



GRT External GPS Modules
Equipment Supplement



Revision A
30-May-2013

Table of Contents

Section 1: Introduction

1.1 About GRT GPS modules.....	3
1.2 Data Port and Hardware Requirements.....	3

Section 2: Installation & Wiring

2.1 Suggested Connections.....	4
2.2 Worksheet: My System.....	4
2.3 Mechanical Installation.....	4
Figure 1: GPS Module Footprint.....	5
Figure 2: WAAS GPS Wiring Diagram.....	6
Figure 3: RAIM GPS Wiring Diagram.....	7

Section 3: Setup & Programming

3.1 Display Unit Setup.....	8
3.2 Configuring The GPS.....	9
3.3 Post-Installation Check-Out.....	9

Section 1: Introduction

1.1 About GRT External GPS Modules

GRT manufactures two different externally-mounted GPS modules for GRT EFIS systems. They include:

GPS-EXT-WAAS: A VFR WAAS GPS with a 1 Hz refresh rate

GPS-EXT-RAIM: A VFR WAAS GPS with Receiver Autonomous Integrity Monitoring (RAIM); it is not certified for IFR use, but provides exclusion of unreliable satellites and a 4 Hz refresh rate.

Both units come with a wiring harness and GPS antenna. The antenna must be mounted within view of the sky, but the GPS module itself may be mounted anywhere inside the aircraft. It is connected to any display unit through any available serial port.* Its position information travels across the inter-display link to enable the use of GPS-dependent features on all of the installed display units. The external GPS is usually installed in Horizon systems. The Sport EFIS system usually uses an internally-mounted version of the same WAAS GPS wired internally to Serial Port 3, but it can utilize either of the External GPS modules using the same procedures described in this manual.

GPS Internal Memory

Note that the GPS chip has an internal battery to provide a memory of the time and last known location for up to 21 days of non-use. If the aircraft is parked for more than 21 days without running the engine/charging system, it may take longer than usual to acquire satellite positions.

The interface between this unit and the EFIS allows for:

- GPS position data to enable moving map and terrain displays, VFR navigation, synthetic approach, ground track and wind vector calculations, ADS-B transmissions, and other GPS-derived features of the GRT EFIS system.

1.2 Data Port & Hardware Requirements

Other than mounting hardware, no extra hardware is required. Modules can be mounted using velcro, screws, or other method appropriate for the location inside the aircraft.

Required Display Unit Data Port	Suggested Assignment
Serial IN	Serial Port 3
Serial OUT (RAIM only)	Serial Port 3

***Note: The RAIM GPS module requires a high-speed serial port.** In Horizon HS and WS systems, serial Port 2 In/Out is high speed and recommended for RAIM or XM Weather. In Sport systems without an upgraded processor, Serial Port 4 is the only high speed port. All the serial ports are high-speed in SX units shipped after 5/1/2013 and all Horizon HX and HXR units.

Section 2: Installation & Wiring

2.1 Suggested Connections

For more information on Display Unit pins and connectors, see Connector Definitions (HX, SX) on the GRT website or Pinout Diagrams in HXR Installation Manual.

Horizon HX and HXR EFIS			
Display Unit Pin	Display Unit Function	GPS Connector Pin	GPS Function
A23	Serial 3 IN	Pin 4	GPS position data to EFIS
A25	Serial 3 OUT (RAIM only)	Pin 3	Data from EFIS for RAIM functions

Note that any suitable serial port may be used. Serial ports listed here are suggested based on GRT's published wiring diagram examples. RAIM GPS requires a high-speed serial port.

2.2 Worksheet: My System

You may use this form to make a record of your own Serial Port IN and OUT choices.

