: Your kit will include one of the above mounting adapters, depending on your order.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic mount</td>
<td>1</td>
<td>720-0033-00A</td>
</tr>
<tr>
<td>Note: Your kit may not include a magnetic mount.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The following accessory items are available for purchase separately for your A101.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power/data cable (single DB9), 3 m</td>
<td>1</td>
<td>051-0129-002#</td>
</tr>
<tr>
<td>Power/data cable (unterminated), 4.6 m</td>
<td>1</td>
<td>051-0169-000#</td>
</tr>
</tbody>
</table>

Product Support
If you have questions regarding the setup, configuration, or operation of A101, contact your local dealer. For additional support information see “Technical Support” on page i (just before the Contents page).
Chapter 2: Installing the A101

Ports and Connections
Communication
Mounting the A101
Powering the A101
Connecting to External Devices
Default Parameters
Configuring the A101
Chapter 2: Installing the A101

Ports and Connections

All connections and ports are located on the bottom of the unit, as shown in Figure 2-1. Table 2-1 provides additional information about each port/connection.

![Figure 2-1: A101 ports and connectors](image)

Table 2-1: A101 ports and connections

<table>
<thead>
<tr>
<th>Port/Connection</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting hole</td>
<td>Pole or tripod mount, marine 1” standard, adaptable to 5/8” (adapter in mounting kit)</td>
</tr>
<tr>
<td>Power, data port (12-pin)</td>
<td>External power/data cable; allows you to supply power to the A101 as well as communicate with external devices via CAN, NMEA 0183 serial, and binary</td>
</tr>
</tbody>
</table>

LED Display

The A101 uses a single LED (see Figure 2-1) that provides system information based on the color and pulse of the LED as follows:

- Red LED = power on
- Amber LED = GPS lock
- Green LED = DGPS position
Chapter 2: Installing the A101

Communication

The A101 supports radar-simulated pulse output and various NMEA 2000 messages.

Radar-Simulated Pulse Output

The radar-simulated pulse output provides accurate ground speed. The A101 uses pin 12 for the speed out pin. Pin 12 will output a square wave with a 50% duty cycle and the frequency of the square wave varies directly with speed. 94 Hz represents a speed of 1 m/sec (or 28.65 pulse/foot traveled).

Note: Pin 12 does not have any form of isolation or surge protection. Hemisphere GPS strongly recommends that you incorporate some form of isolation circuitry into your supporting hardware if you want to utilize the Speed Radar Pulse output.

CAN

The A101 supports a number of NMEA 2000 messages that can be transmitted on a CAN bus. Contact your Hemisphere GPS Sales Representative or Hemisphere GPS Technical Support for more information.

Note: To use the A101 in a NMEA 2000 network requires NMEA certification and a NMEA2000 adapter cable.
Mounting the A101

This section provides information on where to mount your antenna and the different mounting options available.

Selecting the Proper Antenna Location

Proper antenna placement is critical to positioning accuracy.

To select the proper antenna location:

- **Place the antenna with an unobstructed view of the sky.** An obstructed view of the sky may impair system performance. The GPS engine computes a position based on measurements from each satellite to the internal GPS receiver.
- **Mount the antenna on, or as close as possible to, the center of your point of measurement.** For example, ideal antenna placement on a vehicle is the center of the cab roof, assuming there is a clear view of the sky.
- **Position the antenna as high as possible.**

Routing and Securing the Cables

Consider the following when routing cables:

- Power/data cable must reach an appropriate power source
- Power/data cable may connect to a data storage device, computer, or other device that accepts GPS data
- Do not run cables in areas of excessive heat
- Do not expose cables to corrosive chemicals
- Do not crimp or excessively bend cables
- Do not place tension on cables
- Coil up excess cable in the cab of the vehicle or near the antenna
- Secure along the cable route using plastic tie wraps as necessary
- Do not run cables near high voltage or strong RF noise and transmitter sources

**WARNING:** Improperly installed cables near machinery may cause injury or death.

Mounting Options

The A101 allows for the following mounting options:

- Magnetic mount
- Surface mount
- Pole mount
Chapter 2: Installing the A101

**Magnetic Mount**

The magnetic mount can be screwed into the bottom of the A101 and mounts to metal surfaces. A metal disc and foam adhesive are included with each magnetic mount. Use the foam adhesive to bond the metal disc to the desired mounting location if there are no metal surfaces.

To mount the A101 using the magnetic mount:

1. Clean and dry the surface where you will attach the metal disc.
2. Remove the backing from one side of the foam adhesive and press the adhesive onto the mounting surface.
3. Remove the backing from the other side of the foam adhesive and press the metal disc onto the mounting surface, applying firm pressure to ensure good adhesion.
4. Place the magnetic mount on top of the metal disc.

**Surface Mount**

You can surface mount the A101 with four machine screws (no. 8-32).

To surface mount the A101:

1. Determine the desired location for the A101 (see “Selecting the Proper Antenna Location” on page 8).
2. Photocopy the bottom of the A101 for use as a template to plan the mounting hole locations. Use the outer four holes per your installation. If using a photocopy make sure it is scaled one-to-one with the mounting holes on the bottom of the A101.
3. Mark the mounting hole centers on the mounting surface.
4. Place the A101 over the marks to ensure the planned hole centers align with the true hole centers (adjusting as necessary).
5. Use a center punch to mark the hole centers.
6. Drill the mounting holes with a 9 mm bit appropriate for the surface.
7. Place the A101 over the mounting holes and insert the mounting screws through the bottom of the mounting surface into the A101.

---

**WARNING:** Hand tighten only. Damage resulting from overtightening is not covered by the warranty.

**Pole Mount**

The center thread on the bottom of the A101 is 1". The mounting assembly included with the A101 includes an 5/8" adapter compatible with common survey poles. Simply thread the riser/pole into the antenna until snug.

