



GRT HORIZON

Models HX, HS & WS

Installation Manual

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FORWARD

Welcome to Grand Rapids Technologies' GRT Horizon! We are pleased that you have chosen our product to meet your flying needs.

Visit the Grand Rapids Technologies (GRT) website (www.grtavionics.com) for the latest updates and supplemental information concerning the operation of this and other GRT products.

This manual describes the installation of GRT Horizon EFIS using the software version shown in the Record of Revisions. Some differences may be observed when comparing the information in this manual to other software versions. Every effort has been made to ensure that the information in this manual is accurate and complete. GRT is not responsible for unintentional errors or omissions in the manual or their consequences.

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RECORD OF REVISIONS

Rev	Date	SW Rev	Change(s)
A	Feb 2009	32a	Initial Release

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Chapter 1 GENERAL DESCRIPTION

1.1 Introduction

This document provides the physical, mechanical and electrical characteristics and installation requirements for the GRT Horizon EFIS.

This document, the Horizon Set Up Guide, the Horizon Users Guide, the Horizon Cable Description, the Horizon Interface Diagram, and the Horizon Connector Definitions document, make up the set of installation documents. Be sure to get the latest versions of these documents from www.grtavionics.com. They are located in Support, Documents.

1.2 Description

The GRT Horizon EFIS consists of panel mounted Display Unit(s), separately mounted AHRS and a separately mounted magnetometer. There are several Display Unit options:

Standard Resolution Display (MFD-WS)
High Resolution Display (MFD-HS)
High Resolution 8.7" W x 6.47" H Display (HS-8.4)
High Resolution, Accelerated Processor with Synthetic Vision (MFD-HX)
Panel Mount Width (7.1"), Radio Rack Width (6.25") or 8.4 Display (8.7")

Two AHRS packages are available
Single AHRS (AHRS-1)
Dual AHRS (AHRS-2) (standard with dual display systems)

Please consult www.grtavionics.com Support, Documents for the latest dimensions.

The display faces are coated with a special coating which is very sensitive to skin oils, waxes and abrasive cleaners. It is very important to clean the display with an eyeglass lens cleaner and a clean lint free cloth.

1.3 Certification

The GRT Horizon EFIS is not certified for installation in FAA Type Certificated Aircraft. It is designed and intended for installation in aircraft licensed as Experimental.

Chapter 2 ACCESSORIES AND PACKING LIST

Your EFIS has been carefully inspected and packaged and includes the Display Unit (DU) and associated accessories. Before installing and getting started with your new system, please use the packing list that accompanied the DU and the following paragraphs to ensure that no items are missing and that there is no visible damage. If any parts are missing or damaged, please contact GRT, Inc. or your GRT, Inc. dealer immediately.

2.1 Two Display Package

The GRT Horizon two- display package includes two DU's identified by the rear panel label, Aircraft Multifunction Display, Part Number MFD-HS, MFD-HX, MFD-WS or MFD-HS-8.4.

Packaged with the two DUs are:

- Two Aircraft Magnetometers
- One Dual Attitude-Heading Reference System (AHRS-2)
- OAT probe
- Wiring Harness, DU to DU, Two DU to AHRS / Magnetometer
- USB Memory Stick
- User's Guide and Reference Manual
- Installation Manual
- Set Up Manual

Optionally, DUs may be equipped with:

- GPS, internal (WS, HS) or external (WS, HS, HX)
- RAIM GPS, internal (WS, HS) or external (HX)
- Engine Monitor / EIS
- XM weather module
- ARINC 429 interface module (standard in HX)

Packaged with GPS DUs is a GPS antenna.

Packaged with Engine Monitor DUs are:

- Engine Information System (EIS-4000 or EIS-6000) Computer
- Four (4) or Six (6) Exhaust Gas Temperature (EGT) Probes
- Four (4) or Six (6) Cylinder Head Temperature (CHT) Probes
- Oil Temperature Sensor
- Oil Pressure Sensor
- Manifold Pressure Sensor
- Fuel Pressure Sensor
- Fuel Flow Sensor
- Current Sensor
- Wiring Harness

Packaged with XM weather DUs is an GRT XM weather processor and WX Worx weather receiver and antenna. HX Horizon perform weather processing internally so only WX Worx receiver and antenna are supplied.

2.2 3 or 4 Display Packages

3 or 4 display packages will contain the same accessories as a Dual Display package and may be equipped with similar options. DU to DU wiring harness supplied will accommodate the number of DUs supplied.

2.3 Single Display Package

The GRT Horizon single display package includes a DU identified by the rear panel label, Aircraft Multifunction Display, Part Number MFD-HS, MFD-HX, MFD-WS or MFD-HS-8.4.

Packaged with the DU is:

- One Aircraft Magnetometer
- One Single Attitude-Heading Reference System (AHRS-1)
- OAT probe
- Wiring Harness, DU to AHRS,/ Magnetometer
- USB Memory Stick
- User's Guide and Reference Manual
- Installation Manual
- Set Up Manual

The same options are available for a single display package as a dual display package,

- GPS, internal or external, (with or without RAIM)
- Engine Monitor / EIS
- XM weather module
- ARINC 429 interface module (standard in HX)

NOTE: The current software version comes installed from GRT, Inc. Any product or software updates can be found on the Grand Rapids Technologies, Inc. website at www.grtavionics.com. Be sure you have the current software installed.

Chapter 3 MECHANICAL INSTALLATION

3.1 Display Unit Installation

Mount the display unit(s) in the desired location in the instrument panel. The main consideration in choosing a location is simply the ability to view the display unit. Since the display is fully sunlight-readable, no consideration for shielding the display unit from sunlight is required.

1. For panel mount style display units, the use of nut plates behind the instrument panel greatly simplifies the task of installing and removing the 4 screws used to retain the display unit in the panel. #6 socket cap stainless steel screws are recommended.
2. For radio rack style display units, the #6 screws on the side of the unit (2 per side) should be used to attach the display unit to the radio rack.

These two FAA Advisory Circulars provide suggestions for positioning display units with respect to visual field and control location: While they are intended for Part 23 (Certified) Airplanes, the information is useful and applicable to Experimental Airplanes also:

- AC23.1311-1B Installation of Electronic Display in Part 23 Airplanes
- AC 20-138A Airworthiness Approval of Global Navigation Satellite System Equipment

3.2 AHRS Installation

The AHRS is not affected by wiring, magnetic, heat, temperature or vibration influences. However, good practices suggest that it should be located where these influences are minimized. The pitot and static connections are made to the AHRS, so its location should consider this.

It is important that the AHRS is mounted so that the roll, pitch and yaw axes of the AHRS are parallel to the roll, pitch and yaw axes of the aircraft. The precision that this is achieved influences the final performance of the EFIS.

There is no requirement that the AHRS roll, pitch or yaw axes be parallel to those of its associated display unit.

Be sure to mount the AHRS with the connector toward the rear of the airplane. Observe the label on the AHRS to insure it is oriented correctly.

3.3 Magnetometer Installation

Determining the location of the magnetometer requires considerable care because of the magnetometer's sensitivity to magnetic disturbances generated

by the airplane. No periodic maintenance is required for the magnetometer, although it is desirable to mount it in a location that allows access to it if necessary. The most important consideration when mounting the magnetometer is choosing a location in the airplane that is away from magnetic disturbances. It is quite amazing how sensitive the magnetometer is to these disturbances, and how much error this can cause in the magnetic heading reported by the AHRS.

Keep the magnetometer at least 12 inches away from any current carrying wires (such as navigation or landing light wires), and more than 18 inches from ferrous metal, such as the steel mass balance tube that is typically used in the leading edge of ailerons. Use non ferrous hardware (or even double sticky tape) for mounting the magnetometer. Keep the magnetometer as far as possible from transmitting antennas (transponder and especially comm. radio) and their coaxial cables.

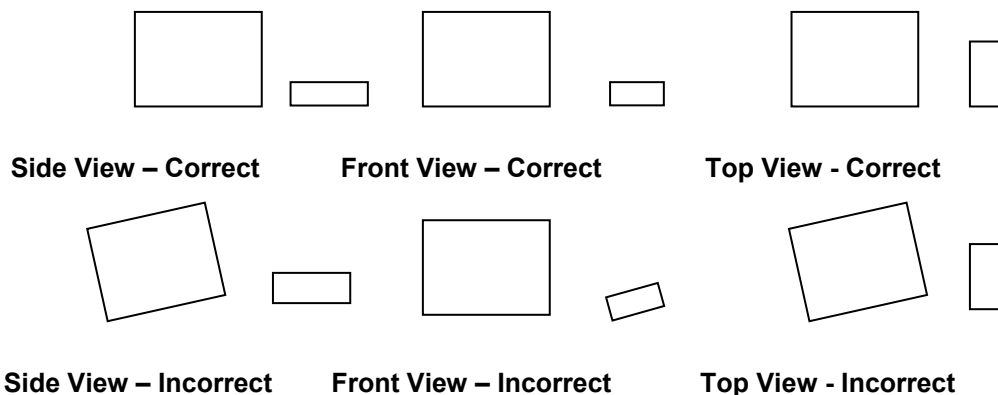
You can test your proposed magnetometer location prior to mounting the magnetometer itself by placing an ordinary compass at the spot. Then,

1. Turn on and off any electrical equipment whose wiring passes within 2 feet of the magnetometer.
2. Move the flight controls from limit to limit.
3. If the magnetometer is located within 2 feet of retractable landing gear, operate the landing gear.
4. Operate the comm. radio (transmit) and transponder (IDENT).

Observe the compass while doing each of the above. The goal is no movement, or compass movement of less than 5 degrees. If you observe greater movement, try another location. After the installation and wiring of the magnetometer and display unit(s) is complete, a more sensitive check for magnetic disturbances will be conducted.

