AIRMAR®
TECHNOLOGY CORPORATION

Owner's Guide & Installation Instructions

Smart™ Sensor

GPS Receiver

Model **G2183**

Patent http://www.airmar.com/patent.html
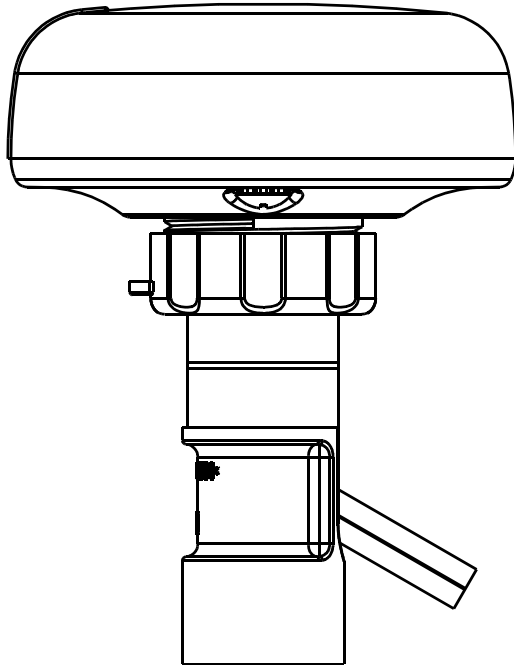
Record the serial number found on the underside of the sensor.

Serial No._____ Date of Purchase_____

Table of Contents

```
┌─────────────────────────────────────────────┐
│                                             │
│   IMPORTANT: Please read the Owner's        │
│   Guide completely before proceeding.       │
│                                             │
│                                             │
└─────────────────────────────────────────────┘
```

Introduction

Thank you for purchasing the Airmar's GPS Receiver and combined antenna. This sensor fixes position using Wide Area Augmentation System (WAAS). The compact housing is waterproof with a single removable cable. Data is output in digital NMEA 0183 and NMEA 2000® formats.

Functions & Outputs

- GPS using WAAS and EGNOS
- NMEA 0183: RS-232 *or* RS-422 standard

Features

- Fast response time
- Simultaneously outputs data in digital NMEA 0183 and NMEA 2000 formats
- Waterproof housing
- Waterproof cable system
- Pole, rail, or flush mount

WARNING

Navigation Aid Only: The sensor is only an aid to navigation and should never be solely relied upon. It is not a replacement for traditional navigation aids and techniques. Only official government charts contain all the information needed for safe navigation.

Follow the safety precautions below to reduce the risk of poor product performance, property damage, personal injury, and/or death.

WARNING: **GPS Accuracy**
The GPS position and velocity accuracies are controlled by the U.S. Department of Defence. Therefore the position accuracy described in the specifications cannot be guaranteed.

WARNING: **Correct Installation Important**
The sensor must be installed and operated according to the instructions in this owner's guide.

WARNING: **Installation Safety**
Always wear safety glasses, a dust mask, and ear protection when installing.

WARNING: **Electrical Safety**
The power supply must be OFF before making electrical connections.

WARNING: **Voltage**
The power supply voltage must be 9 - 40 VDC.

WARNING: **Battery**
Make power connections to a power source that is isolated from the engine start battery(s). Voltage drops may cause the sensor to lose information and/or change operating mode.

WARNING: **Fuse or Circuit Breaker**
A safe installation requires a 0.5 amp fast-blow fuse or circuit breaker.