---

**WARNING:** Hand tighten only. Damage resulting from overtightening is not covered by the warranty.
Chapter 2: Installing the A101

Powering the A101

Power Considerations
The A101 accepts an input voltage of 7-32 VDC. For best performance use a clean and continuous power supply. See Table B-4 on page 21 for complete power specifications.

Connecting to a Power Source
The A101 uses a single cable for power and data input/output.

Note: A power/data cable is not supplied with the A101 but is available as an accessory item. See Table 1-1 on page 3 for a list of accessory items. The following information refers to using the accessory item cables available from Hemisphere GPS.

The antenna end of the cable is terminated with an environmentally sealed 12-pin connection and the opposite end is either DB9 or unterminated (requires field stripping and tinning).

To power the A101:
- Connect the A101 to a 12 VDC source. Selecting the right power connector will depend on your specific installation requirements.

WARNING: Do not apply a voltage higher than 32 VDC. This will damage the receiver and void the warranty.

The A101 features reverse polarity protection to prevent excessive damage if the power leads are accidentally reversed. With the application of power, the A101 automatically proceeds through an internal startup sequence; however, it is ready to communicate immediately.
Chapter 2: Installing the A101

Connecting to External Devices

Figure 2-2 shows the 12-pin power/data port pinout and Table 2-2 provides the pinout specifications.

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manual mark in</td>
</tr>
<tr>
<td>2</td>
<td>Port B Tx</td>
</tr>
<tr>
<td>3</td>
<td>Port B Rx</td>
</tr>
<tr>
<td>4</td>
<td>CAN high</td>
</tr>
<tr>
<td>5</td>
<td>Signal ground</td>
</tr>
<tr>
<td>6</td>
<td>Port A Tx</td>
</tr>
<tr>
<td>7</td>
<td>1 PPS</td>
</tr>
<tr>
<td>8</td>
<td>Port A Rx</td>
</tr>
<tr>
<td>9</td>
<td>CAN low</td>
</tr>
<tr>
<td>10</td>
<td>Power in (12 V)</td>
</tr>
<tr>
<td>11</td>
<td>Power ground</td>
</tr>
<tr>
<td>12</td>
<td>Speed out</td>
</tr>
</tbody>
</table>

Note: For successful communication, the baud rate of the A101 serial ports (Port A and Port B) must be set to match that of the devices to which they are connected.

Default Parameters

Table 2-3 lists the default A101 configuration.

<table>
<thead>
<tr>
<th>Setting</th>
<th>Description</th>
</tr>
</thead>
</table>
| DGPS               | Application 1: Rover  
                      Application 2: Base                                                      |
| Serial ports A and B | Baud rate: 4800, 9600, 19200, 38400, 57600, 115200 (default is 19200)     |
|                    | Data bits: 8  
                      Parity: None  
                      Stop bit: 1  
                      Interface level: RS-232                                                |
| GPS messages       | Type: Hemisphere GPS binary, NMEA 0183, NMEA 2000  
                      Update rate: 1 Hz to 20 Hz  
                      Elevation mask: 5°                                                       |
Chapter 2: Installing the A101

Configuring the A101

You can configure the A101 through the serial ports using Hemisphere GPS commands. For more information on the tilt commands below as well as other Hemisphere GPS commands refer to the Hemisphere GPS Technical Reference (go to www.hemispheregps.com and click the GPS Reference icon).

For example, you can:

- Select one of the two on-board applications:
  `$JAPP,other` or
  `$JAPP,app`

- Select the baud rate:
  `$JBAUD,r`

- Configure the setup and output of tilt commands as follows (note that all commands are preceded with `$JRELAY,PORTC`, to direct them through internal Port C):
  - `$JRELAY,PORTC,$JTILT,CALIBRATE,[RESET]`
    Output the tilt offset values for the X and Y axes. If performing a reset, ensure the A101 is on a flat surface.
  - `$JRELAY,PORTC,$JTILT,TAU,[value]`
    Output the filter constant for tilt value smoothing.
  - `$JRELAY,PORTC,$JTILT,COMPENSATION[,ON|OFF],[height offset]`
    Turn positioning tilt compensation on/off (currently only the GPGGA data log is supported for tilt compensated position output).
  - `$JRELAY,PORTC,$JASC,GPGGA,rate[,port]`
    Turn tilt compensated GPGGA message on.
  - `$JRELAY,PORTC,$JTILT,COGBIAS,[value]`
    Set a COG bias to be used in the tilt compensation algorithms (for use when the A101 is not mounted with the connector facing the forward direction of travel).
  - `$JRELAY,PORTC,$JASC,INTLT,rate[,port]` or
    `$JRELAY,PORTC,$JASC,PSAT,INTLT,rate[,port]`
    Log tilt information from the A101

- Set/query the receiver mode—serial or NMEA2000 (commands must be sent over Port A):
  - `$JRELAY,PORTC,$JQUERYMODE`
    Query the receiver for the current mode
  - `$JRELAY,PORTC,$JSERIALMODE`
    Set the receiver mode to serial
  - `$JRELAY,PORTC,$JN2KMODE`
    Set the receiver mode to NMEA2000

Note: Use the `$SAVE` command to save changes you make to the A101’s configuration for the changes to be present in subsequent power cycles.
Chapter 3: GPS Overview

GPS Operation
Differential Operation
Chapter 3: GPS Overview

This chapter describes the various modes of operation and features of your A101 and internal sensors.

For your convenience, both the GPS and differential correction of the A101 are pre-configured. The receiver will work out of the box, and for most applications, little user setup is necessary. When powered for the first time, the A101 will perform a ‘cold start’ that involves acquiring the available GPS satellites in view and the SBAS differential service.