Each magnetometer and its associated AHRS work together. **For this reason, they must be oriented in the same directions, that is, the pitch, roll and yaw axes of the magnetometer and the AHRS need to be parallel.** A standard level can be used to orient the magnetometer and AHRS such that they are equal in roll, and in pitch. For yaw, the orientation of these devices should be parallel to the fuselage centerline. In cases where the magnetometer is mounted in the wing, it may be possible to orient the magnetometer parallel to a wing rib, if these ribs are oriented in the wing such that they are parallel to the fuselage centerline. This is quite practical in airplanes such as Van's RV's. The following sketch shows this.

NOTE: Magnetometer and AHRS must be mounted in same attitude relative to each other.



There is no requirement that the Magnetometer roll, pitch or yaw axes be parallel to those of its associated display unit.

Be sure to mount the magnetometer with the connector toward the rear of the airplane. Observe the label on the magnetometer to insure it is oriented correctly.

Please refer to www.grtavionics.com Support, Documents for the latest Magnetometer Installation information.

Chapter 4 COOLING CONSIDERATIONS

The GRT Horizon EFIS does not require external cooling. However, as with all electronic equipment, lower operating temperatures extend equipment life. Units in an avionics stack heat each other through radiation, convection and sometimes by direct conduction. Even a stand- alone unit operates at a higher temperature in still air than in moving air. Fans or some other means of moving air around electronic equipment are usually worthwhile. Be certain that cooling air does not contain water – a problem often encountered when using external forced air cooling air.

The Horizon HX contains in internal cooling fan. Be sure that there is adequate air available so that it can cool the display unit.

Chapter 5 PITOT STATIC CONNECTIONS

The AHRS contains the Air Data Computer. The ADC requires connection to the aircraft pitot static system. Connections on the display unit take a 1/8 – 27 NPT male fitting. To facilitate installation and removal of the display unit, quick disconnect fittings may be helpful. Connections and the entire pitot static system must be leak tight. Refer to AC 43.13.1B for approved methods to achieve this.

Chapter 6 WIRING CONSIDERATIONS

6.1 General

The cable assemblies supplied with the EFIS includes wires that are certain to be used pre-installed in the connectors. Other connections to the EFIS, which may or may not be used, are not installed in the d-sub connectors. Colored tefzel wires with d-sub connector contacts pre-installed are included for these connections. The cable description diagrams include recommended wire colors for each connection to the EFIS components.

When routing the wiring, the following guidelines should be considered.

- Good practices for physical installation of the wiring should be followed, such as grommets where wires pass through sheet metal, considering for chaffing and interference with moving mechanisms. Please refer to FAA AC 43-13-1B, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair.
- Cable lengths should include enough extra length to allow for servicing the equipment. For example, the cables which plug into the display unit should be long enough to allow them to be connected to display unit with the display unit not installed in the instrument panel.
- In general, routing of the wiring is not critical, as the EFIS is designed to be tolerant of the electrical noise and other emissions typically found in aircraft. Some consideration should be given to avoid routing wires near antennas, or other locations that could impart high levels of electromagnetic signals on the wiring. This is especially true in composite airframes since, unlike aluminum airframes, composites offer no shielding of electromagnetic energy.
- The checkout procedures should be completed to verify the EFIS is not affected by radio transmissions on any frequency.

6.2 Power Connections

The display units each include 3 isolated power input connections. This allows redundant power sources, such as a main and secondary bus. The display units consume less than 2 amps each, making even a small 3 Amp-Hour gel cell a suitable emergency source.

The majority of the current flow into the display unit will occur on the bus with the highest voltage. So if the voltage of the main bus or power source falls below that of the secondary bus or power supply, the secondary bus will power the display units and operation will not be interrupted. Since it is desirable to not have the display units and AHRS connected to the power supply supplying power to the engine starter during the engine start (to maximize the current available for the starter, and possibly extend the life of the CCFL backlight in the display unit),

this feature allows the fitting of a small (3-5AH) auxiliary battery to one of the power input connections provide power to the EFIS during engine start. If an auxiliary battery is fitted, provisions should be made to keep it charged.

The configuration of the power supplied to the display unit(s) is left to the installer. Considerations such as the number of power buses, the desire or not to supply one piece of equipment with power from redundant buses (which in theory allows the possibility of that device being unaffected by failure of a bus), the configuration of the electrical system with respect to backup equipment, and so on, may dictate the best configuration for a particular airplane.

No provision is included within the display units for a power switch. If a power switch is desired for the EFIS, the +12V power should be controlled with the switch (not ground).

The display units include internal thermally-activated fuses. This protects the equipment from internal electrical faults. Power supplied to the EFIS must pass through an external fuse or circuit breaker. It should be sized to allow at least 2 amps per display unit, with a maximum rating of 5 amps.

The AHRS and display units monitor all of their power inputs, and alarms are available to annunciate the loss of any power source that was provided and is expected to be working according to the "General Setup" menu.

6.3 Ground Connections

The cable assembly provided includes 20 or 22 gauge wire for the ground return of the display units. This will result in a voltage drop of about 0.015 V/foot, which is acceptable for wire lengths up to 10 feet.

6.4 AHRS, Magnetometer & OAT Wiring

Typically, the AHRS & magnetometer cable supplied with the EFIS will not have a d-sub connector installed on DU or magnetometer cable end. This makes it easier to route this cable through the airplane. After the cable has been routed, the wires can be cut to length if desired, although new d-sub pins would need to be installed. If the wires are not cut, inspect the d-sub connector pins to verify they have not been damaged. Insert the indicated wire color into the appropriate d-sub connector housing hole according to the cable description diagram. If desired, the crimp-type d-sub connector can be replaced with a solder-type connector.

All magnetometer connections are made directly to the mating AHRS. This wiring includes the power connections necessary for the magnetometer to operate. Each AHRS and magnetometer pair is calibrated together for optimal accuracy, and thus this pairing should be maintained.

An OAT sensor may be connected to the AHRS package to provide OAT for true airspeed calculations. More commonly, the OAT is connected to EIS.

6.5 Other Wiring Considerations

6.5.1 Switches

Depending on the other equipment installed in the airplane, switches may be necessary or desirable for the following functions:

One may wish to install a switch to allow the autopilot to be controlled by either the EFIS, or directly from the GPS. The benefit of this switch is to allow the GPS to control the autopilot in the event the display unit which normally commands the autopilot is not functioning.

6.5.2 Warning Light Output

A warning output is provided to drive an external warning light. This output provides a path to ground when active, thus the indicator should be wired with one of its terminals to aircraft power, and the other to this output. The maximum current that can be controlled by this output is 0.2 amps.

6.5.3 Clock Power

Horizon installations require the clock to be powered at all times.

6.5.4 Audio Output

An audio output is provided. Future growth is planned to allow this output to provide a warning tone, or possibly other type of audio output. This output may be connected to a spare input on the aircraft's intercom system. Volume level will be controlled by menu settings within the display unit.

Chapter 7 CHECK OUT

7.1 Display Unit Check Out

1. Apply Power to the display unit. The LCD may flicker, and within 10 seconds, the display should show the first page.
2. If multiple power buses connect to the display unit, turn off the display unit, and apply power from each bus individually.
3. For dual or multiple display systems, repeat the above steps for the other display unit(s).

7.2 AHRS/Air Data Computer and Magnetometer Checkout Procedure

1. Apply power to the display unit.
2. Proper operation of the AHRS and magnetometer is indicated as follows:
 - a. The display unit shows altitude and airspeed tapes.
 - b. Attitude and heading data appears on the screen at the completion of the alignment period (typically less than 2 minutes).
 - c. No "ATTITUDE FAIL" message is shown on the PFD screen.
 - d. No failure messages are listed in the status page (accessible from the "Status" softkey on the PFD screen).
3. Select the "Set Menu" from the softkeys, and select the "AHRS Maintenance" page.
4. Verify AHRS communications status is valid, and AHRS status is OK. Verify the AHRS is receiving serial communications from the display unit by observing that no data fields are grayed out.
5. Scroll down this screen to the "Magnetic Heading" field. This is the raw magnetic heading sensed by the magnetometer.
6. To verify the magnetic heading is reasonable, the following conditions must be met.
 - a. The roll and pitch attitude data must be accurate.
 - b. The magnetometer must be in the same attitude as the AHRS.
 - c. The magnetometer must have been electrically connected to the AHRS when the Display Unit was turned on.
 - d. The magnetic heading should be accurate within 30 degrees for any direction in which the airplane is pointed. This can be verified by observing the "Magnetic Heading" data while positioning the airplane in different directions. If this accuracy is not achieved, it is likely due to a wiring error of the magnetometer connector, or magnetic disturbances in the vicinity of the magnetometer.
7. The magnetometer location validation should be performed. Complete calibration must also be performed prior to flight. Refer to the GRT Horizon Users Guide for complete magnetometer calibration instructions
8. For dual or multiple display systems, repeat the above steps for the other Display Unit/AHRS pairs.

Chapter 8 Magnetometer Location Validation

Select “Set Menu”, “AHRS Maintenance”, and locate the Magnetic Heading field on this screen. This shows the magnetic heading data provided by the magnetometer. (The heading data shown on the normal display screens is the gyro slaved heading, which responds slowly to magnetic heading changes.) Observe this reading and verify it does not change by more than +/- 2 degrees while doing the following:

- Turn on and off any equipment whose wiring passes within 2 feet of the magnetometer.
- Move the flight controls.
- If the magnetometer is located near retractable landing gear, operate the landing gear.
- Operate the comm. radio (transmit) and transponder (IDENT).

