



**875-0364-0**

**A222™  
Smart Antenna**

User Guide  
Revision: A3  
October 29, 2019

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## Device Compliance, License and Patents

### Device Compliance

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 product complies with the essential requirements and other relevant provisions of Directive 2014/53/EU. The declaration of conformity may be consulted at [HTTPS://HEMISPHEREGNSS.COM/ABOUT-US/QUALITY-COMMITMENT](https://hemispheregnss.com/about-us/quality-commitment).

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Patents			
6111549	6876920	7400956	8000381
6397147	7142956	7429952	8018376
6469663	7162348	7437230	8085196
6501346	7277792	7460942	8102325
6539303	7292185	7689354	8138970
6549091	7292186	7808428	8140223
6711501	7373231	7835832	8174437
6744404	7388539	7885745	8184050
6865465	7400294	7948769	8190337
8214111	8217833	8265826	8271194
8307535	8311696	8334804	RE41358

Australia Patents	
2002244539	2002325645
2004320401	

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## Device Compliance, License and Patents, Continued

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**Notice to Customers**      Contact your local dealer for technical assistance. To find the authorized dealer near you:

Hemisphere GNSS, Inc  
8515 East Anderson Drive  
Scottsdale, AZ 85255 USA  
Phone: (480) 348-6380  
Fax: (480) 270-5070  
[PRECISION@HGNS.COM](mailto:PRECISION@HGNS.COM)  
[WWW.HGNS.COM](http://WWW.HGNS.COM)

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**Technical Support**      If you need to contact Hemisphere GNSS Technical Support:

Hemisphere GNSS, Inc.  
8515 East Anderson Drive  
Scottsdale, AZ 85255 USA  
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## Terms and Definitions

**Introduction** The following table lists the terms and definitions used in this document.

### A222 terms & definitions

<b>Term</b>	<b>Definition</b>
Activation	Activation refers to a feature added through a one-time purchase. For features that require recurring fees, see <b>Subscription</b> .
Atlas	Atlas is a subscription-based service provided by Hemisphere GNSS.
BeiDou	BeiDou is a global navigation satellite system deployed and maintained by China.
DGPS/DGNSS	Differential GPS/GNSS refers to a receiver using Differential Corrections.
Elevation Mask	Elevation Mask is the minimum angle between a satellite and the horizon for the receiver to use that satellite in the solution.
Firmware	Firmware is the software loaded into the receiver that controls the functionality of the receiver and runs the GNSS engine.
GALILEO	Galileo is a global navigation satellite system deployed and maintained by the European Union and European Space Agency.
GLONASS	Global Orbiting Navigation Satellite System (GLONASS) is a Global Navigation Satellite System deployed and maintained by Russia.
GPS	Global Positioning System (GPS) is a global navigation satellite system deployed and maintained by the United States.
RTCM	Radio Technical Commission for Maritime Services (RTCM) is a standard used to define RTK message formats so that receivers from any manufacturer can be used together.

*Continued on next page*

## Terms and Definitions, Continued

**A222 terms & definitions, continued**

<b>Term</b>	<b>Definition</b>
RTK	Real-Time-Kinematic (RTK) is a real-time GNSS differential method that provides better accuracy compared to other differential corrections.
SBAS	Satellite Based Augmentation System (SBAS) is a system that provides differential corrections over satellite throughout a wide area or region.
Subscription	A subscription is a feature that is enabled for a limited time. Once the end-date of the subscription has been reached, the feature will turn off until the subscription is renewed.
WAAS	Wide Area Augmentation System (WAAS) is a satellite-based augmentation system (SBAS) that provides free differential corrections over satellite in parts of North America.

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## Chapter 1: Introduction

### Overview

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#### Introduction

This User Guide provides information to help you quickly set up your A222 Smart Antenna. You can download this manual from the Hemisphere GNSS website at [WWW.HGNSS.COM](http://WWW.HGNSS.COM).

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## Product Overview

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### Product overview

Hemisphere GNSS' all new scalable A222 was designed to excel in challenging environments, and is ideal for use with various applications, including precision agriculture, machine control, construction, mining, and marine.

The A222 is a multi-GNSS RTK, high accuracy GNSS receiver that allows you to work quickly and accurately. Built on Hemisphere GNSS' Eclipse™ platform, A222 boasts the latest GNSS patented technology and offers quick startup and reacquisition times.

The A222 can be updated by adding L1/L2 GLONASS activations and subscriptions for Athena RTK™ and/or Atlas® L-band. Athena RTK is Hemisphere's most advanced RTK processing software that can be added to the A222 as a subscription service.