GPS Operation

The GPS receiver is always operating, regardless of the DGPS mode of operation. The following sections describe the general operation of the A101’s internal GPS receiver.

Automatic Tracking

The A101’s internal GPS receiver automatically searches for GPS satellites, acquires the signals, and manages the navigation information required for positioning and tracking.

Receiver Performance

The A101 works by finding four or more GPS satellites in the visible sky uses information from the satellites to compute a position within 2.5 m. Since there is some error in the GPS data calculations, the A101 also tracks a differential correction. The A101 uses these corrections to improve its position accuracy to better than 0.6 m.

The two main aspects of GPS receiver performance are 1) satellite acquisition, and 2) positioning and heading calculation.

When the A101 is properly positioned, the satellites transmit coded information to the antenna on a specific frequency. This allows the receiver to calculate a range to each satellite. GPS is essentially a timing system. The ranges are calculated by timing how long it takes for the signal to reach the GPS antenna. The GPS receiver uses a complex algorithm incorporating satellite locations and ranges to each satellite to calculate the geographic location and heading. Reception of any four or more GPS signals allows the receiver to compute three-dimensional coordinates.

Differential Operation

The purpose of differential GPS (DGPS) is to remove the effects of selective availability (SA), atmospheric errors, timing errors, and satellite orbit errors, while enhancing system integrity. Autonomous positioning capabilities of the A101 will result in positioning accuracies of 2.5 m 95% of the time. In order to improve positioning quality to better than 0.6 m 95%, the A101 is able to use differential corrections received through the internal SBAS demodulator or through externally-supplied RTCM corrections (potentially from an external beacon receiver).

Automatic SBAS Tracking

The A101 automatically scans and tracks SBAS signals without the need to tune the receiver. The A101 features three-channel tracking that provides an enhanced ability to maintain a lock on an SBAS satellite when more than one satellite is in view. This redundant tracking approach results in more consistent tracking of an SBAS signal in areas where signal blockage of a satellite is possible.
Appendix A: Troubleshooting
Table A-1 provides a list of issues with possible solutions to help you troubleshoot anomalous A101 operation. Refer to Appendix B, “Technical Specifications” if necessary.

### Table A-1: Troubleshooting

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver fails to power</td>
<td>• Verify polarity of power leads</td>
</tr>
<tr>
<td></td>
<td>• Check 1.0 A in-line power cable fuse connection (only if the cable has a built in fuse)</td>
</tr>
<tr>
<td></td>
<td>• Check integrity of power cable connections</td>
</tr>
<tr>
<td></td>
<td>• Check power input voltage (7 - 32 VDC)</td>
</tr>
<tr>
<td></td>
<td>• Check current restrictions imposed by power source (maximum is 350 mA)</td>
</tr>
<tr>
<td>No data from the A101</td>
<td>• (1) Check receiver power status</td>
</tr>
<tr>
<td></td>
<td>• (2) Verify it is locked to a valid DGPS signal</td>
</tr>
<tr>
<td></td>
<td>• (2) Verify that it is locked to 4 or more GPS satellites</td>
</tr>
<tr>
<td></td>
<td>• (2) Check integrity and connectivity of power and data cable connections</td>
</tr>
<tr>
<td></td>
<td>• Verify the baud rate settings match</td>
</tr>
<tr>
<td>Random binary data from A101</td>
<td>• Verify the RCTM or the Bin messages are not being accidentally output (send a $JSHOW command)</td>
</tr>
<tr>
<td></td>
<td>• Verify the baud rate settings match</td>
</tr>
<tr>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td>No GPS lock</td>
<td>• Check integrity of antenna cable</td>
</tr>
<tr>
<td></td>
<td>• Verify antenna’s view of the sky</td>
</tr>
<tr>
<td></td>
<td>• Verify the lock status and signal to noise ratio of GPS satellites (this can often be done on the receiving device or by using PocketMax)</td>
</tr>
<tr>
<td>No SBAS</td>
<td>• Check antenna cable integrity</td>
</tr>
<tr>
<td></td>
<td>• Verify the antenna's view of the sky, especially toward SBAS satellites, south in the northern hemisphere</td>
</tr>
<tr>
<td></td>
<td>• 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)</td>
</tr>
<tr>
<td></td>
<td>• Verify the proper application is running on the antenna (SBAS)</td>
</tr>
<tr>
<td></td>
<td>• Set the satellite selection to automatic mode $JFREQ,AUTO</td>
</tr>
<tr>
<td></td>
<td>• Set the differential mode to $JDIFF,WAAS</td>
</tr>
<tr>
<td></td>
<td>• Ensure there is SBAS coverage in your area</td>
</tr>
</tbody>
</table>
### Table A-1: Troubleshooting (continued)

<table>
<thead>
<tr>
<th>Issue</th>
<th>Possible Solution</th>
</tr>
</thead>
</table>
| No DGPS position in external RTCM mode    | • Verify 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 the “transmit” from the source must connect to the “receiver” of the RTCM input port) |
| Non-DGPS output                            | • If using RTK, ensure receiver is properly authorized for RTK by sending a $JI command or a $JK command |
Appendix B: Technical Specifications
Table B-1 through Table B-6 provide the GPS sensor, horizontal accuracy, L-band sensor, communication, power, environmental, and mechanical specifications for the A101.

