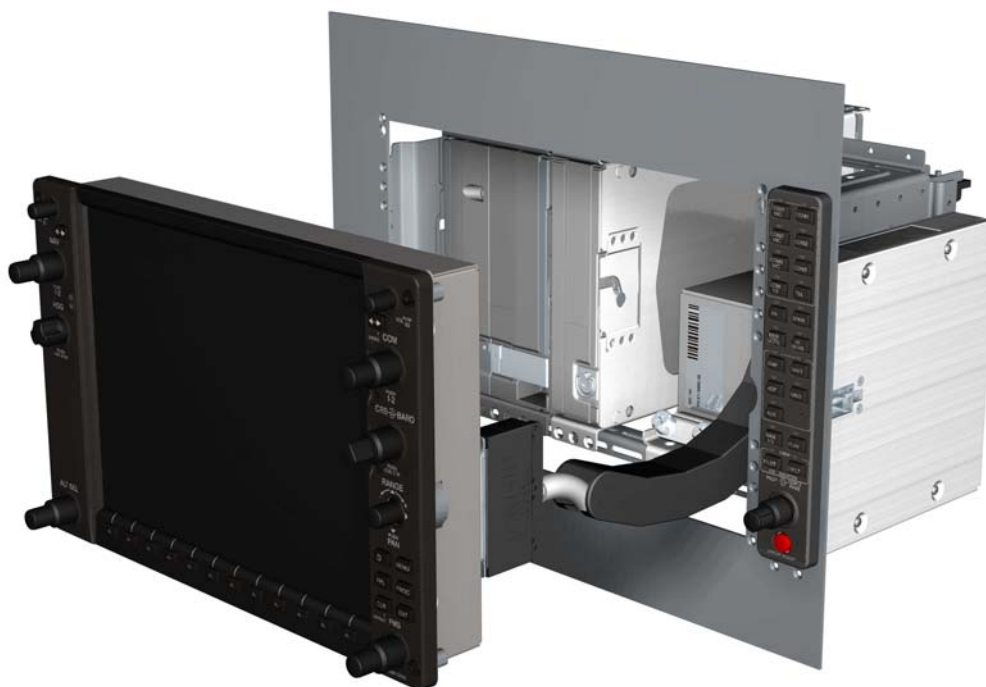


G1000 SYSTEM MAINTENANCE MANUAL

STANDARD PISTON/TURBOPROP AIRCRAFT



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RECORD OF REVISIONS

Revision	Date	Section	Page	Description
A	5/2/08	----	----	Initial Release
B	9/23/08	----	Cover Page	Added "Turboprop" to title page
		---	A	Added Rev. B to table of revisions, revised table to accommodate more detail.
		---	i	Changed GDU software version to 9.0x.
		1	1-1	Added "turboprop" after piston.
		2	2-1	Added "turboprop" after piston.
		4	4-4	Changed the wording on the SD card installation procedure
		5	---	Edited Section 5 in its entirety to bring information up to vGDU 9.0x.
		6	6-4	Item 6.12 GSA Replacement, added a caution about making sure the GSA fits against the GSM mount with no gaps before tightening the mounting bolts to prevent pushing in the bushing which would require GSM replacement.
			6-5	Section 6.13 - corrected the bullet list numbering
			6-6	Section 6.14 - corrected the section # references in the install list #4, #5 & #10.
		7	-----	Edited Section 7 in its entirety to bring information up to vGDU 9.0x.
		9	9-4	Section 9.8: Added a note stating that after sw version 8.20 there is no need to backload GDU software to check the backup caps for certain aircraft.
		10	10-1	Edited note and added new section 10.1, Hardware and Software Compatibility Check.
			10-10	Added new section 10.9 Installation of OEM specific splash screen procedure.
			10-12	Added new section 10.11, Generic SVS Loading Procedure for GDU v9.0x and above.

This manual reflects the operation and configuration of GDU v9.0x.

The following are *General Safety Precautions* that are not related to any specific procedure and therefore do not appear elsewhere in this maintenance manual. These are recommended precautions that personnel should understand and apply during the many phases of maintenance and repair.

KEEP AWAY FROM LIVE CIRCUITS. Maintenance personnel shall observe all safety regulations at all times. Turn off system power before making or breaking electrical connections. Regard any exposed connector, terminal board, or circuit board as a possible shock hazard. Components which retain a charge shall be discharged only when such grounding does not result in equipment damage. If a test connection to energized equipment is required, make the test equipment ground connection before probing the voltage or signal to be tested.

DO NOT SERVICE ALONE. Personnel shall not under any circumstances reach into or enter any enclosure for the purpose of servicing or adjusting the equipment without immediate presence or assistance of another person capable of rendering aid.

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WARNING

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CAUTION

The GDU 1xxx lamps contain mercury and must be recycled or disposed of according to local, state, or federal laws. If you have any questions or would like additional information, please refer to our web site at the following website:
www.garmin.com/aboutGarmin/environment/disposal.jsp.

CAUTION

The GDU 1xxx lens is coated with a special anti-reflective coating which is very sensitive to skin oils, waxes and abrasive cleaners. **CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING.** It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.

NOTE

G1000 software configuration may differ between different aircraft models. Procedures given in this manual are for general reference only. Always refer to approved OEM aircraft installation and/or maintenance information for correct software versions/part numbers and procedures for a specific aircraft model when returning an aircraft to service.

NOTE

To more closely match the LRU nomenclature displayed on the configuration pages, and where appropriate, only the prefix of the LRU will be listed (i.e., GTX 33(x); GTX, etc.). The only duplicate in the prefix of any LRU pertains to the GDL 69(x) XM Satellite Receiver and the GDL 90 GPS WAAS Receiver/UAT. The suffix will be added in that situation.

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SECTION 1

INTRODUCTION

This manual provides maintenance information for the Garmin G1000 Avionics System configured in a piston or turboprop aircraft.

1.1 SCOPE

This manual is general in scope and is intended to be used only as a guideline. Consult OEM maintenance documentation for the most current and exact maintenance information for a specific aircraft. This manual presumes familiarity with the basic operating procedures covered in the G1000 Pilot's Guide and Cockpit Reference Guide (CRG). The G1000 can be configured using two or three displays. This manual describes a two display system.

1.2 MANUAL ORGANIZATION

The following is a brief description of each section in the manual.

Section 1—Introduction

This section discusses the scope of the manual content and describes manual organization.

Section 2—LRU Descriptions

This section describes each G1000 LRU.

Section 3—System Overview

This section gives give an overview of the G1000 System.

Section 4—Configuration Mode

This section explains the configuration mode and the role it plays in troubleshooting. It also contains limited user interface information.

Section 5—Troubleshooting

This section contains troubleshooting procedures which can help isolate a defective LRU.

Section 6—Replacement Procedures

This section lists procedures needed to replace a defective LRU.

Section 7—LRU Software Installation and Testing

This section explains how to install, configure, and test software for a replacement LRU.

Section 8—Return To Service Testing

This section describes return to service tests.

Section 9—Periodic Maintenance

This section contains periodic maintenance procedures.

Section 10—System Reconfiguration

This section explains how to completely reconfigure the system should it become necessary.

Appendix A—Connector Pin Assignments

This appendix illustrates and lists the names of G1000 connector pins.

SECTION 2

LRU DESCRIPTIONS

This section describes the Line Replaceable Units (LRUs) that could be configured in a G1000 for piston and turboprop aircraft. Not all of the LRUs described in this section are necessarily standard equipment, some are optional depending on the specific model of aircraft. Refer to OEM maintenance documentation for the exact quantity of LRUs used in a specific installation.

- GDU 1xxx Multi Function Display (MFD)
- GDU 1xxx Primary Flight Display (PFD)
- GMA 1347(x) Audio Panel with Marker Beacon Receiver
- GIA 63(x) Integrated Avionics Units (IAU)
- GDC 74(x) Air Data Computer (ADC)
- GEA 71 Engine/Airframe Unit
- GTX 33(x) Transponder
- GRS 77 Attitude and Heading Reference System (AHRS)
- GMU 44 Magnetometer
- GDL 69(x) Satellite Data Link Receiver
- GSA 8(x) AFCS Servo Actuator
- GSM 85(A) Servo Gearbox
- GTP 59 Temperature Probe
- GDL 90 GPS WAAS Receiver/UAT
- GWX 68 Weather Radar
- GTA 82 Trim Adapter

2.1 DISPLAYS (GDU 1xxx PFD and GDU 1xxx MFD)



Figure 2-1. GDU 1xxx PFD/MFD

The GDU 1xxx is the most visible portion of the G1000. In a two display installation, one GDU is configured as a Primary Flight Display (PFD), the other is configured as the Multi-Function Display (MFD). The MFD displays navigation information and engine/airframe instrumentation. The PFD displays primary flight information in place of traditional gyro systems. The displays communicate with each other and with the GIA LRUs through a high-speed data bus (HSDB) Ethernet connection. The GDUs also provide control for the GFC 700 Autopilot.

2.2 GMA 1347(x) AUDIO PANEL



Figure 2-2. GMA 1347(x) Audio Panel

The GMA 1347(x) integrates NAV/COM digital audio, intercom system and marker beacon controls. The Audio Panel is typically installed between the MFD and PFD but can also be installed in dual-audio panel applications (usually paired with a dual-PFD setup). The Audio Panel communicates with both GIAs using RS-232 digital interface. The GMA 1347D model differs from the GMA 1347 in cabin and intercom functionality.

2.3 GIA 63(x) INTEGRATED AVIONICS UNIT



Figure 2-3. GIA 63(x) Integrated Avionics Unit

The GIA is the central ‘Integrated Avionics Unit’ (IAU) to the G1000 system. The GIA functions as a main communications hub. The GIA contains the GPS receiver, VHF COM/NAV receivers, and system integration microprocessors. The GIA communicates directly with the displays using a HSDB Ethernet connection. Software and configuration settings are sent from the displays through the GIA to LRUs in the system. The GIA 63W model contains a WAAS certified GPS receiver.

2.4 GDC 74(x) AIR DATA COMPUTER



Figure 2-4. GDC 74(x) Air Data Computer

The GDC 74(x) Air Data Computer compiles information from the pitot/static system and outside air temperature (OAT) probe. The unit provides pressure altitude, airspeed, vertical speed, and OAT information to the G1000 system. The GDC communicates with the GIAs, GDUs, and GRS LRUs using an ARINC 429 digital interface. The GDC 74(A) model is a non-RVSM unit (reduced vertical separation minima or minimum) and the GDC 74(B) is an RVSM capable unit.

2.5 GEA 71 ENGINE/AIRFRAME UNIT



Figure 2-5. GEA 71 Engine/Airframe Unit

The GEA 71 is a microprocessor-based LRU that receives and processes signals from the engine and airframe sensors. Sensors may include engine temperatures, oil temperature and pressure, fuel measurement, airframe discrete inputs and other airframe inputs. The GEA communicates directly with both GIAs using RS-485 digital interface. Software and configuration settings are received through RS-485 digital interface with the GIA.

2.6 GTX 33(x) TRANSPONDER



Figure 2-6. GTX 33(x) Transponder

The GTX 33(x) is a mode-S transponder providing modes A, C, and S. Control and operation is directed through the PFD. The transponder communicates with both GIAs through RS-232 digital interface in a single transponder installation. In a dual transponder installation each transponder typically communicates only with its on-side GIA. The GTX 33(D) model provides diversity functionality.

2.7 GRS 77 ATTITUDE, HEADING, AND REFERENCE UNIT (AHRS)



Figure 2-7. GRS 77 AHRS Unit

The GRS 77 is an attitude, heading, and reference (AHRS) LRU that provides aircraft attitude and flight characteristics information to the displays and GIAs. The unit contains advanced tilt sensors, accelerometers, and rate sensors. In addition, the GRS 77 interfaces with both the GDC 74(x) Air Data computer and the GMU 44 magnetometer. The GRS 77 also utilizes GPS signals sent from the GIA 63(x). Attitude and heading information is sent to both GDUs and GIAs from the GRS using ARINC 429 digital data.

2.8 GMU 44 MAGNETOMETER



Figure 2-8. GMU 44 Magnetometer

The GMU 44 magnetometer senses magnetic field information. Data is sent from the GMU to the GRS for processing to determine aircraft magnetic heading. This unit receives power from the GRS and communicates with the GRS using RS-485 digital data.

2.9 GDL 69(x) Satellite Data Link Receiver



Figure 2-9. GDL 69(x) Satellite Data Link Receiver

The GDL 69(x) is an XM Satellite Radio data link receiver that receives broadcast weather data. The features of the GDL 69A model are the same as the GDL 69 with the addition of audio entertainment. Weather data and volume control is displayed on the MFD via a high-speed data bus (HSDB) Ethernet connection. The GDL 69A interfaces with the GMA for amplification and distribution of the audio signal.

2.10 GSA 8(x) AFCS SERVO ACTUATOR/GSM 85(A) SERVO GEARBOX



Figure 2-10. GSA 8(x) Servo Actuator

The GSA 8(x) servo actuator is an electromechanical device that provides automatic control of pitch, roll, and pitch trim. It also provides manual electric trim functionality. It contains motor control and monitoring circuitry as well as a solenoid and a brushless DC motor. It communicates with each GIA 63(x) unit via a serial RS-485 bus.

The GSM 85(A) Servo Gearbox is mounted to the aircraft structure using a custom mounting bracket, and is responsible for transferring the output torque of the GSA 8(x) servo actuator to the mechanical flight-control surface linkage.

2.11 GTP 59 OAT PROBE



Figure 2-11. GTP 59 OAT Probe

The GTP 59 OAT Probe provides outside air temperature measurements which are processed by the GDC.

2.12 GDL 90 GPS WAAS RECEIVER/UAT



Figure 2-12. GDL 90 Universal Access Transceiver/GPS WAAS Receiver

The GDL 90 is a remote-mounted unit containing a GPS/WAAS Receiver and a Universal Access Transceiver (UAT). The GDL 90 transmits data via the UAT data link and receives data from other UAT-equipped aircraft. The UAT also communicates with UAT ground stations which provide the FIS-B weather. The received data can be output to an appropriate display.

2.13 GWX 68 WEATHER RADAR

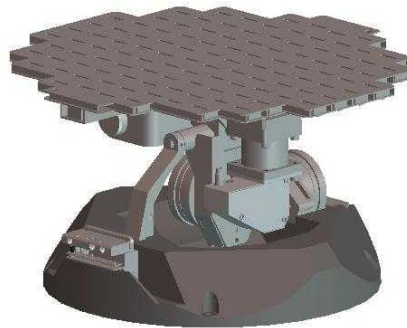


Figure 2-13. GWX 68 Weather Radar

The GWX 68 provides airborne weather and ground mapped radar data via an HSDB connection.

2.14 GTA 82 PITCH TRIM ADAPTER

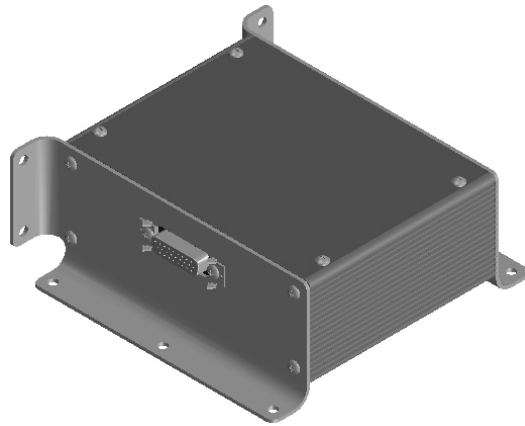


Figure 2-14. GTA 82 Pitch Trim Adapter

The GTA 82 Pitch Trim Adapter is a remotely mounted device that allows the GFC 700 to drive a pitch trim actuator provided by the airframe manufacturer. The trim adapter interfaces with two GIA units through serial communication on RS-485 ports.

SECTION 3

SYSTEM OVERVIEW

This section describes a basic two display G1000 system. Refer to the OEM maintenance documentation for aircraft specific system information. Figure 3-1 shows a basic two display G1000 block diagram.

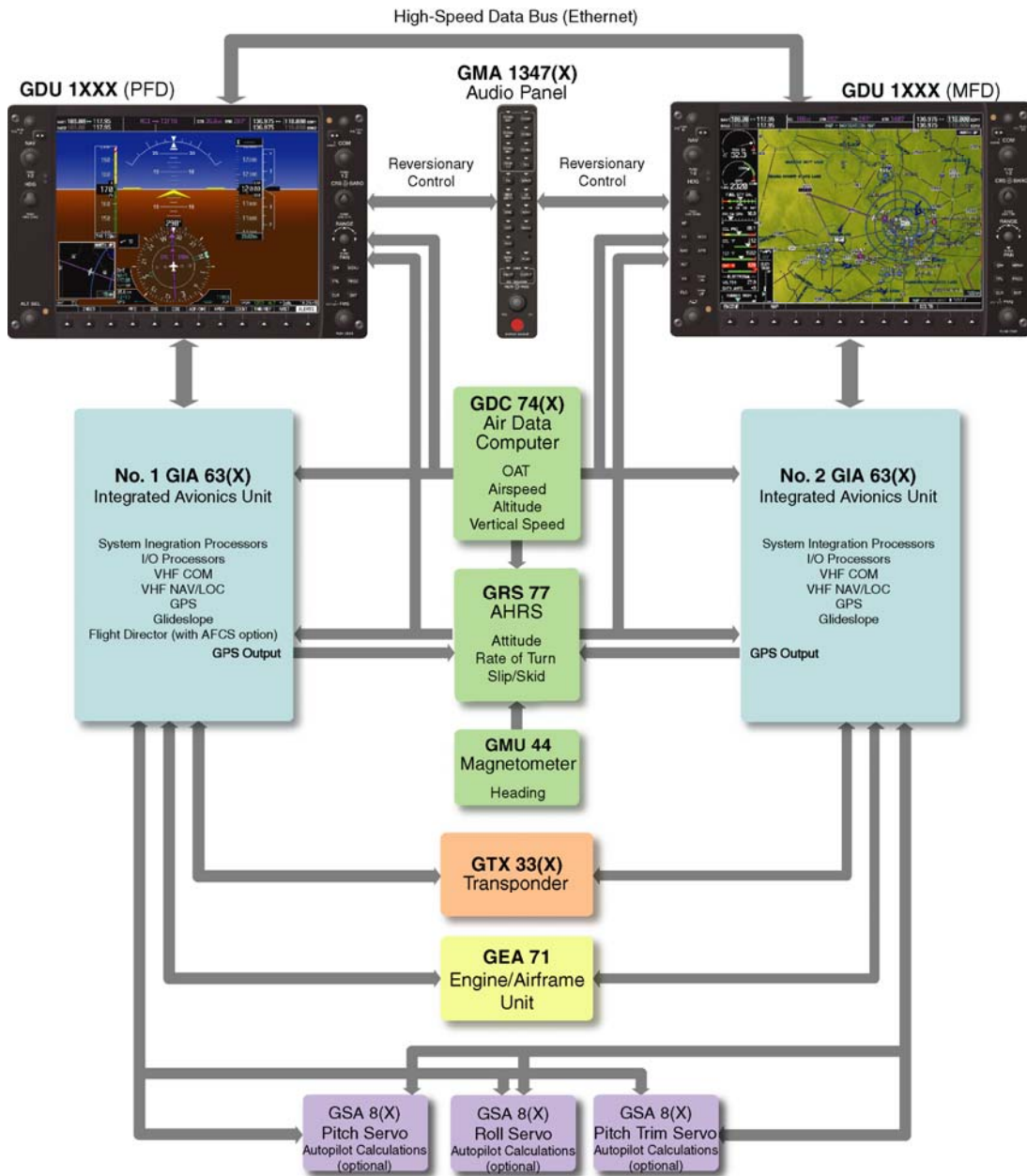


Figure 3-1. Basic G1000 System

3.1 G1000 FLIGHT INSTRUMENTATION

The GRS 77 AHRS, GDC 74(x) Air Data Computer, and GMU 44 Magnetometer provide the G1000 system with flight instrument data consisting of aircraft attitude, heading, yaw rate, altitude, airspeed, vertical speed, and outside air temperature information. This information is displayed on the PFD (and also on the MFD when it is in reversionary mode).

Primary data outputs from the GRS and GDC are sent directly to the PFD via ARINC 429. Secondary data paths connect the GRS and GDC to the MFD. Additional communications paths connect the GRS and GDC to both GIA 63 units, providing multiple redundant communication paths.

The GRS 77 receives GPS data from both GIAs, airspeed data from the GDC, and magnetic heading from the GMU. Using these three external sources combined with internal sensor data, the GRS accurately calculates aircraft attitude and heading.

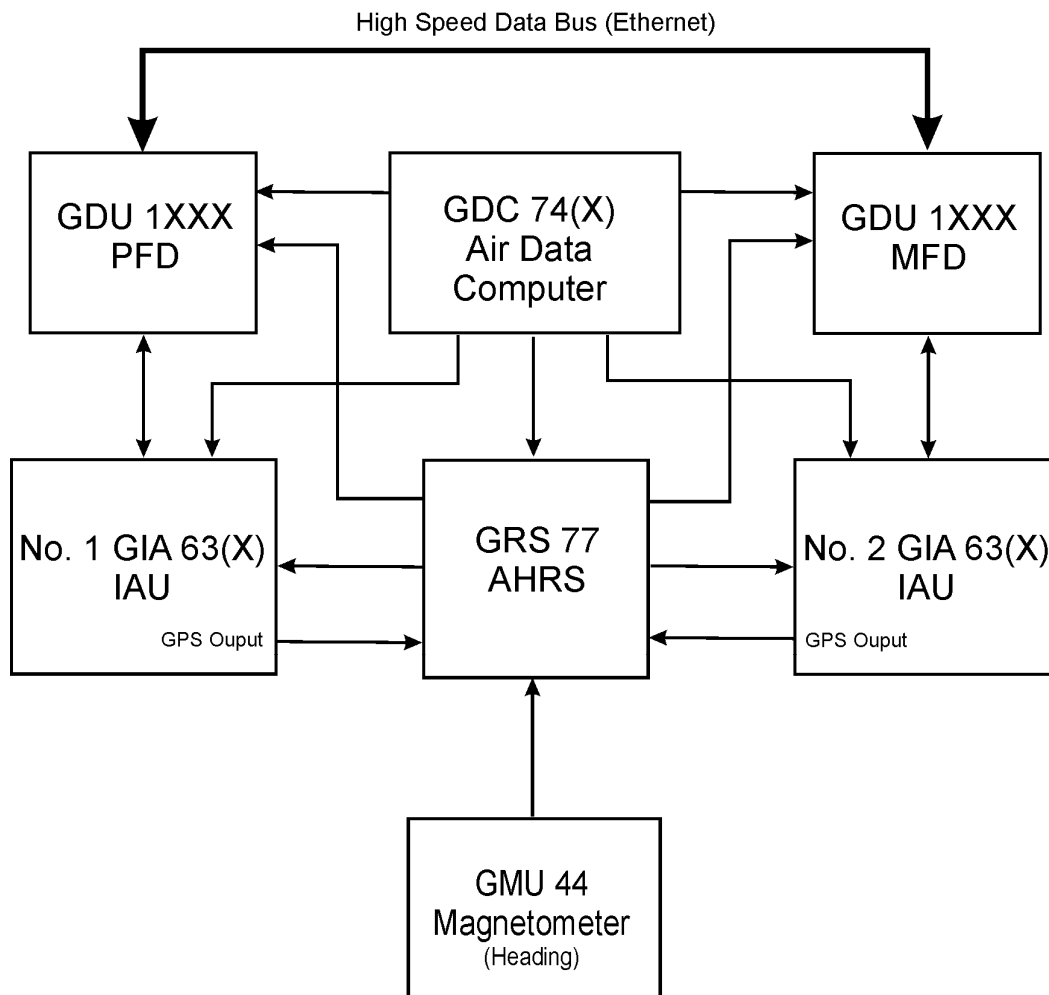


Figure 3-2. Basic G1000 Flight Instrumentation

3.2 G1000 ENGINE INDICATION SYSTEM

The GEA 71 provides engine and airframe data for processing and display. The system interfaces to the various transducers in the aircraft; please consult airplane-specific interconnect or installation drawings for specific interface information. Analog data is received from the transducers and is converted to digital signal by the GEA 71. Digital information is then sent through the primary RS-485 serial path to GIA1. From there, data is sent through the HSDB connection to the PFD, then on to the MFD for display. A backup data path exists in the event the primary path fails.

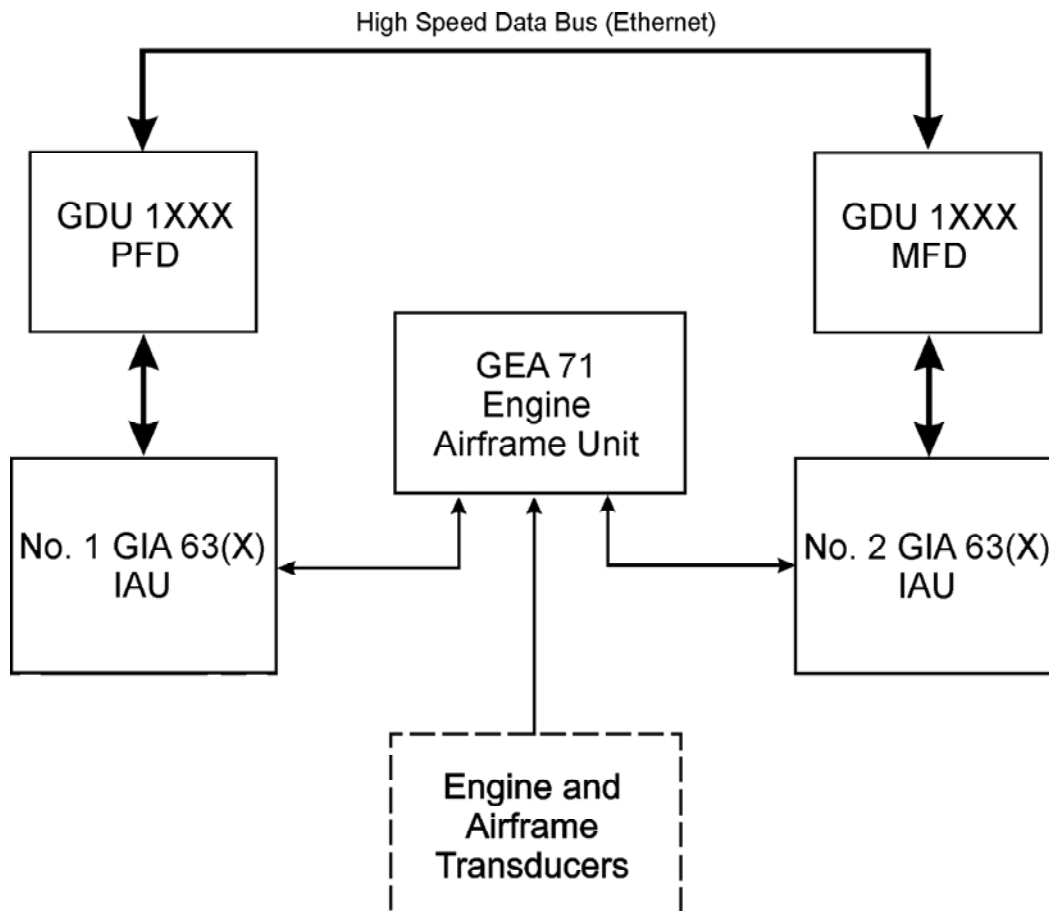


Figure 3-3. Basic G1000 Engine Indication System

3.3 G1000 COMMUNICATION AND NAVIGATION SYSTEM

The GIA 63(x) IAUs contain the VHF COM, VHF NAV, and GPS receivers. COM and NAV digital audio is sent to the Audio Panel. GPS information is sent to the GRS 77 AHRS and both displays for processing. The GTX 33 Transponder communicates with both GIAs in a single transponder installation. In a dual installation each transponder communicates with its on-side GIA. Transponder data is sent from the GIAs to the PFD where control and operation occurs. The Audio Panel controls the display reversionary mode.

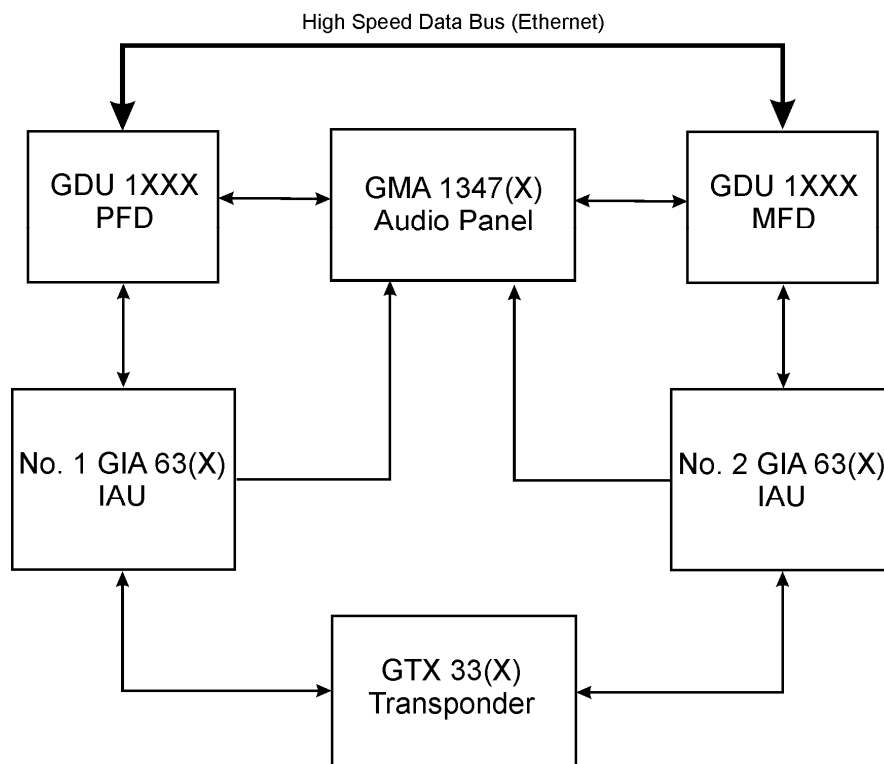


Figure 3-4. Basic G1000 Navigation/Communications System

3.4 GFC 700 AUTOPILOT

The GFC 700 Autopilot is a three-axis fail-safe digital flight control system that is integrated into the G1000. It consists of the following components which are added to the existing G1000 components:

- GSA 8(x) Servo Actuators (Roll, Pitch, Yaw, Pitch Trim)
- GSM 85(A) Servo Mounts (Roll, Pitch, Yaw, Pitch Trim)

The following functions are provided by the GFC 700 in a typical installation which may also include a yaw axis which provides a Yaw Damper (YD) function.

- Flight Director
- Autopilot: Pitch and Roll axis, including Pitch Auto-Trim
- Manual Electric Pitch Trim

Flight Director

The Flight Director operates within GIA1 and uses air data, attitude, and navigation data to calculate commands for display to the pilot and for the Autopilot. Flight Director command bars and mode annunciations are sent to the PFD through a high-speed Ethernet connection for display. The Flight Director operates independently of the Autopilot and allows the pilot to hand-fly the aircraft using command bar guidance if desired.

Autopilot

The Autopilot operates utilizing the GSA Servos and/or GTA 82 Trim Adapter. Flight Director data is processed within the three servos and/or trim adapter and is translated into aircraft flight control surface commands. The Autopilot cannot operate unless the Flight Director is engaged.

Yaw Damper

The Yaw Damper System controls the rudder to dampen out oscillations about the yaw axis without affecting the turning of the aircraft.

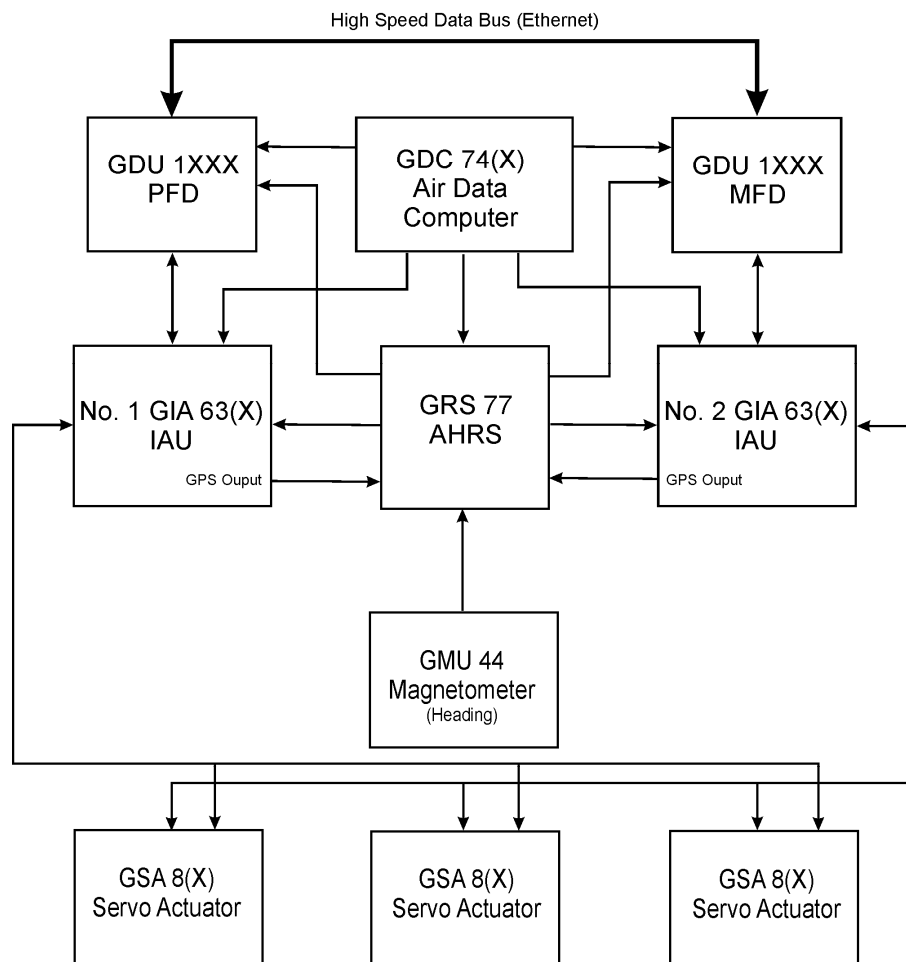


Figure 3-5. Basic GFC 700 Autopilot System

Blank Page

SECTION 4

CONFIGURATION MODE

This section provides an overview of the configuration mode of operation. This section presumes basic familiarity with the basic operation of the G1000.

NOTE

To more closely match the LRU nomenclature displayed on the configuration pages, and where appropriate, only the prefix of the LRU will be listed in this section and in the rest of the manual (i.e., GTX 33(x); GTX, etc.). The only duplicate in the prefix of any LRU pertains to the GDL 69(x) XM Satellite Receiver and the GDL 90 GPS WAAS receiver/UAT. The suffix will be added in that situation.

4.1 INTRODUCTION

NOTE

Screen displays shown in this section are not aircraft or system software level specific. Consult airframe specific guides and manuals for the most current screen display information.

Configuring, calibrating, and troubleshooting the G1000 can be performed when the G1000 is in configuration mode.

To enter configuration mode:

1. Press and hold the ENT key on the PFD while applying power. Release the ENT key after 'INITIALIZING SYSTEM' is displayed in the upper left corner of the PFD.
2. Repeat step 1 for the MFD. The System Status Page (Figure 4-1) is displayed on the MFD and the PFD.

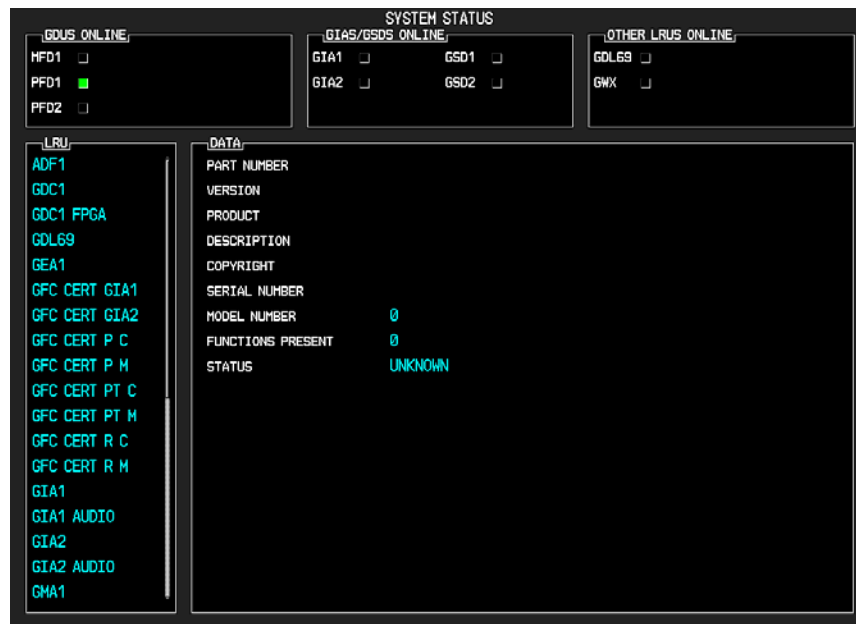


Figure 4-1. System Status Page (Configuration Mode)

4.2 G1000 OPERATION

Once the G1000 is placed in configuration mode, the large and small FMS knobs are used to cycle through the different configuration pages, to change page groups, and to change pages in a group. The FMS knob is also used to perform the following:

- To activate the cursor press the small FMS knob.
- To cycle the cursor through different data fields rotate the large FMS knob.
- To change the contents of a highlighted data field rotate the small FMS knob. This action displays an options menu for the particular field, or in some cases, allows the user to enter data for the field.
- To confirm a selection press the ENT key.

To cancel a selection, press the small FMS knob. Pressing the small FMS knob again turns the cursor off. The CLR key can also be used to cancel a selection or turn the cursor off.

NOTE

The MFD/PFD, Audio Panel, and AFCS controls are described in the Pilot's Guide.

4.2.1 Softkeys

Some configuration pages have commands or selections that are activated by display softkeys (Figure 4-2). If a softkey is associated with a command, that command will be displayed directly above the key. A grayed-out softkey shows a command that is unavailable. A softkey that is highlighted shows the current active selection.



Figure 4-2. G1000 Softkeys

4.3 CONFIGURATION PAGE GROUPS AND PAGES

NOTE

Certain "protected" configuration pages are critical to aircraft operation and safety. The technician is unable to modify or change settings on these pages unless they are authorized and equipped to do so. They are viewable to aid in troubleshooting.

Configuration pages are grouped according to function. The active page title is displayed at the top of the screen in the center. In the bottom right corner of the screen, the current configuration page group, number of pages available in the group, and placement of the current page within the group are indicated by icons. Page groups and pages can change depending on the configuration for a specific aircraft (Table 4-1).

Table 4-1. Configuration Page Groups (example only)

<p>SYSTEM System Status Date/Time Setup Main Lighting Audio Alert Configuration System Upload File Manager Diagnostics Terminal Maintenance Log OEM Diagnostics System Configuration System Data Paths System Setup Manifest Configuration</p>	<p>GDU RS-232/ARINC 429 Config GDU Status GDU Test Diagnostics Serial / Ethernet I/O Alert Configuration Airframe Configuration</p>	<p>GTX RS-232/ARINC 429 Config Transponder Configuration</p>
<p>GIA RS-232/ARINC 429 Config CAN/RS-485 Configuration GIA I/O Configuration COM Setup GIA Status CAN Configuration</p>	<p>GDL GDL69 Configuration</p>	<p>GMA GMA Configuration</p>
<p>GRS AHRS/AIR Data Input GRS/GMU Calibration</p>	<p>GFC GFC Configuration GFC Status</p>	<p>GEA Engine Data GEA Status GEA Configuration Fuel Calibration</p>
<p>GWX GWX Configuration</p>	<p>CAL Fuel Tank Calibration Flaps & Trim Calibration HSCM Calibration Airframe Calibration</p>	
<p>OTHER STORMSCOPE®</p>	<p>GDC GDC Configuration</p>	

4.4 SECURE DIGITAL (SD) CARDS

NOTE

If a loader card is not available, the loader image for most airplanes can be found on the Garmin website.

Software files are uploaded into the G1000 using a secure digital (SD) data card. The card contains all necessary files to load software and configuration settings to all LRUs. All software and configuration parameters are pre-determined by Garmin and/or the OEM. During removal and replacement of LRUs, software and configuration files may need to be reloaded (refer to Section 7).

It is very important that the technician use the correct loader card or loader image part number because each loader card or loader image part number defines all files for a specific G1000 installation except for certain configuration settings such as the aircraft registration number (N#) which must be entered manually.

Use care when using the card during maintenance. The G1000 is designed to immediately initialize the card upon power-up. On-screen prompts must be given careful attention in order to avoid potential loss of data. Always read and thoroughly understand all related information before attempting to use the card.

NOTE

Turn the power off to the G1000 before inserting an SD card.

The GDU data card slots accept secure digital (SD) cards and are located on the top right portion of the display bezels (Figure 4-3). Each display bezel is equipped with two card slots. SD cards are used for aviation database and system software updates as well as terrain database storage.

To install an SD card:

Insert the SD card in the SD card slot with the card label on the left side. Push the card in until the spring latch engages. The end of the card should remain flush with the face of the display bezel.

To remove an SD card:

Gently press in on the SD card to release the spring latch and eject the card.



Figure 4-3. GDU Bezel SD Card Slots

4.5 'SET' AND 'ACTIVE' COMMANDS

The SET and ACTIVE commands on various configuration pages are used for setting input/output conditions (Figure 4-4).



Figure 4-4. SET and ACTIVE Softkeys and Columns

4.5.1 SET and ACTIVE Softkeys

NOTE

Use the ACTV>SET softkey with care. If an improperly configured unit is installed, this softkey causes the wrong configuration to replace the correct one.

When troubleshooting the system, the technician can look for inequalities (configuration mismatches) between the SET and ACTIVE columns. Certain problems can be resolved by pressing the SET>ACTV softkey which reloads settings to the specific LRU from the PFD (this can also be accomplished by reloading the configuration files for the LRU using the G1000 SW Loader Card).

Definitions

SET—refers to a setting or group of settings that reside in the PFDs internal memory and/or master configuration module.

ACTIVE—refers to a current setting stored and used in a LRU. LRUs store the ‘active’ settings within internal memory.

Data can be manually copied from one column to the other by using the following two softkeys:

SET>ACTV (Set to Active)—allows the installer to send the information in the SET column (data stored in the master configuration module) to the ACTV column (data used by the LRU).

ACTV>SET (Active to Set)—causes the current settings of the LRU to be copied to the master configuration module as SET items.

4.6 CONFIGURATION STATUS

Whenever configuration settings are changed, the technician receives on-screen prompts and/or confirmation similar to those shown in Figure 4-5.