**Note:** Throughout the rest of this manual, A222 Smart Antenna is referred to simply as A222.



**Figure 1-1: A222 Smart Antenna**

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## Product Overview, Continued

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### Product overview, continued

A222 is a versatile smart antenna with several first-class features:

- Utilizes Hemisphere's Athena GNSS engine
  - Atlas support over L-band corrections
  - Environment-proven enclosure for the most aggressive user scenarios
- 

### Athena RTK

Athena RTK has the following benefits:

- Improved Initialization time. Performing initializations in less than 15 seconds at better than 99.9% of the time
  - Robustness in difficult operating environments. Extremely high productivity under the most aggressive of geographic and landscape-oriented environments
  - Performance on long baselines. Industry-leading position stability for long baseline applications
  - Performance under scintillation. Sustained accuracy under ionospheric scintillation activities, in high scintillation-affected areas
  - Atlas L-band is Hemisphere's industry leading correction service, which can be added to the A222 as a subscription
- 

### Atlas L-band

Atlas L-band is Hemisphere's industry leading correction service, which can be added to the A222 as a subscription. Atlas L-band has the following benefits:

- **Positioning accuracy** - Competitive positioning accuracies down to 4 cm RMS in certain applications
  - **Positioning sustainability** - Cutting edge position quality maintenance in the absence of correction signals, using Hemisphere's patented technology
  - **Scalable service levels** - Capable of providing virtually any accuracy, precision and repeatability level in the 4 to 100 cm range
  - **Convergence time** – Industry leading convergence times of 10-40 minutes
- 

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## Product Overview, Continued

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**For more  
information**

For more information about Athena RTK, see:  
[HTTP://HGNS.COM/TECHNOLOGY](http://HGNS.COM/TECHNOLOGY)

For more information about Atlas L-band, see:  
[HTTP://HGNS.COM/ATLAS](http://HGNS.COM/ATLAS)

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## Key Features

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### **A222 Key features**

Key features of the A222 include:

- Centimeter-level accuracy using Atlas\* or Athena\*\* technology in a rugged, all-in-one enclosure (\*requires subscription \*\*requires activation)
- Improved GNSS performance—particularly with RTK and/or L-band applications
- Very fast RTK fix and reacquisition times
- Supports, NMEA 0183, NMEA 2000\*, for communication with external devices (\*requires NMEA certification)
- Wide operating voltage range of 8-32 VDC, providing high transient protection for any power source

A222 supports a variety of protocols for communicating with navigation systems, CAN systems, and other devices.

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## What's Included in Your Kit

### A222 kit

The following parts and accessory items are included with your A222 Smart Antenna.

### A222 Parts list

Table 1-1 provides the part name and description, quantity, and part number for each part in your kit.

**Table 1-1 A222 Parts list/accessory items**

Part No.	Description	Qty
804-0153-0	A222 GNSS Smart Antenna or	1
804-0155-0	A222 Unbranded GNSS Smart Antenna	1
710-0130-0	Mounting adapter, 1" to 5/8" Pole Mount	1
<p><b>Note:</b> Your kit will include one of the above mounting adapters, depending on your order.</p> <p><i>The following accessory items are available for purchase separately for your A222.</i></p>		
051-0129-002	Power/data cable (single DB9), 3 m	1
051-0169-000	Power/data cable (unterminated), 4.6 m	1

### Product support

If you have questions regarding the setup, configuration, or operation of A222, contact your local dealer. For additional support information see [Technical Support](#).

## Firmware Upgrades

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### Overview

Periodically, Hemisphere GNSS releases firmware upgrades to improve performance, fix bugs, or add new features to a product. To update the firmware on the A222:

1. Download the latest version of Hemisphere GNSS RightArm from the following link:

<HTTPS://HGNS.COM/RESOURCES-SUPPORT/SOFTWARE>.

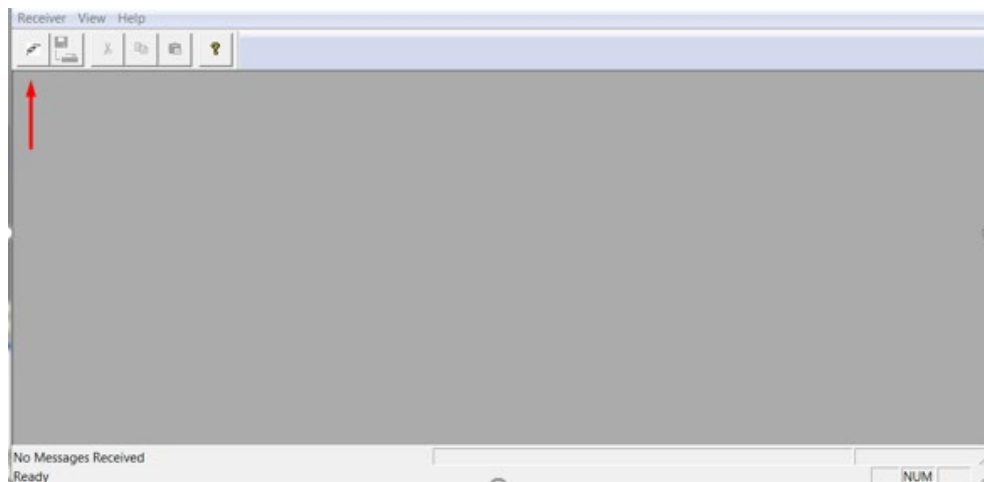
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### RightArm updates

Connect the A222 to a computer over serial. Firmware can be loaded over either serial port. Set the baud rate of the serial port you are using to 19200.

Launch RightArm.

Click the **Connect** button or navigate to Receiver -> Connect.