Before performing the magnetometer calibration procedure, the approximate accuracy of the uncorrected magnetic heading data must be checked. While the calibration procedure can remove errors as large as 125 degrees, accuracy is improved if the location chosen for the magnetometer requires corrections of less than 30 degrees. To check the accuracy of the uncorrected magnetic heading, select the magnetometer calibration page from the AHRS maintenance page by changing the selection next to "Magnetometer Calibration". While on this page, rotate the airplane 360 degrees. A red graph will appear on this page showing the errors showing the calculated errors.

If errors of greater than 30 degrees are observed, they may be caused by magnetic disturbances near the magnetometer, such as ferrous metal, magnetic fields from electric motors, radiation from transmitting antennas or the magnetometer orientation is not the same as the AHRS. (For every 1 degree of misalignment between the magnetometer and the AHRS, approximately 3 degrees of heading error can be expected.)

Location Problems

The most common cause is simply magnetic disturbances near the magnetometer. This can be caused by ferrous metal (any metal that a magnet will stick to), control cables, or cable carrying electrical currents, such as navigation or landing lights, or transmitting antennas (comm., transponder) being too close to the magnetometer. If there is any doubt about a location, try moving the magnetometer to another location. Use tape or other temporary means to hold it in place, roughly aligned with the orientation of the AHRS, and repeat the test.

Wiring Problems

1. Some wiring problems will be detected by the AHRS built-in-test functions. The will result in an AHRS Attitude Fail Message, and an "AHRS: Magnetometer X, Y or Z-Axis Failed" message on the status page that is accessed by the STATUS button from any page. If this message is present, the wiring to the magnetometer should be checked.

2. It is also possible that no built-in-test failure is reported, but the wiring is still incorrect. This can occur if the magnetometer X, Y, Z inputs are swapped. To check for this, point the airplane at various directions listed in the table below, **with the magnetometer in an approximately level position** (it may need to be removed from the airplane and held by hand). Use the AHRS Maintenance page to observe the "Magnetometer X, Y, Z Raw Data". The following should be observed.

Direction	X Raw Data*	Y Raw Data*	Z Raw Data*
Magnetic North	Positive Value above 1000	Between -500 and +500	Greater than positive 1500**
Magnetic East	Between -500 and +500	Positive Value above 1000	Greater than positive 1500**
Magnetic South	Negative Value less than -1000	Between -500 and +500	Greater than positive 1500**
Magnetic West	Between -500 and +500	Negative Value less than -1000	Greater than positive 1500**

* The raw data readings will appear to shift left and right on the screen once per second, as the sign change for a brief moment. This is normal, and the brief sign changes should be ignored when using this table of the expected readings.

** The Z Raw data will be greatly influenced by where on the earth the test is performed. Positive values will be observed in the northern hemisphere and negative values in the southern hemisphere.

Chapter 9 EQUIPMENT INTERCONNECT DETAILS

9.1 Serial Ports

9.1.1 Number

The GRT Horizon HS & WS have 6 serial ports. Serial Port 1 and Serial Port 2 are High Speed. The GRT Horizon HX has 8 high speed serial ports. The current pin outs are available in the Support, Documents section of www.grtavionics.com.

9.1.2 Configuring

Each Serial Port is configurable (Settings Menu, General Setup) as to assignment and baud rate, so the EFIS may be configured to the equipment attached to it. Detailed instructions for configuring Serial Ports are in the Horizon SetUp Guide.

9.1.3 Inter-Display Link

Display units communicate between themselves so that most entries made during flight can be made from any display unit, and will be applied to all. The data that is transmitted on the Inter-Display Unit Link is user defined (Settings Menu, General Setup). In general one should try to have data from connected equipment sent directly to each DU so that data is available in case a DU fails. However since a limited number of Serial ports are available, inevitably some data must be shared via the Inter-Display Unit Link. If possible, the GPS data from an installed panel mount GPS is connected to each DU. XM weather cannot be shared over the link. The Inter-Display Unit Communication is accomplished by connecting a serial output port to a serial input port on each display unit (WS and HS Models).

Horizon HX use Ethernet rather than Serial ports for Inter Display Unit communications. If more than two HX are connected, it is necessary to use an Ethernet Hub. An HX will share all inputs with another HX over the Ethernet link, including Weather.

9.1.4 Internal & External ARINC & GPS Modules

Each HS or WS Horizon DU can have at most one internal module installed, ARINC or GPS. The internal module is connected to Serial Port 1. If the internal module is ARINC, the ARINC module will communicate with the Horizon and also provide a Serial port for other uses. This serial port will be degraded to low speed. If the internal module is a GPS, Serial Port 1 is not available for other use.

In a dual DU system, it is common for the PFD DU to have an internal ARINC and the MFD DU to have a GPS. One might consider a second ARINC module in the MFD DU if two GNS430/530/480 receivers are installed.

All Horizon HX have a built in ARINC module whose connection is independent of the eight serial ports and does not affect the operation of Serial port 1

Horizon WS & HS DUs may be equipped with internal or external GPS or RAIM GPS modules. The Horizon HX may be equipped with an external GPS or RAIM GPS module. In all cases, the GPS module will use one serial port (In & Out). **Please note that even with RAIM GPS, the GRT Horizon EFIS does not meet the certification requirements for stand alone use for IFR flight.**

9.1.5 XM Weather

In HS or WS Horizon DUs, the GRT XM Weather Processor must be connected to a high speed serial port (1 or 2). If a DU has no internal module installed, either serial port may be used. If an internal module is installed, the GRT XM Weather Processor must be connected to Serial Port 2. In a dual display system, if you desire to display weather on both DUs, the output from the XM Weather Module must be connected to a high speed serial port IN on both displays since weather data cannot be transmitted on the Inter-Display Link. A high speed Serial port OUT from only one display is connected to the XM Weather Module and is used to control the XM weather processor.

9.1.6 AHRS to DU

Multiple display systems are supplied with one dual AHRS package. Each AHRS in the dual AHRS package has four Serial Outputs and one Serial Input. Each DU receives data from each AHRS, using two of the DUs Serial Inputs.

A DU can control only one AHRS. So a Serial Output from one DU controls one AHRS and a Serial Output from the other DU controls the other AHRS. AHRS control is used to command magnetometer calibration, to enter altimeter corrections, or update AHRS software.

Multiple display (3 or more) systems have two displays wired to a dual AHRS as described above. The other DU's are supplied a Serial In from each AHRS.

9.1.7 Engine Monitoring (EIS)

Engine monitoring (EIS) systems use one serial port IN. However, if possible, provide a serial port OUT connection for future considerations.

9.1.8 EFIS GPS General Information

Many panel mount GPS receivers require altitude and air data information. This is the same information used by transponders. It is usually Fuel/Air Data Z Format and supplied by a Serial Out port on the EFIS.

It is common to provide the EFIS with GPS data from the GPS receiver. The data may be used for GPS position (removes need for GRT GPS module) and to transmit Flight Plans from the GPS receiver to the EFIS. Panel mount GPS (GNS430 etc) are usually in GPS Aviation format while hand held GPS (GPSMAP 396 etc) are in NEMA format. The data is sent to a serial port IN.

9.1.9 HX Serial Port / Inter-Display Link / ARINC / Weather

All Horizon HX serial ports are high speed and all serial inputs, including weather are shared over the Ethernet link. All Horizon HX have a built in ARINC module whose connection is independent of the eight serial ports and does not affect the operation of Serial port 1. The Horizon HX processes XM weather data internally; it does not use the GRT XM Weather processor. The Horizon HX connects to the WX Works receiver by USB interface and cable, rather than one of the eight serial ports.

The connector diagrams on the website provide **general suggestions** for serial port assignment. You may use any serial port with baud rates compatible with the equipment connected to it. Note that the baud rate for a port is the rate for **both** input and output. A port configured for 9600 baud will receive data at 9600 baud only and will send data only at 9600 baud. Here is a table of common baud rates for commonly connected equipment.

Serial			
Unit	Baud Rate	Display Unit Format(Notes)	Unit Settings
AHRS	19200		
Inter-Display Link	19200		
GRT GPS	4800	NMEA	
GRT Weather	115200	Port 2 Horizon, Port 4 Sport	
EIS	9600		
SL30	9600		
SL40	9600		
GNS430	9600	Aviation/MapCom	Shadin FADC
GNS530	9600	Aviation/MapCom	Shadin FADC
GNS480	9600	Aviation/MapCom	Shadin FADC
GTX327	9600	FAD (Z Format)	Shadin FADC w/ ALT

GTX330	9600	FAD (Z Format)	Shadin FADC w/ ALT
GNC300	9600	Aviation/MapCom	Shadin FADC
GNC250	9600	Aviation/MapCom	Shadin FADC
TruTrak	4800 or 9600	A/P NMEA or A/PAviation	
GPSMap196	Configure?	NMEA	
GPSMap296	Configure?	NMEA	
GPSMap396	Configure?	NMEA	
MX20	Configure?		
Autopilot	Configure	NMEA	
Zaon	57600		
Zaon	9600		
CO Guardian	9600		

9.2 Analog Inputs

The GRT Horizon has 8 user configurable analog inputs. Similar to the Serial Ports, the Analog Inputs may be configured to fit the attached equipment. Common uses include such items as Flap Position, Trim Position etc, although any 0-12 volt signal may be displayed. See www.grtavionics.com Support, Documents for more details.

9.3 USB Port

Each HS & WS display unit has a USB port on the rear. It is used to record flight data to a memory stick (also called a USB drive) and to load software updates from a memory stick. USB extension cables are available so that a receptacle for a USB memory stick can be located at a convenient place in the cockpit.

The GRT Horizon HX has two USB ports. Both are master ports. One may be used to interface to the XM weather receiver (GRT XM Weather processor not used) while the other is used to record flight data or to load software.