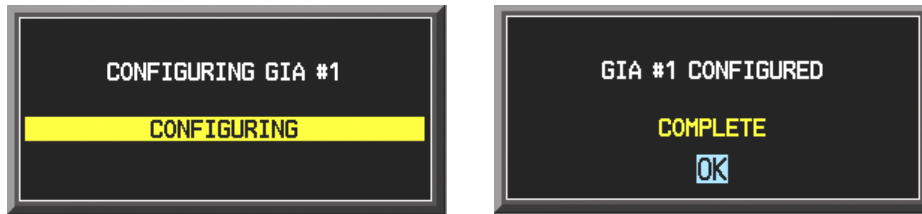


Figure 4-5. Configuration Status Prompts

4.7 DATA TRANSMISSION INDICATORS

Several configuration pages use an indicator light system to show discrete (ON/OFF) data and/or hardware component status. Unless otherwise noted, the following applies to all configuration page status indicators:

- Green—expected data is successfully received and is ON. A green light can also indicate that the parameter/component is working correctly.
- Red—expected data is not received. A red light can also indicate that a parameter/component is invalid.
- Black—expected data is successfully received and is OFF, or no data is expected. A black light can also indicate that the parameter/component is not responding.



Figure 4-6. Data Transmission Indicators

A blank ACTIVE column displays the loss of communication between the display and a specific LRU (Figure 4-7).

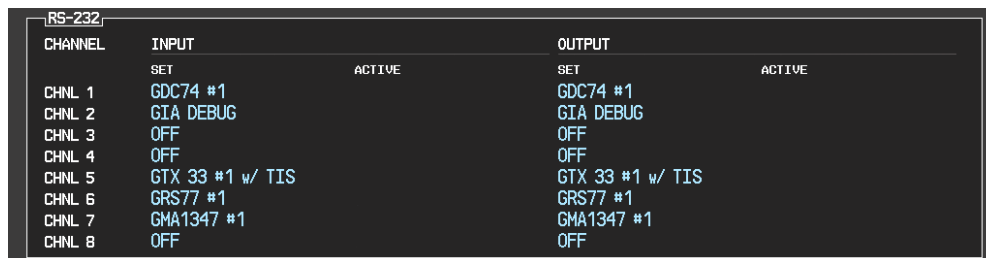


Figure 4-7. Loss of Communication Indication

SECTION 5

TROUBLESHOOTING

This section contains troubleshooting procedures that can aid in isolating a faulty LRU.

5.1 System Annunciations

A red X through a display field (such as COM frequencies, NAV frequencies and engine data) indicates that that particular display field is not receiving valid data. Figures 5-1 and 5-2 show typical display fields and their associated LRU's that are not receiving valid data.

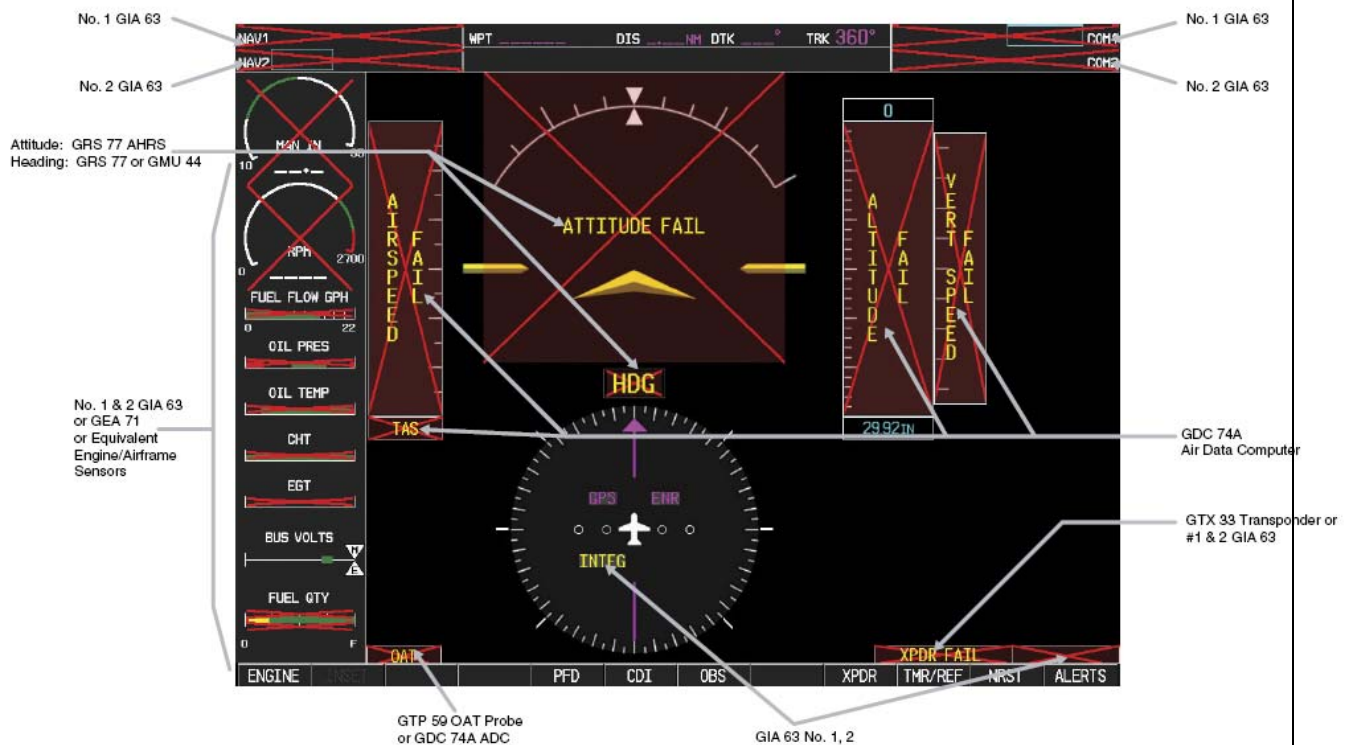


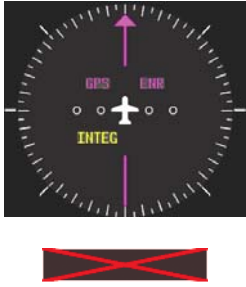


Figure 5-1. Typical Invalid Display Fields


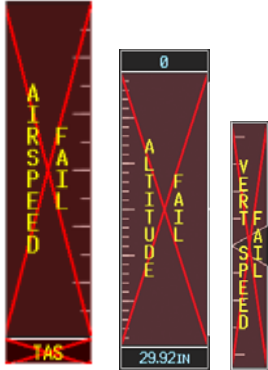


5.1.2 System Annunciation Troubleshooting

Annunciation	Associated LRU	Solution
<p style="text-align: center;">NAV1 or COM1</p> 	GIA1	<ul style="list-style-type: none"> • Check PFD Alert Window for GIA1 configuration, software or failed data path error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2 and reconfigure for their new positions to verify location of problem: <ul style="list-style-type: none"> – If problem follows GIA1, replace GIA1. • Check Ethernet interconnect from GIA1 to PFD and unit connector pins for faults. • If problem persists, replace PFD.
<p style="text-align: center;">NAV2 or COM2</p> 	GIA2	<ul style="list-style-type: none"> • Check PFD Alert Window for GIA2 configuration, software or failed data path error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2 and reconfigure for their new positions to verify location of problem: <ul style="list-style-type: none"> – If problem follows GIA2, replace GIA2. • Check Ethernet interconnect from GIA2 to MFD and unit connector pins for faults. • If problem persists, replace MFD.


System Annunciation Troubleshooting (continued)

Annunciation	Associated LRU	Solution
<p>GPS INTEG or Time</p> 	<p>GIA1 or 2</p>	<ul style="list-style-type: none"> • Check PFD Alert Window for GIA1/2 configuration, software or failed data path error messages. Correct any errors before proceeding. • Verify the aircraft is located where the GPS antennas have a clear view of the sky. • Check for possible external interference to the GPS receivers. <ol style="list-style-type: none"> 1. Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. 2. Turn to the MFD AUX – GPS STATUS page on and check the GPS strength bars on both GPS receivers. If the signal strength levels are erratic, disappear and reappear rapidly, or switch between a solid and hollow bar frequently there is an external device interfering with the GPS receivers. Turn off any devices that radiate a signal in the local area or move the aircraft to another location to remove the interference. 3. Verify the aircraft is not parked in close proximity to a hanger with the doors open and equipped with a GPS repeater. • Verify the GIA's are online by checking for a green checkmark next to the GIA on the MFD Aux – System Status page. • If a GIA is not online (a Red-X will be present instead of a green check mark), check for power input faults. • Refer to the GIAS GPS Troubleshooting Section for additional actions.


System Annunciation Troubleshooting (continued)

Annunciation	Associated LRU	Solution
<p style="text-align: center;">XPDR FAIL</p> 	<p>GTX 33</p>	<ul style="list-style-type: none"> • Check PFD Alert Window for GIA1/2 and GTX 33 configuration, software or failed data path error messages. Correct any errors before proceeding. • Perform a SET>ACTV configuration reset on the GTX Transponder Configuration page for each installed GTX. • For GTX 33 transponders verify the aircraft registration is entered in the GTX Transponder Configuration page. • Check the GIA and GTX racks for connector pin faults (push-back or bent) on the RS-232 interconnect lines. • Replace the GTX 33.
<p style="text-align: center;">TAS FAIL AIRSPEED FAIL, ALTITUDE FAIL, VERT SPEED FAIL</p> 	<p>GDC 74A</p>	<ul style="list-style-type: none"> • Check PFD Alert Window for PFD, MFD or GDC configuration, software or failed data path error messages. Correct any errors before proceeding. • Verify the GDC's are online by checking for a green checkmark next to the GDC on the MFD Aux – System Status page. <ol style="list-style-type: none"> 1. If the GDC is not online (a Red-X will be present instead of a green check mark), check for wiring/power faults and GDC connector security. 2. Replace the GDC 74A. • Inspect GDC 74A pitot/static ports and plumbing for blockage. • Replace the GDC 74A configuration module. • For TAS failure only, replace the GTP 59.
<p style="text-align: center;">OAT  and TAS </p>	<p>GTP 59</p>	<ul style="list-style-type: none"> • Check OAT probe wiring, probe and connectors for faults or damage. • Replace GDC 74A config module and pigtail harness. • Replace the GTP 59. • If problem remains. replace GDC 74A.


System Annunciation Troubleshooting (continued)

Annunciation	Associated LRU	Solution
<p style="text-align: center;">ATTITUDE FAIL</p>  <p>The image shows a PFD attitude indicator with a red 'X' over it and the text 'ATTITUDE FAIL' in yellow. The attitude indicator shows a white triangle pointing up, with a yellow horizon line and a yellow aircraft symbol below it.</p>	<p>GRS 77</p>	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check PFD Alert Window for PFD, MFD or GRS configuration, software or failed data path error messages. Correct any errors before proceeding. • For an attitude failure while parked, check the following – <ul style="list-style-type: none"> – Is the aircraft stationary if GPS is not available? Aircraft movement (rocking the wings or moving the tail) may cause the attitude and heading to fail if it believes the aircraft is in motion without GPS input. – Check if the GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. • Check for metal objects (tool boxes, power carts, nearby large steel structures, etc.) around the aircraft that could be interfering with the magnetometer. • Cycle GRS 77 power to restart initialization. • Check the GRS 77 connector for security and that proper wire harness strain relief is provided. • Check the GRS 77 is fastened down tightly in it's mounting rack and that the mounting rack is not loose (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Perform an Engine Run-Up Test to check if engine vibration is causing the GRS 77 to go offline. • Replace GRS 77. • If problem persists replace the GRS 77 configuration module. • Contact Garmin Aviation Product Support if condition continues after replacing the GRS 77 and config module for additional assistance.

System Annunciation Troubleshooting (continued)

Annunciation	Associated LRU	Solution
<p style="text-align: center;">HDG FAIL</p> 	<p style="text-align: center;">GRS 77 & GMU 44</p>	<ul style="list-style-type: none"> • Check PFD Alert Window for PFD, MFD or GRS configuration, software or failed data path error messages. Correct any errors before proceeding. • Check for metal objects (tool boxes, power carts, nearby large steel structures, etc.) around the aircraft that could be interfering with the magnetometer. • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power after moving aircraft away from metal objects to determine if metal objects were the source of the interference. Allow up to five minutes for the heading to reinitialize. • Is the aircraft stationary if GPS is not available? Aircraft movement (rocking the wings or moving the tail) may cause the attitude and heading to fail if it believes the aircraft is in motion without GPS input. • Perform a Magnetometer Interference Test to check for interference from onboard electrical system components (e.g. NAV lights). Pay particular attention to any new electrical devices that have been installed since the aircraft was new. Correct any discrepancies that do not allow this test to pass before continuing. • Ensure GRS 77 and GMU 44 connectors are secure. • Check the wiring and any inline connectors between the GRS and GMU for faults. • Recalibrate the GMU 44. • Replace the GMU 44. • If problem persists, replace the GRS 77.

System Annunciation Troubleshooting (continued)

Annunciation	Associated LRU	Solution
<p>Engine/Airframe Sensors</p> 	<p>GEA 71 & GIA 63 or GIA63W</p>	<ul style="list-style-type: none"> • Check PFD Alert Window for GIA1/2 or GEA configuration, software or failed data path error messages. Correct any errors before proceeding. • On the PFD in Configuration Mode, turn to the GE STATUS page and verify that the GEA internal power supply, configuration, and calibration status boxes are green. <ul style="list-style-type: none"> – If the internal power supply box is red, check for shorted engine/airframe sensors that receive 5V, 10V or 12V power from the GEA (tach sensor, MAP sensor, Fuel Flow sensor, oil pressure sensor and pitot heat sensor). – The configuration and calibration boxes should be green. If the calibration status boxes are red, replace the GEA 71. • Verify the internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes are not dashed out (does not include Aircraft Power 1 and 2). If any voltages are dashed out, replace the GEA. • Check the MFD AUX – SYSTEM STATUS page if the GEA is online (green checkmark on the AUX – SYSTEM STATUS page is present). If GEA is not online (Red-X is present), verify the unit is receiving power at the GEA rack connector. • Replace the GEA 71. • If problem persists, check the GIA/GEA interconnect wiring and unit connector pins for faults. • For only REX-X of the EGT, TIT and CHT temperature readings, replace the GEA configuration module and thermocouple located in the back shell of the GEA connector.

5.2 Messages and Annunciations



Figure 5-3. Messages and Annunciations

In normal mode, the system displays a variety of system messages and/or annunciations. System messages are typically displayed on the PFD and can be viewed by pressing the bezel key located below the flashing annunciation. This section provides a listing of possible messages, alerts, and annunciations.

5.3 System Status Page (MFD Normal Mode)



Figure 5-4. System Status Page (AUX Group)

The AUX – SYSTEM STATUS page on the MFD displays LRU health status in normal mode.

Failed Path Messages

The following message indicates that a data path connected to the GDU (PFD1 or MFD) or the GIA 63/W (1 or 2) has failed.

- FAILED PATH – A data path has failed.

The **FAILED PATH** message is triggered by a timeout of any one digital channel. The channels that are checked are listed on these pages in config mode:

- 1) GDU RS-232 / ARINC 429 CONFIG (PFD1 and MFD)
- 2) GIA RS-232 / ARINC 429 CONFIG (GIA1 and GIA2)
- 3) GIA CAN / RS-485 CONFIGURATION (GIA1 and GIA2)

Once the FAILED PATH message has been triggered, it remains on the list of messages until the next power cycle. This latching was implemented so that for intermittent failures, the message would remain at the end of the flight (to alert the maintenance crew). This also keeps the crew from having to repeatedly acknowledge messages in the case of intermittent failures.




The box next to each channel indicates the current status of the channel as indicated below:

- Red = data path is known to be failed
- Black = data path status is unknown
- Green = data path is known to be good







The applicable data paths can be verified by viewing the configuration mode pages listed below.

GDU RS-232 / ARINC 429 CONFIG Page




PFD1 RS-232

Channel	LRU	Indicator	Status
CHNL 1	GCU 476 (certain airframes only)		PFD1/GCU 476 data path is functioning correctly.
			<p>PFD1/GCU 476 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for PFD or GCU configuration or software error messages. Correct any errors before proceeding. • Verify GCU is powered on by pressing the “ANN TEST” softkey on the MFD AUX - SYSTEM STATUS page to see if the key indicators turn on. • If GCU will not power on, remove unit and verify power and ground are present at the GCU connector. <ul style="list-style-type: none"> • If power or ground is not present, troubleshoot aircraft wiring for faults. • If power and ground are present, check the PFD and GCU connector for damaged or pushback pins. • Swap PFD and MFD to confirm if the problem is in the PFD. <ul style="list-style-type: none"> • Replace original PFD if box turns green after swapping displays. • Replace the GCU.
			PFD1/GCU 476 data path functionality is unknown. Reload PFD1 configuration file.







PFD1 ARINC 429

Channel	LRU	Indicator	Status
IN 1	GRS 77 #1		PFD1/GRS 77 data path is functioning correctly.
			<p>PFD1/GRS 77 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for PFD or GRS77 configuration or software error messages. Correct any errors before proceeding. • Verify GRS77 status is OK using the AUX – SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 connector is secure and proper wire harness strain relief is provided. • Swap PFD and MFD to confirm if the problem is in the PFD. <ul style="list-style-type: none"> – Replace original PFD if box turns green after swapping displays. • Check the PFD1/GRS 77 interconnect wiring and unit connector pins for faults. • Replace GRS 77.
			PFD1/GRS 77 data path functionality is unknown. Reload PFD1 configuration file.
IN 2	GDC 74 #1		PFD1/GDC 74A data path is functioning correctly
			<p>PFD1/GDC 74A data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for PFD or GDC74 configuration or software error messages. Correct any errors before proceeding. • Verify GDC 74 status is OK using the System Status Page on the MFD. If it has a Red-X, troubleshoot why the GDC is offline before proceeding. • Swap PFD and MFD to confirm if the problem is in the original PFD. <ul style="list-style-type: none"> – Replace original PFD if box turns green after swapping displays. • Check the PFD/GDC 74 interconnect wiring and unit connector pins for faults. • Replace GDC 74 if problem remains.
			PFD1/GDC 74A data path functionality is unknown. Reload PFD1 configuration file.

MFD RS-232







Channel	LRU	Indicator	Status
-CHNL 1	GCU 476 certain airframes only		MFD/GCU 476 data path is functioning correctly.
			<p>MFD/GCU 476 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for MFD or GCU configuration or software error messages. Correct any errors before proceeding. • Verify GCU is powered on by pressing the “ANN TEST” softkey on the MFD AUX - SYSTEM STATUS page to see if the key indicators turn on. • If GCU will not power on, remove unit and verify power and ground are present at the GMC connector. <ul style="list-style-type: none"> – If power or ground is not present, troubleshoot aircraft wiring for faults. – If power and ground are present, check the MFD and GCU connectors for damaged or pushback pins. • Swap PFD and MFD to confirm if the problem is in the original MFD. <ul style="list-style-type: none"> – Replace original MFD if box turns green after swapping displays. • Replace the GCU 476.
			MFD/GCU 476 data path functionality is unknown. Reload MFD configuration file.

MFD ARINC 429




Channel	LRU	Indicator	Status
IN 1	GRS 77 #1		MFD/GRS 77 data path is functioning correctly.
			<p>MFD/GRS 77 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for MFD or GRS77 configuration or software error messages. Correct any errors before proceeding. • Verify GRS77 status is OK using the AUX – SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 connector is secure and proper wire harness strain relief is provided. • Swap PFD and MFD to confirm if the problem is in the MFD. <ul style="list-style-type: none"> – Replace original MFD if box turns green after swapping displays. • Check the MFD/GRS 77 interconnect wiring and unit connector pins for faults. • Replace GRS 77
			MFD/GRS 77 data path functionality is unknown. Reload MFD configuration file.
IN 2	GDC 74A #1		MFD/GDC 74A data path is functioning correctly
			<p>MFD/GDC 74A data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for PFD or GDC74 configuration or software error messages. Correct any errors before proceeding. • Verify GDC 74 status is OK using the System Status Page on the MFD. If it has a Red-X, troubleshoot why the GDC is offline before proceeding. • Swap PFD and MFD to confirm if the problem is in the original MFD. <ul style="list-style-type: none"> – Replace original MFD if box turns green after swapping displays. • Check the MFD/GDC 74 interconnect wiring and unit connector pins for faults. • Replace GDC 74 if problem remains.
			MFD/GDC 74A data path functionality is unknown. Reload MFD configuration file.

GIA RS-232 / ARINC 429 CONFIG Page




GIA1 RS-232

Channel	LRU	Indicator	Status
CHNL 1	GDC 74A #1		GIA1/GDC 74A data path is functioning correctly.
			<p>GIA1/GDC 74A data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GDC configuration or software error messages. Correct any errors before proceeding. • Verify GDC 74 status is OK using the AUX – SYSTEM STATUS page on the MFD. If it has a Red-X, troubleshoot why the GDC is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GDC 74 interconnect wiring and unit connector pins for faults. <p>Replace GDC 74 if problem remains.</p>
			GIA1/GDC 74A data path functionality is unknown. Reload GIA1 configuration files.
CHNL 5	GTX 33 #w/TIS		GIA1/GTX33 data path is functioning correctly.
			<p>GIA1/GTX 33 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD1 Alert Window for GIA or GTX configuration or software error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GTX 33 interconnect wiring and connector pins for faults. • Replace GTX 33 if problem remains.
			GIA1/GTX 33 data path functionality is unknown. Reload GIA1 configuration files.




GIA1 RS-232 (continued)

Channel	LRU	Indicator	Status
CHNL 6	GRS 77 #1		GIA1/GRS 77 data path is functioning correctly.
			<p>GIA1/GRS 77 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GRS configuration or software error messages. Correct any errors before proceeding. • Verify GRS77 status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 connector is secure and proper wire harness strain relief is provided. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GRS 77 interconnect wiring and unit connector pins for faults. • Replace GRS 77.
			GIA1/GRS 77 data path functionality is unknown. Reload GIA1 configuration files.




GIA1 RS-232 (continued)

Channel	LRU	Indicator	Status
CHNL 7	GMA 1347 #1		GIA1/GMA 1347 data path is functioning correctly.
			<p>GIA1/GMA 1347 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GMA configuration or software error messages. Correct any errors before proceeding. • Verify GMA 1347 status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GMA 1347 interconnect wiring and unit connector pins for faults. • Replace GMA 1347.
			GIA1/GMA 1347 data path functionality is unknown. Reload GIA1 configuration files.







GIA1 ARINC 429




Channel	LRU	Indicator	Status
IN 5	GDC 74A #1		GIA1/GDC 74A data path is functioning correctly.
			<p>GIA1/GDC 74A data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GDC configuration or software error messages. Correct any errors before proceeding. • Verify GDC 74A status is OK using the AUX – SYSTEM STATUS page on the MFD. If it has a Red-X, troubleshoot why the GDC is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GDC 74A interconnect wiring and unit connector pins for faults. • Replace GDC 74A
			GIA1/GDC 74A data path functionality is unknown. Reload GIA1 configuration files.

GIA1 ARINC 429 (continued)




Channel	LRU	Indicator	Status
IN 6	GRS 77 #1		GIA1/GRS 77 #1 data path is functioning correctly.
			<p>GIA1/GRS 77 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GRS configuration or software error messages. Correct any errors before proceeding. • Verify GRS77 status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 connector is secure and proper wire harness strain relief is provided. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GRS 77 interconnect wiring and unit connector pins for faults. <p>Replace GRS 77.</p>
			GIA1/GRS 77 data path functionality is unknown. Reload GIA1 configuration files.

GIA2 RS-232 (continued)




Channel	LRU	Indicator	Status
CHNL 3	WX 500		GIA2/WX 500 data path is functioning correctly.
			<p>GIA2/WX 500 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA configuration or software error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/WX500 interconnect wiring and connector pins for faults. • Troubleshoot WX500 per Manufacturer's instructions if problem remains.
			GIA2/WX 500 data path functionality is unknown. Reload GIA2 configuration files.
CHNL 4	CO GUARDIAN		GIA2/GTX33 data path is functioning correctly.
			<p>GIA2/CO GUARDIAN data path is not functioning correctly</p> <ul style="list-style-type: none"> • Reconfigure CO GUARDIAN Option • Check the GIA@/CO GUARDIAN interconnect for wiring faults. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. • Replace original GIA2 if box turns green after swapping units. • Replace CO GAURDIAN if problem persists.
			GIA2/ CO Ruardian data path functionality is unknown. Reload GIA2 configuration files




CHNL 5	GTX 33 #1 w/TIS		GIA2/GTX33 data path is functioning correctly.
			<p>GIA2/GTX 33 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GTX configuration or software error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GTX 33 interconnect wiring and connector pins for faults. • Replace GTX 33.
			GIA2/GTX33 data path functionality is unknown. Reload GIA2 configuration files.

GIA2 RS-232 (continued)




Channel	LRU	Indicator	Status
CHNL 7	GMA 1347 #1		GIA1/GMA 1347 data path is functioning correctly.
			<p>GIA1/GMA 1347 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GMA configuration or software error messages. Correct any errors before proceeding. • Verify GMA 1347 status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GMA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GMA 1347 interconnect wiring and connector pins for faults. • Replace GMA 1347
			GIA1/GMA 1347 data path functionality is unknown. Reload GIA1 configuration files.

GIA2 ARINC 429

Channel	LRU	Indicator	Status
IN 4	RYAN 9900BX TCAD (optional on certain airframes)		GIA2/SKYWATCH 497 data path is functioning correctly.
			<p>GIA2/ RYAN 9900BX TCAD data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA configuration or software error messages. Correct any errors before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/RYAN TCAD interconnect wiring and connector pins for faults. • Troubleshoot RYAN TCAD per Manufacturer's instructions if problem remains.
			GIA2/RYAN TCAD data path functionality is unknown. Reload GIA2 configuration files.

IN 5	GDC 74A #1		GIA2/GDC 74A #1 data path is functioning correctly.
			<p>GIA2/GDC 74A #1 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GDC configuration or software error messages. Correct any errors before proceeding. • Verify GDC 74A #1 status is OK using the AUX – SYSTEM STATUS page on the MFD. If it has a Red-X, troubleshoot why the GDC is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GDC 74A #1 interconnect wiring and unit connector pins for faults. • Replace GDC 74A #1.
			GIA2/GDC 74A #1 data path functionality is unknown. Reload GIA2 configuration files.

GIA2 ARINC 429 (continued)







Channel	LRU	Indicator	Status
IN 6	GRS 77 #1		GIA2/GRS 77 data path is functioning correctly.
			<p>GIA2/GRS 77 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GRS configuration or software error messages. Correct any errors before proceeding. • Verify GRS77 status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 #1 connector is secure and proper wire harness strain relief is provided. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GRS 77 interconnect wiring and unit connector pins for faults. • Replace GRS 77.
			GIA2/GRS 77 data path functionality is unknown. Reload GIA2 configuration files.

GIA RS-485 Configuration Page







NOTE

Do not load GEA configuration files unless absolutely necessary. The HSCMs must be recalibrated if they are reloaded.

GIA1 RS-485

Channel	LRU	Indicator	Status
CHNL 1	GEA1		GIA1/GEA1 data path is functioning correctly.
			<p>GIA1/GEA1 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GEA configuration or software error messages. Correct any errors before proceeding. • Verify GEA status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GEA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GEA1 interconnect wiring and connector pins for faults. • Replace GEA71.
			GIA1/GEA1 data path functionality is unknown. Reload GIA1 configuration files.
CHNL 4	GFC 700		GIA1/GFC 700 data path is functioning correctly.
			<p>GIA1/GFC 700 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA, GFC GTA or GSA configuration or software error messages. Correct any errors before proceeding. • Verify all GSA/GTA servo statuses are OK using the AUX - SYSTEM STATUS PAGE on the MFD. If one or all have a Red-X, troubleshoot why the servos are offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA1. <ul style="list-style-type: none"> – Replace original GIA1 if box turns green after swapping units. • Check the GIA1/GSA/GTA interconnect wiring and connector pins for faults. • Proceed to the Autopilot Troubleshooting section for further assistance.
			GIA1/GFC 700 data path functionality is unknown. Reload GIA1 and GFC700 configuration files.

GIA2 RS-485

Channel	LRU	Indicator	Status
CHNL 1	GEA1		GIA2/GEA1 data path is functioning correctly.
			<p>GIA2/GEA1 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA or GEA configuration or software error messages. Correct any errors before proceeding. • Verify GEA status is OK using the AUX - SYSTEM STATUS PAGE on the MFD. If it has a Red-X, troubleshoot why the GEA is offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GEA1 interconnect wiring and connector pins for faults. • Replace GEA71.
			GIA2/GEA1 data path functionality is unknown. Reload GIA2 configuration files.
CHNL 4	GFC 700		GIA2/GFC 700 data path is functioning correctly.
			<p>GIA2/GFC 700 data path is not functioning correctly.</p> <ul style="list-style-type: none"> • Check PFD Alert Window for GIA, GFC GTA or GSA configuration or software error messages. Correct any errors before proceeding. • Verify all GSA/GTA servo statuses are OK using the AUX - SYSTEM STATUS PAGE on the MFD. If one or all have a Red-X, troubleshoot why the servos are offline before proceeding. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to confirm if the problem is in the original GIA5. <ul style="list-style-type: none"> – Replace original GIA2 if box turns green after swapping units. • Check the GIA2/GSA/GTA interconnect wiring and connector pins for faults. • Proceed to the Autopilot Troubleshooting section for further assistance.
			GIA2/GFC 700 data path functionality is unknown. Reload GIA2 and GFC700 configuration files.

5.4 GDU RELATED ALERTS AND PROBLEMS

5.4.1 General Problems

Symptom	Recommended Action
Display will not track photocell	<ul style="list-style-type: none"> • Go to the GDU TEST page in configuration mode. Cover and uncover the photocells and verify that PHOTOCCELL A or PHOTOCCELL B value changes. <ul style="list-style-type: none"> – If values do not change, replace the display. • Reload GDU configuration files.
Keyboard will not track photocell	
Display will not track dimmer bus	<ul style="list-style-type: none"> • Reload GDU configuration files. • Swap PFD or MFD to see if problem remains with display. <ul style="list-style-type: none"> – Replace display if condition remains with the same unit. – If condition remains in original position after swapping displays, check GDU dimmer input to verify voltage is present.
Keyboard will not track dimmer bus	
Display is blank	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Cycle power. <ul style="list-style-type: none"> – If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software need to be re-loaded, then re-load software. Otherwise, replace the GDU. • Use a bright light to verify LCD is active. <ul style="list-style-type: none"> – Adjust avionics dimmer control full clockwise. – Manually turn up backlight on the PFD and load configuration files to the GDU. • Ensure slide lock is fully engaged with the locking tabs on the back of the unit. <ul style="list-style-type: none"> – If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector. • Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker. • Ensure circuit breakers have not failed and power wire connections are secure. • Swap PFD or MFD. <ul style="list-style-type: none"> – If problem follows unit, replace the display. Please note the position it failed in (PFD1) OR MFD. – If problem does not follow unit, troubleshoot aircraft wiring for fault.
Display resets	
Display flickers	

Symptom	Recommended Action
SD card is stuck in GDU	<ul style="list-style-type: none"> • DO NOT insert a screwdriver of any length into the card slot. • DO NOT pry against the overlay. • DO NOT force the SD Card out. • Use a small screwdriver in the groove on the side of the exposed end of the card to help pull out the card. • Push the card in further to release the card locking mechanism. • Check SD Card for having more than one label. Two or more labels on the card will cause sticking. <ul style="list-style-type: none"> – Remove all but one label. • Insure the SD card is from SanDisk. Use of other brand of SD Cards is not recommended due to variances in card thickness. • If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair.
A button/knob/joystick does not appear to function	<ul style="list-style-type: none"> • Go to the GDU TEST page in configuration mode and verify button, knob, or joystick operates correctly by observing a change in color from red to green in the button/knob/joystick icon when the button/knob/joystick is pressed. If a button is stuck, the button icon will be green without pressing the button as soon as you turn to the GDU TEST page. • If problem is verified, replace GDU.
Terrain/Obstacle/Safetaxi/Flite Charts does not display on map	<ul style="list-style-type: none"> • Ensure supplemental data cards are inserted correctly in the lower slots of all three GDU's. • Allow the system to verify the data on the cards for approximately five minutes after power-up. • If a database does not activate, reload the problem database onto the SD Card or replace the card.

5.4.2 Database and Software Alerts

Message	Cause	Solutions
MFD1 DB ERR – MFD1 aviation database error exists.	The MFD has encountered an error in the Jeppesen database.	<ul style="list-style-type: none"> • Reload aviation database into the display. • Contact Garmin Technical Support for assistance.
PFD1 DB ERR – PFD1 aviation database error exists.	PFD1 has encountered an error in the Jeppesen database.	
MFD1 DB ERR – MFD1 basemap database error exists.	The MFD has encountered an error in the basemap database.	<ul style="list-style-type: none"> • Confirm supplemental data card is inserted fully in the bottom slot of the display. • Remove the supplemental data card from the bottom slot of the display and insert in the top slot. <ul style="list-style-type: none"> – If the problem is resolved, the bottom card slot is dirty or has failed. Try reinserting the card multiple times in the bottom slot to clean the card contacts. If the problem remains in the bottom slot, you may leave the card in the top slot (if the top slot if unused) or replace the display. • Swap with a supplemental data card from another display in the same system. <ul style="list-style-type: none"> – If problem moves to the other display; you may either copy the file “bmap.bin” from the good card to the bad one or replace all the supplemental datacards as a set. If the basemap data files are corrupt on both cards, contact Garmin Product Support for a copy of the database. – If problem remains in the same GDU, replace that GDU.
PFD1 DB ERR – PFD1 basemap database error exists.	PFD1 has encountered an error in the basemap database.	

Database and Software Alerts (continued)		
Message	Cause	Solutions
MFD1 DB ERR – MFD1 terrain database error exists.	The MFD has encountered an error in the terrain database.	<ul style="list-style-type: none"> • Confirm supplemental data card is inserted fully in the bottom slot of the display. • Remove the supplemental data card from the bottom slot of the display and insert in the top slot. <ul style="list-style-type: none"> – If the problem is resolved, the bottom card slot is dirty or has failed. Try reinserting the card multiple times in the bottom slot to clean the card contacts. If the problem remains in the bottom slot, you may leave the card in the top slot (if the top slot if unused) or replace the display. • Swap with a supplemental data card from another display in the same system. <ul style="list-style-type: none"> – If problem moves to the other display, reload the database or replace all the supplemental datacards as a set. – If problem remains in the same GDU, replace that GDU.
PFD1 DB ERR – PFD1 terrain database error exists.	PFD has encountered an error in the terrain database.	
MFD1 DB ERR – MFD1 obstacle database error exists.	The MFD has encountered an error in the obstacle database.	
PFD1 DB ERR – PFD1 obstacle database error exists.	PFD1 has encountered an error in the obstacle database.	
MFD1 DB ERR – MFD1 airport terrain database error exists.	The MFD has encountered an error in the airport terrain database.	
PFD1 DB ERR – PFD1 airport terrain database error exists.	PFD1 has encountered an error in the airport terrain database.	
MFD1 DB ERR – MFD1 Safe Taxi® database error exists.	The MFD has encountered an error in the SafeTaxi® database.	

Database and Software Alerts (continued)		
Message	Cause	Solutions
PFD1 DB ERR – PFD1 Safe Taxi® database error exists.	PFD1 has encountered an error in the SafeTaxi® database.	<ul style="list-style-type: none"> • Confirm supplemental data card is inserted fully in the bottom slot of the display. • Remove the supplemental data card from the bottom slot of the display and insert in the top slot. <ul style="list-style-type: none"> – If the problem is resolved, the bottom card slot is dirty or has failed. Try reinserting the card multiple times in the bottom slot to clean the card contacts. If the problem remains in the bottom slot, you may leave the card in the top slot (if the top slot if unused) or replace the display. • Swap with a supplemental data card from another display in the same system. <ul style="list-style-type: none"> – If problem moves to the other display, reload the database or replace all the supplemental datacards as a set. – If problem remains in the same GDU, replace that GDU.

Database and Software Alerts (continued)		
Message	Cause	Solutions
MFD1 DB ERR – MFD1 Chartview database error.	The MFD has encountered an error in the Chartview database.	<ul style="list-style-type: none"> • Confirm supplemental data card is inserted fully in the top slot of the display. • Remove the supplemental data card from the top slot of the display and insert in the bottom slot. <ul style="list-style-type: none"> – If the problem is resolved, the top card slot is dirty or has failed. Try reinserting the card multiple times in the top slot to clean the card contacts. If the problem remains in the top slot, replace the display. • Reload the Jeppesen ChartView database onto the card.
MFD1 DB ERR – MFD1 Terminal Procs database error exists.	The MFD has encountered an error in the Terminal Procedures database.	<ul style="list-style-type: none"> • Confirm supplemental data card is inserted fully in the bottom slot of the display. • Remove the supplemental data card from the bottom slot of the display and insert in the top slot. <ul style="list-style-type: none"> – If the problem is resolved, the bottom card slot is dirty or has failed. Try reinserting the card multiple times in the bottom slot to clean the card contacts. If the problem remains in the bottom slot, you may leave the card in the top slot (if the top slot if unused) or replace the display. • Swap with a supplemental data card from another display in the same system. <ul style="list-style-type: none"> – If problem moves to the other display, reload the database or replace all the supplemental datacards as a set. – If problem remains in the same GDU, replace that GDU.
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The system has found the Jeppesen aviation database in the PFD and MFD do not match.	<ul style="list-style-type: none"> • Load the same cycle of aviation database to all displays.
DB MISMATCH – Aviation database type mismatch.	The system has found the Jeppesen aviation database types do not match.	<ul style="list-style-type: none"> • Load same type aviation database to all displays.

Database and Software Alerts (continued)		
Message	Cause	Solutions
DB MISMATCH – Terrain database version mismatch.	The PFD and/or MFD have different terrain database versions installed.	<ul style="list-style-type: none"> Insert two identical version supplemental database cards in the PFD and MFD.
DB MISMATCH – Obstacle database version mismatch.	The PFD and/or MFD have different obstacle database versions installed.	
DB MISMATCH – Terrain database type mismatch.	The PFD and/or MFD have different terrain database types installed.	
DB MISMATCH – Airport Terrain database mismatch. Xtalk is off.	The PFD and/or MFD have different airport terrain database types installed.	
CAS INOP	The system has found the PFD and/or MFD software versions do not match.	<ul style="list-style-type: none"> No Dispatch. Reload PFD and MFD software.
	The Aviation databases do not match in both displays.	<ul style="list-style-type: none"> No Dispatch. Reload Aviation database in all displays.
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The system has found the PFDs and/or MFD software versions do not match.	<ul style="list-style-type: none"> Load correct software version into both displays.
MANIFEST – PFD1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in PFD1.	<ul style="list-style-type: none"> Load correct software version into the display.
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD master configuration module has failed.	<ul style="list-style-type: none"> Check master configuration module connector and wiring for damage inside the GDU connector backshell. Replace master configuration module, wiring harness and pins. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed (see note above). The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>

5.4.3 Cooling Alerts

Message	Cause	Solutions
MFD1 COOLING – has poor cooling. Reducing power usage.	The MFD has exceeded its operating temperature range.	<ul style="list-style-type: none"> • Check cooling fan and wiring for proper operation. <ul style="list-style-type: none"> – Replace cooling fan if unable to determine if operating correctly. • If problem persists, replace the MFD.
PFD1 COOLING – has poor cooling. Reducing power usage.	PFD1 has exceeded its operating temperature range.	<ul style="list-style-type: none"> • Check cooling fan and wiring for proper operation. <ul style="list-style-type: none"> – Replace cooling fan if unable to determine if operating correctly. • If problem persists, replace the PFD.

5.4.4 Key Alerts

Message	Cause	Solutions
MFD1 “key” KEYSTK – key is stuck.	The system has determined a key is stuck on the MFD.	<ul style="list-style-type: none"> • Go to the GDU TEST page in configuration mode and verify key is stuck (if key is stuck the corresponding indicator will be green). • Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key. <ul style="list-style-type: none"> • If problem persists replace the display.
PFD1 “key” KEYSTK – key is stuck.	The system has determined a key is stuck on PFD1.	

5.4.5 Miscellaneous Alerts

Message	Cause	Solutions
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and PFD.	<ul style="list-style-type: none"> • Ensure a database error has not occurred (identified in the ALERTS window on the PFD). <ul style="list-style-type: none"> – If a database error has occurred, correct error before proceeding. • Check display Ethernet interconnect wiring and pins for faults. • Replace PFD1 with a known good unit, to verify location of problem: <ul style="list-style-type: none"> – If problem persists, reinstall original PFD1. – If problem persists replace MFD.
SIMULATOR – Sim mode is active. Do not use for navigation.	The system is in simulator mode.	<ul style="list-style-type: none"> • Check wiring (pin 54 in all GDU connectors should be empty). • Replace PFD1 with a known good unit, to verify location of problem: <ul style="list-style-type: none"> – If problem persists, reinstall original PFD1. – If problem persists replace MFD.

Miscellaneous Alerts (continued)

Message	Cause	Solutions
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	<ul style="list-style-type: none"> • If the CLR key was held during a power cycle, disregard message. • Cycle power to PFD1: <ul style="list-style-type: none"> – Ensure CLR key is not stuck on the GDU TEST page. – If problem persists, replace PFD1.
MFD1 SERVICE – needs service. Return unit for repair.	The system has determined the MFD needs service.	<ul style="list-style-type: none"> • Ensure the MFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. <ul style="list-style-type: none"> – If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. – If the CCFT level rises, disregard the message. – If the CCFT level does not rise, replace the MFD. • Replace the MFD.
PFD1 SERVICE – needs service. Return unit for repair.	The system has determined PFD1 needs service.	<ul style="list-style-type: none"> • Ensure the PFD connector is fully seated and locked. • If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level. Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 & 2 levels are above 50. <ul style="list-style-type: none"> – If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises. – If the CCFT level rises, disregard the message. – If the CCFT level does not rise, replace the PFD. • Replace the PFD.

Miscellaneous Alerts (continued)

Message	Cause	Solutions
<p>PFD1 CONFIG – PFD1 configuration error. Config service req'd.</p>	<p>The system has detected a PFD1 configuration mismatch.</p>	<ul style="list-style-type: none"> • Reload PFD1 configuration files from SD Loader Card. • Reload system configuration files by pressing the UPDT CFG softkey on the Configuration Upload Page in the System Page Group to load configuration files into the configuration module. <ul style="list-style-type: none"> – If message persists, check config module wiring for faults and replace if necessary. – If issue continues, replace master configuration module. – If problem persists, replace the PFD1. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>

Miscellaneous Alerts (continued)

Message	Cause	Solutions
MFD CONFIG – MFD configuration error. Config service req'd.	The system has detected a MFD configuration mismatch.	<ul style="list-style-type: none"> • Reload MFD configuration files from SD Loader Card. • Reload system configuration files by pressing the UPDT CFG softkey on the Configuration Upload Page in the System Page Group to load configuration files into the configuration module. <ul style="list-style-type: none"> – If message persists, check config module wiring for faults and replace if necessary. – If issue continues, replace master configuration module. – If problem persists, replace the MFD. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
PFD1 VOLTAGE – PFD1 has low voltage. Reduce power usage.	PFD1 is not receiving sufficient voltage.	<ul style="list-style-type: none"> • Check input voltage to PFD1. <ul style="list-style-type: none"> – If input voltage is ok, replace PFD1.
MFD1 VOLTAGE – MFD1 has low voltage. Reduce power usage.	The MFD is not receiving sufficient voltage.	<ul style="list-style-type: none"> • Check input voltage to the MFD. <ul style="list-style-type: none"> – If input voltage is ok, replace the MFD.