Cables & Connecting/Converting Hardware

The GPS Receiver (sensor) can be connected in several ways. **You must have the correct cable and any needed converting/connecting hardware before beginning the installation.**

Sensor Cables	Length	Part No.
• NMEA 0183 Cable	10 m	33-862-02
• NMEA 2000 Cable	6 m	33-1029-02
• NMEA 2000 Cable	10 m	33-1029-06

NOTE: *Additional cable lengths are available.*

Connecting/Converting Hardware	Length	Part No.
• NMEA 0183 to USB, Data Converter		33-801-01
• NMEA 0183 to USB Combiner		NDC-4-AIR
• NMEA 2000 CAN to USB, U200 Gateway		33-727-01
• NMEA 0183 & NMEA 2000 Splitter	15 m	33-641-02
• NMEA 0183 & NMEA 2000 Splitter	30 m	33-641-03

Tools & Materials

CAUTION: **Vehicles/boats traveling above 30 MPH**—Do not use the plastic Cable Side-exit Adapter (part D) supplied. Purchase a stainless steel part. At high speeds, the plastic adapter may break, causing the sensor to fall off.

NOTE: *The sensor has standard marine 1"-14 threads.*

Pole/rail mounting hardware (some installations)
Safety glasses
Dust mask
Ear protection
Screwdrivers (Pole/Rail Mount installation)
Teflon pipe thread tape, 1/2" wide (some installations)
Pencil (some installations)
Electric drill (some installations)
Drill bits and hole saws (some installations):

Pilot hole	3 mm *or* 1/8"
Flush mount stud holes	6 mm *or* 1/4"
Flush mount cable hole	38 mm *or* 1-1/2"

Loctite® 242® or other removable thread locker (Flush Mount installation)
Grommets (some installations)
Cutting pliers (some installations)
Heat-shrink tubing (some installations)
Heat gun (some installations)
Wire strippers (some installations)
Multimeter (some installations)
Cable ties (some installations)

Choosing the Mounting Location

For a reliable GPS signal, selecting the best location for the sensor is very important. It can be mounted on a pole, rail, or flat surface. Choose a location that balances the requirements below.

- The sensor must have a clear view of the sky to the horizon in all directions to receive satellite signals. Be sure there are no obstructions from buildings, boats, etc. However, the lower it can be mounted, the more stable it will be. It will better track satellites low on the horizon.
- Do not mount on top of a sailboat mast. The sway will cause jitter in the data.
- Mount it as far as possible from high-powered transmitting antennas to avoid mutual interference (Figure 1).
- Mount it lower than any on-board INMARSAT communications antenna.
- Mount above or below any radar beam. *Do not mount within a radar beam.*
- Mount reasonably level with the earth's surface—*not tilted to one side*.
- Do not mount where the sensor could be a tripping hazard or be tread upon. Note that frozen water spray on the unit may degrade reception.
- Be sure there is access to the underside of the mounting surface.
- Be sure the cable(s) can be routed to reduce electrical interference from other electrical wiring and any on-board equipment with a strong magnetic field such as radar equipment, radio transmitters, engines, generators, etc. Separate the cables by at least 1 m (3').
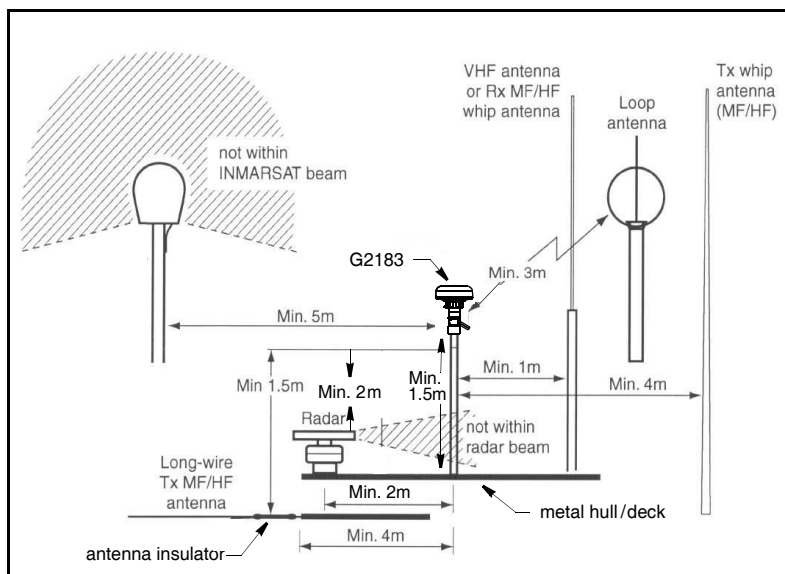

Figure 1. Minimum distance from sensor
Courtesy of Northstar, Acton, MA

Installing

CAUTION: Be sure to use the correct parts for your installation. Do not use the flush mount parts (gasket, part B) to mount the receiver on a pole. Using the wrong parts may allow water to leak into the unit.