9.4 ARINC Interface

9.4.1 General

The optional (Horizon HS & WS) ARINC interface provides additional features to interface with GPS receivers and autopilots. The GRT Horizon HX comes standard with the ARINC interface. The connections are made via 9 pin D Sub connector. Please refer to www.grtavionics.com for up to date details.

The ARINC 429 adapter provides 2 serial inputs and 1 serial output that conform to the ARINC 429 serial communication standard. The inputs may be configured for various uses according to the other equipment installed in the airplane as described below. Each input may be configured for any of the possible functions.

The ARINC 429 output is used by the EFIS to generate data usable by a variety of equipment, such as autopilots and GPS receivers. The ARINC 429 output can be connected to as many ARINC 429 inputs (receivers) as desired, GNS430 and Autopilot for example.

GRT Horizon uses of ARINC include control of an autopilot using GPSS/GPSV mode, to accept TIS information from a GTX 330 transponder, and exchange of information with GPS and Nav receivers.

9.4.2 ARINC Check Out

If the ARINC 429 input and/or outputs are wired, these interfaces must be verified.

ARINC 429 Inputs

1. Select the "SET MENU", "Display Unit Maintenance" menu. Scroll down near the end of this menu to locate the "ARINC Status" setting. Select the ARINC Status menu by selecting the "Change to activate menu", and pushing the knob.

This menu will show if data is being received, and if it is valid. If the ARINC Counter is changing for each input that has been wired to equipment in the airplane, and this equipment is transmitting ARINC data, the counter will be increasing. The counter can increase even if the input is wired backwards, so the data must also be verified.

Verifying Valid Data

The status menu will show labels for data it expects to receive. For each device that sends ARINC data to the EFIS, if any data can be confirmed, the interface can be assumed 100% functional. For example, if a Garmin 430 is wired to the EFIS, it will send the VOR/ILS frequency tuned on the radio. If the ARINC status page shows the same frequency displayed on the G430, the interface is functional.

Troubleshooting

If the counter is not changing, the device that transmits the data is not sending data, or the electrical connection is open circuit for one of both of the 429 electrical connections.

If the counter is counting, but no valid data is observed, the two 429 electrical connections are reversed, or are not from the same ARINC output.

9.5 HX Wiring

The HX Horizon has the same 25 pin d sub connectors as do the HS & WS Horizons and all the pin connections are identical. So if HS or WS displays are being replaced by HX displays, merely copy the configuration data to a memory stick (Settings Menu, Display Unit Maintenance), change the displays and copy the old configuration to the HX displays.

If HX DUs are being installed in a new install, to take full advantage of the current and planned features of the HX Horizon,

1. Use the provided Ethernet ports for Inter-Display Link.
2. Connect Wx Worx XM Weather receiver (no GRT Processor) to one of the USB ports.

Connect peripheral equipment to Serial Ports and Analog Inputs in accordance with documentation.

9.6 Commonly Connected Equipment

Here is connection information for commonly connected equipment.

9.6.1 Localizer/Glideslope

The localizer/glideslope deviation indicators (scales or needles) provided on the EFIS can be driven from any Garmin ILS/GS receiver or combination Nav/GPS receivers (GNS430/530,480, etc). ARINC interface is not required. Specific wiring recommendations are provided for GNS430/530/480 systems below.

When Nav receivers are connected to the EFIS, the localizer and glideslope deviation and flag connections are made to the EFIS localizer/glideslope deviation and flag inputs. If the Nav receiver includes an "ILS Tuned" output, indicating an ILS frequency is selected on the Nav radio, connect this to an Analog input on the Display unit (Analog 1 recommended) as shown in the following tables.

These inputs require practically no power from the Nav receiver's outputs, allowing the Nav receiver to be wired to as many display units as desired. Nav heads may also be wired to these connections.

For redundancy purposes, it is desirable to connect these signals to all display units.

Note that the operation of the HSI for VOR and GPS indications is performed within the Horizon, independent of the Nav receiver.

Display Unit Connector A Connections

Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	Notes
A-6	Localizer Deviation + Left Input	
A-7	Localizer Deviation + Right Input	
A-8	Glideslope Deviation + Down	
A-9	Glideslope Deviation + Up	
A-10	Localizer Valid – Input	
A-11	Localizer Valid + Input	
A-12	Glideslope Valid – Input	
A-13	Glideslope Valid + Input	

Display Unit Connector B Connections

Mating Connector: 25-pin Male D-sub (Instrument has 25-pin Female D-sub)

EFIS Display Unit Pin	Function	Notes
B-21	Analog Input 1 – ILS Tuned Input	Pull-Up Required**

** Pull-Up required indicates a pull-up resistor is required. If this input is also connected to another system, such as a Nav head, the pull-up resistor is not required as long as this other system is installed. If this signal is not shared with other systems, a 10k ohm resistor, connected with one lead to aircraft 12V power, and the other lead “tee-d” into this connection is required.

9.6.2 Garmin GNS430 / GNS530 / GNS430W / GNS530W

Note: In this Chapter (9.6.2), wherever Garmin GNS430 is used, it applies to any of the four receivers, GNS430, GNS430W, GNS530 or GNS530W.

The following guidelines are provided for reference purposes only. They provide suggested methods for connecting this GPS to the EFIS display unit to allow optimal performance of both units.

The interface between this GPS and the EFIS allows for:

- GPS position, groundspeed and ground track to be provided to the EFIS.
- GPS flight plan data to the EFIS (although curved paths such as DME arcs, procedure turns and holding patterns are not displayed)

- Display of Localizer/Glideslope data on the EFIS
- Display of GPS CDI data to the EFIS in the same format as localizer data
- Transmission of air and fuel data to the GPS to allow RAIM integrity monitoring, and other functions within the GPS related to fuel management, etc.
- With the optional ARINC 429 interface, full VOR functionality is provided on the EFIS, and selected course is transmitted to the GNS430 from the EFIS when the OBS selection on the GNS430 is on.

9.6.2.1 GPS Data to EFIS

The Garmin GNS430 must be configured for “AVIATION” output on one its serial output channels. This output is connected to a serial input of the DU(s) (Serial Input 5 is suggested), and the DU input configured as “AVIATION” input at 9600 baud. For redundancy, this input should be provided to each DU. This connection provides GPS position, groundspeed, ground track and flight plan data to the EFIS.

9.6.2.2 EFIS to GPS Data

Configure the DU for Fuel/Air Data Z Format on one of its serial outputs (Serial 6 Out is suggested), and connect this serial output to one of the 4 serial inputs to the Garmin GNS430. Configure the Garmin GNS430 for “Shadin FADC” (9600 baud) on this input. This will allow fuel and air data to be supplied to the GPS, allowing the RAIM integrity monitoring, and other functions to operate in the GPS.

9.6.2.3 Localizer / Glideslope Data

To display VOR data on the EFIS, the optional ARINC 429 interface is required. See Chapter 9.6.2.6 below. However, Localizer/GS information may be displayed without ARINC. See Chapter 9.6.1 above. In multiple Horizon systems, usually DUs other than the PFD are wired and configured to display this data in the event the display unit with the ARINC 429 module, or its inter-display unit communication, fails.

9.6.2.4 Display Unit to GNS430 Analog Connections

Connector A Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	Garmin 430 Connector-Pin	Notes
A-1	Serial Out 6 – RS232 Out (This is the recommended serial output to be configured as “Fuel/Air Data”	Any of the RS-232 serial inputs	

	output to the GNS-430.)		
A-6	Localizer Deviation + Left Input	P4001-21*	
A-7	Localizer Deviation + Right Input	P4001-22*	
A-8	Glideslope Deviation + Down	P4001-28*	
A-9	Glideslope Deviation + Up	P4001-27*	
A-10	Localizer Valid – Input	P4001-24*	
A-11	Localizer Valid + Input	P4001-23*	
A-12	Glideslope Valid – Input	P4001-30*	
A-13	Glideslope Valid + Input	P4001-29*	
A-22	Serial Input 5 – RS232 GPS Data In (Aviation Format) (Suggested Port)	Any one of the RS-232 serial outputs	

*These connections are not required on a DU with an ARINC 429 Module installed and the GNS430 VOR/ILS/GS ARINC output connected to the ARINC 429 Module. These connections should be made to all display units which do not include the ARINC 429 Module so that this data is provided to the display unit in the event the display unit with the ARINC429 module, or its inter-display unit communication, fails.

Connector B Mating Connector: 25-pin Male D-sub (Instrument has 25-pin Female D-sub)

EFIS Display Unit Pin	Function	Garmin 430 Connector-Pin	Notes
B-21	Analog Input 1– Reserved for future growth/ILS Tuned Input	P4006-29*	Pull-Up Required**
B-20	Analog Input 2 – GPS Deviations Active (true when low)	P4001-2*	Pull-Up Required**
B-19	Analog Input 3 – VOR/ILS Deviations Active (true when low)	P4001-1*	Pull-Up Required**
B-18	Analog Input 4 - OBS Select (this connection may not be required)	P4001-7*	Pull-Up Required**

*These connections are not required on a DU with an ARINC 429 Module installed and the GNS430 VOR/ILS/GS ARINC output connected to the ARINC 429 Module. These connections should be made to all display units which do not include the ARINC 429 Module so that this data is provided to the display unit in the event the display unit with the ARINC429 module, or its inter-display unit communication, fails.

** Pull-Up required indicates a pull-up resistor is required. If this input is also connected to another system, such as a Nav head, the pull-up resistor is not required as long as this other system is installed. If this signal is not shared with other systems, a 10k ohm resistor, connected with one lead to aircraft 12V power, and the other lead “tee-d” into this connection is required.

9.6.2.5 Configuring the Display Unit for GNS430 Analog Inputs

The display unit must be configured according to the following table to enable it to read the above analog signals.