Miscellaneous Alerts (continued)

Message	Cause	Solutions
TAWS FAIL	A TAWS system failure has occurred.	<ul style="list-style-type: none"> • If message occurred on the first power up after activating TAWS, cycle power to initialize TAWS again. • Ensure each GDU contains a supplemental data card with a terrain and obstacle database present. • Verify GIA's are online. • Verify GPS receivers have a position lock. TAWS must have a GPS position and altitude present to operate. • Ensure an Airport Terrain, Obstacle, Terrain, Aviation Database, or GDU SW mismatch has not occurred. <ul style="list-style-type: none"> – If a mismatch has occurred, load correct database/software files or replace all the supplemental database cards as a set.
TAWS TEST	TAWS system is currently being tested.	<ul style="list-style-type: none"> • Normal annunciation during self test. Test will take up to two minutes to complete.
TAWS INHB	TAWS system alerting is disabled	<ul style="list-style-type: none"> • Enable TAWS system alerting by pressing the MENU button from the MAP – TAWS page.
TAWS N/A	GPS system integrity not high enough to enable TAWS	<ul style="list-style-type: none"> • Ensure valid GPS position is received from the AUX – GPS STATUS page.
TRAFFIC FAIL	Communication with the traffic device has failed.	<ul style="list-style-type: none"> • If a non-Garmin Traffic device is installed, refer to the manufacturer's maintenance manual to determine if it is operating correctly. • Check GIA2/Traffic Device wiring and connectors for faults.

5.5 GMA 1347 RELATED ALERTS AND PROBLEMS

5.5.1 Common Problems

Symptom	Recommended Action
Noise in Audio	<p>Most often the cause of the noise is external to the GMA 1347. Try the following to locate the source of the noise before replacing the 1347:</p> <ul style="list-style-type: none"> • Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry. • Check for noise with engine off. <ul style="list-style-type: none"> – If the noise is present only when the engine is running, check the generator and/or ignition system as possible sources of noise (see OEM Maintenance Manual). • Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.). <ul style="list-style-type: none"> – If the noise is identified from one electrical system or component refer to the OEM airframe maintenance manual. • Ensure the NAV/COM squelch is not open. Ensure the ADF and DME audio is not active. • Ensure the marker beacon audio is not active. Ensure the ICS squelch is not open. Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments. • Check resistors in line with Music 1 and Music 2 wiring at the GMA 347 in accordance with system wiring diagrams • Verify Mic and Phone jacks are insulated from airframe ground and that Music 1 and Music 2 jacks are not insulated from airframe ground in console. • Replace unit only after all possible external sources of noise are eliminated.
Buttons Do Not Work.	<ul style="list-style-type: none"> • Some buttons are disabled in the GMA CONFIGURATION page by default. This is to remove potential sources of audio noise for inputs that are not used. If in doubt as to which buttons should be disabled, reload GMA config files and other config files for optional equipment installed in the aircraft (ADF, DME) from the loader card.

COM Bleedover	<ul style="list-style-type: none"> Verify on the GMA CONFIGURATION page that “MUTE AUDIO ON TX” has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, normal Split COM operation is not approved. If the box is black, highlight “MUTE AUDIO ON TX” with the cursor and press the ENT key to turn the box green.
Speaker Cuts Out	<ul style="list-style-type: none"> Reduce volume level of the item that caused the speaker to cut out when turned up. A speaker protection circuit disables the speaker output if the volume is too high. If the volume is not sufficient, replace aircraft cabin speaker, reference the OEM Maintenance Manual.
MIC Audio Heard in Speaker	<ul style="list-style-type: none"> Reduce ICS Volume.

5.5.2 GMA 1347 Alerts

Message	Cause	Solutions
MANIFEST – GMA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMA 1347.	<ul style="list-style-type: none"> • Load correct software version.
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The system has determined GMA 1347 needs service.	<ul style="list-style-type: none"> • Replace GMA 1347.
GMA1 FAIL – GMA 1 is inoperative.	The system has detected a failure in GMA 1347.	<ul style="list-style-type: none"> • Ensure 1347 is receiving power. • Ensure both GIAs are receiving power. • Ensure all GDUs are receiving power. • Ensure the 1347/GIA RS-232 data lines are working properly. • Ensure the GIA/GDU Ethernet data lines are working properly. • Replace 1347.
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The system has detected a GMA 1347 configuration mismatch.	<ul style="list-style-type: none"> • Load 1347 configuration files, see Section 7. • Replace GMA 1347. • If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>

5.6 GIA 63W RELATED ALERTS AND PROBLEMS

5.6.1 COM

Symptom	Recommended Action
Weak COM transmit power	<ul style="list-style-type: none"> Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> If problem follows unit, replace GIA. If problem does not follow unit, check COM antenna and cabling for faults.
Weak COM receiver or COM squelch opens intermittently	<ul style="list-style-type: none"> Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> If problem follows unit, perform GIA COM Procedure per Section 5.6.1.1. <ul style="list-style-type: none"> Replace GIA if COM adjustment does not achieve desired results. If problem does not follow unit, check COM antenna and cabling for faults.
No COM sidetone	<ul style="list-style-type: none"> Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> If problem follows unit, replace GIA. If problem persists, replace 1347.
COM Bleedover	<ul style="list-style-type: none"> Verify on the GMA CONFIGURATION page that “MUTE AUDIO ON TX” has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, normal Split COM operation is not approved. If the box is black, highlight “MUTE AUDIO ON TX” with the cursor and press the ENT key to turn the box green.

5.6.1.1 COM Adjustment Procedure

The COM Calibration Procedure is not a required procedure and is not generally performed during installation or maintenance. This procedure may be used to adjust COM receiver 25kHz/8.33kHz squelch settings if needed. If the COM squelch opens after performing this procedure, the aircraft’s electrical system may be noisy causing the COM squelch to open. Find the source of electrical system noise and correct (electrical motors are a common source of interference). Desensitizing the COM squelch to prevent it from opening due to electrical system noise may reduce the receiving range of the COM.

To set COM squelch threshold:

- Connect a ground power unit to the aircraft.
- Disconnect GIA COM antenna connector at the back of the GIA rack and connect an RF generator.
 - For 25kHz frequency spacing; set the RF generator to 5.0µV hard, modulated 30% at 1000Hz.
 - For 8.33kHz frequency spacing; set the RF generator to 3.0µV hard, modulated 30% at 1000Hz.
- Turn on the Perspective system and allow to initialize in normal mode.
- Turn off the PFD and MFD by pulling their circuit breakers.
- Restart the PFD and MFD in Configuration Mode.
- On the PFD, turn to the COM SETUP page.

7. Activate the cursor and select the desired tuning frequency using the FMS knobs. Only the frequencies 118.00, 127.00, & 136.975 may be used when setting squelch and sidetone levels.
8. Select GIA1 or GIA2 in the COM Setup window. **This forces an update of the calibration data values and must be accomplished prior to making any changes.** Failure to do so may allow COM calibration values to be inadvertently stored into incorrect memory locations requiring GIA replacement.
9. For 25kHz operation, adjust the SQ 250 value. It may be set to any value between 0 (zero) and 63. The higher the number, the *less* signal is required to break squelch.
10. For 8.33kHz operation, adjust the SQ 833 value. It may be set to any value between 0 (zero) and 63. The higher the number, the *more* signal is required to break squelch.
11. After the squelch value is adjusted to the desired number, press the STORE softkey at the bottom of the display to save the value to the GIA.
12. Repeat steps 7-11 for tuning additional frequencies.

5.6.2 GPS

Symptom	Recommended Action
Will not acquire satellites	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check for possible external interference to the GPS receivers. <ul style="list-style-type: none"> – Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. – Turn to the GPS page on the MFD and check the GPS strength bars on both GPS receivers. If the signal strength level is erratic, or they disappear and reappear rapidly, or switch between a solid and hollow bar frequently there is an external device interfering with the GPS receivers. Turn off any devices that radiate a signal in the local area or move the aircraft to another location to remove the interference. • Check date and time on Date/Time Setup Page. <ul style="list-style-type: none"> – If date and time are incorrect, enter the correct date and time. • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows unit, clear the GPS almanac by performing the following steps – <ul style="list-style-type: none"> ▪ Using the PFD in config mode, go to the GIA RS-232/ARNIC 429 Config Page. ▪ At the top of the screen, select the GIA that can not acquire satellites (GIA1 or GIA2) and press the ENT key. ▪ Press the “CLR NV” softkey at the bottom of the screen. ▪ Select “OK” in the “Clear GIA nonvolatile memory?” pop-up window. ▪ Next reload GIA Audio and Config files from a loader card, see Section 7 for instructions. Be sure to reload the config files for any optional equipment installed on the aircraft that require the GIA config to be updated. • Cycle power on the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac. <ul style="list-style-type: none"> – If clearing nonvolatile memory is unsuccessful and the GPS still can not acquire a position, replace the GIA. • If problem does not follow unit, check GPS antenna and cabling.

5.6.3 NAV

Symptom	Recommended Action
Weak NAV receiver	<ul style="list-style-type: none"> • Set up a NAV/COM Ramp Test Set to radiate a test signal. • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows unit, replace GIA. – If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

5.6.4 G/S

Symptom	Recommended Action
Weak G/S receiver	<ul style="list-style-type: none"> • Set up a NAV/COM Ramp Test Set to radiate a test signal. • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows unit, replace GIA. – If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

5.6.5 COM Related Alerts

Message	Cause	Solutions
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has determined COM1 needs service.	<ul style="list-style-type: none"> • Replace GIA1.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The system has determined COM2 needs service.	<ul style="list-style-type: none"> • Replace GIA5.
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	<ul style="list-style-type: none"> • Press the push-to-talk switch(s) again to cycle its operation. • Check push-to-talk switch(s) and wiring. • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA1. • Check GIA1/GMA 1347 interconnect. • Replace GMA 1347.
COM2 PTT – COM2 push-to-talk key is stuck.	The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	<ul style="list-style-type: none"> • Press the push-to-talk switch(s) again to cycle its operation. • Check push-to-talk switch(s) and wiring. • Switch GIA2 and GIA1, to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA5.

		<ul style="list-style-type: none"> • Check GIA1/GMA 1347 interconnect. • Replace GMA 1347.
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The system has detected an over temperature in COM1.	<ul style="list-style-type: none"> • Check fan, wiring and air tubing for proper operation (if applicable). • Replace cooling fan if unable to determine if operating correctly. • Replace GIA1.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	The system has detected an over temperature in COM5.	<ul style="list-style-type: none"> • Check fan, wiring and air tubing for proper operation (if applicable). • Replace cooling fan if unable to determine if operating correctly. • Replace GIA5.

NOTE

COM 1 and COM 2 remain operable in an over-temperature condition with reduced transmit power.

5.6.6 NAV Related Alerts

Message	Cause	Solutions
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The system has detected a failure in NAV1 receiver.	<ul style="list-style-type: none"> • Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The system has detected a failure in NAV2 receiver.	<ul style="list-style-type: none"> • Replace GIA5.

5.6.7 G/S Related Alerts

Message	Cause	Solutions
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	<ul style="list-style-type: none"> • Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The G1000 has detected a failure in G/S1 receiver.	<ul style="list-style-type: none"> • Replace GIA5.
G/S1 FAIL – G/S1 is inoperative.	The G1000 has detected a failure in G/S1 receiver.	<ul style="list-style-type: none"> • Switch GIA1 and GIA2 to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA. – If problem does not follow unit, check G/S1 antenna and cabling.
G/S2 FAIL – G/S2 is inoperative.	The System has detected a failure in G/S2 receiver.	<ul style="list-style-type: none"> • Switch GIA1 and GIA2 to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA. – If problem does not follow unit, check G/S2 antenna and cabling.

5.6.8 GPS Related Alerts

NOTE

Before troubleshooting, ensure that no cell phones or devices using cell phone technology are turned on in the cabin (even in a monitoring state).

Message	Cause	Solutions
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The System has detected a failure in GPS1 receiver.	<ul style="list-style-type: none"> • Replace GIA1.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The system has detected a failure in GPS2 receiver.	<ul style="list-style-type: none"> • Replace GIA5.
GPS1 FAIL – GPS1 is inoperative.	The system has detected a failure in GPS1 receiver.	<ul style="list-style-type: none"> • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA1. – If problem does not follow the unit, check GPS1 antenna and cabling.
GPS2 FAIL – GPS2 is inoperative.	The system has detected a failure in GPS2 receiver.	<ul style="list-style-type: none"> • Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> – If problem follows the unit, replace GIA5. – If problem does not follow the unit, check GPS2 antenna and cabling.
GPS NAV LOST – Loss of GPS navigation. GPS fail.	The system has lost GPS navigation information.	<ul style="list-style-type: none"> • Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAMs may be issued for periods of outages, or the US Coast Guard website http://www.navcen.uscg.gov/gps/gps_notices/default.htm will have notices posted. • Using the MFD AUX – GPS Status page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check GPS antenna and cabling.

5.6.9 GIA Configuration Alerts

Message	Cause	Solutions
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The system has detected a GIA configuration mismatch.	<ul style="list-style-type: none"> • See Section 7 for GIA configuration instructions. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <p style="text-align: center;"><u>NOTE</u></p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		

Message	Cause	Solutions
GIA1 CONFIG – GIA1 audio config error. Config service req'd.	The system has detected a GIA audio configuration mismatch.	<ul style="list-style-type: none"> See Section 7 for GIA configuration instructions. If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
GIA2 CONFIG – GIA2 audio config error. Config service req'd.		
HW MISMATCH – GIA hardware mismatch. GIA1 communication halted.	The system has detected a non-WAAS GIA 63.	<ul style="list-style-type: none"> Replace GIA with a WAAS unit.
HW MISMATCH – GIA hardware mismatch. GIA2 communication halted.		
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA 1.	<ul style="list-style-type: none"> Load correct software version.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA 5.	
GIA1 SERVICE – GIA1 needs service. Return unit for repair.	The system has detected a failure in GIA1.	<ul style="list-style-type: none"> Replace GIA1.
GIA2 SERVICE – GIA1 needs service. Return unit for repair.	The system has detected a failure in GIA5.	<ul style="list-style-type: none"> Replace GIA5.

5.7 GRS 77/GMU 44 RELATED ALERTS AND PROBLEMS

5.7.1 Common Problems

Symptom	Recommended Action
AHRS does not complete initialization	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important if this issue appears during ground operation only. • Calibrate the GRS 77. • Check GRS 77 configuration module wiring for damage. • Check GRS 77 connector for bent pins. <ul style="list-style-type: none"> – If no damage can be found, replace GRS 77 configuration module. • If problem persists, replace the GRS 77.
Attitude appears unstable	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Ensure the four GRS 77 mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify. • Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). • Ensure GRS 77 connector is securely fastened and proper strain relief is provided. • Remove GRS 77 connector and verify there are no bent pins. • Replace the GRS 77. • Contact Garmin for further troubleshooting if required.

5.7.2 GRS 77 Related Alerts

Message	Cause	Solutions
AHRS TAS – AHRS not receiving airspeed.	The GRS 77 is not receiving airspeed information from the GDC 74A.	<ul style="list-style-type: none"> • Check GRS #1/GDC 74A interconnect. • Replace the GDC 74A • If problem does not clear, replace the GRS 77
AHRS GPS – AHRS using backup GPS source.	GRS 77 is using a backup GPS source.	<ul style="list-style-type: none"> • Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check GPS status for GIA 1 and 2 on MFD - AUX GPS STATUS page. If one or both GPS receivers cannot acquire a position lock. Troubleshoot GPS problems using Sections 5.1.2 and 5.6.5. • Replace the GRS 77.
AHRS GPS – AHRS not receiving backup GPS information.	GRS 77 is not receiving backup GPS information from either GIA 63/W.	
AHRS GPS – AHRS operating exclusively in no-GPS mode.	The GRS 77 is operating in the absence of GPS.	
AHRS GPS – AHRS1 not receiving any GPS information.	GRS 77 is not receiving GPS data from either GIA 63/W.	
MANIFEST – AHRS software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GRS 77 #1.	<ul style="list-style-type: none"> • Load correct software version in the GRS77.
AHRS MAG DB – AHRS magnetic model database version mismatch.	The system has detected a magnetic model database version mismatch.	<ul style="list-style-type: none"> • Reference Garmin SB 0533 for update instructions.

5.7.3 GMU 44 Related Alerts

Message	Cause	Solutions
MANIFEST – GMU1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMU 44.	<ul style="list-style-type: none"> • Load correct software version in the GMU44.
HDG FAULT – AHRS magnetometer fault has occurred.	A fault has occurred in GMU 44.	
		<ul style="list-style-type: none"> • Check GMU 44/GRS 77 interconnect for faults. • Replace GMU 44 • If problem persists, replace GRS 77

5.8 GDC 74A RELATED ALERTS AND PROBLEMS

5.8.1 Common Problems

Symptom	Recommended Action
Altitude is different than standby altimeter	<ul style="list-style-type: none"> Perform a pitot/static check (see OEM Maintenance Manual for procedure). Allow the GDC 74A to warm up for fifteen minutes before checking accuracy, per Garmin Service Advisory 0606. Determine which instrument is outside limits and recalibrate or replace. Note: Both units may individually be in spec but show a difference in altitude. Do not return a GDC 74A to Garmin for service if not outside limits. If GDC is outside limits, recalibration may be performed in accordance with Section 5.9.
GDC 74A Config file does not load.	<ul style="list-style-type: none"> Replace GDC 74A config module. If problem persists, replace GDC 74A config module wire harness.

5.8.2 GDC 74A Related Alerts

Message	Cause	Solutions
MANIFEST – GDC 74A software mismatch Communication halted.	The system has detected an incorrect software version loaded in the GDC 74A	<ul style="list-style-type: none"> Load correct software version.

5.9 GDC 74A Field Calibration Utility

NOTE

Field calibration of GDC 74A units requires a pressure control system with altitude accuracy equal to or better than ± 5 feet at sea level, ± 15 feet at 30,000 feet, and ± 15 feet at 41,000 feet. For calibration of GDC 74A, the pressure control system must control altitude automatically.

Purpose

The GDC 74(X) Field Calibration utility (P/N T06-A0156-00) is designed to adjust the calibration of GDC 74A units that have failed the 14 CFR Part 43 Appendix E tests due to altitude drift.

Limitations

- These procedures should be performed on the bench (not in aircraft) at room temperature.
- The GDC 74(X) Field Calibration utility should only be used to correct errors due to altitude drift.
- If the drift is greater than the limits defined in the GDC 74(X) Field Calibration utility at any of the test points, the utility will not allow the calibration to continue and the GDC 74A unit must be returned to Garmin.
- If the GDC 74A unit does not pass 14 CFR Part 43 Appendix E after the calibration utility has been run, the GDC 74A unit should be returned to Garmin.

Requirements

- GDC 74A unit
- Power supply (14/28V, 500mA)
- PC with a Serial Port or serial port adapter.
- Pressure control system capable of generating the correct static pressures for 0 feet, 11,000 feet, 30,000 feet, and 41,000 feet.
- Fabricate a cable built to interface a GDC 74A to a PC Serial Port (see Figure 5-5). Cable is not available from Garmin.

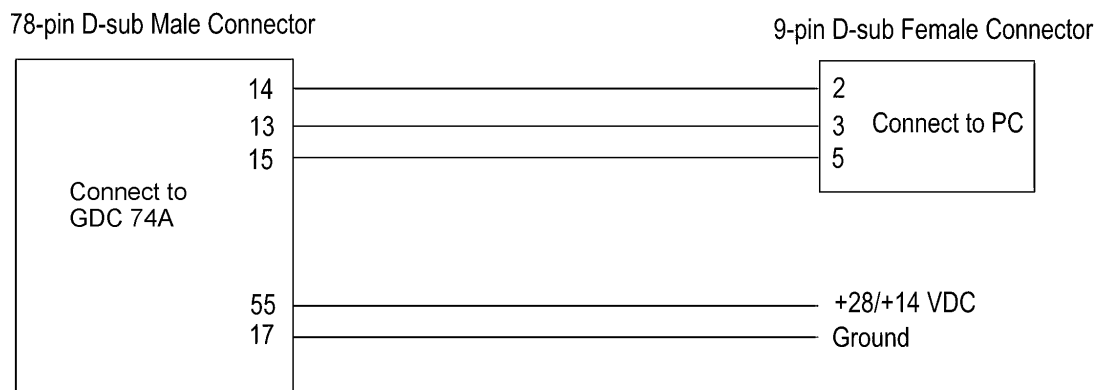


Figure 5-5. GDC 74A - PC Interface Cable

Software Installation

Before beginning the software field upgrade procedure, the GDC 74(X) Field Calibration utility must be downloaded from the Garmin website.

1. Enter the Dealer Resource portion of the Garmin website (www.garmin.com).
2. From the Technical Resource list, click on the link for the GDC 74(X) Field Calibration utility.
3. Follow the instructions to save the file to the PC (it is recommended to create a folder 'C:\Garmin' as a target directory for the file).

Procedure

1. Connect GDC 74A to the pressure control system.
2. Connect the GDC 74A to the PC serial port using the GDC 74A – PC Interface Cable (Figure 5-4).
3. Connect the GDC 74A - PC Interface Cable to the power supply (Figure 5-5).
4. Power on the GDC 74A and the pressure control system.
5. Set the pressure control system to a pressure altitude of 40,000 feet and determine that leakage is less than 140 feet per minute.
6. Run GDC_FieldCal.exe.
7. Click on 'Begin Field Calibration'.

NOTE

The GDC 74(X) Field Calibration utility requires that the GDC 74A and the pressure control system be powered on for a minimum of 20 minutes before calibration.

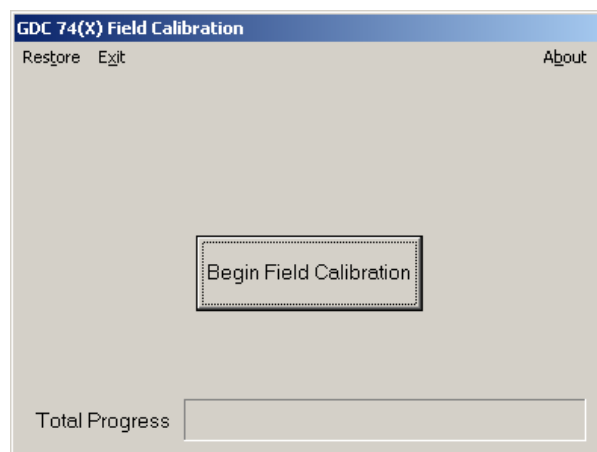


Figure 5-6. GDC 74A Field Calibration Utility, Main Page

8. Select the Serial Port on the PC that will be used to communicate with the GDC 74(X), and click 'OK'.

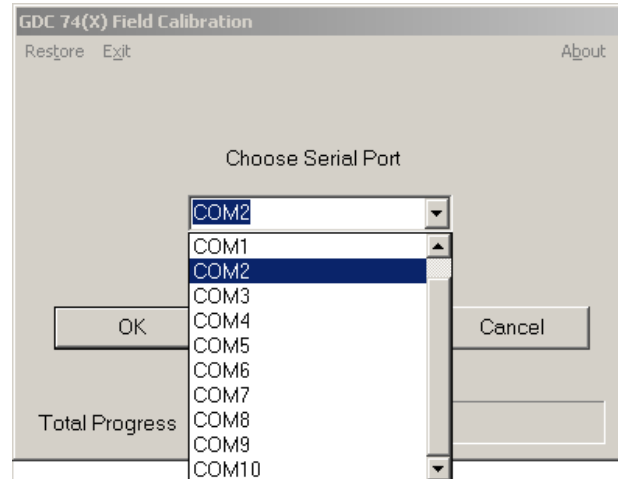


Figure 5-7. Serial Port Pull-down List

9. After communication with the GDC 74A is established, the 'Full Backup' screen appears while a full backup of the original unit setting is saved to a file named BKUP_(serial_num)_YYYYMMDD_HHMMSS.txt. This file can be used (by Garmin) to restore the unit to the original settings if necessary.
10. After the full backup file has been created, the 'Prepare To Take Measurements' screen appears while the program retrieves the unit type from the GDC 74A.
11. After the unit type has been determined, the 'Set altitude to 0 ft' screen (Figure 5-8) appears.
12. Per the on-screen instructions, set the pressure control system to a pressure altitude of 0 feet.
13. Allow the on-screen altitude reading to stabilize, then click 'OK'.

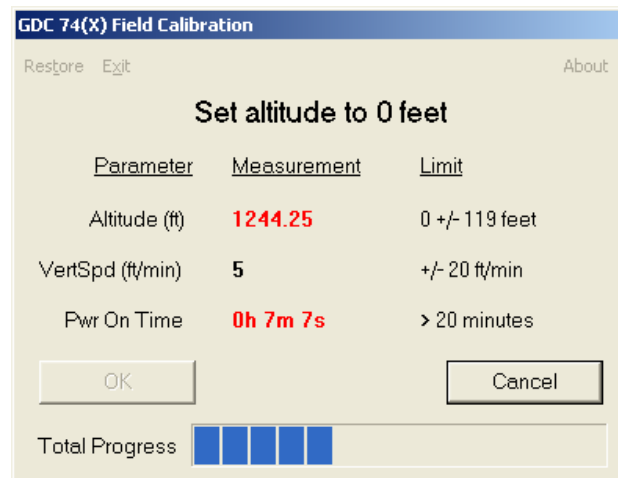


Figure 5-8. 0 Feet Calibration Screen

NOTE

If any of the three measurements (Altitude, Vertical Speed, Power On Time) are outside of their respective displayed limits, the displayed measurement will appear in red, and the 'OK' button will be unavailable (grayed-out). If successful calibration is not achievable, clicking 'Cancel' will halt the program and produce the below popup message.

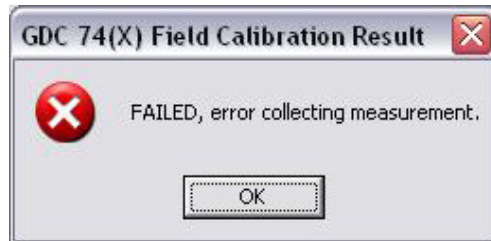


Figure 5-9. Calibration Failed Screen

14. After the 0 feet calibration is complete, the 'Set altitude to 11,000 ft' screen appears.
15. Per the on-screen instructions, set the pressure control system to a pressure altitude of 11,000 feet.
16. Allow the on-screen altitude reading to stabilize, then click 'OK'.
17. After the 11,000 feet calibration is complete, the 'Set altitude to 30,000 ft' screen appears.
18. Per the on-screen instructions, set the pressure control system to a pressure altitude of 30,000 feet.
19. Allow the on-screen altitude reading to stabilize, then click 'OK'.
20. After the 30,000 feet calibration is complete, the 'Set altitude to 41,000 ft' screen appears.
21. Per the on-screen instructions, set the pressure control system to a pressure altitude of 41,000 feet.
22. Allow the on-screen altitude reading to stabilize, then click 'OK'.
23. After the altitude calibrations are complete, the 'Program Calibration to Unit?' screen (Figure 5-9) appears. Click 'OK' to program the new calibration to the GDC 74(X) unit.

NOTE

Before the new calibration is written to the unit, the program stores the current calibration to a file named CAL_(serial_num)_YYYYMMDD_HHMMSS.txt that can be used to restore the original calibration back to the unit if needed (refer to the "To Restore Original Calibration" section).

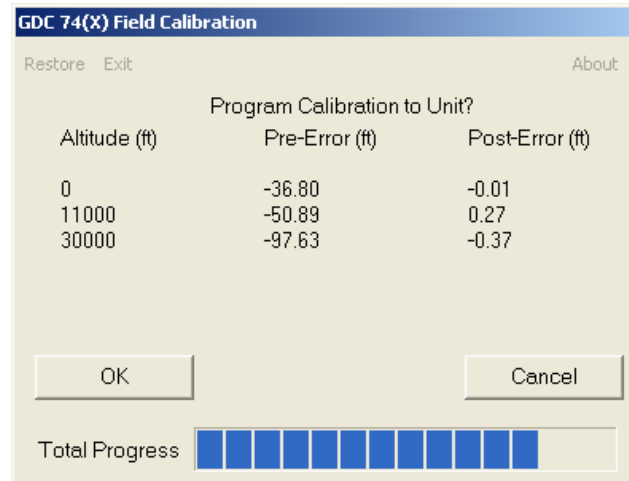


Figure 5-10. Program Calibration to Unit Screen

24. Ensure that the pop-up cal result window shows 'PASSED', press 'OK' to confirm message.

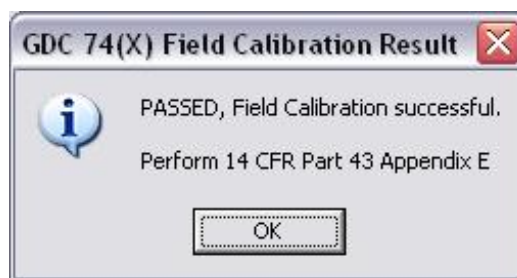


Figure 5-11. Field Calibration Result Screen

25. Return the pressure control system to ambient pressure before disconnecting the pitot and static lines from the GDC 74A.
26. Click on 'Exit' in the upper left corner to exit the program.
27. The Field Calibration is now completed, the unit may be installed in the aircraft (per the instructions in this manual) to perform the operational system testing portion of 14 CFR Part 43 Appendix E.

To Restore Original Calibration (if needed)

If needed, the original calibration can be restored to the unit using the following steps.

1. Run GDC_FieldCal.exe.
2. Select 'Restore' from the upper left-hand corner of the page.
3. Select the CAL_(serial_num)_YYYYMMDD_HHMMSS.txt calibration file to restore to the unit and click 'Open'.

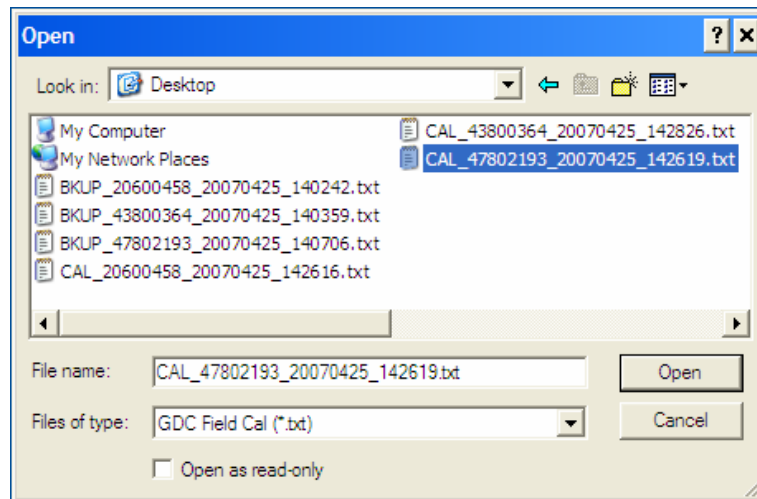


Figure 5-12. Calibration Files Screen

4. Select the Serial Port on the PC that will be used to communicate with the GDC 74(X), and click 'OK'.
5. A progress bar screen appears while the calibration is being restored to the unit.
6. If cal restoration is successful, the screen will display 'Completed', before returning to the main entry screen.
7. Click on 'Exit' in the upper left corner to exit the program.
8. The original calibration is now restored, the unit may be installed in the aircraft (per the instructions in this manual) to perform the operational system testing portion of 14 CFR Part 43 Appendix E.

Calibration File Storage

Save copies of the calibration (BKUP and CAL) files for permanent storage, these files will be located in the C:\Garmin directory, or in the same directory where the GDC_FieldCal.exe file resides. Also, email copies of these files to avionics@garmin.com. Please enter "GDC 74(X) Field Calibration Data" in the subject line, as shown in Figure 5-13.

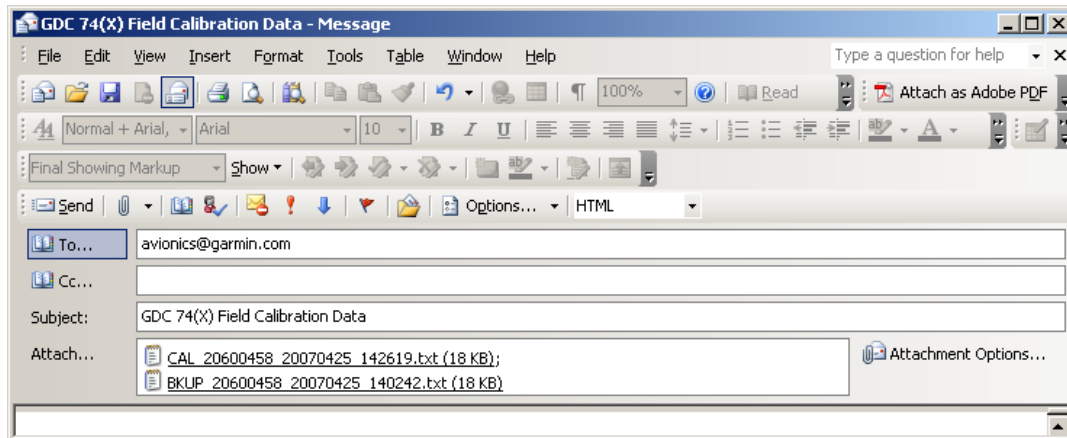


Figure 5-13. Example Post-Calibration E-mail

Software Version

1. Click on 'About' in the upper right hand corner of the program, the software version is displayed.

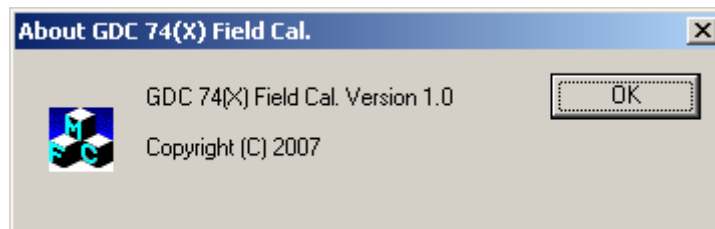


Figure 5-14. About Screen

2. Click 'OK' to return to previous screen.

5.10 GEA 71 Related Alerts and Problems

Message	Cause	Solutions
GEA1 CONFIG – GEA1 configuration error. Config service req'd.	The system has detected a GEA 71 configuration mismatch.	<ul style="list-style-type: none"> See Section 7 for instructions on configuration. If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
MANIFEST – GEA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GEA 71.	<ul style="list-style-type: none"> Load correct software version.
Discharged standby battery Indication.	ALT1, ALT2, and BAT1 circuits needs to be recalibrated	<ul style="list-style-type: none"> Refer to Section 5.10.1 for the High Side Current Monitor calibration Procedure.

5.11 GTX 33 RELATED ALERTS AND PROBLEMS

Message	Cause	Solutions
XPDR1 CONFIG – XPDR1 configuration error. Config service req'd.	The system has detected a GTX33 configuration mismatch.	<ul style="list-style-type: none"> • Perform a SET>ACTV configuration reset on the GTX Config page. • For a GTX33, verify the aircraft registration is present in the GTX Configuration page. • If error is still present, reload config files from a loader card. See Section 7. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <p style="text-align: center;">NOTE</p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
MANIFEST – GTX1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GTX 33.	<ul style="list-style-type: none"> • Load correct software version
XPDR1 SRVC – XPDR1 needs service. Return unit for repair.	The system has detected a failure in GTX 33.	<ul style="list-style-type: none"> • Replace GTX 33.
XPDR1 FAIL – XPDR1 is inoperative.	GTX 33 is not responding.	<ul style="list-style-type: none"> • Check GIA1/2 to GTX33 data paths for failures per Section 5.3. • Replace GTX 33.

5.12 GDL 69/69A RELATED ALERTS AND PROBLEMS

5.12.1 Common Problems

Symptom	Recommended Action
No XM audio is heard	<ul style="list-style-type: none"> • Check PFD Alert Window for MFD or GDL configuration or software error messages. Correct any errors before proceeding.
No XM weather information is displayed	<ul style="list-style-type: none"> • Verify that the GDL69/69A software option has been loaded to the aircraft by the presence of the MFD AUX – XM RADIO page. • Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable OEM Pilot’s Guide for intercom operation and isolation modes): <ul style="list-style-type: none"> • Verify nothing is plugged into the Music 1 or 2 jacks. • Verify the XM volume is not muted on the MFD AUX – XM RADIO page. Verify the headphone volume is turned up. • Verify the COM squelch is not open. • Verify the ICS squelch is not open. • Verify the marker beacon tones are not being received. • Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online. <ul style="list-style-type: none"> • If a red X is present, verify the unit is receiving power at the rack connector. • Restart the PFD and MFD in configuration mode and go to the GDL page. <ul style="list-style-type: none"> • Verify unit is active. • Verify the Signal number is “2” or “3”. If it is “0” or “1” check the GDL 69/69A antenna and cabling for faults. • Reseat the GDL 69/69A to verify the coax connector is fully seated. • If unit is not active, contact XM Customer service at 1-800-985-9200 to have a refresh signal sent to your unit. You will need to provide them the Audio Radio ID (and Data Radio ID number for XM weather) numbers. Also verify with XM that the correct Weather package (Aviator Lite or Aviator) is on the account, and that no traffic service has been activated against that Radio ID. The unit must be on for approximately one hour after the request for the refresh has been sent to receive the signal. • Alternatively, you may also go to XM’s website at http://www.xmradio.com/refresh/ and enter the radio ID’s to have a refresh signal sent. • If there is still problems receiving weather products after performing the above step, call XM and have the account deactivated, and a new account activated to clear out any corrupt account information. The unit must be on and receiving XM to receive the deactivation signal, then the reactivation signal. • Verify that a good ground connection exists through the aircraft between the MFD and the GDL69/69A unit. Reference the OEM Maintenance Manual for instructions on how to check bonding and ground points. If problem persists, replace the GDL 69/69A.

5.12.2 GDL 69/69A Related Alerts

Message	Cause	Solutions
<p>GDL 69 FAIL – GDL 69 has failed.</p>	<p>The system has detected a failure in the GDL 69A.</p>	<ul style="list-style-type: none"> • If a GDL 69 is not installed, deactivate the option by performing the following steps: <ol style="list-style-type: none"> 1. Turn the system on in Configuration Mode. 2. On PFD1, go to the “System Configuration” Page in the System Group. 3. Turn the Cursor on by pressing the FMS Knob. 4. The “GDL69” text should be flashing. Press the ENT key to turn the GDL 69 off (indicated by the green light box changing to black). 5. Turn the system off. • Replace GDL 69A. • Check GDL 69A antenna and cabling. • Check the GDL 69A and MFD interconnect.
<p>GDL69 CONFIG – GDL 69 configuration error. Config service req’d.</p>	<p>The system has detected a GDL 69A configuration mismatch.</p>	<ul style="list-style-type: none"> • See Section 7 for GDL configuration instructions. • If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. <p style="text-align: center;"><u>NOTE</u></p> <p>New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master config module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.</p>
<p>MANIFEST – GDL software mismatch. Communication halted.</p>	<p>The system has detected an incorrect software version loaded in GDL 69A.</p>	<ul style="list-style-type: none"> • Load correct software version.

5.13 AFCS SYSTEM TROUBLESHOOTING

The information in this section is specific to the GFC 700. Should a problem be encountered during the operation of the GFC 700, the pilot and technician should first evaluate the overall status and condition of the system on the AUX – System Status Page (MFD). Any alert messages, annunciations, or other abnormal behavior should be noted in an effort to isolate the fault.









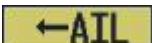


5.13.1 Annunciations and Alerts

The GFC 700 AFCS Annunciation field is located above the airspeed tape on the PFD (Figure 5-15).



Figure 5-15. AFCS Annunciation Field

The following annunciations may appear in the AFCS Annunciation field:

Annunciation	Condition	Solutions
	AFCS System Failure	<ul style="list-style-type: none"> • Ensure that the system is in proper working order. Check specifically for proper operation of the: <ul style="list-style-type: none"> – GIA 63/W Integrated Avionics Unit – GRS 77 AHRS – GDC 74A Air Data Computer – All GSA 80/81 Servos and GTA82 Pitch Trim Adapter (GTA82 only used on certain OEM aircraft) • Check that no red X's are present on the MFD and PFDs. • Check that there are no Alert messages present in the PFD Alert window. Correct any software or configuration errors noted. • Go to the AUX SYSTEM STATUS page on the MFD and verify that all LRUs have a 'green' check.
	Pitch Axis Failure	<ul style="list-style-type: none"> • Check the AUX – SYSTEM STATUS page to see if the servo is online (green check).
	Yaw Axis Failure	<ul style="list-style-type: none"> • Check that the affected servo is receiving power. Check the servo wiring and connector.
	Pitch Trim Axis Failure	<ul style="list-style-type: none"> • Ensure PTRM switches are not stuck. If failure condition still exists, remove and replace the affected servo.
	Roll Axis Failure	
	Elevator Mistrim Down	<ul style="list-style-type: none"> • If mistrim annunciations persist, check the GTA 82 and trim motor servo for proper operation. Verify that the servo is online at the AUX – SYSTEM STATUS page. • Check the GTA 82 and trim motor servo wiring and connector. Ensure the servo is receiving power.
	Elevator Mis-Trim Up	<ul style="list-style-type: none"> • Check the aircraft trim control rigging. • If mistrim condition still exists, remove and replace the affected servo.
	Aileron Mistrim Right	<ul style="list-style-type: none"> • Check for possible fuel imbalance. • Check aileron control rigging.
	Aileron Mistrim Left	<ul style="list-style-type: none"> • If mistrim condition still exists remove and replace the roll servo. If mistrim condition still exists remove and replace the roll servo. • If mistrim condition still exists remove and replace the roll trim motor.
	Pre-Flight Test	<ul style="list-style-type: none"> • Reset system power.
		<ul style="list-style-type: none"> • Allow the system to complete pre-flight tests. The preflight test should finish within 2 minutes. If it does not pass, the red 'PFT' annunciation is shown. In case of PFT failure, troubleshoot in the same manner as for the red 'AFCS' annunciation.

5.13.2 GFC 700 Pre-Flight Test Sequence and Troubleshooting

This section helps the technician determine why the GFC 700 has failed the Pre-Flight Test (PFT) indicated by the red PFT annunciation. There are 16 steps to the GFC 700 PFT. The PFT is performed by both GIA's at startup, and needs to pass on both GIA's before the autopilot can be engaged.

The PFT is only started if the AHRS has aligned, the GIA's and servos are configured, and the certification gains are valid. If the PFT has not completed after one minute from when the initialization started it will fail.

After the system PFT has passed, it will be performed again if a servo resets, if the autopilot servo breaker is reset or the cross-side GIA restarts it.

Generally, the PFT failure fault is logged in the GIA Maintenance Log and not in the Servo Maintenance Logs unless the GIA log fault identifies a servo problem.

NOTE

Thoroughly understanding the operation of the system in configuration mode before starting this procedure. The GFC Status Page may be used to check the status of the servos as an aid in troubleshooting.

To access the GIA and GSA/GTA Maintenance Logs:

1. Start the system in configuration mode.
2. Use the FMS knob on PFD1 to display the Diagnostics Terminal Page in the system group. This page allows the technician to view maintenance logs associated with the GFC 700.
3. Choose 'GIA 1' or 'GIA 2' in the LRU window.
4. In the SERVO window, choose 'NONE' to view the GIA Maintenance Log, or choose a servo to view their logs.
5. Using the FMS knob, choose 'VIEW MAINTENANCE LOG' in the COMMAND window.
6. Press the ENT key.
7. When the Maintenance Log data starts to display in the OUTPUT window, you may see "More...press any key to continue..." at the bottom of the OUTPUT window. This informs you there is more data to display and the system has paused allowing you to view the data before continuing. To see more of the data, reselect the "VIEW MAINTENANCE LOG" in the COMMAND window and press the ENT key. The "...press any key to continue..." function is not active at this time.
8. Scroll through the OUTPUT list by pressing the OUTPUT softkey.