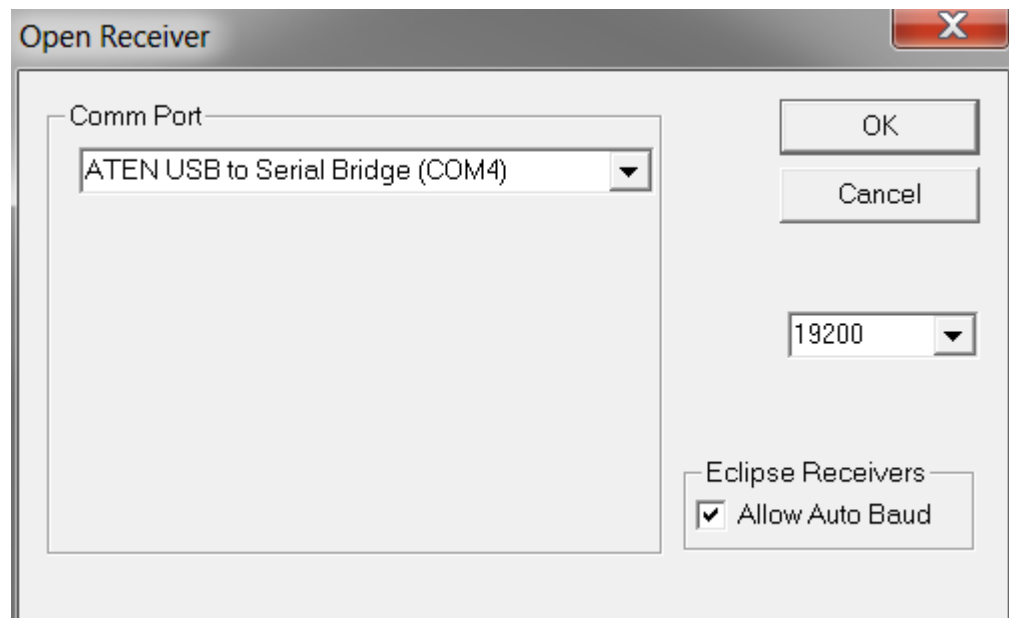


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## Firmware Upgrades, Continued

**RightArm  
updates,  
continued**

Choose the COM port connected to the A222 and click **OK**.



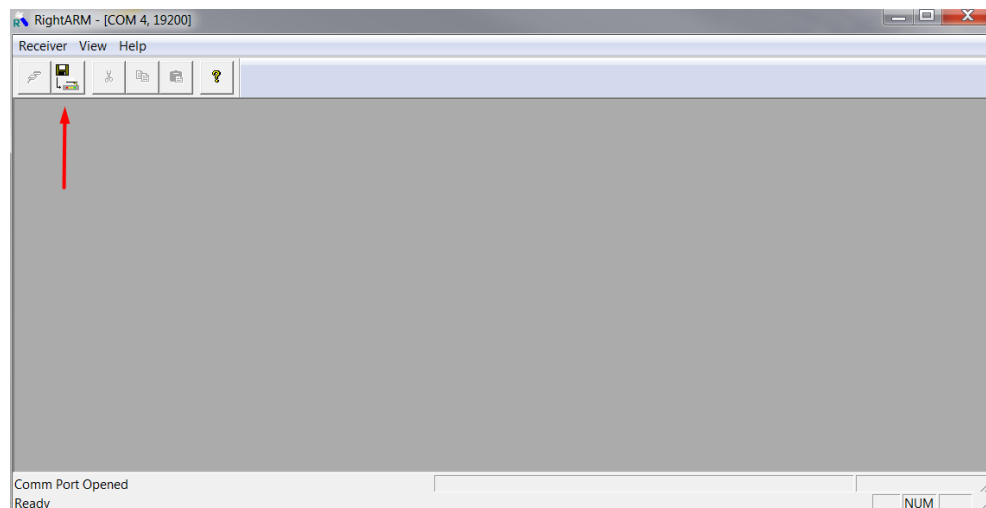
**Note:** The baud rate of the serial port should be set to 19200 bps. Select "Allow Auto Baud" to change the baud rate during the firmware upgrade for a faster update.

*Continued on next page*

## Firmware Upgrades, Continued

RightArm  
updates,  
continued

Click the **Programming** button.



Select a **Program Type**.

The A222 has two firmware applications, allowing two different versions of GNSS firmware. Hemisphere GNSS suggests loading the new firmware onto both applications.

After the firmware update is completed, check the current GNSS firmware.

If the current firmware is different from the newly loaded firmware, the A222 could be using the other application. You can switch applications by sending the following command:

`$JAPP,OTHER.`

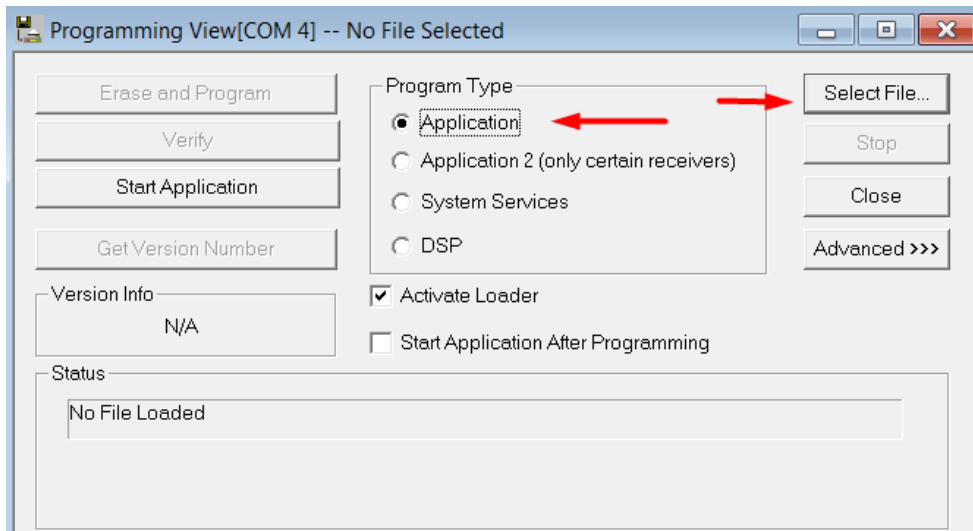
Choose the Application, and press **Select File** to select the firmware file.