Display Unit Pin	Display Unit Serial Port	GPS Connector Pin	Wire Color
	Serial _____ IN	Pin 4	
	Serial _____ OUT	Pin 3	

2.3 Mechanical Installation

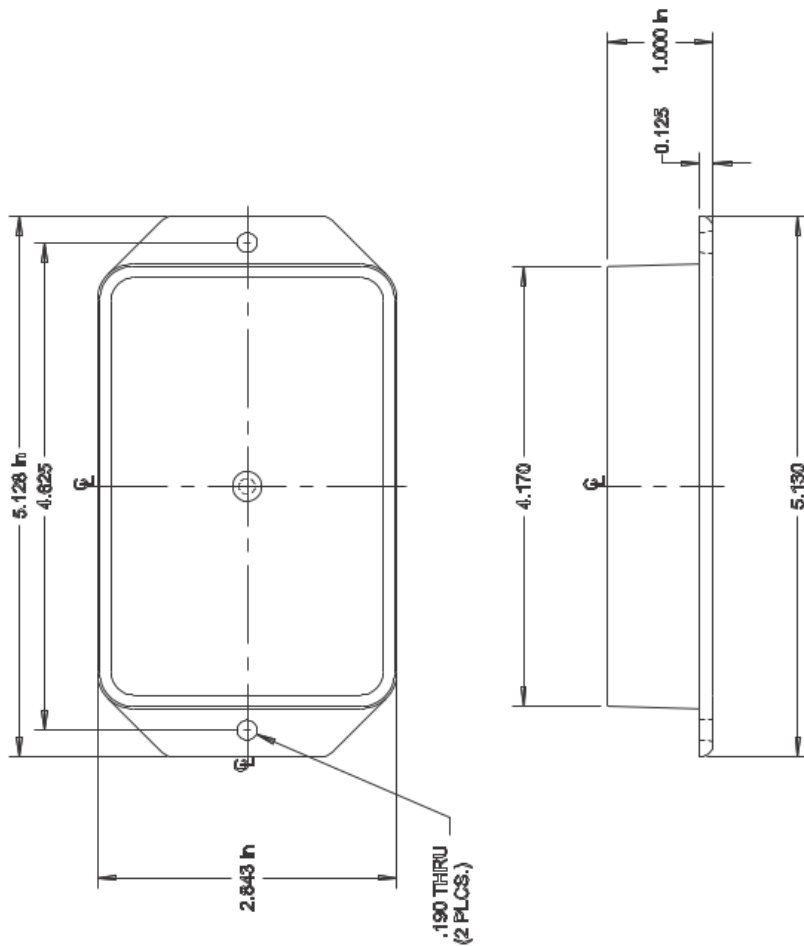
Mount the GPS Module in a location away from moisture, fuel, and extreme heat. It may be mounted using screws, velcro, tape, or any secure method appropriate for the mounting surface.

Plug the antenna into the gold colored antenna port on the module. The antenna must always be in a location with a clear view of the sky for the best satellite reception.

Current Draw is less than 0.1 amp. Power should be supplied to the unit through a breaker of 5 amps or less. It is acceptable to share a breaker with this and other equipment, provided that if the breaker opens, the loss of the equipment powered by that breaker does not cause an issue with the safety of flight.

The GPS module has a 9-pin D-sub connector for power, ground, and data connections. See GPS Wiring Diagrams, Figures 2 and 3, for more information on wiring the power and ground.

Figure 1: GPS Module Footprint



- External GPS module
- RAIM GPS module
- ARINC module
- Magnetometer

Notes:

