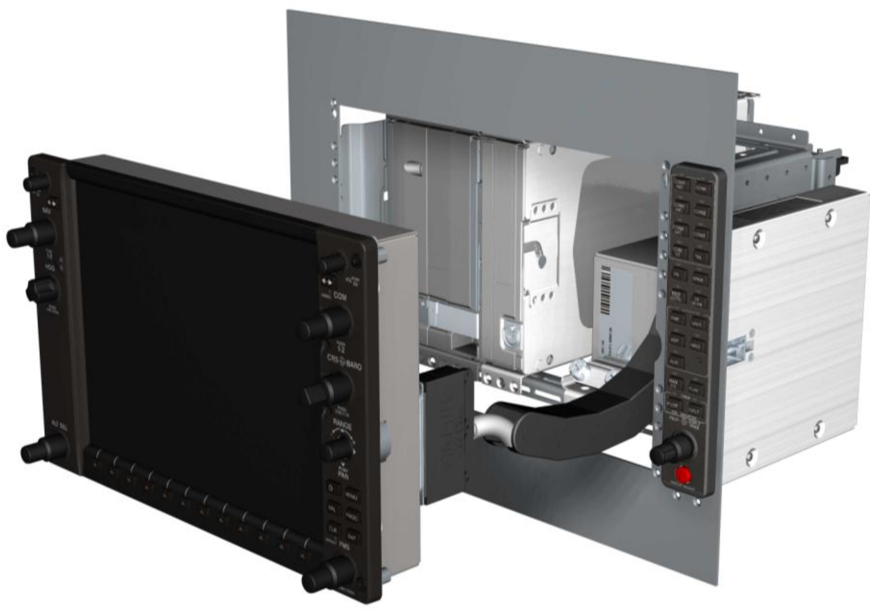
G1000® INTEGRATED FLIGHT DECK
SYSTEM MAINTENANCE MANUAL
(STANDARD PISTON/TURBOPROP AIRCRAFT)



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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

Revision	Date	Section	Page	Description
C	9/15/09	Cover		Added “G1000® Integrated Flight Deck” to title to be consistent with other Garmin maintenance manuals, installation manuals, and pilot’s guides
		Front Content	iv	Changed GDU software level note
		1	1-1	Revised opening paragraph and note, added additional note
		2	2-1	Opening paragraph. Added new LRUs to existing list. Added note
			2-2	Added “GDU Communication” section to 2.1
			2-4	Revised section 2.3
			2-5	Added Figure 2-4, GIA 63X Block Diagram
			2-6	Revised section 2.4
			2-13	Added sections 2.15 through 2.21
		3	3-1	Added “G1000” to title
			3-1 and 3-2	Added figures 3-1 and 3-2 (two and three display system block diagrams)
			3-3	Added section 3.1 (System Communication)
			3-8	Added Figure 3-6, COM/NAV Data Path Block Diagram
			3-11	Added Figure 3-8, GFC 700 autopilot system block diagram (three display)
			3-12	Added Garmin GTS 8XX TCAS section 3.5 and block diagram
			3-14	Added GDU Overview Sections 3.6 and 3.6.1
		4	4-1	Revised opening paragraph
			4-5	Added GDU 10.0 screens to table 4-1
			4-6	Added sections 4.4, and 4.4.1, and figures 4-4 and 4-5
		5	All	Comprehensive revision (and addition) of information in entire section to support GDU software 10.0 including adding a section on Engine Trend Monitoring

Revision	Date	Section	Page	Description
		6	All	Comprehensive revision (and addition) of information in entire section to support GDU software 10.0
		7	7-1	Revised opening statement. Added caution after opening statement. Removed existing notes and created a general notes section making it more compatible to GDU software 10.0
			7-4	Comprehensive revision (and addition) of information in GDU Software Installation and Testing section to support two and three display configurations
			7-14	Added screen shot
			7-19	Dual Audio Panel information and procedures
			7-41	Added Dual Transponder information and procedures
			7-47	Added GMC 71X Autopilot Controller section 7.13 (includes 710 and 715) information and procedures
			7-53	Created section for the GCU 475.
		8	8-2 through 8-4	Revised sections 8.1 through 8.4 to support three display systems
			8-6	Added sections 8.5 and 8.6 to support a two display system
			8-8	Added new section 8.8, GTS 8XX tests
		9	9-1	Deleted section 9.1 “Service Timer”
			9-2	Added GDL 90, GSA 8X Servos, and GSM 85A Servo Gearbox procedures. Removed GSA Servos and GSM Servo Gearbox procedures
			9-4	Revised section 9.5, GSA greasing procedure. Added section 9.6, GSM Slip clutch checking and adjustment procedure

Revision	Date	Section	Page	Description
			9-10	Corrected symbology in Table 9-2
			9-11	Added section 9.8, Category B Long Term Power Interrupt Annual Inspection Procedure
		10	All	Comprehensive revision (and addition) of information in entire section to support GDU software 10.0 and three display configuration
		Appendix A	All	Comprehensive revision (and addition) of table (connector) information in entire section to support GDU software 10.0

DOCUMENT PAGINATION

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NOTE

This manual reflects the operation and configuration of GDU software version 10.0. In select instances, pre-GDU software version 10.0 information has been retained.

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

This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This Notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to the Garmin web site at www.garmin.com/prop65.

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

The content in this manual is nonspecific and is not associated to any particular aircraft configuration. All display screen shots serve as examples only.

NOTE

System software configuration and operation 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 data for correct software versions/part numbers and procedures for a specific aircraft model when returning an aircraft to service.

NOTE

At times, 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 33X; GTX, etc.)

CONTENTS

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SECTION 7—LRU SOFTWARE INSTALLATION AND TESTING

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SECTION 10—SYSTEM RECONFIGURATION

APPENDIX A—CONNECTOR PIN ASSIGNMENTS

SECTION 1
INTRODUCTION

This manual provides non-airframe specific top level maintenance information for the G1000 Integrated Flight Deck installed in standard piston/turboprop aircraft. Two and three display configurations are included. Field service of the G1000 is limited to replacing LRUs (Line Replaceable Units).

NOTE

This manual contains generic content—always refer to approved airframe specific information before performing maintenance. Different aircraft manufacturers may employ various methods to suit a particular installation.

NOTE

This manual presumes familiarity with the basic operating procedures covered in the applicable G1000 Pilot's Guide and Cockpit Reference Guide (CRG).

1.1 MANUAL ORGANIZATION

<u>Section 1—Introduction</u>

Discusses the scope of manual content and describes manual organization.

<u>Section 2—G1000 System Overview</u>

Provides an overview of the G1000 System.

<u>Section 3—LRU Descriptions</u>

Describes each G1000 LRU.

<u>Section 4—Configuration Mode</u>

Explains the configuration mode and the role it plays in troubleshooting. Also contains limited user interface information.

<u>Section 5—Troubleshooting</u>

Contains troubleshooting procedures which can help isolate a defective LRU.

<u>Section 6—LRU Replacement Procedures</u>

Lists procedures needed to replace a defective LRU.

<u>Section 7—LRU Software Installation and Testing</u>

Explains how to install, configure, and test software for a replacement LRU.

<u>Section 8—Return To Service Testing</u>

Describes return to service tests.

Section 9—Periodic Maintenance

Contains periodic maintenance procedures.

Section 10—System Reconfiguration

Provides an example of how to reconfigure the G1000.

Appendix A—Connector Pin Assignments

Provides a list of G1000 LRU pinouts.

SECTION 2

LRU DESCRIPTIONS

This section gives an example of the type of LRU that could be installed in a G1000 system. Refer to OEM maintenance documentation for the exact quantity and type of LRU used in a specific installation.

NOTE

The following list is not meant to be a complete listing of all LRUs installed in a specific aircraft. There may be others identified in the OEM maintenance documentation.

- GA 58 TCAS Antenna
- GCU 47X MFD Control Unit
- GCU 47X Remote Controller
- GDC 74X Air Data Computer (ADC)
- GDL 59 High Speed Data Link
- GDL 69X Satellite Data Link Receiver
- GDL 90 GPS WAAS Receiver/UAT
- GDU 1XXX Multi Function Display (MFD)
- GDU 1XXX Primary Flight Display (PFD)
- GEA 71 Engine/Airframe Unit
- GIA 63X Integrated Avionics Units (IAU)
- GMA 1347X Audio Panel with Marker Beacon Receiver
- GMC 71X AFCS Control Unit
- GMU 44 Magnetometer
- GPA 65 TCAS Power Amplifier
- GRC 10 Remote Control
- GRS 77 Attitude and Heading Reference System (AHRS)
- GRT 10 Wireless Transceiver
- GSA 8X AFCS Servo Actuator
- GSD 41 Data Concentrator
- GSM 8X Servo Gearbox
- GSR 56 Iridium Data Link
- GTA 82 Trim Adapter
- GTP 59 Outside Temperature Probe (OAT)
- GTS 8XX TCAS
- GTX 33X Transponder
- GWX 68 Weather Radar

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

Figure 2-1. GDU 1XXX PFD/MFD

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). Some aircraft may use a three display configuration. In a three display installation, the outer two displays are configured as primary flight displays (PFD's) giving the pilot and co-pilot identical views of the primary flight instruments. A third display is located in the center of the instrument panel and serves as the multi function display (MFD). The MFD displays navigation and engine/airframe instrumentation. The PFD displays primary flight information in place of traditional gyro systems.

GDU Communication

In a three-display installation, The MFD GDU communicates with both PFD GDUs and the GDL 69A through a High-Speed Data Bus (HSDB) Ethernet connection and with the GCU 47X via RS-232. Each PFD communicates with the MFD, GDL69A, its onside GIA, and the other PFD via HSDB Ethernet connection and with the GMC 71X via RS-232. In a two-display installation, the displays communicate with each other and with the GIA LRUs through a high-speed data bus (HSDB) Ethernet connection and with the GCU 47X via RS-232.

2.2 GMA 1347X AUDIO PANEL

Figure 2-2. GMA 1347X Audio Panel

The GMA 1347X 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 63X INTEGRATED AVIONICS UNIT

Figure 2-3. GIA 63X Integrated Avionics Unit

The GIA 63X provides the following functionality:

1. Avionics interface unit – the GIA 63X communicates with external avionics over many different interfaces (Figure 2-4). In the standard configuration, all interfaces are digital, and will provide full functionality when integrated with other Garmin avionics equipment, as well as many other avionics equipment with digital interfaces. An optional configuration is offered which will also interface with older equipment with analog, synchro, and other unique interfaces.

2. AFCS computer – the GIA 63X directly controls the automatic flight control system servos over a dedicated RS 485 bus.

3. HSDB communications hub – the GIA 63X transmits any data to be displayed on the GDUs over a dedicated Ethernet based high speed data bus (HSDB). In turn, the GDU provides control information back to the GIA 63X on a dedicated HSDB receiver.

4. Integrated avionics unit – the GIA 63X also contains the GPS WAAS Receiver, Glideslope and NAV radio receivers, and the COM transceiver.

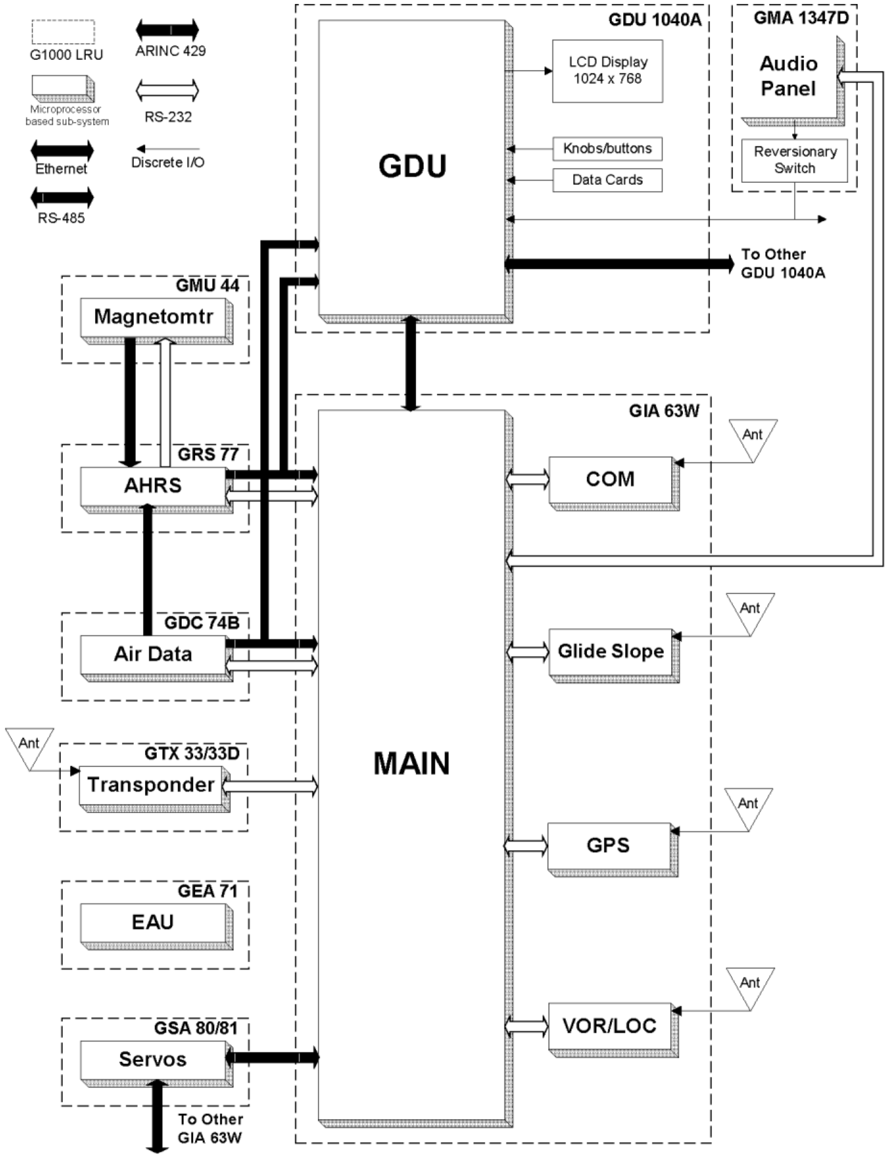


Figure 2-4. GIA 63X Block Diagram (example)

2.4 GDC 74X AIR DATA COMPUTER

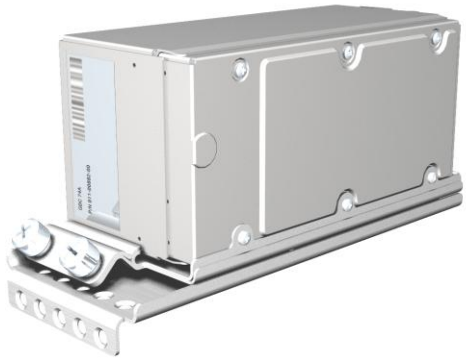


Figure 2-4. GDC 74X Air Data Computer

The GDC 74X is the Air Data Computer LRU, it uses pitot-static measurements and Outside Air Temperature data from the GTP 59 OAT probe to give air data calculations to the GIAs and the PFD's. Airplane-specific configuration parameters are kept in an external configuration module.

The GDC74X determines the following parameters:

1. Total Air Temperature, TAT. This is the temperature of the outside air, which includes the normal rise of temperature due to the ram effect. When air is compressed, as it is when it enters the pitot tube, the temperature of the air is increased. Since it is difficult to sense air temperature without some compression, TAT is measured and corrections are made as a function of airspeed.

2. Pressure Altitude. This parameter is simply read from an aneroid altimeter without correction for atmospheric pressure. Pressure altitude is used for the radar transponder and may be used for altitude hold, particularly for high-altitude flight.

3. Indicated Airspeed. This requires ram air from the pitot tube and provides information for an autopilot and for panel-mounted indicators.

4. Calibrated Airspeed. This parameter is used for indicators, as well as for the autopilot. The total air temperature and altitude are used as correction factors for determining calibrated airspeed.

5. Vertical Speed or Rate of Climb (ROC). Differentiating the altitude as a function of time in the computer provides the vertical speed parameter. The air data computer provides the instantaneous vertical speed output for use by the VSI (Vertical Speed Indicator) or IVSI (Instantaneous Vertical Speed Indicator) and the autopilot.

6. Mach. This parameter is a measure of speed based on the velocity of sound at the altitude and temperature at which the aircraft is operating. The calculation of mach involves the TAT and the indicated airspeed. The mach output is provided for the mach indicator and for the autopilot for use in the mach hold mode. In addition to the above, the GDC 74X also provides 2 RS-232 I/O Channels, 3 ARINC429 TX Channels, and 4 ARINC429 RX Channels.

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 33X TRANSPONDER

Figure 2-6. GTX 33X Transponder

The GTX 33X 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 74X Air Data computer and the GMU 44 magnetometer. The GRS 77 also utilizes GPS signals sent from the GIA 63X. 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 69X SATELLITE DATA LINK RECEIVER

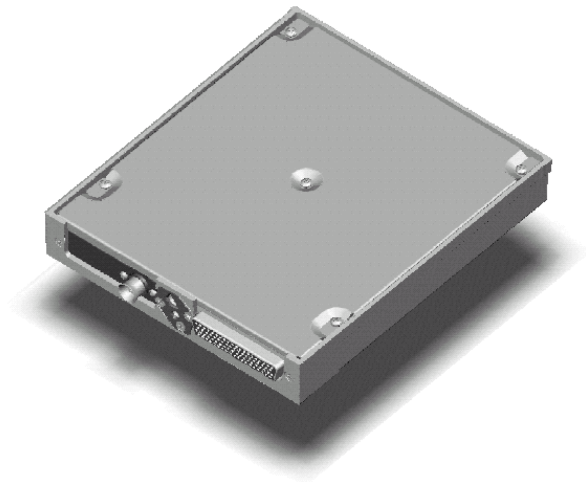


Figure 2-9. GDL 69X Satellite Data Link Receiver

The GDL 69X 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 8X AFCS SERVO ACTUATOR/GSM 85(A) SERVO GEARBOX

Figure 2-10. GSA 8X Servo Actuator

The GSA 8X 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 63X 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 8X servo actuator to the mechanical flight-control surface linkage.

2.11 GTP 59 OAT PROBE

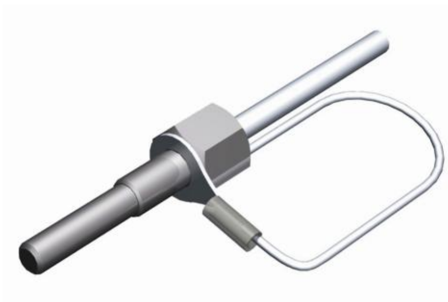


Figure 2-11. GTP 59 OAT Probe

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

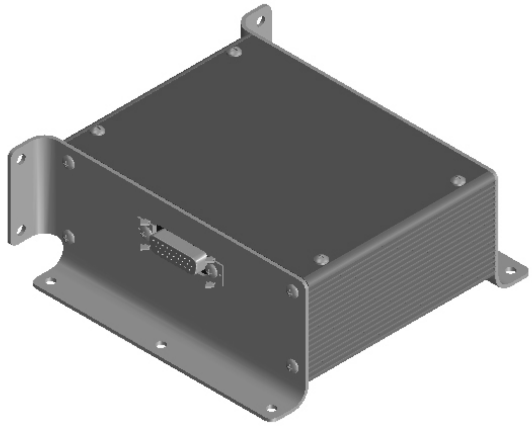


Figure 2-14. GTA 82 Pitch Trim Adapter

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.

2.15 GRT 10/GRC 10

Figure 2-14. GRT 10 Wireless Transceiver

The optional GRT 10/GRC 10 wireless remote system (Figures 2-14 and 2-15) is for use by passengers in the aircraft to control the audio functions of the Garmin GDL 69A Datalink Receiver. The system consists of two components: (1) The GRT 10 Wireless Transceiver installed in the aircraft and connected to the GDL 69A serial port, and (2) the GRC 10 Wireless Remote with an LCD display.

Figure 2-15. GRC 10 Wireless Remote

2.16 GTS 8XX/GPA 65/GA 58

The term "GTS 8XX" refers to a family of Traffic Advisory System (TAS) or Traffic Alert and Collision Avoidance System (TCAS I) microprocessor-based sub-systems used to interface to various avionics display and navigation equipment produced by Garmin.

The GTS 8XX family of products consists of the GTS 800, GTS 820 and GTS 850. The GTS 800 TAS product consists of the one LRU which has low power (40 Watts) transmit capability, and one GA 58 directional antenna. The GTS 820 TAS and GTS 850 TCAS I products include one LRU paired with one GPA 65 PA/LNA Amplifier Module, which allows high power (200W) transmit capability, and one GA 58 or other Garmin approved directional antenna. An optional second antenna may also be installed with either system. The optional second bottom mounted antenna may be omnidirectional or a Garmin approved directional antenna.

	GTS 800	GTS 820	GTS 850
Traffic Advisory System (TAS)	X	X	
Traffic Alert and Collision Avoidance System (TCAS I)			X
LRU	X	X	X
GPA 65 PA/LNA		X	X
GA 58 or other Garmin Approved Directional Antenna	X	X	X
Optional Garmin Approved Directional or Omnidirectional Antenna	X	X	X

The GTS 8XX is a microprocessor-based LRU (Figure 2-16) that uses active interrogations of Mode S and Mode C transponders to provide Traffic Advisories to the pilot. The GTS 820 and GTS 850 include a GPA 65 power amplifier/low-noise amplifier (PA/LNA) module (Figure 2-17), which allows for up to 40 nm of active surveillance range as well as Mode S interrogation capability. When installed with a 1090 MHz ADS-B transmit class of equipment, the GTS 800, GTS 820, and GTS 850 also utilize passive surveillance. Traffic is displayed on an external MFD via ARINC 429 and/or Ethernet High Speed Data Bus (HSDB). Aural traffic advisory alerting is also provided to the audio panel for broadcast to the crew.

A top-mounted directional antenna (Figure 2-18) is used to derive bearing to the intruder aircraft, which is displayed with relative altitude to own aircraft. Top antenna transmitted interrogations are directional, reducing the number of transponders that receive the interrogation thus reducing potential garble on the 1090 MHz band. Optional bottom antenna transmit interrogations are omni directional, using a monopole antenna (recommended for fixed gear installations) or a directional antenna (recommended for retractable gear installations). A bottom directional antenna installation gives the benefit of intruder bearing visibility for targets that are shaded from the top directional antenna.

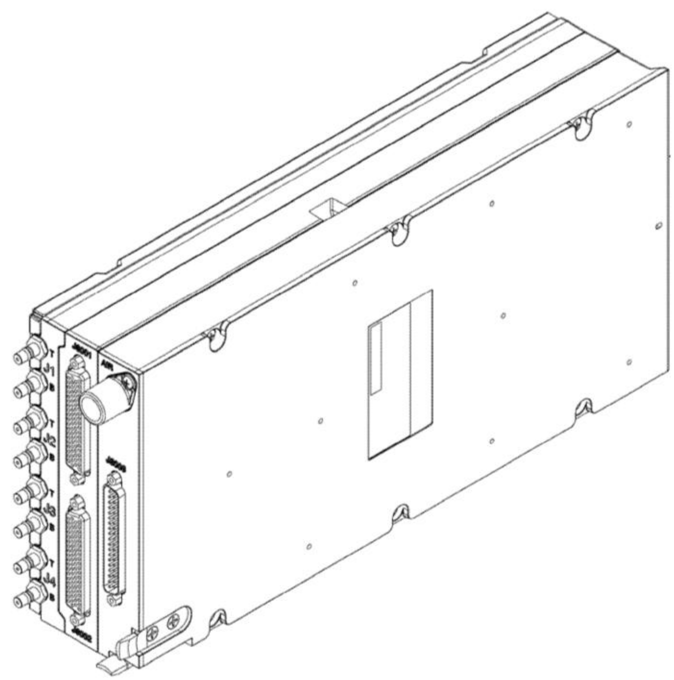


Figure 2-16. GTS 8XX TCAS Unit

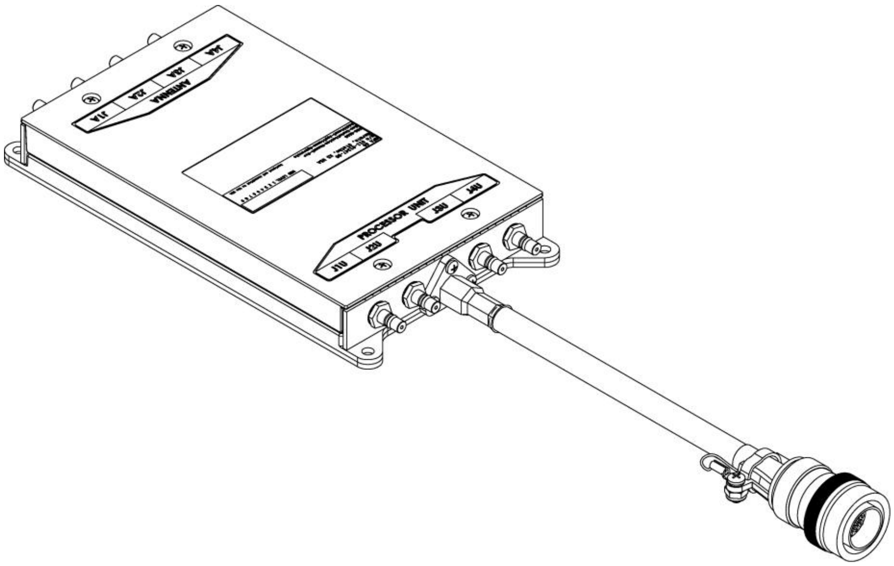


Figure 2-17. GPA 65 Power Amplifier

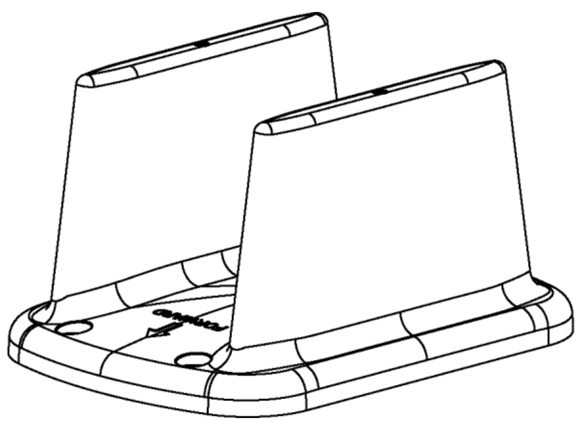


Figure 2-18. GA 58 Antenna

2.17 GCU 475 MFD CONTROL UNIT

Figure 2-16. GCU 475 MFD Control Unit

The GCU 475 provides the Flight Management System (FMS) controls for the MFD through an RS-232 digital interface.

2.18 GMC 715 AFCS CONTROL UNIT

Figure 2-17. GMC 715 AFCS Control Unit

The GMC 715 provides the controls for the GFC 700 AFCS through an RS-232 digital interface allowing communication with both PFDs.

2.19 GSD 41 DATA CONCENTRATOR

Figure 2-18. GSD 41 Data Concentrator

The GSD 41 is a data concentrator used to expand the input and output capabilities of the G1000 system. Communication is through the High Speed Data Bus.

2.20 GSR 56/GDL 59

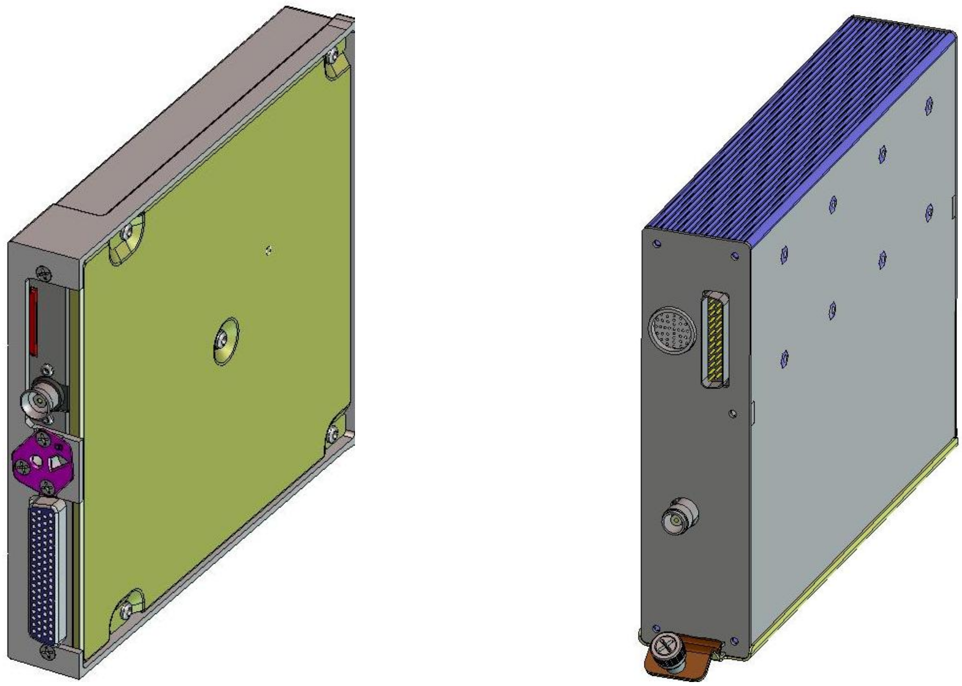


Figure 2-21. GDL 59 and GSR 56 Units

The GDL 59 serves as a short range, high speed data link between the aircraft and ground based networks. The GDL 59 is located in the aircraft and will provide communications service through an 802.11 RF link when on the ground. The GDL 59 can also provide a flight data logger function. When paired with the GSR 56 Iridium data link, the GDL 59 can provide in-flight voice calling and short burst data communications to ground based networks. The GDL 59 has various connection options to aircraft audio panels, a Plain Old Telephone Service (POTS) handset, aircraft avionics through High Speed Data Bus (HSDB), and zero, one or two GSR 56 Iridium satellite modules. The GDL 59 provides an effective means for aircraft avionics, pilots, and potential passengers to transfer voice and data between the aircraft and ground networks.