*Continued on next page*



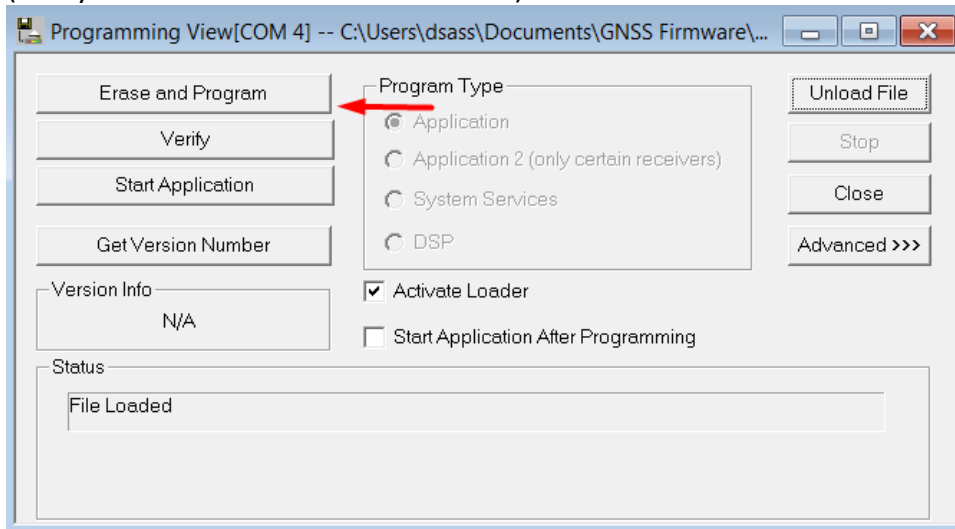
## Firmware Upgrades, Continued

RightArm updates, continued



Choose the firmware, and click **Erase and Program**.

The **Activate Loader** checkbox in the Programming View window is selected. After pressing the Erase and Program button, this checkbox will de-select, and the **Status** field indicates the receiver is in loader mode (ready to receive the new firmware file).



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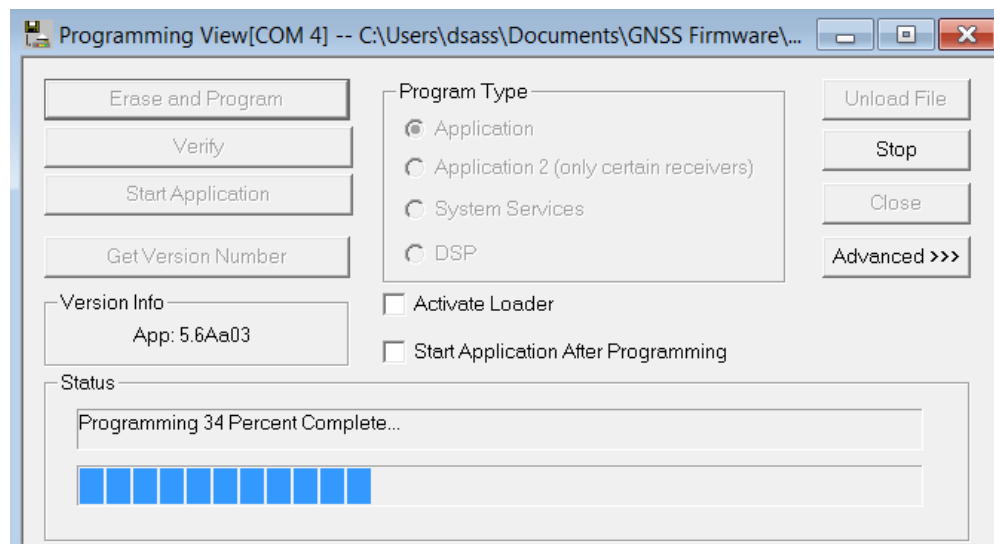
## Firmware Upgrades, Continued

**RightArm updates, continued**

**Note:** If the Activate Loader check box remains selected, power the receiver off and on. When the receiver powers back on, the Activate Loader box should be de-selected.

**⚠ WARNING:**

**Do not interrupt the power supply to the receiver, and do not interrupt the communication link between the PC and the receiver until programming is complete. Failure to do so may cause the receiver to become inoperable and will require factory repair.**



**Note:** After completing the firmware update, Hemisphere GNSS suggests repeating this process for the other application.

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## Chapter 2: Installing the A222

### Overview

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**Introduction** This chapter provides instructions on how to mount and install your A222 Smart Antenna.