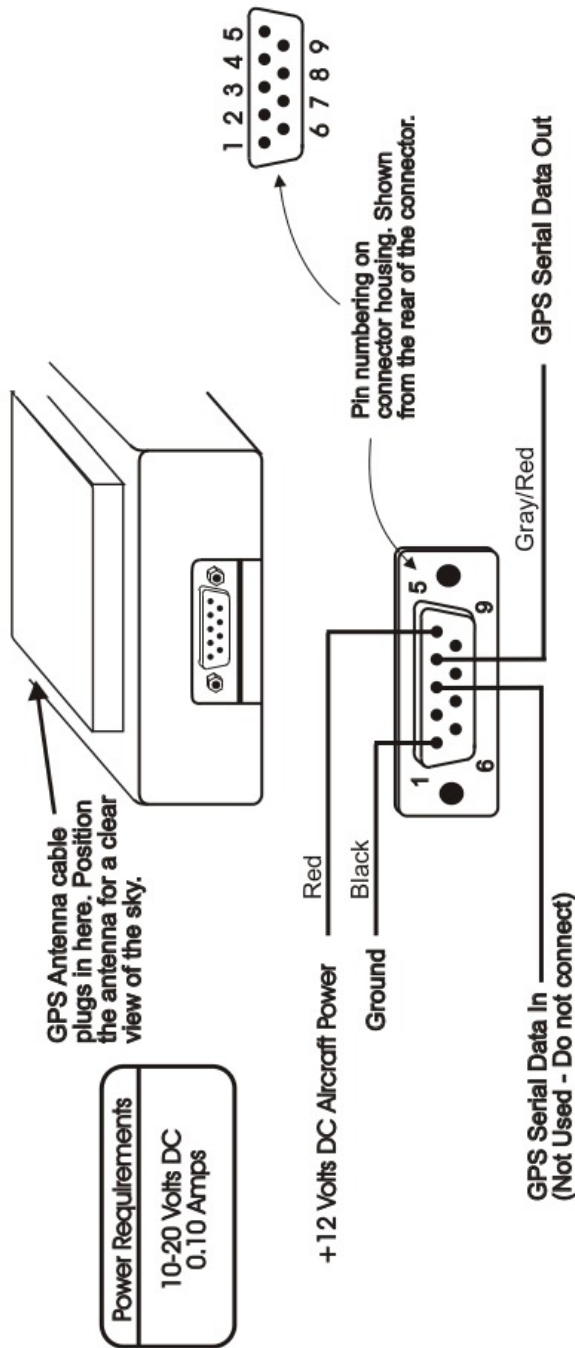
- Drawing shows height of module mounting platform only.
- GPS and ARINC modules are 9/16" taller than mount.
- Allow an extra 3" above ARINC module for D-sub connector.

External Module Footprint and Mounting Holes



Module Dimensions Rev A.cdr

Figure 2: WAAS GPS Wiring Diagram



Notes:

1. Mount the GPS Module to avoid water, fuel, and extreme heat.
2. Turn off power to the module adapter when not in use to avoid discharging the aircraft's battery.
3. Wiring is shown to the connector that plugs into the adapter.
4. Current Draw is less than 0.1 amp. Power should be supplied to the unit through a breaker of 5 amps or less. It is acceptable to share a breaker with this and other equipment, provided that if the breaker opens, the loss of the equipment powered by that breaker does not cause an issue with the safety of flight.