### Table B-1: GPS sensor specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Receiver type</td>
<td>L1 GPS</td>
</tr>
<tr>
<td>Channels</td>
<td>12 L1CA GPS&lt;br&gt;12 L1P GPS&lt;br&gt;3 SBAS or 3 additional L1CA GPS</td>
</tr>
<tr>
<td>GPS sensitivity</td>
<td>-142 dBm</td>
</tr>
<tr>
<td>SBAS tracking</td>
<td>3-channel, parallel tracking</td>
</tr>
<tr>
<td>Update rate</td>
<td>10 Hz standard, 20 Hz optional (with subscription)</td>
</tr>
<tr>
<td>Pitch/roll accuracy</td>
<td>1° using tilt sensor</td>
</tr>
<tr>
<td>Timing (1PPS) accuracy</td>
<td>20 ns</td>
</tr>
<tr>
<td>Cold start</td>
<td>&lt; 60 s typical (no almanac or RTC)</td>
</tr>
<tr>
<td>Warm start</td>
<td>&lt; 30 s typical (almanac and RTC)</td>
</tr>
<tr>
<td>Hot start</td>
<td>&lt; 10 s typical (almanac, RTC, and position)</td>
</tr>
<tr>
<td>Maximum speed</td>
<td>1,850 kph (999 kts)</td>
</tr>
<tr>
<td>Maximum altitude</td>
<td>18,288 m (60,000 ft)</td>
</tr>
</tbody>
</table>

### Table B-2: Horizontal accuracy

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMS (67%)</td>
<td>2DRMS (95%)</td>
</tr>
<tr>
<td>RTK1,2</td>
<td>10 mm+1 ppm&lt;br&gt;20 mm+2 ppm</td>
</tr>
<tr>
<td>SBAS (WAAS)1</td>
<td>0.3 m&lt;br&gt;0.6 m</td>
</tr>
<tr>
<td>Autonomous, no SA1</td>
<td>1.2 m&lt;br&gt;2.5 m</td>
</tr>
</tbody>
</table>

### Table B-3: Communication specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial</td>
<td>2 full-duplex RS-232, CAN</td>
</tr>
<tr>
<td>Baud rates</td>
<td>4800 - 115200</td>
</tr>
<tr>
<td>Data I/O protocol</td>
<td>NMEA 0183, NMEA 2000*, Hemisphere GPS binary&lt;br&gt;*To use the A101 in a NMEA 2000 network requires NMEA certification and a NMEA2000 adapter cable</td>
</tr>
<tr>
<td>Correction I/O protocol</td>
<td>Hemisphere GPS proprietary, RTCM v2.3 (DGPS), RTCM v3 (RTK), CMR (RTK), CMR+ (RTK)&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Timing output</td>
<td>1 PPS CMOS, active high, rising edge sync, 10 kΩ, 10 pF load</td>
</tr>
<tr>
<td>Event marker input</td>
<td>CMOS, active low, falling edge sync, 10 kΩ, 10 pF load</td>
</tr>
</tbody>
</table>
### Appendix B: Technical Specifications

#### Table B-4: Power specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input voltage</td>
<td>7-32 VDC with reverse polarity operation</td>
</tr>
<tr>
<td>Power consumption</td>
<td>&lt; 3 W @ 12 VDC typical</td>
</tr>
<tr>
<td>Current consumption</td>
<td>134 mA @ 12 VDC typical</td>
</tr>
<tr>
<td>Power isolation</td>
<td>No</td>
</tr>
<tr>
<td>Reverse polarity</td>
<td>Yes</td>
</tr>
<tr>
<td>Antenna voltage</td>
<td>Internal antenna</td>
</tr>
</tbody>
</table>

#### Table B-5: Environmental specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40°C to +70°C (-40°F to +158°F)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-40°C to +85°C (-40°F to +185°F)</td>
</tr>
<tr>
<td>Humidity</td>
<td>95% non-condensing</td>
</tr>
<tr>
<td>EMC</td>
<td>CE (ISO 14982 Emissions and Immunity), FCC Part 15, Subpart B, CISPR 22</td>
</tr>
<tr>
<td>Enclosure</td>
<td>IP67</td>
</tr>
</tbody>
</table>

#### Table B-6: Mechanical specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td>104.0 H x 145.0 D (mm)</td>
</tr>
<tr>
<td></td>
<td>4.09 H x 5.71 D (in)</td>
</tr>
<tr>
<td>Weight</td>
<td>&lt;558 g (&lt;19.7 oz)</td>
</tr>
<tr>
<td>Status indicators (LED)</td>
<td>Power, GPS lock</td>
</tr>
<tr>
<td>Power/data connector</td>
<td>12-pin male (metal)</td>
</tr>
<tr>
<td>Antenna mounting</td>
<td>1-14 UNS-2A female, 5/8-11 UNC-2B adapter, and mag-mount available</td>
</tr>
</tbody>
</table>

1. Depends on multipath environment, number of satellites in view, satellite geometry and ionospheric activity
2. Depends also on baseline length
3. Receive only, does not transmit this format
Index

Numerics
1 PPS timing accuracy 11, 20

A
antenna placement 8
automatic SBAS tracking 14
automatic tracking 14
autonomous accuracy specification 20

C
cables, routing 8
CAN 2, 3, 6, 7, 11, 20
channels specification 20
COAST 2
cold start specification 20
configuring the A101 12
connecting
to a power source 10
to external devices 11
connections 6
mounting hole 6
current consumption specification 21

D
data port 6
default parameters 11
dGPS position LED 6
differential operation 14
dimensions specification 21

E
external devices, connecting to 11

G
GPS lock LED 6
GPS operation 14

H
hot start specification 20

I
input voltage specification 21

L
LED
  DGPS position 6
  GPS lock 6

M
magnetic mount 9
maximum altitude specification 20
maximum speed specification 20
mounting
  magnetic 9
  pole 9
  surface 9
  mounting hole 6