The GIA Maintenance Log can record any of the following faults:

- **FCS Task not started: Bad gains**

The FCS task has not started because the gains are not present or have been corrupted.

Reload the gain files to correct.

- **FCS Task not started: Gain structure out of range**

The FCS task has not started because the gains are not compatible with the GIA software.

Reload the gain files to correct.

- **PFT FAIL: Timeout, <STEP>**

Pre-flight test has failed because the specified step has not passed in the allotted time. See the GIA pre-flight steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

- **PFT FAIL: Cross GIA Failed, State: <STEP>**

Pre-flight test has failed on opposite GIA. <STEP> specifies the pre-flight test step on selected GIA that was in progress when the pre-flight test failed on the opposite GIA. See the GIA pre-flight steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

- **PFT FAIL: <STEP>**

Pre-flight has failed because the step specified has failed. See the GIA pre-flight test steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.

- **AHRS MON invalid: <STATE>**

The AHRS monitor has detected that the AHRS data is invalid. The possible values for <STATE> are:

Mon Prmtr Invalid: The ARINC 429 data used by one of the monitors has not been received.

Attitude Prmtr Invalid: The ARINC 429 pitch or roll angle has not been received.

Exceeded Attitude Limits: The pitch or roll angle has exceeded the engagement limits.

Cross Hdg Accel Fail: Cross heading acceleration monitor failed.

Vert Accel Fail: Vertical acceleration monitor failed.

Fltrd Cross Hdg Accel Fail: Filtered cross heading acceleration monitor failed.

Fltrd Vert Accel Fail: Filtered vertical acceleration monitor failed.

Roll Accel Fail: Roll acceleration monitor has failed.

Normal Accel Fail: Normal acceleration has failed.

Troubleshoot the GRS 77 for the cause of the failure.

- **Stuck switch invalidated parameter: <AXIS>**

A MET switch in the specified axis is stuck.

Check the MET (trim) switches for proper operation.

- **PRMTR: <PARAMETER> MODE:<MODE> Parameter lost**

The mode specified by <MODE> has been disengaged because the parameter specified by <PARAMETER> has become invalid. The following is a list of some of the possible values for <PARAMETER>:

AD TDM Comm Valid: The specified mode has been disengaged because communication with the servos, via the Time Division Multiplexer protocol, has been lost.

Troubleshoot possible loss of communication paths to servos or loss of servo/AP disconnect power to the servos.

AP Pitch MET not stuck: The specified mode has been disengaged due to a stuck pitch MET switch.

Check the MET (trim) switches for proper operation.

GIA Pre-Flight Test Steps

- **PFT Step 0: System initializing, verify GFC powered**

This step checks to ensure the GFC is powered up.

Ensure the GIA is connected to the autopilot disconnect on the GFC Configuration page.

Ensure all configured servos are communicating on the System Status page.

- **PFT Step 1: System initializing, verify GIA audio is valid**

This step checks to ensure the GIA audio region has been loaded and configured.

Load GIA audio files to correct.

- **PFT Step 2: System initializing, verify required servos are configured**

This step checks to ensure the current servo configuration matches the servo configuration specified in the certification gain file.

Reload the gain files to correct.

- **PFT Step 3: System initializing, verify selected side**

This step checks to ensure the PFD is online and sending the selected AFCS side data over HSDB to the GIA.

Ensure the PFD is turned on.

Ensure the Ethernet connection from the PFD to the GIA is functioning.

- **PFT Step 4: System initializing, verify AHRS monitor**

This step checks to ensure the AHRS monitor is valid and not reporting an AHRS failure.

NOTE: AHRS monitor will be assumed valid if on the ground.

Ensure the GRS 77 and GDC 74A are turned on and sending valid data.

- **PFT Step 5: System initializing, verify configured servos are valid**

This step checks to ensure that none of the servos are reporting any type of failure. Note that trim servos will report a failure on stuck MET switches.

Ensure MET switch is not stuck.

Cycle power on all servos.

- **PFT Step 6: System initializing, verify cross GIA valid**

This step checks to ensure the cross-side GIA is online and communicating with all servos from ARINC 485 data lines. The cross-side GIA must also pass its AHRS monitoring.

Ensure both GIAs are online and communicating with all servos.

- **PFT Step 7: Verify cross GIA initialized**

This step checks to ensure the cross-side GIA is initialized.

Cycle power on all servos and GIAs.

Ensure the PFD1/2 and MFD are turned on.

- **PFT Step 8: Verify servo type**

This step checks to ensure the servos are correct type.

Verify servos are correct type.

- **PFT Step 9: Verify servo first certification data**

This step checks to ensure the servos and the GIAs have the same certification gains.

Reload the certification gains to all GIAs and servos.

- **PFT Step 10: Verify servo second certification data**

This step checks to ensure the servos and the GIAs have the same certification gains.

Reload the certification gains to all GIAs and servos.

- **PFT Step 11: Updating servo RTC**

This step sets the servo system time to the GIA system time.

If fails this step, GIA's can not communicate with servos. Check for GIA/servo data path issues and power/AP disconnect loss.

- **PFT Step 12: Verify servo PFT status**

This step checks to ensure all servos have passed their own pre-flight test.

- **PFT Step 13: Verify AP disconnect enabled**

This step checks to ensure GIA 1, GIA 2, and all servos are connected to the 28 volt autopilot disconnect.

Ensure the autopilot disconnect is connected to all GIAs and servos and is registering 28 volts.

Ensure the autopilot disconnect switch is not pressed.

- **PFT Step 14: Verify servo validity**

This step checks to ensure all servos are online and communicating with valid data.

Ensure all servos are turned on and communicating.

- **PFT Step 15: Verify cross GIA PFT is completed**

This step checks to ensure the cross-side GIA is also on step 14.

Cycle power on all servos and GIAs.

Ensure the PFD1/2 and MFD are turned on.

- **PFT Step 16: PFT completed**

The pre-flight test is successfully completed.

- **PFT Step 17: PFT failed**

The pre-flight test has failed.

Servo Faults and Troubleshooting

Whenever a servo fault occurs, a status message is logged to the corresponding servo control or maintenance log. This information is also accompanied by a time and date stamp. An “RTC DATE” entry is made every time a servo is powered on and is normally not useful for troubleshooting.

The following is a listing of possible faults that could be reported in a GSA fault log. Faults can occur in either the monitor board processor or the control board processor, both of which are contained in the GSA.

Monitor Processor

The monitor processor contains the logs that are found in these processors:

- 2 – Pitch Servo
- 4 – Roll Servo
- 6 – Yaw Servo
- 8 – Pitch Trim Servo

There are two main groupings of faults that can occur in the monitor processor:

The first grouping of faults can occur during the GSA unit pre-flight test (PFT). If there is a fault during PFT the unit will not be able to transition to normal mode and the only way to clear this state would be to cycle unit power. The second grouping of faults can occur during normal mode. These faults generally cause a disconnect of power to the GSA and report that a fault has occurred to the GIA.

The Notes column indicates any actions that can be taken to troubleshoot the problem in the aircraft by the technician. Any faults that are not listed here indicate an internal problem requiring replacement of the servo. If the items in the Notes column check out ok, replace the servo.

PFT Faults

MONITOR PFT STEP	NOTES
"INTERNAL COMM FAIL"	This can sometimes be a result of a failure on the other internal servo board, check faults on the other processor
"UNSW POWER INV"	Check unit power
"MON SOL PWR ON FAIL"	Check unit power and AP Disconnect power
"CTL SOL PWR ON FAIL"	Check unit power and AP Disconnect power
"SOL PWR FAIL"	Check unit power and AP Disconnect power
"CERT DATA UNINSTALLED"	Upload the certification gain file to the Monitor board
"STRAP CODE MISMATCH"	Check the connector strap inputs to the unit

Normal Mode Faults

MONITOR FAULT	NOTES
"GIA DIS FAULT"	Check the AP Disconnect power into the unit
"HOST DATA DIF"	Check the AHRS wiring to the system
"HOST DATA INV"	Check the AHRS wiring to the system
"SVO PWR INV"	Check unit power and AP Disconnect power
"STRP CODE CHNG"	Check the connector strap inputs to the unit
"MET STUCK SWTCH"	Check the MET switch inputs into the system
"MET STATUS DIF"	Check the MET switch inputs into the system

Control Processor

The control processor contains the following logs:

- 3 – Pitch Servo
- 5 – Roll Servo
- 7 – Yaw Servo
- 9 – Pitch Trim Servo

There are two main groupings of faults that can occur in the control processor. The first grouping of faults can occur during the GSA unit pre-flight test (PFT). If there is a fault during PFT, the unit will not be able to transition to normal mode and the only way to clear this state is to cycle unit power.

The second grouping of faults can occur during normal mode. These faults generally cause a disconnect of power to the GSA and report that a fault has occurred to the GIA.

The notes column indicates any actions that can be taken to troubleshoot the problem in the aircraft by the technician. Any faults that are not listed here indicate an internal problem requiring replacement of the servo. If the items in the Notes column check out ok, replace the servo.

PFT Faults

CONTROL PFT STEP	NOTES
"INT COMM TEST FAIL"	This can sometimes be a result of a failure on the other board, check faults on other processor
"CTL MOT PWR ON FAIL"	Check unit power and AP Disconnect power
"MON MOT PWR ON FAIL"	Check unit power and AP Disconnect power
"HALL 1 FAIL"	Check unit power and AP Disconnect power
"HALL 2 FAIL"	Check unit power and AP Disconnect power
"HALL 3 FAIL"	Check unit power and AP Disconnect power
"HALL 4 FAIL"	Check unit power and AP Disconnect power
"HALL 5 FAIL"	Check unit power and AP Disconnect power
"HALL 6 FAIL"	Check unit power and AP Disconnect power
"CURR OFFST FAIL"	Check unit power and AP Disconnect power
"SVO TYPE FAIL"	Check unit power and AP Disconnect power
"CERT DATA UNINSTALLED"	Upload the certification gain file to the Control board
"STRAP CODE MISMATCH"	Check the connector strap inputs to the unit

Normal Mode Faults

CONTROL FAULT	NOTES
"GIA DIS FAULT"	Check the AP Disconnect power into the unit
"HOST DATA DIF"	Check the AHRS wiring to the system
"HOST DATA INV"	Check the AHRS wiring to the system
"SVO PWR INV"	Check unit power and AP Disconnect power
"STRP CODE CHNG"	Check the connector strap inputs to the unit
"MET STUCK SWTCH"	Check the MET switch inputs into the system
"MET STATUS DIF"	Check the MET switch inputs into the system

Downloading GIA and GSA Maintenance Logs

If additional assistance is needed in troubleshooting autopilot faults, the maintenance logs can be downloaded to an SD card as a text file (.txt) and e-mailed to Garmin Aviation Product Support at avionics@garmin.com. Please call Garmin Aviation Product Support before sending a maintenance log to notify them you are sending it. This will prevent a delay in response. You may download multiple GIA and GSA/GTA maintenance logs to the same file, however in your e-mail to Garmin you must furnish the order in which they were downloaded (i.e. GIA1, then GIA2, then SRVO PTCH MON, then SRVO PTCH CTL, etc.).

1. Insert a FAT 32 formatted SD card into the top slot of the PFD before turning on the displays.
2. Power up PFD and MFD in the configuration mode.
3. On the PFD in the System page group, use the small FMS knob to scroll to the Diagnostics Terminal page.
4. Press the LG2CRD softkey at the bottom of the PFD. Verify that the softkey text grays out. This indicates the recording function is active and all text that is displayed in the OUTPUT window will be saved to the card.
5. Enable the cursor by pressing the FMS knob, select "GIA1" in the LRU drop down menu and then press the ENT key to select it.
6. Skip the SERVO box and move the cursor to the COMMAND box and select "View Maintenance Log" in the drop down menu then press the ENT key. The error log data will be displayed in the OUTPUT box. If you see the "more...press any key to continue" text at the bottom of the screen, you may need to reselect "View Maintenance Log" for GIA data to allow it to continue scrolling down the screen (pressing any key will not continue, disregard the text instruction you to do so). Continue to scroll through all the OUTPUT data until you see the text, "End of Fault Log".
7. Move the cursor back to the LRU box, select "GIA2" in the LRU drop down menu and then press the ENT key to select it.
8. Skip the SERVO box and move the cursor to the COMMAND box and select "View Maintenance Log" in the drop down menu then press the ENT key. The error log data will be displayed in the OUTPUT box. If you see the "more...press any key to continue" text at the bottom of the screen, you may need to reselect "View Maintenance Log" for GIA data to allow it to continue scrolling down the screen (pressing any key will not continue, disregard the text instruction you to do so). Continue to scroll through all the OUTPUT data until you see the text, "End of Fault Log".
9. If you need to download Servo fault logs (usually done at the request of Garmin Product Support), perform the following steps. Otherwise, skip to step 10.
 - a. In the LRU box, you may select either "GIA1" or "GIA2".
 - b. In the SERVO box, choose a servo using the FMS knobs. Each servo contains two logs, one in the Monitor (MON) processor and one in the Control (CTL) processor. You must download both for each servo separately.
 - c. In the COMMAND box, select "View Maintenance Log" and press the ENT key.

- d. The log will appear in the OUTPUT box. It will scroll to the end automatically. When it is complete, repeat steps a-c for the other servos in the aircraft. Be sure to note the order the servos were downloaded in including the Monitor or Control logs to email to Garmin Product Support. Without knowing the order in which the logs were downloaded, Garmin will be unable to process them and will ask for another full download.
10. Press the LG2CRD softkey to turn off the recording function.
11. Wait 1 minute for the system to save the data from the download to the SD card.
12. While you are waiting for the data to be saved to the SD card, record the order of the LRU's and/or Servos were downloaded so that you can provide that information to the OEM or Garmin to help decipher the order of the error data.
13. Power down the system and remove the SD card.
14. Insert the SD card in the card reader of a laptop or desktop computer and open the "diag_buf_log.txt" file from the SD card using the WordPad program. Verify that all of the fault logs were downloaded by checking for the "End of Fault Log" message at the end of the GIA data, and that the last servo log entry has the current date.
15. Insert the fault log as an attachment to an email and include the LRU order how the data was downloaded and send to Garmin Aviation Product Support at avionics@Garmin.com.

5.14 BACKPLATE CONNECTORS

The following figures depict the physical locations of the Backplate Connectors viewed with the LRU removed. Pin numbers are included in the illustrations.

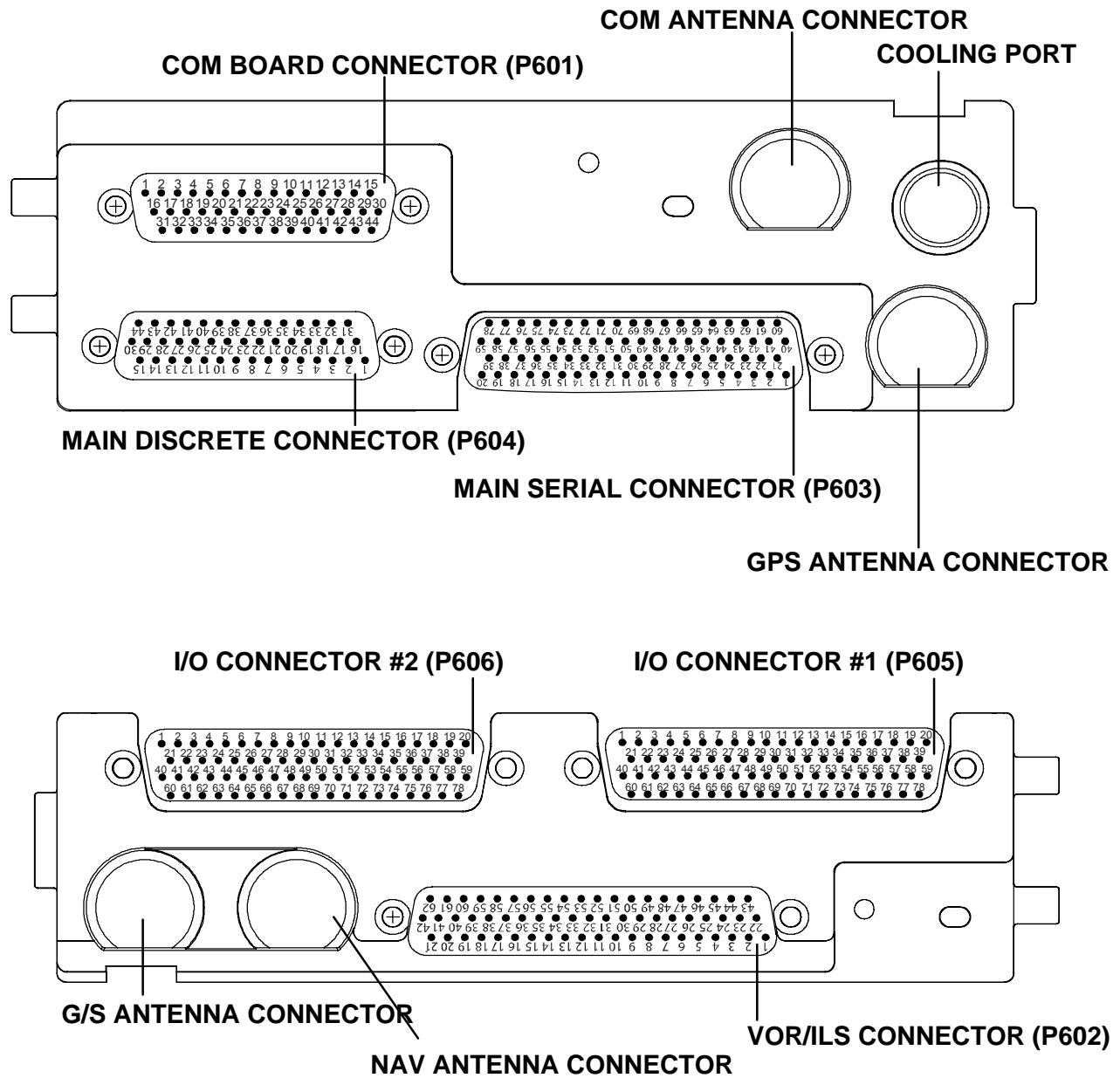


Figure 5-16. GIA 63W Backshell Connectors

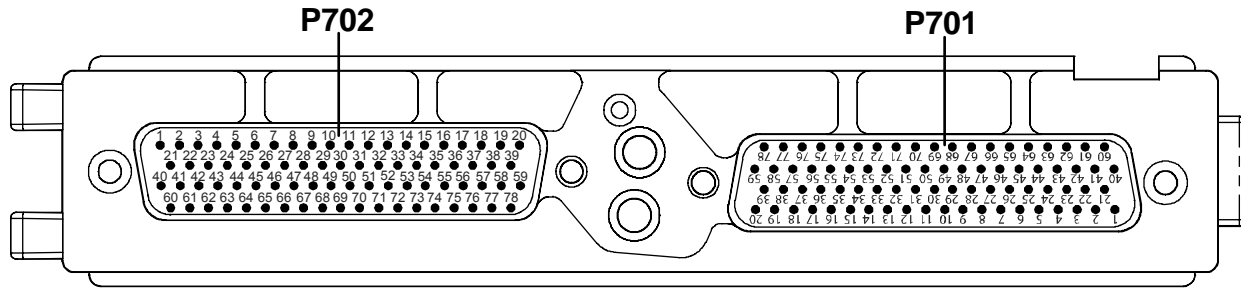


Figure 5-17. GEA 71 Backshell Connectors

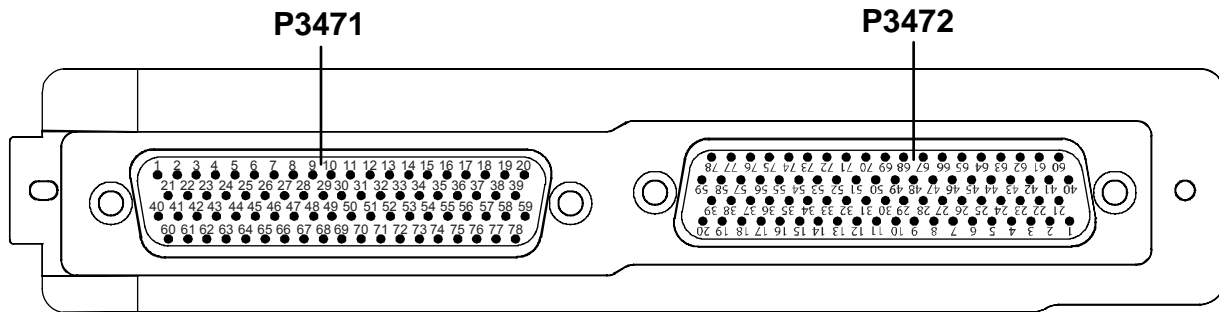


Figure 5-18. GMA Backshell Connectors

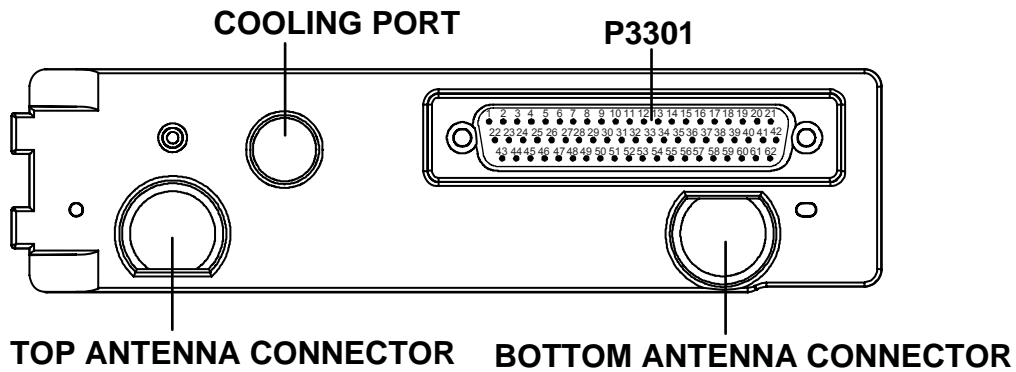


Figure 5-19. GTX 33 Backshell Connectors

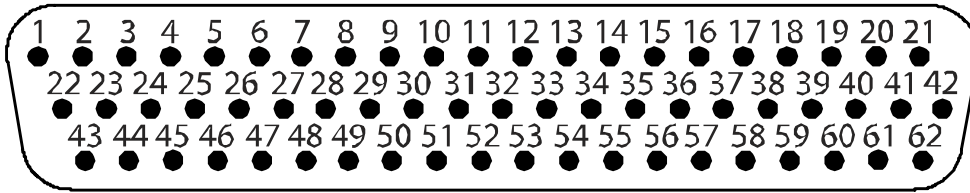


Figure 5-20. GDU 104X Backshell Connector (P10001)

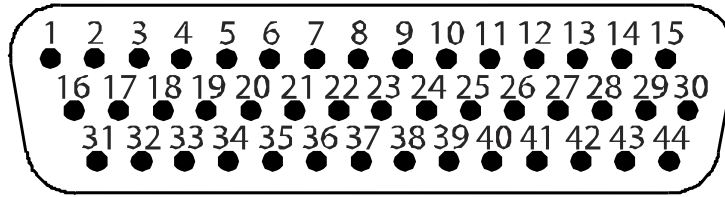


Figure 5-21. GRS 77 Backshell Connector (P771)

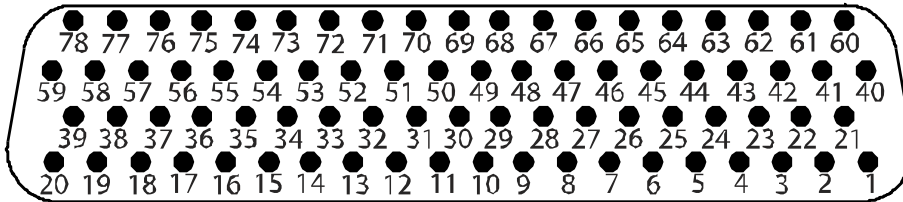


Figure 5-22. GDC 74A Backshell Connector (P741)

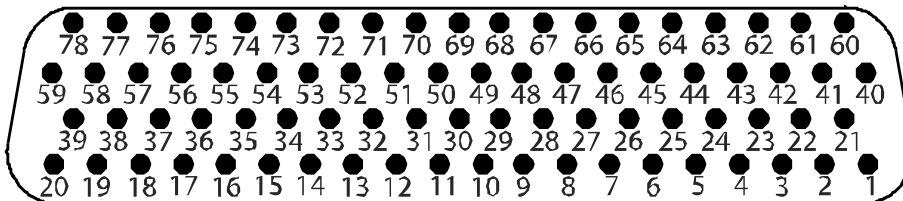


Figure 5-23. GDL 69A Backshell Connector (P691)

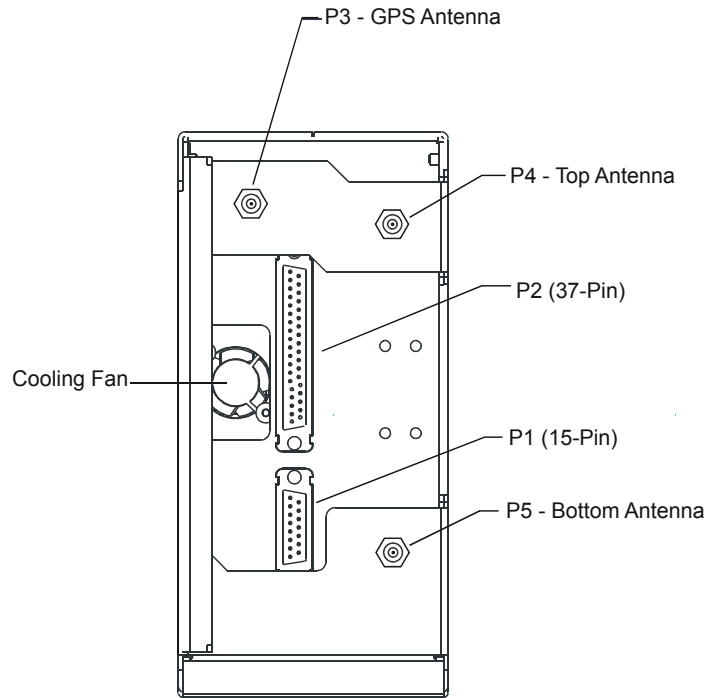


Figure 5-24. GDL 90 Backshell Connectors

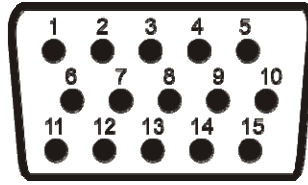


Figure 5-25. GCU 476 Backshell Connector (P4751)

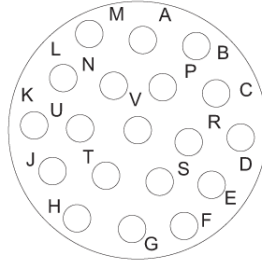
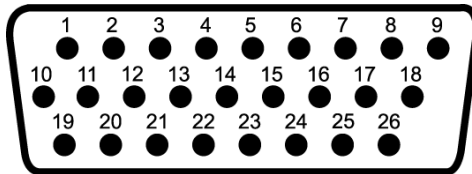


Figure 5-26. GSA 81 Backshell Connector (P801)



**Figure 5-27. GTA 82 Backshell Connector (P821)
Only used on Certain OEM Aircraft**

SECTION 6

REPLACEMENT PROCEDURES

This section contains replacement procedures for a defective LRU. Replacement of an LRU is on condition of failure.

6.1 ACCESSING LRUs

The G1000 mounting system is designed to simplify the installation, removal, and servicing of G1000 LRUs. The system typically consists of a main system rack, LRU racks, a Cable Harness Protection System (CHiPS) harness assembly, and any required cooling accessories or other structural supports mounted behind the instrument panel. Typically, the PFD and MFD mount to the instrument panel cutout directly in front of the main system rack. In this way, LRUs are quickly accessible by removing and disconnecting the display. Refer to the installation and outline drawings in each LRU installation manual for detailed installation/removal information.

Before removing any LRU, verify the LRU software part number and version against the software configuration listed in the Required Equipment List.

To check an LRU software part number and/or version:

1. Start the G1000 system in configuration mode.
2. The System Status Page (Figure 6-1) shows a list of LRUs in the LRU window. Activate the cursor and use the FMS knob to scroll through the list in the window and select the displayed LRUs.
3. The software part number and version is displayed in the DATA window. Compare this to the software configuration in the Required Equipment List.
4. If a faulty LRU is not reporting its software version and part number, check aircraft maintenance logs for last software version loaded and verify against the Required Equipment List. The Software Manifest Page can also be used to check part numbers and versions.

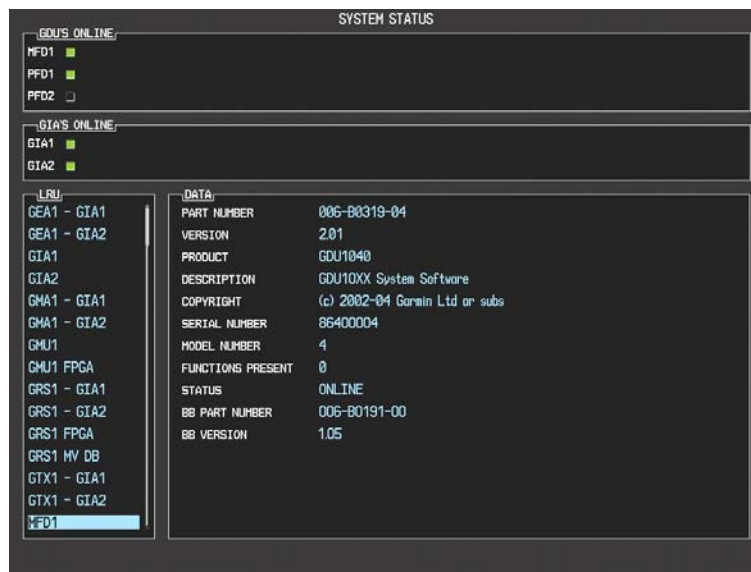


Figure 6-1. System Status Page (Configuration Mode)

6.2 GDU REPLACEMENT

To remove:

1. Use a 3/32" hex drive tool to turn each of the four locking sockets ¼ turn counterclockwise until they reach their stops.
2. Disconnect Backshell assembly from unit.
3. Remove and save Terrain SD Card.

To install:

1. Inspect connector(s) for damaged pins.
2. Connect Backshell assembly to unit.
3. Hold unit flush with the instrument panel, ensuring locking stud alignment marks are in the vertical position.
4. Use a 3/32" hex drive tool to turn each of the four locking sockets ¼ turn clockwise (this may require applying a small amount of forward pressure to engage the ¼ turn sockets).

6.3 GMA REPLACEMENT

To remove:

Insert a 3/32" hex drive tool into the access hole on the unit face and rotate counterclockwise until the unit can be freely pulled from the rack.

To install:

1. Inspect connector(s) for damaged pins.
2. Insert a 3/32" hex drive tool into the access hole and rotate the mechanism 90° counterclockwise to insure correct position prior to placing the unit in the rack.
3. Gently push unit into the rack to engage the connectors.
4. Insert a 3/32" hex drive tool into the access hole and rotate the mechanism clockwise until the unit is firmly seated in the rack, avoiding excessive tightening.

6.4 GIA REPLACEMENT

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GIA lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.

To install:

1. Inspect connector(s) for damaged pins.
2. Gently push unit into the rack to engage the connectors.
3. Push the GIA lever down towards the bottom of the unit, avoiding the use of excessive force.
4. Lock the handle into the GIA body and tighten the Phillips screw.

6.5 GRS REPLACEMENT

To remove:

1. Disconnect Backshell connector from unit.
2. Loosen four screws holding the unit to the mounting rack (do not loosen mounting rack bolts).

To install:

1. Inspect connector(s) for damaged pins.
2. Fasten unit to mounting rack.
3. Connect Backshell assembly to unit.

6.6 GMU REPLACEMENT

To remove:

1. Loosen three screws connecting the unit to the aircraft mounting plate.
2. Disconnect cable.

To install:

1. Inspect connector for damaged pins.
2. Connect cable and properly secure connector in a stationary fashion.
3. Fasten unit to the aircraft mounting rack.

6.7 GDC REPLACEMENT

To remove:

1. Loosen two thumb screws that secure the unit to the mounting rack
2. Disconnect Backshell assembly and pitot-static plumbing from unit.
3. Remove all Teflon tape or sealing compound. Take care not to allow Teflon tape or sealing compound to fall inside unit.

To install:

1. Inspect connector(s) and pitot-static plumbing for damage.
2. Install Teflon tape or sealing compound to pitot-static plumbing
3. Connect Backshell assembly and pitot-static plumbing to the unit.
4. Tighten two thumb screws that secure the unit to the mounting rack.

6.8 GEA REPLACEMENT

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GEA lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.

To install:

1. Inspect connector(s) for damaged pins.
2. Gently push unit into the rack to engage the connectors.
3. Push the GEA 71 lever down towards the bottom of the unit, avoiding the use of excessive force..
4. If lever fails to go down, adjust backplate while engaging unit.
5. Lock the handle into the GEA 71 body and tighten the Phillips screw.

6.9 GTX REPLACEMENT

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GTX 33(X) lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.

To install:

1. Inspect connector(s) for damaged pins.
2. Gently push unit into the rack to engage the connectors.
3. Push the GTX 33(X) lever down towards the bottom of the unit, avoiding the use of excessive force.
4. If lever fails to go down, adjust backplate while engaging unit.
5. Lock the handle into the GTX 33(X) body and tighten the Phillips screw.

6.10 GDL 69(x) REPLACEMENT

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GDL lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.

To install:

1. Inspect connector(s) for damaged pins.
2. Gently push unit into the rack to engage the connectors.
3. Push the GDL lever down towards the bottom of the unit, avoiding the use of excessive force.
4. If lever fails to go down, adjust backplate while engaging unit.
5. Lock the handle into the GDL body and tighten the Phillips screw.

6.11 GDL 90 REPLACEMENT

Refer to the applicable aircraft maintenance manual for removal and installation information.

6.12 GSA REPLACEMENT

CAUTION

Make sure the GSA fits against the GSM mount with no gaps before tightening the mounting bolts. This prevents pushing in the bushing which if damaged, would require GSM replacement.

To remove:

1. Disconnect the connector.
2. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
3. Carefully remove the servo and place a protective cover on the output gear.
4. Place a protective cover over the GSM.

To install:

1. Inspect the output gear for abnormal wear or the absence of grease.
2. Carefully place the servo into the capstan, ensuring proper orientation and alignment.
3. Fasten the servo to the capstan using the existing hardware.
4. Inspect the Backshell assembly and connector for damaged pins.
5. Connect Backshell assembly to the unit.

6.13 GSM REPLACEMENT

To remove:

1. Remove the GSA Servo.
2. De-rig the flight control cabling or chain.
3. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
4. Carefully remove the servo mount.

To install:

Follow the installation instructions in the respective servo installation drawing. If no other maintenance is to be performed, reinstall the servo(s).

6.14 CONFIGURATION MODULE

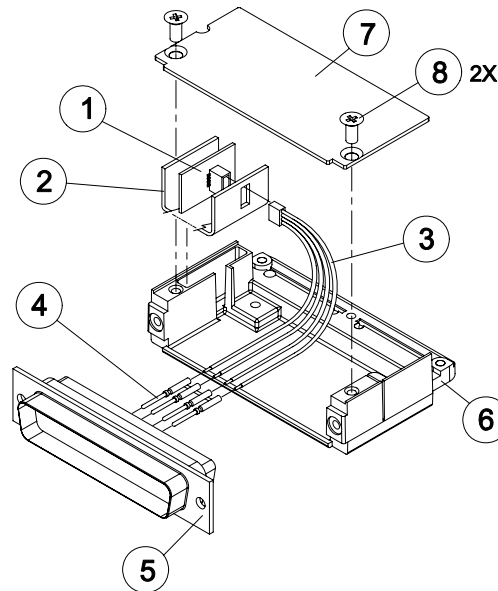


Figure 6-2. Configuration Module

To remove:

1. Remove two screws (item 8) from cover (item 7) and remove cover.
2. Unplug connector from configuration module (item 1).
3. Remove configuration module.

To install:

1. Inspect connector for damaged pins.
2. Place configuration module (item 1) in position.
3. Insert connector into configuration module (item 1).
4. If the GRS configuration module is replaced, proceed to Section 7.6.
5. If the GDC configuration module is replaced, proceed to Section 7.5.
6. If master configuration module is replaced:
7. Turn the PFD on in configuration mode. (press and hold the ENT key while powering the unit.)
8. Go to the Configuration Upload Page in the System Page Group.
9. Press the UPDT CFG softkey.
10. If the PFD and master configuration module is replaced, proceed to Section 10.

NOTE

If the master configuration module is replaced, the G1000 system ID number will change. The Terrain, TAWS Unlock, Chartview/Jeppview/FlightCharts and other SD cards may need to be replaced since they will be locked to the old system ID number. Contact Garmin for assistance in determining which cards will need to be replaced.

6.15 GEA BACKSHELL THERMOCOUPLE

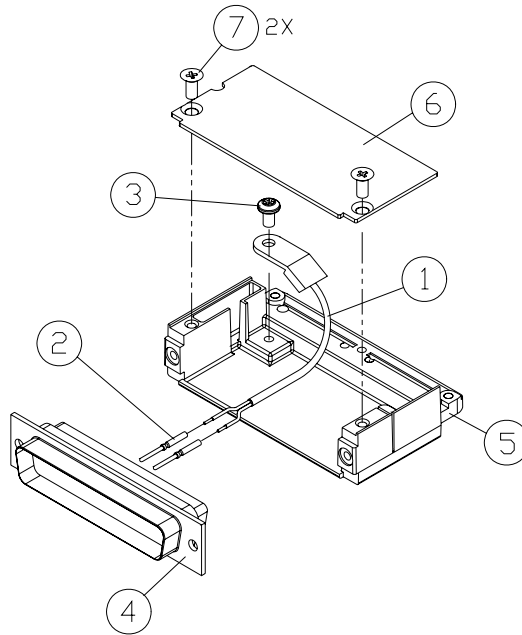


Figure 6-3. GEA Backshell Thermocouple

Item #	Description	Qty. Needed	Garmin Part Number
1	3" Thermocouple, K type	1	925-L0000-00
2	Pins #22 AWG	2	336-00021-00
3	Screw	1	211-60234-08

To remove:

1. Remove the GEA.
2. Remove the GEA connector backplate.
3. Remove connector J701, item 5, from the backplate.
4. Remove cover, item 6, from the backplate.
5. Unscrew thermocouple from boss on Backshell. Extract the thermocouple pins from the connector.

To install:

1. Crimp pins, item 2, onto each of the thermocouples wires, item 1. Ensure that pre-stripped wire length is 1/8" prior to crimping.
2. Insert newly crimped pins and wires into the appropriate connector housing location, item 6.
3. Place thermocouple body, item 1, onto the Backshell boss, item 5. Place the thermocouple as shown, so the wires exit towards the bottom of the Backshell.
4. Fasten thermocouple tightly to Backshell using the provided screw, item 6.
5. Fasten cover, item 6, to Backshell using the provided screw, item 7.

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SECTION 7

LRU SOFTWARE INSTALLATION AND TESTING

7.1 INTRODUCTION

This section describes how to upload software and configuration files to a replacement LRU. Section 10 explains how to completely reinstall software for the first time after the upload which took place at the time of the original G1000 installation (refer to the installation manual for detailed information).

NOTES

- **DO NOT ALLOW POWER TO BE REMOVED FROM THE G1000 SYSTEM WHEN LOADING SOFTWARE.** Connect a ground power unit to the aircraft for software loading. Do not rely on only the aircraft batteries during the software loading process. Power loss during a software upgrade may cause a LRU to become corrupted and unresponsive requiring replacement. Replacing corrupted units are not covered under warranty. Remove power only when told to do so by the procedure.
- **Make sure the software loader card has the correct software version before loading any files into the G1000 system.** Loading the files from a previous software version loader card will prevent the system from operating correctly. Verify the software part number on the MFD AUX – SYSTEM STATUS page matches the software part number listed in the “ldr_part_nmbr.txt” file on the loader card.
- **Place all GDU displays in the same mode (configuration or normal) for loading software unless instructed differently.** If the displays are not in the same mode the software load may not be successful.
- **Verify the presence or non-presence of GIA63 WAAS units to help you choose the correct software to load (see Figures 7-1 and 7-2).** Loading WAAS software into a non-WAAS unit or vice-versa may make the unit inoperable. Unit repairs due to loading the wrong software is not covered under warranty.

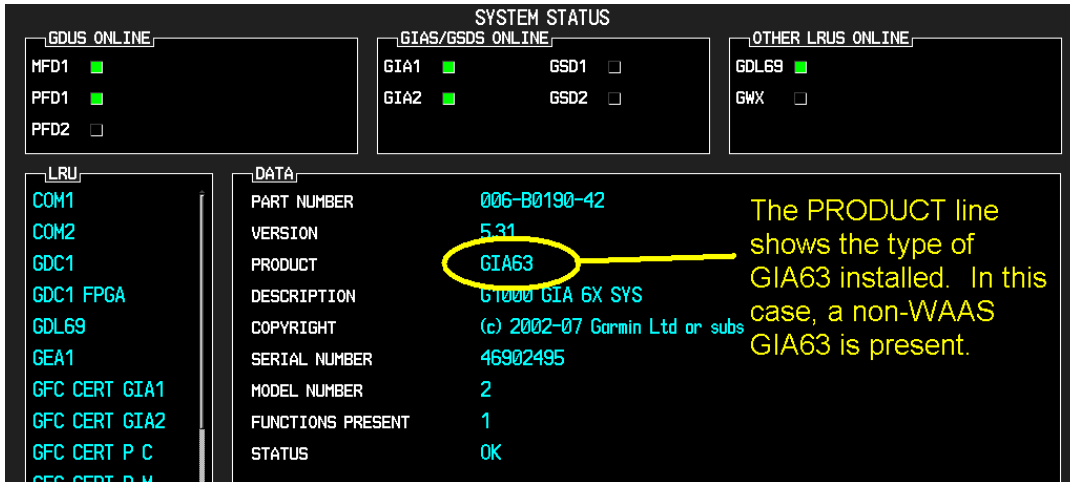


Figure 7-1. Non-WAAS (GIA 63) System Status Page

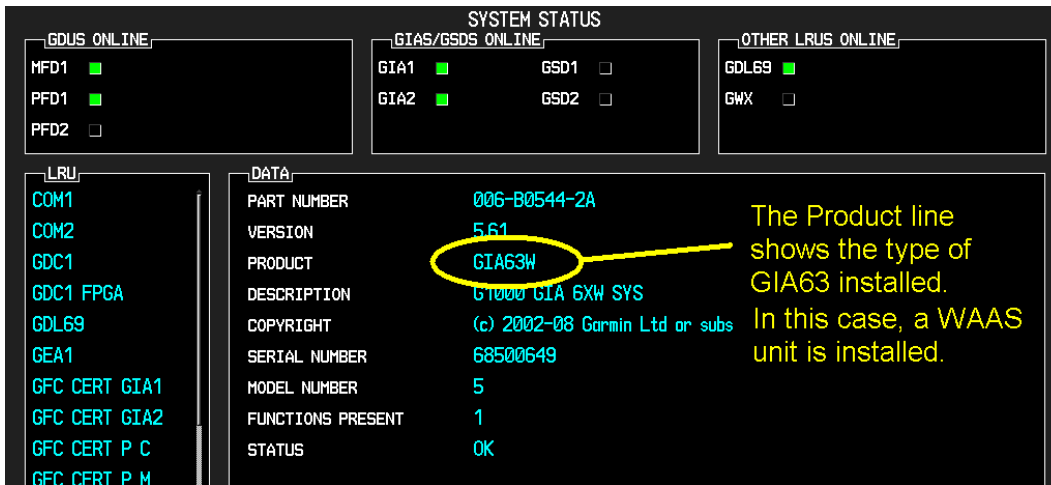


Figure 7-2. WAAS (GIA 63W) System Status Page

CAUTION

Remove Supplemental Database Cards from the lower slot of all displays before loading software into any unit. Not removing the cards may corrupt them during the software upload. Replacing corrupted database cards are not covered under warranty.