Set Menu Page	Setting	Value
General Setup	Analog 1 Function	ILS Tuned
General Setup	Discrete 1 Active Voltage	Low
General Setup	Analog 2 Function	GPS Deviation Active
General Setup	Discrete 2 Active Voltage	Low
General Setup	Analog 3 Function	VOR/ILS Deviations Active
General Setup	Discrete 3 Active Voltage	Low
General Setup	Analog VOR/ILS Inputs	Nav1 (or Nav2 if this display unit is wired to Nav receiver 2.)
General Setup	Serial Port 6 Out (Suggested Port)	Fuel/Air Data Z Format
General Setup	Serial Port 6	Rate 9600
General Setup	Serial Port 5 In (Suggested Port)	GPS Aviation
General Setup	Serial Port 5	Rate 9600

9.6.2.6 Display Unit to GNS430 ARINC 429 Connections for VOR/ILS/GS

The following connections to the GNS430 allow the EFIS to receive VOR/ILS/GS navigation information from the GNS430 via ARINC. The data transmitted to the EFIS also includes ILS data, making it unnecessary to connect the analog localizer and glideslope deviation and validity signals (connections shown in tables above except for Serial 6 Out, Fuel/Air Data and Serial 5 In, GPS Aviation).

ARINC 429 Adapter Pin	Function	GNS430 Pin	GNS430 Function
C-3 (or C-1)*	VOR/ILS Input	J4006-24	ARINC 429 A - VOR/ILS Output
C-4 (or C-2)*	VOR/ILS Input	J4006-23	ARINC 429 B - VOR/ILS Output
C-5	EFIS Output May also connect to other devices, such as an autopilot	J4001-48** ARINC IN 1A (J4001-50 ARINC IN 2A)	ARINC 429 A Channel 1 EFIS Input.
C-9	EFIS Output May also connect to other devices, such as an autopilot	J4001-49** ARINC IN 1B (J4001-51 ARINC IN 2B)	ARINC 429 B - Channel 1 EFIS Input.

* C-3, C-4 must be used as a pair, or C-1, C-2 must be used as a pair.

** If this input to the G430 is used by other equipment, the other ARINC 429 input may be used.

If desired, the ARINC output wires from the EFIS may connect to a switch for the autopilot data source as mentioned in Chapter 6.5.1. See Chapter 9.6.10 for more detail.

9.6.2.7 Configuring the Display Unit for ARINC Data Input (VOR/ILS/GS)

The display unit must be configured according to the following table to enable it to read the above ARINC signals:

Set Menu Page	Setting	Value
General Setup	ARINC Module Connected*	Yes
General Setup	ARINC Receive Rate*	Low (A/P Dependent)
General Setup	ARINC Transmit Rate	Low
General Setup	ARINC VOR/ILS Inputs*	Nav1 (or Nav 2 if this display unit is connected to number 2 GNS430/530)

9.6.2.8 Configuring the GNS430

Refer to the GNS430 installation manual, and configure the serial input used to receive fuel / air data for FADC w/ALT format, and the serial output used to send GPS data for “Aviation” format.

Setting	Value
RS232 Input - Channel used for fuel/air data input from display unit.	Shadin-FADC
RS232 Output - Channel Used for GPS Output to display unit.	Aviation
VOR/LOC/GS ARINC 429 - TX	Low (Autopilot Requirement)
VOR/LOC/GS ARINC 429 - RX	Low (Autopilot Requirement)
ARINC429 Input - Channel 1 (or the channel connected to ARINC429 Module Output)	Speed Low Speed Data EFIS/Airdata (Provides selected course and air data.)

9.6.2.9 Display Unit to GNS430 ARINC 429 for GPS

Since the Horizon database does not contain approach information, the Horizon cannot provide lateral steering for procedure turns, DME arcs, holding patterns etc. However, the GNS430 can provide GPS position, flight plan data, lateral deviation, vertical deviation, roll commands and mode selection to the Horizon over an additional ARINC connection (ARINC GPS), just like the VOR/ILS/GS ARINC connection. This information allows the EFIS to provide VNAV functions for an approach and follow roll commands from the GNS430 while still controlling pitch commands. This eliminates the need for analog inputs for deviation and requires less switching of the autopilot output between the EFIS and the GNS430. With this feature, the external switch (see Chapter 6.5.1) can be left in the EFIS position unless there is an EFIS failure. See the Horizon Users Manual, Chapter 5.3.1, GNAV for how to use these features.

9.6.2.10 Display Unit to GNS430 ARINC 429 Connections for GPS

ARINC 429 Adapter Pin	Function	GNS430 Pin	GNS430 Function
C-1	GPS Input	J4001-46	ARINC 429 A - GPS Output May also connect to other devices, such as an autopilot
C-2	GPS Input	J4001-47	ARINC 429 B – GPS Output May also connect to other devices, such as an autopilot

If desired, the ARINC output wires from the GNS430 may connect to a switch for the autopilot data source as mentioned in Chapter 6.5.1. See Chapter 9.6.10 for more detail.

9.6.2.11 Configuring the Display Unit for ARINC Data Input (GPS)

The display unit must be configured according to the following table to enable it to read the above ARINC signals:

Set Menu Page	Setting	Value
General Setup	ARINC Receive Rate*	To match GNS430 rate
General Setup	ARINC GPS Inputs*	GPS1 (or GPS 2 if this display unit is connected to number 2 GNS430/530)

9.6.2.12 Configuring the GNS430 for ARINC (GPS)

Refer to the GNS430 installation manual, and configure the serial input used to receive fuel / air data for FADC w/ALT format, and the serial output used to send GPS data for “Aviation” format.

Setting	Value
RS232 Input - Channel used for fuel/air data input from display unit.	Shadin-Fadc
RS232 Output - Channel Used for GPS Output to display unit.	Aviation
ARINC CONFG OUT DATA	GAMA 429
ARINC CONFG SPEED	Match VOR/LOC/GS output
ARINC CONFG VNAV	Enable labels
ARINC CONFG SDI	LNAV 1

9.6 3 Garmin GNS480

The following guidelines are provided for reference purposes only. They provide

suggested methods for connecting this GPS to the EFIS display unit to allow optimal performance of both units.

The interface between this GPS and the EFIS allows for:

- GPS position, groundspeed and ground track to be provided to the EFIS.
- GPS flight plan data to the EFIS (although curved paths such as DME arcs, procedure turns and holding patterns are not displayed)
- Display of Localizer/Glideslope data on the EFIS
- Display of GPS CDI data to the EFIS in the same format as localizer data
- Transmission of air and fuel data to the GPS to allow RAIM integrity monitoring, and other functions within the GPS related to fuel management, etc.
- With the optional ARINC 429 interface, full VOR functionality is provided on the EFIS, and selected course is transmitted to the 480 from the EFIS when the OBS selection on the 480 is in

9.6.3.1 GPS Data to EFIS

The Garmin 480 must be configured for “MAPCOM” output on one its serial output channels. This output is connected to a serial input of the display unit(s) (serial input 5 is recommended), and the input configured as “AVIATION” input at 9600 baud. This connection provides GPS position, groundspeed, ground track and flight plan data to the EFIS.

9.6.3.2 EFIS to GPS Data

Configure the display unit for Fuel/Air Data Z Format on one of its serial outputs, and connect this serial output to one of the 3 serial inputs to the Garmin 480. Configure the Garmin 480 for “FADC” (9600 baud) on this input. This will allow fuel and air data to be supplied to the GPS, allowing the RAIM integrity monitoring, and other functions to operate in the GPS.

9.6.3.3 Localizer / Glideslope Data

To display VOR data on the EFIS, the optional ARINC 429 interface is required. See Chapter 9.6.4.6 below. However, Localizer/GS information may be displayed without ARINC. See Chapter 9.6.1 above. In multiple Horizon systems, usually DUs other than the PFD are wired and configured to display this data in the event the display unit with the ARINC 429 module, or its inter-display unit communication, fails.

9.6.3.4 Display Unit to GNS480 Analog Connections

Connector A Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	Garmin 480 Connector-Pin	Notes
A-1	Serial Out 6 – RS232 Out (This is the recommended serial output to be configured as “Fuel/Air Data” output to the GNS-480.)	Any of the RS-232 serial inputs	
A-6	Localizer Deviation + Left Input	P7-14*	
A-7	Localizer Deviation + Right Input	P7-13*	
A-8	Glideslope Deviation + Down	P7-31*	
A-9	Glideslope Deviation + Up	P7-30*	
A-10	Localizer Valid – Input	P7-29*	
A-11	Localizer Valid + Input	P7-10*	
A-12	Glideslope Valid – Input	P7-32*	
A-13	Glideslope Valid + Input	P7-13*	
A-22	Serial Input 5 – RS232 GPS Data In (Aviation Format) (Suggested Port)	Any one of the RS-232 serial outputs	

*These connections are not required on a DU with an ARINC 429 Module installed and the GNS480 VOR/ILS/GS ARINC output connected to the ARINC 429 Module. These connections should be made to all display units which do not include the ARINC 429 Module so that this data is provided to the display unit in the event the display unit with the ARINC429 module, or its inter-display unit communication, fails.

Connector B Mating Connector: 25-pin Male D-sub (Instrument has 25-pin Female D-sub)

EFIS Display Unit Pin	Function	Garmin 430 Connector-Pin	Notes
B-21	Analog Input 1 – Reserved for future growth/ILS Tuned Input	P5-68*	Pull-Up Required**
B-20	Analog Input 2 – GPS Deviations Active (true when low)	P7-17*	Pull-Up Required**
B-19	Analog Input 3 – VOR/ILS Deviations Active (true when low)	P7-18*	Pull-Up Required**

*These connections are not required on a DU with an ARINC 429 Module installed and the GNS480 VOR/ILS/GS ARINC output connected to the ARINC 429 Module. These connections should be made to all display units which do not include the ARINC 429 Module so that this data is provided to the display unit in the event the display unit with the ARINC429 module, or its inter-display unit communication, fails.