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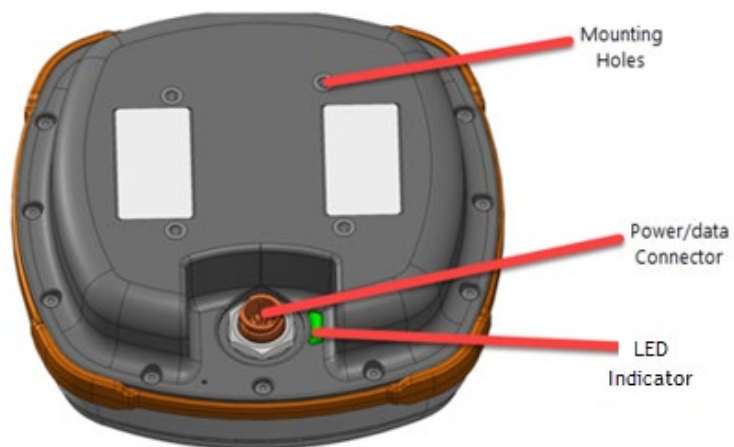
## Installing the A222

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**Introduction** This section provides information on installing the A222 Smart Antenna.

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**Display, mounting and connectors** 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: A222 Connections and Ports**

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## Installing the A222, Continued

Display,  
mounting and  
connectors,  
continued

**Table 2-1: A222 Ports and Connections**

Port/Connection	Description
Mounting holes	Four off-set mounting holes. Two adapters are available, the first includes a marine 1" standard, adaptable to 5/8". The second allows for flush-mounting the unit.
Power, data port (12-pin)	External power/data cable; allows you to supply power to A222 as well as communicate with external devices via NMEA 0183 serial, and binary.

Power/data  
cable  
considerations

Before mounting the A222, consider the following regarding power/data cable routing:

Do	Do not
Ensure cable reaches appropriate power source.	Run cables in areas of excessive heat.
Keep cable away from corrosive chemicals.	Run cables through a door or window jams.
Connect to a data storage device, computer, or other device that accepts GNSS data.	Crimp or excessively bend the cable.
Keep cable away from rotating machinery.	Place tension on the cable.
Remove unwanted slack from the cable at the A222 end.	
Secure along the cable route using plastic wrapping.	

**⚠ WARNING:**

**Improperly installed cable near machinery can be dangerous.**

## LED Indicator

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- LED Indicator** A222 uses a single LED (see Figure 2-1) that provides system information based on the color of the LED as follows:
- Blinking Red - Power on
  - Blinking Amber - GNSS position available, including RTK float and Atlas
  - Blinking Green - RTK-fixed or Atlas-converged position available
  - Blinking any color - Receiver operational

**⚠ WARNING:** If at any time the LED turns to a solid color for an extended period, the receiver has malfunctioned.

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## Mounting the A222

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**Overview** This section provides information on where to mount your antenna and the different mounting options available with the A222 Smart Antenna.

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**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 GNSS engine computes a position based on measurements from each satellite to the internal GNSS 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 GNSS 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.

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## Mounting the A222, Continued

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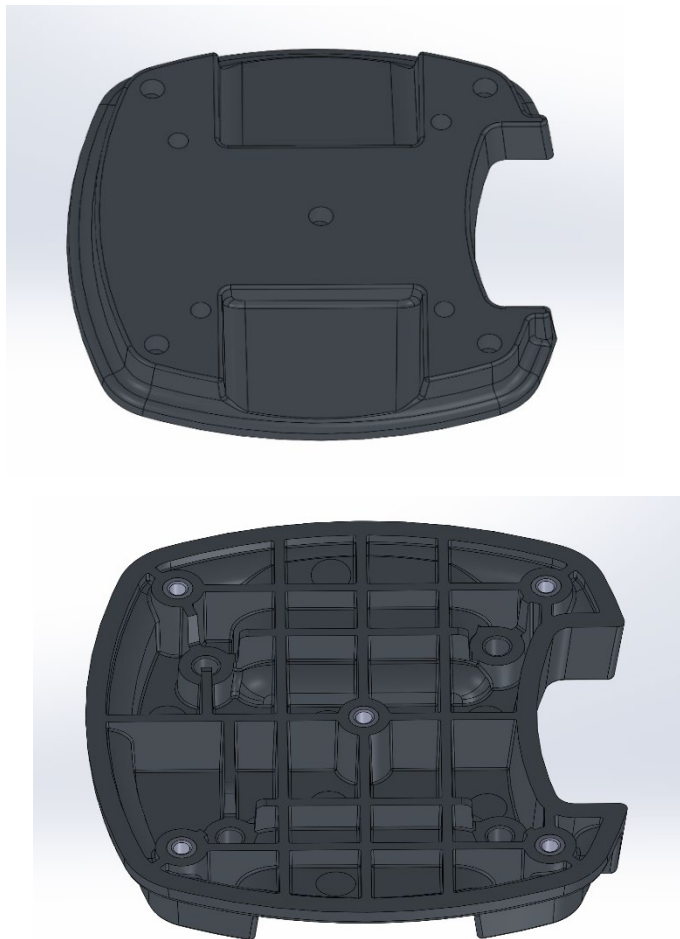
### Mounting options

A222 allows for the following mounting options:

- Surface-mount
  - Pole-mount
- 

### Surface-mount

You can surface-mount A222 with four machine screws (no. 8-32).