2.21 GCU 477

Figure 2-21. GCU 477 Remote Controller

The GCU 477 is a panel-mounted user control interface that enables the aircraft's flight crew to control the Garmin G1000 Flight Management System (FMS). The GCU 477 has 40 alpha-numeric keys, 15 special function keys, one dual rotary encoder, and one joystick encoder. The unit sends data over an RS-232 serial connection to the G1000 that informs the GDU when the manual interface controls are operated by the user.

SECTION 3

G1000 SYSTEM OVERVIEW

This section describes a generic G1000 system using two or three displays. The block diagrams are a representation only. The purpose of this section is to give the technician a general understanding of the G1000 system, not specific. Refer to OEM maintenance documentation for actual system information. Figure 3-1 shows a generic two display G1000 system and Figure 3-2 shows a generic three display G1000 system.

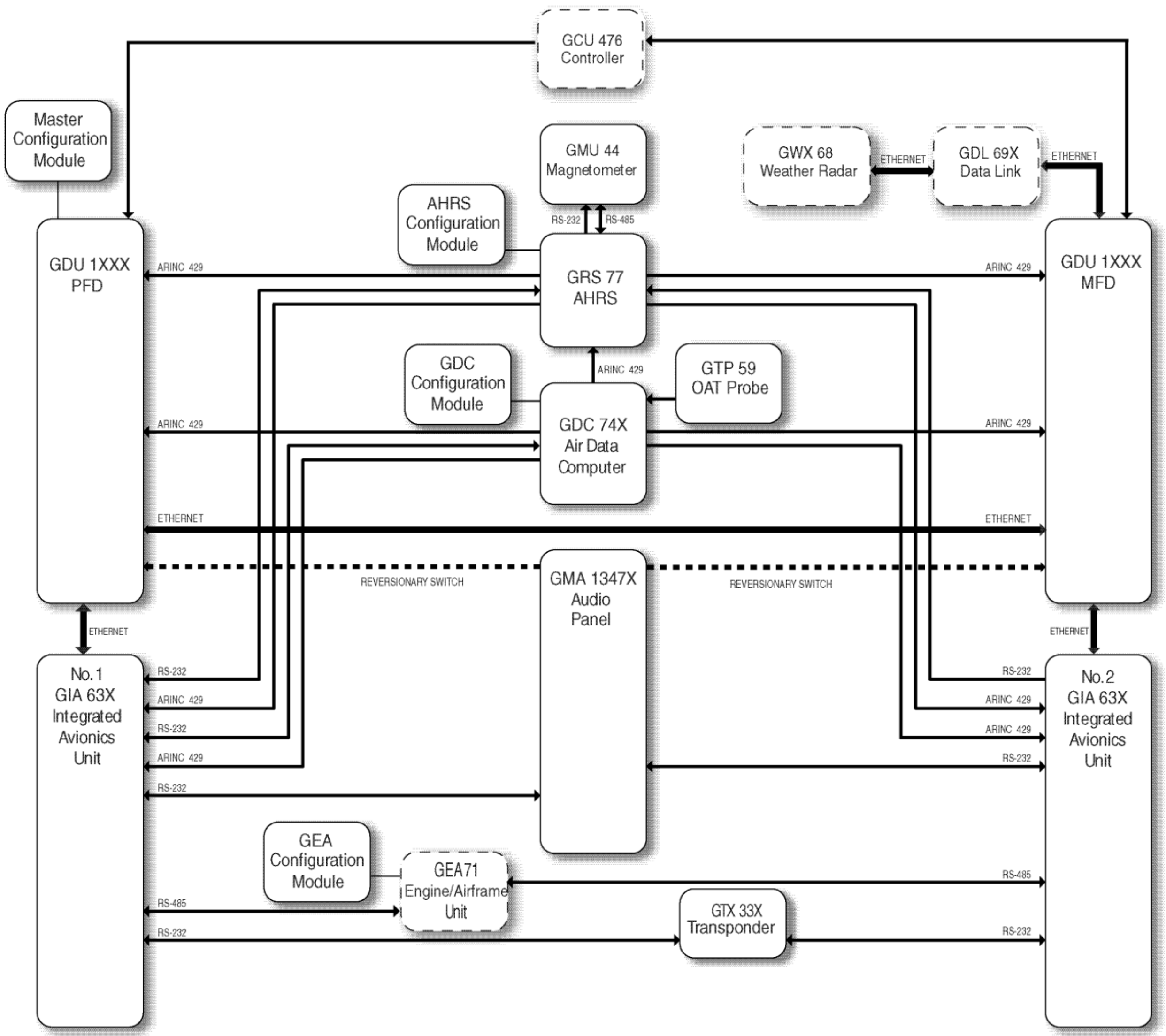


Figure 3-1. Two Display G1000 System

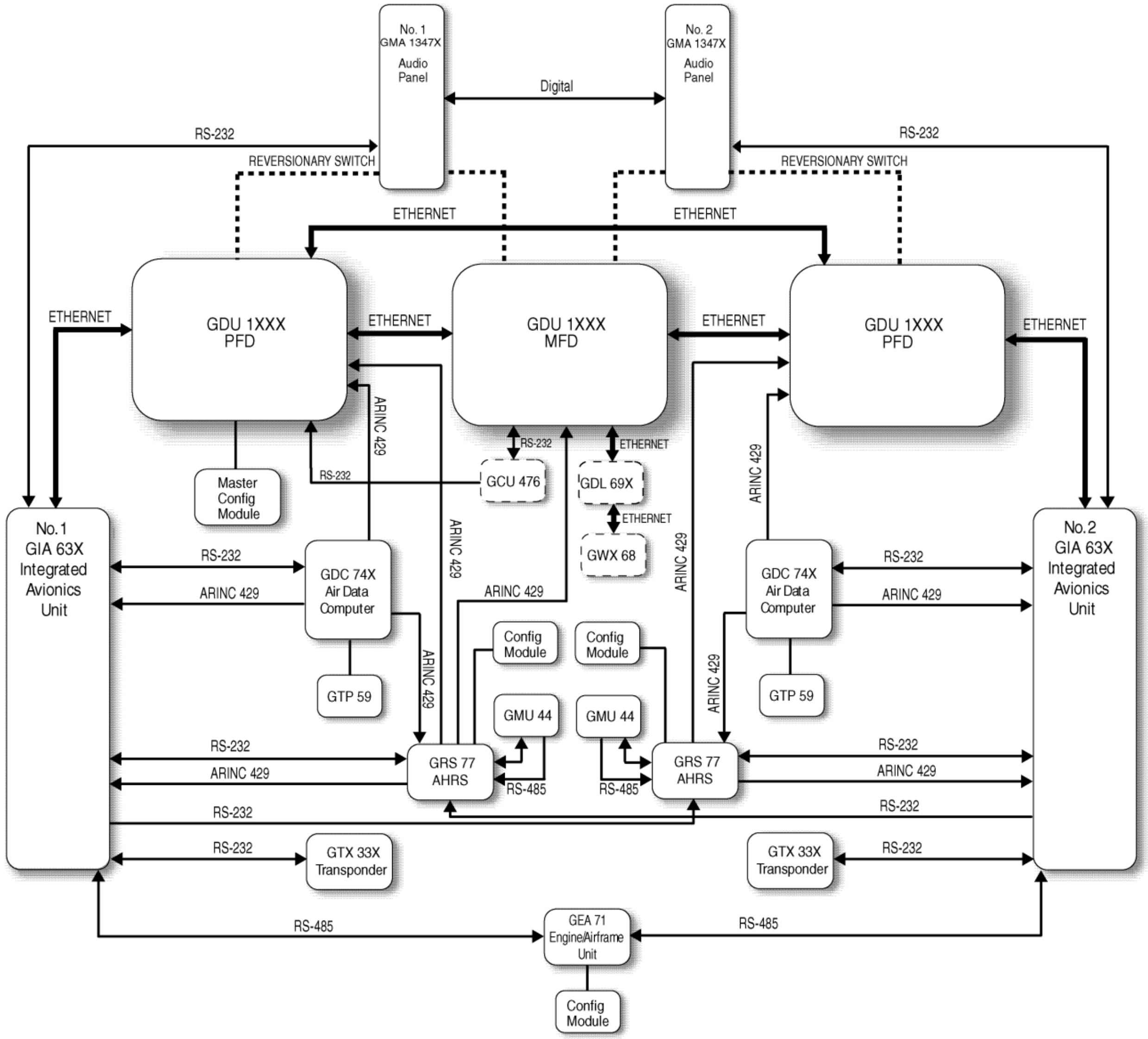


Figure 3-2. Three Display G1000 System

3.1 SYSTEM COMMUNICATION

The G1000 uses four main communication protocols to pass data between LRUs: ARINC 429, Ethernet/HSDB, RS-232, and RS-485. This section describes each one with the rationale behind its selection.

ARINC 429

The G1000 system utilizes uni-directional high (100k bits/second) and low speed (12.5k bits/second)ARINC 429 communication with parity integrity check. G1000 ARINC 429 data complies with the ARINC specification. This communication protocol was chosen for AHRS and air data because ARINC 429 is the standard aviation communication protocol for AHRS data. ARINC 429 communication in the G1000 system is utilized as follows:

- Path for AHRS data into the GDUs (primary path for displayed data).
- Path for AHRS data into the GIAs (backup path for displayed data in the event that the primary data path fails and primary path for AHRS data that is sent to the servos for AFCS purposes).
- Path for ADC data into the GDUs (primary path for displayed data) and the on-side GRS units.
- Path for ADC data into the GIAs (backup path for displayed data in the event that the primary data path fails and primary path for ADC data that is sent to the servos for AFCS purposes).

Ethernet/HSDB

The G1000 utilizes a proprietary communication protocol called HSDB (High-Speed Data Bus) to provide upper level communication capabilities, with point-to-point, full duplex channels capable of 10 Mbits/s data rates. This protocol was designed to give the required integrity and functionality with minimal additional overhead found in other more standard higher level Ethernet communication protocols and provides guaranteed delivery of asynchronous packets through an acknowledge protocol. Additionally, the HSDB communication protocol monitors the age of the communication data and contains routing information that the receiving sub-system utilizes to determine if the data needs to be passed along to another sub-system. The communication packets use an IEEE Standard 802.3 data link layer that utilizes broadcast messages. In the G1000 system this protocol is utilized as follows:

- Exclusive communication path between GDUs, GIAs, GSDs, GWX, GTS, and GDL.

RS-232

The G1000 system utilizes uni-directional or bi-directional configurable baud rate communication channels. RS-232 communication in the G1000 system is utilized as follows:

- Path between the GIAs and on-side GRS and GDC units for system installation configuration data and code uploading capabilities. This data path is also used by the GIA to send GPS data to the GRS. This communication protocol uses a CRC-16 integrity check. This communication protocol was chosen because of the requirement for two way communication. This data is checked by a CRC-32 before being used by the GRS and GDC.
- Primary path between the GIA and the GTX for pilot selection of the unit operating mode, transponder identification code, position identification mode and status information from the transponder such as the operating mode, transponder identification code, position identification mode and reply annunciation. This communication protocol uses a checksum scheme to validate the data. This communication protocol was chosen because of the two way communication requirement with the GTX in a low noise environment with low criticality data and because it is the communication protocol used in previously-certified Garmin transponder products.
- Path from GRS 77 to the GMU 44 utilized for code uploading. This communication protocol uses a CRC-16 integrity check. This communication protocol was chosen because of the requirement for a minimum number of pins on the connector of the GMU 44. The data being sent to the GMU 44 is code upload data which is checked by a CRC-32 before being used.
- Primary path between the GIA and the GMA for VHF COM selection information and code and configuration uploading. This communication protocol uses a CRC-16 integrity check. This communication protocol was chosen because of the requirement for two way communication with these sub-systems of low criticality data.

RS-485

The G1000 system utilizes RS-485 as a bi-directional point to point communication channels with a fixed baud rate of 115.2k bits/second and CRC-16 integrity check. RS-485 communication in the G1000 system is utilized as follows:

- Communication between the GIAs and the GEAs to communicate engine and airframe data. The communication with the GEA is a dedicated point-to-point communication used for data being passed in both directions. This communication protocol uses a token passing protocol to handle bus arbitration.
- Communication between the GIAs and the GSAs.

3.2 FLIGHT INSTRUMENTATION

The GRS 77 AHRS, GDC 74X Air Data Computer, and GMU 44 Magnetometer provides the G1000 with flight instrumentation. Data consist of aircraft attitude, heading, altitude, airspeed, vertical speed, and outside air temperature information, all displayed on the PFD (data is displayed on the MFD in reversionary mode). Data outputs from the GRS and GDC 74X are sent directly to the PFD via ARINC 429.

Additional communications paths connect the GRS and GDC 74X to on-side GIA 63W units, providing redundant data paths for primary flight data. The GRS 77 receives GPS data from both GIAs, airspeed data from the GDC 74X, and magnetic heading from the GMU. Using these three external sources, combined with internal sensor data, the GRS accurately calculates aircraft attitude and heading.

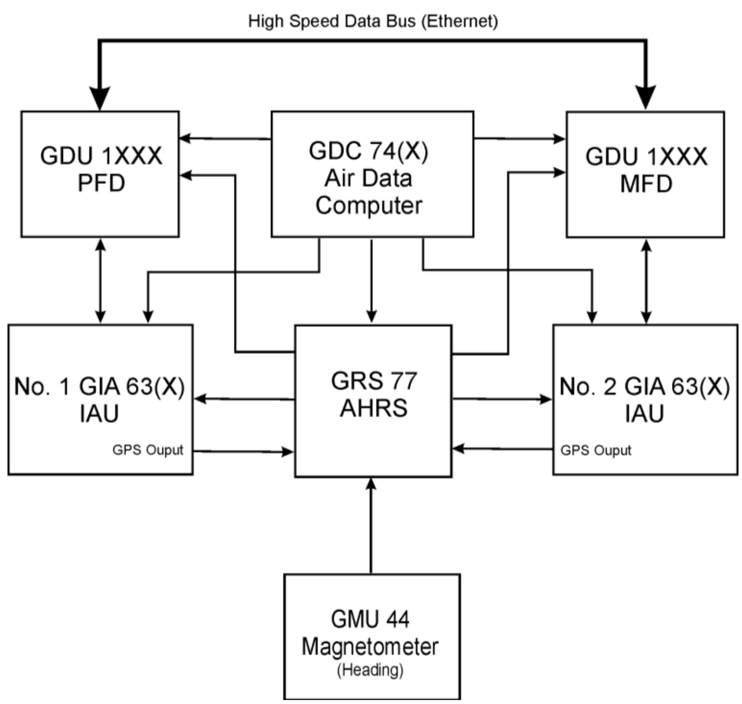


Figure 3-3. Basic G1000 Flight Instrumentation (Two Display System)

3.3 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

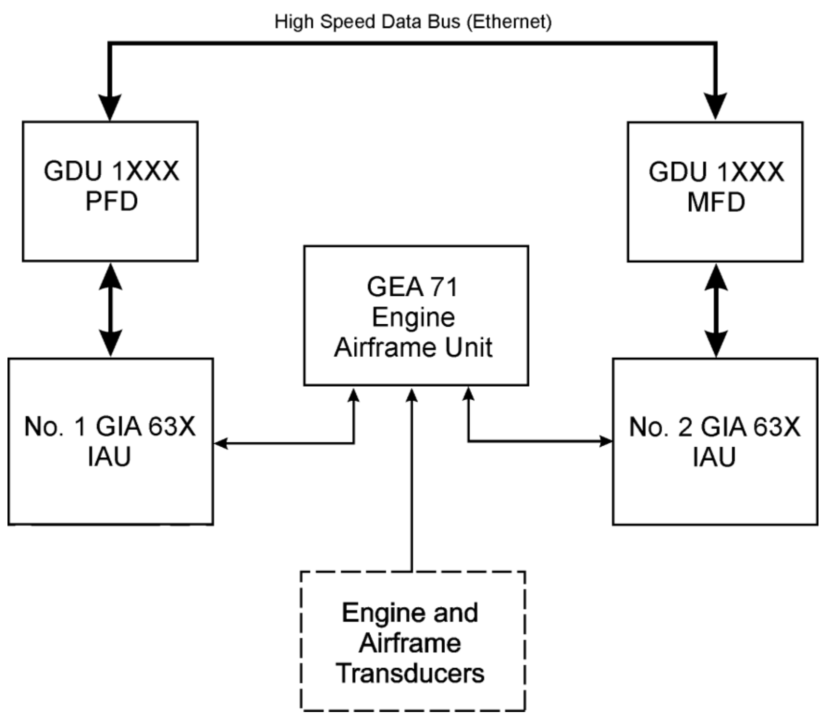


Figure 3-4. G1000 Engine Indication System (Two Display System)

3.3 G1000 COM/NAV SYSTEM

The GIA 63X IAUs contain the VHF COM, VHF NAV, and GPS receivers. COM and NAV digital audio is sent to the Audio Panel (analog COM is used as a backup). 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. The GIA 63X also generates audio alerts.

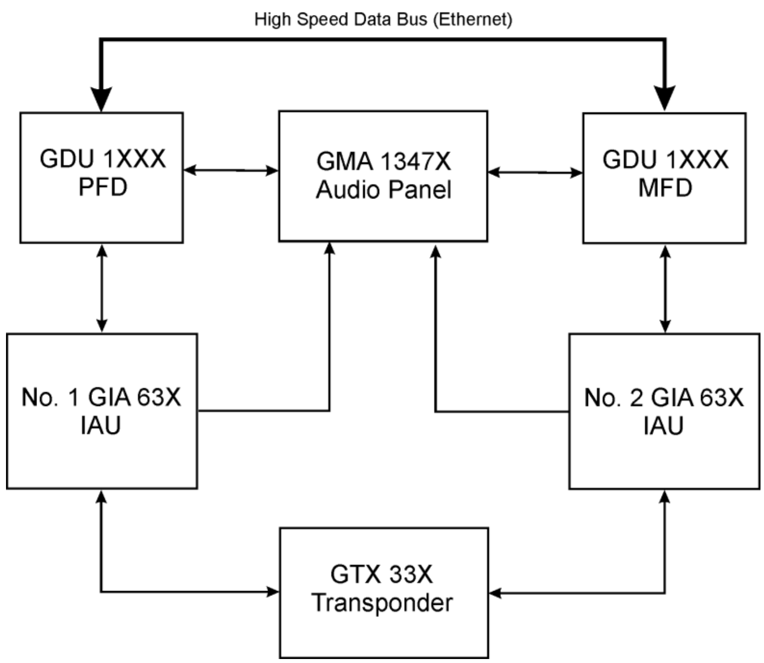


Figure 3-5. G1000 COM/NAV System (Two Display)

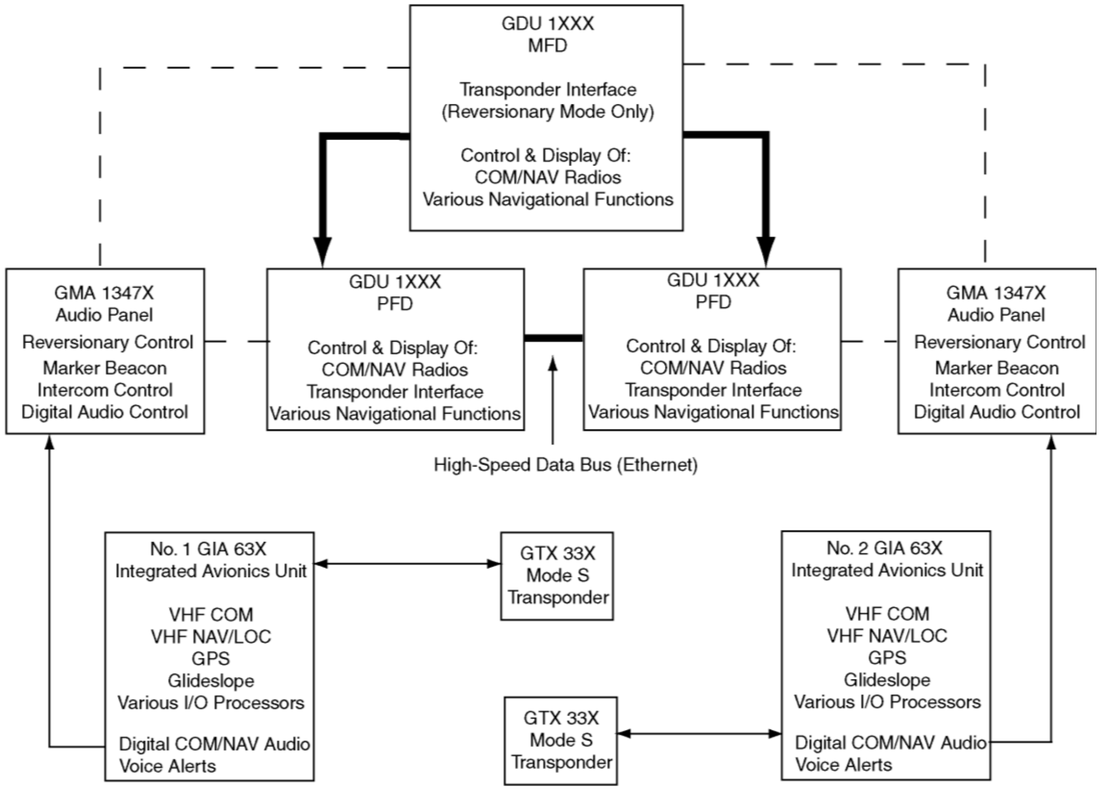


Figure 3-6. G1000 COM/NAV Data Paths (Three Display System)

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 a GIA 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. It does not actively maneuver the aircraft laterally or vertically.

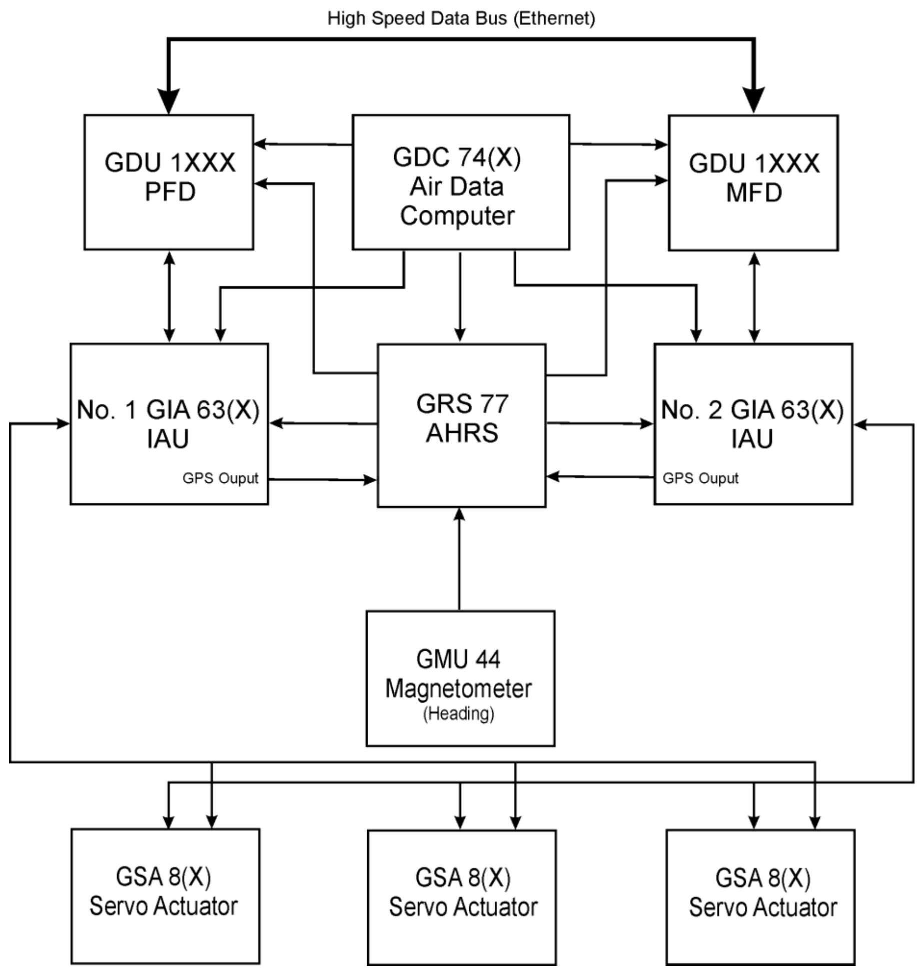


Figure 3-7. Typical GFC 700 Autopilot System (Two Display)

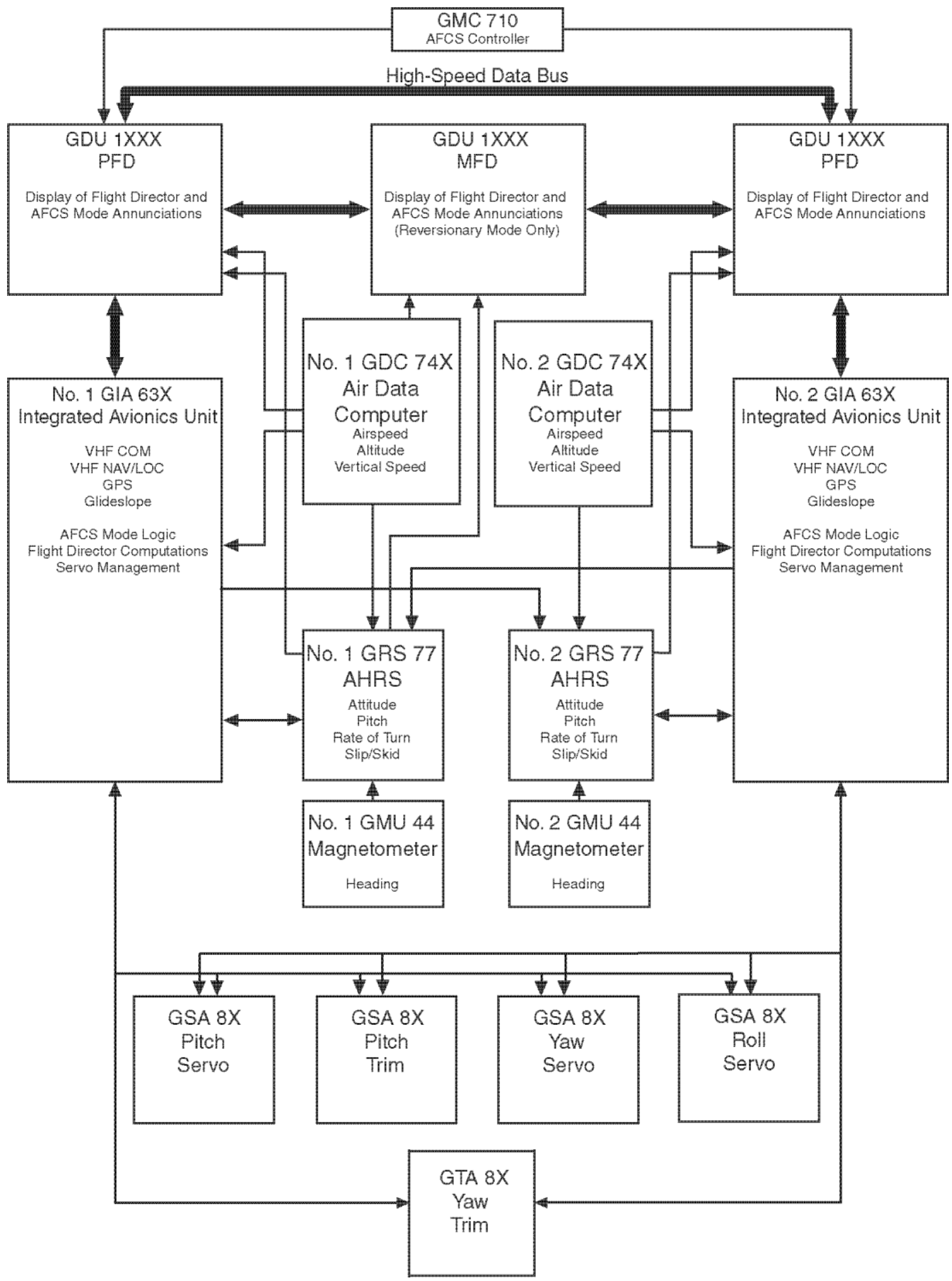


Figure 3-8. Typical GFC 700 Autopilot System (Three Display)

3.5 GTS 8XX TCAS SYSTEM

The term "GTS 8XX" refers to the family of Traffic Advisory System (TAS) or Traffic Alert and Collision Avoidance System (TCAS I) microprocessor-based sub-systems used to interface to various avionics display and navigation equipment. The GTS 8XX Sub-System is shown in Figure 3-9.

The functions provided by the GTS 8XX include:

- Output relative altitude and bearing of targets tracked through active and passive surveillance using ARINC 429 protocol or Garmin's proprietary HSDB protocol.

- Generate Traffic Advisories, via visual annunciation, aural annunciation, voice messages and serial data using ARINC 429 protocol or Garmin's proprietary HSDB protocol to aid pilots in visual acquisition of traffic targets.

High level functions of the GTS 8XX include:

- Active interrogation and tracking of up to 45 intruders equipped with Mode A/C transponder.

- Active interrogation and tracking of up to 30 intruders equipped with Mode S transponder (GTS 820/GTS 850 only).

- Passive surveillance of traffic targets by monitoring ADS-B messages received on 1090 MHz band, and correlation with targets tracked through active surveillance.