N
NMEA 2000 messages 7

O
operating temperature specification 21

P
parts list 3
pole mount 9
ports 6
data 6
power 6
power
  connecting to a power source 10
  considerations 10
  power consumption
  specification 21
  power on LED 6

R
receiver performance 14
receiver specifications 20
  autonomous accuracy 20
  channels 20
cold start 20
current consumption 21
dimensions 21
hot start 20
input voltage 21
maximum altitude 20
maximum speed 20
operating temperature 21
power consumption 21
receiver type 20
## Index

- RTK accuracy 20
- SBAS accuracy 20
- SBAS tracking 20
- serial port 20
- storage temperature 21
- timing accuracy 20
- update rate 20
- warm start 20
- weight 21
- receiver type specification 20
- routing cables 8
- RTK accuracy specification 20

### S
- SBAS accuracy specification 20
- SBAS tracking specification 20
- serial port specification 20
- specifications, see receiver specifications 20
- storage temperature specification 21
- surface mount 9

### T
- timing accuracy specification 20

### U
- update rate specification 20

### W
- warm start specification 20
- weight specification 21
End User License Agreement

IMPORTANT. This is an agreement (the "Agreement") between you, the end purchaser ("Licensee") and Hemisphere GNSS Inc. ("Hemisphere") which permits Licensee to use the Hemisphere software (the "Software") that accompanies this Agreement. This Software may be licensed on a standalone basis or may be embedded in a Product. Please read and ensure that you understand this Agreement before installing or using the Software Update or using a Product.

In this agreement any product that has Software embedded in it at the time of sale to the Licensee shall be referred to as a ‘Product’. As well, in this Agreement, the use of a Product shall be deemed to be use of the Software which is embedded in the Product.

By installing or using the Software Update or the Product, Licensee hereby agrees to be legally bound by the terms of this Agreement. If you do not agree to these terms, (i) do not install or use the Software, and (ii) if you are installing an Update to the Software, do not install the Update and promptly destroy it.

Hemisphere provides limited warranties in relation to the Software. As well, those who use the embedded Software do so at their own risk. You should understand the importance of these and other limitations set out in this Agreement before installing or using the Software or the Product.

1. LICENSE. Hemisphere hereby grants to Licensee a non-transferable and non-exclusive license to use the Software as embedded in a Product and all Updates (collectively the "Software"), solely in binary executable form.

2. RESTRICTIONS ON USE. Licensee agrees that Licensee and its employees will not directly or indirectly, in any manner whatsoever:
   a. install or use more copies of the Software than the number of copies that have been licensed;
   b. use or install the Software in connection with any product other than the Product the Software was intended to be used or installed on as set out in the documentation that accompanies the Software.
   c. copy any of the Software or any written materials for any purpose except as part of Licensee's normal backup processes;
   d. modify or create derivative works based on the Software;
   e. sub-license, rent, lease, loan or distribute the Software;
   f. permit any third party to use the Software;
   g. use or operate Product for the benefit of any third party in any type of service outsourcing, application service, provider service or service bureau capacity;
   h. reverse engineer, decompile or disassemble the Software or otherwise reduce it to a human perceivable form;

   i. Assign this Agreement or sell or otherwise transfer the Software to any other party except as part of the sale or transfer of the whole Product.

3. UPDATES. At Hemisphere's discretion Hemisphere may make Updates available to Licensee. An update ("Update") means any update to the Software that is made available to Licensee including error corrections, enhancements and other modifications. Licensee may access, download and install Updates during the Warranty Period only. All Updates that Licensee downloads, installs or uses shall be deemed to be Software and subject to this Agreement. Hemisphere reserves the right to modify the Product without any obligation to notify, supply or install any improvements or alterations to existing Software.

4. SUPPORT. Hemisphere may make available directly or through its authorized dealers telephone and email support for the Software. Contact Hemisphere to find the authorized dealer near you. As well, Hemisphere may make available user and technical documentation regarding the Software. Hemisphere reserves the right to reduce and limit access to such support at any time.

5. BACKUPS AND RECOVERY. Licensee shall back-up all data used, created or stored by the Software on a regular basis as necessary to enable proper recovery of the data and related systems and processes in the event of a malfunction in the Software or any loss or corruption of data caused by the Software. Licensee shall assume all risks of loss or damage for any failure to comply with the foregoing.

6. OWNERSHIP. Hemisphere and its suppliers own all rights, title and interest in and to the Software and related materials, including all intellectual property rights. The Software is licensed to Licensee, not sold.

7. TRADEMARKS. "Hemisphere," "Hemisphere GPS," "Hemisphere GNSS," "Crescent," "Eclipse" and the associated logos are trademarks of Hemisphere. Other trademarks are the property of their respective owners. Licensee may not use any of these trademarks without the consent of their respective owners.

8. LIMITED WARRANTY. Hemisphere warrants solely to the Licensee, subject to the exclusions and procedures set forth herein below, that for a period of one (1) year from the original date of purchase of the Product in which it is embedded (the "Warranty Period"), the Software, under normal use and maintenance, will conform in all material respects to the documentation provided with the Software and any media will be free of defects in materials and workmanship. For any Update, Hemisphere warrants, for 90 days from performance or delivery, or for the balance of the original Warranty Period, whichever is greater, that the Update, under normal use and maintenance, will conform in all material respects to the documentation provided with the Update and any media will be free of defects in materials and workmanship. Notwithstanding the foregoing, Hemisphere does not warrant that the Software will meet Licensee's requirements or that its operation will be error free.