NOTES

- **Garmin recommends the use of Sandisk SD cards for loading software and configuration files.** Use of other brand cards is not recommended.
- **Refer to the OEM Maintenance Manual for approved software versions and part numbers.**
- **Determine what optional equipment (i.e. ADF, DME, Oxygen, Autopilot, etc.) is installed in the aircraft before loading software.** Optional equipment configuration files will need to be reloaded after an LRU replacement to reenable them. Failure to load configuration files for optional equipment will prevent them from working properly with the G1000 system.
- **Determine what optional features (i.e. SAR, TAWS, Synthetic Vision (SVT), Jeppesen ChartView, etc.) are installed before loading the AIRFRAME configuration file.** If the AIRFRAME configuration file is loaded from the system software card, you will need to unlock the optional features using their unlock cards. Failure to load configuration files for optional features will prevent them from working.

7.2 GDU SOFTWARE INSTALLATION AND TESTING

NOTE

Insure Jeppesen aviation database is present. Refer to Section 10 for aviation database update instructions.

Original Display Reinstalled:

If the removed display(s) are reinstalled in their original positions, no software or configuration loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange Display(s) Installed:

If a new, repaired, or exchange GDU is installed; the correct software, configuration and Jeppesen aviation database files must be loaded to the unit. Retain the database SD card(s) from the original display to install in the new display after loading software. See Section 10 for aviation database update instructions.

NOTE

If replacing the PFD with a new, repaired, or exchanged GDU, the new GDU must be placed in the MFD location and the GDU system files loaded there to prevent calibration and other configuration data residing in the PFD config module from being deleted. It is not necessary to install a display in the PFD position to load GDU software into a display installed in the MFD position. After loading GDU software into the display in the MFD position, turn off the system and move the GDU to the PFD position in the instrument panel and continue the install by loading the configuration files.

7.2.1 GDU Software

1. Remove the supplemental database cards from the bottom slots of each display. Note which one was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading are complete. It might contain a FliteChart® or ChartView database which is only used in the MFD.
2. Insert the software loader card into the top slot of the GDU which was replaced.
3. Power the display on in configuration mode.
4. Press the YES softkey at 'DO YOU WANT TO UPDATE SYSTEM FILES?' prompt.
5. Confirm update completion.

7.2.2 GDU Configuration

1. Insert the software loader card into the top slot of the PFD.
2. Power the PFD and the MFD on in configuration mode.
3. Press the NO softkey at 'DO YOU WANT TO UPDATE SYSTEM FILES?' prompt.
4. Select the System Upload Page on the PFD.
5. Activate the cursor and highlight the appropriate aircraft in the AIRFRAME field.
6. Press the ENT key.
7. Highlight the appropriate aircraft base configuration file in the FILE field.
8. Press the ENT key.
9. Press the CLR ALL softkey.
10. Using the FMS knob highlight the AIRFRAME configuration box and press the ENT key.

11. Press the ENT key to select the SYSTEM, MANIFEST, MFD, and PFD configuration box.
12. Press the LOAD softkey.
13. View the SUMMARY field and ensure that the load is complete, then de-activate the cursor.
14. After the software and configuration files are loaded, turn off the system. Turn the system back on and load the screenshot file (if present on loader card for aircraft type) by following the screen prompts. If the screenshot is not present, you will not receive a prompt to load the screenshot file.
15. Turn the system off and remove the software loader card. Proceed to the Options Loading section to install/unlock optional features such as DME, ADF and TAWS.
16. Load the Jeppesen Aviation database File. It must be the same version that is in the other display.
17. Reinsert the Supplemental Database Cards in the bottom slot of each display. Be sure to insert the card removed from the MFD back into the MFD.
18. Continue to the PFD/MFD Test procedure.

7.2.4 GDU Testing

If the display is removed or replaced, the following tests are recommended.

1. Allow displays to initialize.
2. Check that all COM/NAV display fields are valid in the top corners of the display.

For PFD: Check that attitude, heading, altitude, airspeed, vertical speed and OAT fields are valid within 2 minutes of power up.

For MFD: Check that the engine instrument fields are valid.



Figure 7-3. G1000 Normal Mode Check

3. Push the red display reversion button on the GMA 1347. Verify both displays enter reversionary mode (both should have valid attitude, heading, altitude, airspeed, vertical speed, and engine instruments):



Figure 7-4. G1000 Reversionary Mode Check

4. De-activate reversionary mode by pushing the red reversion button again.
5. Verify Optional Features and Equipment (if equipped; i.e. ADF, DME, TAWS, ChartView, etc.) are operational.
6. On the PFD, press the ALERTS softkey. Correct any PFD/MFD Alert messages.

7.3 GIA SOFTWARE INSTALLATION AND TESTING

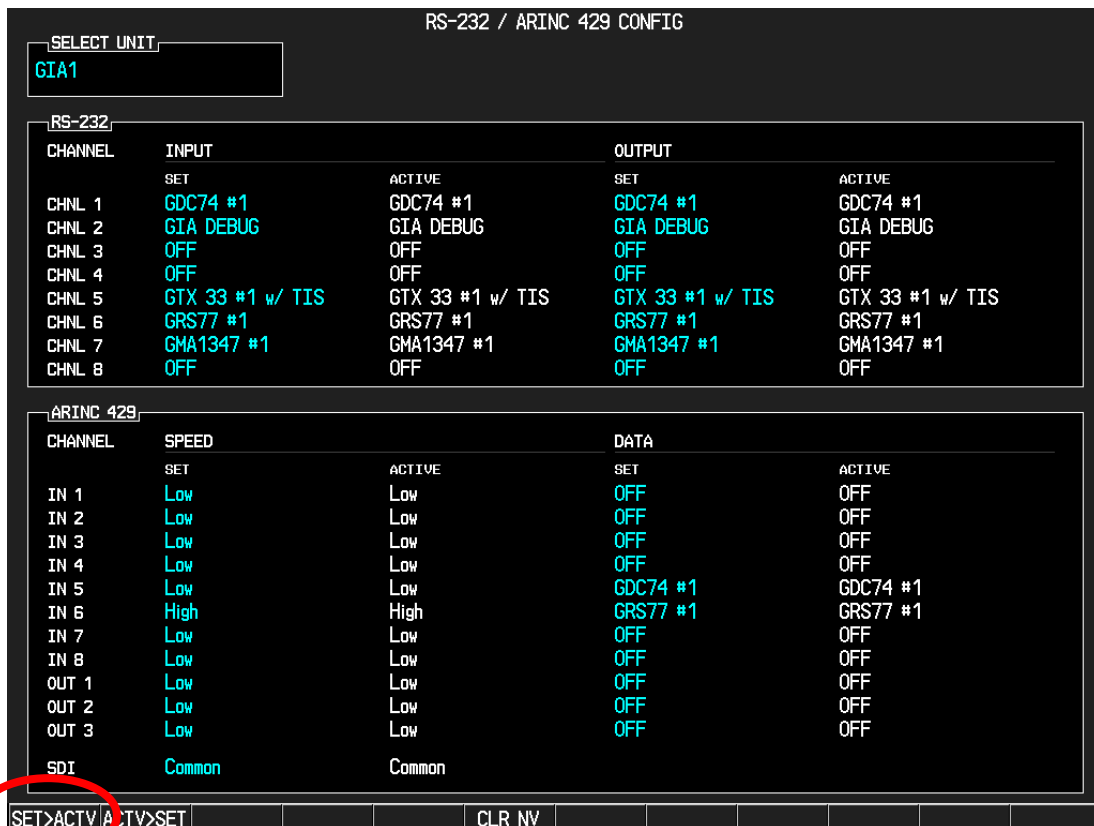
Original GIA Reinstalled:

No software or configuration loading is required if the removed GIA is reinstalled in its original position (GIA1 and GIA2 in their original racks). This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

Original GIA Installed in Opposite Locations for Troubleshooting:

No software loading is required if the originally installed GIA units are re-installed in opposite positions (GIA1 and GIA2 in opposite unit racks). However, the units must be re-configured. Follow these instructions to reconfigure the units without requiring the software loader card:

1. With the system turned off, remove the GIA63 units and install in the opposite location (i.e. GIA1 into the GIA2 slot and vice versa).
2. Apply system power, insuring both MFD and PFD are in Configuration Mode.
3. On the PFD, use the FMS knob to navigate to the GIA RS-232/ARNIC 429 CONFIG page.
4. In the SELECT UNIT box in the upper left corner of the screen, verify GIA1 is listed.
5. Press the SET>ACTV softkey in the lower left corner of the screen.



6. When the “Activate parameter settings?” window appears, verify OK is highlighted and press the ENT key.
7. When the “GIA #1 Configured” window shows “Complete”, press the ENT key to select OK in the window.

8. Activate the cursor, turn the small FMS knob to show the list of GIA choices, highlight GIA2 in the pop-up box and press the ENT key.
9. Press the SET>ACTV softkey in the lower left corner of the screen.
10. When the "Activate parameter settings?" window appears, verify OK is highlighted and press the ENT key.
11. When the "GIA #2 Configured" window shows "Complete", press the ENT key to select OK in the window.
12. Turn off the system.

New, Repaired or Exchange GIA Installed:

If a new, repaired or exchange GIA is installed, load the following files after removing the supplemental database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GIA1 Software
- GIA2 Software
- GPS1 Software
- GPS2 Software
- GIA1 Configuration
- GIA2 Configuration
- GIA Gains
- GIA Audio
- GIA1/2 Files for optional equipment installed on the aircraft (i.e. ADF, HF radio, TAS, etc.).

Determining Current Boot Block Software Version

If a replacement GIA 63 (Non-WAAS) has been installed, the following procedure applies. Non-WAAS GIA v4.01 (or later) boot block software must be installed prior to upgrading to the GIA software versions listed in this document. Boot Block software is available from the OEM provided G1000 software CD-ROM or free from the Dealer's Only section of Garmin's website (www.Garmin.com).

NOTE

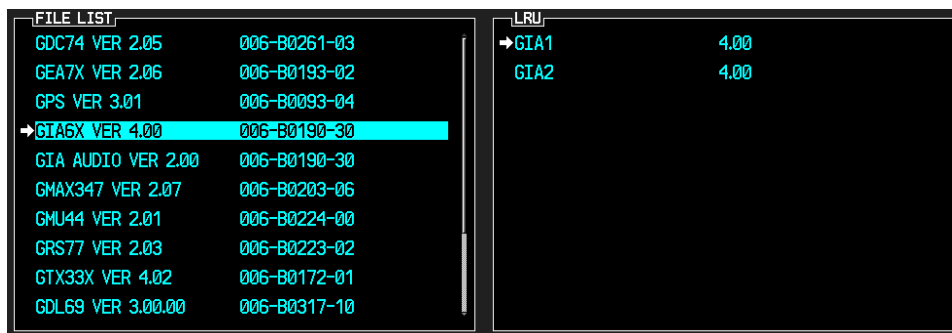
A quick way to tell if GIA Boot Block needs to be updated is if an audio software loading file fails. If it does, then the GIA Boot Block software needs to be updated.

1. Ensure the G1000 is powered off.
2. Remove the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart or ChartView database which is only used by the MFD.
3. Insert the airframe specific software loader card (containing GIA main software version 4.00 or later) into the top slot of the PFD.
4. While holding the ENT key on the PFD, restore power to the PFD.

5. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the PFD, release the ENT key.
6. Press the NO softkey at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
7. Repeat step 3 and 4 for the MFD.
8. Restore power to all remaining G1000 LRUs.
9. On the MFD use the FMS knob to highlight the replaced GIA (1 or 2) on the System Status page.



10. On the PFD use the FMS knob to turn to the Software Upload page.
11. Use the FMS knob to highlight GIA 6X software.



12. Press the LRU softkey and highlight the replacement GIA (1 or 2).
13. Press the ENT key to begin loading software.
14. The boot block version should now appear on the MFD.

15. If GIA main boot block version is 4.00 or earlier press the CANCEL softkey on the PFD and select 'YES' at the prompt. Continue to the next Section for instructions on loading GIA main boot block version 4.01.

NOTE

If GIA main boot block version is 4.01, do not cancel the software upload.

Loading Boot Block Version 4.01

1. Remove power from the PFD.

NOTE

If power is removed from the entire G1000 system GIA 2 may appear as GIA 1.

2. Insert the GIA 63 boot block version 4.01 loader card into the top slot of the PFD.
3. While holding the ENT key on the PFD, restore power to the PFD.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the PFD, release the ENT key.
5. Use the FMS knob to turn to the Software Upload page on the PFD.
6. Verify 'GIA 6X Boot Block 4.01' appears in the File List.
7. Verify 'GIA 1' and 'GIA 2' appears in the LRU window.
8. Press the FMS knob to highlight 'GIA 6X Boot Block 4.01'.
9. Press the LOAD softkey.
10. Press the ENT key at the "BEGIN FILE UPLOAD?" prompt.

NOTE

Do not turn power off or cancel the software upload while the boot block is loading.

11. Confirm update completion and press the ENT key.
12. On the MFD use the FMS knob to turn to the System Status page.
13. Highlight the replacement GIA (1 or 2).
14. Verify 'G1000 GIA 6X SYS' is being reported in the description field.
15. Power down the G1000 system.
16. Remove the GIA 63 boot block version 4.01 loader card from the PFD.

7.3.1 GIA Testing

If unit is removed or replaced the following tests are recommended:

GPS Signal Acquisition Test



Figure 7-5. AUX-GPS Status Page (Example)

The GIA units normally acquire a 3D GPS navigation solution within 5-10 minutes of startup, provided the aircraft is outside (or indoors with a GPS repeater).

NOTE

In some rare instances when the GPS receiver is taking longer than normal to acquire, a date and/or time change may be required.

Select the satellite status page on the MFD (fourth page in AUX group). Two softkeys on the bottom of the display allow the user to toggle between GPS 1 and GPS 2. Verify that both receivers show 3D Navigation with a WAAS fix on the MFD.

VHF COM Interference Test

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test. Once the signal acquisition test has been completed successfully, perform the following steps:

1. On the MFD, monitor GPS signal strength bars on the third AUX Page.
2. On the PFD, ensure that the CDI is set to GPS. If it is not, press the 'CDI' softkey until GPS ENR is displayed.
3. Verify that the GPS "INTEG" flag is out of view.
4. Select 121.150 MHz on the No. 1 COM transceiver.
5. Transmit for a period of 30 seconds while monitoring GPS 1 signal strength levels.
6. During the transmit period, verify that the GPS "INTEG" flag does not come into view on the PFD and verify that GPS 1 does not lose a 3-D navigation solution on the MFD.
7. Repeat steps 5-6 and re-transmit while monitoring GPS 2 signal levels on the MFD.
8. Repeat steps 4 through 7 for the following frequencies:

- 121.175 MHz
 - 121.200 MHz
 - 131.250 MHz
 - 131.275 MHz
 - 131.300 MHz
9. Repeat steps 4 through 8 for the No. 2 COM transceiver (GIA2).
 10. On the MFD, select the fourth AUX page.
 11. Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
 12. Go back to the third AUX page.
 13. Select 121.185 MHz on the No. 1 COM transceiver (GIA1).
 14. Transmit for a period of 35 seconds while monitoring GPS 1 signal strength levels.
 15. During the transmit period, verify that the GPS “INTEG” flag does not come into view on the PFD and verify that GPS 1 does not lose a 3-D navigation solution on the MFD.
 16. Repeat steps 14 and 15 while monitoring the GPS 2 (GIA2) signal levels on the MFD.
 17. Repeat steps 14 through 16 for each of the following frequencies:
 - 121.190 MHz
 - 130.285 MHz
 - 131.290 MHz
 18. Repeat steps 14 through 17 for the No. 2 COM transceiver (GIA2).
 19. On the MFD, select the fourth AUX page and change the COM channel spacing back to 25kHz.

VOR/LOC/GS Test

Check the VOR, ILS, and Glideslope functions with ramp test equipment. Operate the equipment according to the test equipment manufacturer's instructions. Adjust the RF signal to a level adequate to perform the test. Note that the PFD CDI will not show a course deviation bar unless a valid VHF NAV frequency is tuned. Simulate a VOR signal on radial 000° with a course-width of 20°. Verify full-scale deflection of the CDI while applying a 10° deviation signal. Exercise the CDI with both right and left deviations for both NAV 1 and 2. Exercise the Glideslope indicator with up and down deviation indications.

7.4 GMA SOFTWARE INSTALLATION AND TESTING

Original GMA Reinstalled:

No software or configuration loading is required if the original GMA 1347(X) is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchanged GMA Installed:

If a new, repaired, or exchange GMA 1347 is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GMA Software
- GMA Configuration
- GMA Files for optional equipment installed on the aircraft (i.e. ADF, HF radio, etc.).

7.4.1 GMA Testing

If unit is removed or replaced the following tests are recommended:

Intercom System (ICS) Check

Except for marker beacon operation, an in-aircraft checkout may be performed in the aircraft on the ramp with known good microphone, headset, and speaker.

1. Plug in headsets at each ICS position.
2. Ensure that the MAN SQ button is off (no light).
3. Adjust volume for each position and verify that the ICS is working properly.
4. Check Pilot and Copilot ICS positions for isolation and proper operation of volume and squelch controls.
5. Press the PA key. Verify that microphone audio is heard over the passengers headsets when the Push-To-Talk (PTT) key is pressed.

Transceiver Operational Check

Perform a ramp test radio check by exercising the installed transceivers, microphone, microphone key and audio over the headphones and speaker. Verify that communications are clear and PTT operation is correct for each pilot position.

1. Select the audio source corresponding to each installed avionics unit (i.e. NAV1, NAV2, COM1, COM2) and check for audio over the headsets.
2. Press the SPKR key and verify that the selected audio is heard over the speaker, if installed.

Failsafe Operation Check

1. Turn the GMA off by pulling the circuit breaker. This directs all COM 1 phone audio, MIC audio and MIC key to the pilot's position.
2. Check the failsafe operation by exercising the COM 1 microphone, microphone key and audio over the headphones. All volume control for the COM audio should be made through the PFD volume control. Verify proper operation of COM 1 using the failsafe operation.

3. Close the circuit breaker to continue testing.

Marker Beacon Test

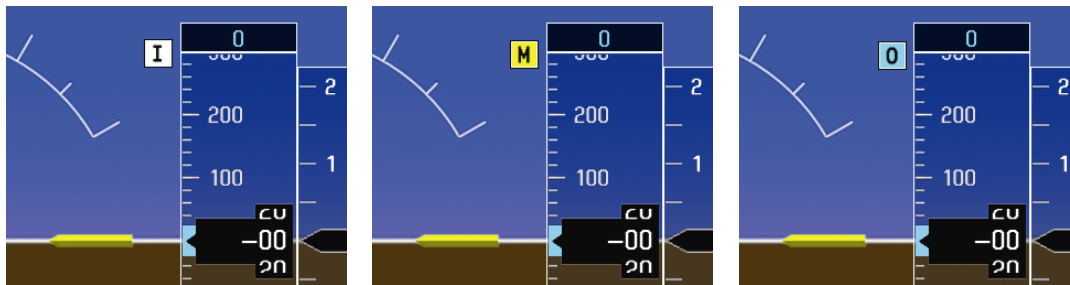


Figure 7-6. Marker Beacon Symbology

Using a ramp tester, simulate the outer marker, middle marker and inner marker signals by following the test equipment manufacturer’s instructions. Verify that each marker audio signal is present over the headphones and speaker. Verify that the outer, middle, and inner annunciations appear on the PFD when the corresponding signal is applied. Marker beacon annunciations appear at the upper left corner of the altitude indicator on the PFD as shown in Figure 7-6. Operate the MKR MUTE key on the GMA and ensure that the audio signal is muted.

7.5 GRS/GMU SOFTWARE INSTALLATION AND TESTING

Original GRS is Reinstalled:

If the original GRS is reinstalled, no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchanged GRS is Installed:

If a new, repaired or exchange GRS is installed; load the file listed below after removing the supplemental database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GRS Software

New GRS Configuration Module is Installed:

If the GRS 77 configuration module was replaced, no software loading is required.

Original GMU is Reinstalled:

If the original GMU is reinstalled, no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchanged GMU is Installed:

If a new, repaired or exchange GMU is installed; load the file listed below after removing the Supplemental Database cards from the bottom slots of each display. Note which card was

removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GMU Software

7.5.1 GRS/GMU Calibration

System software for certain aircraft allows valid outputs from the AHRS prior to completion of the AHRS and magnetometer calibration procedures, as long as the GRS can definitively determine that the aircraft is not moving. This gives a technician the ability to perform functional tests during aircraft assembly that require valid AHRS outputs. Additionally, a “CALIBRATE AHRS/MAG” message will be displayed on the PFD until a successful magnetic calibration has been completed.

The criteria used by the AHRS to determine the aircraft is moving are as follows:

1. If valid GPS data is available and each component of 3D GPS velocity is less than 4 knots, the aircraft is considered “not moving” and attitude/heading will become valid.
2. If valid 3D GPS data is not available, but valid true airspeed is less than 30 knots, the aircraft is considered “not moving” and attitude/heading will become valid.
3. If both 3D GPS and true airspeed are unavailable, attitude/heading will not become valid.

No configuration is required for the GRS, unless the mounting bolts that secure the mounting rack are loosened. If the mounting bolts are loosened a new post-installation calibration is required. Any GMU that is removed and/or replaced requires a magnetometer calibration.

There are six calibration procedures available:

- a. Pitch/Roll Offset (Procedure A1)
- b. Pitch/Roll Offset, Manual Entry (Procedure A2)
- c. Magnetometer Calibration, (Procedure B)
- d. Heading Offset Compensation, (Procedure C)
- e. Engine Run-Up Vibration Test, (Procedure D)
- f. Magnetometer Interference Test, (Procedure E)

NOTE

Procedures A2 and C are not required and should not be performed on certain aircraft.

When ready to perform the procedures, shut both PFDs and MFD off by pulling the circuit breakers. Restart all displays in configuration mode. Follow the steps given for each procedure on-screen at the GRS/GMU CALIBRATION page. Note that the CALIBRATE command cannot be selected and activated until the installer acknowledges all required steps have been carried out by pressing the ENT key on each step.

Table 7-1. GRS/GMU Calibration

Condition	Calibration Procedure Required		
	A1	B	D
Removed or replaced the GRS without loosening mounting rack bolts	None Required		
Replaced the GRS and loosened mounting rack bolts	X	X	X
Replaced the GRS Configuration Module	X	X	X
Replaced the GMU (new serial number)		X	
GMU was removed and reinstalled (same serial number)	None Required		

Procedure A1: Pitch/Roll Offset Calibration



Figure 7-7. Pitch/Roll Offset

This procedure must be performed for both GRS units installed in the aircraft. This procedure must be carried out with the engine off.

1. Level the aircraft (according to the aircraft manufacturer’s instructions) to within $\pm 0.25^\circ$ of zero pitch and zero roll.
2. Initiate the AHRS Ground Pitch/Roll Aircraft Level compensation mode by performing the following steps:
 - a. Enter configuration mode and go to GRS/GMU CALIBRATION page as shown in Figure 7-7.
 - b. This page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence:
 1. Softkey 9
 2. Softkey 10
 3. Softkey 11
 4. Softkey 12

- c. Ensure that the GRS1 is selected.
- d. Select PITCH/ROLL OFFSET, then press the ENT key.
- e. Follow the checklist items displayed on the PFD and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
- f. After several seconds, a new checklist appears in the lower half of the PFD. Press the ENT key as each item is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking, press the ENT key to continue.
- g. The result of the pitch/roll offset compensation is displayed on the PFD. If successful, the AHRS records the required pitch and roll offsets, informs the operator of a successful conclusion and returns to normal operation.
- h. Press the ENT key on the PFD. Repeat steps 1 through 4 for GRS2.

Procedure B: Magnetometer Calibration

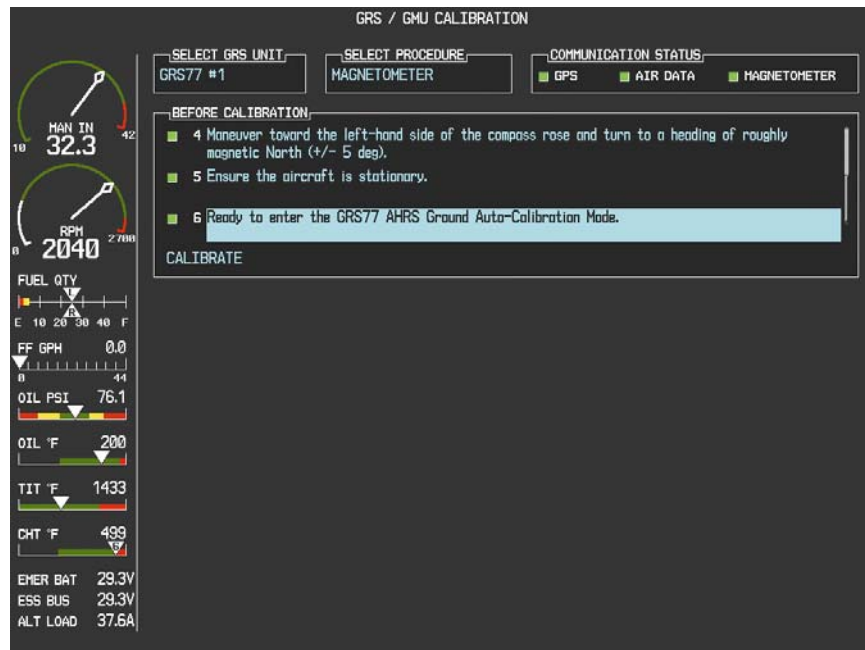


Figure 7-8. Magnetometer Calibration

The Magnetometer Calibration Procedure must be carried out at a site that is free of magnetic disturbances. A Site Evaluation for Magnetic Disturbances can be performed for Magnetometer Calibration Procedure if a compass rose is not available or may not be free of magnetic interference (i.e. lamp poles or a blast fence installed nearby). The accuracy of the GRS 77 and GMU 44 cannot be guaranteed if this calibration is not performed on a magnetically clean area.

NOTE

Typically, a compass rose is an acceptable location to perform the magnetometer calibration procedure. However, because not all compass roses are well maintained, even an existing compass rose should be regularly evaluated using the method described here to determine if it is free of magnetic disturbances. If evaluation of an existing compass rose indicates that magnetic disturbances are present, then an alternative location must be found to perform the Magnetometer Calibration Procedure.

The G1000 system can be used to evaluate a candidate site for magnetic disturbances and determine whether or not it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters. The Garmin equipped aircraft used to evaluate the site must have already completed the pitch/roll offset compensation procedure (Procedure A). However, prior completion of the Magnetometer Calibration Procedure (Procedure B) is not required.

In order to evaluate a candidate site, the Magnetometer Calibration Procedure must be performed twice: once turning clockwise around the site, and once turning counter-clockwise. Both times, the procedure should be conducted with the exception of the direction of turns around the site.

NOTE

Although the Magnetometer Calibration Procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counter-clockwise turns for the purpose of evaluating the site for magnetic disturbances.

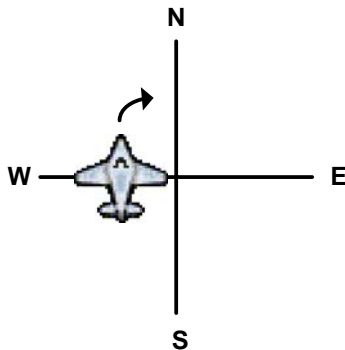
If, upon completion of the Magnetometer Calibration Procedure in each clockwise and counter-clockwise direction, the PFD displays the "CALIBRATION SUCCESSFUL / SITE IS CLEAN" message, then the candidate site is sufficiently free of magnetic disturbances and is acceptable for performing the Magnetometer Calibration Procedure. It is important to obtain successful result in both the clockwise and counter-clockwise directions to ensure that the magnetometer sweeps over a large enough area at the candidate site.

If, upon completion of the Magnetometer Calibration Procedure in either of the two directions, the PFD displays either the "MAG FIELD AT SITE NOT UNIFORM", or "MAG FIELD AT SITE DIFFERS FROM IGRF MODEL" message, then the site contains magnetic disturbances that are too large and can not be used for Magnetometer Calibrations.

With the aircraft stationary, initiate the GRS 77 AHRS magnetometer calibration procedure as follows:

1. Start both displays in normal mode.
2. Start the aircraft engine following the procedures in the POH.
3. After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose or magnetically clean location determined in section above.

4. At the compass rose, align the aircraft to a heading of magnetic north ($\pm 5^\circ$) with sufficient offset to the left (west) of the North/South axis to allow a clockwise turn around the compass rose to be performed. See figure below.

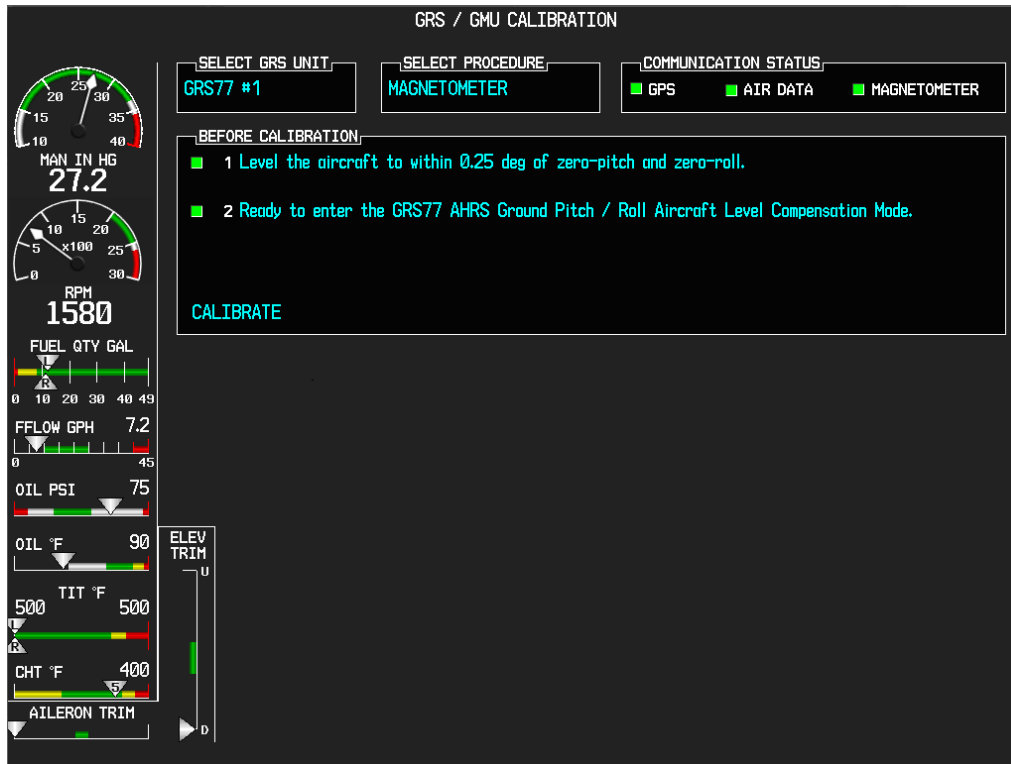


5. Restart the PFD and MFD in configuration mode.

NOTE

If needed, advise the Control Tower or Ground Control you may temporarily not be able to receive or transmit on your COM radios during this procedure before restarting the system in config mode.

6. On the PFD, go to the GRS/GMU CALIBRATION Page. Note that engine instruments may be monitored on this page during this procedure.
7. Select the GRS/GMU Calibration page and enter the following softkey password:
 - a) 9
 - b) 10
 - c) 11
 - d) 12 (Far Right softkey)



8. Activate the cursor and highlight the SELECT PROCEDURE window and select MAGNETOMETER.
9. Press the ENT button.
10. Use the cursor to highlight the BEFORE CALIBRATION window.
11. Follow the checklist items displayed on the PFD and press the ENT key as each one is completed or confirmed. When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
12. The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.
13. Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

NOTE

Due to the difficulties in executing smooth, accurate turns the PFD may incorrectly interpret a station and instruct to “HOLD POSITION” prior to full completion of a 30° turn. If this scenario is encountered, it is best for the operator to ignore the “HOLD POSITION” command and instead use outside references to complete the approximate 30° turn. Instead of using the PFD instruction to turn as a real-time indication of when to turn, simply judge the 30° ($\pm 5^\circ$) turn increments of the aircraft by using the compass rose radials. Dwelling at these 30° increments for the time recommended by the PFD should result in successful calibration.

14. The PFD guides the operator to dwell at multiple headings around a complete circle.

NOTE

Due to high winds or excessive airframe vibration, the operator may encounter a condition where the PFD restarts the 18-second countdown without full completion of the previous countdown. If this is encountered more than once for a given station, the operator should begin turning to the next station (approximately 30°). A minimum of 2 successful stations per quadrant is required, where a successful station is a full 18-second countdown followed by instruction to move. Ensure that at least 2 stations per quadrant are completed. Thus, it may sometimes be required to dwell at a station after a countdown restart. A maximum of 20 stations is allowed for the entire calibration procedure. If too many countdown restarts are encountered, the calibration will fail with the message, "TOO MANY STATIONS." Aircraft rocking from excessive winds may prevent the calibration from passing. If repeated attempts in windy conditions do not pass, wait until the winds calm before reattempting this procedure.

15. Repeat the turn-and-stop process until the PFD advises that a successful calibration is complete. The GRS 77 AHRS then enters its normal operational mode. Press the ENT button on the PFD to conclude this procedure.

Procedure D: Engine Run-Up Vibration Test

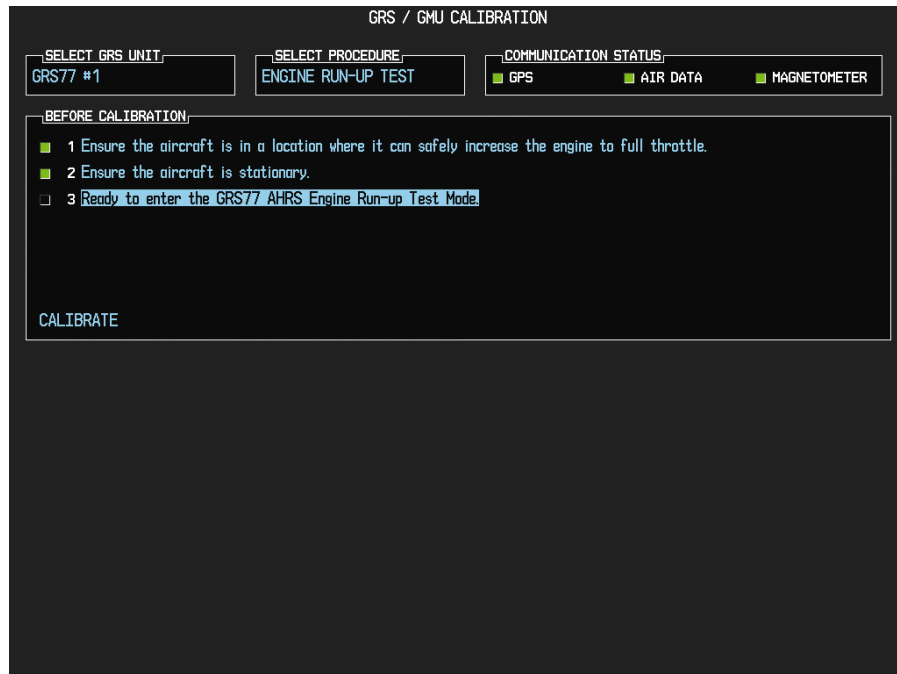


Figure 7-9. Engine Run-Up

Calibration procedures A and B are not required prior to performing this procedure. This procedure verifies the AHRS mounting is sufficiently rigid and insensitive to vibration.

1. Start both displays in normal mode.
2. Start the aircraft engine following the procedures in the POH.
3. After aircraft engine startup, taxi the aircraft to a suitable area for engine run-up.
4. Restart both displays in configuration mode.
5. On the MFD, select the GEA page group. On the Engine Data page, monitor engine performance during the procedure.
6. Go to the GRS Page Group on the PFD.
7. Select the GRS/GMU Calibration page and enter the following softkey password:
 - a) 9
 - b) 10
 - c) 11
 - d) 12 (Far Right softkey)
8. Initiate the AHRS engine run-up vibration test procedure by performing the following steps:
 - a) Select the ENGINE RUN-UP TEST procedure and press the ENT key.
 - b) Follow the checklist items displayed on the PFD, and press the ENT key as each step is completed or confirmed.
 - c) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.

9. The PFD instructs the operator to gradually increase power from idle to full throttle and back to idle over a period of 2-4 minutes.
10. When the operator has completed the engine run-up and the engine is back to an idle setting, press the ENT key to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
11. The PFD informs the operator if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and numeric values are displayed on the PFD.
12. Press the ENT button on the PFD to conclude this procedure.

NOTE

If failures are indicated, the engine run-up test may be repeated once or at most twice. If the test does not pass after three attempts, then the installation should not be considered reliable until the source of the vibration problem is identified and remedied. In the event of repeated failure of the engine run-up test, record the values that are reported to be out of range for future reference.

The following are potential causes for failure of the engine run-up test:

- Vibration motion of GRS 77 and/or GMU 44 caused by neighboring equipment and/or supports.
- Mounting screws and other hardware for GRS 77 and/or GMU 44 not firmly attached.
- GRS 77 connector not firmly attached to unit.
- Cabling leading to GRS 77 or GMU 44 not firmly secured to supporting structure.
- An engine / propeller that is significantly out of balance

Procedure E: Magnetometer Interference Test

This procedure validates that no electronic device is interfering with the operation of the GMU magnetometer which directly impacts the determination of attitude and heading by the GRS. Calibration Procedures A-1 through D are not required prior to this execution of this procedure.

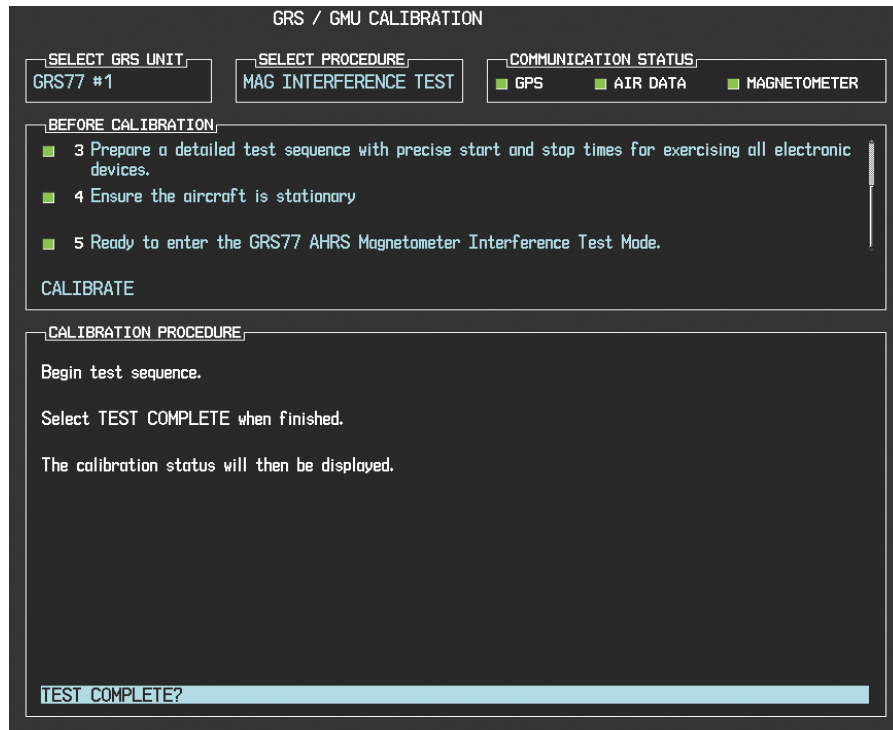


Figure 7-10. Magnetometer Interference

1. Enter Configuration Mode and go to GRS/GMU Calibration page as shown in Figure 7-10.
2. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence: 9, 10, 11, and 12.
3. Select GRS unit and press the ENT key.
4. Select MAG INTERFERENCE TEST and press the ENT key.
5. Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.

NOTE

The 3rd item on the checklist instructs the operator to “prepare a detailed test sequence with precise start and stop times for exercising all electronic devices”. Only the electronic devices that are likely to affect the operation of the GMU 44 magnetometer need be included in the test sequence. The list of relevant electronic devices will vary from aircraft to aircraft. An example of an appropriate test sequence is given in Table 7-2.

Table 7-2. Magnetometer Interference Test Sequence (example)

Elapsed Time since Start of Test (min:secs)	Action
0:00	Test begins
0:10	Aileron full right
0:20	Aileron full left
0:30	Aileron level
0:40	Flaps down
0:50	Flaps up
1:00	Landing gear up
1:20	Landing gear down
1:40	Speed brake up
1:50	Speed brake down
2:00	Navigation lights on
2:10	Navigation lights off
2:20	Landing lights on
2:30	Landing lights off
2:40	Taxi lights on
2:50	Taxi lights off
3:00	Landing + Taxi lights on
3:10	Landing + Taxi lights off
3:20	Strobes on
3:30	Strobes off
3:40	Recognition lights on
3:50	Recognition lights off
4:00	Turn on all wing-tip lights simultaneously (typically will include navigation lights, recognition lights and strobe)
4:10	Turn off all wing-tip lights simultaneously
4:20	Beacon on
4:30	Beacon off
4:40	Pitot heat on
4:50	Pitot heat off
5:00	End of test

When the CALIBRATE field is blinking, press the ENT key to begin the procedure, and have a stopwatch ready to begin recording the elapsed time.

NOTE

It is important that the “time equals zero” moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE message. The operator should carry out the actions called for in the prepared test sequence.

It is important that all actions are carried out in the order and at the precise elapsed time as specified in the prepared test sequence. When the operator has completed the actions specified in the test sequence, press the ENTER button to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking. The PFD informs the operator if the installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test.

If the test fails, the installation should be considered unreliable until the source of magnetic interference is identified and remedied. When the magnetometer interference test fails, record the three magnetometer maximum deviation values and their corresponding timestamps. Any maximum deviation value greater than 2.5 milliGauss indicates a problem that must be resolved. Compare the corresponding timestamps with the prepared test sequence to identify which action produced the problem. Contact Garmin for assistance in resolving the problem.

NOTE

Two common reasons for a failed magnetometer interference test are: 1) new equipment is installed in close proximity to the GMU 44 magnetometer, and 2) an existing or new electronic device has become grounded through the aircraft structure instead of via the proper ground wire in a twisted shielded pair.

Press the ENT key on the PFD to conclude this procedure.