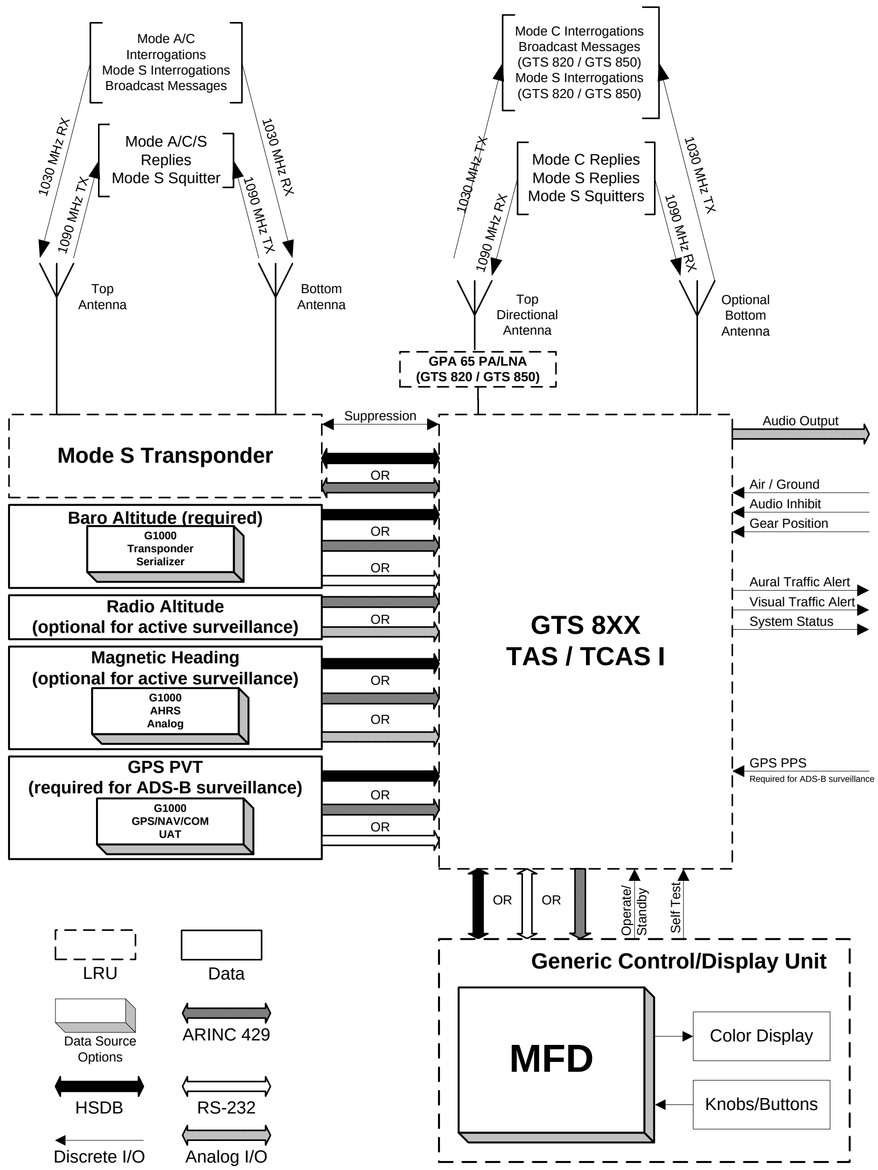


Figure 3-9. GTS 8XX Sub-System

3.6 GDU OVERVIEW

The GDU 1xxx provides display and control for the G1000. Typical piston/turboprop aircraft installations can involve two or three GDUs and optional remote control devices.

3.6.1 GDU Communication

HSDB

The term HSDB refers to an Ethernet based high speed data bus communications capability, providing an interface between individual sub-systems (LRUs) of the G1000 system. Each connection between those sub-systems is a point-to-point full-duplex connection that utilizes standard Ethernet technology combined with Garmin proprietary protocols. The displays communicate directly with other LRUs via HSDB. These other LRUs include other displays, integrated avionics units (GIA 63X), serial data concentrators, data link receivers, and weather radars. The GIA 63X communicates with additional LRUs and discretes, concentrating serial, analog, and discrete input and output data. This data provides a means for the GDU 1xxx to communicate indirectly with additional LRUs. These indirect LRUs include audio panels, engine acquisition units, and FADECs.

ARINC 429

The GDU communicates directly with other LRUs via ARINC 429. These LRUs include Attitude and Heading Reference Systems (AHRS) and Air Data Computers (ADC).

RS-232

The GDU receives data directly from remote control units and provides debugging information via RS-232.

Dimming

The GDU provides dimming of the displays and other integrated control/display LRUs (such as the audio panels and remote controllers) via its monitoring of an aircraft dimming bus, through a light detection sensor (photocell), or manually.

Uploading and Configuring Software

The GDUs SD card slots are used to upload and configure software for the G1000. A software loader card contains software files and configuration files. An SD card can also be used to download maintenance data.

GDU Software

GDU software is uploaded into each GDU individually from a software loader card. GDUs are configured in a similar manner as other LRUs. Other LRUs are uploaded with software after the GDU software is loaded.

Databases

The basemap and navigation databases are stored internally in each GDU. Other databases are stored on a SD Card that remain resident in the GDU. These databases include the terrain, obstacle, SafeTaxi, ChartView, FliteCharts, and airport terrain databases. Each GDU retains its own copy of each database. Some product features such as ChartView, Synthetic Vision, and TAWS require a one-time activation by means of a uniquely programmed SD card.

Blank Page

SECTION 4
CONFIGURATION MODE

This section describes the configuration mode of operation which is used in troubleshooting and configuring the G1000. This section presumes 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., a GTX 33(x) will be identified in this section as GTX). The only duplicate in the prefix of any LRU pertains to the GDL 69(x) XM Satellite Receiver, GDL 90 GPS WAAS receiver/UAT, and the GDL 59. The suffix will be added in that situation.

NOTE

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

Configuring, calibrating, and troubleshooting the G1000 is 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 and PFD2 (if installed). The System Status Page (Figure 4-1) is displayed on the MFD and the PFD.

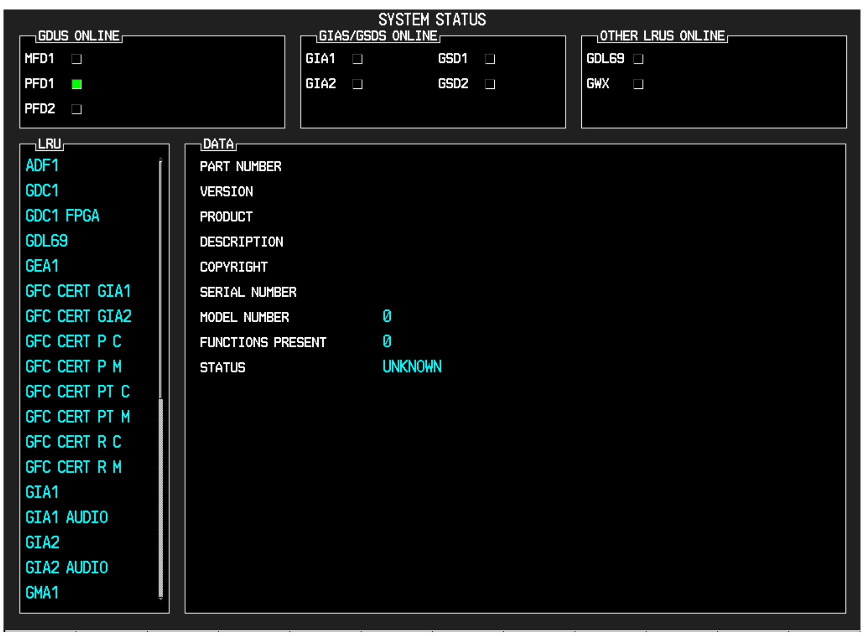


Figure 4-1. System Status Page (Configuration Mode)

4.1 USER INTERFACE

Once the G1000 is placed in configuration mode, the large and small FMS knob is 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, MFD Control Unit and AFCS controls are described in the Pilot's Guide.

4.1.1 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

4.2 SECURE DIGITAL (SD) CARDS

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 G1000 LRUs. Basically, 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 card part number because each card part number defines all files found on the card 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

Ensure that the G1000 system is powered off before inserting the SD card.

The GDU data card slots use the 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 SD 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 label facing to the left. Push the card in fully and release, the spring latch should hold the card in place. The end of the card should be nearly flush with the face of the display bezel.

To remove an SD card:

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

Figure 4-3. GDU Bezel SD Card Slots

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 theses 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).

GARMIN

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

SYSTEM System Status Date/Time Setup Main Lighting Audio Alert Configuration System Upload File Manager Diagnostics Terminal Maintenance Log OEM Diagnostics Terminal System Configuration System Data Paths System Setup Manifest Configuration Maintenance Log	**GDU** RS-232/ARINC 429 Config GDU Status GDU Test Diagnostics Serial / Ethernet I/O Video Alert Configuration Airframe Configuration Terrain Proximity Setup (TAWS Configuration)	**GDC** GDC Configuration
GIA RS-232/ARINC 429 Config CAN/RS-485 Configuration GIA I/O Configuration COM Setup GIA Status CAN Configuration	**GSD** GSD ARINC Configuration GSD RS-485 Configuration GSD I/O Configuration GSD Status	**GDL** GDL69 Configuration
GTX RS-232/ARINC 429 Config Transponder Configuration	**GRS** AHRS/AIR Data Input GRS/GMU Calibration	**OTHER** STORMSCOPE S-TEC®
GFC GFC Configuration GFC Status	**GMA** GMA Configuration	**GWX** GWX Configuration
RMT Remote Status	**CAL** Fuel Tank Calibration Flaps & Trim Calibration HSCM Calibration Airframe Calibration	**ADC Configuration** ADC Configuration GDC Configuration
GEA Engine Data GEA Status GEA Configuration	**GTS** GTS Configuration	

4.4 CONFIGURATION FILES

NOTE

The GRS 77 AHRS and GMU 44 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 following configuration files (this list is nonspecific and can differ depending on the requirements of a particular installation):

- AIRFRAME – configures the G1000 for the specific aircraft.
- SYSTEM - configures the G1000 Ethernet to communicate with a PFD, MFD, and GIAs and other LRUs that support HSDB.
- MANIFEST - uploads a manifest of all software part numbers and versions associated with an approved system configuration.
- MFD1 - configures the MFD serial/discrete communications settings.
- PFD1/PFD2 - configures PFD serial/discrete communication system settings.
- GIA1/GIA2 - these files configure GIA1/GIA2 serial/discrete and other digital communication settings.
- GMA1/GMA2 - configures GMA audio and serial communication settings.
- GTX1/GTX2 - configures GTX transponder and serial communications settings.
- GEA1/GEA2 - configures GEA engine/airframe parameters.
- GDC1/GDC2 - configures GDC air data values for the aircraft.
- GDL69 - configures GDL 69/69A data link and communications settings.
- GMC - configures the GMC 710 lighting settings.
- GCU - configures the GCU 475 lighting settings.
- CALIBRATION - configures the fuel and trim calibration data as well as other calibration data. This data is typically loaded only during initial production, or prior to recalibrating a specific aircraft system.
- GWX - configures the GWX 68 weather radar settings.
- AUDIO - configures all of the audio messages for the G1000 system including tones and voice messages.
- GTS – configures GTS 8XX TCAS.
- ALERT-configures the GIA for alert messages.
- GFC-if aircraft is equipped with GFC there will be cert gain files, servo files, etc.

4.4.1 Configuration File Retention

The G1000 stores all configuration settings in various locations allowing the configuration of the system to be retained in the aircraft during maintenance. Since the G1000 is installed in a variety of aircraft, it is imperative that aircraft specific data be retained at the aircraft level. Figures 4-4 and 4-5 illustrate a block diagram of how a typical G1000 stores configuration settings. The GRS 77 and GDC 74X configuration modules function differently than the rest of the system. The GDC 74X's configuration file is loaded directly to GDC internal memory, a copy is also stored in the GDC configuration module. The GRS 77 configuration module stores calibration data recorded during installation calibration procedures and does not store configuration settings.

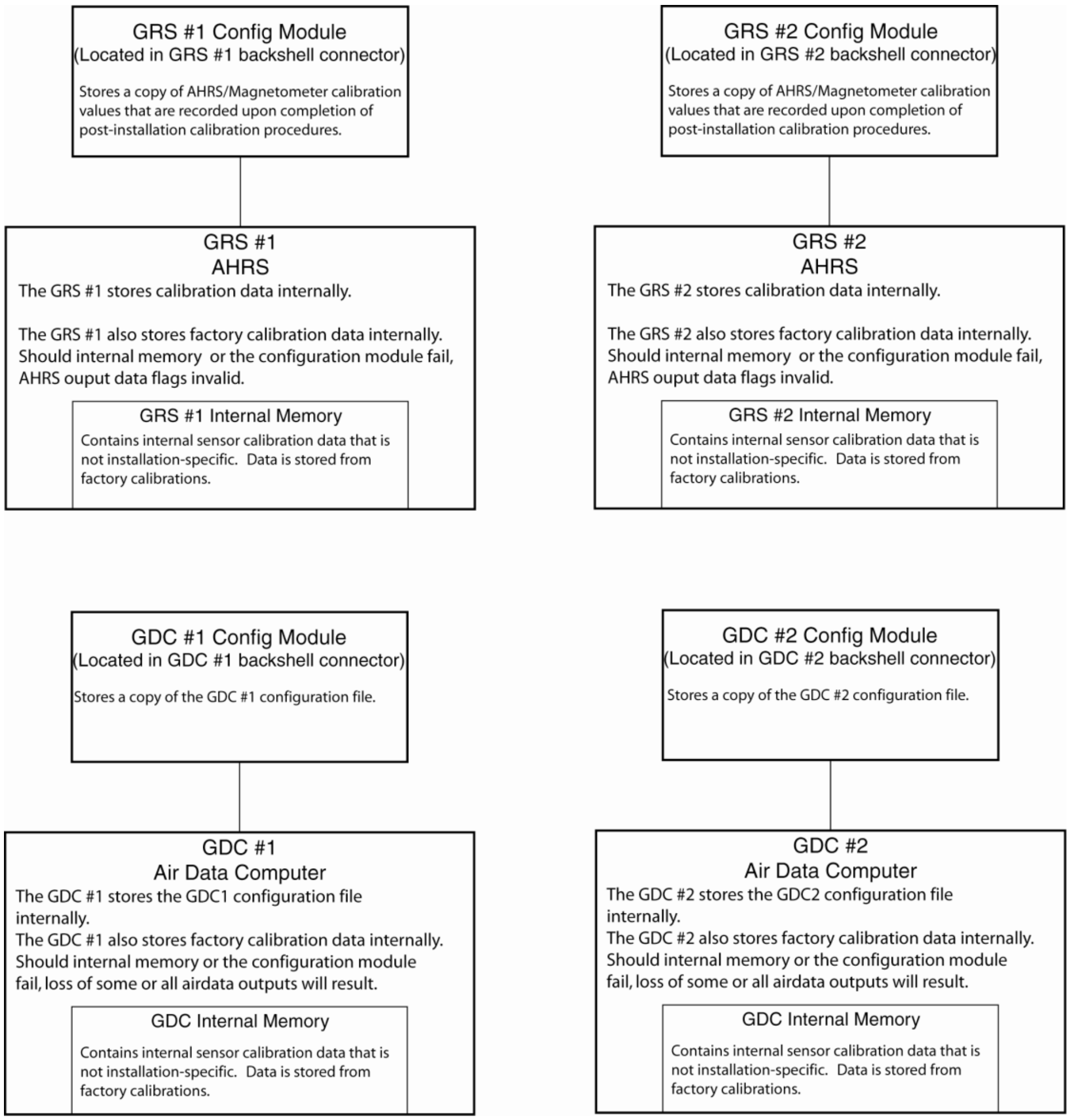


Figure 4-4. GRS/GDC Configuration File Storage (3 Display)

NOTE: Starting with GDU 9.0, the PFD config module no longer stores all config.
It only contains a subset used to store calibration type partameters. Therefore, it doesn't
have an identical copy and doen't serve as a backup.

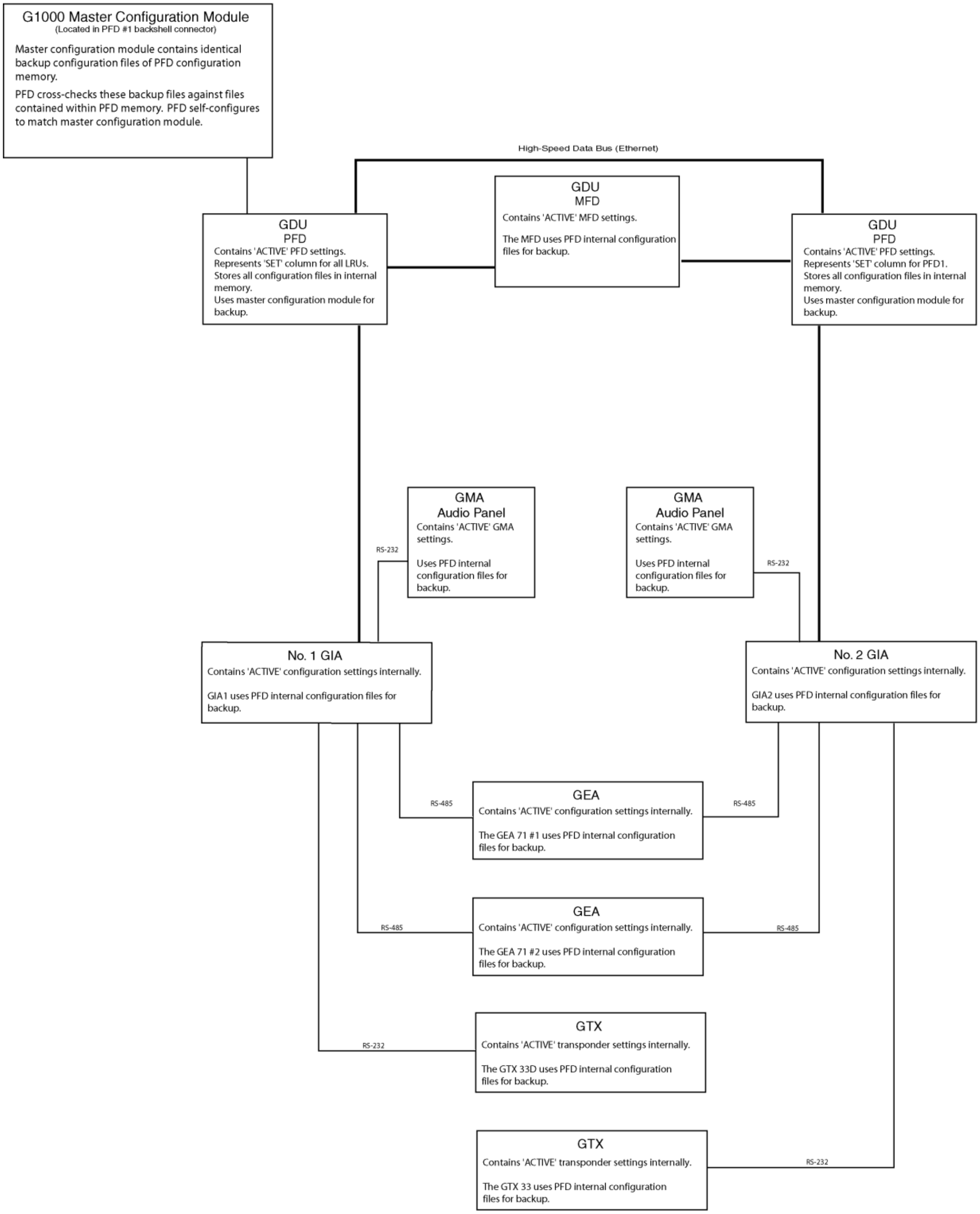
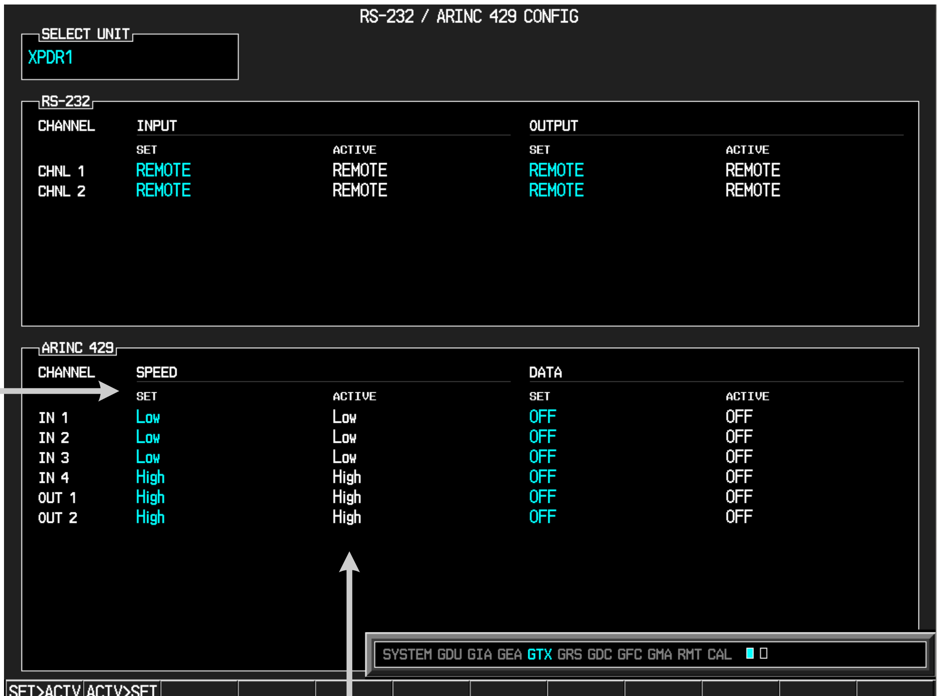


Figure 4-5. System Configuration File Storage (3 Display)

4.5 'SET' AND 'ACTIVE' COMMANDS

The SET and ACTIVE commands on various configuration pages are used for setting input/output conditions (Figure 4-6).

SET Column



ACTIVE Column

SET>ACTV and ACTV> Softkeys

Figure 4-6. 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 4-7.

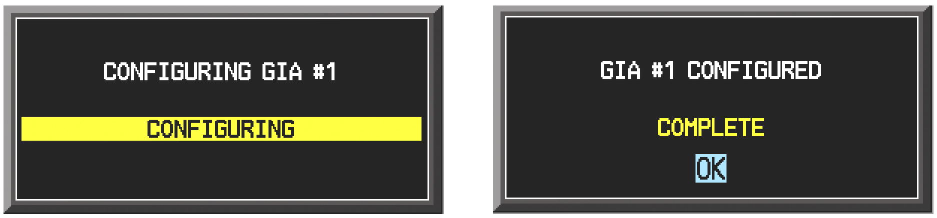


Figure 4-7. Configuration Status Prompts

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 4-8. Data Transmission Indicators

A blank ACTIVE column displays the loss of communication between the display and a specific LRU (Figure 4-9).

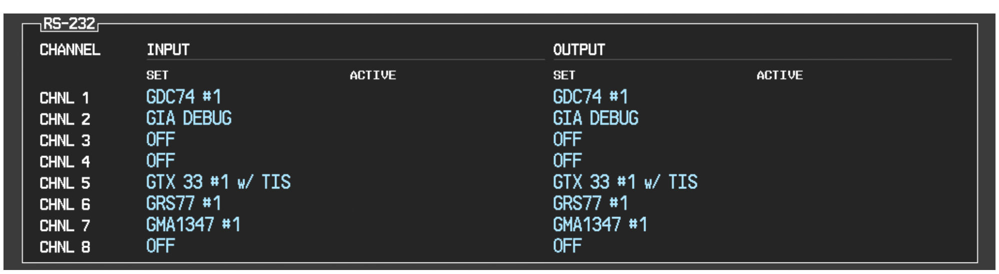


Figure 4-9. Loss of Communication Indication

SECTION 5
TROUBLESHOOTING

This section contains troubleshooting procedures that can aid in isolating a faulty LRU. The procedures and methods described are generic and must be adapted for specific situations.

5.1 TROUBLESHOOTING METHODS

5.1.1 Visual Hardware Inspection

Begin troubleshooting with a visual inspection. Check for corrosion, damage, or other defects. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors. Follow the guidance given in Section 6 for LRU replacement. Refer to the OEM maintenance documentation for instructions on removing any aircraft access panels.

5.1.2 LRU Failure 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.

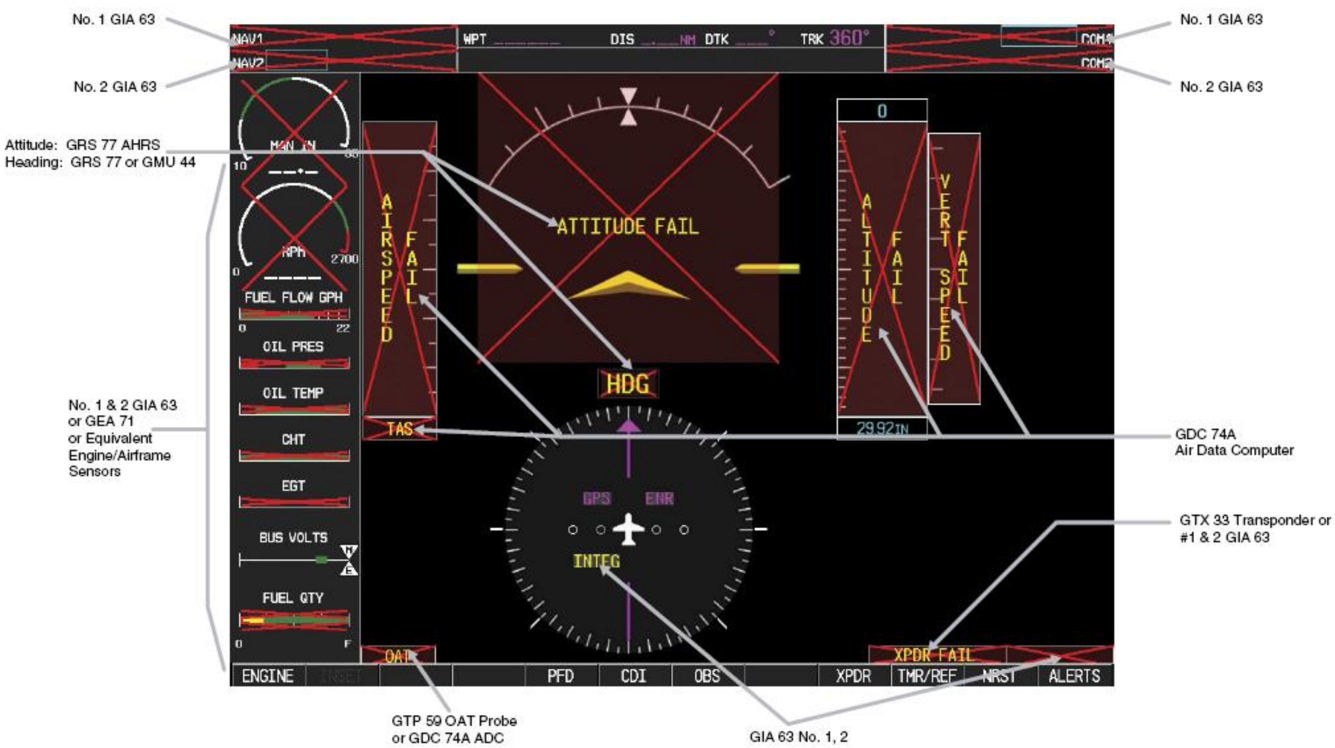


Figure 5-1. LRU Failure Annunciations

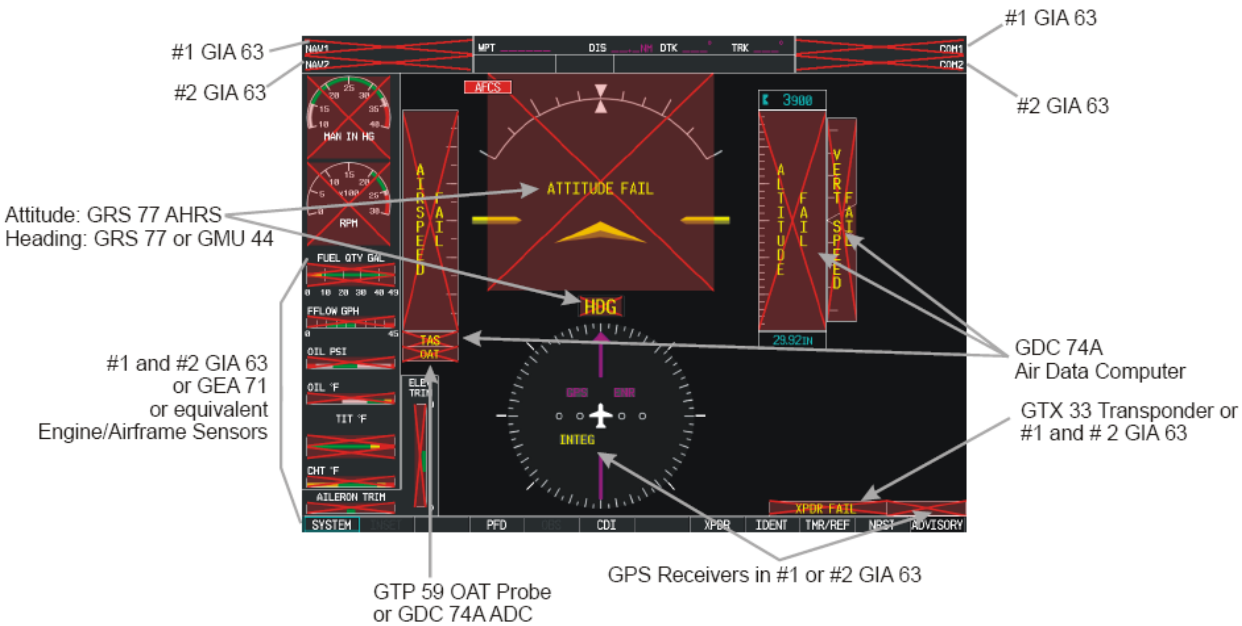
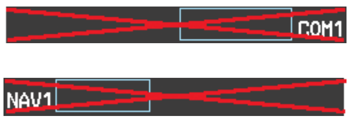


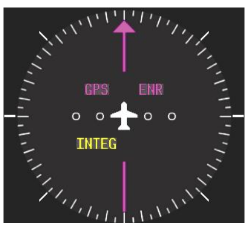
Figure 5-2. Additional Invalid Display Fields

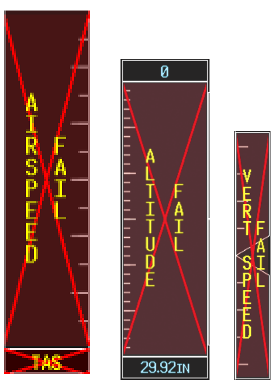
5.1.2.1 LRU Failure Annunciations and Recommended Actions

Table 5-1 lists specific annunciations, the associated LRU, and recommended actions to take. Use the information listed in Table 5-1 in conjunction with Figures 5-1 and 5-2.