CAUTION: If you use a thread locker, use teflon pipe thread tape. Do not use a liquid thread locker as it may weaken the plastic, causing it to swell and crack.

IMPORTANT: Plan the cable route between the sensor and the display and/or network before beginning the installation.

Pole or Rail Mount

The nut assembly supplied has standard marine 1"-14 threads that can be screwed to a standard marine antenna mount, extension pole, or rail-mount bracket. Before beginning the installation, plan for securing the pole/rail bracket to the selected mounting surface and purchase all the necessary hardware. It may be helpful to fasten the pole/rail bracket in place before proceeding.

1. Remove the label from the sensor unit's socket (Figure 2). Fasten the mount base (part C) to the sensor unit (part A) with the two machine screws and lock washers supplied. The torque for the screws is 1.35 Nm.
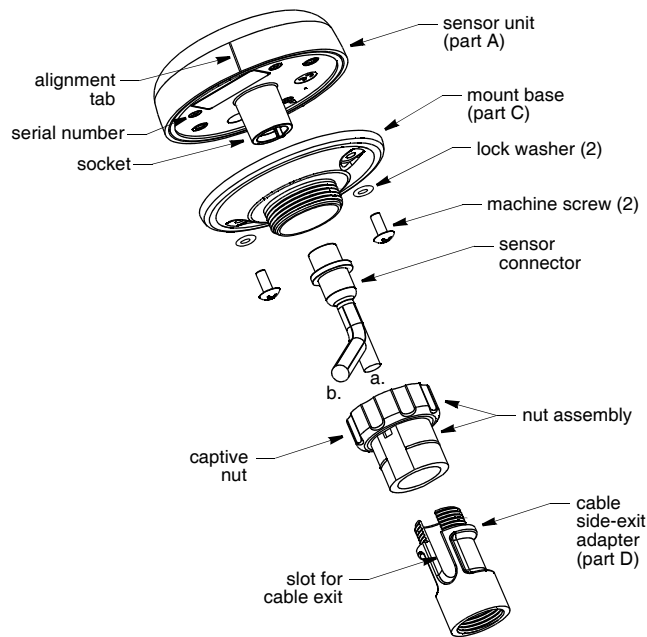

Figure 2. Pole/Rail mount

2. Decide if you want the cable to exit through the center or along the side of the pole/rail bracket. Slide the nut assembly onto the cable at the *sensor* connector. *Do not connect the sensor at this time.*

   a. **Center exit**—Pass the *instrument* connector end of the cable through the center of the pole. *Be sure to leave several inches of cable extending beyond the nut assembly.*

   b. **Side exit**—Place the cable side-exit adapter (part D) over the cable. *Being sure the cable is passing through the slot in the side, s*crew the nut assembly onto the adapter. **Hand tighten only**. Do not over tighten.

   NOTE: Use the adaptor supplied as it has smooth edges that will not chafe the cable. Do not use a purchased part.

3. Screw the extension pole/rail bracket onto the nut assembly /side-exit adaptor. **Hand tighten only**. Do not over tighten.

4. Remove the protective cap from the sensor connector on the cable. (Save the cap to protect the connector when the receiver is removed.) Plug the cable firmly into the sensor.

5. With the alignment tab on the sensor facing forward, slide the captive nut upward and screw it onto the mount base. **Hand tighten** only. Do not over tighten.