Test

Verify attitude and heading, on PFD in normal mode.

7.6 GDC SOFTWARE INSTALLATION AND TESTING

Original GDC is Reinstalled:

No software or configuration loading is required if the original GDC is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange GDC is Installed:

NOTE

Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded.

If a new, repaired or exchange GDC 74 is installed, load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GDC1 Software

- GDC1 Configuration

New GDC Configuration Module is Installed:

The correct configuration files must be loaded, if the GDC configuration module has been replaced.

Load the following files:

- GDC1 Configuration

NOTE

Any pitot/static covers must be removed in order to successfully execute the Software and/or configuration loading to the GDC.

7.6.1 GDC Testing

NOTE

Allow the unit to warm up for 15 minutes before performing the following tests.

Verification of the altimeter and airspeed must be performed using an air data test set (ADTS). The static port and altimeter must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) § 91.411 and Part 43 Appendix E. The PFD must be in Configuration mode and the MFD must be in Reversionary mode for performing the tests as outlined in Part 43 Appendix E.

To prepare the G1000 System for Part 43 Appendix E testing:

CAUTION

Configuration mode contains certain pages and settings that are critical to aircraft operation and safety. These pages are protected and cannot be modified, unless the technician is properly authorized and equipped. However, most protected pages are viewable to allow system awareness for troubleshooting.

1. Start the G1000 system in normal mode.
2. Remove power to PFD1.
3. Turn PFD1 on in Configuration mode by pressing and holding the ENT key on the PFD while applying power.
4. Release the ENT key after “INITIALIZING SYSTEM” appears in the upper left corner of the PFD.

NOTE

Configuration mode contains certain pages and settings that are critical to aircraft operation and safety. These pages are protected and cannot be modified, unless the technician is properly authorized and equipped. However, most protected pages are viewable to allow system awareness for troubleshooting.

5. Using the FMS knob on the PFD turn to the GRS page group. Use the B ALT field for all CFR Part 43 Appendix E tests for G1000 altitude.
6. Place the MFD in Reversionary mode by pressing the red “display backup” button on the GMA. The baro setting can then be read from the MFD for CFR Part 43 Appendix E tests.

NOTE

The baro setting on the MFD is controlled by PFD1. The baro setting will apply to both GDC1 and GDC2 regardless of the GDC selected on the MFD. The copilot's display can be ignored.

After completing the tests specified by § 91.411 and Part 43 Appendix E, return both the MFD and the PFD to normal mode.

NOTE

The following tests are above and beyond the requirements set forth in Appendix E, and are required only when appendix E tests are required.

Pitot/Static Airspeed Test

1. Command air data test set (ADTS) to simulate air speeds shown in the table below.
2. Wait for ADTS to report that target values have been achieved.
3. Verify that computed air speeds shown on the PFD are within the tolerances specified in the OEM maintenance documentation.

Static Port Vertical Speed (Rate of Climb) Test

1. Command ADTS to change the altitude at the rates shown in the table below.
2. Wait for ADTS to report that target rates have been achieved.
3. Verify that the Rate of Climb reported by the Vertical Speed field on the PFD is within the tolerances specified in the table below:

Vertical Speed, feet/minute	Allowed tolerance, ±feet/minute
2000	100
0	45
-2000	100

7.7 GEA SOFTWARE INSTALLATION AND TESTING

Original GEA 71 Reinstalled:

No software or configuration loading is required if the original GEA 71 is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange GEA 71 Installed:

If a new, repaired or exchange GEA 71 is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display:

- GEA1 Software
- GEA1 Configuration

Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

CAUTION

Do not cancel a software upload that is in progress. A canceled software upload may result in an unresponsive GEA 71.

7.7.1 GEA Testing

If unit is removed or replaced the following tests are recommended:

Each GEA sensor input must be checked with the aircraft engine off. Verify all engine information systems are valid on the MFD, and no GEA related alerts appear on the PFD. Exercise and test all discrete, analog, and/or digital inputs and check for appropriate responses.

7.8 GTX SOFTWARE INSTALLATION AND TESTING

Original GTX Reinstalled:

No software or configuration loading is required if the original GTX is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange GTX is Installed:

NOTE

Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded.

If a new, repaired or exchange GTX is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used in the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GTX1 Software
- GTX2 Software
- GTX1 Configuration
- GTX2 Configuration

After loading software and configuration files, turn to the transponder configuration page and enter the registration (address) and flight ID numbers.

7.8.1 GTX Testing

If unit is removed or replaced the following tests are recommended:

The integrated transponder/altitude reporting system must be verified in accordance with Title 14 of the Code of Federal Regulations (CFR) §§ 91.411 and 91.413.

Transponder Ramp Test

This test requires the use of a Mode S ramp generator. Specific instructions for operating the ramp tester are contained in the applicable operator's manual. Refer to Title 14 CFR Part 43 Appendix F for testing criteria.

7.9 GDL SOFTWARE INSTALLATION AND TESTING

Original GDL Reinstalled:

No software or configuration loading is required if the original GDL is reinstalled. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange GDL is Installed:

If a new, repaired or exchange GDL is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GDL Software
- GDL Configuration
- If a GA37 Antenna is installed, load the optional GA37 Antenna file.

NOTE

See the XM Satellite Radio Activation Instructions, Garmin part number 190-00355-04, for instructions on activating the GDL.

7.9.1 GDL Testing

NOTE

This section verifies correct installation in the aircraft. It does not activate the GDL 69 XM data link radio. If the XM Radio is activated, the channel list will contain more channels than the three that are shown for a radio that has not been activated. Complete instructions for activating the XM data link can be found in Garmin document 190-00355-04 or by calling XM at 1-800-985-9200.



1. Select the AUX – XM RADIO page on the MFD.
2. Using the channel control located in the cabin, verify that you can increment and decrement the channels (the white arrow to the left of the channel list indicates the currently selected channel). Select channel 1 when complete.
3. Using the volume control located in the cabin, verify that you can increase and decrease the XM radio volume (the volume bar at the bottom of the screen will show changes to the volume level). Set the volume to the mid position when done.
4. Plug a set of headphones into one of the passenger stations and verify that you can hear the XM radio playing in both left and right channels. The volume level may be adjusted to a comfortable level at this point.
5. Plug a set of headphones into one of the pilot station and verify that you can hear the XM radio playing in both left and right channels.

7.10 GSA SOFTWARE INSTALLATION AND TESTING

Original Servo(s) Reinstalled:

If the removed servo(s) are re-installed (same serial numbers), no software loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange Servo(s) Installed:

If a new, repaired or exchange servo is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GSA Pitch
- GSA Pitch TR
- GSA Roll
- GSA Yaw
- GSA Pitch Gains
- GSA Pitch TR Gains
- GSA Roll Gains
- GSA Yaw Gains

7.10.1 GSA Testing

The following procedure will verify the proper operation of the GFC 700 AFCS. The technical performing these checks must be thoroughly familiar with the GDC 700, refer to the applicable Garmin G1000 Cockpit Reference Guide.

Autopilot Pre-Flight Test

NOTE

The autopilot pre-flight test will run on every full autopilot power-on.

1. After powering up the system in normal mode, open the AP SERVOS circuit breaker and reset. The AFCS will re-initiate the pre-flight test.

NOTE

A red AFCS annunciation will be displayed until both GIAs, the AHRS, and the autopilot servos are online.

2. Verify that a white 'PFT' annunciation is displayed on the PFD.

NOTE

If the red AFCS annunciation remains on the PFD after the attitude comes up and never switches to a white PFT annunciation, it indicates there is a failure in the autopilot system preventing the preflight test from starting.

3. Upon successful completion of the test approximately 10 to 15 seconds, the autopilot disconnect aural alert will sound and the annunciation will clear.

NOTE

If the 'PFT' annunciation turns red, the test has failed and additional troubleshooting will have to be performed prior to continuing the test.

4. If the aural alert is not heard, but pre-flight testing passed, engage the autopilot by pressing the AP key and disengage the autopilot by pressing the AP key again. Visual and aural disconnect alerting should clear. If no alert is heard, check the audio interface.

AFCS Switch Checks

To verify the AFCS systems buttons and switches are operating correctly, perform the following checks:

1. Actuate both halves of the Manual Electric Trim (MET) switch on the same direction. The trim clutch should engage and the trim wheel should run on the selected direction. Check operation in both directions.
2. Press the AP DISC button and hold while actuating the MET switch. The trim wheel should stop running.
3. Release the AP DISC button. The trim wheel should resume running.
4. Release the MET switch.
5. Engage the autopilot by pressing the AP key.
6. Press and hold the left half of the MET switch. The autopilot should command a normal disengagement and the trim wheel should stop moving and rotate freely when moved manually. A single disconnect tone will be heard and a flashing amber "AP" and "YD" will be visible on the PFD.
7. Engage the autopilot again by pressing the AP key on the MFD. The pitch and roll clutches should engage, resisting movement of the control wheel.
8. Press and hold the CWS switch. "CWS" will be annunciated in white on the PFD and the control wheel should now move freely when moved manually.
9. Release the CWS switch. The "CWS" annunciation will be replaced by a green "AP." The autopilot should hold the control wheel in its present attitude.
10. Press the AP DISC switch. The autopilot should command a normal disengagement. A single disconnect tone will be heard and a flashing amber "AP" will be visible on the PFD.
11. Verify the control yoke is free in pitch and roll axes.
12. Engage the autopilot again by pressing the AP key.
13. Pull the AP SERVOS circuit breaker. The autopilot should command an abnormal disconnect, consisting of a continuous disconnect tone and a flashing red "AP" and amber "YD" annunciation.
14. Press the AP DISC button to silence the autopilot abnormal disconnect tone.
15. Reset the AP SERVOS breaker.
16. Wait for the pre-flight test sequence to successfully complete again.
17. Press the TO/GA button. "TO" should be annunciated on the PFD for both pitch and roll modes and the command bars should indicate a wings-level climb to 10 degrees.

NOTE

The GA ENGAGED legend on the Go Around button will not illuminate, since it is not supported in the current version of software.

18. Press the FD key twice to deactivate the Go Around mode and reset the flight director. Green “PIT” and “ROL” annunciations and the flight director command bars will be visible on the PFD.
19. Center the trim wheel if it is not already centered.
20. Press the AP key to engage the autopilot.
21. Press the CWS button and verify there is no residual force on the control wheel for the pitch axis.
22. Disengage the autopilot by pressing the AP DISC switch.

Autopilot Clutch Overpower Check

NOTE

The GFC 700 uses electronic torque limiting as well as mechanical slip clutches to limit the maximum servo effort. When the system is on the ground, the electronic torque limiting is removed, allowing manual checks of the slip-clutch settings. The clutch overpower check is not necessary if the GSM servo mount was not changed or serviced.

1. Engage the Autopilot by pressing the AP key.
2. Apply force to the control yoke to determine if the Autopilot clutches can be overpowered in pitch and roll. Overpowered means that the control surfaces can be moved by applying force to the control wheel or the rudder pedals against the resistance of the engaged Autopilot. If the Autopilot clutches cannot be overpowered, check the servo clutch torque settings.
3. Apply force to the rudder pedals to determine if the Autopilot clutch can be overpower in yaw. If the Autopilot clutch cannot be overpowered, check the servo clutch torque settings.
4. Actuate the MET switch (this causes an Autopilot disconnect). While the trim is running, grasp the aircraft pitch trim wheel and verify that the trim clutch can be overpowered by preventing the trim wheel from moving. If it cannot be overpowered, check the trim servo clutch torque setting. Verify also that the trim wheel moves smoothly in both directions throughout the entire trim range during MET operation. If the trim wheel hesitates excessively (more than 2 seconds without motion), this may indicate that the pitch trim clutch is slipping. First verify proper clutch setting and cable tension. If both clutch setting and cable tension are within tolerance, check the aircraft pitch trim system for excessive friction.

Manual Electric Trim Speed Check

1. Run MET in one direction until it runs against the stop.
2. Using a stop watch or equivalent device, time the trim speed from one end of travel to the opposite stop. The elapsed time is installation-specific. Refer the reader to the aircraft-specific maintenance data for this check.

Autopilot Operation Checks

1. Push the HDG knob in to synchronize the heading bug to the present aircraft heading on the HSI.
2. Engage the Autopilot and Yaw Damper by pressing the AP key.
3. Select Heading mode by pressing the HDG key on the MFD. The command bars should be level and the control wheel should be stationary (very slow movement acceptable, due to the aircraft not being perfectly level).

4. Turn the HDG knob to the left and verify that the command bars move to the left and the control wheel turns to the left (counter-clockwise).
5. Turn the HDG knob to the right and verify that the command bars move to the right and the control wheel turns to the right (clockwise).
6. Push the CWS button and verify that “CWS” is annunciated in white on the PFD. Pull the control wheel to the middle of the pitch control range.
7. Release the CWS button. Verify that the Autopilot clutches re-engage and hold the wheel stationary.
8. Holding the control wheel lightly, press the UP key to increase the pitch reference. Verify that the command bars move up approximately 1/2 degree and the control wheel begins moving aft.
9. Hold the control wheel and press the CWS button, re-synchronizing the pitch reference and re-centering the control wheel.
10. Release the CWS button and verify that servo clutches re-engage before releasing the control wheel.
11. Press the DN key. Verify that the command bars command down and the control wheel begins moving forward.
12. Hold the controls and press CWS to re-center the command bars and stop control wheel movement.
13. With the Autopilot still engaged and the CWS button pressed, move the control wheel to its aft limit.
14. Release the CWS button and apply continuous forward pressure, slowly moving the control wheel. After 1 or 2 seconds, the trim wheel should begin moving in a trim up direction.
15. Grip the control wheel and press the CWS button. Trim motion should stop.
16. Move the control wheel to the forward limit and release the CWS button.
17. Slowly pull back on the control wheel. After a similar delay, the trim wheel should begin to trim down.
18. Relieve pressure on the wheel and the trim motion should stop. Verify that the trim wheel is free to turn.
19. Hold the control wheel and press the AP DISC switch to disconnect the autopilot.
20. Engage VS mode by pressing the VS key. Verify the PFD display ‘VS’ in green and indicates a pitch reference of ‘0 FPM’.
21. Press the FLC key and verify that “FLC” is annunciated on the PFD in green.
22. Press the ALT key and verify that the “ALT” annunciation is displayed in green on the PFD.
23. Press the FD key and verify that the mode annunciations and command bars are removed from the display.
24. Press the YD key and verify that the “YD” annunciation is displayed in green on the PFD.
25. Press the rudder pedals and verify that the yaw servo is resisting movement of the rudder pedals.
26. Press the AP DISC button and verify that a flashing yellow “YD” annunciation is displayed on the PFD.
27. Verify that the rudder pedals move freely.

7.11 GWX SOFTWARE INSTALLATION AND TESTING

Original GWX Reinstalled:

If the removed GWX 68 is re-installed (same serial number), no software loading or configuration is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchange GWX Installed:

If a new, repaired or exchange GWX is installed; load the following files after removing the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart® or ChartView database which is only used by the MFD. Reinstall all the cards after the software and configuration file loads are complete.

- GWX Software
- GWX Configuration

7.11.1 GWX Testing

Operation of the GWX Weather Radar is accomplished using the MFD/GCU 475. Refer to the applicable G1000 Cockpit Reference Guide for basic operation. Perform a basic operation check on the weather radar.

NOTE

Before energizing the equipment, be sure microwave radiation safety precautions including both fuel and personnel safety considerations have been observed. These include clearing all personnel to an area beyond the maximum permissible exposure level (MPEL) boundary. The MPEL for the GWX is 11 feet.

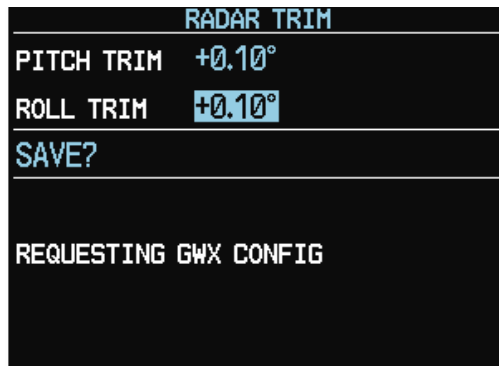


Figure 7-10. Radar Trim Window

The following procedure assumes the correct configuration data files have been loaded and the G1000 is in normal operating mode.

1. On the PFD press the following softkey sequence: 11, 11, 1, 1, 2.
2. The Radar Trim window will now appear (see Figure 7-7).
3. Use the FMS knob to highlight and adjust the pitch and roll trim. Pitch and roll trim can be adjusted in 0.05° degree increments, between ± 4.00°. As you change a value the window will display 'Configuring GWX' then 'GWX Configured'. The resulting radar returns can be viewed on the MFD.
4. Use the FMS knob to highlight 'SAVE?' and press the ENT key. The GWX 68 will now restart.

7.12 GCU 476 REMOTE KEYPAD

Original GCU 476 is Reinstalled

No software or configuration loading is required if the removed GCU 476 is re-installed. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process.

New, Repaired or Exchanged GCU 476 is Installed

If a new, repaired or exchanged GCU 476 is installed; the correct software boot block and certification gains must be loaded to the unit. Continue to the GCU 476 Software Loading procedure. If the configuration fails to load, performing a boot block upgrade may be required. Refer to the GCU 476 Boot Block Upgrade section if needed.

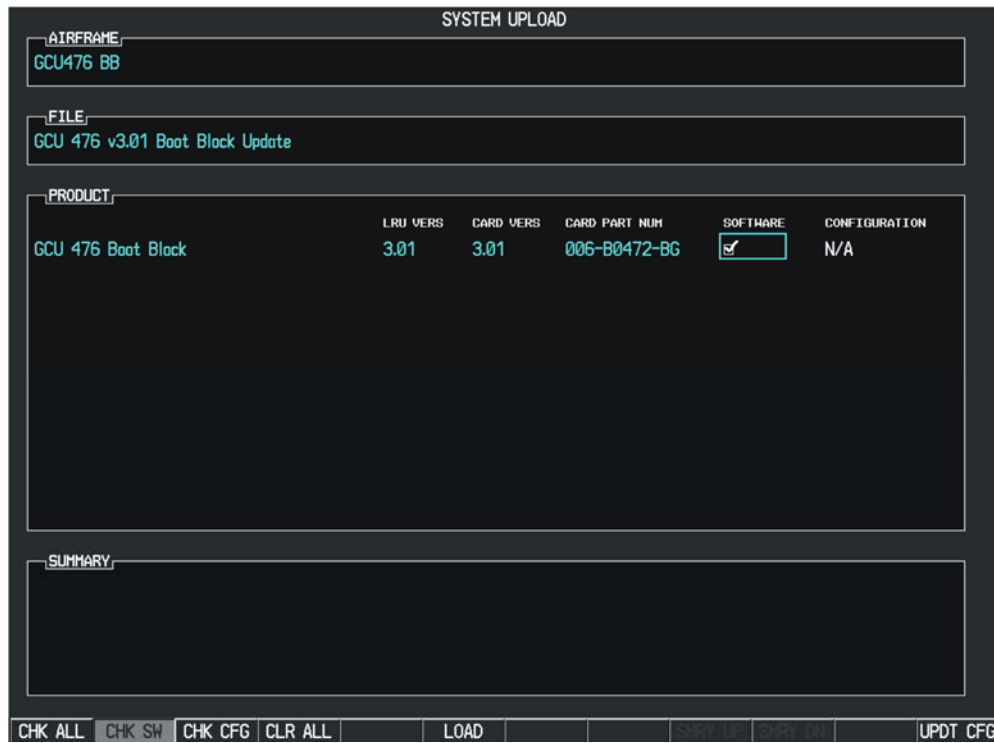
7.12.3 GCU 476 Boot Block Upgrade

The GCU 476 requires a boot block version of 3.01 or higher. If the configuration does not load it is an indicator that boot block upgrade is required (GCUs with older dates of manufacture may not have this version). If it was determined in one of the previous software loading procedures that the GCU 476 does not have boot block version 3.01 or higher, follow this procedure to update the GCU 476's software boot block.

NOTE

It is critical for electrical power to remain on during the boot block update procedure. Take steps to ensure that a 28 VDC ground power supply is properly connected and is not disturbed during the update.

- 1 Obtain the required GCU 476 Boot Block loader card (SD Card,G1000,GCU476 BB v3.01 GPN 010-00533-02) from Garmin or download it from the Garmin Dealer's Only Section of their website and make a card.
- 2 Insert the boot block loader card into the top slot of the PFD.
- 3 Apply system power and place both displays in Configuration Mode.
- 4 After the SYSTEM STATUS page appears on the PFD, use the small FMS knob to turn to the SYSTEM UPLOAD page.
- 5 Activate the cursor and select GCU476 BB in the AIRFRAME field. Press the ENT key. The cursor will drop down to the FILE field.
- 6 Rotate the small inner FMS knob and select GCU Boot Block 3.01. Press the ENT key.
- 7 Verify that the SOFTWARE box is checked (see screen shot). Press the LOAD softkey. The GCU boot block will begin loading. Do not remove power while the update is in process.



- 8 The upload is completed when the message “Upload Complete, NO UPLOAD IN PROCESS” is displayed on the PFD. Press the ENT key to confirm software upload completion.
- 9 Power down the system. Remove the GCU Boot Block loader card.
- 10 Load the GCU configuration.

7.13 Optional Systems

This section describes the steps that must be completed in order to configure the G1000 for optional systems. Only those systems that are installed must be configured.

ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen. This procedure is only required if the ChartView option is purchased by the customer.

NOTE

If the configuration for an optional system is inadvertently loaded for a system that is NOT installed, the LRUs listed in the optional file must have their configuration file reloaded from the BASE or Full Configuration file. Following this, the configuration for the optional systems must be repeated.

7.13.1 Activation Procedure for TAWS, ChartView, SAR and SVT

The Unlock card can only enable the feature on one G1000 system (one aircraft). The available unlock cards are –

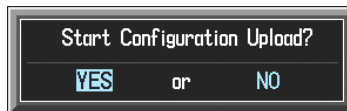
- TAWS Unlock, P/N 010-00330-51
- SAR Unlock, P/N 010-00330-52
- ChartView Unlock, P/N 010-00330-53 (Piston Aircraft Only)
- ChartView Unlock, P/N 010-00330-50 (Turboprop Aircraft Only)
- SVT Unlock, P/N 010-00330-54 (Single PFD Aircraft Only)
- SVT Unlock, P/N 010-00330-55 (Dual PFD Aircraft Only)

7.13.2 Activation with GDU software version less than 7.00

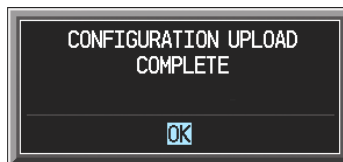
1. Insert the Unlock card in the upper slot of the PFD.
2. Apply system power and place both displays in Configuration Mode.
3. After the SYSTEM STATUS page appears on the PFD, use the small FMS knob to turn to the CONFIGURATION UPLOAD page.



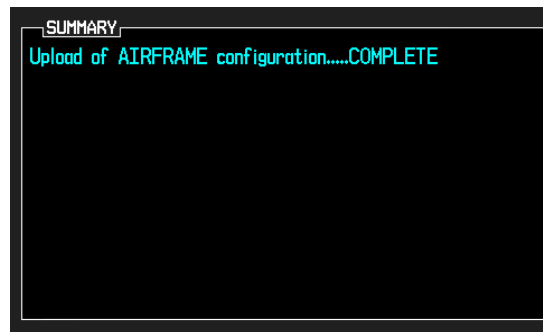
4. Activate the cursor and use the small FMS knob to highlight 'Enable <feature>' in the FILE field.
5. Press the ENT key to select the Enable option. Once the option is selected the configuration files in the SECTION field will be displayed.
6. Press the LOAD ALL softkey.
7. Select YES and press ENT to acknowledge the following prompt:



8. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:



9. View the SUMMARY field and ensure that the item is 'COMPLETE':



10. De-activate the cursor.
11. Power down the system and remove the Unlock card from the PFD.

7.13.3 Activation for GDU Software Versions 7.00 and Higher

1. Insert the Unlock card in the upper slot of the PFD.
2. Apply system power and place both displays in Configuration Mode.
3. After the SYSTEM STATUS page appears on the PFD, use the small FMS knob to turn to the SYSTEM UPLOAD page.
4. Activate the cursor. Use the small FMS knob to select CONFIGURATION FILES in the AIRFRAME field and press the ENT key.
5. Highlight the FILE field. Use the small FMS knob to select the 'Enable <feature>' option and press the ENT key. Once the option is selected, the configuration files in the PRODUCT field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
6. Press the LOAD softkey.
7. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
8. View the SUMMARY field and ensure that the item is 'COMPLETE'.
9. De-activate the cursor.
10. Power down the system and remove the Unlock card from the PFD.

7.13.4 Optional Equipment Configuration

The following configuration options are available for some G1000 equipped aircraft:

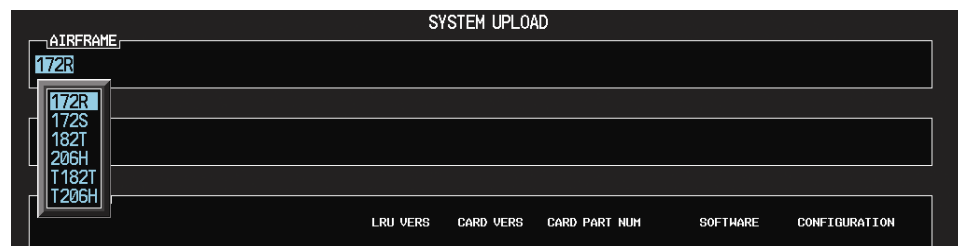
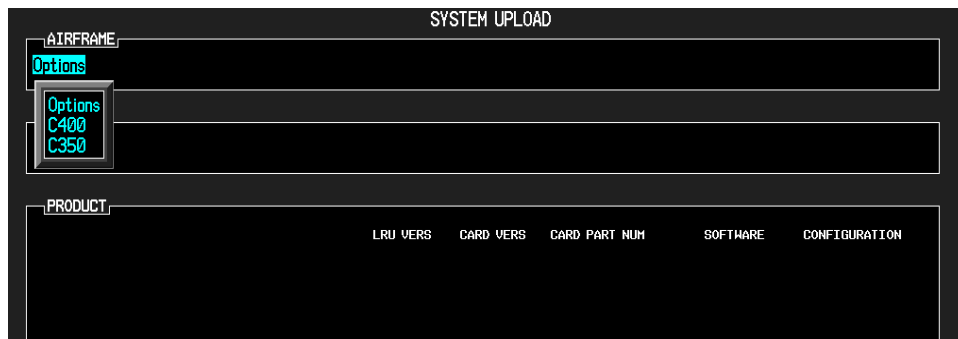
- KN63 DME
- KR87 ADF
- Becker 3502 ADF
- Artex C406-N ELT
- KTA870 TAS
- CO Guardian
- GDL 90
- KAP 140
- GFC 700
- Oxygen
- WX500 StormScope
- Ryan TAS 9900BX

If these optional systems are installed in the aircraft, follow the procedure below to configure the G1000.

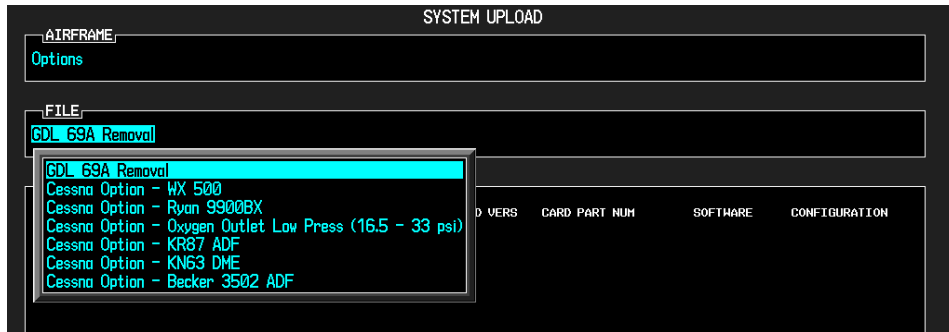
NOTE

Ensure that the base airframe configuration option is selected and loaded first after a software upload, LRU replacement, or optional system installation. The optional system configuration file will be overwritten by the base airframe configuration file if the optional system configuration file is loaded first.

1. Remove the Supplemental Database cards from the bottom slots of each display. Note which card was removed from the MFD so it may be identified later for reinsertion in the MFD when software and configuration loading is complete. It contains a FliteChart or ChartView database which is only used by the MFD.
2. Insert the correct airframe software loader card into the top slot of the PFD.
3. Apply system power and place both displays in Configuration Mode.
4. On the PFD, press the NO softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
5. After the SYSTEM STATUS page appears on the PFD, use the small FMS knob to turn to the SYSTEM UPLOAD page.
6. Activate the cursor and turn the small FMS knob to highlight the appropriate airframe or Options file.



7. Press the ENT key.
8. Turn the small FMS knob and highlight the appropriate installation option in the FILE field.



9. Press the ENT key to select the file.
10. Press the LOAD softkey.
11. When the upload is complete, press the ENT key to confirm.



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SECTION 8

RETURN TO SERVICE TESTING

The return to service testing checks various secondary communications paths to ensure that the paths are functioning correctly. Verify the LRU software part number and version against those listed on the required equipment list after reinstalling any LRU.

1. Start the system in configuration mode. The System Status Page displays a list of LRUs in the LRU window (Figure 8-1).
2. Activate the cursor and highlight the LRU window.
3. Use the FMS knob to scroll through the list in the window and select the displayed LRUs.
4. The software part number and version is displayed in the DATA window. Compare this to the software configuration shown in the Required Equipment List. It is important that the software versions be checked and validated according to the listed versions in the Required Equipment List. Software configuration is a critical part of the G1000 operation and must be verified before returning an aircraft to service.

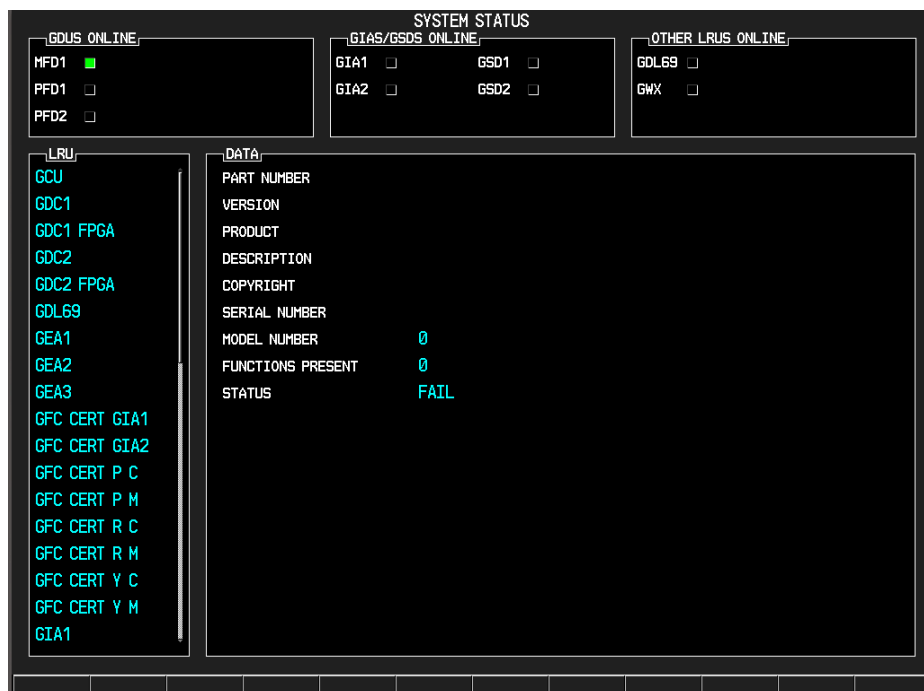


Figure 8-1. System Status Page (Configuration Mode)

8.1 GPS FAILURE TEST

Step	Desired Result
<p>Single GPS Failure Conditions:</p> <ol style="list-style-type: none"> 1. Place a metal shroud (sufficient enough to block a GPS signal) over the GPS antenna for GIA1 to prevent signal reception. Verify loss of signal on MFD AUX page. 2. Check for desired results. 3. Remove shroud from the GIA 1 GPS antenna. 4. Place a metal shroud (sufficient enough to block a GPS signal) over the GPS antenna for GIA2 to prevent signal reception. Verify loss of signal on MFD AUX page. 5. Check for desired results. 6. Remove shroud from the GIA 2 GPS antenna. 	<p>GPS Failure - For each of the specified GPS failure conditions, the following shall remain valid on the PFD throughout the procedure:</p> <ul style="list-style-type: none"> • Attitude and Heading from AHRS. • Airspeed, Altitude, Vertical Speed, and OAT from Air Data Computer. • GPS CDI remains valid on PFD.
<p>Dual GPS Failure Conditions:</p> <ol style="list-style-type: none"> 1. Cover both GPS antennas. Verify loss of signal on MFD AUX page. 2. Check for desired results. 3. Remove shrouds from GPS antennas. 4. Allow both receivers to re-acquire satellite signals before continuing. 	<p>Dual GPS Failure - For a dual GPS failure, the following shall occur:</p> <ul style="list-style-type: none"> • GPS CDI flags INTEG on PFD. • Attitude and Heading remain valid from AHRS. • Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.

8.2 GIA FAILURE TEST

Step	Desired Result
<p>Single GIA Failure Conditions:</p> <ol style="list-style-type: none"> 1. Remove power from GIA1. 2. Check for desired results. 3. Restore power to GIA1. Allow to re-acquire satellites. 4. Remove power from GIA2. 5. Check for desired results. 6. Restore power to GIA2. 	<ul style="list-style-type: none"> • GIA1 Failure - Transponder 1 may flag invalid in a dual transponder installation. Third-party LRUs connected to only GIA 1 may also show a failed condition. • GIA2 Power Failure - Transponder 2 may flag invalid in a dual transponder installation. Third-party LRUs connected to only GIA 2 may also show a failed condition.
<p>Dual GIA Failure Conditions:</p> <ol style="list-style-type: none"> 1. Remove power from both GIA units. 2. Check for desired results. 3. Restore power to both GIA units. 	<p>Dual GIA Failure – For a dual GIA failure, only the following shall occur:</p> <ul style="list-style-type: none"> • COM/NAV1 & COM/NAV 2 fields flag invalid. • GPS CDI flags INTEG on PFD. • NAV1 and 2 CDI loses deviation bar. • XPDR field flags invalid on PFD. • Engine Instrument field flags invalid on MFD. • All AHRS & ADC fields valid.

8.3 GDU FAILURE TEST

Step	Desired Result
<p>MFD Display Failure Conditions:</p> <ol style="list-style-type: none"> 1. Remove power from MFD. 2. Check for desired results. 3. Restore power to MFD. 	<ul style="list-style-type: none"> • Transponder 2 may flag invalid in a dual transponder installation. Third-party LRUs connected to only GIA 2 may also show a failed condition.
<p>PFD Display Failure Conditions:</p> <ol style="list-style-type: none"> 1. Remove power from PFD. 2. Check for desired results. 3. Restore power to PFD. 	<ul style="list-style-type: none"> • Transponder 1 may flag invalid in a dual transponder installation. Third-party LRUs connected to only GIA 1 may also show a failed condition.

8.4 AHRS/AIR DATA BACKUP PATH TEST

Step	Desired Result
Secondary AHRS/ADC path check: 1. Remove power from PFD. 2. Remove power from GIA2. 3. Check for desired results. 4. Restore power to the PFD and GIA2.	The following shall occur on the MFD when power is removed from the PFD and GIA2: <ul style="list-style-type: none"> • MFD switches to reversion mode. • Attitude and Heading remain valid from AHRS. • Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer. • Engine Instrumentation flags invalid. • All COM & NAV fields flag invalid.

8.5 FLIGHT TEST

A flight test is recommended after the installation is complete to ensure satisfactory performance of G1000.

8.6 VHF COM TESTS

Verify the communications capability on both the high and low ends of the VHF COM spectrum. It may be required by the governing regulatory agency to verify operation of the COM transmitter and receiver at the extents of the ground facility's service volume (FAA AC 23-8A).

8.7 VOR/ILS TESTS

Select a VOR channel within a 40 nautical mile range. Listen to the VOR audio and verify that no electrical interference such as magneto noise is present. Check the tone identifier filter operation. Fly inbound or outbound on a selected VOR radial and check for proper LEFT/RIGHT, TO/FROM flag indications on the CDI. Check the VOR accuracy. It may be required by the governing regulatory agency to verify operation of the VOR receiver at the extents of a ground facility's service volume (FAA AC 23-8A).

8.8 MAINTENANCE RECORDS

After conducting the function check flight in accordance with the Airplane Maintenance Manual, the aircraft may be returned to service. Record the following information in appropriate aircraft maintenance logs:

- Part number of the loader card used to perform software loading or software updates.
- Any other applicable information related to the maintenance work performed on the aircraft.

SECTION 9

PERIODIC MAINTENANCE

This section contains periodic maintenance procedures. Removal and replacement of an LRU is on condition of failure. The procedures in this section do not pertain to any specific aircraft configuration. For actual aircraft maintenance requirements refer to the OEM aircraft maintenance documentation.

9.1 SERVICE TIMER

The G1000 stores an airframe time-in-service timer and displays this time on the MFD EIS window. To access the timer, press the ENGINE softkey, then press the SYSTEM softkey. Airframe total time in service is determined by on-ground and off-ground states within the G1000. When the aircraft is determined to be airborne, the timer starts.

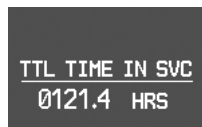


Figure 9-1. Total Time In Service

9.2 MAINTENANCE INTERVALS

Refer to the OEM maintenance documentation for maintenance tasks that are required to be performed at certain intervals.

9.3 RECOMMENDED TOOLS

The following tools are used to perform the various maintenance tasks described in this section:

- Voltmeter capable of measuring 0-32 Volts DC
- Phillips Screwdriver
- 3/32nd inch Hex Tool
- Digital Level with 0.25 degrees of accuracy capability
- VHF NAV/COM/ILS Ramp Tester
- Transponder Ramp Tester including Mode S capability for Mode S transponder equipped aircraft
- Air Data Test Set (ADTS) capable of simulating altitude up to the aircraft's service ceiling
- GPS Indoor Repeater (if outside GPS signals cannot be acquired)
- Headset/Microphone

9.4 GENERAL MAINTENANCE PROCEDURES

Pitot/Static Leak Test

Before starting the pitot static test, allow the GDC to operate at least 15 minutes according to Garmin Service Advisory 0608. Perform a pitot/static leak test as described in Title 14 CFR §§ 91.411 and Part 43 Appendix E.

Altimeter (GDC and PFD)

Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) Barometric Scale Error) are not applicable because the digital outputs of the GDC are not susceptible to these types of errors.

Airspeed Function Test (GDC and PFD)

Check for correct indication.

Vertical Speed Indicator (GDC and PFD)

Check for correct indication.

GTX Transponder

Test according to Title 14 CFR §§ 91.411 and 91.413 as well as Part 43 Appendix F.

GRS Earth Magnetic Field Updates

The GRS utilizes an earth magnetic field model, which is updated once every five years. The update is expected to be available from Garmin by July 1 of each of the following years: 2005, 2010, 2015, and every five years thereafter, as long as the GRS remains a Garmin-supported product. Otherwise maintenance of the GRS is on condition of failure only.

GSA Servos

Conduct a visual inspection every 1000 hours or every annual. Clean and apply grease to output gear every 1000 hours or 3 years.

GSM Servo Gearbox

Conduct a visual inspection and check Slip Clutches once every 12 months.

Automatic Slip Clutch Test Procedure

The Automated Slip Clutch Test Procedure is installation-specific. Refer to aircraft-specific PICP documentation as appropriate.

9.5 GFC 700 VISUAL INSPECTION PROCEDURE

1. Remove the access panels according to OEM maintenance documentation.
2. Inspect the servos, connectors, support structures, and control cables to ensure that no corrosion, chafing, cracks, or other defects exist.
3. Manually move the ailerons (for roll servo), elevators (for pitch servo), elevator trim wheel (for pitch trim servo), and rudder pedals (for yaw servo) from stop to stop and observe the servo, capstan, and control surface rigging. Ensure there is no binding in the control cabling, and that the capstan pulleys rotate freely.
4. Check the servo control cables to ensure no fraying, corrosion, or other damage exists. Replace the cable if the condition is questionable. Check the tension of each servo control cable. Refer to the OEM Maintenance documentation for cable tension specifications.
5. Inspect the GFC 700 system wiring to ensure no chafing, wear, or other damage exists.

9.6 GSA GREASING PROCEDURE

NOTE

Clean and apply grease Aeroshell 33MS (preferred), or Aeroshell 17 to output gear every 1000 hours or 3 years, whichever comes first.

NOTE

It is not necessary to remove all of the grease from the output gear, only the excess grease. Do not use solvents to clean the output gear.

1. Remove each servo.
2. Remove excess grease build-up from the single servo output gear using a lint-free cloth.
3. Apply a thin coat of grease to the servo output gear using a brush or other applicator (see note above).
4. Re-install the servos.
5. Rotate control surfaces through their range of motion to ensure freedom of movement.

9.7 GDC RVSM ALTITUDE INSPECTION

Operation with the GDC at RVSM altitudes requires an accuracy inspection every 12 months. Refer to the GDC Field Calibration Tool Instructions if recalibration is required. The table below provides the criteria and associated action for altitude inspection.

Table 9-1. GDC RVSM Altitude Inspection Criteria

Inspection Pressure-Altitude (ft)	Error, x (ft) at Inspection	Action for Associated Error
29,000	$x \cdot 40$	No Action
	$40 < x \cdot 120$	Use Field Calibration Tool
	$120 < x$	Replace Unit
35,000	$x \cdot 40$	No Action
	$40 < x \cdot 120$	Use Field Calibration Tool
	$120 < x$	Return Unit to Garmin
41,000	$x \cdot 40$	No Action
	$40 < x \cdot 120$	Use Field Calibration Tool
	$120 < x$	Return Unit to Garmin

9.8 CATEGORY B LONG TERM POWER INTERRUPT ANNUAL INSPECTION PROCEDURE

NOTE

Loading “GDU Backup Cap Test Software” (006-B0380-15) to the GDUs temporarily changes the GDU software version. It is required to return the system to the currently approved system software version and configuration following the Long Term Power Interrupt Test.

NOTE

For GDU software greater than 8.20 in certain aircraft, no backloading of the GDU software to check the backup caps is necessary. Instead, select the GDU test page in configuration mode and look for a green box for BKUP CAPS. If the indicator is red, replace the display.