Table 5-1. LRU Failure Annunciations and Recommended Actions

Annunciation	Associated LRU	Solution
NAV1 or COM1 	**GIA1**	• Check PFD1 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: – If problem follows GIA1, replace GIA1. • Check Ethernet interconnect from GIA1 to MFD or PFD1 (based on aircraft configuration) and unit connector pins for faults. • If problem persists, replace PFD1.
NAV2 or COM2 	**GIA2**	• Check PFD1 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: – If problem follows GIA2, replace GIA2. • Check Ethernet interconnect from GIA2 to MFD or PFD2 (based on aircraft configuration) and unit connector pins for faults. • If problem persists, replace MFD or PFD2 (based on aircraft configuration).

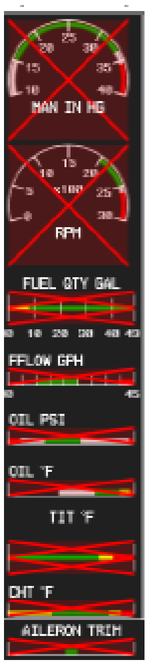
Annunciation	Associated LRU	Solution
GPS INTEG or Time  	**GIA1 or 2**	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • Check PFD1 Alert Window for GIA1/2 configuration, software or failed data path error messages. Correct any errors before proceeding. • Verify the aircraft is located where the GPS antennas have a clear view of the sky. • Verify the aircraft is not parked in close proximity to a hanger with the doors open equipped with a GPS repeater • On the MFD AUX – GPS STATUS page, check for erratic GPS Signal Strength bars. If they are erratic, external interference is affecting the GPS receiver. Locate source of interference and remove. • Swap GIA1 and GIA2 to verify location of problem. If problem follows the GIA, replace the GIA. • Check corresponding GPS antenna and cable for faults. Correct antenna or cable fault. • Check PFD1 to GIA1 and PFD2 (or MFD) to GIA2 Ethernet interconnect for faults. Correct interconnect fault. • If problem persists; replace PFD1, PFD2 or the MFD that shows the problem.

Annunciation	Associated LRU	Solution
XPDR FAIL  	**GTX 33**	• 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.
TAS FAIL **AIRSPEED FAIL, ALTITUDE FAIL, VERT SPEED FAIL**  	**GDC 74A**	• 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 PFD1 Alert Window for PFD1/2, MFD or GDC configuration, software or failed data path error messages. Correct any errors before proceeding. • Inspect GDC 74X pitot/static ports and plumbing for blockage. • Check GDC 74X configuration settings for the PFDs, MFD, GIA1, and GIA2. Reload if unsure they are correct. • If PFDs, MFD, and GIA configuration settings are correct, replace the GDC 74X. • If problem persists, replace the GDC 74X configuration module.
OAT  **and** **TAS**  	**GTP 59**	• Check OAT probe wiring, probe and connectors for faults or damage. • Replace GDC 74X config module and pigtail harness. • Replace the GTP 59. • If problem remains, replace GDC 74X.

Annunciation	Associated LRU	Solution
ATTITUDE FAIL 	**GRS 77**	• 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 metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that may contain steel reinforcements • Check PFD1 Alert Window for PFD1/2, MFD or GRS configuration, software or failed data path error messages. Correct any errors before proceeding. • Ensure GRS 77 unit connecter is secure and proper wire harness strain relief is provided. • Ensure the GRS 77 is fastened down tightly in its 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). • Cycle GRS 77 power to restart initialization. • 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 for an ATTITUDE FAIL that appears during ground operation only. • 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 GRS77 Configuration module. • Contact Garmin Aviation Product Support if condition continues after replacing the GRS 77 and config module for additional assistance.

Annunciation	Associated LRU	Solution
HDG FAIL 	**GRS 77 & GMU 44**	• Check PFD1 Alert Window for PFD1/2, MFD or GRS configuration, software or failed data path error messages. Correct any errors before proceeding. • Ensure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that may contain steel reinforcements • 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. • 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
Engine/Airframe Sensors  	**GEA 71 & GIA 63 or GIA63W**	• 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 GEA STATUS page and verify that the GEA internal power supply, configuration, and calibration status boxes are green. – 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 RED-X of the EGT, TIT and CHT temperature readings, or any other data that uses a thermocouple or thermopile, replace the GEA configuration module and thermocouple located in the back shell of the GEA connector.

5.1.3 LRU Failure Indications on the System Status Page

The System Status Page (MFD) in the AUX group of pages displays the status for all detected LRUs. Green checks indicate active LRUs, red x's indicate failed LRUs.

Figure 5-3. System Status Page (AUX Group of pages)

5.1.4 Data Path Failure Messages

In addition to LRU failure indications, data path messages can also be used to help identify a faulty LRU. For example, the following message indicates that a data path connected to the GDU (MFD or PFD) or the GIA 63/GIA 63W (1or 2) has failed:

FAILED PATH – A data path has failed. Check configuration mode

The failed path message is triggered by the timeout of a digital channel. The channels that are checked are displayed on these configuration pages:

1. Main GDU RS-232/ARINC 429 Configuration Page (PFD1/2, and MFD) (Figure 5-9).
2. GIA RS-232/ARINC 429 Configuration Page (GIA1 and GIA2) (Figure 5-10).
3. GIA RS-485 Configuration Page (GIA1 and GIA2) (Figure 5-11).

Note: a failed path message remains in the list of messages until the next power cycle.

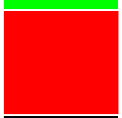
5.1.5 Data Path Indications on the Main and GIA Configuration Pages

NOTE

Pre GDU 9.11 software uses solid green, black, and red indicator boxes on the configuration pages. Post GDU 9.11 software uses green check, red x, black N/A, and yellow ? indicator boxes on the configuration pages. Although the manual uses pre GDU 9.11 boxes in the troubleshooting tables, the technician should be aware of the differences.

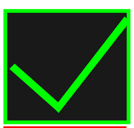
Pre GDU 9.11 Software:

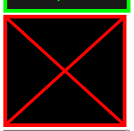

Data Path is Good

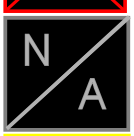

Data Path Has Failed


Data Path Status is Unknown

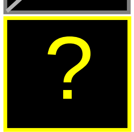
Post GDU 9.11 Software:


Data Path is Good


Data Path Has Failed



Data Path is not Applicable



Data Path Status is Unknown

In addition to failure messages, the data path can be checked by observing the indication boxes on the GDU and GIA Configuration Pages. The status of the channel is indicated by the following colors:

(Pre GDU 9.11 Software):

- Red = data path has failed
- Black = data path status is unknown
- Green = data path is good

(Post GDU 9.11 Software):

- Red X = data path has failed
- Green check mark = data path is good
- N/A = data path status is not applicable
- ? = data path is unknown

5.1.6 System Data Paths

In addition to troubleshooting via the GDU and GIA Configuration Pages, the System Data Path Configuration Page displays port status and information. The System Data Paths Configuration page (Figures 5-4 through 5-7) displays the following data when the A429, CAN, RS-232, or RS-485 data path softkey is selected:

A table containing one row for each configured LRU with the following information per row, ordered from left to right:

- A text field indicating the LRU name in the column
- A text field indicating the channel name
- A status indicator showing:
  - An N/A indication if the monitor is on and data path status is not applicable
  - A positive indication if the monitor is on and data path status is "OK"
  - A negative indication if the monitor is on and data path status is "FAIL"
  - An unknown indication if the monitor is off or the monitor is "ON" and data path status is "UNKNOWN"
- A text field indicating the port monitor status:
  - "ON" if the monitor is turned on
  - "OFF" if the monitor is turned off
- A text field indicating the following port status:
  - "OK" if the port is communicating
  - "FAIL" if the port is not communicating
  - "N/A" if the port is not applicable
  - "UNKNOWN" if the port status is unknown

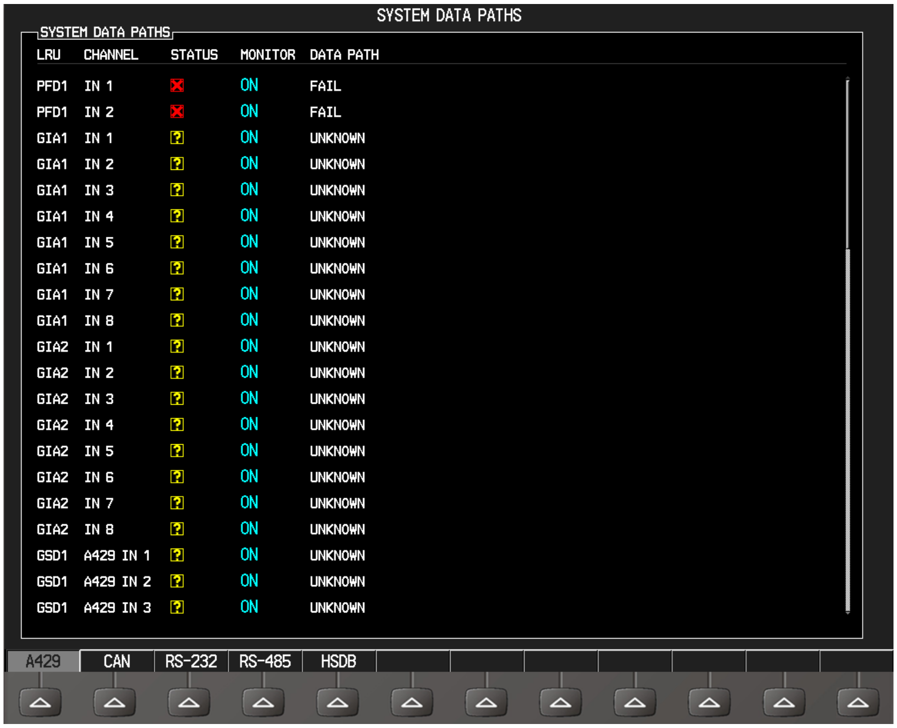


Figure 5-4. A429 Data Path Page

Figure 5-5. CAN Data Path Page

Figure 5-6. RS-232 Data Path Page

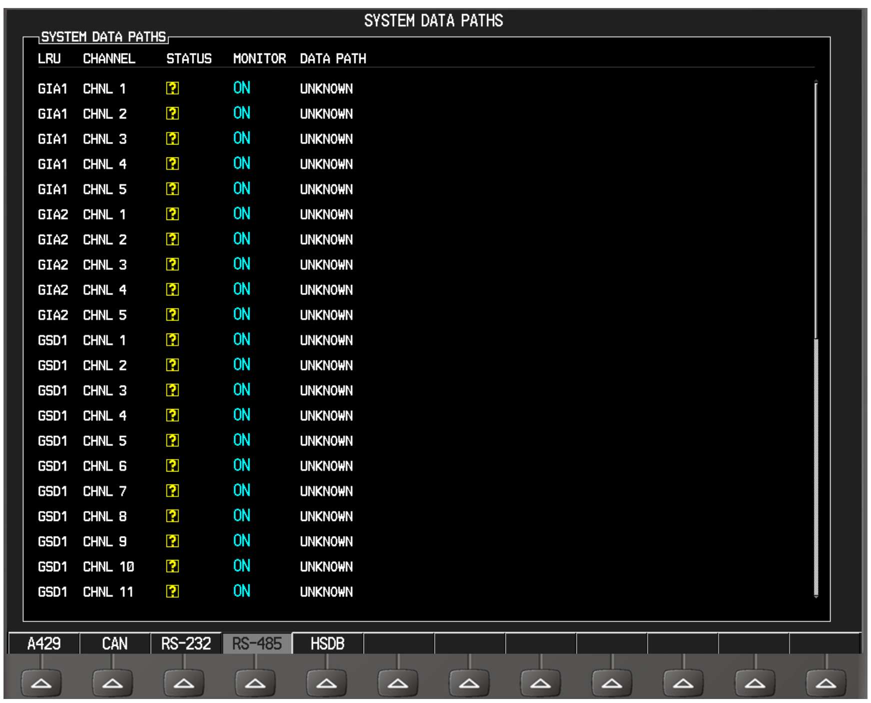


Figure 5-7. RS-485 Data Path Page

The System Data Paths Configuration page displays the following data when the HSDB data path softkey is selected:

- A table containing one row for each configured LRU with the following data per row, ordered from left to right:
    - A text field indicating the LRU name in the column
    - A drop down selectable field indicating the expected LRU for each HSDB port
    - A white text field indicating the current LRU for each HSDB port
    - A status indicator for each HSDB port:
        - An N/A indicator if the expected LRU is configured to none and there is no actual LRU online.
        - A positive indicator if the expected LRU matches actual LRU online
        - A negative indicator if the expected LRU does not match actual LRU online

Figure 5-8. HSDB Data Path Page

5.1.7 Troubleshooting Tables

GDU RS-232/ARINC 429 Configuration Page (PFD1/2 and MFD)

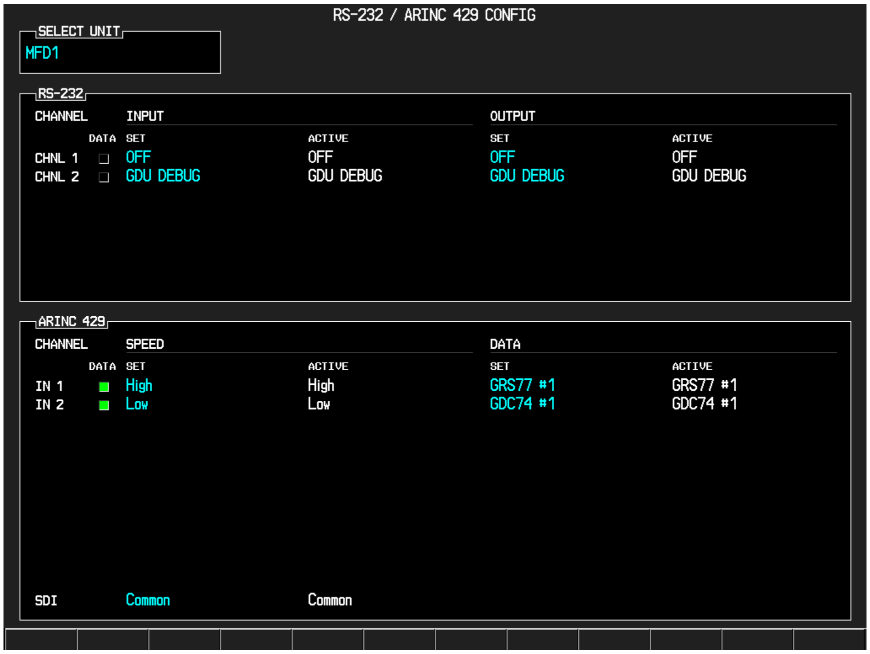


Figure 5-9. Main RS-232/ARINC 429 Configuration Page

The Main RS-232/ARINC 429 Configuration Page (Figure 5-9) troubleshooting tables show channel, LRU, status indication, and troubleshooting helps. Channel assignments with their associated LRUs differ depending on the specific aircraft configuration. The tables are only examples.

GDU RS-232 / ARINC 429 CONFIG Page

PFD1 RS-232

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">CHNL 1</td><td rowspan="3">GCU 476
(certain airframes only)</td><td></td><td>PFD1/GCU 476 data path is functioning correctly.</td></tr>
<tr><td></td><td>PFD1/GCU 476 data path is not functioning correctly.
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.
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.
Replace original PFD if box turns green after swapping displays.
Replace the GCU.</td></tr>
<tr><td></td><td>PFD1/GCU 476 data path functionality is unknown. Reload PFD1 configuration file.</td></tr>
</table>

PFD1 ARINC 429

Channel	LRU	Indicator	Status
IN 1	GRS 77 #1	🟩	PFD1/GRS 77 data path is functioning correctly.
		🟥	PFD1/GRS 77 data path is not functioning correctly. • 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 is has a Red-X, troubleshoot why the GRS is offline before proceeding. • Ensure GRS77 connecter is secure and proper wire harness strain relief is provided. • Swap PFD and MFD to confirm if the problem is in the PFD. – 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
		🟥	PFD1/GDC 74A data path is not functioning correctly. • 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. – 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.

SELECT UNIT—PFD2 RS-232 WINDOW			
Channel	**LRU**	**Indicator**	**Status/Recommended Actions**
CHNL 2	GMC 710 or GMC 715		PFD2/GMC 710 or GMC 715 data path is functioning correctly.
			PFD2/GMC 710 or GMC 715 data path is not functioning correctly. • Check PFD1 Alert Window for PFD2 or GMC configuration or software error messages. Correct any errors before proceeding. • Verify GMC 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 GMC indicator lights do not come on, remove unit and verify power and ground are present at the GMC connector. – If power or ground is not present, troubleshoot aircraft wiring for faults. – If power and ground are present, check the PFD2 and GMC connector for damaged pins. • Swap PFD1 and PFD2 to confirm if the problem is in the original PFD2. – Replace original PFD2 if box turns green after swapping displays. • Replace the GMC.
			PFD2/GMC 710 or GMC 715 data path functionality is unknown. Reload PFD2 configuration file.

<table>
<tr><td colspan="4">SELECT UNIT—PFD2
ARINC 429 WINDOW</td></tr>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status/Recommended Actions</th></tr>
<tr><td rowspan="3">IN 1</td><td rowspan="3">GRS 77 #2</td><td></td><td>PFD2/GRS 77 #2 data path is functioning correctly.</td></tr>
<tr><td></td><td>PFD2/GRS 77 #2 data path is not functioning correctly.
Check PFD1 Alert Window for PFD2 or GRS configuration or software error messages. Correct any errors before proceeding.
Verify GRS77 #2 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 GRS connecter is secure and proper wire harness strain relief is provided.
Swap GRS1 and GRS2 (if a GRS2 is installed) to confirm if the problem is in the original GRS2.
Replace original GRS2 if box turns green after swapping units.
Swap PFD1 and PFD2 to confirm if the problem is in the original PFD2.
Replace original PFD2 if box turns green after swapping displays.
Check the PFD2/GRS 77 #2 interconnect wiring and unit connector pins for faults.
Replace GRS 77 #2.</td></tr>
<tr><td></td><td>PFD2/GRS 77 #2 data path functionality is unknown. Reload PFD2 configuration file.</td></tr>
</table>

<table>
<tr><td colspan="4">SELECT UNIT—PFD2
ARINC 429 WINDOW
(Con't.)</td></tr>
<tr><td rowspan="3">IN 2</td><td rowspan="3">GDC 74X #2</td><td></td><td>PFD2/GDC 74X #2 data path is functioning correctly.</td></tr>
<tr><td></td><td>PFD2/GDC 74X #2 data path is not functioning correctly.
• Check PFD1 Alert Window for PFD2 or GDC configuration or software error messages. Correct any errors before proceeding.
• Verify GDC 74X #2 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 PFD1 and PFD2 to confirm if the problem is in the original PFD2.
– Replace original PFD2 if box turns green after swapping displays.
• Check the PFD2/GDC 74X #2 interconnect wiring and unit connector pins for faults.
• Replace GDC 74X #2.</td></tr>
<tr><td></td><td>PFD2/GDC 74X #2 data path functionality is unknown. Reload PFD2 configuration file.</td></tr>
</table>

MFD RS-232

Channel	LRU	Indicator	Status
-CHNL 1	GCU 476 certain airframes only		MFD/GCU 476 data path is functioning correctly.
			MFD/GCU 476 data path is not functioning correctly. • 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. – 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. – 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

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">IN 1</td><td rowspan="3">GRS 77 #1</td><td></td><td>MFD/GRS 77 data path is functioning correctly.</td></tr>
<tr><td></td><td>MFD/GRS 77 data path is not functioning correctly.
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 is has a Red-X, troubleshoot why the GRS is offline before proceeding.
Ensure GRS77 connecter is secure and proper wire harness strain relief is provided.
Swap PFD and MFD to confirm if the problem is in the MFD.
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</td></tr>
<tr><td></td><td>MFD/GRS 77 data path functionality is unknown. Reload MFD configuration file.</td></tr>
<tr><td rowspan="3">IN 2</td><td rowspan="3">GDC 74A #1</td><td></td><td>MFD/GDC 74A data path is functioning correctly</td></tr>
<tr><td></td><td>MFD/GDC 74A data path is not functioning correctly.
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.
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.</td></tr>
<tr><td></td><td>MFD/GDC 74A data path functionality is unknown. Reload MFD configuration file.</td></tr>
</table>

GIA RS-232/ARINC 429 Configuration Page (GIA1 and GIA2)

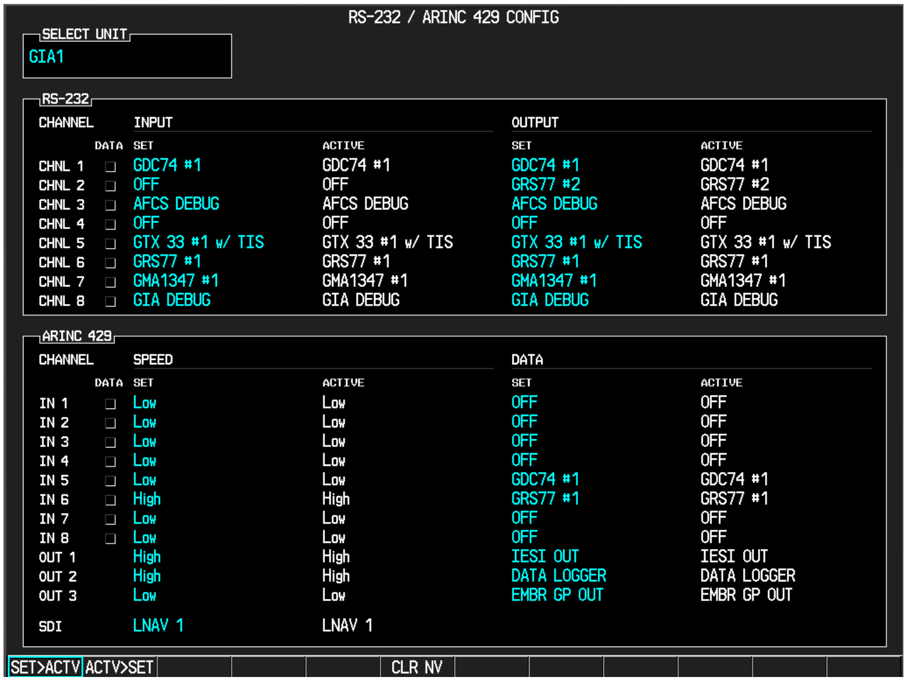


Figure 5-10. GIA RS-232/ARINC 429 Configuration Page

The following GIA RS-232/ARINC 429 Configuration Page troubleshooting tables show channel, LRU, status indication, and troubleshooting helps. Channel assignments with their associated LRUs differ depending on the specific aircraft configuration. The tables are only examples.

GIA RS-232 / ARINC 429 CONFIG Page

GIA1 RS-232

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">CHNL 1</td><td rowspan="3">GDC 74A
#1</td><td></td><td>GIA1/GDC 74A data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA1/GDC 74A data path is not functioning correctly.
• 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.
– Replace original GIA1 if box turns green after swapping units.
• Check the GIA1/GDC 74 interconnect wiring and unit connector pins for faults.
Replace GDC 74 if problem remains.</td></tr>
<tr><td></td><td>GIA1/GDC 74A data path functionality is unknown. Reload GIA1 configuration files.</td></tr>
<tr><td rowspan="3">CHNL 5</td><td rowspan="3">GTX 33
#w/TIS</td><td></td><td>GIA1/GTX33 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA1/GTX 33 data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA1/GTX 33 data path functionality is unknown. Reload GIA1 configuration files.</td></tr>
</table>

GIA1 RS-232 (continued)

Channel	LRU	Indicator	Status
CHNL 6	GRS 77 #1	Green	GIA1/GRS 77 data path is functioning correctly.
		Red	GIA1/GRS 77 data path is not functioning correctly. • 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 connecter 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. – 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.
		Black	GIA1/GRS 77 data path functionality is unknown. Reload GIA1 configuration files.

GIA1 RS-232 (continued)

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">CHNL 7</td><td rowspan="3">GMA 1347 #1</td><td></td><td>GIA1/GMA 1347 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA1/GMA 1347 data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA1/GMA 1347 data path functionality is unknown. Reload GIA1 configuration files.</td></tr>
</table>

GIA1 ARINC 429

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">IN 5</td><td rowspan="3">GDC 74A
#1</td><td></td><td>GIA1/GDC 74A data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA1/GDC 74A data path is not functioning correctly.
• 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.
– 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</td></tr>
<tr><td></td><td>GIA1/GDC 74A data path functionality is unknown. Reload GIA1 configuration files.</td></tr>
</table>

GIA1 ARINC 429 (continued)

Channel	LRU	Indicator	Status
IN 6	GRS 77 #1		GIA1/GRS 77 #1 data path is functioning correctly.
			GIA1/GRS 77 data path is not functioning correctly. • 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 connecter 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. – 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.

GIA2 RS-232 (continued)

Channel	LRU	Indicator	Status
CHNL 3	WX 500	■	GIA2/WX 500 data path is functioning correctly.
		■	GIA2/WX 500 data path is not functioning correctly. • 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. – 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.
		■	GIA2/CO GUARDIAN data path is not functioning correctly • 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 GUARDIAN if problem persists.
		■	GIA2/ CO Guardian data path functionality is unknown. Reload GIA2 configuration files

<table>
<tr><td rowspan="3">CHNL 5</td><td rowspan="3">GTX 33 #1 w/TIS</td><td></td><td>GIA2/GTX33 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA2/GTX 33 data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA2/GTX33 data path functionality is unknown. Reload GIA2 configuration files.</td></tr>
</table>

GIA2 RS-232 (continued)

Channel	LRU	Indicator	Status
CHNL 7	GMA 1347 #1		GIA1/GMA 1347 data path is functioning correctly.
			GIA1/GMA 1347 data path is not functioning correctly. • 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. – 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

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">IN 4</td><td rowspan="3">RYAN 9900BX TCAD (optional on certain airframes)</td><td></td><td>GIA2/SKYWATCH 497 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA2/ RYAN 9900BX TCAD data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA2/RYAN TCAD data path functionality is unknown. Reload GIA2 configuration files.</td></tr>
<tr><td rowspan="3">IN 5</td><td rowspan="3">GDC 74A #1</td><td></td><td>GIA2/GDC 74A #1 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA2/GDC 74A #1 data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA2/GDC 74A #1 data path functionality is unknown. Reload GIA2 configuration files.</td></tr>
</table>

GIA2 ARINC 429 (continued)

Channel	LRU	Indicator	Status
IN 6	GRS 77 #1		GIA2/GRS 77 data path is functioning correctly.
			GIA2/GRS 77 data path is not functioning correctly. • 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 connecter 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. – 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 (GIA1 and GIA2)

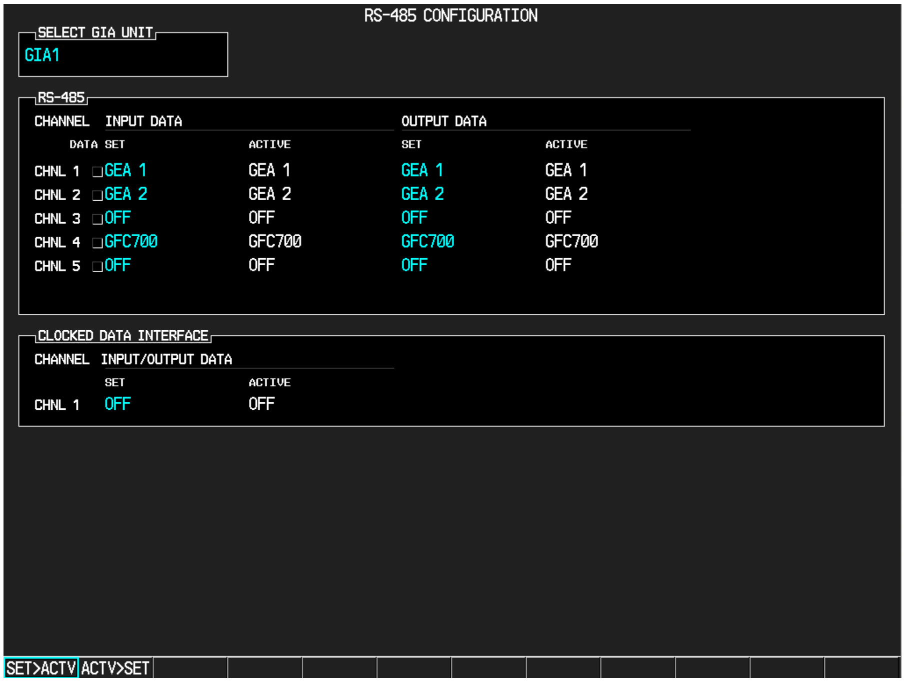


Figure 5-11. GIA RS-485 Configuration Page

The following GIA RS-485 Configuration Page troubleshooting tables show channel, LRU, status indication, and troubleshooting helps. Channel assignments with their associated LRUs differ depending on the specific aircraft configuration. The tables are only examples.