Flush Mount

1. Remove the label from over the sensor unit's socket (Figure 3). Apply *removable* thread locker to the two studs supplied. Screw the studs into the underside of the sensor unit (part A).

2. Using the gasket (part B) as a template, position it at the selected mounting location *upside down* with the arrow facing forward. Mark the position for the two mounting holes and the center hole for the cable.

3. Using a 3mm or 1/8" bit, drill the pilot holes. Using a 6mm or 1/4" bit, drill the two mounting holes for the studs. Drill the cable hole with a 38mm or 1-1/2" hole saw.

   Fiberglass—Minimize surface cracking by running the drill in reverse until the gelcoat is penetrated.

4. Pass the *instrument* connector-end of the cable through the center of the gasket and through the center mounting hole in the vehicle/boat.

5. Plug the cable firmly into the sensor unit.

6. Orient the gasket with the arrow facing in the same direction as the alignment tab on the sensor unit. Push the gasket onto the studs and slide it over the connector.

   NOTE: The gasket fits one way only. A groove in the gasket fits over the alignment tab on the connector.

7. With the sensor's alignment tab pointing forward, push the studs through the mounting surface. *Check to be sure the gasket is tucked under the lip of the unit.* From underneath the mounting surface, slide a flat washer and lock washer onto each stud. Fasten them with the thumb nuts. **Hand tighten** only. Do not over tighten.
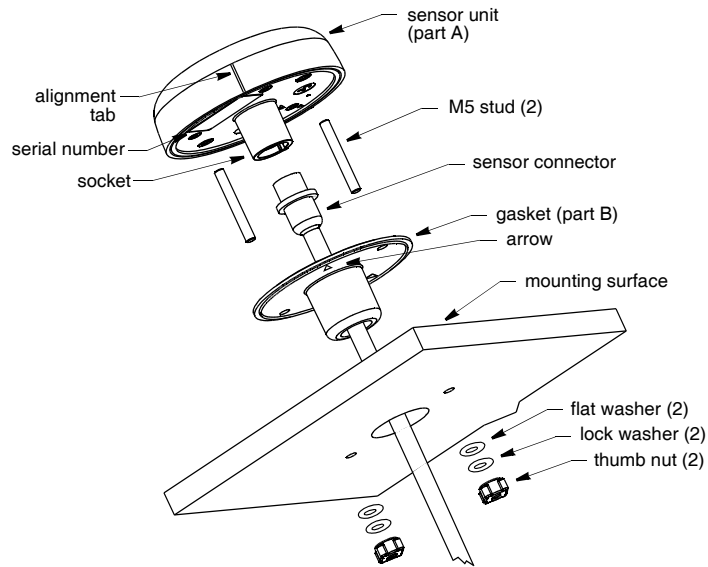

Figure 3. Flush mount

Cable Routing & Connecting

Depending on the equipment you will be using, route the sensor cable to an Airmar Data Converter, Combiner, an NMEA 0183 display, an NMEA 2000 network, a laptop, or other device. After reading the cautions below, go to the appropriate instructions.

CAUTION: Do not remove the waterproof connector(s) to ease cable routing. Buy a cable without a connector. Instructions for wiring are supplied.

CAUTION: To reduce electrical interference from other electrical wiring and any on-board equipment with a strong magnetic field such as radar equipment, radio transmitters, engines, generators, etc., separate the cables by at least 1m (3'). Ensure that all the cables shields are appropriately grounded.

CAUTION: Be careful not to tear the cable jackets when passing them through compartments, bulkheads, or walls. Use grommets to prevent chaffing.

CAUTION: Use a multimeter to check the polarity and the connections to the power supply before applying power to the sensor.

CAUTION: Coil any excess cable(s) and secure with cable ties to prevent damage.

Connecting to a Data Converter, Combiner, or Splitter

Follow the installation instructions that are supplied with the unit.