**Figure 2-2: A222 top/bottom**

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## Mounting the A222, Continued

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**Surface-mount, continued** To surface-mount the A222 use the following steps:

Step	Action
1	Determine the desired location for A222 (see <a href="#">Selecting the Proper Antenna Location</a> ).
2	Refer to the template of the bottom portion of the A222 surface-mount (provided with A222 accessories). Use the outer four holes per your installation.
3	Mark the mounting hole centers on the mounting surface.
4	Place A222 surface mount 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 5mm bit appropriate for the surface.
7	Use four machine screws (no. 8-32) to attach A222 to the surface mount adapter before securing the complete unit to the intended area.
8	Place A222 surface mount over the mounting holes and insert the mounting screws through the bottom of the mounting surface into A222 surface mount adapter.

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## Mounting the A222, Continued

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Surface-mount,  
continued

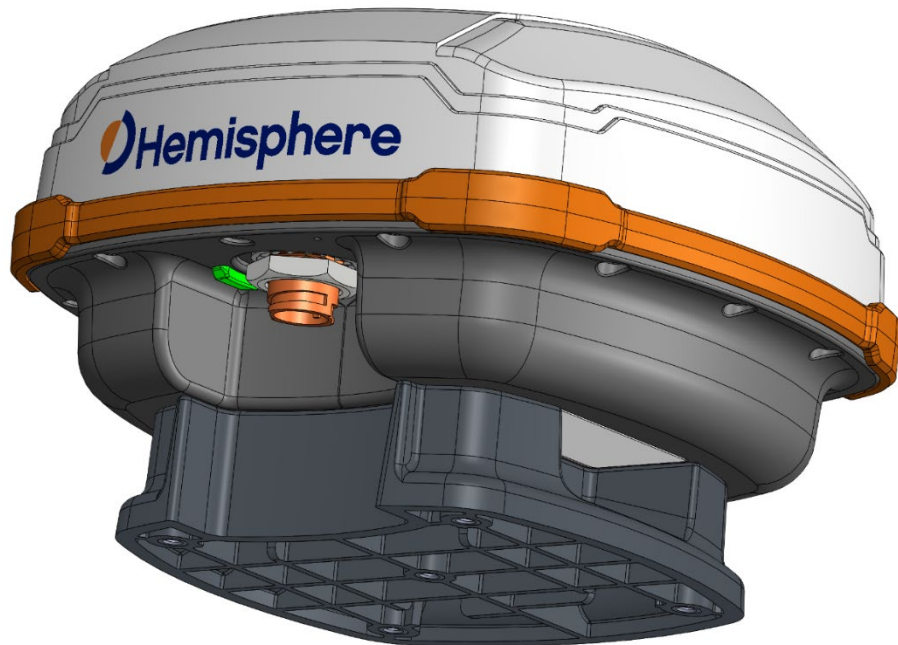


Figure 2-3: A222 Antenna with Surface Mount Accessory

**⚠ WARNING:** Hand-tighten only (10 to 12 in-lbs). Damage resulting from over-tightening is not covered by the warranty.

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## Mounting the A222, Continued

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### Pole-mount

To pole-mount the A222 use the following information:

The center thread on the bottom of A222 is 1-14 UNS. The mounting assembly included with A222 includes a 5/8-11 UNC adapter. Simply thread the riser/pole into the antenna until snug.



Figure 2-4: Pole-mount

**⚠ WARNING:** Hand-tighten only (screws 10-12 in-lbs; pole 35-40 in-lbs.).  
Damage resulting from over-tightening is not covered by the warranty.

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## Powering the A222

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### Power considerations

A222 accepts an input voltage of 8-32 VDC. For best performance use a clean and continuous power supply. When applying 12 VDC, A222 will draw 3.2W.

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### Connecting to a power source

A222 uses a single cable for power and data input/output.

**Note:** A power/data cable is not supplied with A222 but is available as an accessory item. See [Table 1-1](#) for a list of accessory items.

**Note:** The following information refers to using the accessory item cables available from Hemisphere GNSS.

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

To power A222 connect to a 12 VDC source.

**Note:** 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.

A222 features reverse polarity protection to prevent excessive damage if the power leads are accidentally reversed. With the application of power, A222 automatically proceeds through an internal startup sequence; however, it is ready to communicate immediately.

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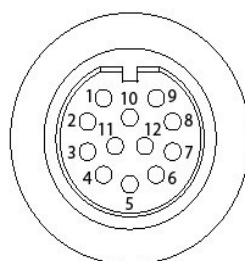
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## Powering the A222, Continued

### Power/data connector

Figure 2-5 shows the 12-pin power/data connector pinout assignments and Table 2-2 provides the pinout specifications.

**Note:** The Wire Color column in Table 2-2 refers to the color of the wires at the unterminated end of accessory item 051-0169-000 (4.6 m unterminated power/data cable).



**Figure 2-5: Pin-out assignments**

**Table 2-2: Pin-out specifications**

Pin	Description	Wire Color
1	Manual mark in	White
2	Port B Tx	Brown
3	Port B Rx	Blue
4	CAN high	Orange
5	Signal ground	Yellow
6	Port A Tx	Violet
7	1 PPS	Gray
8	Port A Rx	Pink
9	CAN low	Tan
10	Power in (12 V)	Red
11	Power ground	Black
12	Speed out	Green

**Note:** For successful communication, the baud rate of the A222 serial ports (Port A and Port B) must be set to match that of the connected devices.

## Chapter 3: Operating the A222

### Overview

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#### Introduction

This chapter explain the operations used in tracking with the A222 Smart Antenna.