NOTE

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

GIA1 RS-485

Channel	LRU	Indicator	Status
CHNL 1	GEA1	🟩	GIA1/GEA1 data path is functioning correctly.
		🟥	GIA1/GEA1 data path is not functioning correctly. • 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. – 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.
		🟥	GIA1/GFC 700 data path is not functioning correctly. • 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. – 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

<table>
<tr><th>Channel</th><th>LRU</th><th>Indicator</th><th>Status</th></tr>
<tr><td rowspan="3">CHNL 1</td><td rowspan="3">GEA1</td><td></td><td>GIA2/GEA1 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA2/GEA1 data path is not functioning correctly.
• 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.
– Replace original GIA2 if box turns green after swapping units.
• Check the GIA2/GEA1 interconnect wiring and connector pins for faults.
• Replace GEA71.</td></tr>
<tr><td></td><td>GIA2/GEA1 data path functionality is unknown. Reload GIA2 configuration files.</td></tr>
<tr><td rowspan="3">CHNL 4</td><td rowspan="3">GFC 700</td><td></td><td>GIA2/GFC 700 data path is functioning correctly.</td></tr>
<tr><td></td><td>GIA2/GFC 700 data path is not functioning correctly.
• 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.
– 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.</td></tr>
<tr><td></td><td>GIA2/GFC 700 data path functionality is unknown. Reload GIA2 and GFC700 configuration files.</td></tr>
</table>

5.1.8 Advisory Messages

In Normal Mode of operation the G1000 system displays a variety of system messages and/or annunciations to the operator and technician (Figure 5-12). System messages are normally presented on the PFD and can be viewed by pressing the rightmost softkey. This section provides a listing of possible messages, alerts, and annunciations. Aircraft specific alerts are not covered in this manual. The following advisory messages are intended to aid in isolating failures to a defective LRU. They are not listed in their order of importance.

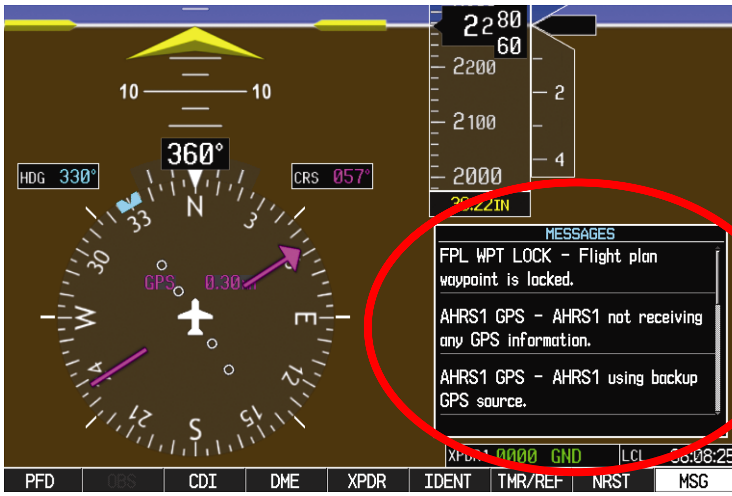


Figure 5-12. Advisory Messages

5.1.8.1 GDU Cooling Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
MFD COOLING – MFD has poor cooling. Reducing power usage.	The MFD has exceeded its operating temperature range.	a. Check cooling fan and wiring. b. Replace cooling fan. c. If problem persists, replace the MFD. d. If problem continues contact Garmin Aviation product Support for assistance.
PFD1 COOLING – PFD1 has poor cooling. Reducing power usage.	PFD1 has exceeded its operating temperature range.	Same as above.
PFD2 COOLING – PFD2 has poor cooling. Reducing power usage.	PFD2 has exceeded its operating temperature range.	Same as above.

5.1.8.2 GDU Advisory Messages

<table>
<tr><th>Advisory Message</th><th>Possible Cause</th><th>Recommended Actions</th></tr>
<tr><td>MFD “key” KEYSTK – key is stuck.</td><td>The G1000 has determined a key is stuck on the MFD.</td><td rowspan="3">a. Select the GDU Test Page and verify key is stuck (if key is stuck the corresponding indicator will be green).
b. Exercise suspected stuck key and reset GDU Test Page to see if indicator remains green without pressing the key.
c. If problem persists replace the display.</td></tr>
<tr><td>PFD1 “key” KEYSTK – key is stuck.</td><td>The G1000 has determined a key is stuck on PFD1.</td></tr>
<tr><td>PFD2 “key” KEYSTK – key is stuck.</td><td>The G1000 has determined a key is stuck on PFD2.</td></tr>
</table>

5.1.8.3 Database and Software Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
MFD DB ERR – MFD aviation database error exists.	The MFD has encountered an error in the Jeppesen database.	a. Reload aviation database into the display. b. Contact Garmin Technical Support for assistance.
PFD1 DB ERR – PFD1 aviation database error exists.	PFD1 has encountered an error in the Jeppesen database.	
PFD2 DB ERR – PFD2 aviation database error exists.	PFD2 has encountered an error in the Jeppesen database.	
MFD DB ERR – MFD Basemap database error exists.	The MFD has encountered an error in the Basemap database.	• Confirm supplemental data card is inserted fully in the bottom slot of the display. • Move the data card to the top slot of the display. – If the error clears, the problem is with the bottom slot. Insert and remove a SD card multiple times to clean the contacts. If the card still does not work in the bottom slot, leave the card in the top slot or replace the display. • Swap with a supplemental data card from another display in the same system. • If problem remains in the same GDU, contact Garmin Aviation Product Support to see if a Basemap file may be obtained to load into the display. • If problem moves to the other display, replace the supplemental data card. You may need to replace all data cards as a set to keep the database cycles the same and prevent database mismatch errors.
PFD1 DB ERR – PFD1 Basemap database error exists.	PFD1 has encountered an error in the Basemap database.	
PFD2 DB ERR – PFD1 Basemap database error exists.	PFD2 has encountered an error in the Basemap database.	

<table>
<tr><td>MFD DB ERR – MFD terrain database error exists.</td><td>The MFD has encountered an error in the terrain database.</td><td rowspan="8">• Confirm supplemental data card is inserted fully in the bottom slot of the display.
• Move the data card to the top slot of the display.
– If the error clears, the problem is with the bottom slot. Insert and remove a SD card multiple times to clean the contacts. If the card still does not work in the bottom slot, leave the card in the top slot or replace the display.
• Swap with a supplemental data card from another display in the same system.
• If problem remains in the same GDU, replace that GDU.
• If problem moves to the other display, reload the database on the data card or replace it. You may need to replace all data cards as a set to keep the database cycles the same and prevent database mismatch errors.</td></tr>
<tr><td>PFD1 DB ERR – PFD1 terrain database error exists.</td><td>PFD1 has encountered an error in the terrain database.</td></tr>
<tr><td>PFD2 DB ERR – PFD1 terrain database error exists.</td><td>PFD2 has encountered an error in the terrain database.</td></tr>
<tr><td>MFD DB ERR – MFD obstacle database error exists.</td><td>The MFD has encountered an error in the obstacle database.</td></tr>
<tr><td>PFD1 DB ERR – PFD1 obstacle database error exists.</td><td>PFD1 has encountered an error in the obstacle database.</td></tr>
<tr><td>PFD2 DB ERR – PFD2 obstacle database error exists.</td><td>PFD2 has encountered an error in the obstacle database.</td></tr>
<tr><td>MFD DB ERR – MFD airport terrain database error exists.</td><td>The MFD has encountered an error in the airport terrain database.</td></tr>
<tr><td>PFD1 DB ERR – PFD1 airport terrain database error exists.</td><td>PFD1 has encountered an error in the airport terrain database.</td></tr>
</table>

Advisory Message	Possible Cause	Recommended Actions
PFD2 DB ERR – PFD2 airport terrain database error exists.	PFD2 has encountered an error in the airport terrain database.	• Confirm supplemental data card is inserted fully in the bottom slot of the display. • Move the data card to the top slot of the display. – If the error clears, the problem is with the bottom slot. Insert and remove a SD card multiple times to clean the contacts. If the card still does not work in the bottom slot, leave the card in the top slot or replace the display. • Swap with a supplemental data card from another display in the same system. • If problem remains in the same GDU, replace that GDU. • If problem moves to the other display, reload the database on the data card or replace it. You may need to replace all data cards as a set to keep the database cycles the same and prevent database mismatch errors.
MFD DB ERR – MFD Safe Taxi database error exists.	The MFD has encountered an error in the safe taxi database.	
PFD1 DB ERR – PFD1 Safe Taxi database error exists.	PFD #1 has encountered an error in the safe taxi database.	
PFD2 DB ERR – PFD2 Safe Taxi database error exists.	PFD #2 has encountered an error in the safe taxi database.	

MFD DB ERR – MFD ChartView database error.	The MFD has encountered an error in the ChartView database.	• Confirm supplemental data card is inserted fully in the bottom slot of the display. • Move the data card to the top slot of the display. – If the error clears, the problem is with the bottom slot. Insert and remove a SD card multiple times to clean the contacts. If the card still does not work in the bottom slot, leave the card in the top slot or replace the display. • Reload ChartView from Jeppesen's loader program. • Replace supplemental data card. You may need to replace all data cards as a set to keep the database cycles the same and prevent database mismatch errors. • Replace MFD.
MFD DB ERR – MFD Terminal Procs database error exists.	The MFD has encountered an error in the Terminal Procedures database.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The G1000 has found the Jeppesen aviation database in the PFDs and MFD do not match.	Load the same cycle of aviation database to all displays.
DB MISMATCH – Aviation database type mismatch.	The G1000 has found the Jeppesen aviation database types do not match.	Load same type aviation database to all displays.

Advisory Message	Possible Cause	Recommended Actions
DB MISMATCH – Terrain database version mismatch.	The PFD and/or MFD have different terrain database versions installed.	Insert three identical version terrain database cards in the PFD's 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 G1000 has found the PFDs and/or MFD software versions do not match.	No Dispatch. Software correction needed.
CAS INOP	The Aviation databases do not match on all 3 displays.	No Dispatch. Database correction required.
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The G1000 has found the PFDs and/or MFD software versions do not match.	Load correct software version.
MANIFEST – PFD1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in PFD #1.	Load correct software version.
MANIFEST – PFD2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in PFD #2.	
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	

Advisory Message	Possible Cause	Recommended Actions
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD master configuration module has failed.	• Check master configuration module connector and wiring for damage inside the GDU connector backplate. • Replace master configuration module wiring and pins. • If problem persists, replace master configuration module. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.

5.1.8.4 COM Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
COM1 SERVICE – COM1 needs service. Return unit for repair.	The GIA63W has determined COM1 needs service.	Replace GIA1.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The GIA63W has determined COM2 needs service.	Replace GIA2.
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.	• Press the push-to-talk switch(s) again to cycle its operation. • Check push-to-talk switch(s) and wiring. • Check GIA1/GMA 1347 #1 interconnect. • Switch GIA1 and GIA2, to verify location of problem: – If problem follows the unit, replace GIA1. – If problem persists replace GMA 1347 #1.
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.	• Press the push-to-talk switch(s) again to cycle its operation. • Check push-to-talk switch(s) and wiring. • Check GIA2/1347 #2 interconnect. • Switch GIA1 and GIA2, to verify location of problem: – If problem follows the unit, replace GIA2. – If problem persists replace GMA 1347 #2.

COM1 TEMP – COM1 over temp. Reducing transmitter power.	The G1000 has detected an over temperature in COM1.	a. Check fan, wiring and air tubing for proper operation (if applicable). b. Replace cooling fan if unable to determine if operating correctly. c. Replace GIA1. d. If problem persists contact Garmin Aviation Product Support for assistance.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	The G1000 has detected an over temperature in COM2.	a. Check fan, wiring and air tubing for proper operation (if applicable). b. Replace cooling fan if unable to determine if operating correctly. c. Replace GIA2. d. If problem persists contact Garmin Aviation Product Support for assistance.

5.1.8.5 NAV Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The G1000 has detected a failure in NAV1 receiver.	Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The G1000 has detected a failure in NAV2 receiver.	Replace GIA2.
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The NAV1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	• Press the NAV1 external remote transfer switch again to cycle its operation. • Check NAV1 remote transfer switch and wiring. • Switch GIA1 and GIA2, to verify location of problem. – If problem follows the unit, replace GIA1.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	• Press the NAV2 external remote transfer switch again to cycle its operation. • Check NAV2 remote transfer switch and wiring. • Switch GIA1 and GIA2, to verify location of problem. – If problem follows the unit, replace GIA2.

5.1.8.6 Glideslope Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The G1000 has detected a failure in G/S1 receiver.	Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The G1000 has detected a failure in G/S1 receiver.	Replace GIA2.
G/S1 FAIL – G/S1 is inoperative.	The G1000 has detected a failure in G/S1 receiver.	• Switch GIA1 and GIA2 to verify location of problem: – 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 G1000 has detected a failure in G/S2 receiver.	• Switch GIA1 and GIA2 to verify location of problem: – If problem follows the unit, replace GIA. – If problem does not follow unit, check G/S2 antenna and cabling.

5.1.8.7 GPS Advisory Messages

NOTE

Ensure that no cell phones or devices in the cabin using cell phone technology are turned on or in a monitoring state before starting GPS troubleshooting procedures.

Advisory Message	Possible Cause	Recommended Actions
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The G1000 has detected a failure in GPS1 receiver.	Replace GIA1.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The G1000 has detected a failure in GPS2 receiver.	Replace GIA2.
GPS1 FAIL – GPS1 is inoperative.	The G1000 has detected a failure in GPS1 receiver.	• Switch GIA1 and GIA2, to verify location of problem. – 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 G1000 has detected a failure in GPS2 receiver.	• Switch GIA1 and GIA2, to verify location of problem. – If problem follows the unit, replace GIA2. – If problem does not follow the unit, check GPS2 antenna and cabling.
GPS NAV LOST – Loss of GPS navigation. GPS fail.	The G1000 has lost GPS navigation information.	a. Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAMs may be issued for periods of outages. b. 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.). c. Check GPS antenna and cabling.

5.1.8.8 GIA Cooling Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GIA1 COOLING – GIA1 temperature too low.	GIA1 operating temperature is too low.	Allow unit to warm up.
GIA2 COOLING – GIA2 temperature too low.	GIA2 operating temperature is too low.	Allow unit to warm up.
GIA1 COOLING – GIA1 over temperature.	GIA1 has exceeded its operating temperature range.	a. Check fan, wiring and air tubing for proper operation (if applicable). b. Replace cooling fan if unable to determine if operating correctly. c. Replace GIA1. d. If problem persists contact Garmin Aviation Product Support for assistance.
GIA2 COOLING – GIA2 over temperature.	GIA2 has exceeded its operating temperature range.	a. Check fan, wiring and air tubing for proper operation (if applicable). b. Replace cooling fan if unable to determine if operating correctly. c. Replace GIA2. d. If problem persists contact Garmin Aviation Product Support for assistance.

5.1.8.9 GIA Configuration Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The G1000 has detected a GIA configuration mismatch.	• Reload GIA Configuration files including optional equipment configuration files that list GIA 1 or 2 in the PRODUCT box on the System Upload page. • Replace master configuration module, check config module harness for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		

GIA1 CONFIG – GIA1 audio config error. Config service req'd. GIA2 CONFIG – GIA2 audio config error. Config service req'd.	The G1000 has detected a GIA audio configuration mismatch.	• Reload GIA Audio software and configuration files. • Replace master configuration module, check config module harness for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
HW MISMATCH – GIA hardware mismatch. GIA1 or GIA2 communication halted.	The G1000 has detected a non-WAAS GIA 63.	Replace GIA63 with a WAAS unit.

Advisory Message	Possible Cause	Recommended Actions
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA 1.	Load correct software version.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA 2.	
GIA1 SERVICE – GIA1 needs service. Return unit for repair.	The G1000 has detected a failure in GIA1.	Replace GIA1.
GIA2 SERVICE – GIA1 needs service. Return unit for repair.	The G1000 has detected a failure in GIA2.	Replace GIA2.

5.1.8.10 GDC 74X Related Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
MANIFEST – GDC 74X#1 software mismatch Communication halted.	The system has detected an incorrect software version loaded in the GDC 74X #1.	Load correct software version.
MANIFEST – GDC 74X #2 software mismatch Communication halted.	The system has detected an incorrect software version loaded in the GDC 74X #2.	
BACKUP PATH – Airdata using backup data path.	The GDC 74X is using a backup ARINC 429 data path.	Troubleshoot for a failed datapath using Section 5.1.5.

5.1.8.11 GRS 77 Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
AHRS1 TAS – AHRS1 not receiving airspeed.	The GRS 77 #1 is not receiving airspeed information from the GDC 74X #1.	a. Check GRS #1/GDC 74X #1 interconnect. b. Replace the GDC 74X #1 c. If problem persists, replace the GRS 77 #1
AHRS2 TAS – AHRS2 not receiving airspeed.	The GRS 77 #2 is not receiving airspeed information from the GDC 74X #2.	a. Check GRS #2/GDC 74X #2 interconnect b. Replace the GDC 74X #2 c. If problem persists, replace the GRS 77 #2

AHRS1 GPS – AHRS1 using backup GPS source.	GRS 77 #1 is using a backup GPS source.	• Troubleshoot the possible loss of either GPS receiver per Section 5.1.2.1, GPS INTEG or Time failure. • Replace the GRS 77.
AHRS1 GPS – AHRS1 not receiving backup GPS information.	GRS 77 #1 is not receiving backup GPS information from either GIA 63W.	
AHRS1 GPS – AHRS operating exclusively in no-GPS mode.	The GRS 77 is operating in the absence of GPS.	
AHRS1 GPS – AHRS1 not receiving any GPS information.	GRS 77 #1 is not receiving GPS data from either GIA 63W.	
AHRS2 GPS – AHRS2 using backup GPS source.	GRS 77 #2 is using a backup GPS source.	
AHRS2 GPS – AHRS2 not receiving backup GPS information.	GRS 77 #2 is not receiving backup GPS information from either GIA 63W.	
AHRS2 GPS – AHRS2 operating exclusively in no-GPS mode.	The GRS 77 #2 is operating in the absence of GPS.	
AHRS2 GPS – AHRS2 not receiving any GPS information.	GRS 77 #2 is not receiving GPS data from either GIA 63W.	
AHRS1 SRVC – AHRS1 magnetic field model needs update.	AHRS #1 magnetic field model has expired.	Reference Garmin SB 0533 for update instructions.
AHRS2 SRVC – AHRS2 magnetic field model needs update.	AHRS #2 magnetic field model has expired.	
MANIFEST – AHRS1 software mismatch. Communication Halted.	The G1000 has detected an incorrect software version loaded in GRS 77 #1.	Load correct software version in the GRS77.
MANIFEST – AHRS2 software mismatch. Communication Halted.	The G1000 has detected an incorrect software version loaded in GRS 77 #2.	

AHRS MAG DB – AHRS magnetic model database version mismatch.	The G1000 has detected a magnetic model database version mismatch.	Reference Garmin SB 0533 for update instructions.
BACKUP PATH – AHRS using backup data path.	The PFD is using a backup ARINC 429 data path to receive AHRS data.	Troubleshoot for a failed datapath using Section 5.1.5.

5.1.8.12 GMU Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
MANIFEST – GMU1 software mismatch. Communication Halted.	The G1000 has detected an incorrect software version loaded in GMU 44 #1.	Load correct software version in the GMU44.
MANIFEST – GMU2 software mismatch. Communication Halted.	The G1000 has detected an incorrect software version loaded in GMU 44 #2.	
HDG FAULT – AHRS1 magnetometer fault has occurred.	A fault has occurred in GMU 44 #1.	a. Check GMU 44/GRS 77 interconnect for faults. b. Replace GMU 44 #1 c. If problem persists, replace GRS 77 #1
HDG FAULT – AHRS2 magnetometer fault has occurred.	A fault has occurred in GMU 44 #2.	a. Check GMU 44/GRS 77 interconnect for faults. b. Replace GMU 44 #2 c. If problem persists, replace GRS 77 #2

5.1.8.13 GEA 71 Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GEA1 CONFIG – GEA1 configuration error. Config service req'd.	The G1000 has detected a GEA #1 configuration mismatch.	• Reload GEA Configuration files including optional equipment configuration files that list GEA 1 or 2 in the PRODUCT box on the System Upload page. • Replace master configuration module, check config module harness for faults and replace if necessary. **<u>NOTE</u>** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
GEA2 CONFIG – GEA2 configuration error. Config service req'd.	The G1000 has detected a GEA #2 configuration mismatch.	
MANIFEST – GEA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GEA 71 #1.	Load correct software version.
MANIFEST – GEA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GEA 71 #2.	
BACKUP PATH – EIS using backup data path.	The GEA 71 is using a backup RS-485 data path.	Troubleshoot for a failed datapath using Section 5.1.5.

5.1.8.14 GMA 1347D Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
MANIFEST – GMA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMA 1347D #1.	Load correct software version.
MANIFEST – GMA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMA 1347D #2.	Load correct software version.
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The G1000 has determined GMA 1347D #1 needs service.	Replace GMA 1347D #1.
GMA2 SERVICE – GMA2 needs service. Return unit for repair.	The G1000 has determined GMA 1347D #2 needs service.	Replace GMA 1347D #2.
GMA1 FAIL – GMA 1 is inoperative.	The G1000 has detected a failure in GMA 1347D #1.	• Ensure GMA 1347D #1, both GIAs and all GDUs are receiving power. • Troubleshoot for a failed datapath using Section 5.1.5. • Replace GMA 1347D #1.
GMA2 FAIL – GMA 2 is inoperative.	The G1000 has detected a failure in GMA 1347D #2.	• Ensure 1347D #2, both GIAs and all GDUs are receiving power. • Troubleshoot for a failed datapath using Section 5.1.5. • Replace GMA 1347D #2.

Advisory Message	Possible Cause	Recommended Actions
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The G1000 has detected a GMA 1347D #1 configuration mismatch.	• Reload GMA #1 Configuration files including optional equipment configuration files that list GMA 1 in the PRODUCT box on the System Upload page. • Replace GMA 1347D #1. • If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.

GMA2 CONFIG – GMA2 configuration error. Config service req'd.	The G1000 has detected a GMA 1347D #2 configuration mismatch.	• Reload GMA #2 Configuration files including optional equipment configuration files that list GMA 2 in the PRODUCT box on the System Upload page. • Replace 1347D #2. • If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.

Advisory Message	Possible Cause	Recommended Actions
GMA XTALK – GMA crosstalk error has occurred.	The G1000 has detected an error in the communication between GMA 1347D #1 and GMA 1347D #2.	• Ensure both units are receiving power. • Ensure both units are configured. • Check interconnect wiring and connector pins for faults. • Replace GMA 1347D #1 with a known good unit. • If problem persists, reinstall original 1347D #1 and replace GMA 1347D #2.
BACKUP PATH – Audio panel using backup data path.	The GMA 1347 is using a backup RS-232 data path.	• Troubleshoot for a failed datapath using Section 5.1.5.

5.1.8.15 GMC 710/GMC 715 Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GMC CNFG – GMC Config error. Config service req'd.	The G1000 has detected a GMC 710 or GMC 715 configuration mismatch.	a. Load GMC configuration files, b. Replace GMC. c. If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
GMC FAIL – GMC is inoperative.	The G1000 has detected a failure in the GMC 710 or GMC 715.	Replace the GMC 710 or GMC 715.
MANIFEST – GMC software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GMC 710 or GMC 715.	Load correct software version.

5.1.8.16 GCU 475 Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GCU CNFG – GCU Config error. Config service req'd.	The G1000 has detected a GCU 475 configuration mismatch.	a. Load GCU configuration files, b. Replace GCU. c. If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
GCU FAIL – GCU is inoperative.	The G1000 has detected a failure in the GCU 475.	Replace the GCU 475.
MANIFEST – GCU software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GCU 475.	Load correct software version.

5.1.8.17 GWX 68 Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GWX CONFIG – GWX configuration error. Config service req'd.	The G1000 has detected a GWX 68 configuration mismatch.	a. Load GWX configuration files. b. Replace GWX. c. If problem persists, replace master configuration module, check config module wiring for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
GWX FAIL – GWX is inoperative.	The G1000 has detected a failure in the GWX 68.	a. Check Ethernet connection between the GWX and GDL69A for faults. b. Replace the GWX 68.
GWX SERVICE – Needs service. Return unit for repair.	The G1000 has detected a failure in GWX 68.	Replace the GWX 68.
MANIFEST – GWX software mismatch. Communication halted.	The system has detected an incorrect software version loaded in the GWX 68.	Load correct software version.

5.1.8.18 Miscellaneous Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and PFDs.	a. Ensure a database error has not occurred (identified in the ADVISORY MESSAGES window on the PFD). b. If a database error has occurred, correct error before proceeding. c. Check display Ethernet interconnect wiring. d. Replace PFD1 with a known good unit, to verify location of problem. e. If problem persists, reinstall original PFD1 and replace PFD2. f. If problem persists, reinstall PFD2 and replace MFD.
SIMULATOR – Sim mode is active. Do not use for navigation.	The G1000 is in simulator mode.	a. Check wiring (pin 54 in all GDU connectors should be empty). b. Replace PFD1 with a known good unit, to verify location of problem. c. If problem persists, reinstall original PFD1 and replace PFD2. d. If problem persists, reinstall PFD2 and replace MFD.
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	a. If the CLR key was held during a power cycle, disregard message. b. Cycle power to PFD1 and Ensure CLR key is not stuck on the GDU TEST page. c. If problem persists, replace PFD1.

Advisory Message	Possible Cause	Recommended Actions
MFD SERVICE – needs service. Return unit for repair.	The G1000 has determined the MFD needs service.	• 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. • 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 G1000 has determined PFD #1 needs service.	• 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. • 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.

Advisory Message	Possible Cause	Recommended Actions

PFD2 SERVICE – needs service. Return unit for repair.	The G1000 has determined PFD #2 needs service.	• 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.
		• 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.

PFD1 CONFIG – PFD1 configuration error. Config service req'd.	The G1000 has detected a PFD #1 configuration mismatch.	• Reload PFD 1 Configuration files including optional equipment configuration files that list PFD 1 in the PRODUCT box on the System Upload page. Also reload unlock cards for TAWS, ChartView, etc. • Press the UPDT CFG softkey on the Configuration Upload Page in the System Page Group to load configuration files into the configuration module. • Check PFD1 configuration module wiring for faults and replace if necessary. • Replace PFD1 configuration module. • Replace the PFD1. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.

PFD2 CONFIG – PFD2 configuration error. Config service req'd.	The G1000 has detected a PFD #2 configuration mismatch.	• Reload PFD 2 Configuration files including optional equipment configuration files that list PFD 2 in the PRODUCT box on the System Upload page. • Press the UPDT CFG softkey on the Configuration Upload Page in the System Page Group to load configuration files into the configuration module. • Check PFD1 configuration module wiring for faults and replace if necessary. • Replace PFD1 configuration module. • Replace PFD2. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.

Advisory Message	Possible Cause	Recommended Actions
MFD CONFIG – MFD configuration error. Config service req'd.	The G1000 has detected a MFD configuration mismatch.	• Reload MFD Configuration files including optional equipment configuration files that list MFD in the PRODUCT box on the System Upload page. • Press the UPDT CFG softkey on the Configuration Upload Page in the System Page Group to load configuration files into the configuration module. • Check PFD1 configuration module wiring for faults and replace if necessary. • Replace PFD1 configuration module. • Replace the MFD. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
PFD1 VOLTAGE – PFD1 has low voltage. Reduce power usage.	PFD1 is not receiving sufficient voltage.	Check input voltage to PFD1. If input voltage is ok, replace PFD1.
PFD2 VOLTAGE – PFD2 has low voltage. Reduce power usage.	PFD2 is not receiving sufficient voltage.	Check input voltage to PFD2. If input voltage is ok, replace PFD2.
MFD VOLTAGE – MFD has low voltage. Reduce power usage.	The MFD is not receiving sufficient voltage.	Check input voltage to the MFD. If input voltage is ok, replace the MFD.

Advisory Message	Possible Cause	Recommended Actions
TAWS FAIL	A TAWS system failure has occurred.	• If message occurred on the first power up after unlocking TAWS, cycle system power to reinitialize TAWS and message should clear. • Ensure each GDU contains a supplemental data card. • Verify GIAs and GPS are online using the MFD AUX – SYSTEM STATUS page. • Verify GPS has a position lock. • Ensure an Airport Terrain, Obstacle, Terrain, Aviation Database, or GDU SW mismatch has not occurred. Correct any database and software errors.
TAWS TEST	TAWS system is currently being tested.	Normal annunciation during self test. Test will take up to two minutes to complete.
TAWS INHB	TAWS system alerting is disabled	Enable TAWS system alerting by pressing the MENU button from the MAP – TAWS page.
TAWS N/A	GPS accuracy not high enough to enable TAWS	Satellite coverage insufficient in the area for TAWS calculations. Contact Garmin Aviation Product Support for assistance if persistent.

5.1.8.19 GDL 69/69A Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
GDL 69 FAIL – GDL 69 has failed.	The G1000 has detected a failure in the GDL 69/69A.	• Replace GDL 69/69A. • Check GDL 69/69A antenna and cabling.