9. WARRANTY EXCLUSIONS. The warranty set forth in Section (8) will not apply to any deficiencies caused by (a) the Product not being used as described in the documentation supplied to Licensee, (b) the Software having been altered, modified or converted in any way by anyone other than Hemisphere approved by Hemisphere, (c) any malfunction of Licensee's equipment or other software, or (d) damage occurring in transit or due to any accident, abuse, misuse, improper installation, lightning (or other electrical discharge) or neglect other than that caused by Hemisphere. Hemisphere does not warrant or guarantee the precision or accuracy of positions obtained when using the Software (whether standalone or embedded in a Product). The Product and the Software is not intended and should not be used as the primary means of navigation or for use in safety of life applications. The potential
positioning and navigation accuracy obtainable with the Software as stated in the Product or Software documentation serves to provide only an estimate of achievable accuracy based on specifications provided by the US Department of Defense for GPS positioning and DGPS service provider performance specifications, where applicable.

10. **WARRANTY DISCLAIMER.** EXCEPT AS EXPRESSLY SET OUT IN THIS AGREEMENT, HEMISPHERE MAKES NO REPRESENTATION, WARRANTY OR CONDITION OF ANY KIND TO LICENSEE, WHETHER VERBAL OR WRITTEN AND HEREBY DISCLAIMS ALL REPRESENTATIONS, WARRANTIES AND CONDITIONS OF ANY KIND INCLUDING FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY, ACCURACY, RELIABILITY OR THAT THE USE OF THE SOFTWARE WILL BE UNINTERRUPTED OR ERROR-FREE AND HEREBY DISCLAIMS ALL REPRESENTATIONS, WARRANTIES AND CONDITIONS ARISING AS A RESULT OF CUSTOM, USAGE OR TRADE AND THOSE ARISING UNDER STATUTE.

11. **LIMITS ON WARRANTY DISCLAIMER.** Some jurisdictions do not allow the exclusion of implied warranties or conditions, so some of the above exclusions may not apply to Licensee. In that case, any implied warranties or conditions which would then otherwise arise will be limited in duration to ninety (90) days from the date of the license of the Software or the purchase of the Product. The warranties given herein give Licensee specific legal rights and Licensee may have other rights which may vary from jurisdiction to jurisdiction.

12. **CHANGE TO WARRANTY.** No employee or agent of Hemisphere is authorized to change the warranty provided or the limitation or disclaimer of warranty provisions. All such changes will only be effective if pursuant to a separate agreement signed by senior officers of the respective parties.

13. **WARRANTY CLAIM.** In the event Licensee has a warranty claim Licensee must first check for and install all Updates that are made available. The warranty will not otherwise be honored. Proof of purchase may be required. Hemisphere does not honor claims asserted after the end of the Warranty Period.

14. **LICENSEE REMEDIES.** In all cases which involve a failure of the Software to conform in any material respect to the documentation during the Warranty Period or a breach of a warranty, Hemisphere’s sole obligation and liability, and Licensee’s sole and exclusive remedy, is for Hemisphere, at Hemisphere’s option, to (a) repair the Software, (b) replace the Software with software conforming to the documentation, or (c) if Hemisphere is unable, on a reasonable commercial basis, to repair the Software or to replace the Software with conforming software, then within ninety (90) days, to terminate this Agreement and thereafter Licensee shall cease using the Software. Hemisphere will also issue a refund for the price paid by Licensee less an amount on account of amortization, calculated on a straight-line basis over a deemed useful life of three (3) years.

15. **LIMITATION OF LIABILITY.** IN NO EVENT WILL HEMISPHERE BE LIABLE TO LICENSEE FOR ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL OR INDIRECT DAMAGES INCLUDING ARISING IN RELATION TO ANY LOSS OF DATA, INCOME, REVENUE, GOODWILL OR ANTICIPATED SAVINGS EVEN IF HEMISPHERE HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH LOSS OR DAMAGE. FURTHER, IN NO EVENT WILL HEMISPHERE’S TOTAL CUMULATIVE LIABILITY HEREUNDER, FROM ALL CAUSES OF ACTION OF ANY KIND, EXCEED THE TOTAL AMOUNT PAID BY LICENSEE TO HEMISPHERE TO PURCHASE THE PRODUCT. THIS LIMITATION AND EXCLUSION OF LIABILITY IS IRRESPECTIVE OF THE CAUSE OF ACTION, INCLUDING BUT NOT LIMITED TO BREACH OF CONTRACT, NEGLIGENCE, STRICT LIABILITY, TORT, BREACH OF WARRANTY, MISREPRESENTATION OR ANY OTHER LEGAL THEORY AND WILL SURVIVE A FUNDAMENTAL BREACH.

16. **LIMITS ON LIMITATION OF LIABILITY.** Some jurisdictions do not allow for the limitation or exclusion of liability for incidental or consequential damages, so the above limitation or exclusion may not apply to Licensee and Licensee may also have other legal rights which may vary from jurisdiction to jurisdiction.

17. **BASIS OF BARGAIN.** Licensee agrees and acknowledges that Hemisphere has set its prices and the parties have entered into this Agreement in reliance on the limited warranties, warranty disclaimers and limitations of liability set forth herein, that the same reflect an agreed-to allocation of risk between the parties (including the risk that a remedy may fail of its essential purpose and cause consequential loss), and that the same forms an essential basis of the bargain between the parties. Licensee agrees and acknowledges that Hemisphere would not have been able to sell the Product at the amount charged on an economic basis without such limitations.