Connecting to an NMEA 0183 Display

Route the sensor cable to the display. *Do not fasten the cable in place at this time.*

Connector on Display End

If your sensor cable has a connector on the display end, and it can be plugged into the port on your NMEA 0183 display; do so now. Coil any excess cable and secure it with cable ties to prevent damage. Fasten the cable in place.

No Connector on Display End: Wiring

If your sensor cable does NOT have a connector on the display end, it must be hard wired. Referring to the owner's manual that came with your display, connect the colored wires as show in Figure 4.

CAUTION: Your sensor has either an RS-422 *or* RS-232 standard. You must follow the wiring diagram in Figure 4 that matches your sensor. If it is wired for the wrong standard, it will not transmit and receive data properly.

NOTE: If your display does NOT have NMEA 0183 output connections, the yellow and orange wires are not needed. Apply heat-shrink tubing to each unused wire. (Alternatively, the yellow and orange wires can be connected to an external sensor.)

NOTE: The display power may be wired directly to the sensor cable, or it may be wired separately.

1. Allowing an extra 25 cm (10") for wiring ease, cut the cable to length.
2. Strip 60 mm (2-1/2") of the outer jacket and foil shielding from the cut end of the cable (Figure 4).
3. Strip 10 mm (3/8") of conductor insulation from the end of each colored wire.
4. Protect the cable's foil shielding from causing a short by using heat-shrink tubing around the jacket where the wires emerge from the cable. The tubing must overlap the wires a minimum of 6 mm (1/4"). Shrink the tubing using a heat gun.
5. Being sure the power supply is OFF, connect the wires to the display.
6. Fasten the cable in place.
7. Your installation is complete. To begin receiving data, refer to the owner's manual that came with your display.
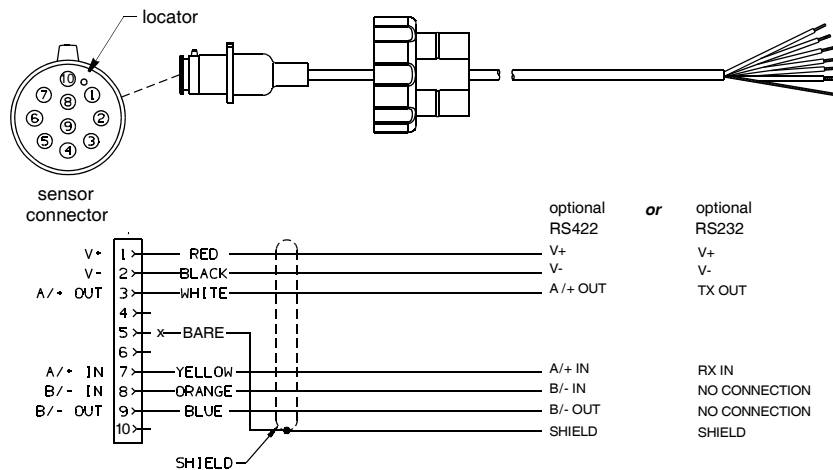

Figure 4. NMEA 0183 sensor cable

Copyright © 2007 - 2014 Airmar Technology Corp.

Connecting to an NMEA 2000® Network

CAUTION: Only two termination resistors are required on an NMEA 2000 network. More than two will degrade the bus performance.

Route the sensor cable to the NMEA 2000 network. Plug the NMEA 2000 connector into the network node (Figure 5). Coil any excess cable and secure with cable ties to prevent damage.
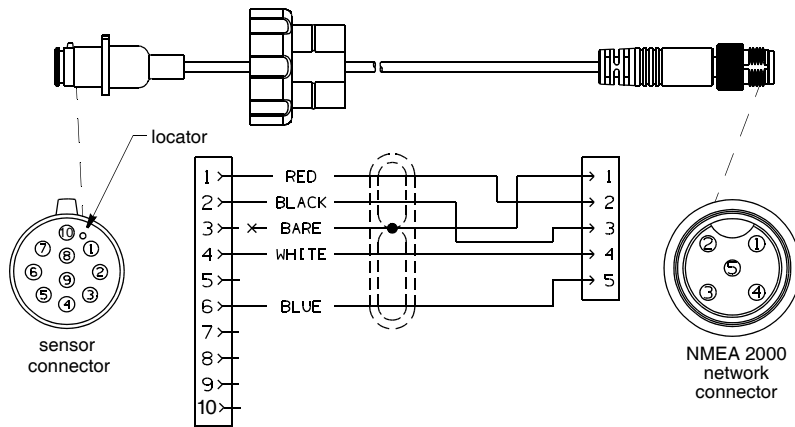