5.1.8.20 GTX 33/33D Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
XPDR1 CONFIG – XPDR1 configuration error. Config service req’d.	The G1000 has detected a GTX 33 configuration mismatch.	a. Perform a SET>ACTV configuration reset on the GTX Config page and verify the aircraft registration is present. b. If error is still present, reload config files from a loader card. c. If problem persists, replace master configuration module, check config module harness for faults and replace if necessary. **NOTE** New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The G1000 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.
XPDR2 CONFIG – XPDR2 configuration error. Config service req’d.		
MANIFEST – GTX1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GTX 33 #1.	Load correct software version
MANIFEST – GTX2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GTX 33 #2.	
XPDR1 SRVC – XPDR1 needs service. Return unit for repair.	The G1000 has detected a failure in GTX 33 #1.	Replace GTX 33D #1.
XPDR2 SRVC – XPDR2 needs service. Return unit for repair.	The G1000 has detected a failure in GTX 33 #2.	Replace GTX 33/33D #2.

XPDR1 FAIL – XPDR1 is inoperative.	GTX 33D #1 is not responding.	• Troubleshoot for a failed datapath using Section 5.1.5. • Replace GTX 33D #1
XPDR2 FAIL – XPDR is inoperative.	GTX 33/33D #2 is not responding.	• Troubleshoot for a failed datapath using Section 5.1.5. • Replace GTX 33/33D #2.
BACKUP PATH – Transponder using backup data path.	The GTX 33 is using a backup RS-232 data path.	Troubleshoot for a failed datapath using Section 5.1.5.

5.1.8.21 GTS 8XX Advisory Messages

Advisory Message	Possible Cause	Recommended Actions
CALIBRATION DATA FAULT	Stored factory calibration parameters are invalid.	Replace the unit.
CONFIGURATION DATA FAULT	Stored system configuration parameters are invalid or Mode S address is invalid (All 0's or F's). Fault will persist until configuration is corrected.	Reconfiguration the GTS 8XX. If problem persists, replace the unit.
FPGA FAULT	Check of the FPGA image failed. Fault will persist until valid FPGA image is loaded.	If upload of FPGA image was recently attempted, retry the upload. Otherwise, replace the unit.
ROM FAULT	Internal non-volatile memory failure, or invalid data image detected.	If upload of audio image or IGRF magnetic field image was recently attempted, retry the upload. Otherwise replace the unit.
EXECUTION FAULT	CPU execution fault has occurred.	Cycle power and retry self test. If fault persists, replace the unit.
ELECTRICAL FAULT	One of the internal electrical voltages are out of range. Fault will persist until power is cycled.	Check aircraft power supply. If fault persists, replace the unit.
WHISPER SHOUT FAULT	Transmitted power is out of tolerance.	Check cable loss configuration, antenna installation and all cable connections and retry self test. If fault persists, replace the unit.
TRANSMIT POWER FAULT	One of the internal transmitter power source voltages are out of range. Fault will persist until power is cycled.	Check aircraft power supply. If fault persists, replace unit.
1030 MHZ FREQUENCY SOURCE FAULT	Transmit Frequency synthesizer is not locked.	Cycle power and retry self test. If fault persists, replace unit.
1090 MHZ FREQUENCY SOURCE FAULT	Receive Frequency synthesizer is not locked.	Cycle power and retry self test. If fault persists, replace unit.

RECEIVER CALIBRATION FAULT	--------	Check antenna installation and all cable connections and retry self test. Ensure that self test occurs in area free of buildings and large objects that can reflect signals. If fault persists, replace unit.
TRANSMITTER CALIBRATION FAULT	--------	Check antenna installation and all cable connections and retry self test. Ensure that self test occurs in area free of buildings and large objects that can reflect signals. If fault persists, replace unit.
BAROMETRIC ALTITUDE INPUT FAULT	Own ship barometric altitude calculation is invalid or has timed out.	Check wiring to source of barometric altitude and ensure that source is operating. Fault will clear as soon as valid barometric altitude data is received.
MAIN BOARD TEMPERATURE FAULT	Main board temperature or RF receiver temperature is greater than 90° Celsius or less than -60° Celsius.	Fault will persist until internal temperature returns to acceptable range.
TCAS EQUIPAGE TIMEOUT FAULT	TCAS Equipage data is not being received or has timed out for 800ms.	Check wiring to TCAS Equipage data source and ensure that source is operating. Fault will clear as soon as valid TCAS Equipage data is received.

5.1.9 Common Problems

5.1.9.1 GDU

Symptom	Recommended Actions
• Display will not track photocell • Keyboard will not track photocell	• If you suspect the settings were manually changed by an operator, reload PFD1/2, MFD, GCU and GMC Configuration files including optional equipment configuration files that list PFD1/2 and MFD in the PRODUCT box on the System Upload page. • For displays, go to the GDU TEST page in configuration mode. Cover and uncover the photocells and verify that PHOTOCELL A or PHOTOCELL B value changes. If values do not change, replace the display.
• Display will not track dimmer bus • Keyboard will not track dimmer bus	• If you suspect the settings were manually changed by an operator, reload PFD1/2, MFD, GCU and GMC Configuration files including optional equipment configuration files that list PFD1/2 and MFD in the PRODUCT box on the System Upload page. • Check display dimmer input to verify voltage is present. • Replace display if dimmer voltage is present.
• Display is blank • Display resets • Display flickers	a. Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. b. Cycle power. 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. c. Use a bright light to verify LCD is active. d. Adjust avionics dimmer control full clockwise. e. Manually turn up backlight on the PFD and load configuration files to the GDU. f. Ensure slide lock is fully engaged with the locking tabs on the back of the unit. 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. g. Ensure GDU is receiving power and ground. If a circuit breaker is tripped, determine source of short before resetting breaker. h. Ensure circuit breakers have not failed and power wire connections are secure. i. Swap PFD1 and PFD2. If problem follows unit, replace the display.

Symptom	Recommended Actions
SD card is stuck in GDU	• 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. You may need to push the card in further to release the card locking mechanism. • If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair. • If the card can be removed, check the card for having more than one label. Two or more labels on the card will cause sticking. Remove all but one label. • Ensure the SD card is from SanDisk. Use of other SD Cards is not recommended.
A button/knob/joystick does not appear to function	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 does not display	a. Ensure supplemental data cards are inserted correctly in the lower slots of all three GDU's. b. Allow the system to verify the data on the cards for approximately five minutes after power-up. c. If a database does not activate, reload the problem database onto the SD Card or replace the card. You may need to replace all data cards as a set to keep the database cycles the same and prevent database mismatch errors.

5.1.9.2 GIA 63W

Symptom	Recommended Actions
Weak COM transmit power	• Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to verify the unit or aircraft wiring is the problem. • If problem follows unit, replace GIA. • If problem does not follow unit, check COM antenna and cabling for faults.
Weak COM receiver	• Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to verify the unit or aircraft wiring is the problem. • If problem follows unit, replace GIA. • If problem does not follow unit, check COM antenna and cabling for faults.
No COM sidetone	• Swap GIA1 and GIA2, reconfigure both GIA's to their new locations to verify the unit or aircraft wiring is the problem. • If problem follows unit, replace GIA. • If problem persists, replace 1347D # with a known good unit. • If problem persists, reinstall original 1347D #1 and replace 1347D #2.
COM Bleed over	• Verify on the GMA CONFIGURATION page that "Disable Split COM" has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. • If the box is black (indicating COM ½ button is active), highlight "Disable Split COM" with the curser and press the ENT key to turn the box green which will deactivate Split COM mode.

5.1.9.3 WAAS GPS

Symptom	Recommended Actions
Will not acquire satellites	• Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. • 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 date and time on Date/Time Setup Page. If date and time are incorrect, enter the correct date and time. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations, to verify location of problem. If problem follows unit, clear the GPS almanac by performing the following steps: – 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 cannot 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. – Reload GIA Audio and Config files from a loader card. 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. • If clearing nonvolatile memory is unsuccessful and the GPS still cannot acquire a position, replace the GIA. • Check GPS antenna and cabling.

5.1.9.4 NAV

Symptom	Recommended Actions
Weak NAV receiver	• Set up a NAV/COM Ramp Test Set to radiate a test signal. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations, to verify location of problem. – If problem follows unit, replace GIA. – If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

5.1.9.5 Glideslope

Symptom	Recommended Actions
Weak G/S Receiver	• Set up a NAV/COM Ramp Test Set to radiate a test signal. • Swap GIA1 and GIA2, reconfigure both GIA's to their new locations, to verify location of problem. – If problem follows unit, replace GIA. – If problem does not follow unit, check NAV antenna, coupler, and cabling for faults.

5.1.9.6 GDC 74X

Symptom	Recommended Actions
Altitude is different than standby altimeter	• Perform a pitot/static check (see applicable airframe specific maintenance manual for procedure). Allow the GDC 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 to Garmin for service if not outside limits. • If GDC is outside limits, recalibration may be performed in accordance with Garmin Service Bulletin 0720, Section 2.7.3.
GDC 74X Config file does not load.	• Replace GDC 74X config module. • If problem persists, replace GDC 74X config module wire harness.

5.1.9.7 AHRS

Symptom	Recommended Actions
AHRS does not complete initialization	a. Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. b. 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. c. Calibrate the GRS 77. d. Check GRS 77 configuration module wiring for damage. e. Check GRS 77 connector for bent pins. If no damage can be found, replace GRS 77 configuration module. f. If problem persists, replace the GRS 77.
Attitude appears unstable	a. Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin. b. Ensure the four GRS 77 mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify. c. 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). d. Ensure GRS 77 connector is securely fastened and proper strain relief is provided. e. Remove GRS 77 connector and verify there are no bent pins. f. Replace the GRS 77. g. Contact Garmin for further troubleshooting if required.

5.1.9.8 GEA

Symptom	Recommended Actions
Fuel quantity flags intermittently	• Check for an open in the wiring and connectors between the GEA, signal conditioner, and the sender (hi, low, or signal ground lines). • Check fuel sender for an open or dead spot. • For capacitance systems, refer to the airframe maintenance manual for troubleshooting information.
Engine instruments are missing on the MFD	Clear user data on each GDU by holding down the CLR button while powering on each GDU. Keep the other display off while clearing user data.
Battery discharge indication	Consult the OEM Maintenance manual for troubleshooting information. If the battery is not truly discharging, recalibrating the measuring circuit may be necessary using the HSCM Configuration Page in Configuration Mode.

5.1.9.9 GMA 1347D

Symptom	Recommended Actions
Noise in Audio	Most often the cause of the noise is external to the GMA 1347D. Try the following to locate the source of the noise before replacing the 1347D: • 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 engines turned off. • If the noise is present only when the engines are running, check the generator and/or ignition system as possible sources of noise (see applicable airframe maintenance manual). • Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.). • If the noise is identified from one electrical system or component refer to the applicable airframe specific 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 1347D CONFIGURATION page for higher noise environments. • Replace unit only after all possible external sources of noise are eliminated.
Buttons Do Not Work.	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 (i.e. ADF, HF, etc.) from the loader card.

COM Bleed over	Verify on the GMA CONFIGURATION page that “Disable Split COM” has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. If the box is black (indicating COM ½ button is active), highlight “Disable Split COM” with the cursor and press the ENT key to turn the box green which will deactivate Split COM mode.
Speaker Cuts Out	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 Airframe Maintenance Manual.
Mic Audio Heard in Speaker	Reduce ICS Volume.

5.1.9.10 XM

Symptom	Recommended Actions
No XM audio is heard No XM weather information is displayed	a. Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 Pilot's Guide): • Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD. • Verify no music sources are plugged into the AUX music input jack. Verify the COM squelch is not open. Verify the ICS squelch is not open. • Verify the marker beacon tones are not being received. • Verify the headphone (if equipped) volume is turned up. • Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online. If a red X is present, verify the unit is receiving power at the rack connector. • Check Garmin service literature for GDL software advisories. Ensure there are no GDL advisory Messages in the alert window. If there is an Alert for software or configuration error or mismatch, reload the file noted in the Alert. • Restart the PFD and MFD in configuration mode and go to the GDL page. 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 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. b. Verify there is a good ground connection through the aircraft between the MFD and the GDL69/69A unit. Reference the Aircraft Maintenance Manual for instructions on how to check bonding and ground points. c. If problem persists, replace the GDL 69/69A.

5.1.10 Using Configuration Pages in Troubleshooting

In addition to LRU failure annunciations, data path failure and advisory messages, the information displayed on the configuration pages can be used to help troubleshoot the G1000.

5.1.10.1 GDL 69 Page

NOTE

Configuration settings are not adjustable on the GDL 69 Page.

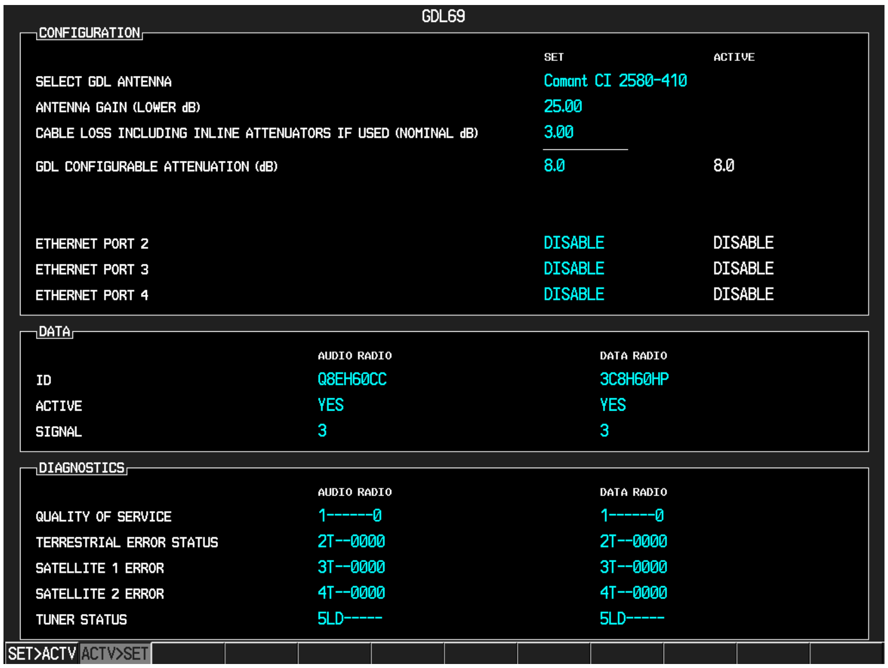


Figure 5-13. GDL 69 Configuration Page

The following information describes how the GDL 69 Configuration Page is arranged.

CONFIGURATION—this window contains the following fields:

a. SELECT GDL ANTENNA—selects the GDL antenna.

b. ANTENNA GAIN (LOWER dB)—sets the antenna gain value.

c. CABLE LOSS INCLUDING INLINE ATTENUATIONS IF USED (NOMINAL dB)—Sets the inline cable loss attenuation value.

d. GDL CONFIGURABLE ATTENUATION (dB)—sets the desired GDL attenuation value.

e. ETHERNET PORT 2, 3, 4—enables and/or disables the desired Ethernet port.

NOTE

'AUDIO RADIO' refers to the XM audio receiver installed in the GDL 69A. 'DATA RADIO' refers to the XM data receiver installed in both the GDL 69 and GDL 69A.

DATA:

a. ID—displays the identification number for the GDL 69/69A.

b. ACTIVE—displays the active status for the GDL 69/69A.

c. SIGNAL—displays the signal level for the GDL 69/69A.

0 – no signal

1 – weak signal

2 – adequate signal

3 – good signal

NOTE

Levels 2 and 3 should allow for proper operation of all GDL69/69A audio and weather options. Levels 0 and 1 are likely indications of problems with availablity. A “204” message in the signal field indicates that signal information has not initialized.

DIAGNOSTICS (For XM use only, not useful for troubleshooting):

a. QUALITY OF SERVICE—displays the quality of service for the GDL 69/69A.

b. TERRESTRIAL ERROR STATUS—displays the terrestrial error status for the GDL 69/69A.

c. SATELLITE 1 ERROR—displays the error status for satellite 1.

d. SATELLITE 2 ERROR—displays the error status for satellite 2.

e. TUNER STATUS—displays the tuner status for the GDL 69/69A.

5.1.10.2 GDL 90

Refer to the GDL 90 Installation Manual for troubleshooting information.

5.1.10.3 GMA 1347 Configuration Page

Figure 5-14. GMA Configuration Page (Display Format 1 and 2)

The following information describes the arrangment of the GMA Configuration Page. There are two display formats, display format 1 and display format 2.

DISPLAY FORMAT 1:

SELECT GMA UNIT—displays the currently selected GMA 1347 audio panel.

HEADSET VOLUME:

Adjustable range is between –31 and + 31 for the following:

a. MUSIC #1, 2—sets the music input volume levels.
b. UNSWITCHED IN #1, 2, 3—sets unswitched input volume levels.
c. ALTITUDE WARNING—sets the altitude warning input volume level.
d. PASSENGER VOLUME—sets the passenger volume.
e. MASTER VOLUME MIN—sets the passenger volume.

SPEAKER VOLUME:

a. CREW AUDIO—sets the crew audio volume level. Speaker volume adjustable range is between –31 and 31.
b. PILOT MIC VOLUME—adjusts Pilot Mic Volume for PA speaker.
c. COPILOT MIC VOLUME—adjusts Copilot Mic Volume for PA speaker.

MASTER SQUELCH:

a. SENSITIVITY VALUE—sets the Master Avionics Squelch (MASQ™) threshold value. Value is adjustable between –31 and 31.

MARKER BEACON:

a. HI/LO SENSE THRESHOLD—sets Hi/Lo marker sensitivity thresholds, value is adjustable between –31 and 31.

b. VOLUME—adjusts marker beacon volume, value is adjustable between –31 and 31.

HAIL TONE:

a. CHIME INHBT TIME—sets chime inhibit time, value is adjustable between 0 and 255 seconds.

b. VOLUME—adjusts hail tone volume, value is adjustable between –31 and 31.

DISPLAY FORMAT 2:

KEYPAD ANNUNCIATORS—The following audio panel settings can be enabled or disabled:

a. DISABLE COM3—disables COM3 button in situations where no COM3 is installed.

b. DISABLE TEL—disables TEL button in situations where no telephone is installed.

c. DISABLE DME—disables DME button for situations where no DME is installed.

d. DISABLE ADF—disables ADF button for situations where no ADF is installed.

e. DISABLE AUX—disables AUX button for situations where no auxiliary input is connected.

f. DISABLE SPEAKER—disables SPEAKER button for situations where no speaker input is connected.

g. DISABLE PA—disables PA button for situations where no PA input is connected.

h. DISABLE PLAY—disables PLAY button for situations where no play input is connected.

i. DISABLE MUSIC—disables music input.

j. DISABLE REC—not used in certain installations.

CONFIGURATION INPUTS—the following audio panel settings can be enabled or disabled:

a. MASQ INHIBIT—disables the Master Squelch circuit, which switches out aircraft radios during times of 'silence' to reduce the noise heard by the occupants. The Master Squelch threshold value is used to adjust the trip level of the circuit.

b. ICS MUTE—mutes the MUSIC 1 channel during ICS activity.

c. INTERNAL SIDETONE—causes the audio panel to provide COM sidetone in situations when the GIA radios do not provide sidetone.

d. MUTE AUDIO ON TX/RX—all secondary COM audio is muted upon transmitting over primary COM. Upon detection of primary COM transmission, all secondary COM is muted.

e. ANALOG INSTALL—COM 1 and COM 2 are connected using the analog interfaces instead of the digital interface.

f. RECORD COM 2—during split-COM operation, the digital clearance recorder records COM 2 only and playback only on the co-pilot’s channel.

g. POWER-UP w/ AUX ON—enables the GMA 1347 to always power up with the AUX channel enabled.

h. DUAL INSTALL—the audio panel is part of a dual-installation.

i. DISABLE SPLIT COM—allows split-COM feature to be disabled for installations where split-COM operation is not desired.

j. COM 2 ON-SIDE—in a dual audio panel installation, this designates the unit as a ‘right-hand/co-pilot’ unit.

k. DISABLE 347 BEEP—not used in certain installations.
l. SPKR ON PWR ON—when green, automatically turns the speaker on when the audio panel is turned on.
m. ALLOW MUSIC MUTE—enables the music mute toggle function for Music 1 using the MKR key.
n. PASS AUTO SQL—allows the passenger mic squelch to always be set to auto regardless of the pilot's selection of auto or manual squelch.
o. INTRCOM ON PWR ON—not used in certain installations.
p. DSBL ICS SIDETONE—not used in certain installations.
q. MUS 2 MUTE ON RAD—mute music #2 on radio when passengers hear radios
r. PASS HANDSET INST—passenger handset install
s. SEL AUDIO TO PASS—route selected audio to passengers
t. PA TO SPKR PA—sent to speaker in GMA 1347C/D
u. CABIN ON PWR ON—cabin button selected on power-up
v. CAB HAIL OVERRIDE—cabin hail override
w. SPKR ON RMT FAIL—speaker on remote communication failure
x. DISABLE XSIDE MIC ON RMT FAIL—disable cross-side microphone on remote communication failure
y. 347 IN G1000—GMA 1347 installed in G1000
z. 02 MIC 2 SPEAKERS—send the oxygen microphone mask audio out to both the cross-side and the on-side speaker
aa. TEL RNG AS ALERT—enable audio panel's telephone ringer input as an analog alert input only when dual communication has failed

5.1.10.4 AHRS/Air Data Input Configuration Page

Figure 5-15. AHRS/Air Data Input Configuration Page

This page displays real time data from the GRS 77 (AHRS 1) and GDC74X (Air Data1). If the AHRS 1 or Air Data 1 fields are blank, the units are not online and the cause should be determined.

AHRS 1, 2:

a. T HDG—True heading value input from GRS 77, expressed in degrees.
b. ROLL—Roll value input from GRS 77, expressed in degrees.
c. PITCH—Pitch value input from GRS 77, expressed in degrees.
d. X ACC—X Axis acceleration value, expressed in m/s^2.
e. Y ACC—Y Axis acceleration value, expressed in m/s^2.
f. Z ACC—Z Axis acceleration value, expressed in m/s^2.

AIR DATA 1, 2:

a. SAT—Static Air Temperature measurement input from GDC 74X, expressed in degrees Celsius.
b. IAS—Indicated Air Speed measurement input from GDC 74X, expressed in knots.
c. TAS—True Air Speed measurement input from GDC 74X, expressed in knots.
d. B ALT—Barometric corrected altitude input from GDC 74X, expressed in feet.
e. D ALT—Density altitude input from GDC 74X, expressed in feet.
f. P ALT—Pressure altitude input from GDC 74X, expressed in feet.
g. STATIC PRESS—The raw value of the atmospheric pressure in the static input.
h. DIFF PRESS—The raw value of the pressure in the pitot vs. static inputs.
i. MACH—Displays aircraft speed in Mach number.

5.1.10.5 Engine Data Page

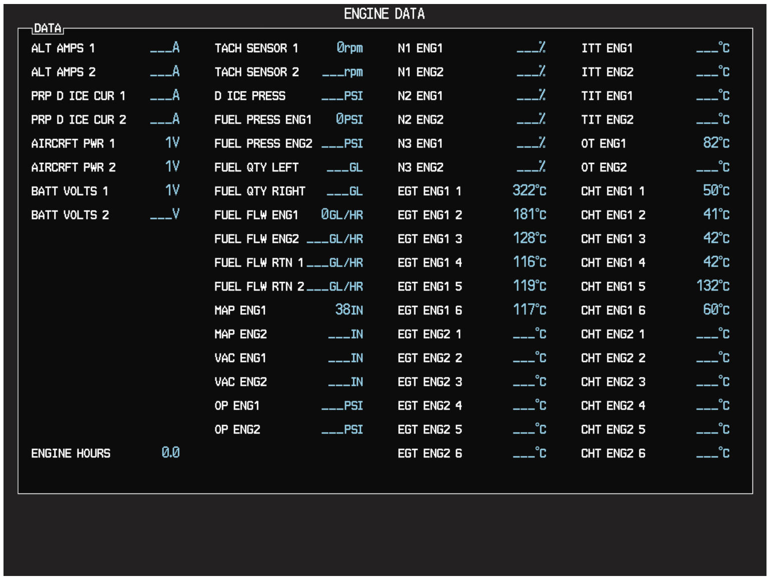


Figure 5-16. Engine Data Page

The Engine Data Page displays engine sensor readings in real-time. Items shown in Figure 5-16 are typically used in most aircraft. There are no configurable parameters on this page.

DATA:

a. ALT AMPS 1, 2—Alternator Amps measurement, expressed in amperes.
b. PROP D ICE CUR 1, 2—Propeller De-Ice current measurement, expressed in amperes.
c. AIRCRFT PWR 1, 2—Aircraft power input measurement, expressed in volts DC.
d. BATT VOLTS 1, 2—Battery Voltage measurement, expressed in volts DC.
e. ENGINE HOURS—Displays engine time in hours, as measured by the engine tachometer input.
f. TACH SENSOR 1, 2—Tachometer sensor measurement, expressed in revolutions per minute (RPM).
g. D ICE PRESS—De-Ice system pressure measurement, expressed in pounds per square inch (PSI).
h. FUEL PRESS ENG 1, 2—Fuel Pressure measurement, expressed in pounds per square inch (PSI).
i. FUEL QTY RIGHT, LEFT—Fuel Quantity measurement, expressed in gallons (GL).
j. FUEL FLW ENG 1, 2—Fuel Flow measurement, expressed in gallons per hour (GL/HR).
k. MAP ENG 1, 2—Manifold Air Pressure sensor reading, expressed in inches/mercury (“/Hg).
l. VAC ENG 1, 2—Vacuum measurement, expressed in inches/mercury (“/Hg).
m. OP ENG 1, 2—Oil Pressure, expressed in pounds per square inch (PSI).

n. N1, N2, N3 ENG 1, 2—Compressor spool speeds, expressed in percent RPM. (Turbine aircraft only)
o. EGT ENG 1, 2 (1-6)—Exhaust Gas Temperature, expressed in degrees Celsius.
p. ITT ENG 1, 2—Interstage Turbine Temperature, expressed in degrees Celsius. (Turbine aircraft only)
q. TIT ENG 1, 2—Turbine Intake Temperature, expressed in degrees Celsius. (Turbine aircraft only)
r. OT ENG 1, 2—Oil Temperature, expressed in degrees Celsius.
s. CHT ENG 1, 2 (1-6)—Cylinder Head Temperature, expressed in degrees Celsius.

5.1.10.6 GEA Status Page

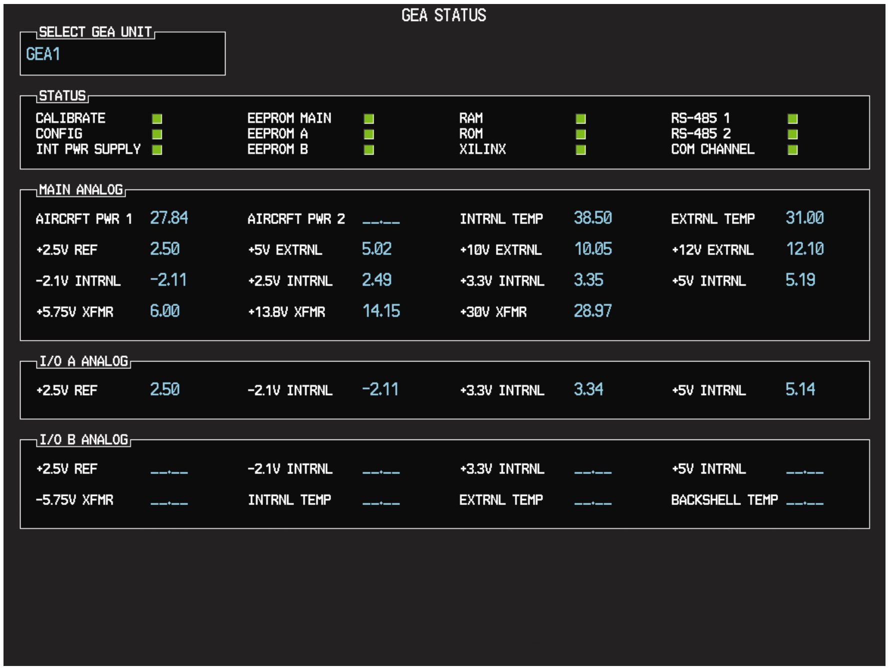


Figure 5-17. GEA Status Page

This page displays various items related to the GEA 71 and its operation. The technician can use this page to aid in diagnosis and troubleshooting of the GEA 71.

SELECT GEA UNIT:

This box displays the currently selected GEA 71 engine/airframe unit.

STATUS:

NOTE

A green box indicates good working order. A red box indicates an issue. Contact Garmin for assistance.

a. CALIBRATE—Displays status of GEA 71 calibration.

b. CONFIG—Displays status of GEA 71 configuration.

c. INT PWR SUPPLY—Displays status of the GEA 71 +5, +10, and +12 sensor power supply voltages. If it is red, troubleshoot as for Engine Instrument Red-X’s.

d. EEPROM MAIN, A, B—Displays status of internal EEPROM for main, I/O ‘A’ and I/O ‘B’ boards.

e. RAM, ROM, XILINX—Displays status of internal memory and FPGA.

f. RS-485 1, 2—Displays status of RS-485 I/O channels.

g. COM CHANNEL—Displays whether or not the main RS-485 channel usage is greater than 80%. Red indicates a utilization of greater than 80%, whereas green indicates a utilization of less than 80% of the channels’ capacity (preferred). A red box is not cause for replacement of the unit, it is an indicator of communication capacity utilization.