18. **PROPRIETARY RIGHTS INDEMNITY.** Hemisphere shall indemnify, defend and hold harmless Licensee from and against any and all actions, claims, demands, proceedings, liabilities, direct damages, judgments, settlements, fines, penalties, costs and expenses, including royalties and attorneys’ fees and related costs, in connection with or arising out of any actual infringement of any third party patent, copyright or other intellectual property right by the Software or by its use, in accordance with this Agreement and documentation, PROVIDED THAT: (a) Hemisphere has the right to assume full control over any action, claim, demand or proceeding, (b) Licensee shall promptly notify Hemisphere of any such action, claim, demand, or proceeding, and (c) Licensee shall give Hemisphere such reasonable assistance and tangible material as is reasonably available to Licensee for the defense of the action, claim, demand or proceeding. Licensee shall not settle or compromise any of same for which Hemisphere has agreed to assume responsibility without Hemisphere’s prior written consent. Licensee may, at its sole cost and expense, retain separate counsel from the counsel utilized or retained by Hemisphere.

19. **INFRINGEMENT.** If use of the Software may be enjoined due to a claim of infringement by a third party then, at its sole discretion and expense, Hemisphere may do one of the following: (a) negotiate a license or other agreement so that the Product is no longer subject to such a potential claim, (b) modify the Product so that it becomes non-infringing, provided such modification can be accomplished without materially affecting the performance and functionality of the Product, (c) replace the Software, or the Product, with non-infringing software, or product, of equal or better performance and quality, or (d) if none of the foregoing can be done on a commercially reasonable basis, terminate this license and Licensee shall stop using the Product and Hemisphere shall refund the price paid by Licensee less an amount on account of amortization, calculated on a straight-line basis over a deemed useful life of three (3) years.

The foregoing sets out the entire liability of Hemisphere and the sole obligations of Hemisphere to Licensee in respect of any claim that the Software or its use infringes any third party rights.

20. **INDEMNIFICATION.** Except in relation to an infringement action, Licensee shall indemnify and hold Hemisphere harmless from any and all claims, damages, losses, liabilities, costs and expenses (including reasonable fees of lawyers and other professionals) arising out of or in connection with Licensee’s use of the Product, whether direct or indirect, including without limiting the foregoing, loss of data, loss of profit or business interruption.
21. **TERMINATION.** Licensee may terminate this Agreement at any time without cause. Hemisphere may terminate this Agreement on 30 days notice to Licensee if Licensee fails to materially comply with each provision of this Agreement unless such default is cured within the 30 days. Any such termination by a party shall be in addition to and without prejudice to such rights and remedies as may be available, including injunction and other equitable remedies. Upon receipt by Licensee of written notice of termination from Hemisphere or termination by Licensee, Licensee shall at the end of any notice period (a) cease using the Software; and (b) return to Hemisphere (or destroy and provide a certificate of a Senior Officer attesting to such destruction) the Software and all related material and any magnetic or optical media provided to Licensee. The provisions of Sections 6, 7, 8, 9, 10, 15, 21, 26 and 27 herein shall survive the expiration or termination of this Agreement for any reason.

22. **EXPORT RESTRICTIONS.** Licensee agrees that Licensee will comply with all export control legislation of Canada, the United States, Australia and any other applicable country’s laws and regulations, whether under the Arms Export Control Act, the International Traffic in Arms Regulations, the Export Administration Regulations, the regulations of the United States Departments of Commerce, State, and Treasury, or otherwise as well as the export control legislation of all other countries.

23. **PRODUCT COMPONENTS.** The Product may contain third party components. Those third party components may be subject to additional terms and conditions. Licensee is required to agree to those terms and conditions in order to use the Product.

24. **FORCE MAJEURE EVENT.** Neither party will have the right to claim damages as a result of the other’s inability to perform or any delay in performance due to unforeseeable circumstances beyond its reasonable control, such as labor disputes, strikes, lockouts, war, riot, insurrection, epidemic, Internet virus attack, Internet failure, supplier failure, act of God, or governmental action not the fault of the non-performing party.

25. **FORUM FOR DISPUTES.** The parties agree that the courts located in the State of Arizona and the courts of appeal there from will have exclusive jurisdiction to resolve any disputes between Licensee and Hemisphere concerning this Agreement or Licensee’s use or inability to use the Software and the parties hereby irrevocably agree to attorn to the jurisdiction of those courts. Notwithstanding the foregoing, either party may apply to any court of competent jurisdiction for injunctive relief.

26. **APPLICABLE LAW.** This Agreement shall be governed by the laws of the State of Arizona, exclusive of any of its choice of law and conflicts of law jurisprudence.

27. **CISG.** The United Nations Convention on Contracts for the International Sale of Goods will not apply to this Agreement or any transaction hereunder.

28. **GENERAL.** This is the entire agreement between Licensee and Hemisphere relating to the Product and Licensee’s use of the same, and supersedes all prior, collateral or contemporaneous oral or written representations, warranties or agreements regarding the same. No amendment to or modification of this Agreement will be binding unless in writing and signed by duly authorized representatives of the parties. Any and all terms and conditions set out in any correspondence between the parties or set out in a purchase order which are different from or in addition to the terms and conditions set forth herein, shall have no application and no written notice of same shall be required. In the event that one or more of the provisions of this Agreement is found to be illegal or unenforceable, this Agreement shall not be rendered inoperative but the remaining provisions shall continue in full force and effect.
Warranty Notice

COVERED PRODUCTS: This warranty covers all products manufactured by Hemisphere GNSS and purchased by the end purchaser (the “Products”), unless otherwise specifically and expressly agreed in writing by Hemisphere GNSS.

LIMITED WARRANTY: Hemisphere GNSS warrants solely to the end purchaser of the Products, subject to the exclusions and procedures set forth below, that the Products sold to such end purchaser and its internal components shall be free, under normal use and maintenance, from defects in materials, and workmanship and will substantially conform to Hemisphere GNSS’ applicable specifications for the Product, for a period of 12 months from delivery of such Product to such end purchaser (the “Warranty Period”). Repairs and replacement components for the Products are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship, and will substantially conform to Hemisphere GNSS’ applicable specifications for the Product, for 90 days from the delivery of the warranty component for the repair, replacement, or to the end purchaser (the “Warranty Period”). Repairs and replacement components for the Products are warranted, subject to the exclusions and procedures set forth below, to be free, under normal use and maintenance, from defects in material and workmanship, and will substantially conform to Hemisphere GNSS’ applicable specifications for the Product, for 90 days from the delivery of the warranty component for the repair, replacement, or to the end purchaser (the “Warranty Period”).