**Pull-Up required indicates a pull-up resistor is required. If this input is also connected to another system, such as a Nav head, the pull-up resistor is not required as long as this other system is installed. If this signal is not shared with

other systems, a 10k ohm resistor, connected with one lead to aircraft 12V power, and the other lead “tee-d” into this connection is required.

9.6.3.5 Configuring the Display Unit for GNS480 Analog Inputs

The display unit must be configured according to the following table to enable it to read the above analog signals.

Set Menu Page	Setting	Value
General Setup	Analog 1 Function	ILS Tuned
General Setup	Discrete 1 Active Voltage	Low
General Setup	Analog 2 Function	GPS Deviation Active
General Setup	Discrete 2 Active Voltage	Low
General Setup	Analog 3 Function	VOR/ILS Deviations Active
General Setup	Discrete 3 Active Voltage	Low
General Setup	Analog VOR/ILS Inputs	Nav1 (or Nav2 if this display unit is wired to Nav receiver 2.)
General Setup	Serial Port 6 Out (Suggested Port)	Fuel/Air Data Z Format
General Setup	Serial Port 6	Rate 9600
General Setup	Serial Port 5 In (Suggested Port)	GPS Aviation
General Setup	Serial Port 5	Rate 9600

9.6.3.6 Display Unit to GNS480 ARINC 429 Connections for VOR/ILS/GS

The following connections to the GNS480 allow the EFIS to receive VOR/ILS/GS navigation information from the GNS480 via ARINC. The data transmitted to the EFIS also includes ILS data, making it unnecessary to connect the analog localizer and glideslope deviation and validity signals.

ARINC 429 Adapter Pin	Function	GNS480 Pin	GNS480 Function
C-3 (or C-1)*	VOR/ILS Input	P5-4	ARINC 429 A - VOR/ILS Output
C-4 (or C-2)*	VOR/ILS Input	P5-24	ARINC 429 B - VOR/ILS Output
C-5	EFIS Output May also connect to other devices, such as an autopilot	P5-7	ARINC 429 A EFIS Input.
C-9	EFIS Output May also connect to other devices, such as an autopilot	P5-27	ARINC 429 B – EFIS Input.

* C-3, C-4 must be used as a pair, or C-1,C-2 must be used as a pair.

If desired, the ARINC output wires from the EFIS may connect to a switch for the autopilot data source as mentioned in Chapter 6.5.1. See Chapter 9.6.10 for

more detail.

9.6.3.7 Configuring the Display Unit for ARINC Data Input (VOR/ILS/GS)

The display unit must be configured according to the following table to enable it to read the above ARINC signals:

Set Menu Page	Setting	Value
General Setup	ARINC Module Connected*	Yes
General Setup	ARINC Receive Rate*	Low (A/P Dependent)
General Setup	ARINC VOR/ILS Inputs*	Nav1 (or Nav 2 if this display unit is connected to number 2 GNS480)

9.6.3.8 Configuring the GNS480

Refer to the GNS480 installation manual, and configure serial input for data from EFIS for the FADC w/ALT format, and serial output for data to EFIS for “GPS Aviation” format.

Setting	Value
RS232 Input - Channel used for fuel/air data input from display unit.	Fadc
RS232 Output - Channel Used for GPS Output to display unit.	MapCom
VOR/LOC/GS ARINC 429 - TX	Low (A/P Dependent)
VOR/LOC/GS ARINC 429 - RX	Low (A/P Dependent)
ARINC429 Input	Speed Low Speed Data EFIS/Airdata (Provides selected course and air data.)

9.6.3.9 Display Unit to GNS480 ARINC 429 for GPS

Since the Horizon database does not contain approach information, the Horizon cannot provide lateral steering for procedure turns, DME arcs, holding patterns etc. However, the GNS480 can provide GPS position, flight plan data, lateral deviation, vertical deviation, roll commands and mode selection to the Horizon over an additional ARINC connection (ARINC GPS), just like the VOR/ILS/GS ARINC connection. This information allows the EFIS to provide VNAV functions for an approach and follow roll commands from the GNS480 while still controlling pitch commands. This eliminates the need for analog inputs for deviation and requires less switching of the autopilot output between the EFIS and the GNS480. With this feature, the external switch (see Chapter 6.5.1) can be left in the EFIS position unless there is an EFIS failure. See the Horizon Users Manual, Chapter 5.3.1, GNAV for how to use these features.

9.6.3.10 Display Unit to GNS480 ARINC 429 Connections for GPS

ARINC 429 Adapter	Function	GNS480 Pin	GNS480 Function
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Pin			
C-1	GPS Input	P5-5	ARINC 429 A - GPS Output May also connect to other devices, such as an autopilot
C-2	GPS Input	P5-25	ARINC 429 B – GPS Output May also connect to other devices, such as an autopilot

If desired, the ARINC output wires from the GNS480 may connect to a switch for the autopilot data source as mentioned in Chapter 6.5.1. See Chapter 9.6.10 for more detail.

9.6.3.11 Configuring the Display Unit for ARINC Data Input (GPS)

The display unit must be configured according to the following table to enable it to read the above ARINC signals:

Set Menu Page	Setting	Value
General Setup	ARINC Receive Rate*	To match GNS480 rate
General Setup	ARINC GPS Inputs*	GPS1 (or GPS 2 if this display unit is connected to number 2 GNS480)

9.6.3.12 Configuring the GNS480

Refer to the GNS480 installation manual, and configure serial input 1 for the FADC w/ALT format, and serial output 2 for “GPS” format.

Setting	Value
RS232 Input - Channel used for fuel/air data input from display unit.	Fadc
RS232 Output - Channel Used for GPS Output to display unit.	MapCom
ARINC CONFG OUT DATA	GAMA 429
ARINC CONFG SPEED	Match VOR/LOC/GS output
ARINC CONFG VNAV	Enable labels
ARINC CONFG SDI	LNAV 1

9.6.4 GPS 155XL / GNC 300XL

The following guidelines are provided for reference purposes only. They provide suggested methods for connecting this GPS to the EFIS display unit to allow optimal performance of both units.

The interface between this GPS and the EFIS allows for:

- GPS position, groundspeed and ground track to be provided to the EFIS.

- GPS flight plan data to the EFIS, although curved paths (such as DME arcs, procedure turns, holding patterns) are not displayed at this time.
- Display of GPS lateral (cross-track or CDI) deviation data.
- Ability to set course in to a GPS waypoint
- Transmission of air and fuel data to the GPS to allow RAIM integrity monitoring, sequencing of altitude dependent type waypoints, and other functions within the GPS related to fuel management, etc.
- For EFIS installations that include the ARINC 429 interface, selected course and magnetic heading data is sent to the GPS and CDI scaling can be read from the GPS.

Use of GPS 155XL / GNC 300XL with Horizon EFIS will require use of an external annunciator panel such as Garmin / Mid Continent MD41 to indicate GPS mode.

9.6.4.1 GPS Data to EFIS

The Garmin GPS155XL / GNC300XL must be configured for “AVIATION” output on one its serial output channels. This output is connected to a serial input of the DU(s) (serial input 5 is recommended), and the DU input configured as “AVIATION” input at 9600 baud. For redundancy, this input should be provided to each DU. This connection provides GPS position, groundspeed, ground track and flight plan data to the EFIS.

9.6.4.2 EFIS to GPS Data

Configure the display unit for Fuel/Air Data Z Format on one of its serial outputs, and connect this serial output to one of the to the GPS155XL / GNC300XL serial inputs. Configure the GPS for “Shadin Fuel” (9600 baud) on this input. This will allow fuel and air data to be supplied to the GPS, allowing the RAIM integrity monitoring, and other functions to operate in the GPS.

Alternative EFIS to GPS Data Connections

Alternatively, RS232 serial altitude encoder data that is transmitted to the transponder can also be wired to the GPS instead of the fuel/aid data output. This may limit the amount of data is provided to the GPS to accommodate the needs of the transponder (resulting in less functionality in the GPS), this does allow the possibility of using 1 less serial output from the display unit. Although not conforming to the RS-232 specification, it is usually acceptable to connect this output to both the GPS, and a transponder.

9.6.4.3 No ARINC Operation

For full control of the GPS receiver, the optional ARINC 429 interface is required. See Chapter 9.6.4.6 below. Limited information may be displayed without ARINC. In multiple Horizon systems, usually DUs other than the PFD are wired and configured to display this data in the event the display unit with the ARINC 429 module, or its inter-display unit communication, fails.

9.6.4.4 Display Unit / GPS155XL / GNC300XL Analog Connections

Connector A Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	GPS155XL/GNC300XL Connector-Pin
A-1	Serial Out 6 – RS232 Out (This is the recommended serial output to be configured as “Fuel/Air Data” output to the GNS-430.)	Any of the RS-232 serial inputs
A-6	CDI + Left Input	P101-1*
A-7	CDI + Right Input	P101-4*
A-8	TO +	P101-2*
A-9	FROM +	P101-4*
A-10	Flag -	P101-4*
A-11	Flag +	P101-3*
A-22	Serial Input 5 – RS232 GPS Data In (Aviation Format) (Suggested Port)	Any one of the RS-232 serial outputs

These connections are not required on a DU with an ARINC 429 Module installed and the GPS155XL/GNC300XL GPS ARINC output connected to the ARINC 429 Module. These connections should be made to all display units which do not include the ARINC 429 Module so that this data is provided to the display unit in the event the display unit with the ARINC429 module, or its inter-display unit communication, fails. These signals may also be connected to a conventional Nav head, without the need for any special considerations such as isolation diodes, or the like.