5.1.10.7 GEA Configuration Page

CAUTION

The data contained on the GEA Configuration Page (Figure 5-18) is extremely critical to aircraft safety. Although the content can be viewed, the technician cannot make changes unless authorized and equipped to do so.

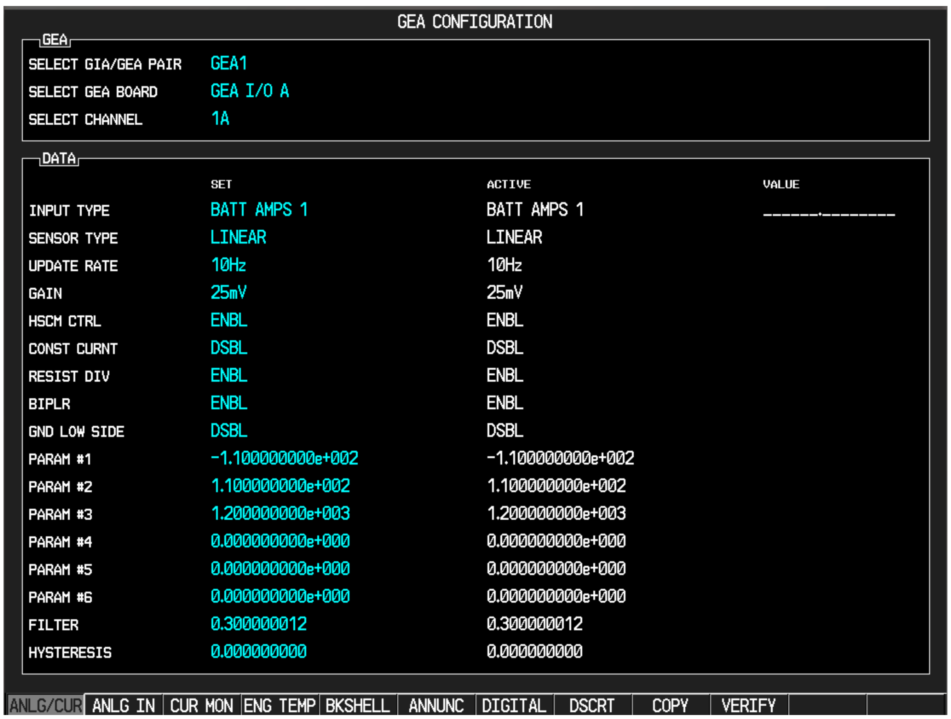


Figure 5-18. GEA Configuration Page

These pages show configuration settings for all inputs/outputs of the GEA 71 Engine/Airframe Unit. All settings are pre-established for a particular installation and are loaded from the appropriate G1000 Loader Card. Input/Outputs are categorized by groups and are brought on-screen by the pressing appropriate softkey. All settings are contained in the 'GEA 1' configuration file.

GEA—This box indicates which GEA, GEA circuit board, and/or GEA I/O channel is currently selected for display.

DATA—This box displays current configuration settings for the selected inputs/outputs in the GEA window.

SOFTKEYS:

a. ANLG/CRNT—Displays analog/current configuration settings.

b. ANLG IN—Displays analog in configuration settings.

c. CRNT MON—Displays current monitor configuration settings.

d. ENG TEMP—Displays engine temperature sensor configuration settings.

e. BKSHELL—Displays backplate thermocouple configuration settings.

f. ANNUNC—Displays annunciation configuration settings.
g. DIGITAL—Displays digital input configuration settings.
h. DSCRT—Displays discrete input configuration settings.
i. COPY—Copies the selected input/output or channels in preparation for a SET>ACTV or ACTV>SET command.VERIFY—Verifies that the COPY command operated successfully and stores appropriate Cyclic Redundancy Checks (CRCs) or checksums in the master configuration module.

5.1.10.8 GDU Status Page

The GDU Status Page (Figure 5-19) displays various items relating to the GDU and its operation. Use this page to help diagnosis and troubleshoot the GDU.

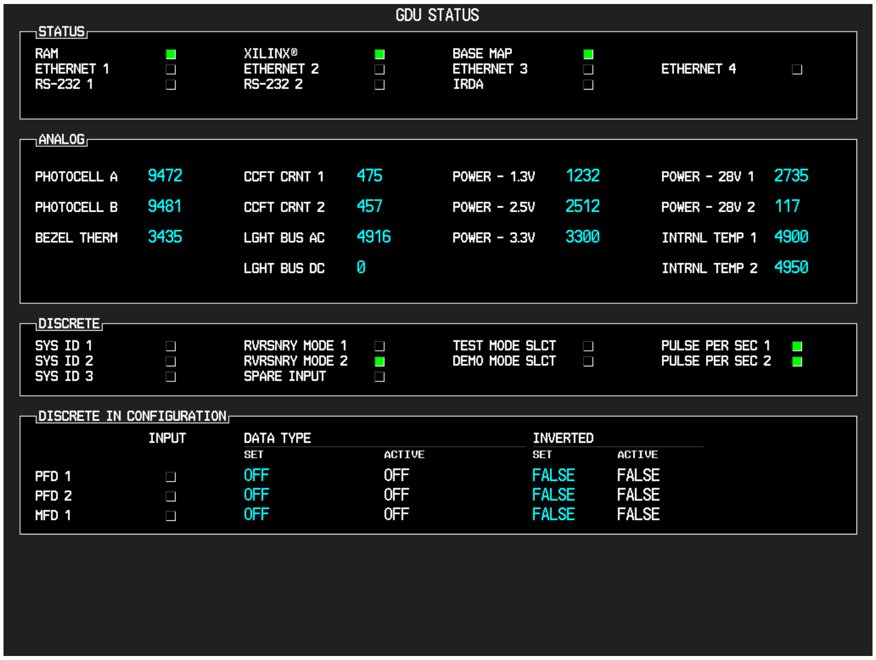


Figure 5-19. GDU Status Page

The following information describes how the GDU Status Page is arranged.

'STATUS' Window:

a. RAM—Indicates condition of GDU 104X RAM memory. If it does not pass, the unit may not initialize.
b. XILINX—Indicates condition of GDU 104X XILINX processor. If it does not pass, the unit may not initialize.
c. BASE MAP—Indicates condition of stored basemap in the GDU 104X. A green box indicates the basemap has been installed. If the box is black, the basemap will need to be loaded. Contact Garmin for assistance.
d. ETHERNET 1, 2, 3—Indicates status of the GDU 104Xs Ethernet channel. A green box indicates the ETHERNET loopback tests passed. A red or black box indicates it may not be used or a wiring fault is present.
e. RS-232 1, 2—Indicates status of the GDU 104X's RS-232 channel. A green box indicates the

RS-232 loopback tests passed. A red or black box indicates it may not be used or a wiring fault is present.

f. IRDA—Indicates status of GDU 104X IrDA infrared port. Used for Garmin testing, it is not activated at this time

g. ETHERNET 4—Indicates status of GDU 104Xs Ethernet channel 5. Used for Garmin testing, it is not activated at this time

'ANALOG' Window:

a. PHOTOCELL A, B: Displays the input value of display photocells, between 0 and 9999. The values can be converted to a percentage by adding a decimal place two digits over from the right (example:
8035 = 80.35%). If there is a significant split (~30% to 50%) you can expect the display to appear different from the other display in the aircraft, IF both of their lighting curves are set to the same values. Replace the display if one photocell reading is significantly different from the other.

b. BEZEL THERM—Displays the temperature of the GDU bezel, expressed in degrees Celsius.
(Example: 2064 = 20.64 degrees Celsius)

c. CCFT CRNT 1, 2—Displays an indication of current flowing through the display backlight bulbs. Number does not reflect actual current value and is not useful for troubleshooting.

d. LGHT BUS AC—Displays the input value of the AC lighting bus, if enabled. Disregard number if it is not used in the installation.

e. LGHT BUS DC—Displays the input value of the DC lighting bus, if enabled. Disregard number if not used in the installation.

f. POWER (1.3V, 2.5V, 3.3V, 28 V 1/2)—Displays power input voltages of various internal components. Should be within 10% of the desired voltage. (example: for 2.5V field, 2500 = 2.500 Vdc; for 28V Field, 3633 = 36.33 Vdc). Replace the display if these values are more than 10% from the desired voltage.

g. INTRNL TEMP 1, 2—Displays the internal temperature sensor values of the display, in degrees Celsius (example: 45267 = 45.267°C).

'DISCRETE' Window:

GDU System ID 1	GDU System ID 2	GDU System ID 3	Display Mode
Black	Black	Green	MFD
Black	Black	Black	PFD #1
Green	Black	Black	PFD #2

h. SYS ID 1, 2, 3—Displays the current system ID assigned to the display. Green indicates that the System ID pin is strapped to ground. Black indicates that the System ID pin is left 'open' and not strapped to ground.

i. RVRSNRY MODE 1, 2—Displays the current status of the reversionary modes. Reversionary Mode 1 is activated by the GMA 1347 reversion button. Reversionary Mode 2 is activated by a second GMA 1347, if installed. Reversionary 1 input is a ground on Pin 58, reversionary 2 input is a ground on Pin 15.

j. SPARE INPUT—A green box indicates Pin 14 is grounded. This input should have a black box, if it is green check for connector miswiring or a bent pin.

k. TEST/DEMO MODE SLCT—A green box indicates Pin 53/54 is grounded. These inputs should have a black box, if either box is green check for connector miswiring or a bent pin.

l. PULSE PER SEC 1, 2—Displays status of GPS time synchronization inputs (from GIA) to the GDU. Used for Garmin testing, not useful for troubleshooting.

'DISCRETE' Window:

The 'Discrete' Window displays the current configuration of discrete inputs into the display. These settings are loaded with the G1000 Loader Card and must not be changed. The input box is green if it is receiving the input, black if no input is expected, or red for a missing input. If the active column does not match the set column, load PFD/MFD configuration files. These settings are loaded with the G1000 Loader Card and must not be changed.

5.1.10.9 GDU Test Page

The GDU Test Page (Figure 5-20) shows a graphical layout of all display buttons in red. Each red button turns green when the button is pressed indicating correct operation of the button.

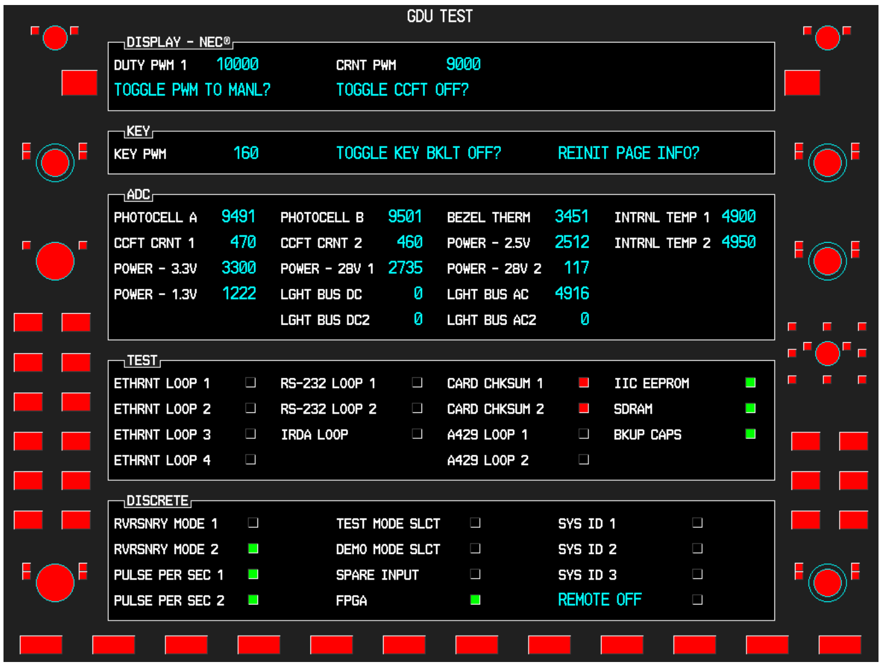


Figure 5-20. GDU Test Page

GDU Test Page Window Descriptions

'DISPLAY-NEC®' Window:

a. DUTY PWM 1—Displays the display brightness duty pulse width modulation. Value range is between 0 and 9999 and corresponds to the display brightness value shown. Not useful for troubleshooting.

b. CRNT PWM—Displays percentage of current pulse-width-modulation to backlight bulbs. Value is between 0 and 10,000, showing the percentage of the maximum allowable current to the backlight. Not useful for troubleshooting.

c. TOGGLE PWM TO MANL?— Allows the technician to manually adjust the display brightness.

d. TOGGLE CCFT OFF?— Allows the technician to turn off the backlight current controller.

'KEY' Window:

a. KEY PWM—Displays the keypad pulse width modulation brightness value. Range is between 0 and 9999 and corresponds to the keypad brightness value shown. Not useful for troubleshooting.

b. TOGGLE KEY BKLT OFF?—Allows the technician to toggle the keyboard backlight off.
c. REINIT PAGE INFO?—Allows technician to re-initialize all information on the test page.

'ADC' Window:

a. PHOTOCELL A, B—Displays the input value of display photocells, between 0 and 9999. The values can be converted to a percentage by adding a decimal place two digits over from the right (Example:
8035 = 80.35%). If there is a significant split (~30% to 50%) you can expect the display to appear different from the other display in the aircraft, IF both of their lighting curves are set to the same values. Replace the display if one photocell reading is significantly different from the other.
b. BEZEL THERM—Displays the temperature of the GDU bezel, expressed in degrees Celsius.
c. CCFT CRNT 1, 2—Displays an indication of current flowing through the display backlight bulbs. Number does not reflect actual current value and is not useful for troubleshooting.
d. POWER (2.5V, 3.3V, 28 V 1, 2; 1.3V)—Displays power input voltages of various internal components. (Example: for 2.5V field, 2500 = 2.500 Vdc; for 28V Field, 3633 = 36.33 Vdc) They need to be within 10% of desired voltages. Replace the display if these values are more than 10% from the desired voltage.
e. LGHT BUS DC, AC—Displays input value of AC and DC lighting bus inputs, depending on which is configured. Disregard number if not used in the installation.
f. INTRNL TEMP 1, 2—Displays the internal temperature of the GDU, expressed in degrees Celsius.

'TEST' Window:

a. IIC EEPROM—Displays the condition of the GDU configuration module EEPROM chip, located in the backplate connector. It should be green for the PFD and red for the MFD. If it is red on the PFD, check configuration module wiring and pins for damage before replacing the configuration module.
b. DATACARD CHKSUM 1, 2—Requires the use of a special data card. Tests the data card reader interface function. Used for Garmin testing, not useful for troubleshooting.
c. NAND, NOR FLASH, SDRAM—Displays the condition of various GDU internal components.
d. A429 LOOP 1, 2—Indicated the status of the GDU 104Xs ARINC 429 channels. A green box indicates the ARINC 429 loopback tests passed. A red or black box indicated it may not be used or a wiring fault is present.
e. ETHERNET 1, 2, 3—Indicates status of the GDU 104Xs Ethernet channel. A green box indicates the ETHERNET loopback tests passed. A red or black box indicates it may not be used or a wiring fault is present.
f. RS-232 1, 2—Indicates status of the GDU 104X’s RS-232 channel. A green box indicates the RS-232 loopback tests passed. A red or black box indicates it may not be used or a wiring fault is present.
g. IRDA—Indicates status of GDU 104X IrDA infrared port. Used for Garmin testing, it is not activated at this time.
h. BKUP CAPS—Indicates status of the Backup Capacitor Test. A green box indicates the test passed, a red box indicates it failed.

'DISCRETE' Window:

GDU System ID 1	GDU System ID 2	GDU System ID 3	Display Mode
Black	Black	Green	MFD
Black	Black	Black	PFD #1
Green	Black	Black	PFD #2

a. RVRSNRY MODE 1, 2—Displays the current status of the reversionary modes. Reversionary Mode 1 is activated by the GMA 1347 reversion button. Reversionary Mode 2 is activated by a second GMA 1347, if installed. Reversionary 1 input is a ground on Pin 58, reversionary 2 input is a ground on Pin 15.

b. PULSE PER SEC 1, 2—Displays status of GPS time synchronization inputs (from GIA 63/GIA 63W) to the GDU. Used for Garmin testing, not useful for troubleshooting.

c. TEST, DEMO MODE SELECT—A green box indicates Pin 53/54 is grounded. These inputs should have a black box, if either box is green check for connector miswiring or a bent pin.

d. FPGA—Displays the condition of the GDU FPGA processor. If it does not pass the unit may not initialize.

e. SYS ID 1, 2, 3—Displays the current system ID assigned to the display. Green indicates that the System ID pin is strapped to ground. Black indicates that the System ID pin is left ‘open’ and not strapped to ground. (See Table below) PFD #2 is not used in certain aircraft.

f. REMOTE OFF—Allows the display to control power of a remote system. Not used in any installation at this time.

5.1.10.10 Diagnostics Page

Information on the Diagnostics Page is protected and cannot be changed.

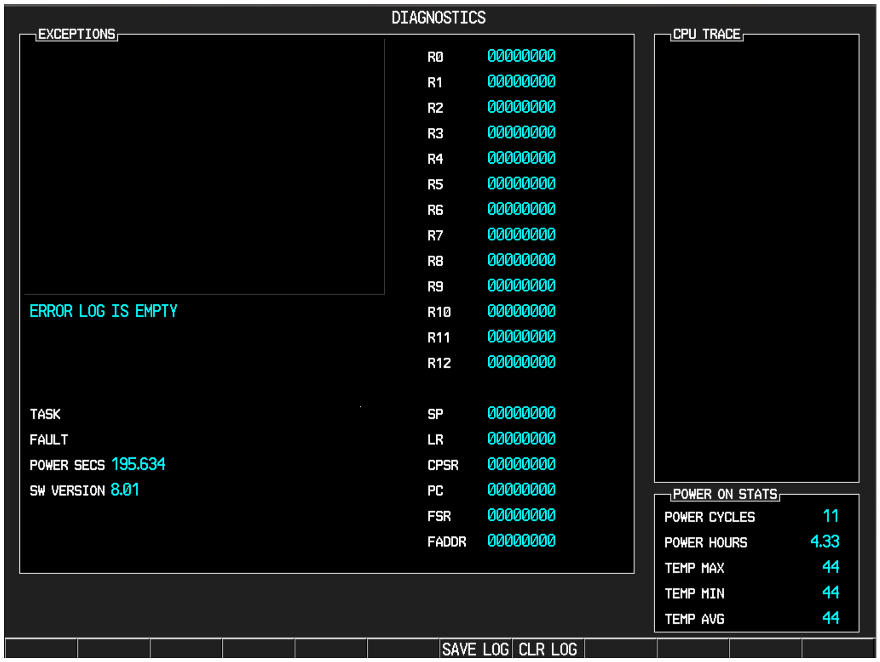


Figure 5-21. Diagnostics Page

5.1.10.11 Serial/Ethernet I/O Page

The Serial/Ethernet I/O Page displays Ethernet communication statistics (Figure 5-22). If Ethernet communication symptoms are suspected, this page logs errors as they occur and displays them. A few errors are generally not cause for unit rejection. If there are a substantial, growing number of errors logged, it indicates an Ethernet communication issue. Use the FMS knob to check all three Ethernet ports. There should generally be a continually increasing number in the RCV GOOD FRAMES and XMT GOOD FRAMES to show Ethernet communications are working. This data on this page is protected and cannot be changed.

If the number of errors are continually increasing, check the Ethernet wiring between GDU's and GIA's for any disconnects. If none are found, troubleshoot which LRU or GDL is causing the problem (PFD, MFD, GIA 1, or GIA2).

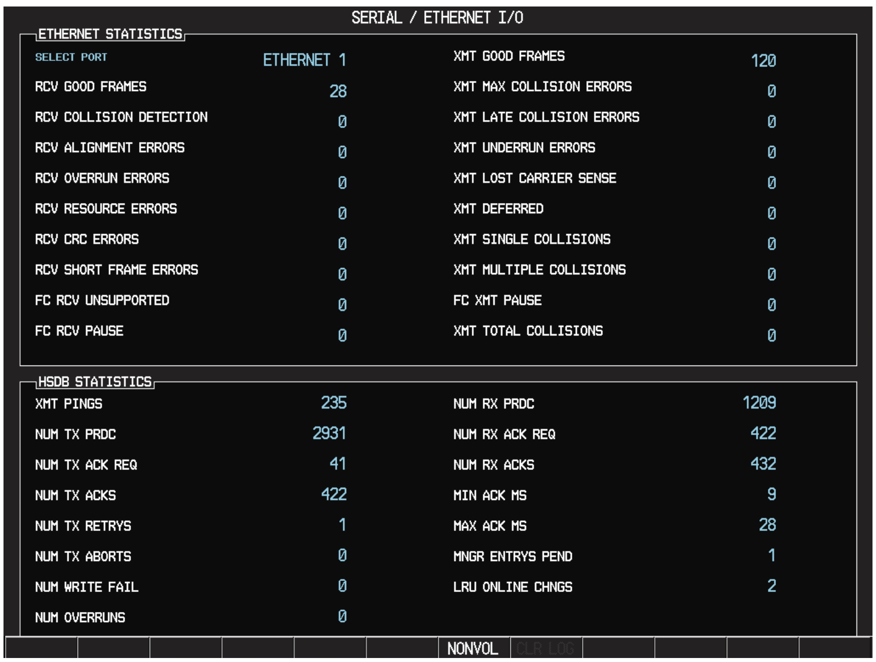


Figure 5-22. Serial/Ethernet I/O Page

5.1.10.12 Alert Configuration Page

The Alert Configuration Page displays all crew alerting system (CAS) messages and their causes. The information on this page is protected and cannot be changed.

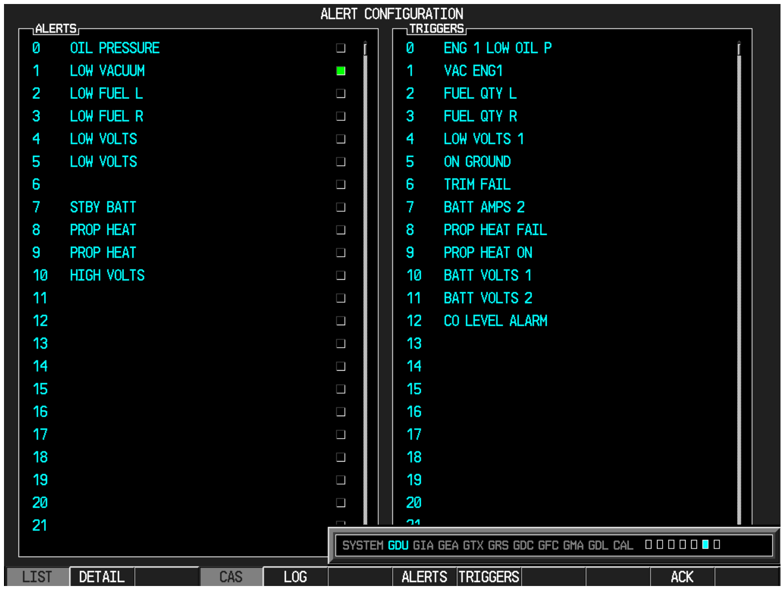


Figure 5-23. Alert Configuration Page

5.1.10.13 Airframe Configuration Page

The Airframe Configuration Page displays the airframe configuration parameters for instruments, airspeed bugs, and other items. The data on this page is protected and cannot be changed.

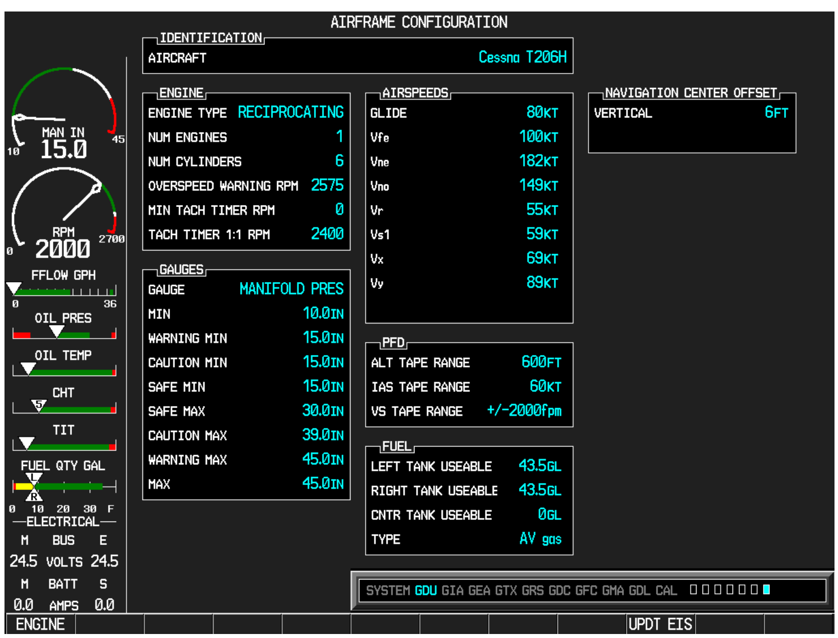


Figure 5-24. Airframe Configuration Page

5.1.10.14 RS-232/ARINC 429 Configuration Page (GIA 63/63W)

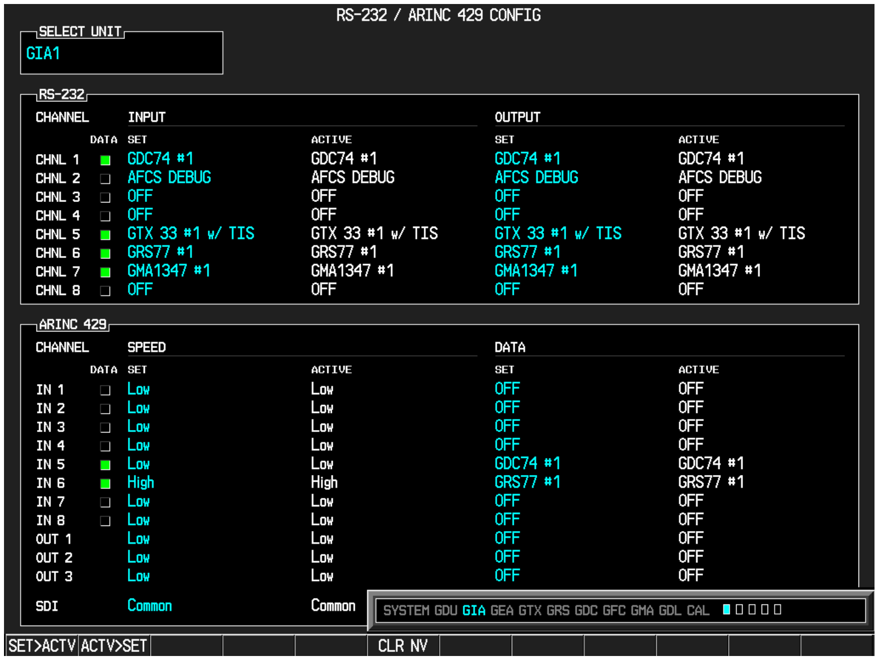


Figure 5-25. RS-232/ARINC 429 Configuration Page

Main ARINC 429 and RS-232 communications channels for GIA 1 and GIA 2 are displayed on this page. All settings are pre-established for a particular installation and are loaded from the G1000 Loader Card and should not be changed. The 'GIA 1' and 'GIA 2' configuration files contain the settings shown on this page.

Windows:

a. SELECT UNIT—displays the currently selected GIA 63/GIA 63W unit.

b. RS-232—displays active RS-232 configuration settings for currently selected GIA.

c. ARINC 429—displays active ARINC 429 configuration settings for currently selected GIA.

Softkeys:

The following softkeys are displayed on this page:

a. SET>ACTV—See configuration section for description.

b. ACTV>SET—See configuration section for description.

c. CLR NV—clears all 'Active' settings from memory from the selected GIA 63/GIA 63W and restores default settings. The GIA and optional equipment configuration files need to be reloaded if the memory is cleared.

5.1.10.15 RS-485 Config Page (Pre GDU 10.0)

This page displays settings for the RS-485 channels used by the GIA 63/GIA 63W. All settings are pre-established for a specific installation and are loaded from the appropriate G1000 Loader Card. The settings should not be changed. The ‘GIA 1’ and ‘GIA 2’ configuration files contain the settings shown on this page.

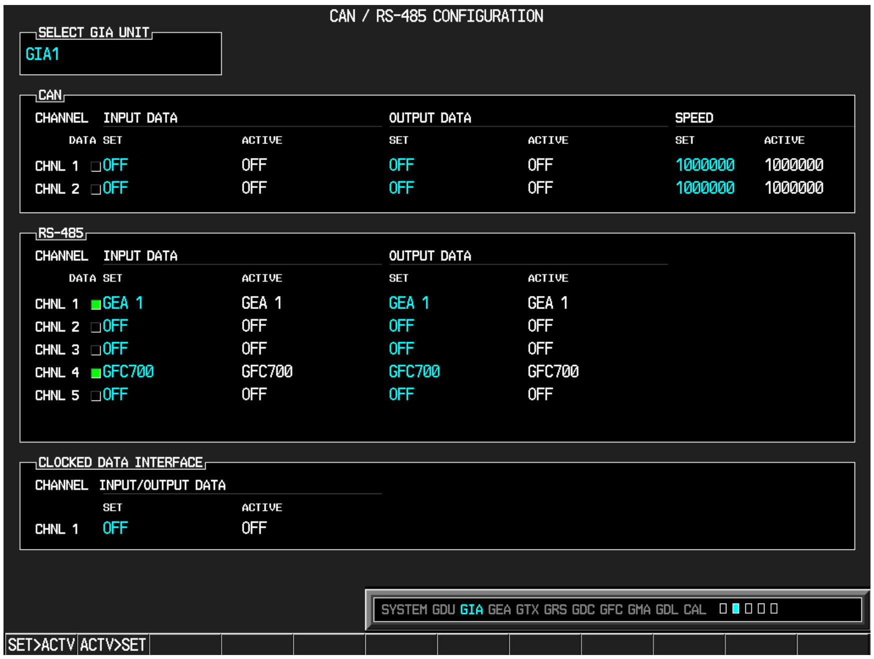


Figure 5-26. CAN/RS-485 Configuration Page

Windows:

a. SELECT GIA UNIT—displays the currently selected GIA 63/GIA 63W.

b. CAN—displays active Controller Area Network configuration settings for currently selected GIA.

c. RS-485—displays active RS-485 configuration settings for currently selected GIA.

d. CLOCKED DATA INTERFACE—displays active Clocked Data Interface settings, typically only used when interfacing to an external DME.