1. Before beginning the Category B Long Term Power Interrupt Annual Inspection Procedure, the test software “GDU Backup Cap Test Software (006-B0380-15)” must be downloaded from the Garmin website:
2. Access the Dealer Resource portion of the Garmin website (www.garmin.com).
3. From the Technical Resource list, click on the “GDU Backup Cap Test Software (006-B0380-15)” link. Extract the files onto a blank SD card.
4. Remove the Supplemental Data Card from the lower slot of the GDU before loading any software. Supplemental Data Cards left inserted can become corrupt, making them unusable. Replacing corrupt cards is not covered under warranty
5. Insert the SD card containing the test software into the top slot of the MFD.
6. Power the MFD on in configuration mode by holding down the ENT key while applying power (release the ENT key when the words “INITIALIZING SYSTEM” appear on the display).
7. Press the ENT key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
8. Press the ENT key to confirm software update completion.
9. Remove the SD card from the MFD and insert into the top slot of the PFD (leave the MFD on in configuration mode).
10. Power the PFD on in configuration mode by holding down the ENT key while applying power (release the ENT key when the words “INITIALIZING SYSTEM” appear on the display).
11. Press the ENT key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
12. Press the ENT key to confirm software update completion.
13. Use the FMS knob to select the SYSTEM UPLOAD Page.
14. Select the configuration file “Backup Capacitor Test 50ms” from the SYSTEM UPLOAD Page.
15. Press the ENT key to confirm the configuration file selection.
16. Press the LOAD softkey to load the configuration file. Press the ENT key to confirm upload completion.
17. Remove the SD card from the PFD.
18. Remove power to all GDUs.
19. Power on the MFD and PFD in normal mode, and leave on for a minimum of eleven minutes.
20. Remove power from the MFD and PFD.
21. Turn on the MFD and PFD in configuration mode by holding down the ENT key while applying power (release the ENT key when the words “INITIALIZING SYSTEM” appear on the display).

22. Use the FMS knob to select the GDU TEST Page. Verify that the “BKUP CAPS” checkbox on the GDU TEST Page is green for each GDU. If the “BKUP CAPS” checkbox is red return the GDU to Garmin for repair.
23. Backload the MFD and PFD to currently approved system software version and reconfigure the system.

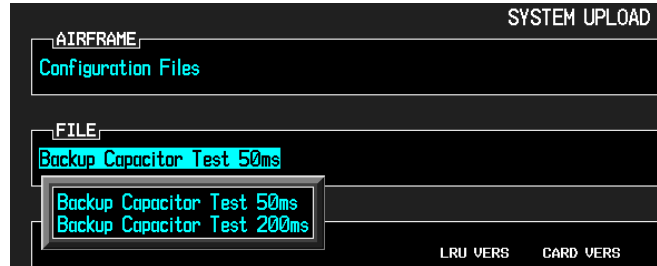


Figure 9-2. System Upload Page



Figure 9-3. Upload 'Complete' Window

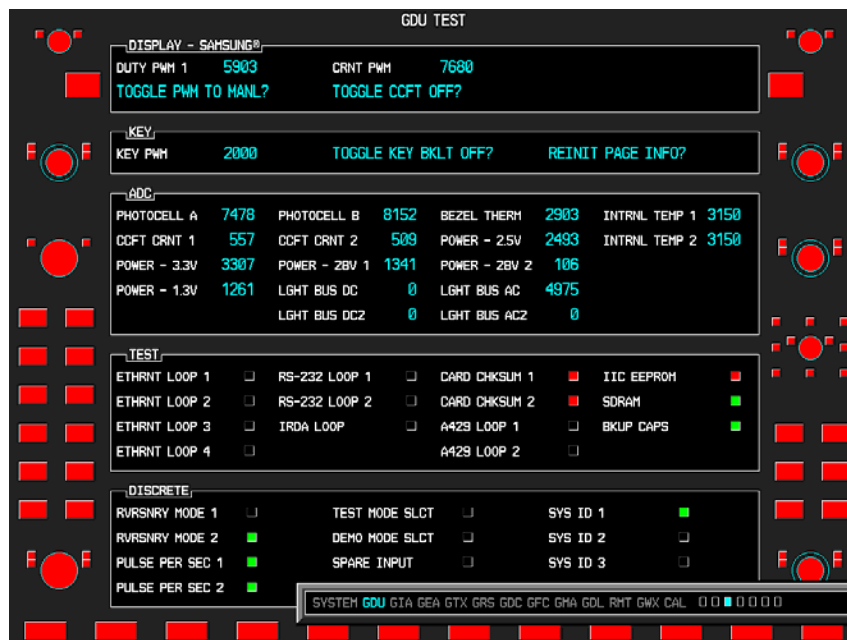


Figure 9-4 BKUP CAPS Checkbox on GDU TEST Page

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SECTION 10

SYSTEM RECONFIGURATION

NOTE

Garmin recommends only the use of SanDisk cards to load system software and configuration files. If software loading problems occur when using another brand of card, replace the card with a SanDisk card and try the upload procedure again.

The initial G1000 software upload and configuration took place at the time of installation as described in the installation manual. Section seven explained how to upload, configure, and test software for a replacement LRU. The information in this section is an example on how to completely reconfigure the G1000 when necessary. Software part numbers and software versions are not listed in this section. For actual software versions and part numbers refer to OEM maintenance documentation. The screen shots in the remaining sections serve only as examples. They will vary depending on the specific configuration involved.

10.1 HARDWARE AND SOFTWARE COMPATIBILITY CHECK

Before installing hardware, the technician must first ensure that hardware part numbers are compatible with the loader card that is to be used. The part number of this card is directly associated with the combination of software file part numbers and version levels that are defined on the card. Should software part numbers or versions change, a new loader card part number is issued.

NOTE

After verifying hardware/loader card compatibility, record the loader card part number and all LRU hardware part and serial numbers in the appropriate aircraft records before proceeding.

10.2 CONFIGURATION FILE OVERVIEW

NOTE

The GRS and GMU Magnetometer LRUs do not use configuration files. However, these LRUs do require several calibrations during installation and/or maintenance.

The G1000 loader card contains the configuration files listed below (this list is an example, it can differ depending on the requirements of a specific installation):

- **AIRFRAME:** This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that configure a PFD or MFD to a specific airframe.
- **SYSTEM:** This file configures the G1000 Ethernet to communicate with a PFD, MFD, and GIAs.
- **MANIFEST:** This file loads a manifest of all software part numbers and versions associated with an approved system configuration.
- **MFD1:** This file configures the MFD serial/discrete communications and alerting system settings.
- **PFD1:** This file configures the PFD serial/discrete communications and alerting system settings.

- GIA1/GIA2: These files configure GIA1 and GIA 2 serial/discrete communications settings.
- GMA1: This file configures the GMA audio and serial communications settings.
- GTX1: This file configures the GTX transponder and serial communications settings.
- GEA1: This file configures GEA engine/airframe parameters.
- GDC1: This file configures the GDC air data values.
- GDL69: This file configures the GDL serial communications settings
- CALIBRATION: This file configures calibration values for various analog sensors connected to the GEA (fuel quantity, fuel flow, etc.)
- AUDIO: This file configures all of the audio messages for the G1000 system. This includes both tones and voice messages that are utilized for alerts, cautions, and warnings.

The configuration files are loaded during the configuration process. Each file is sent directly to the applicable LRU. The same file is also stored into PFD internal configuration memory and the configuration module. If the PFD is replaced, the configuration module retains all configuration files in the aircraft. The G1000 stores all configuration settings in various places so that the configuration of the system is retained in the aircraft during maintenance.

The GRS and GDC configuration modules function differently than the rest of the system. The GDC configuration file is loaded directly to GDC internal memory. A copy of the file is stored in the GDC configuration module. The GRS configuration module does not store any configuration settings. It stores calibration data recorded during installation calibration procedures.

Optional Configuration Groups

The optional configuration groups listed below are typically available; always check the latest system software for currency. Each option group contains one or more of the above configuration files. These files are loaded after the factory baseline configuration is established. They contain customized settings that enable listed options for the G1000. Any required supporting hardware for the option must be installed before the option can function.

Possible Options:

- Option – ADF
- Option – DME
- Option – Extended Range Tanks
- Option – GDL 69A (Data Link)
- Option – GFC 700 (AFCS)
- Option – SKY 497 (Traffic)
- Option – WX 500 Stormscope
- Option – TAWS (Requires a separate TAWS enable SD card)

Certain software and configuration files are required to be loaded again during maintenance that involves the removal and replacement of any LRU. Refer to Section 7 for reconfiguration requirements for an LRU. To enable TAWS, a separate 'TAWS ENABLE' SD card is used. Refer to the OEM general arrangement drawing for part number information.

10.3 INITIAL SOFTWARE AND CONFIGURATION OVERVIEW

The steps listed below describe the software and configuration upload that took place at the time of the initial installation as explained in the G1000 installation manual.

1. Software is first loaded to the MFD and then the PFD. G1000 systems do not contain any usable software or configuration files from the factory.
2. After software is loaded to the MFD and PFD, the following configuration files can be loaded:
 - AIRFRAME
 - MANIFEST
 - SYSTEM
 - MFD
 - PFD
3. The PFD and MFD can now communicate with GIA1 and GIA2. This allows the GIA software to be loaded.
4. After loading the GIA software, GIA configuration settings are loaded. Configuration enables the GIAs to communicate with the other LRUs in order to be able to load LRU software and configuration settings.
5. The GIAs can now communicate to the individual LRUs. The following software can be loaded:
 - GMA
 - GDC
 - GRS
 - GMU
 - GTX
 - GEA
 - GFC
6. After all of the software is loaded, the final LRU configuration settings can be loaded. These include:
 - GMA
 - GTX
 - GEA
 - GDC
 - GDL
 - GWX

10.4 G1000 SOFTWARE AND CONFIGURATION UPLOAD

NOTES

Do not remove power from the G1000 during software loading. Do not rely solely on the aircraft batteries to prevent loss of power during the software loading process, connect a ground power unit to the aircraft. All GDUs should be in the same mode (configuration or normal), unless instructed differently by the procedure. Remove power only when instructed by the procedure.

Perform these preliminary steps before uploading software:

- Remove supplemental data cards from the lower slot of the GDUs before loading any software. Supplemental data cards left inserted can become corrupt making them unusable. Replacing corrupt cards is not covered under warranty.
- Refer to the appropriate OEM maintenance documentation for approved software versions and part numbers.

NOTE

Loading the wrong software into GIA units may cause an inoperable condition that is not covered by warranty. Identify which type of GIA (WAAS or non-WAAS) LRU is installed in the aircraft, and then choose the correct WAAS or non-WAAS software file before loading GIA software. Loading the incorrect software may necessitate returning the unit to Garmin for a non-warranty repair. No warning appears if the incorrect software is selected.

1. Select the System Upload Page on the PFD.
2. Highlight the appropriate airframe in the AIRFRAME field.
3. Press the ENT key.
4. Highlight the appropriate full configuration in the FILE field.
5. Press the ENT key.
6. Press the CHK ALL softkey to select all loadable software and configuration files.
7. Press the LOAD softkey.
8. Repeat steps 4 through 7 to load any optional items.
9. When the upload is complete, press the ENT key to confirm.



NOTE

Ensure that the base airframe configuration option is selected and loaded first after a software upload, LRU replacement, or optional system installation. The optional system configuration (detailed below) will be overwritten by the base airframe configuration if the optional system configuration is completed first.

1. Insert the proper G1000 loader card into the top card slot of the PFD.
2. Press and hold the ENT key on PFD while applying power.
3. When the words 'INITIALIZING SYSTEM' appear in the upper left corner of the PFD, release the ENT key.
4. Turn the MFD on in the same manner.
5. Select the SYSTEM UPLOAD page on the PFD.
6. Highlight the appropriate air frame.
7. Press the ENT key.
8. Highlight the appropriate installation option in the FILE field.
9. Press the ENT key.
10. Press the LOAD softkey.
11. When the upload is complete, press the ENT key to confirm.

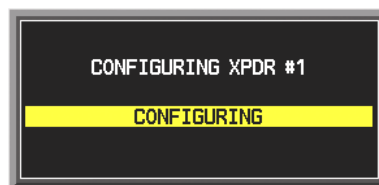


10.5 FINAL CONFIGURATION ITEMS

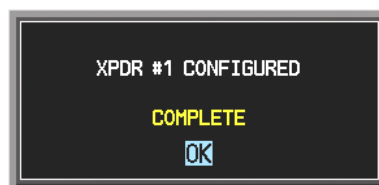
10.5.1 Aircraft Registration Number Entry



1. Select the GTX page group, then select the TRANSPONDER CONFIGURATION page using the small FMS knob on the PFD.
2. Ensure that the 'ADDRESS TYPE' is 'US TAIL' under the 'SET' and 'ACTIVE' columns.
3. Activate the cursor and highlight the 'ADDRESS' field. Use the small/large FMS knobs to enter the aircraft registration number.
4. Once the correct registration number is entered, press the ENT key. The transponder is configured:



5. The transponder then alerts the technician of complete configuration:


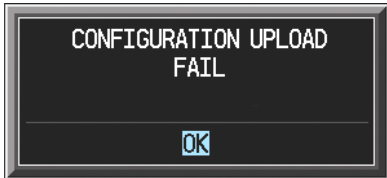



6. Press the ENT key on the PFD and deactivate the cursor.

NOTE

To enter a non-US Mode-S registration number set the 'ADDRESS TYPE' to 'HEX ID' and enter the Mode-S registration number in the 'ADDRESS' field. Ensure the 'FLIGHT ID TYPE' is set to 'CONFIG ENTRY' or 'PFD ENTRY'. The CONFIG ENTRY allows the Aircraft Registration/ID number to be entered once and stored in memory by entering the Registration/ID number in the 'FLIGHT ID' field. PFD ENTRY allows the pilot to enter the Registration/ID number from the PFD, via the 'TMR/REF' softkey.

10.6 SOFTWARE CONFIGURATION TROUBLESHOOTING

Problem	Solutions
<p>The MFD or PFD does not power up.</p>	<ul style="list-style-type: none"> • Ensure power is present at display backshell connector. • Replace the MFD or PFD.
<p>Software file load fails:</p> 	<ul style="list-style-type: none"> • Ensure that LRU is reporting data on the System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Restart MFD & PFD in configuration mode and retry software file load or try using a different card. • Ensure that the MFD is not touched during the loading process, unless explicitly instructed to do so. • Ensure that LRU part number is compatible with software version and loader card. Refer to approved post-installation and/or maintenance data. • Replace LRU.
<p>Configuration file load fails:</p> 	<ul style="list-style-type: none"> • Ensure that LRU is reporting data on the System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Restart MFD & PFD in Configuration Mode and retry configuration file load or try using a different card. • Ensure that the MFD is not touched during the loading process, unless explicitly instructed to do so. • Ensure that LRU part number is compatible with software version and loader card. Refer to approved post-installation and/or maintenance data. • Replace LRU.

<p>GIA1 to 'LRU' serial data path not working</p>	<ul style="list-style-type: none"> • Ensure GIA1 and GIA2 are configured correctly. Check wiring, connectors & pins as needed.
<p>Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode:</p> 	<ul style="list-style-type: none"> • Ensure that proper software file part number and version were loaded to LRU. • Ensure that LRU part number is compatible with software version and Loader Card. Refer to approved post-installation and/or maintenance data. • Reload 'MANIFEST' configuration file to the PFD.

10.7 SYSTEM COMMUNICATION HIERARCHY

The following criteria must be satisfied to be able to perform these desired options:

Desired Operation	Criteria for Success
<p>Load software to MFD or PFD.</p>	<ul style="list-style-type: none"> • G1000 SW Loader Card must be inserted in top slot for each display to be loaded. • Power only one display on at a time during software loading.
<p>Load AIRFRAME, SYSTEM, MFD1, PFD1, and MANIFEST configuration files to the MFD and PFD.</p>	<ul style="list-style-type: none"> • G1000 SW Loader Card must be inserted in top slot of the PFD. • PFD and MFD must be powered on. • PFD and MFD must have correct software.
<p>Load Software/Configuration files to GIAs.</p>	<ul style="list-style-type: none"> • G1000 SW Loader Card must be inserted in top slot of the PFD. • G1000 system must be powered on. • PFD and MFD must have correct software. • PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MFD1, and PFD1 configuration files.
<p>Load Software/Configuration files to:</p> <ul style="list-style-type: none"> GMA GDC GEA GRS (software only) GMU (software only) GTX GDL GWX 	<ul style="list-style-type: none"> • G1000 must be powered on. • Airframe specific card loader must be inserted into PFD top slot. • PFD and MFD must have correct software and configuration settings. • GIA must have correct software. • GIA must be successfully configured with GIA1 and GIA2 configuration files. • Data path from GIA1 to each LRU must be operational.

10.8 AVIATION DATABASES

Jeppesen aviation databases are released every 28 days, and are provided directly to the pilot by Jeppesen. Updates must be loaded to both the MFD and PFD using an aviation database update SD Card, provided by Jeppesen. The card reader downloads the aviation database files and stores them in PFD and MFD internal memory.

NOTE

The display downloads the aviation database and stores it internally. The aviation database SD Card is not required to remain in the display after the update.

To Update the Jeppesen Aviation Database:

1. With the G1000 system off, insert the aviation database update SD Card into the top card slot of the PFD.
2. Turn the G1000 system on. The following prompt is displayed in the upper left corner of the PFD:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
```

3. Press the ENT key to confirm the database update. The following prompt is displayed:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
UPDATING AVIATION DATABASE
.
UPDATED 1 FILES SUCCESSFULLY!
```

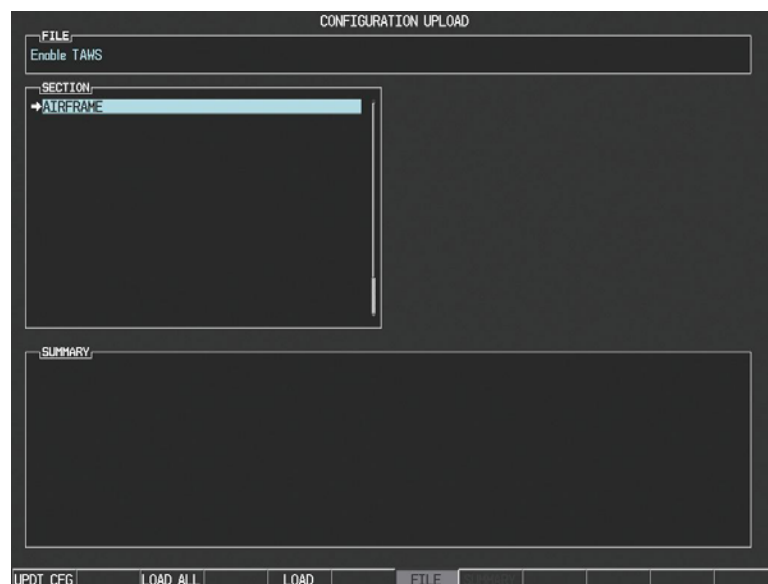
4. After the update completes, the PFD starts in normal mode. Remove the aviation database update SD Card from the PFD.
5. Power the G1000 system down.
6. Repeat steps 1 through 4 for the MFD. The MFD and PFD aviation databases are now updated.
7. Confirm that the correct update cycle and version is loaded during startup of the MFD.

10.9 INSTALLATION OF OEM SPECIFIC SPLASH SCREENS

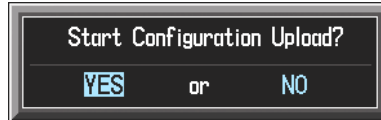
1. Turn off the system.
2. Hold the ENT key on the replaced display and restore power by closing the applicable circuit breaker (power only the replaced unit).
3. When the words INITIALIZING SYSTEM appear in the upper left corner of the display, release the ENT key.
4. When the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt appears, press the NO softkey.
5. When the “DO YOU WANT TO UPDATE SPLASHSCREEN” prompt appears, press the YES softkey (This is optional and may not be displayed).
6. Press any key to confirm update completion after the splashscreen has finished loading.

10.10 TAWS CONFIGURATION

1. Insert the TAWS Enable card into the top card slot of the PFD.
2. While holding the ENT key on PFD, apply power by closing the PFD circuit breaker.
3. When the words 'INITIALIZING SYSTEM' appear in the upper left corner of the PFD, release the ENT key.
4. Turn the MFD on in the same manner.



5. On the PFD go to the CONFIGURATION UPLOAD page using the FMS knob.
6. Activate the cursor and highlight the Enable TAWS file in the FILE field.
7. Press the ENT key.
8. Highlight AIRFRAME in the SECTION field.
9. Press the LOAD softkey.
10. Select YES and press the ENT key to acknowledge the following prompt:



11. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:



12. View the SUMMARY field and ensure that all items are 'complete'.



13. De-activate the cursor.
14. Cycle power to the PFD and MFD to reboot the system.
15. Verify that the MAP – TERRAIN PROXIMITY page on the MFD has been renamed as the MAP – TAWS page.

NOTE

Due to time required for the GIA to exit configuration mode, power must be cycled to the PFD and MFD following the first bootup in normal mode (after exiting configuration mode). Failure to do so may result in an erroneous 'TAWS FAIL' message.

16. Cycle power again to the PFD and MFD to reboot the system.
17. Verify the unit successfully passes TAWS self test.

10.11 TERRAIN-SYNTHETIC VISION (SVS) CONFIGURATION

NOTE

Once an unlock SD card is utilized for a particular installation the card becomes locked the system ID for that aircraft. The unlock cards must be retained for that aircraft should there be a need to unlock the feature again in the field.

Perform this procedure only if the aircraft is to be equipped with the Garmin Terrain-SVS option.

1. Remove power from the PFD and MFD by opening the PFD and MFD circuit breakers.
2. A special Synthetic Vision unlock card is required to enable SVS. Refer to the appropriate OEM drawing for the correct part number. Insert this card in the upper slot of the PFD.
3. While holding the ENT key on the PFD and MFD, restore power to the displays.
4. When the words 'INITIALIZING SYSTEM' appear in the upper left corner of both displays, release the ENT keys.
5. On the PFD, go to the System Upload page using the FMS knob.
6. Activate the cursor. Use the small FMS knob to select CONFIGURATION FILES in the AIRFRAME field and press the ENT key.
7. Highlight the FILE field. Use the small FMS knob to select the 'Enable Synthetic Vision' option and press the ENT key. Once the option is selected, the configuration files in the PRODUCT field will be displayed. All files should be checked. If not, press the CHK ALL softkey.
8. Press the LOAD softkey.
9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
10. View the SUMMARY field and ensure that the item is 'COMPLETE'.
11. De-activate the cursor.
12. Power down the system and remove the Synthetic Vision Enable card from the PFD.

10.12 JEPPESEN DATABASES

NOTE

Use only blank SD cards to load Jeppesen Aviation Database into the GDUs. Do not copy the Jeppesen Aviation database (not including ChartView) onto supplemental data cards to load into the GDUs. Doing so may corrupt the supplemental database cards making them unusable. Replacing corrupt cards is not covered under warranty.

Aviation

The Jeppesen aviation database is updated on a 28-day cycle and is provided directly from Jeppesen. The Jeppesen aviation database may be installed from the Jeppesen supplied SD data card. After the Jeppesen aviation database is installed, the card may be removed after loading the update to each GDU.

Updating the Jeppesen aviation database:

1. With the G1000 System OFF, insert the SD card containing the aviation database update into the top card slot of the PFD to be updated (label of SD card facing left).
2. Turn the G1000 System ON. A prompt is displayed in the upper left corner.
3. Press the ENT key to start the database update.
4. After the update completes, the PFD starts in normal mode.
5. Turn the G1000 System OFF and remove the SD card.
6. Repeat steps 1 through 4 for the MFD. The MFD and PFD databases are now updated. Remove the SD card when finished.
7. Verify that the correct update cycle is loaded during startup of the MFD.

ChartView

The ChartView database is updated on a 14-day cycle and is provided directly from Jeppesen. If the ChartView database is not updated within 70 days of the expiration date, ChartView will no longer function. The ChartView database should be copied to the Garmin supplied Supplemental Data Card which will reside in the bottom card slot of the MFD.

10.13 MISCELLANEOUS G1000 DATABASES

The following G1000 databases are stored on supplemental data cards provided by Garmin.

Terrain, Airport Terrain, and Obstacle

G1000 topography, terrain, airport terrain, and obstacle data is stored on a supplemental data card provided by Garmin. The obstacle database update cycle is every 56 days. The terrain and airport terrain database is updated less often, and on an irregular basis. Since these databases are not stored internally in the MFD or PFD, supplemental data cards containing identical database versions must be kept in both displays to retain terrain and obstacle data. A supplemental data card should be inserted into the bottom card slot of the PFD and MFD.

Expanded Basemap

The expanded basemap database contains data for the topography and land features, such as rivers, lakes, and towns. It is updated only periodically, with no set schedule. There is no expiration date. This database is not stored internally in the MFD or PFD. Supplemental data cards containing identical database versions must be kept in both displays. A supplemental data card should be inserted into the bottom card slot of the PFD and MFD.

Obstacle

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. Obstacles 200 feet and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. This database is updated on a 56-day cycle. This database is not stored internally in the MFD or PFD. Supplemental data cards containing identical database versions must be kept in both displays. A supplemental data card should be inserted into the bottom card slot of the PFD and MFD.

SafeTaxi®

The SafeTaxi® database contains detailed airport diagrams for selected airports. These diagrams aid in following ground control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle. The SafeTaxi® database should be copied to the Garmin supplied supplemental data card which will reside in the bottom card slot of the MFD.

FliteCharts®

The FliteCharts® database contains terminal procedure charts for the United States only. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts® will no longer be active. The FliteCharts® database should be copied to the Garmin supplied supplemental data card which will reside in the bottom card slot of the MFD.

10.14 UPDATING GARMIN DATABASES

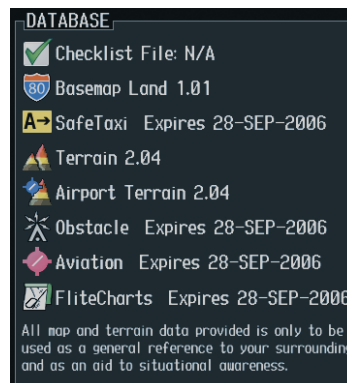
The Garmin database updates can be obtained by following the instructions detailed in the ‘Aviation Databases’ section of the Garmin website (www.garmin.com). Once the updated files have been downloaded from the website, a PC equipped with an appropriate SD card reader is used to unpack and program the new databases onto the existing supplemental data cards. The following equipment is required to perform the update:

- Windows-compatible PC computer (Windows 2000 or XP recommended)
- SanDisk SD Card Reader (P/Ns SDDR-93 or SDDR-99) or equivalent
- Updated database obtained from the Garmin website
- Existing supplemental data cards from both PFD and MFD

In some cases it may be necessary to obtain an unlock code from Garmin in order to make the database product functional. It may also be necessary to have the system configured by a Garmin authorized service facility in order to use some database features.

After the data has been copied to the appropriate data cards, perform the following steps:

1. Insert one SD card in the bottom card slot of the MFD and one in the bottom card of the PFD. The SD card containing the ChartView or FliteCharts® database must be inserted into the bottom slot on the MFD.
2. Apply power to the G1000 System. View the MFD power-up splash screen. Check that the databases are initialized and displayed on the splash screen. When updating the terrain and FliteCharts® databases, an ‘in progress’ message may be seen. If this message is present, wait for the system to finish loading before verifying the correct databases are initialized, then proceed to step 3.



3. Acknowledge the power-up page agreement by pressing the ENT Key or the right most softkey.
4. Select the AUX Page group on the MFD.
5. Select the System Status Page.
6. Press the DBASE Softkey to place the cursor in the ‘Database’ box.
7. Turn either FMS Knob to scroll through the database list and check that all databases are current and there are no errors.
8. Power down the G1000.

Blank Page

APPENDIX A

CONNECTOR PIN ASSIGNMENTS

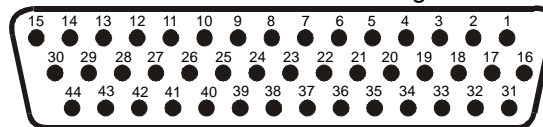
The tables in this section provide LRU pin lists for the G1000.

NOTE

In this section, an asterisk (*) notation is used for signals that are active low (ground to activate). On installation wiring diagrams, the more traditional overline symbology is used. For example, the discrete input shown as “TRANSMIT INTERLOCK*” in this document is shown as “TRANSMIT INTERLOCK” on installation wiring diagrams.

A.1 GIA 63(x) (P601;COM)

View of J601 connector looking at unit

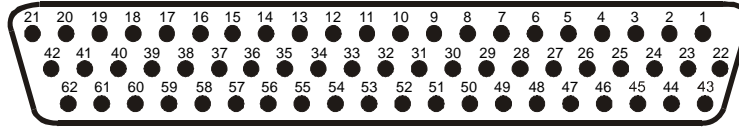


Pin	Pin Name	I/O
1	RESERVED (UNSQLACHED AUDIO TEST)	--
2	RESERVED	--
3	RESERVED	--
4	COM MIC KEY*	In
5	INTERCOM MIC IN HI	In
6	INTERCOM MIC IN LO (GROUND)	--
7	COM MIC AUDIO IN HI	In
8	COM MIC AUDIO IN LO (GROUND)	--
9	COM 500Ω AUDIO OUT HI	Out
10	COM 500Ω AUDIO OUT LO (GROUND)	--
11	TRANSMIT INTERLOCK*	In
12	COM REMOTE TRANSFER*	In
13	COM DIGITAL AUDIO OUT	Out
14	COM MIC DIGITAL AUDIO IN	In
15	SIGNAL GROUND	--
16	COM REMOTE POWER OFF	In
17	AIRCRAFT POWER 1	In
18	SPARE	--
19	AIRCRAFT POWER 1	In
20	SPARE	--
21	AIRCRAFT POWER 1	In
22	SPARE	--
23	AIRCRAFT POWER 2	In
24	SPARE	--
25	AIRCRAFT POWER 2	In
26	SPARE	--
27	AIRCRAFT POWER 2	In
28	RESERVED	--
29	RESERVED	--

30	POWER GROUND	--
31	POWER GROUND	--
32	RESERVED	--
33	RESERVED	--
34	RESERVED	--
35	RESERVED	--
36	RESERVED	--
37	RESERVED	--
38	RESERVED	--
39	RESERVED	--
40	RESERVED	--
41	RESERVED	--
42	RESERVED	--
43	POWER GROUND	--
44	POWER GROUND	--

P602 (VOR/ILS)

View of J602 connector looking at unit

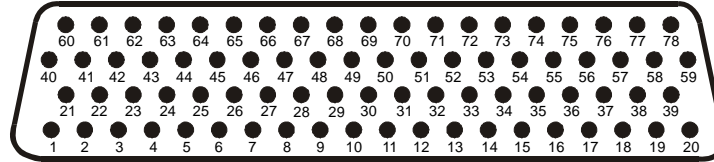


Pin	Pin Name	I/O
1	VOR/LOC +TO	Out
2	VOR/LOC +FROM (VOR/LOC COMMON)	--
3	VOR/LOC +FLAG	Out
4	VOR/LOC -FLAG (VOR/LOC COMMON)	--
5	VOR/LOC +LEFT	Out
6	VOR/LOC +RIGHT (VOR/LOC COMMON)	--
7	RESERVED	--
8	VOR/LOC COMPOSITE OUT	Out
9	VOR OBS ROTOR C	Out
10	VOR OBS ROTOR H (GROUND)	--
11	VOR OBS STATOR E (VOR/LOC COMMON)	--
12	VOR OBS STATOR F	In
13	VOR OBS STATOR D	In
14	VOR OBS STATOR G (VOR/LOC COMMON)	--
15	VOR/LOC SUPERFLAG	Out
16	VOR/LOC 500Ω AUDIO OUT HI	Out
17	VOR/LOC 500Ω AUDIO OUT LO	--
18	KING SERIAL DME CLOCK	Out
19	KING SERIAL DME DATA	Out
20	KING SERIAL RNAV REQUEST	In
21	KING SERIAL RNAV* MODE	In
22	SIGNAL GROUND	--
23	VOR/ILS ARINC 429 OUT B	Out
24	VOR/ILS ARINC 429 OUT A	Out
25	VOR OBI CLOCK	Out
26	VOR OBI SYNC	Out
27	VOR OBI DATA	Out
28	VOR/ILS REMOTE TRANSFER*	In
29	ILS ENERGIZE*	Out
30	RESERVED	--
31	RESERVED	--
32	GLIDESLOPE +FLAG	Out
33	PARALLEL DME 1 MHZ-D	Out
34	GLIDESLOPE +UP	Out
35	VOR/ILS ARINC 429 IN B	In
36	VOR/ILS ARINC 429 IN A	In
37	PARALLEL DME 100 KHZ-A	Out
38	GLIDESLOPE SUPERFLAG	Out
39	PARALLEL DME 100 KHZ-B	Out
40	PARALLEL DME 100 KHZ-C	Out
41	DME COMMON	In
42	PARALLEL DME 100 KHZ-D	Out
43	PARALLEL DME 50 KHZ	Out
44	SPARE	--

Connector P602, continued		
Pin	Pin Name	I/O
45	PARALLEL DME 1 MHZ-A	Out
46	PARALLEL DME 1 MHZ-B	Out
47	PARALLEL DME 1 MHZ-C	Out
48	RESERVED	--
49	SIGNAL GROUND	--
50	RESERVED	--
51	SPARE	--
52	SPARE	--
53	GLIDESLOPE -FLAG (GLIDESLOPE COMMON)	--
54	PARALLEL DME 100 KHZ-E	Out
55	GLIDESLOPE +DOWN (GLIDESLOPE COMMON)	--
56	PARALLEL DME 1 MHZ-E	Out
57	RESERVED	--
58	SPARE	--
59	VOR/LOC DIGITAL AUDIO OUT	Out
60	SIGNAL GROUND	--
61	POWER GROUND	--
62	POWER GROUND	--

P603 (Main Serial)

View of J603 connector looking at unit

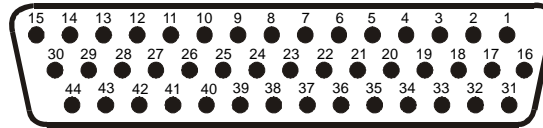


Pin	Pin Name	I/O
1	RESERVED	--
2	ETHERNET OUT A	Out
3	ETHERNET OUT B	Out
4	RS-485 4 A	I/O
5	RS-485 4 A	I/O
6	RS-485 4 B	I/O
7	RS-485 4 B	I/O
8	MAIN ARINC 429 IN 3 A	In
9	MAIN ARINC 429 IN 3 B	In
10	MAIN ARINC 429 IN 4 A	In
11	MAIN ARINC 429 IN 4 B	In
12	MAIN ARINC 429 IN 5 A	In
13	MAIN ARINC 429 IN 5 B	In
14	MAIN ARINC 429 IN 6 A	In
15	MAIN ARINC 429 IN 6 B	In
16	MAIN ARINC 429 IN 7 A	In
17	MAIN ARINC 429 IN 7 B	In
18	MAIN ARINC 429 IN 8 A	In
19	MAIN ARINC 429 IN 8 B	In
20	CAN BUS 1 HI	I/O
21	RESERVED	--
22	CAN BUS 1 LO	I/O
23	RS-485 1 A	I/O
24	RS-485 1 B	I/O
25	RS-485 2 A	I/O
26	RS-485 2 B	I/O
27	RS-485 3 A/RS-422 IN A	I/O
28	RS-485 3 B/RS-422 IN B	I/O
29	MAIN ARINC 429 IN 1 A	In
30	CAN BUS 2 LO	I/O
31	MAIN ARINC 429 IN 1 B	In
32	CAN BUS 2 HI	I/O
33	MAIN ARINC 429 IN 2 A	In
34	CAN BUS 1 TERMINATION	--
35	MAIN ARINC 429 IN 2 B	In
36	RS-485 5 A/RS-422 OUT A	I/O

Connector P603, continued		
Pin	Pin Name	I/O
37	RS-485 5 B/RS-422 OUT B	I/O
38	RESERVED	--
39	CAN BUS 2 TERMINATION	--
40	RESERVED	--
41	MAIN RS-232 IN 1	In
42	SIGNAL GROUND	--
43	MAIN RS-232 OUT 1	Out
44	MAIN RS-232 IN 2	In
45	SIGNAL GROUND	--
46	MAIN RS-232 OUT 2	Out
47	MAIN RS-232 IN 3	In
48	SIGNAL GROUND	--
49	MAIN RS-232 OUT 3	Out
50	MAIN RS-232 IN 4	In
51	SIGNAL GROUND	--
52	MAIN RS-232 OUT 4	Out
53	MAIN RS-232 IN 5	In
54	SIGNAL GROUND	--
55	MAIN RS-232 OUT 5	Out
56	MAIN RS-232 IN 6	In
57	SIGNAL GROUND	--
58	MAIN RS-232 OUT 6	Out
59	MAIN RS-232 IN 7	In
60	RESERVED	--
61	SIGNAL GROUND	--
62	MAIN RS-232 OUT 7	Out
63	MAIN RS-232 IN 8	In
64	SIGNAL GROUND	--
65	MAIN RS-232 OUT 8	Out
66	RESERVED	--
67	GPS PPS OUT	Out
68	RESERVED	--
69	VOICE ALERT DIGITAL AUDIO OUT	Out
70	MAIN ARINC 429 OUT 1 B	Out
71	MAIN ARINC 429 OUT 1 A	Out
72	MAIN ARINC 429 OUT 2 B	Out
73	MAIN ARINC 429 OUT 2 A	Out
74	MAIN ARINC 429 OUT 3 B	Out
75	MAIN ARINC 429 OUT 3 A	Out
76	ETHERNET IN A	In
77	ETHERNET IN B	In
78	RESERVED	--

P604 (Main Discrete)

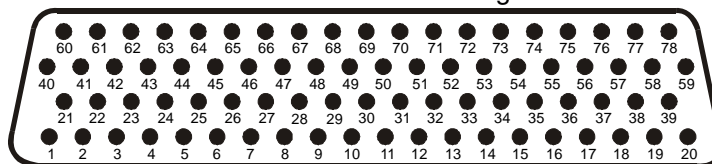
View of J604 connector looking at unit



Pin	Pin Name	I/O
1	ANNUNCIATE* 22	Out
2	VOICE ALERT 500Ω AUDIO OUT HI	Out
3	VOICE ALERT 500Ω AUDIO OUT LO (GROUND)	--
4	DISCRETE IN 13	In
5	DISCRETE IN 14	In
6	ANNUNCIATE* 1	Out
7	DISCRETE IN* 1	In
8	DISCRETE IN* 2	In
9	DISCRETE IN* 3	In
10	DISCRETE IN 15	In
11	AP DISCONNECT IN	In
12	DISCRETE IN* 4	In
13	DISCRETE IN* 5	In
14	DISCRETE IN* 6	In
15	DISCRETE IN 16	In
16	DISCRETE IN 17	In
17	DISCRETE IN* 7	In
18	DISCRETE IN* 8	In
19	DISCRETE IN* 9	In
20	DISCRETE IN* 10	In
21	DISCRETE IN* 11	In
22	GIA SYSTEM ID PROGRAM* 1	In
23	GIA SYSTEM ID PROGRAM* 2	In
24	DISCRETE IN* 12	In
25	ANNUNCIATE* 2	Out
26	ANNUNCIATE* 3	Out
27	ANNUNCIATE* 4	Out
28	ANNUNCIATE* 5	Out
29	ANNUNCIATE* 6	Out
30	ANNUNCIATE* 7	Out
31	ANNUNCIATE* 8	Out
32	ANNUNCIATE* 9	Out
33	ANNUNCIATE* 10	Out
34	ANNUNCIATE* 11	Out
35	ANNUNCIATE* 12	Out
36	ANNUNCIATE* 13	Out
37	ANNUNCIATE* 14	Out
38	ANNUNCIATE* 15	Out
39	ANNUNCIATE* 16	Out
40	ANNUNCIATE* 17	Out
41	ANNUNCIATE* 18	Out
42	ANNUNCIATE* 19	Out
43	ANNUNCIATE* 20	Out
44	ANNUNCIATE* 21	Out

P605 (I/O #1)

View of J605 connector looking at unit

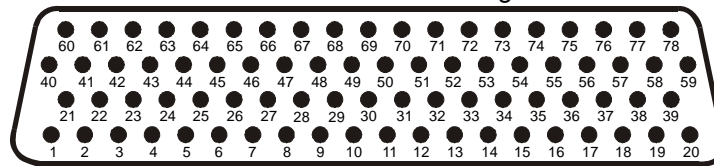


Pin	Pin Name	I/O
1	RADAR ALTIMETER DC HI	In
2	RADAR ALTIMETER DC LO	In
3	DISCRETE IN 18A	In
4	SPARE	--
5	SPARE	--
6	SPARE	--
7	SPARE	--
8	FLIGHT DIRECTOR PITCH +UP	In
9	FLIGHT DIRECTOR PITCH +DOWN	In
10	FLIGHT DIRECTOR ROLL +RIGHT	In
11	FLIGHT DIRECTOR ROLL +LEFT	In
12	DISCRETE IN 19A	In
13	POTENTIOMETER SIGNAL IN	In
14	POTENTIOMETER REF IN HI	In
15	POTENTIOMETER REF IN LO	In
16	DISCRETE IN 20A	In
17	MAIN LATERAL DEVIATION +LEFT	Out
18	MAIN LATERAL DEVIATION +RIGHT (MAIN COMMON)	Out
19	MAIN LATERAL +FLAG	Out
20	MAIN LATERAL -FLAG (MAIN COMMON)	Out
21	SPARE	--
22	SPARE	--
23	MAIN VERTICAL DEVIATION +UP	Out
24	MAIN VERTICAL DEVIATION +DOWN (MAIN COMMON)	Out
25	MAIN VERTICAL +FLAG	Out
26	MAIN VERTICAL -FLAG (MAIN COMMON)	Out
27	SPARE	--
28	SPARE	--
29	AIRCRAFT POWER 1	In
30	POTENTIOMETER SIGNAL OUT	Out
31	AIRCRAFT POWER 1	In
32	POTENTIOMETER REF OUT HI	Out
33	AIRCRAFT POWER 2	In
34	POTENTIOMETER REF OUT LO (GROUND)	Out
35	AIRCRAFT POWER 2	In
36	GIA REMOTE POWER OFF	In

Connector P605, continued		
Pin	Pin Name	I/O
37	DISCRETE IN* 1A	In
38	DISCRETE IN* 2A	In
39	DISCRETE IN* 3A	In
40	DISCRETE IN* 4A	In
41	DISCRETE IN* 5A	In
42	DISCRETE IN* 6A	In
43	DISCRETE IN* 7A	In
44	DISCRETE IN* 8A	In
45	DISCRETE IN* 9A	In
46	DISCRETE IN* 10A	In
47	DISCRETE OUT* 1A	Out
48	SIGNAL GROUND	--
49	DISCRETE IN* 11A	In
50	DISCRETE IN 21A	In
51	DISCRETE IN 22A	In
52	DISCRETE IN* 12A	In
53	DISCRETE IN* 13A	In
54	DISCRETE IN* 14A	In
55	DISCRETE IN* 15A	In
56	OUTER MARKER LAMP IN	In
57	MIDDLE MARKER LAMP IN	In
58	AIRWAY/INNER MARKER LAMP IN	In
59	DISCRETE IN* 16A	In
60	DISCRETE IN 23A	In
61	SIGNAL GROUND	--
62	MAIN LATERAL SUPERFLAG	Out
63	MAIN VERTICAL SUPERFLAG	Out
64	SUPERFLAG 4A	Out
65	SPARE	--
66	SPARE	--
67	SUPERFLAG 1A	Out
68	DISCRETE OUT* 2A	Out
69	DISCRETE OUT* 3A	Out
70	DISCRETE OUT* 4A	Out
71	ANNUNCIATE* 1A	Out
72	ANNUNCIATE* 2A	Out
73	DISCRETE IN* 17A	In
74	DISCRETE IN 24A	In
75	SUPERFLAG 2A	Out
76	POWER GROUND	--
77	SUPERFLAG 3A	Out
78	POWER GROUND	--

P606 (I/O #2)