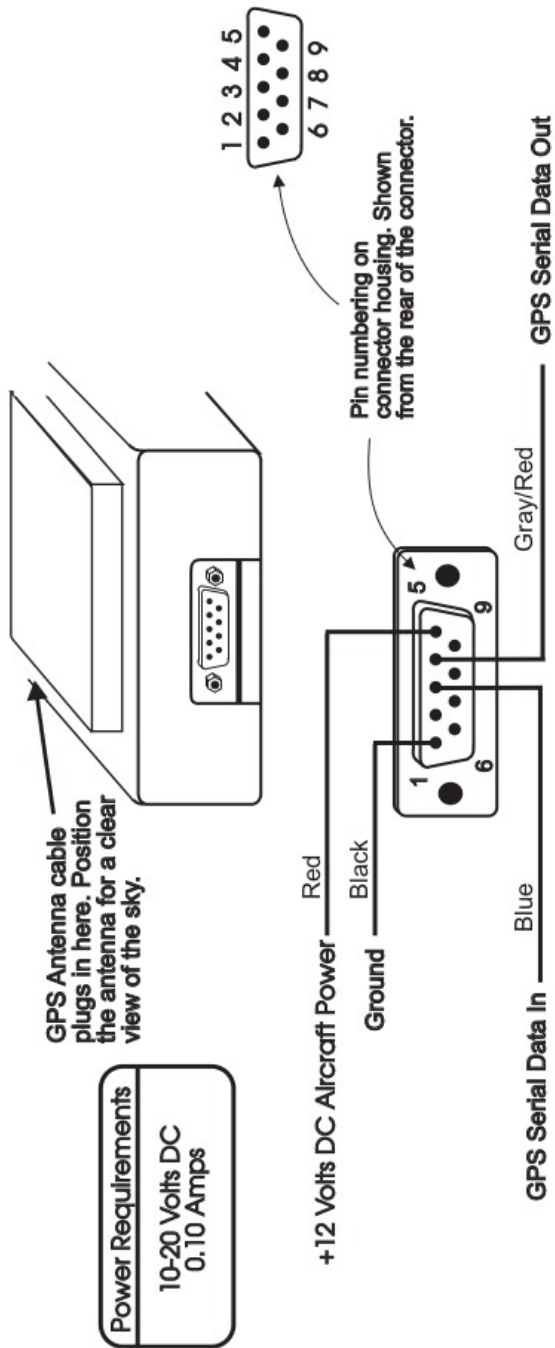
Configuring the EFIS

1. Using the Set Menu, "General Setup" pages, configure the serial port that has been wired to the GPS module to "NMEA0183 GPS".
2. Set the baud rate to 4800.
3. The serial output from the EFIS to the GPS is not used. This output may be used for other purposes that can utilize 4800 baud data.
4. Verify the Serial Port counter is incrementing, if this counter is not changing, serial data is not being received at the EFIS, and the wiring should be checked.
5. Use the "Display Unit Maintenance" page, and select "GPS Status" to observe if the GPS is able to receive satellite data. Initial position lock may take 10-20 minutes.

External GPS Module
GRT Avionics, Inc.

GPS-External Module Rev B.odt
 Rev B

Figure 3: RAIM GPS Wiring Diagram



Notes:

1. Mount the GPS Module to avoid water, fuel, and extreme heat.
2. Turn off power to the module adapter when not in use to avoid discharging the aircraft's battery.
3. Wiring is shown to the connector that plugs into the adapter.
4. Current Draw is less than 0.1 amp. Power should be supplied to the unit through a breaker of 5 amps or less. It is acceptable to share a breaker with this and other equipment, provided that if the breaker opens, the loss of the equipment powered by that breaker does not cause an issue with the safety of flight.

Configuring the EFIS

1. Using the Set Menu, "General Setup" pages, configure the serial port that has been wired to the GPS module to "NMEA0183 GPS".
2. Set the baud rate to 57600.
3. The serial output from the EFIS to the GPS must be connected, as well as the serial input.
4. Verify the Serial Port counter is incrementing. If this counter is not changing, serial data is not being received at the EFIS, and the wiring should be checked.
5. Use the "Display Unit Maintenance" page, and select "GPS Status" to observe if the GPS is able to receive satellite data. Initial position lock may take 10-20 minutes.

External GPS RAIM Module
GRT Avionics, Inc.

GPS RAIM -External Module Rev B.cdr
Rev A

Section 3: Setup & Programming

3.1 Display Unit Setup

After the display unit and the GPS module are installed and wired, use the following table to program the display unit to communicate with the GPS.

Access the specified Set Menu page in the display unit. Then, look down the list to find each Setting. Press the right knob to activate the setting, and turn the knob to set each corresponding Value. This Setup information applies to all GRT EFIS Systems.

In this example, we've chosen **GPS1** to represent the GRT GPS module. If multiple GPS units are installed, such as a Garmin navigation unit, you may wish to designate the GRT module as GPS2 instead by simply selecting a Value of "NMEA0183 **GPS2**/Global Positioning (or Configuration)" instead of GPS1, and setting GPS2 as the Internal Flight Plan Source. The GRT GPS module should always be designated as the Internal Flight Plan Source, regardless of whether it is GPS1 or GPS2.

GPS-EXT-WAAS

Set Menu Page	Setting	Value
General Setup	Serial Port ____ Rate*	4800
General Setup	Serial Port ____ Input*	NMEA0183 GPS1/Global Positioning
General Setup	GPS1 Flight Plan Source	Internal

* Fill in blank with display unit serial port you designated for the GPS.