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## Using A222

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### **Overview**

For your convenience, both the GNSS and differential correction of the A222 are preconfigured. The receiver will work out-of-the-box, and for most applications, little user setup is necessary.

When powered for the first time, the A222 will perform a “cold start,” which involves acquiring the available GNSS satellites in view and the SBAS differential service.

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## Differential and RTK Operation

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### Differential (DGNSS) and RTK operation

The purpose of differential GNSS (DGNSS) and RTK is to remove the effects of atmospheric errors, timing errors and satellite orbit errors, while enhancing system integrity.

Autonomous positioning capabilities of the A222 will result in positioning accuracies of 2.5m 95% of the time.

To improve positioning quality, the A222 can receive DGNSS corrections over SBAS, L-band corrections with Hemisphere GNSS' Atlas L-band technology, or RTK corrections over serial.

For more information on the differential services and the associated commands refer to the [Hemisphere GNSS Technical Reference Manual](#).

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## SBAS Tracking

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### SBAS tracking

SBAS is a standard feature on the A222 and does not require an activation or subscription code.

The A222 automatically scans and tracks SBAS signals without the need to tune the receiver.

The A222 features two-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.

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## Athena RTK

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### Athena RTK

Athena RTK requires the use of two separate receivers: a stationary base station (primary receiver) that broadcasts corrections over a wireless link to the rover (secondary receiver).

The A222 can use RTK through either serial. The receiver uses any RTK message coming in over a serial port if the RTK message type is included in the list of available differential sources.

If you do not know which RTK message type is being sent by the base station, you can include RTCM3, ROX, and CMR.

Including extra differential sources will not affect the receiver if those differential sources are not being received.

After setting the differential source configure the baud rate of the serial port receiving the RTK corrections. Ensure that the serial port configuration of the external device (such as radio or modem) is 8 bits/byte, 1 stop bit, no parity and no flow control.

Connect the external device to the serial port of the A222. Some cables may require the use of a gender changer and/or null modem adapter.

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## Supported Constellations

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### Supported constellations

A222 is available in its base form as L1 GPS, G1 GLONASS, E1 Galileo, and B1 BeiDou.

By adding multi-frequency GPS and GLONASS, the number of available signals increases – which improves RTK robustness.

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## Default Parameters

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### Default parameters

The following table lists the A222 default parameters:

Setting	Description
DGNSS	<b>Application:</b> Newest GNSS FW found at <a href="http://WWW.HGNSS.COM">WWW.HGNSS.COM</a>
Serial ports A and B	<b>Baud rate:</b> 4800, 9600, 19200, 57600, 115200 <b>Data bits:</b> 8 <b>Parity:</b> None <b>Stop bit:</b> 1 <b>Interface level:</b> RS-232
GNSS messages	<b>Type:</b> Hemisphere GNSS binary, NMEA 0183, NMEA 2000 <b>Update rate:</b> 1 Hz to 20 Hz* <b>Max DGNSS age:</b> 259,200 sec <b>Elevation mask:</b> 5°  *With activation code

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## Configuring the A222

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### Overview

You can configure the A222 through the serial port using Hemisphere GNSS commands.

For example, you can select:

- Baud rate
- NMEA 2000 data message to output on the dual serial ports and the update rate of each message

**Note:** Use the \$JSAVE command to save changes you make to the A222's configuration for the changes to be present in subsequent power cycles.

For information on Hemisphere GNSS commands refer to the [Hemisphere GNSS Technical Reference](#).

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### Auto-seed

Auto-Seed allows the end user to shut down their device in a static position for any extended period of time. If the antenna remains stationary at shut down, the position status and Atlas convergence will remain in the device memory and resume upon start-up. This enables the Atlas solution to regain its accurate position within two minutes of start-up.

Auto-seed provides quick response positioning and enables the customer to get to work faster and with confidence in the GNSS solution.

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# Appendix A: Troubleshooting

## Overview

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**Introduction** Appendix A provides troubleshooting for A222 common problems.

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## Troubleshooting

### Appendix A troubleshooting

Symptom	Possible Solution
Receiver fails to power	<ul style="list-style-type: none"> <li>• Verify polarity of power leads</li> <li>• Check integrity of power cable connectors</li> <li>• Check power input voltage (8 to 32 VDC)</li> <li>• Check current restrictions imposed by power source (maximum is 300 mA at 12 VDC)</li> </ul>
No data from A222	<ul style="list-style-type: none"> <li>• Check receiver power status</li> <li>• Check integrity and connectivity of power and data cable connections</li> <li>• Verify the baud rate settings match</li> <li>• Verify receiver responds to valid \$J Command (\$J1)</li> <li>• Verify it is locked to a valid DGNSS signal</li> <li>• Verify it is locked to 4 or more GNSS satellites</li> </ul>
Random binary data from A222	<ul style="list-style-type: none"> <li>• Verify the RTCM or the BIN messages are not being accidentally output</li> <li>• Verify the baud rate settings match</li> <li>• Potentially, the volume of data requested to be output could be higher than the current baud rate supports. Try either using a higher baud rate for communications or decreasing the number of messages and/or baud rates</li> </ul>
No GNSS lock	<ul style="list-style-type: none"> <li>• Check the integrity of the antenna's power/data cable</li> <li>• Verify the antenna is outdoors with a clear a view of the sky</li> <li>• Verify the lock status and signal-to-noise ratio (SNR) of GNSS satellites</li> </ul>