View of J606 connector looking at unit

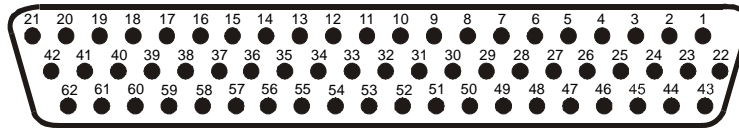


Pin	Pin Name	I/O
1	26 VAC VERTICAL GYRO REF HI	In
2	26 VAC VERTICAL GYRO REF LO	In
3	26 VAC ADF REF HI	In
4	26 VAC ADF REF LO	In
5	26 VAC AFCS REF HI	In
6	26 VAC AFCS REF LO	In
7	DIRECTIONAL GYRO MOTOR A	In
8	DIRECTIONAL GYRO MOTOR B	In
9	SIGNAL GROUND	--
10	ADF X/COS	In
11	ADF Y/SIN	In
12	ADF Z (GROUND)	In
13	SIGNAL GROUND	--
14	HEADING X	In
15	HEADING Y	In
16	HEADING Z (GROUND)	In
17	SIGNAL GROUND	--
18	PITCH ATTITUDE X	In
19	PITCH ATTITUDE Y	In
20	PITCH ATTITUDE Z (GROUND)	In
21	ROLL ATTITUDE X	In
22	ROLL ATTITUDE Y	In
23	ROLL ATTITUDE Z (GROUND)	In
24	SIGNAL GROUND	--
25	SPARE	--
26	SPARE	--
27	SPARE	--
28	SPARE	--
29	RESERVED	--
30	SIGNAL GROUND	--
31	RESERVED	--
32	ADF DC REF IN	In
33	RESERVED	--
34	ANALOG ROLL STEERING HI	Out
35	RESERVED	--
36	ANALOG ROLL STEERING LO (GROUND)	Out

Connector P606, continued		
Pin	Pin Name	I/O
37	HEADING BOOTSTRAP OUT X	Out
38	HEADING BOOTSTRAP OUT Y	Out
39	HEADING BOOTSTRAP OUT Z (GROUND)	Out
40	AC ROLL ATTITUDE OUT HI	Out
41	AC ROLL ATTITUDE OUT LO (GROUND)	Out
42	AC PITCH ATTITUDE OUT HI	Out
43	AC PITCH ATTITUDE OUT LO (GROUND)	Out
44	YAW RATE +RIGHT	Out
45	YAW RATE +LEFT (GROUND)	Out
46	HEADING DATUM HI	Out
47	HEADING DATUM LO (GROUND)	Out
48	COURSE DATUM HI	Out
49	COURSE DATUM LO (GROUND)	Out
50	SIGNAL GROUND	--
51	26 VAC DIRECTIONAL GYRO REF HI	In
52	26 VAC DIRECTIONAL GYRO REF LO	In
53	REMOTE ANNUNCIATE CLOCK	In
54	REMOTE ANNUNCIATE DATA	In
55	REMOTE ANNUNCIATE SYNC	In
56	MAIN OBI CLOCK	Out
57	MAIN OBI DATA	Out
58	MAIN OBI SYNC	Out
59	MAIN KING SERIAL DME DATA	I/O
60	MAIN KING SERIAL DME CLOCK	I/O
61	MAIN KING SERIAL DME HOLD* OUT	Out
62	MAIN KING SERIAL DME REQUEST	I/O
63	MAIN KING SERIAL DME ON* OUT	Out
64	MAIN KING SERIAL RNAV REQUEST	In
65	RESERVED	--
66	RESERVED	--
67	DISCRETE OUT* 1B	Out
68	DISCRETE OUT* 2B	Out
69	DISCRETE OUT* 3B	Out
70	DISCRETE OUT* 4B	Out
71	DISCRETE OUT* 5B	Out
72	DISCRETE OUT* 6B	Out
73	DISCRETE OUT* 7B	Out
74	DISCRETE OUT* 8B	Out
75	DISCRETE OUT* 9B	Out
76	RESERVED	--
77	DISCRETE OUT* 10B	Out
78	RESERVED	--

A.2 GDU 1xxx (P10001)

View of J10001 connector from back of unit

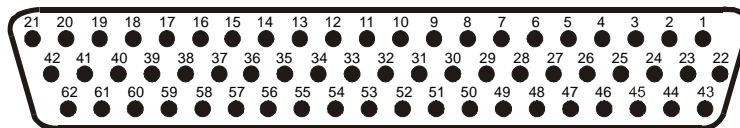


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	Out
2	ETHERNET OUT 1 A	Out
3	ETHERNET OUT 1 B	Out
4	ETHERNET IN 1 A	In
5	ETHERNET IN 1 B	In
6	ETHERNET OUT 2 A	Out
7	ETHERNET OUT 2 B	Out
8	ETHERNET IN 2 A	In
9	ETHERNET IN 2 B	In
10	ETHERNET OUT 3 A	Out
11	ETHERNET OUT 3 B	Out
12	ETHERNET IN 3 A	In
13	ETHERNET IN 3 B	In
14	FAN MONITOR VALID*	In
15	REVERSIONARY MODE SELECT 2	In
16	ARINC 429 IN 2 A	In
17	ARINC 429 IN 2 B	In
18	ARINC 429 IN 1 A	In
19	ARINC 429 IN 1 B	In
20	RESERVED (GDU 1500) SIGNAL GROUND (GDU 104X)	-- --
21	RESERVED (GDU 1500) SIGNAL GROUND (GDU 104X)	-- --
22	CONFIG MODULE DATA	I/O
23	CONFIG MODULE POWER OUT	Out
24	RESERVED	--
25	RESERVED	--
26	SIGNAL GROUND	--
27	POWER GROUND	--
28	RESERVED	--
29	POWER GROUND	--
30	SIGNAL GROUND	--
31	POWER GROUND	--
32	SIGNAL GROUND	--
33	POWER GROUND	--
34	SIGNAL GROUND	--
35	AIRCRAFT POWER 1	In
36	SIGNAL GROUND	--
37	AIRCRAFT POWER 1	In
38	SIGNAL GROUND	--
39	AIRCRAFT POWER 2	In
40	SIGNAL GROUND	--
41	AIRCRAFT POWER 2	In
42	SIGNAL GROUND	--

Connector P10001, continued		
Pin	Pin Name	I/O
43	CONFIG MODULE CLOCK	Out
44	RS-232 OUT 1	Out
45	RS-232 IN 1	In
46	RS-232 OUT 2	Out
47	RS-232 IN 2	In
48	UNIT 5 REMOTE POWER OFF	Out
49	UNIT 4 REMOTE POWER OFF	Out
50	UNIT 3 REMOTE POWER OFF	Out
51	UNIT 2 REMOTE POWER OFF	Out
52	UNIT 1 REMOTE POWER OFF	Out
53	RESERVED	--
54	DEMO MODE SELECT*	In
55	CDU SYSTEM ID PROGRAM* 1	In
56	CDU SYSTEM ID PROGRAM* 2	In
57	CDU SYSTEM ID PROGRAM* 3	In
58	REVERSIONARY MODE SELECT 1	In
59	LIGHTING BUS 1 HI	In
60	LIGHTING BUS 1 LO	In
61	RESERVED	--
62	RESERVED	--

GDU 12xx (P12001)

View of J12001 connector from back of unit

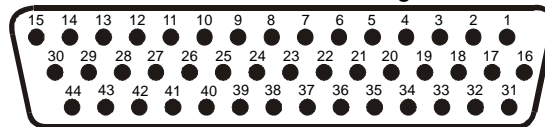


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	Out
2	ETHERNET OUT 1 A	Out
3	ETHERNET OUT 1 B	Out
4	ETHERNET IN 1 A	In
5	ETHERNET IN 1 B	In
6	ETHERNET OUT 2 A	Out
7	ETHERNET OUT 2 B	Out
8	ETHERNET IN 2 A	In
9	ETHERNET IN 2 B	In
10	ETHERNET OUT 3 A	Out
11	ETHERNET OUT 3 B	Out
12	ETHERNET IN 3 A	In
13	ETHERNET IN 3 B	In
14	FAN MONITOR VALID*	In
15	REVERSIONARY MODE SELECT 2	In
16	ARINC 429 IN 2 A	In
17	ARINC 429 IN 2 B	In
18	ARINC 429 IN 1 A	In
19	ARINC 429 IN 1 B	In
20	LIGHTING BUS 2 HI	In
21	LIGHTING BUS 2 LO	In
22	CONFIG MODULE DATA	I/O
23	CONFIG MODULE POWER OUT	Out
24	RESERVED	--
25	RESERVED	--
26	SIGNAL GROUND	--
27	POWER GROUND	--
28	COMPOSITE VIDEO IN 1 HI	In
29	POWER GROUND	--
30	SIGNAL GROUND	--
31	POWER GROUND	--
32	SIGNAL GROUND	--
33	POWER GROUND	--
34	SIGNAL GROUND	--
35	AIRCRAFT POWER 1	In
36	SIGNAL GROUND	--
37	AIRCRAFT POWER 1	In
38	SIGNAL GROUND	--
39	AIRCRAFT POWER 2	In
40	SIGNAL GROUND	--
41	AIRCRAFT POWER 2	In
42	SIGNAL GROUND	--

Connector P12001, continued		
Pin	Pin Name	I/O
43	CONFIG MODULE CLOCK	Out
44	RS-232 OUT 1	Out
45	RS-232 IN 1	In
46	RS-232 OUT 2	Out
47	RS-232 IN 2	In
48	ETHERNET OUT 4 A	Out
49	ETHERNET OUT 4 B	Out
50	ETHERNET IN 4 A	In
51	ETHERNET IN 4 B	In
52	UNIT 1 REMOTE POWER OFF	Out
53	RESERVED	--
54	DEMO MODE SELECT*	In
55	CDU SYSTEM ID PROGRAM* 1	In
56	CDU SYSTEM ID PROGRAM* 2	In
57	CDU SYSTEM ID PROGRAM* 3	In
58	REVERSIONARY MODE SELECT 1	In
59	LIGHTING BUS 1 HI	In
60	LIGHTING BUS 1 LO	In
61	RESERVED	--
62	COMPOSITE VIDEO IN 2 HI	In

A.3 GRS 77 (P771)

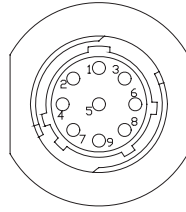
View of J771 connector looking at unit



Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	AHRS SYSTEM ID PROGRAM* 1	In
3	AHRS SYSTEM ID PROGRAM* 2	In
4	RESERVED	--
5	SPARE	--
6	GPS 2 RS-232 IN	In
7	RESERVED	--
8	SPARE RS-232 IN 1	In
9	MAGNETOMETER POWER OUT	Out
10	MAGNETOMETER RS-232 OUT	Out
11	GPS 1 RS-232 IN	In
12	ARINC 429 OUT 3 A	Out
13	ARINC 429 OUT 2 A	Out
14	ARINC 429 OUT 1 A	Out
15	ARINC 429 IN 1 A	In
16	CONFIG MODULE DATA	I/O
17	CONFIG MODULE POWER OUT	Out
18	AIRCRAFT POWER 1	In
19	ARINC 429 OUT 3 B	Out
20	AIRCRAFT POWER 2	In
21	GPS 2 RS-232 OUT	Out
22	POWER GROUND	--
23	SPARE RS-232 OUT 1	Out
24	POWER GROUND	--
25	MAGNETOMETER RS-485 IN A	In
26	GPS 1 RS-232 OUT	Out
27	ARINC 429 OUT 3 B	Out
28	ARINC 429 OUT 2 B	Out
29	ARINC 429 OUT 1 B	Out
30	ARINC 429 IN 1 B	In
31	CONFIG MODULE CLOCK	Out
32	SPARE	--
33	ARINC 429 OUT 3 A	Out
34	SPARE	--
35	SIGNAL GROUND	--
36	SPARE	--
37	SIGNAL GROUND	--
38	SIGNAL GROUND	--
39	MAGNETOMETER RS-485 IN B	In
40	MAGNETOMETER GROUND	--
41	SIGNAL GROUND	--
42	SIGNAL GROUND	--

43	SIGNAL GROUND	--
44	SIGNAL GROUND	--

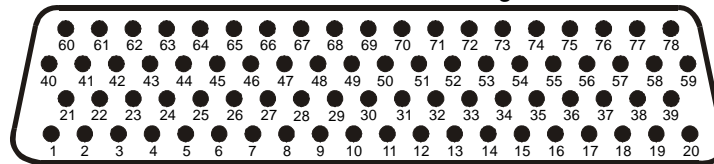
View of J441 connector looking at pigtail



Pin	Pin Name	I/O
1	SIGNAL GROUND	--
2	RS-485 OUT B	Out
3	SIGNAL GROUND	--
4	RS-485 OUT A	Out
5	SPARE	--
6	POWER GROUND	--
7	SPARE	--
8	RS-232 IN	In
9	+12 VDC POWER	In

A.5 GDC 74x (P741)

View of J741 connector looking at unit

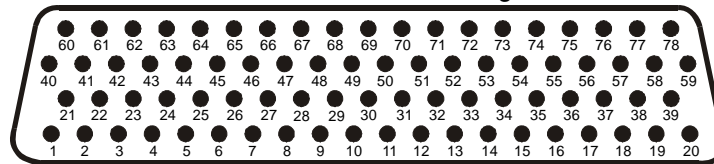


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	OAT PROBE POWER OUT	Out
3	OAT PROBE IN HI	In
4	OAT PROBE IN LO	In
5	SIGNAL GROUND	--
6	ADC SYSTEM ID PROGRAM* 1	In
7	SIGNAL GROUND	--
8	DISCRETE IN* 6	In
9	SIGNAL GROUND	--
10	RS-232 IN 1	In
11	RS-232 OUT 1	Out
12	SIGNAL GROUND	--
13	RS-232 IN 2	In
14	RS-232 OUT 2	Out
15	SIGNAL GROUND	--
16	RESERVED	--
17	POWER GROUND	--
18	POWER GROUND	--
19	POWER GROUND	--
20	POWER GROUND	--
21	CONFIG MODULE POWER OUT	Out
22	SPARE	--
23	ARINC 429 IN 1 A	In
24	ARINC 429 IN 1 B	In
25	SIGNAL GROUND	--
26	ARINC 429 OUT 1 A	Out
27	ARINC 429 OUT 1 B	Out
28	SIGNAL GROUND	--
29	ARINC 429 OUT 2 A	Out
30	ARINC 429 OUT 2 B	Out
31	SIGNAL GROUND	--
32	ARINC 429 OUT 3 A	Out
33	ARINC 429 OUT 3 B	Out
34	SIGNAL GROUND	--
35	ARINC 429 IN 2 A	In
36	ARINC 429 IN 2 B	In

Connector P741, continued		
Pin	Pin Name	I/O
37	SIGNAL GROUND	--
38	SPARE	--
39	SPARE	--
40	CONFIG MODULE DATA	I/O
41	ARINC 429 OUT 1 A	Out
42	ARINC 429 OUT 1 B	Out
43	SIGNAL GROUND	--
44	ARINC 429 OUT 2 A	Out
45	ARINC 429 OUT 2 B	Out
46	SIGNAL GROUND	--
47	ARINC 429 OUT 3 A	Out
48	ARINC 429 OUT 3 B	Out
49	SIGNAL GROUND	--
50	DISCRETE IN 7	In
51	SIGNAL GROUND	--
52	DISCRETE IN 8	In
53	SIGNAL GROUND	--
54	SPARE	--
55	AIRCRAFT POWER 1	In
56	SPARE	--
57	SPARE	--
58	AIRCRAFT POWER 2	In
59	SPARE	--
60	CONFIG MODULE CLOCK	Out
61	DISCRETE IN* 1	In
62	SIGNAL GROUND	--
63	DISCRETE IN* 2	In
64	SIGNAL GROUND	--
65	DISCRETE IN* 3	In
66	SIGNAL GROUND	--
67	DISCRETE IN* 4	In
68	SIGNAL GROUND	--
69	DISCRETE IN* 5	In
70	SIGNAL GROUND	--
71	ADC SYSTEM ID PROGRAM* 2	In
72	SIGNAL GROUND	--
73	ARINC 429 IN 3 A	In
74	ARINC 429 IN 3 B	In
75	SIGNAL GROUND	--
76	ARINC 429 IN 4 A	In
77	ARINC 429 IN 4 B	In
78	SIGNAL GROUND	--

A.6 GEA 7x (P701)

View of J701 connector looking at unit

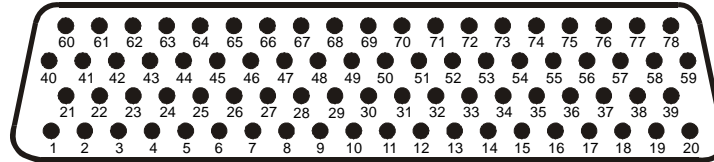


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	DIGITAL IN* 1	In
3	DIGITAL IN* 2	In
4	SIGNAL GROUND	--
5	RS-485 1 A	I/O
6	RS-485 1 B	I/O
7	RS-485 2 A	I/O
8	RS-485 2 B	I/O
9	GEA SYSTEM ID PROGRAM* 1	In
10	GEA SYSTEM ID PROGRAM* 2	In
11	TRANSDUCER POWER OUT LO (GROUND)	--
12	TRANSDUCER POWER OUT LO (GROUND)	--
13	TRANSDUCER POWER OUT LO (GROUND)	--
14	+10 VDC TRANSDUCER POWER OUT	Out
15	+5 VDC TRANSDUCER POWER OUT	Out
16	+12 VDC TRANSDUCER POWER OUT	Out
17	ENGINE TEMP ANALOG IN 6 HI	In
18	ENGINE TEMP ANALOG IN 6 LO	In
19	SIGNAL GROUND	--
20	POWER GROUND	--
21	CONFIG MODULE POWER OUT	Out
22	ANALOG IN 1 HI	In
23	ANALOG IN 1 LO	In
24	ANALOG IN 2 HI	In
25	ANALOG IN 2 LO	In
26	ENGINE TEMP ANALOG IN 1 HI	In
27	ENGINE TEMP ANALOG IN 1 LO	In
28	ENGINE TEMP ANALOG IN 2 HI	In
29	ENGINE TEMP ANALOG IN 2 LO	In
30	ENGINE TEMP ANALOG IN 3 HI	In
31	ENGINE TEMP ANALOG IN 3 LO	In
32	SIGNAL GROUND	--
33	ENGINE TEMP ANALOG IN 4 HI	In
34	ENGINE TEMP ANALOG IN 4 LO	In
35	AIRCRAFT POWER 1	In
36	ENGINE TEMP ANALOG IN 5 HI	In
37	AIRCRAFT POWER 2	In
38	ENGINE TEMP ANALOG IN 5 LO	In

Connector P701, continued		
Pin	Pin Name	I/O
39	SIGNAL GROUND	--
40	CONFIG MODULE DATA	I/O
41	DIGITAL IN* 3	In
42	ANALOG IN 3 HI	In
43	ANALOG IN 3 LO	In
44	ANALOG IN 4 HI	In
45	ANALOG IN 4 LO	In
46	ANALOG IN 5 HI	In
47	ANALOG IN 5 LO	In
48	ENGINE TEMP ANALOG IN 7 HI	In
49	ENGINE TEMP ANALOG IN 7 LO	In
50	ENGINE TEMP ANALOG IN 8 HI	In
51	ENGINE TEMP ANALOG IN 8 LO	In
52	ENGINE TEMP ANALOG IN 9 HI	In
53	ENGINE TEMP ANALOG IN 9 LO	In
54	ENGINE TEMP ANALOG IN 10 HI	In
55	ENGINE TEMP ANALOG IN 10 LO	In
56	ENGINE TEMP ANALOG IN 11 HI	In
57	ENGINE TEMP ANALOG IN 11 LO	In
58	ENGINE TEMP ANALOG IN 12 HI	In
59	ENGINE TEMP ANALOG IN 12 LO	In
60	CONFIG MODULE CLOCK	Out
61	DIGITAL IN* 4	In
62	ANALOG IN 6 HI	In
63	ANALOG IN 6 LO	In
64	ANALOG IN 7 HI	In
65	ANALOG IN 7 LO	In
66	ANALOG IN 8 HI	In
67	ANALOG IN 8 LO	In
68	THERMOCOUPLE REF IN HI	In
69	THERMOCOUPLE REF IN LO	In
70	DISCRETE IN* 1	In
71	DISCRETE IN* 2	In
72	ANALOG IN 9 HI	In
73	ANALOG IN 9 LO	In
74	ANALOG IN 10 HI	In
75	ANALOG IN 10 LO	In
76	DISCRETE IN* 3	In
77	GEA REMOTE POWER OFF	In
78	POWER GROUND	--

P702

View of J702 connector looking at unit

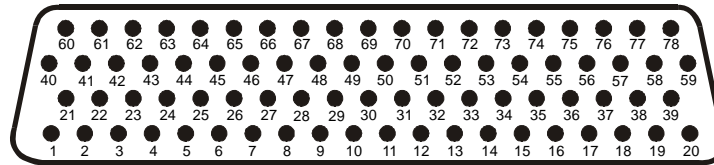


Pin	Pin Name	I/O
1	ANNUNCIATE* 1A	Out
2	ANNUNCIATE* 2A	Out
3	ANNUNCIATE* 3A	Out
4	ANNUNCIATE* 4A	Out
5	ANNUNCIATE* 5A	Out
6	ANNUNCIATE* 6A	Out
7	ANNUNCIATE* 7A	Out
8	ANNUNCIATE* 8A	Out
9	ANNUNCIATE* 9A	Out
10	ANNUNCIATE* 10A	Out
11	TRANSDUCER POWER OUT LO (GROUND)	--
12	TRANSDUCER POWER OUT LO (GROUND)	--
13	TRANSDUCER POWER OUT LO (GROUND)	--
14	+10 VDC TRANSDUCER POWER OUT A	Out
15	+5 VDC TRANSDUCER POWER OUT A	Out
16	+12 VDC TRANSDUCER POWER OUT A	Out
17	ANNUNCIATE* 11A	Out
18	ANNUNCIATE* 12A	Out
19	ANNUNCIATE* 13A	Out
20	ANNUNCIATE* 14A	Out
21	ANNUNCIATE* 15A	Out
22	ANNUNCIATE* 16A	Out
23	ANNUNCIATE* 17A	Out
24	ANNUNCIATE* 18A	Out
25	DISCRETE IN* 11A	In
26	DISCRETE IN* 12A	In
27	DISCRETE IN* 13A	In
28	DISCRETE IN* 14A	In
29	DISCRETE IN* 15A	In
30	DISCRETE IN* 16A	In
31	SIGNAL GROUND	--
32	SIGNAL GROUND	--
33	SIGNAL GROUND	--
34	SIGNAL GROUND	--
35	SIGNAL GROUND	--
36	SIGNAL GROUND	--
37	SIGNAL GROUND	--
38	SIGNAL GROUND	--
39	SIGNAL GROUND	--

Connector P702, continued		
Pin	Pin Name	I/O
40	DISCRETE IN* 17A	In
41	DISCRETE IN* 18A	In
42	DISCRETE IN* 19A	In
43	DISCRETE IN* 20A	In
44	ANALOG/CURRENT MONITOR IN 1A HI	In
45	ANALOG/CURRENT MONITOR IN 1A LO	In
46	ANALOG/CURRENT MONITOR IN 2A HI	In
47	ANALOG/CURRENT MONITOR IN 2A LO	In
48	ANALOG/CURRENT MONITOR IN 3A HI	In
49	ANALOG/CURRENT MONITOR IN 3A LO	In
50	ANALOG/CURRENT MONITOR IN 4A HI	In
51	ANALOG/CURRENT MONITOR IN 4A LO	In
52	ANALOG IN 1A HI	In
53	ANALOG IN 1A LO	In
54	ANALOG IN 2A HI	In
55	ANALOG IN 2A LO	In
56	ANALOG IN 3A HI	In
57	ANALOG IN 3A LO	In
58	ANALOG IN 4A HI	In
59	ANALOG IN 4A LO	In
60	DISCRETE IN* 1A	In
61	DISCRETE IN* 2A	In
62	DISCRETE IN* 3A	In
63	DISCRETE IN* 4A	In
64	DISCRETE IN* 5A	In
65	DISCRETE IN* 6A	In
66	DISCRETE IN* 7A	In
67	DIGITAL IN* 5A	In
68	DIGITAL IN* 6A	In
69	DIGITAL IN* 7A	In
70	DIGITAL IN* 8A	In
71	DISCRETE IN* 8A	In
72	DISCRETE IN* 9A	In
73	DISCRETE IN* 10A	In
74	DIGITAL IN* 1A	In
75	DIGITAL IN* 2A	In
76	DIGITAL IN* 3A	In
77	DIGITAL IN* 4A	In
78	SIGNAL GROUND	--

A.7 GMA 1347x (P3471)

View of J3471 connector from back of unit

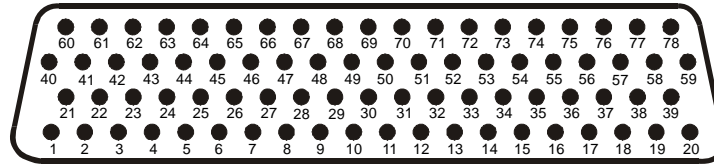


Pin	Pin Name	I/O
1	FAIL SAFE PILOT SUMMED AUDIO OUT HI (GMA 1347C/1347D) FAIL SAFE WARN AUDIO IN (GMA 1347)	Out In
2	OXYGEN MASK MIC SELECT* (GMA 1347C/1347D) RESERVED (GMA 1347)	In --
3	TEL RINGER AUDIO IN HI	In
4	TEL RINGER AUDIO IN LO	In
5	REMOTE PASS ICS OUT HI	Out
6	ON-SIDE NAV AUDIO IN HI	In
7	ON-SIDE COM AUDIO IN HI	In
8	ON-SIDE COM AUDIO LO	I/O
9	PILOT HEADSET AUDIO OUT LEFT	Out
10	PILOT HEADSET AUDIO OUT RIGHT	Out
11	PILOT HEADSET AUDIO OUT LO	Out
12	CROSS-SIDE COM AUDIO IN HI	In
13	CROSS-SIDE COM AUDIO LO	I/O
14	CROSS-SIDE NAV AUDIO IN HI	In
15	DME AUDIO IN HI	In
16	DME AUDIO IN LO	In
17	MUSIC IN 1 LEFT	In
18	MUSIC IN 1 RIGHT	In
19	UNSWITCHED AUDIO IN 1 HI	In
20	UNSWITCHED AUDIO IN 2 HI	In
21	REMOTE CREW ICS AUDIO IN HI	In
22	REMOTE CREW ICS AUDIO IN LO	In
23	TEL MIC AUDIO OUT HI	Out
24	PASS ICS KEY*	In
25	ON-SIDE NAV AUDIO IN LO	In
26	ON-SIDE COM MIC AUDIO OUT HI	Out
27	ON-SIDE COM MIC KEY*	Out
28	PILOT MIC AUDIO IN HI	In
29	PILOT MIC KEY* IN	In
30	PILOT MIC IN LO	In
31	PILOT ICS KEY*	In
32	CROSS-SIDE COM MIC AUDIO OUT HI	Out
33	CROSS-SIDE COM MIC KEY*	Out
34	CROSS-SIDE NAV AUDIO IN LO	In
35	ADF AUDIO IN HI	In
36	ADF AUDIO IN LO	In

Connector P3471, continued		
Pin	Pin Name	I/O
37	MUSIC IN 1 LO	In
38	UNSWITCHED AUDIO IN 3 HI	In
39	UNSWITCHED AUDIO IN LO	In
40	REMOTE PASS ICS AUDIO IN HI	In
41	REMOTE PASS ICS AUDIO IN LO	In
42	TEL AUDIO IN HI	In
43	TEL AUDIO IN LO	In
44	PASS 3 MIC AUDIO IN HI	In
45	PASS 3 MIC AUDIO IN LO	In
46	PASS 1 MIC AUDIO IN HI	In
47	PASS 1 MIC AUDIO IN LO	In
48	PASS HEADSET AUDIO OUT LO	Out
49	COPILOT MIC AUDIO IN HI	In
50	COPILOT MIC KEY* IN	In
51	COPILOT MIC IN LO	In
52	COPILOT ICS KEY*	In
53	SUMMED AUDIO OUT LO	--
54	ALTITUDE WARN AUDIO IN HI	In
55	ALTITUDE WARN AUDIO IN LO	In
56	MUSIC IN 2 LEFT	In
57	MUSIC IN 2 RIGHT	In
58	COM 3 AUDIO IN HI	In
59	COM 3 AUDIO LO	I/O
60	REMOTE CREW ICS OUT HI	Out
61	REMOTE ICS OUT LO	Out
62	TEL MIC AUDIO OUT LO	Out
63	PASS 4 MIC AUDIO IN HI	In
64	PASS 4 MIC AUDIO IN LO	In
65	PASS 2 MIC AUDIO IN HI	In
66	PASS 2 MIC AUDIO IN LO	In
67	PASS HEADSET AUDIO OUT LEFT	Out
68	PASS HEADSET AUDIO OUT RIGHT	Out
69	COPILOT HEADSET AUDIO OUT LEFT	Out
70	COPILOT HEADSET AUDIO OUT RIGHT	Out
71	COPILOT HEADSET AUDIO OUT LO	Out
72	PILOT SUMMED AUDIO OUT HI	Out
73	COPILOT SUMMED AUDIO OUT HI	Out
74	AUX AUDIO IN HI	In
75	AUX AUDIO IN LO	In
76	MUSIC IN 2 LO	In
77	COM 3 MIC AUDIO OUT HI	Out
78	COM 3 MIC KEY*	Out

P3472

View of J3472 connector from back of unit

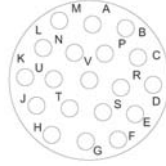


Pin	Pin Name	I/O
1	RESERVED	--
2	RESERVED	--
3	PROGRAM GROUND	--
4	RECORDER PLAY* (GMA 1347) RESERVED (GMA 1347C/1347D)	In --
5	PROGRAM GROUND	--
6	RS-232 OUT 1	Out
7	RS-232 IN 1	In
8	ON-SIDE COM MIC DIGITAL AUDIO OUT	Out
9	ON-SIDE COM DIGITAL AUDIO IN	In
10	RESERVED	--
11	PROGRAM GROUND	--
12	RESERVED	--
13	RESERVED	--
14	POWER GROUND	--
15	RESERVED	--
16	POWER GROUND	--
17	COM SWAP*	In
18	PROGRAM GROUND	--
19	RESERVED	--
20	RESERVED	--
21	RESERVED	--
22	RESERVED	--
23	PROGRAM GROUND	--
24	RECORDER OFF SELECT* (GMA 1347/1347C) RESERVED (GMA 1347D)	In --
25	PROGRAM GROUND	--
26	RESERVED	--
27	GMA REMOTE POWER OFF	In
28	ON-SIDE NAV DIGITAL AUDIO IN	In
29	VOICE ALERT DIGITAL AUDIO IN (GMA 1347) ON-SIDE VOICE ALERT DIGITAL AUDIO IN (GMA 1347C/1347D)	In In
30	AIRCRAFT POWER 2	In
31	RESERVED	--
32	AIRCRAFT POWER 2	In
33	RESERVED	--
34	MIDDLE MARKER SENSE	Out
35	RESERVED	--
36	REVERSIONARY MODE 1	Out
37	REVERSIONARY MODE COMMON 1	--

Connector P3472, continued		
Pin	Pin Name	I/O
38	RS-232 OUT 2	Out
39	RS-232 IN 2	In
40	RESERVED	--
41	SPEAKER AUDIO OUT LO	Out
42	SPEAKER AUDIO OUT HI	Out
43	RESERVED	--
44	PROGRAM GROUND	--
45	RESERVED	--
46	PROGRAM GROUND	--
47	CROSS-SIDE COM MIC DIGITAL AUDIO OUT	Out
48	CROSS-SIDE COM DIGITAL AUDIO IN	In
49	SECONDARY DIGITAL AUDIO CLOCK OUT	Out
50	SECONDARY DIGITAL AUDIO CLOCK IN	In
51	14 V LIGHTING HI	In
52	28 V LIGHTING HI	In
53	AIRCRAFT POWER 1	In
54	RESERVED	--
55	AIRCRAFT POWER 1	In
56	REVERSIONARY MODE 2	Out
57	REVERSIONARY MODE COMMON 2	--
58	RESERVED	--
59	MARKER ANTENNA LO	In
60	RESERVED	--
61	CROSS-SIDE VOICE ALERT DIGITAL AUDIO IN (GMA 1347C/1347D) RESERVED (GMA 1347)	In --
62	RESERVED	--
63	RESERVED	--
64	PA MUTE* OUT	Out
65	RESERVED	--
66	RESERVED	--
67	PROGRAM GROUND	--
68	CROSS-SIDE NAV DIGITAL AUDIO IN	In
69	POWER GROUND	--
70	RESERVED	--
71	POWER GROUND	--
72	RESERVED	--
73	RESERVED	--
74	CABIN CALL EXT LAMP OUT (GMA 1347C) AIRWAY/INNER MARKER EXT LAMP OUT (GMA 1347/1347D)	Out Out
75	MIDDLE MARKER EXT LAMP OUT	Out
76	OUTER MARKER EXT LAMP OUT	Out
77	COCKPIT CALL SELECT* (GMA 1347C) RESERVED (GMA 1347/1347D)	In --
78	MARKER ANTENNA HI	In

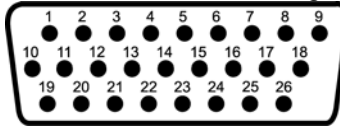
A.8 GSA 8x (P801)

View of J801 connector looking at unit



Pin	Pin Name	I/O
A	SPARE	--
B	SPARE	--
C	SPARE	--
D	SPARE	--
E	RS-485 2 B	I/O
F	SERVO PROGRAM 3	In
G	SERVO PROGRAM 2	In
H	SERVO PROGRAM 1	In
J	RS-485 1 A	I/O
K	SPARE	--
L	SPARE	--
M	SPARE	--
N	AIRCRAFT POWER	In
P	AP DISCONNECT	In
R	PROGRAM GROUND	
S	RS-485 2 A	I/O
T	RS-485 1 B	I/O
U	PROGRAM GROUND	
V	POWER GROUND	--

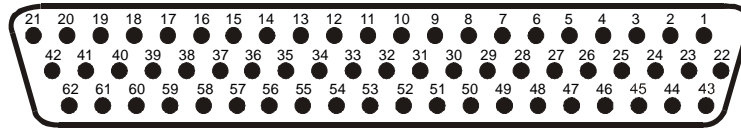
View of J821 connector looking at unit



Pin	Pin Name	I/O
1	MANUAL TRIM CW*	In
2	AIRCRAFT POWER	In
3	POWER GROUND	--
4	SERVO ENABLE 1	In
5	AP DISCONNECT	In
6	SERVO PROGRAM 1	In
7	SERVO PROGRAM 2	In
8	SERVO PROGRAM 3	In
9	MOTOR CW	Out
10	MANUAL TRIM ARM*	In
11	MANUAL TRIM CCW*	In
12	RESERVED	--
13	RESERVED	--
14	RESERVED	--
15	RESERVED	--
16	PROGRAM GROUND	--
17	PROGRAM GROUND	--
18	MOTOR COMMON	Out
19	MANUAL TRIM ENABLE*	In
20	RS-485 2 A	I/O
21	RS-485 2 B	I/O
22	RS-485 1 B	I/O
23	RS-485 1 A	I/O
24	RESERVED	--
25	RESERVED	--
26	MOTOR CCW	Out

A.10 GTX 33x (P3301)

View of J3301 connector looking at unit

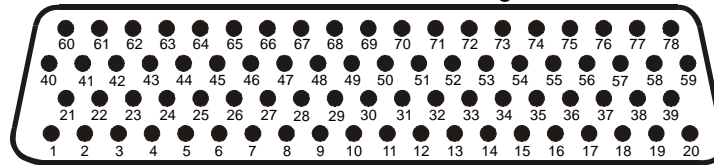


Pin	Pin Name	I/O
1	RESERVED	--
2	ALTITUDE A1	In
3	ALTITUDE C2	In
4	ALTITUDE A2	In
5	ALTITUDE A4	In
6	ALTITUDE C4	In
7	ALTITUDE B1	In
8	ALTITUDE C1	In
9	ALTITUDE B2	In
10	ALTITUDE B4	In
11	ALTITUDE D4	In
12	EXTERNAL IDENT SELECT*	In
13	EXTERNAL STANDBY SELECT*	In
14	NOT USED	In
15	AUDIO OUT HI	Out
16	AUDIO OUT LO	Out
17	SQUAT SWITCH IN	In
18	RESERVED	--
19	ALTITUDE ALERT ANNUNCIATE*	Out
20	RESERVED	--
21	AIRCRAFT POWER 1	In
22	RS-232 IN 1	In
23	RS-232 OUT 1	Out
24	RS-232 IN 2	In
25	RS-232 OUT 2	Out
26	ARINC 429 IN 3 A	In
27	POWER GROUND	--
28	ARINC 429 OUT 2 B	Out
29	ARINC 429 IN 3 B	In
30	ARINC 429 OUT 2 A	Out
31	EXTERNAL SUPPRESSION I/O	I/O
32	ARINC 429 IN 1 A	In
33	ARINC 429 IN 2 A	In
34	ARINC 429 OUT 1 B	Out
35	ARINC 429 IN 1 B	In
36	ARINC 429 IN 2 B	In
37	ARINC 429 OUT 1 A	Out
38	RESERVED	--
39	RESERVED	--
40	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	Out
42	AIRCRAFT POWER 1	In

Connector P3301, continued		
Pin	Pin Name	I/O
43	POWER GROUND	--
44	CURRENT TEMPERATURE PROBE IN	In
45	NOT USED	In
46	TIS CONNECT SELECT*	In
47	AUDIO MUTE SELECT*	In
48	ARINC 429 IN 4 A	In
49	ARINC 429 IN 4 B	In
50	ALTITUDE COMMON (GROUND)	In
51	SIGNAL GROUND	--
52	RESERVED	--
53	RESERVED	--
54	XPDR REMOTE POWER OFF	In
55	NOT USED	--
56	AIRCRAFT POWER 2	In
57	NOT USED	--
58	SIGNAL GROUND	--
59	NOT USED	--
60	AIRCRAFT POWER 2	In
61	NOT USED	--
62	SWITCHED POWER OUT	Out

A.11 GDL 69x (P691)

View of J691 connector looking at unit

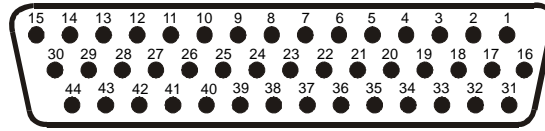


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	Out
2	RS-232 OUT 2	Out
3	RS-232 OUT 3	Out
4	SIGNAL GROUND	--
5	RS-232 IN 2	In
6	RS-232 IN 3	In
7	RS-232 IN 1	In
8	RS-232 OUT 1	Out
9	DATA LINK SYSTEM ID PROGRAM* 1	In
10	DATA LINK SYSTEM ID PROGRAM* 2	In
11	SIGNAL GROUND	--
12	SPARE	--
13	SIGNAL GROUND	--
14	SPARE	--
15	SPARE	--
16	SPARE	--
17	AUDIO OUT 1 LO (SPARE FOR GDL 69)	Out
18	AUDIO OUT 1 RIGHT (SPARE FOR GDL 69)	Out
19	AUDIO OUT 1 LEFT (SPARE FOR GDL 69)	Out
20	POWER GROUND	--
21	CONFIG MODULE POWER OUT	Out
22	ETHERNET IN 1 B	In
23	ETHERNET IN 1 A	In
24	ETHERNET OUT 1 B	Out
25	ETHERNET OUT 1 A	Out
26	ETHERNET IN 2 B	In
27	ETHERNET IN 2 A	In
28	ETHERNET OUT 2 B	Out
29	ETHERNET OUT 2 A	Out
30	ETHERNET IN 3 B	In
31	ETHERNET IN 3 A	In
32	ETHERNET OUT 3 B	Out
33	ETHERNET OUT 3 A	Out
34	SPARE	--
35	AIRCRAFT POWER 1	In
36	SPARE	--

Connector P691, continued		
Pin	Pin Name	I/O
37	AIRCRAFT POWER 2	In
38	SPARE	--
39	SIGNAL GROUND	--
40	CONFIG MODULE DATA	I/O
41	SPARE	--
42	SPARE	--
43	SPARE	--
44	SPARE	--
45	SPARE	--
46	SPARE	--
47	SPARE	--
48	SPARE	--
49	SPARE	--
50	SPARE	--
51	SPARE	--
52	RESERVED	--
53	RESERVED	--
54	RESERVED	--
55	SPARE	--
56	ETHERNET IN 4 B	In
57	ETHERNET IN 4 A	In
58	ETHERNET OUT 4 B	Out
59	ETHERNET OUT 4 A	Out
60	CONFIG MODULE CLOCK	Out
61	AUDIO MUTE SELECT 1 (SPARE FOR GDL 69)	In
62	AUDIO MUTE SELECT 2 (SPARE FOR GDL 69)	In
63	AUDIO MUTE SELECT 3 (SPARE FOR GDL 69)	In
64	AUDIO MUTE SELECT* 4 (SPARE FOR GDL 69)	In
65	AUDIO MUTE SELECT* 5 (SPARE FOR GDL 69)	In
66	AUDIO MUTE SELECT* 6 (SPARE FOR GDL 69)	In
67	DISCRETE IN* 2	In
68	DISCRETE IN* 1	In
69	RESERVED	--
70	AUDIO MUTE*	In
71	CHANNEL INCREMENT*	In
72	CHANNEL DECREMENT*	In
73	VOLUME INCREMENT*	In
74	VOLUME DECREMENT*	In
75	SIGNAL GROUND	--
76	SPARE	--
77	DATA LINK REMOTE POWER OFF	In
78	POWER GROUND	--

A.12 GWX 68 (P400)

View of J400 connector looking at unit



Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RESERVED	--
3	RESERVED	--
4	ARINC 453 OUT A	Out
5	ARINC 453 OUT B	Out
6	RESERVED	--
7	AIRCRAFT POWER 1	In
8	RESERVED	--
9	AIRCRAFT POWER 1	In
10	AIRCRAFT POWER 2	In
11	RESERVED	--
12	AIRCRAFT POWER 2	In
13	POWER GROUND	--
14	RESERVED	--
15	POWER GROUND	--
16	CONFIG MODULE DATA	I/O
17	CONFIG MODULE POWER	Out
18	ROLL ATTITUDE HI	In
19	ROLL ATTITUDE LO	In
20	26 VAC GYRO REF LO	In
21	26 VAC GYRO REF HI	In
22	ARINC 429 IN 2 A	In
23	ARINC 429 IN 2 B	In
24	RESERVED	--
25	RESERVED	--
26	RESERVED	--
27	RESERVED	--
28	RESERVED	--
29	RESERVED	--
30	RESERVED	--
31	CONFIG MODULE CLOCK	Out
32	PITCH ATTITUDE HI	In
33	PITCH ATTITUDE LO	In
34	ETHERNET IN A	In
35	ETHERNET IN B	In

36	ETHERNET OUT A	Out
37	ETHERNET OUT B	Out
38	ARINC 429 IN 1 A	In
39	ARINC 429 IN 1 B	In
40	RESERVED	--
41	RESERVED	--
42	RESERVED	--
43	RESERVED	--
44	RADAR REMOTE POWER OFF	In