Connector B Mating Connector: 25-pin Male D-sub (Instrument has 25-pin Female D-sub)

EFIS Display Unit Pin	Function	GPS155XL/GNC300XL Connector-Pin	Notes
B-18	Analog 1 ILS Tuned)	J101-10*	Pull-Up Required** Connects also to Garmin MD41 Switch/Annunciator panel, pin 9

* This connection is not required if the ARINC 429 interface is used, and connected to the GPS ARINC 429 Output from the GPS. This signal may also be connected to a conventional Nav head, without the need for any special

considerations such as isolation diodes, or the like.

** Pull-Up required indicates a pull-up resistor is required. If this input is also connected to another system, such as a Nav head, the pull-up resistor is not required as long as this other system is installed. If this signal is not shared with other systems, a 10k ohm resistor, connected with one lead to aircraft 12V power, and the other lead “tee-d” into this connection is required.

9.6.4.5 Configuring the Display Unit for GPS155XL/GNC300XL Analog Input

The display unit must be configured according to the following table to enable it to read the above analog signal.

Set Menu Page	Setting	Value
General Setup	Analog 1 Function	ILS Tuned
General Setup	Discrete 1 Active Voltage	Low

9.6.4.6 Display Unit to GPS155XL/GNC300XL ARINC 429 Connections (GPS)

At the time of this writing it is believed that ARINC 429 connections to the GPS are required or GNC300XL will error out. The benefits of using the ARINC 429 interface are as follows:

- CDI scaling information is provided directly by the GPS. Without this scaling information, the EFIS attempts to duplicate the scaling based flight plan data.
- Selected Course Data is provided to the GPS from the EFIS. This allows the CDI analog output of the GPS to operate correctly when waypoint sequencing is in the "HOLD" state.
- Magnetic Heading information is provided to the GPS.

The following connections allow the EFIS and GPS155XL/GNC300XL to share information via the ARINC interface.

ARINC 429 Adapter Pin	Function	GPS155XL/GNC300XL Pin	GPS155XL/GNC300XL Function
C-3 (or C-1)*	GPS Input	J101-16	ARINC 429 A - GPS Output
C-4 (or C-2)*	GPS Input	J101-15	ARINC 429 B - GPS Output
C-5	EFIS Output May also connect to other devices, such as an autopilot	J101-32	ARINC 429 A Channel 1 EFIS Input.
C-9	EFIS Output May also connect to other devices, such as an autopilot	J101-33	ARINC 429 B - Channel 1 EFIS Input.

* C-3, C-4 must be used as a pair, or C-1,C-2 must be used as a pair.

9.6.4.7 Configuring the Display Unit for ARINC Data Input

Set Menu Page	Setting	Value
General Setup	ARINC Module Connected	Yes
General Setup	ARINC Receive Rate*	Low
General Setup	ARINC GPS Inputs*	GPS1 (or GPS 2 if this display unit is connected to number 2 GPS155XL/GNC300XL)

The display unit must be configured for "LOW" speed ARINC data. Note that since both ARINC input channels must be configured for the same rate, and since traffic data provided by the GNX330 is high speed, it is not possible to connect this GPS and the GTX330 transponder into the same ARINC 429 interface.

9.6.4.8 Configuring the GPS155XL/GNC300XL

The GPS must be configured with its ARINC 429 output as "Collins PL2 EFS" or "King EFS 40/50".

9.6.5 Altitude Encoder

Horizon WS & HS DUs have Gray code encoding outputs for transponders that require this format. These outputs are provided on connector B. Each output (such as A1, A2, A4, etc.) from the display unit connects to the corresponding input (A1, A2, A4, etc.) of the transponder.

Gray code outputs are not available on Horizon HX. Encoding data must be sent using RS232 encoding information as described in the next paragraph. Most transponders accept RS232 serial data as described next.

9.6.6 GTX327 Transponder

The EFIS can provide altitude encoding data to this transponder. The data must be provided via a serial data output, as the gray code input to these transponders is not compatible with the gray code output provided by the EFIS.

9.6.6.1 Display Unit Connector A Connections to the Garmin GTX327

Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	GTX327 Connector 3271 Pin Number	Notes
A-1	Serial Output 6	19	Provides Altitude Encoding Data to

	(Suggested Port)		Transponder. This output may also be wired to other devices (GNS430/530) requiring this data.
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9.6.6.2 Configuring the GTX327

Refer to the GTX327 installation manual, and configure serial input 1 for the FADC w/ALT format.

Setting	Value
RS232 Input - Channel 1	FADC w/ALT

9.6.6.3 Configuring the Display Unit

Use the "Settings Menu", "General Setup", to select the following:

Setting	Value
Serial Port 6 Output (Suggested Port)	Fuel/Air Data (Z Format)
Serial Port 6 Rate	9600

9.6.7 GTX 330 Transponder

The EFIS can provide altitude encoding data to this transponder. The data must be provided via a serial data output, as the gray code input to these transponders is not compatible with the gray code output provided by the EFIS. This transponder also provides traffic information to the EFIS. Traffic (TIS) may be sent via RS232 Serial link or ARINC.

9.6.7.1 Display Unit Connector A Connections to the Garmin GTX330

Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	GTX330 Connector 3301 Pin Number	Notes
A-1	Serial Output6 (Suggested Port)	24	Provides Altitude Encoding Data to Transponder.
A-24	Serial Input 6 (Suggested Port)	25	Receives TIS data from Transponder.

9.6.7.2 Configuring the GTX330

Refer to the GTX330/330D installation manual, and configure it as follows:

Setting	Value
RS232 Input - Channel 2	FADC w/ALT

RS232 Output - Channel 2	Remote + TIS
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9.6.7.3 Configuring the Display Unit

Use the "Settings Menu", "General Setup", to select the following:

Setting	Value
Serial Port 6 In (Suggested Port)	Garmin TIS
Serial Port 6 Output (Suggested Port)	Fuel/Air Data (Z Format)
Serial Port 6 Rate	9600

9.6.7.4 ARINC

Alternatively, TIS information may be transmitted via ARINC interface.

9.6.7.4.1 Connections with ARINC

GTX330 Connector P3301 Pin Number	Function	EFIS Pin	Notes
30	Traffic Out	ARINC C1 or (C3)*	ARINC Traffic
28	Traffic Out	ARINC C2 or (C4)*	ARINC Traffic
24	Fuel/Air Data In	A1	EFIS Serial 6 Out (Suggested Port)
25**	Traffic Out	A24	EFIS Serial 6 In (Suggested Port)

* C-3, C-4 must be used as a pair, or C-1, C-2 must be used as a pair

** If no ARINC input available on EFIS, use Serial connection.

9.6.7.4.2 Configuring the Display Unit

Use the "Settings Menu", "General Setup", to select the following:

Setting	Value
Serial Port 6 In**(Suggested Port)	Garmin TIS
Serial Port 6 Output (Suggested Port)	Fuel/Air Data (Z Format)
Serial Port 6 Rate	9600
ARINC Module Connected	Yes
ARINC Receive Rate	High
ARINC In 1 Function	GTX330 Traffic

** If no ARINC input available on EFIS, use Serial connection.

9.6.8 Other GPS (GPSMAP496, Lowrance etc)

The EFIS can accept and display GPS data including flight plans. Most panel mount GPS supply data in GPS Aviation / MapCom format. Most hand held GPS (GPSMAP496 etc) supply data in NMEA 0183 format.

9.6.8.1 Display Unit Connector A Connections to other GPS

EFIS Display Unit Pin	Function	Other GPS Connection	Notes
A-22	Serial Port 5 IN (Suggested Port)	Varies RS232 Serial Data OUT	Use RS232 Serial Out from Other GPS

9.6.8.2 Configuring Other GPS

Configure Other GPS for data out in either Aviation Format or NMEA 0183 format.

9.6.8.3 Configuring the Display Unit

Use the "Settings Menu", "General Setup", to select the following:

Setting	Value
Serial Port 5 Input (Suggested Port)	GPS1 Aviation /MapCom or NMEA 0183
Serial Port 5 Rate	9600
GPS1 Flight Plan Source	External

9.6.9 SL30/SL40 Nav/Com or Com

9.6.9.1 Display of Navigation Data from the SL30

The EFIS provides an HSI and other functions that display and use the VOR bearing data provided by the SL30 Nav/Com radio. Localizer and glide slope deviation data is also displayed on the EFIS from this radio. This data is transmitted to the EFIS display unit via an RS-232 output from the Nav radio.

While the RS-232 connection is the preferred method for communicating this data to the EFIS, the SL30's analog outputs for glideslope and localizer may also be connected to the EFIS. If both the RS-232 serial data connection and analog connections are made, the EFIS will use the RS-232 data.

9.6.9.2 Radio Tuning and Loading of Pre-Sets in the SL30/SL40

The EFIS has the ability to load the SL30 and SL40 with frequency pre-sets to allow convenient selection of these frequencies from the front panel controls of

the radio. For the SL30, the EFIS can also tune the navigation radio. This data is transmitted to the radio via an RS-232 output from the EFIS display unit.

9.6.9.3 Multi-Display Unit Considerations

Although the data from the SL30 may be communicated to other display units via the inter-display unit serial data connections, allowing this data to appear on all display units, it is preferable to connect the serial data output from the SL30 to each display unit. Connecting the serial output from the SL30 to each display unit in multiple display unit systems, allows the SL30 data to be displayed in the event one display unit is not functional.

The serial ports within the display unit provide minimal loading of the serial data signals, allowing the one serial data output from the SL30 to be connected to multiple display units.

Only one serial data output to the SL30/SL40 may be provided. If the display unit which provides this (tuning) data to the SL30/SL40 was not operational, the SL30/SL40 would be tuned by its front panel controls.