GPS-EXT-RAIM

Set Menu Page	Setting	Value
General Setup	Serial Port ____ Rate*	57600
General Setup	Serial Port ____ Input*	NMEA0183 GPS1/Global Positioning
General Setup	Serial Port ____ Output*	NMEA0183 GPS1/Configuration
General Setup	GPS1 Flight Plan Source	Internal

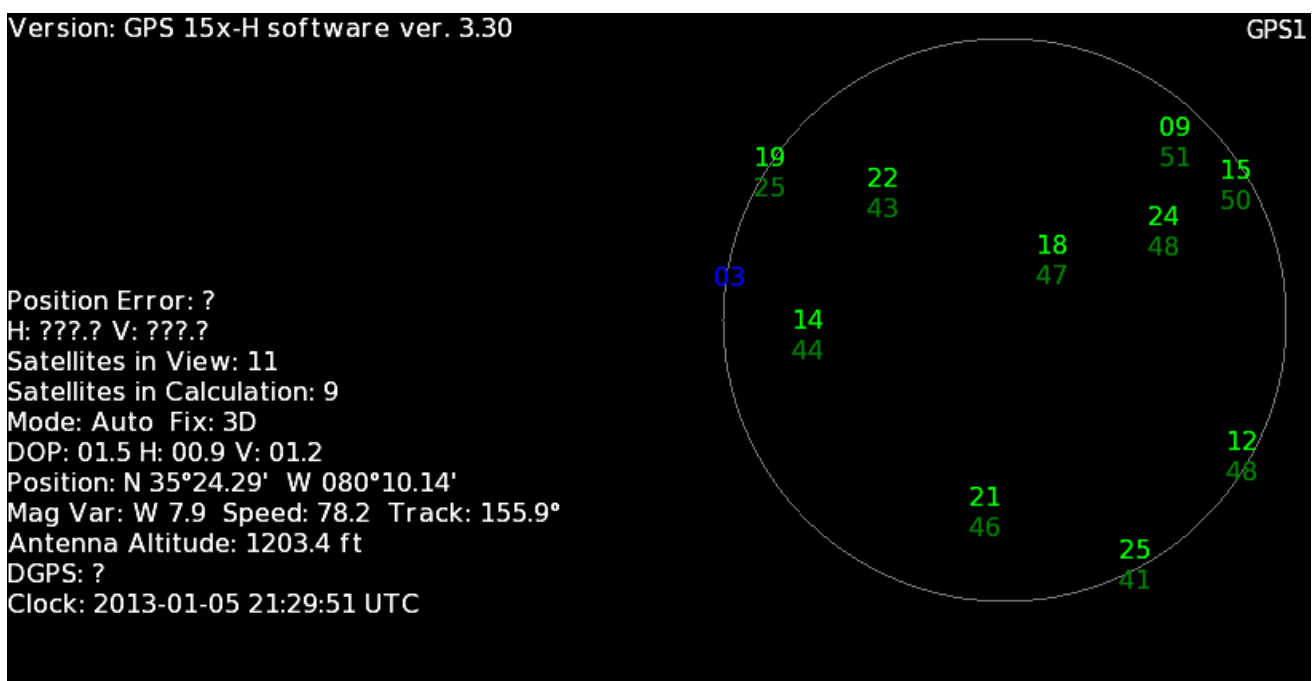
* Fill in blank with display unit serial port you designated for the GPS.

3.2 Configuring the GPS Module

No other configuration or setup is needed for the GPS module.

3.3 Post-Installation Checkout for the GPS

1. Pull the aircraft outside with a clear view of the sky. The receiver will most likely not pick up any GPS satellites inside a hangar.
2. Power on the system.
3. Go to SET MENU>Display Unit Maintenance. Scroll to GPS Status. There should be a notation GPS1:OK and, if a second GPS is also installed, GPS2:OK. Press the knob to view the GPS Status Page. It should look something like the screenshot below. Note that it might take several minutes to initially acquire the satellites.
4. If two GPS units are installed, a softkey is on the screen that allows you to select GPS1 or GPS2. Highlight the GPS you want and then wait a few seconds for it to switch screens.
5. **A note about GPS flight plans:** When programming flight plans into the EFIS system, keep in mind that flight plans created within the EFIS unit are called Internal Flight Plans even though the GPS unit is called an "External GPS Module." The GRT GPS is called an External module because it is mounted outside of the display unit box, but it is considered an "Internal Flight Plan" because it is an integral part of the GRT system and the flight plans are created inside the EFIS system. "EXTERNAL" Flight Plans are flight plans created in an external third-party GPS navigation unit, such as a Garmin IFR GPS, and then imported into the EFIS system. External Flight Plans cannot be edited within the EFIS system.



THIS PAGE INTENTIONALLY BLANK