EXCLUSION OF ALL OTHER WARRANTIES. The LIMITED WARRANTY shall apply only if the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GNSS’ relevant User’s Manual and Specifications, AND the Product is not modified or misused. The Product is provided “AS IS” and the implied warranties of MERCHANTABILITY and FITNESS FOR A PARTICULAR PURPOSE and ALL OTHER WARRANTIES, express, implied or arising by statute, by course of dealing or by trade usage, in connection with the design, sale, installation, service or use of any products or any component thereof, are EXCLUDED from this transaction and shall not apply to the Product. The LIMITED WARRANTY is IN LIEU OF any other warranty, express or implied, including but not limited to, any warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE, title, and non-infringement.

LIMITATION OF REMEDIES. The purchaser’s EXCLUSIVE REMEDY against Hemisphere GNSS shall be, at Hemisphere GNSS’ option, the repair or replacement of any defective Product or components thereof. The purchaser shall notify Hemisphere GNSS or a Hemisphere GNSS’ approved service center immediately of any defect. Repairs shall be made through a Hemisphere GNSS approved service center only. Repair, modification or service of Hemisphere GNSS products by any party other than a Hemisphere GNSS approved service center shall render this warranty null and void. The remedy in this paragraph shall only be applied in the event that the Product is properly and correctly installed, configured, interfaced, maintained, stored, and operated in accordance with Hemisphere GNSS’ relevant User’s Manual and Specifications, AND the Product is not modified or misused. No OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, SPECIAL, INDIRECT, INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO PURCHASER, even if Hemisphere GNSS has been advised of the possibility of such damages. Without limiting the foregoing, Hemisphere GNSS shall not be liable for any damages of any kind resulting from installation, use, quality, performance or accuracy of any Product.

HEMISPHERE IS NOT RESPONSIBLE FOR PURCHASER’S NEGLIGENCE OR UNAUTHORIZED USES OF THE PRODUCT. IN NO EVENT SHALL HEMISPHERE GNSS BE IN ANY WAY RESPONSIBLE FOR ANY DAMAGES RESULTING FROM PURCHASER’S OWN NEGLIGENCE, OR FROM OPERATION OF THE PRODUCT IN ANY WAY OTHER THAN AS SPECIFIED IN HEMISPHERE GNSS’ RELEVANT USER’S MANUAL AND SPECIFICATIONS. Hemisphere GNSS IS NOT RESPONSIBLE for defects or performance problems resulting from (1) misuse, abuse, improper installation, neglect of Product; (2) the utilization of the Product with hardware or software products, information, data, systems, interfaces or devices not made, supplied or specified by Hemisphere GNSS; (3) the operation of the Product under any specification other than, or in addition to, the specifications set forth in Hemisphere GNSS’ relevant User’s Manual and Specifications; (4) damage caused by accident or natural events, such as lightning (or other electrical discharge) or fresh/salt water immersion of Product; (5) damage occurring in transit; (6) normal wear and tear, or (7) the operation or failure of operation of any satellite-based positioning system or differential correction service, or the availability or performance of any satellite-based positioning signal or differential correction signal.

THE PURCHASER IS RESPONSIBLE FOR OPERATING THE VEHICLE SAFELY. The purchaser is solely responsible for the safe operation of the vehicle used in connection with the Product, and for maintaining proper system control settings. UNSAFE DRIVING OR SYSTEM CONTROL SETTINGS CAN RESULT IN PROPERTY DAMAGE, INJURY, OR DEATH. The purchaser is solely responsible for his/her safety and for the safety of others. The purchaser is solely responsible for maintaining control of the automated steering system at all times. THE PURCHASER IS SOLELY RESPONSIBLE FOR ENSURING THE PRODUCT IS PROPERLY AND CORRECTLY INSTALLED, CONFIGURED, INTERFACED, MAINTAINED, STORED, AND OPERATED IN ACCORDANCE WITH HEMISPHERE GNSS’ RELEVANT USER’S MANUAL AND SPECIFICATIONS. Hemisphere GNSS does not warrant or guarantee the positioning and navigation precision or accuracy obtained when using Products. Products are not intended for primary navigation or for use in safety of life applications. The potential accuracy of Products as stated in Hemisphere GNSS literature and/or Product specifications serves to provide only an estimate of achievable accuracy based on performance specifications provided by the satellite service operator (i.e. US Department of Defense in the case of GNSS) and differential correction service provider. Hemisphere GNSS reserves the right to modify Products without any obligation to notify, supply or install any improvements or alterations to existing Products.

GOVERNING LAW. This agreement and any disputes relating to, concerning or based upon the Product shall be governed by and interpreted in accordance with the laws of the State of Arizona.

OBTAINING WARRANTY SERVICE. In order to obtain warranty service, the end purchaser must bring the Product to a Hemisphere GNSS approved service center along with the end purchaser’s proof of purchase. Hemisphere GNSS does not warrant claims asserted after the end of the warranty period. For any questions regarding warranty service or to obtain information regarding the location of any of Hemisphere GNSS approved service center, contact Hemisphere GNSS at the following address:

Hemisphere GNSS
8444 W. 90th Street, Suite 120
Scottsdale, AZ 85258
Phone: 480-348-9919 Fax: 480-348-6370
technicalsupport@hemispherengs.com