*Continued on next page*

## Troubleshooting, Continued

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**Appendix A**  
**troubleshooting**  
, continued

<b>Symptom</b>	<b>Possible Solution</b>
No GNSS position	<ul style="list-style-type: none"><li>• Verify the antenna is outdoors with a clear view of the sky</li></ul>
A222 LED not blinking after connection to power	<ul style="list-style-type: none"><li>• Verify polarity of power leads</li><li>• Check integrity of power cable connections</li><li>• Check power input voltage (8 - 32 VDC)</li></ul>
A222 LED indicator solid color (not blinking)	<ul style="list-style-type: none"><li>• Power-cycle the receiver</li><li>• Contact Technical Support</li></ul>

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## Appendix B: Technical Specifications

### Technical Specifications

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**Introduction** Appendix B provides the A222 technical specifications for sensor, communication and power.

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## A222 Technical Specifications

**Overview** Table B-1 through Table B-7 provides the GNSS sensor, horizontal accuracy, L-band sensor, communication, power, environmental, and mechanical specifications for the A222.

**A222 technical specifications**

**Table B-1: A222 sensor**

Item	Specification
Receiver type	GNSS L1, G1 (Standard) GNSS L2, L-band, RTK (optional)
Signals received	GNSS, GLONASS, and Atlas
Channels	114
GNSS sensitivity	-142 dBm
SBAS tracking	3-channel, parallel tracking
Update rate	10 Hz standard, 20 Hz optional (with activation)
Timing (1PPS) accuracy	20 ns
Cold start	< 60 s typical (no almanac or RTC)
Warm start	< 30 s typical (almanac and RTC)
Hot start	< 10 s typical (almanac, RTC, and position)
Maximum speed	1,850 kph (999 kts)
Maximum altitude	18,288 m (60,000 ft)

*Continued on next page*



## A222 Technical Specifications, Continued

A222 technical specifications

**Table B-2: Horizontal accuracy**

Item	Specification	
	RMS (67%)	2RDMS (95%)
RTK <sup>1,2</sup>	8 mm+1 ppm	15 mm+2 ppm
L-band <sup>1,3</sup>	0.04 m	0.08 m
SBAS (WAAS) <sup>1</sup>	0.3 m	0.6 m
Autonomous	1.2 m	2.4 m

**Table B-3: L-band sensor specifications**

Item	Specification
Receiver type	Single channel
Channels	1530 to 1560 MHz
Sensitivity	-130 dBm
Channel spacing	5.0 kHz
Satellite selection	Manual and automatic
Reacquisition time	15 seconds (typical)

**Table B-4: Communication specifications**

Item	Specification
Serial	2 full-duplex RX-232
Baud rates	4800-115200
Data I/O protocol	NMEA 0183, NMEA 2000*, and Hemisphere GNSS binary. <i>*requires NMEA certification</i>
Correction I/O protocol	Hemisphere GNSS proprietary, RTCM v2.3 (DGNSS), RTCM v3 (RTK), CMR (RTK), CMR+ (RTK) <sup>4</sup>
Timing output	1 PPS CMOS, active low, rising edge sync, 10 kΩ, 10 pF load
Event marker input	CMOS, active low, falling edge sync, 10 kΩ, 10 pF load

Continued on next page

## A222 Technical Specifications, Continued

A222 technical specifications, continued

**Table B-5: Power specifications**

Item	Specification
Input voltage	8- 32 VDC with reverse polarity operation
Power consumption	< 3.2 W nominal GNSS (L1/L2), GLONASS (L1/L2) and L-band
Current consumption	0.26 A nominal GNSS (L1/L2), GLONASS (L1/L2) and L-band
Power isolation	No
Reverse polarity protection	Yes
Antenna voltage	Internal antenna

**Table B-6: Environmental specifications**

Item	Specification
Operating temperature	-40° C to +70° C (-40° F to +158° F)
Storage temperature	-40° C to +85° C (-40° F to +185° F)
Humidity	95% non-condensing
Shock and Vibration	Mechanical Shock: EP455 Section 5.14.1 Operational Vibration: EP455 Section 5.15.1 Random
EMC	CE (ISO 14982 Emissions and Immunity), FCC Part 15, Subpart B, CISPR 22
Enclosure	IP67

*Continued on next page*

## A222 Technical Specifications, Continued

A222 technical specifications, continued

**Table B-7: Mechanical specifications**

Item	Specification
Dimensions	15.8 L x 15.8 W x 7.9 H (cm) 6.2 L x 6.2 W x 3.2 H (in)
Weight	<1.05 kg (<2.30 lbs)
Status indicators (LED)	<ul style="list-style-type: none"> <li>• Blinking Red - Power on</li> <li>• Blinking Amber - GNSS position available, including RTK float and Atlas</li> <li>• Blinking Green - RTK-fixed or Atlas-converged position available</li> <li>• Blinking any color - Receiver operational</li> </ul>
Power/data connector	12-pin male (metal)
Antenna mounting	1-14 UNS female, 5/8-11 UNC female adapter, and surface mount available

References:

<sup>1</sup> Depends on multipath environment, number of satellites in view, satellite geometry and ionospheric activity

<sup>2</sup> Depends also on baseline length

<sup>3</sup> Requires a subscription for Atlas

<sup>4</sup> Receive only, does not transmit this format

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### Warranty notice, continued

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