Figure 5. NMEA 2000 sensor cable [6m (20') shown]
Copyright © 2008 - 20011 Airmar Technology Corp.

NOTE: *Sensor cables longer than 6m (20') have a termination resistor built into the sensor connector (Figure 6).*
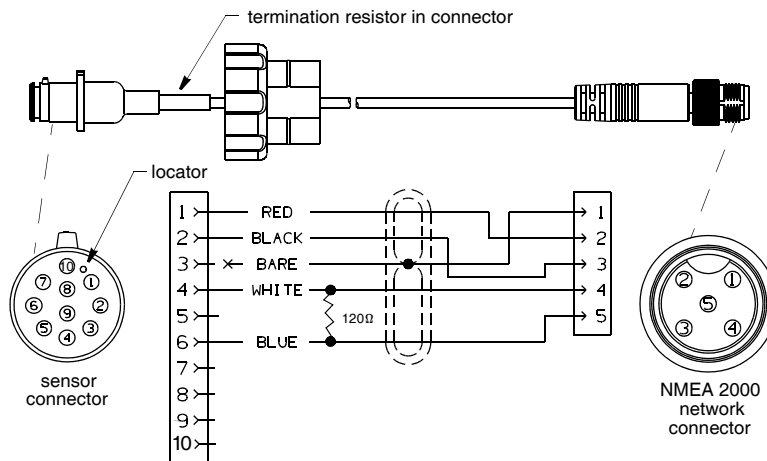

Figure 6. NMEA 2000 sensor cable [10m (33') shown]
Copyright © 2009 - 2011 Airmar Technology Corp.

Maintenance

CAUTION: Do not disassemble the sensor. Removing the screws from the sensor unit (part A) will damage the waterproof seal, thus voiding the warranty.

CAUTION: Do not immerse in water or pressure wash. Doing so may allow water to infiltrate the sensor, voiding the warranty.

Since the sensor has no moving parts, it requires minimal maintenance. Clean with a soft damp cloth and mild household detergent.

Troubleshooting
• Is there power to the sensor?
• Are all the connections tight?
• Is the cable-run free of kinks or damage?
• Does the sensor have a clear view of the sky?
• Is there interference from other antennas or instruments?
• Is there damage to the sensor?
• Is there ice on the sensor?

Firmware Revisions
Airmar may release updated versions of the sensor's firmware. Periodically, check Airmar's website at www.airmar.com to down-load the latest revision, or contact Technical Support for a CD.

NMEA 2000®: Load Equivalency Number
LEN is the amount of current a devise draws from an NMEA 2000 network.
(1 LEN = 50 mA)

LEN..3

Where to Purchase Parts
Lost, broken, or worn parts should be replaced immediately. Obtain parts from your instrument manufacturer or marine dealer.

Gemeco   USA
                                Tel: 803-693-0777
                                email: sales@gemeco.com

Airmar EMEA   Europe, Middle East, Africa
                                Tel: +33.(0)2.23.52.06.48
                                email: sales@airmar-emea.com

Trademarks
Airmar® is a trademark of Airmar Technology Corporation.
Loctite® and 242® are trademarks of Henkel Corporation.
NMEA 2000® is a registered trademark of the National Marine Electronics Assoc.
Smart™ is a trademark of Airmar Technology Corporation.

NOTES

AIRMAR®
TECHNOLOGY CORPORATION