9.6.9.4 Display Unit Connector A Connections

Mating Connector: 25-pin Female D-sub (Instrument has 25-pin male D-sub)

EFIS Display Unit Pin	Function	SL30/SL40	Notes
A-2	Serial Output 1 from Display Unit to SL30/SL40 (Suggested Port)	Pin 4 of 37-pin connector-SL30 Pin 10 of 15-pin connector-SL40	Only 1 display unit may provide this connection.
A-20	Serial Input 1 from SL30 (Suggested Port)	Pin 5 of 37-pin connector	This output from the SL30 may be connected to multiple display units.

9.6.9.5 Configuring the Display Unit

Using the general setup menu, set the display unit to which the above connections are made to 9600 baud. For the serial data output, select "SL30/SL40 Output". For the serial input, select "SL30/SL40 Input".

9.6.10 Autopilot

The Horizon may send steering commands to an autopilot via RS232 Serial communications. These steering commands are GPS Nav format and provide Lateral steering only. Some advanced autopilots can accept GPSS and GPSV

steering commands from the Horizon via ARINC and may provide both Lateral and Vertical steering.

9.6.10.1 Serial Interface

Display Unit Connector A Connections

EFIS Display Unit Pin	Function	Autopilot Connection	Notes
A-5	Serial Output 4 - Autopilot NEMA or Aviation (Suggested Port)	GPS Serial Data Input	Output from the EFIS emulates Aviation or NMEA 0813 format data to control the autopilot.

Optional Dual Serial Inputs to the Autopilot

To allow coupling the autopilot to the GPS in the event the display unit that normally controls the autopilot is not functional, a switch may be installed. This switch is wired so that it selects either the EFIS autopilot output, or the GPS serial data output. This switch should remain in the "EFIS" position, unless the display unit that provides the autopilot output is not functional. When the switch is in the "GPS" position, the autopilot will follow the GPS flight plan only, and will not respond to EFIS autopilots mode selections, such as HDG or others.

The switch needs to be a single pole, two position device. The common pin will be wired to the autopilot serial input and the other switch connections are one to the EFIS serial out port and one to the GPS receiver serial out port.

Configuring the Autopilot

Make the following setting on the autopilot. Refer to the autopilot installation manual for additional information.

Setting	Value
RS232 Serial Input Baud Rate	4800 or as necessary to match EFIS autopilot serial port baud rate.

9.6.10.2 ARINC Interface

ARINC Connections

For autopilots that accept ARINC 429 inputs for GPS steering, both the serial port autopilot connection (above), and the ARINC 429 connection are required.

ARINC 429 Adapter Pin	Function	Autopilot Connection	Autopilot Function
C-5	EFIS Output May also connect to other devices, such as an GNS430	ARINC 429 A	ARINC 429 A Channel 1 EFIS Input.
C-9	EFIS Output May also connect to other devices, such as an GNS430	ARINC 429 B	ARINC 429 B - Channel 1 EFIS Input.

Optional Dual ARINC Inputs to the Autopilot

To allow coupling the autopilot to the GPS in the event the display unit that normally controls the autopilot is not functional, a switch may be installed. This switch is wired so that it selects either the EFIS ARINC output, or the GPS ARINC output. This switch should remain in the "EFIS" position, unless the display unit that provides the autopilot output is not functional. When the switch is in the "GPS" position, the autopilot will follow the GPS flight plan only, and will not respond to EFIS autopilots mode selections, such as HDG or others.

The switch needs to be a two pole, two position device. The common pins will be wired to the autopilot ARINC input and the other switch connections are one to the EFIS ARINC out port and one to the GPS receiver ARINC out port.

When using ARINC to interface to an autopilot and a GNS430(W) / 530(W) or GNS480 another function is available, GNAV.

Since the Horizon database does not contain approach information, the Horizon cannot provide lateral steering for procedure turns, DME arcs, holding patterns etc. However, the GNS430 can provide GPS position, flight plan data, lateral deviation, vertical deviation, roll commands and mode selection to the Horizon over an additional ARINC connection (ARINC GPS) just like the VOR/ILS/GS ARINC connection. This information allows the EFIS to provide VNAV functions for an approach and follow roll commands from the GNS430 while still controlling pitch commands. This requires less switching of the autopilot output between the EFIS and the GNS430. With this feature, the external switch (see Chapter 6.5.1) can be left in the EFIS position unless there is an EFIS failure. See the Horizon Users Manual, Chapter 5.3.1, GNAV for how to use these features.

Configuring the Display Unit

Set Menu Page	Setting	Value
General Setup	ARINC Module Connected	Yes
General Setup	ARINC Transmit Rate*	Low
General Setup	Serial Out 4 (Suggested Port)	Serial Output 4 - Autopilot NEMA or Aviation

Configuring the Autopilot

Setting	Setting
ARINC 439 A In	Autopilot
ARINC 429 B In	Autopilot
RS232 Baud Rate	To match Horizon Output

GNAV ARINC Connections

ARINC 429 Adapter Pin	Function	GNS430 Pin	GNS430 Function
C-1	GPS Input	J4001-46	ARINC 429 A - GPS Output May also connect to other devices, such as an autopilot
C-2	GPS Input	J4001-47	ARINC 429 B – GPS Output May also connect to other devices, such as an autopilot
C-5	EFIS Output May also connect to other devices, such as an autopilot	J4001-48** ARINC IN 1A (J4001-50 ARINC IN 2A)	ARINC 429 A Channel 1 EFIS Input..
C-9	EFIS Output May also connect to other devices, such as an autopilot	J4001-49** ARINC IN 1B (J4001-51 ARINC IN 2B)	ARINC 429 B - Channel 1 EFIS Input..

Configuring the Display Unit for GNAV ARINC Data In

The display unit must be configured according to the following table to enable it to read the above ARINC signals:

Set Menu Page	Setting	Value
General Setup	ARINC Receive Rate*	To match GNS430 rate
General Setup	ARINC GPS Inputs*	GPS1 (or GPS 2 if this display unit is connected to number 2 GNS430/530)

Configuring the GNS430(W) / GNS530(W) or GNS480 for GNAV

Refer to the GNS430 installation manual, and configure serial input 1 for the FADC w/ALT format, and serial output 2 for “GPS” format.

Setting	Value
RS232 Input - Channel used for fuel/air data input from display unit.	Shadin-Fadc (Fadc only for GNS480)
RS232 Output - Channel Used for GPS Output	Aviation

to display unit.	
ARINC CONFIG OUT DATA	GAMA 429
ARINC CONFIG SPEED	Match VOR/LOC/GS output
ARINC CONFIG VNAV	Enable labels

9.6.11 Zoon Traffic

Zoon Collision Avoidance System requires only a Serial Port In connection to GRT Horizon. The data may either be Zoon format at 57600 baud or TIS Traffic format at 9600 baud. The later may be preferable since it does not tie up an entire Serial Port. The higher baud rate may deliver better performance since the data transmission rate is higher.

High Speed Connection (57600 baud)

EFIS Display	EFIS Pin	Zoon Pin	Function
Serial Port In	Available Serial Port	See Manual	Profile 2

Configuration

EFIS Display	Function	Zoon	Function
Serial Port In	Zoon Traffic	Serial Out	Profile 2 Traffic
Serial Port Rate		57600	

Low Speed Connection (9600 baud)

EFIS Display	EFIS Pin	Zoon Pin	Function
Serial Port In	Available Serial Port	See Manual	Garmin

Configuration

EFIS Display	Function	Zoon	Function
Serial Port In	Garmin GTX330	Serial Out	Garmin
Serial Port Rate		9600	

9.6.12 CO Guardian

Certain CO Guardian CO detectors have provisions for connection to MFD via RS232 Serial communication. Both a Serial Port In and a Serial Port Out connection to GRT Horizon is required since acknowledging the alarm sends a reset message to the detector.

Connection

EFIS Display	EFIS Pin	CO Guardian Pin	Function
Serial Port In	Available Serial Port	See Manual	
Serial Port Out	Available Serial Port	See Manual	

Configuration

EFIS Display	Function	CO Guardian	Function
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Serial Port In	Co Guardian	Serial Out	CO Alarm
Serial Port Rate		9600	

Chapter 10 : MOUNTING DIAGRAMS

Please refer to www.grtavionics.com Support, Documents for up to date mounting information.

Chapter 11 CONNECTOR DESCRIPTIONS

Please refer to www.grtavionics.com Support, Documents for up to date connector descriptions.

Chapter 12 INTERCONNECT DIAGRAMS

Please refer to www.grtavionics.com, Support, Documents for up to date interconnect diagrams.

Many find it useful to use the Interconnect Diagrams, the Cable Descriptions and Connector Definitions from the website and the information in this document to construct a spreadsheet defining all the interconnections for their particular aircraft and installed equipment. A sample spreadsheet is:

Unit	Pin No	Name	Use	Format	Baud	TO/FROM	Pin No	Name
MFD 1	A-22	Serial 5 In	GPS Data	GPS Aviation	9600	GNS430	P4001-56	Serial 1 Out

Group each the Serial Port together, ie

Unit	Pin No	Name	Use	Format	Baud	TO/FROM	Pin No	Name
		Serial 1 In						
		Serial 1 Out						
		Serial 2 In						
		Etc						
		Serial 6 Out						

Then you can easily assign Serial ports keeping in mind that baud rate must be the same for In and Out on each port. **Note that Serial Port assignments shown in GRT documents are suggested only.** Any Serial Port may be assigned any function with exceptions only being those connected to internal ARINC or GPS and the requirement of high speed ports for XM Weather.

Use a similar spreadsheet to assign Analog inputs. **Note that Analog Input assignments shown in GRT documents are suggested only.**

Add other connections to the spreadsheet such as power, OAT etc so that you end up with a comprehensive document that fully describes your aircraft.

Chapter 13 MAGNETOMETER INSTALLATION

Please refer to www.grtavionics.com Support, Documents for up to date magnetometer installation information.