Softkeys:

The following softkeys appear on this page:

a. SET>ACTV—see configuration section for description.

b. ACTV>SET—see configuration section for description.

5.1.10.16 RS-485 Config Page (GDU 10.0)

This page displays settings for the RS-485 channels used by the GIA 63W. All settings are pre-established for a specific installation and are loaded from the appropriate G1000 Loader Card. The settings should not be changed. The 'GIA 1' and 'GIA 2' configuration files contain the settings shown on this page.

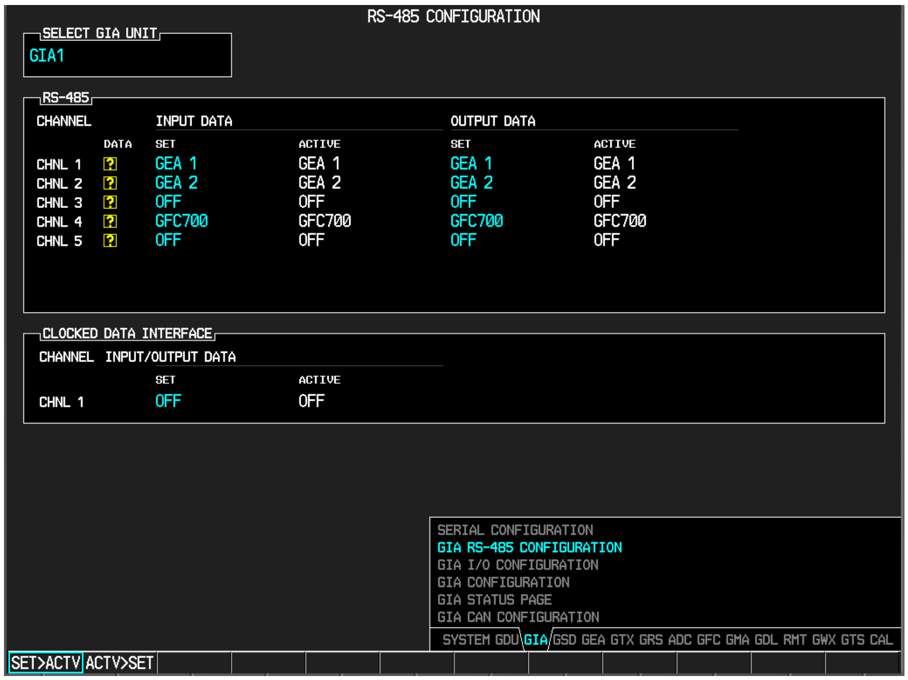


Figure 5-27. RS-485 Configuration Page

Windows:

e. SELECT GIA UNIT—displays the currently selected GIA 63W.

f. RS-485—displays active RS-485 configuration settings for currently selected GIA.

g. CLOCKED DATA INTERFACE—displays active Clocked Data Interface settings, typically only used when interfacing to an external DME.

Softkeys:

The following softkeys appear on this page:

c. SET>ACTV—see configuration section for description.

d. ACTV>SET—see configuration section for description.

5.1.10.17 CAN Config Page (GDU 10.0)

This page displays settings for the Controller Area Network (CAN) used by the GIA 63W. All settings are pre-established for a specific installation and are loaded from the appropriate G1000 Loader Card. The settings should not be changed. The ‘GIA 1’ and ‘GIA 2’ configuration files contain the settings shown on this page.

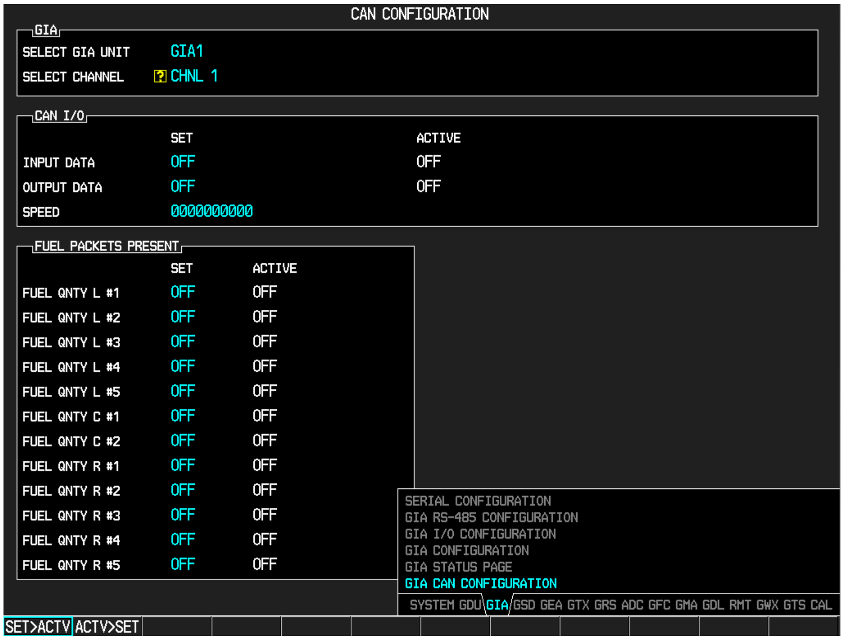


Figure 5-28. CAN Configuration Page

Windows:

a. GIA—displays the currently selected GIA 63W.

b. CAN I/O—displays active Controller Area Network configuration settings for currently selected GIA.

c. FUEL PACKETS PRESENT—displays active fuel packets.

Softkeys:

The following softkeys appear on this page:

e. SET>ACTV—see configuration section for description.

f. ACTV>SET—see configuration section for description.

5.1.10.18 GIA I/O Configuration Page

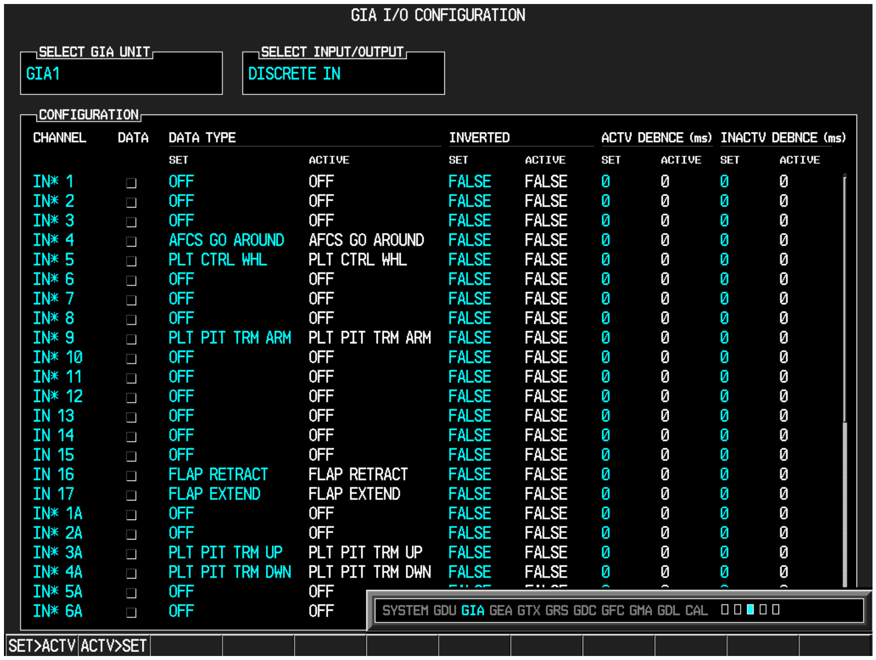


Figure 5-29. GIA I/O Configuration Page

Discrete and analog input/output channels for GIA 1 and GIA 2 are shown on this page. All settings are pre-established for a specific installation and are loaded from the G1000 Loader Card. The settings should not be changed. The ‘GIA1’ and ‘GIA2’ configuration files contain the settings shown on this page.

Windows:

SELECT GIA UNIT—displays the currently selected GIA 63/GIA 63W unit.

SELECT INPUT/OUTPUT—displays input/output type that is displayed for the currently selected GIA.

Options include:

a. Discrete In
b. Discrete Out
c. Analog In
d. Analog Out

Configuration—displays active I/O configuration settings for the currently selected GIA and input/output type. A green box indicates an input is active, a black/red box indicates an input is not active or not is use.

Softkeys:

The following softkeys appear on this page.

a. SET>ACTV: See configuration section for description.
b. ACTV>SET: See configuration section for description.

5.1.10.19 COM Setup Page

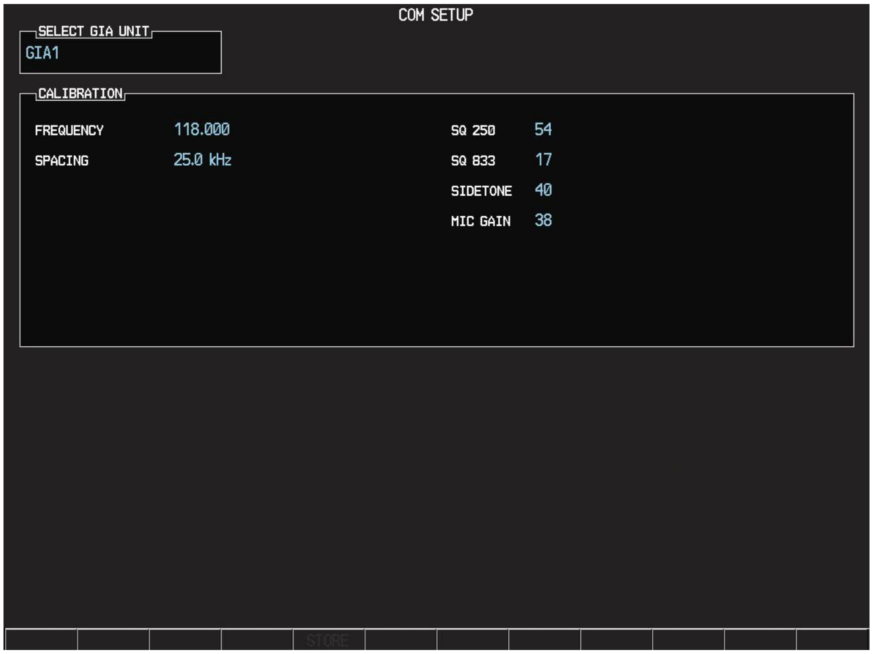


Figure 5-30. COM Setup Page

Windows:

a. SELECT GIA UNIT—displays the currently selected GIA 63/GIA 63W.

b. CALIBRATION

NOTE

Making incorrect adjustments will disable the COM and require GIA replacement.

c. FREQUENCY—selects a VHF communication frequency. For purposes of setting squelch and sidetone levels, only the frequencies 118.00, 127.00, 136.975 can be used.

SPACING:

Selection	Description
25.0 kHz	Selects the traditional 25 kilohertz spacing (760 channel)
8.33 kHz	Selects 8.33 kilohertz channel spacing, required in certain areas of the world.

d. SQ 250—sets the squelch threshold for 25 kHz channel spacing operation. May be set to any value between 0 (zero) and 63. The higher the number, the less signal is required to break squelch.

e. SQ 833—sets the squelch threshold for 8.33 kHz channel spacing operation. May be set to any value between 0 (zero) and 63. The higher the number, the more signal required to break squelch.

f. SIDETONE—sets the sidetone audio output level. May be set to any value between 0 (zero) and 63.

g. MIC GAIN—sets the headset microphone gain level to any value between 0 (zero) and 63.

5.1.10.20 GIA Status Page

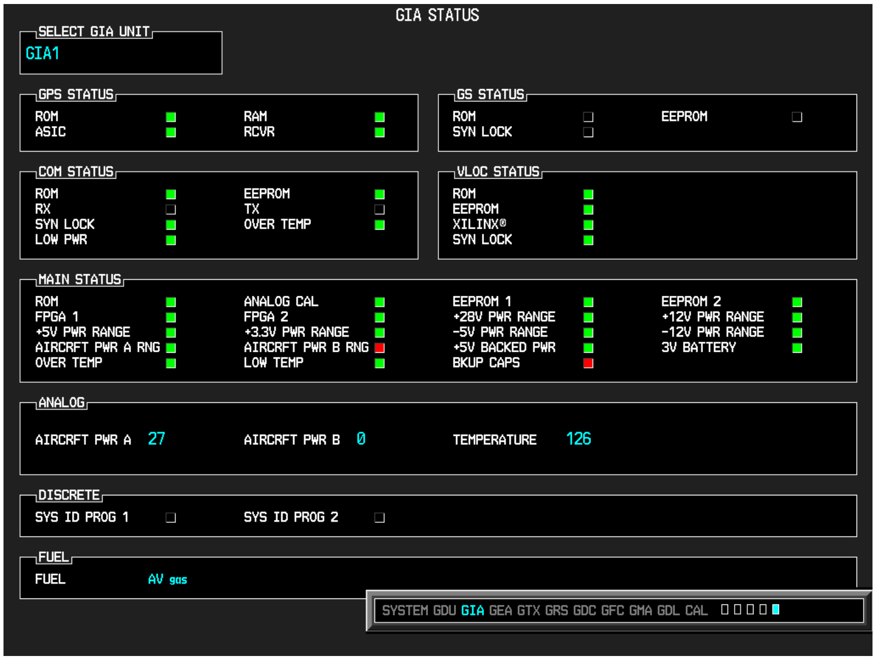


Figure 5-31. GIA Status Page

This page displays various items related to the operation of the GIA 63/GIA 63W. The technician can use this page to aid in diagnosis and troubleshooting.

Windows:

a. SELECT GIA UNIT—displays the currently selected GIA 63/GIA 63W.

b. GPS STATUS (ROM, RAM, ASIC, RCVR)—displays the condition of various GPS receiver hardware components. Black boxes may indicate the GPS is not locked onto valid signals, and may not be an indication of a failed unit.

c. GS STATUS (ROM, SYN LOCK, EEPROM)—displays the condition of various Glideslope receiver hardware components. Black boxes may indicate the GS is not locked onto valid signals, and may not be an indication of a failed unit.

d. COM STATUS (ROM, EEPROM, SYN LOCK)—displays the condition of various COM transceiver hardware components.

e. RX—displays whether or not the GIA 63/GIA 63W COM is currently receiving. (Green = Receiving)

f. TX—displays whether or not the GIA 63/GIA 63W COM is currently transmitting. (Green = Transmitting)

g. LOW PWR—informs the technician of a low power condition for the COM transceiver. (Green = Low Power)

h. OVER TEMP—informs the technician of an over-temperature condition for the COM transceiver.
(Red = Over-temperature, Green = Normal-temperature)

i. VLOC STATUS (ROM, XILINX, SYN LOCK, EEPROM)—displays condition of various NAV receiver components. These boxes should be green, a red box indicates an internal failure.

MAIN STATUS:

a. ROM, FPGA 1/3, EEPROM 1/2—displays the condition of various GIA 63/GIA 63W main board components. These boxes should be green, a red box indicates an internal failure.

b. +5, +3.3, -5, +12/-12, +28 PWR RANGE—displays condition of various internal power supply ranges. They need to be within 10% of desired voltages. Replace the unit if these values are more than 10% from the desired voltage.

c. AIRCRFT PWR A/B RNG—displays the technician that the main power inputs of the GIA 63/GIA 63W are within acceptable ranges. If a box is red, and the Aircraft PWR voltage is listed as 0 in the Analog Status box below, check that all aircraft buses are on and GIA breakers are pushed in.

d. ANALOG CAL—displays the condition of the GIA calibration. (Green = Valid Analog Calibration)

e. OVER TEMP—informs the technician of an over-temperature condition on the GIA 63/GIA 63W main board. (Red = Over-temperature, Green = Normal-temperature)

f. LOW TEMP—informs the technician of a low temperature condition on the main board. (Red = Low-temperature, Green = Normal-temperature)

g. BKUP CAPS—indicates status of the Backup Capacitor Test. A green box indicates the test passed, a red box indicates it failed.

ANALOG STATUS:

a. AIRCRFT PWR (A, B)—displays aircraft power input values, expressed in Volts DC (example: 2214 = 22.14 Vdc).

b. TEMPERATURE—displays the internal temperature of GIA unit, expressed in degrees Fahrenheit (example: 12267 = 122.67°F).

c. DISCRETE:

d. SYS ID PROG 1, 2—identifies the assigned GIA number when two or more GIA units are installed. Green indicates that the System ID pin is left strapped to ground. Black indicates that the System ID pin is left ‘open’ and not strapped to ground. GIA #3 and GIA #4 may not be used in certain aircraft.

GIA System ID 1	GIA System ID 2	GIA Unit Number
Black	Black	#1 GIA
Green	Black	#2 GIA
Black	Green	#3 GIA
Green	Green	#4 GIA

e. FUEL—displays the type of fuel to be used on the aircraft.

5.1.10.21 GTS Configuration Page

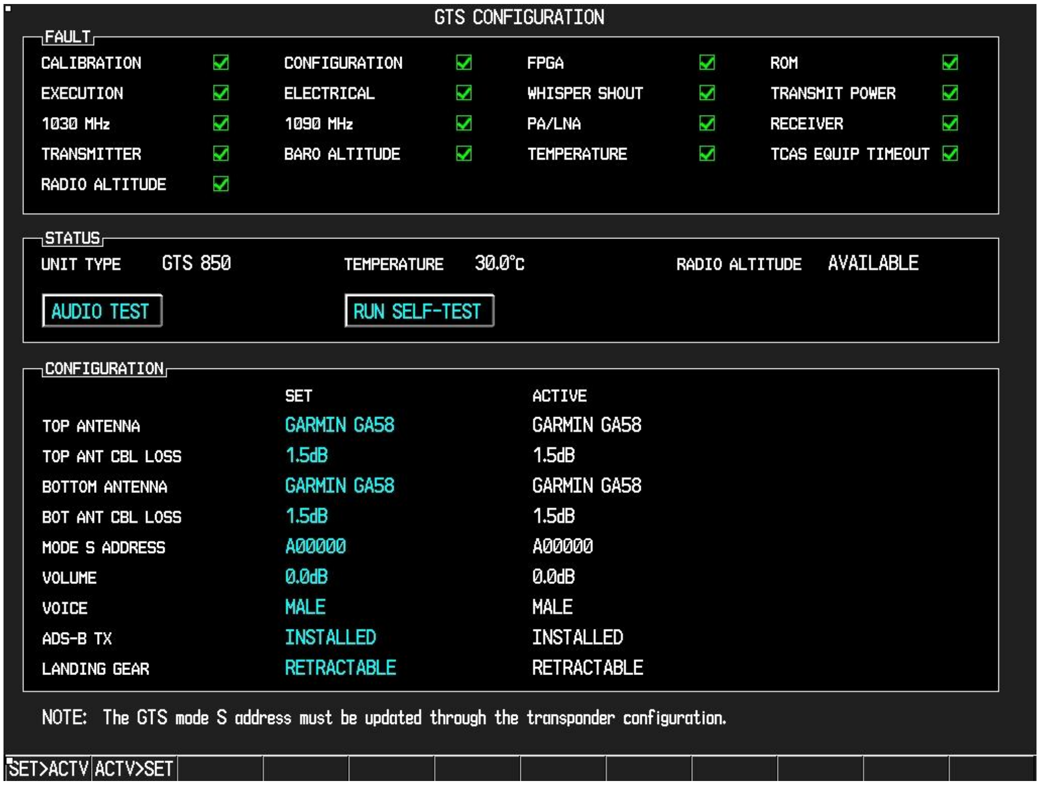


Figure 5-32. GTS Configuration Page

This page displays various items related to the configuration of the GTS. The technician can use this page to aid in diagnosis and troubleshooting.

Windows:

a. FAULT—displays configuration page status indicators for the GTS 8XX.

b. STATUS—displays the status of the GTS 8XX. An audio test and self-test may be run from this window.

c. CONFIGURATION—displays GTS 8XX configuration information.

5.1.10.22 GIA CAN Configuration Page

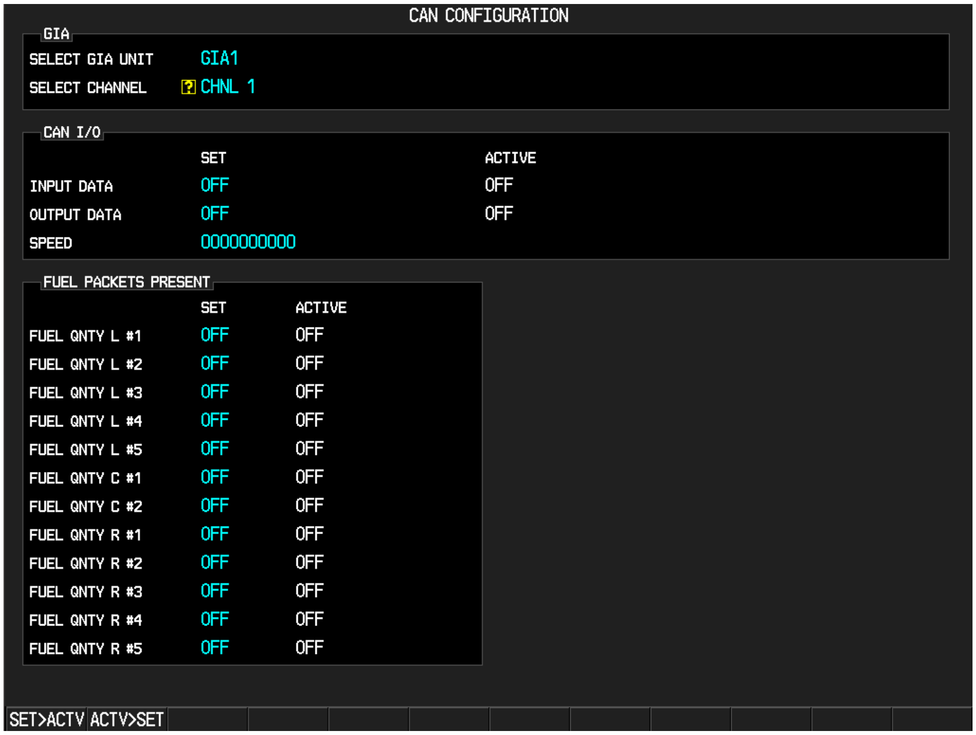


Figure 5-33. GIA CAN Configuration Page

The GIA CAN Configuration page displays the following data:

- Current GIA unit selected
- Current CAN channel selected
- Set and active input data type for CAN channels 1 and 2
- Set and active output data type for CAN outputs on channels 1 and 2
- Set and active speeds for CAN channels 1 and 2
- Set and active on/off status for five left, two center, and five right fuel packets for CAN channels 1 and 2

5.1.11 TROUBLESHOOTING THE GFC 700 AUTOPILOT

Troubleshooting the GFC 700 involves the use of the GFC Configuration Page and the GFC Status Page.

5.1.11.1 GFC Configuration Page

The following information describes how the GFC Configuration Page is arranged.

CAUTION

The data contained on the GFC Configuration Page is vital to aircraft safety.

NOTE

All settings made on the GFC Configuration Page are contained in the GFC configuration file.

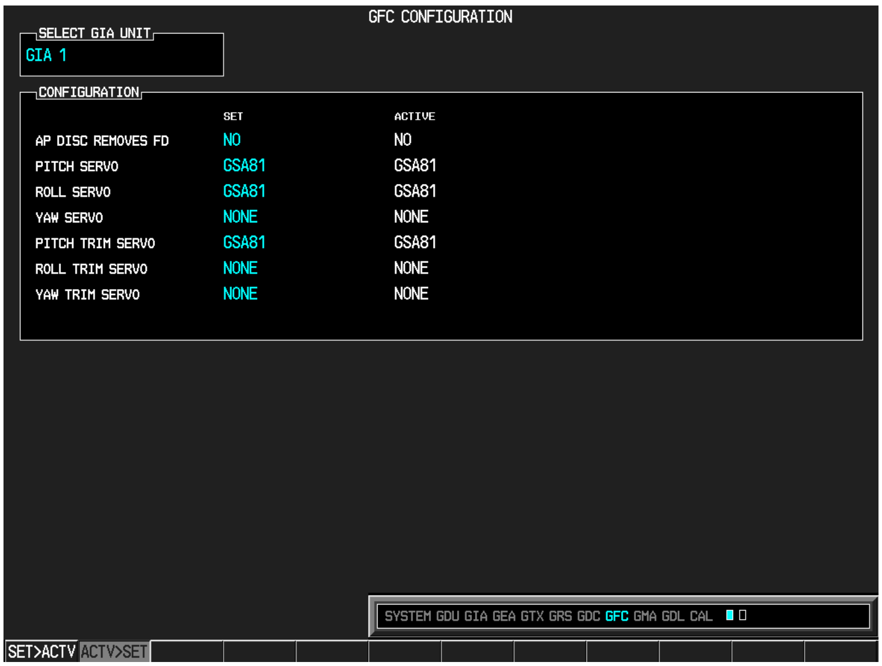


Figure 5-34. GFC Configuration Page

'SELECT GIA UNIT'—This box displays the currently selected GIA.

'CONFIGURATION'—This box displays the following:

a. AP DISC REMOVES FD—Turns the autopilot flight director on or off.
b. PITCH SERVO—Displays the currently selected pitch servo.
c. ROLL SERVO—Displays the currently selected roll servo.
d. YAW SERVO—Displays the currently selected yaw servo.
e. PITCH TRIM SERVO—Displays the currently selected pitch trim servo.
f. ROLL TRIM SERVO—Displays the currently selected roll trim servo.
g. YAW TRIM SERVO—Displays the currently selected yaw trim servo.

5.1.11.2 GFC Status Page

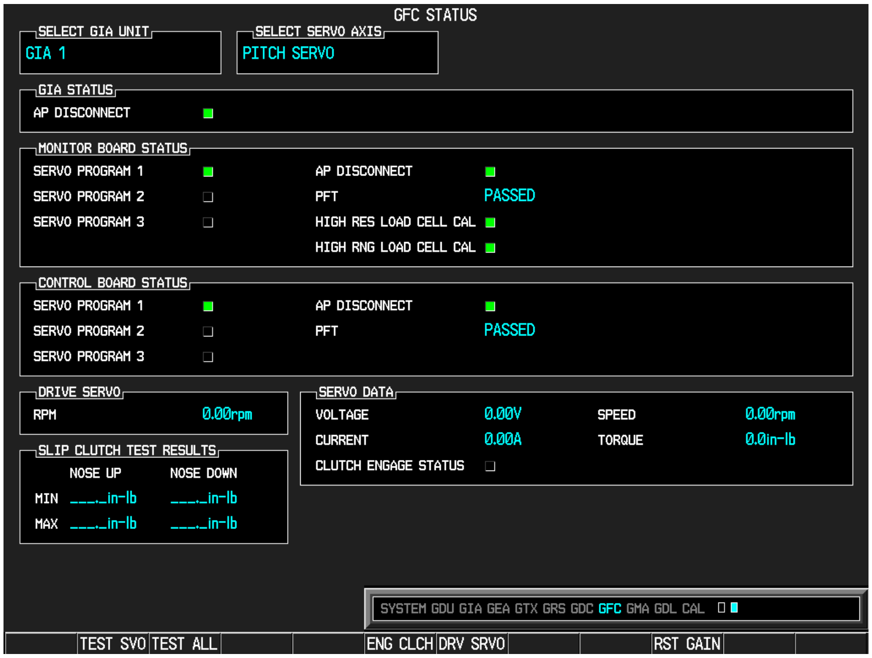


Figure 5-35. GFC Status Page

The GFC Status page displays the following status information regarding the GFC 700"

GIA STATUS

AP DISCONNECT: Displays the condition of the AP DISC +28 VDC input to the GIAs and servos, which is required for the Autopilot to operate. A green status indicator displays the AP DISC switch is closed and the GFC 700 is actively receiving 28. volts. A black indicator box indicates the GIAs and servos are no longer receiving the +28 VDC AP DISC power (switch open or other fault).

MONITOR/CONTROL BOARD STATUS

Displays the condition of various monitor board components.

SERVO PROGRAM (1-3): Servo program discretes are used to determine the HW strapping for each

GSA to define the servo type. This information can be cross-referenced against the system interconnects

to verify proper servo grounding.

AP DISCONNECT: Same as GIA Status.

PFT: Indicates whether the pre-flight test has passed or failed.

HIGH RES & HIGH RNG LOAD CELL CAL: Displays the condition of the high resolution and high range load cells on the monitor board. If box is black, this indicates a corrupt or missing load cell calibration; return the servo to Garmin.

DRIVE SERVO

Allows the technician to enter a desired RPM at which to manually drive the selected servo. Direction of

rotation is controlled by the polarity of the RPM (+ or -). After the speed is entered, the technician may use the ENG CLCH and DRV SRVO softkeys to drive the servo.

NOTE

The flight controls must be clear and safe to operate before manually driving the servo.

SLIP CLUTCH TEST RESULTS (GFC Status Page)

This window is used during the automatic slip clutch torque measurement check.

NOTE

This automated clutch check method is NOT approved as an acceptable means of compliance with the annual slip clutch maintenance requirements.

5.1.11.3 GFC 700 Annunciations

The GFC 700 AFCS Annunciation field is located above the airspeed tape on the PFD as shown in Figure 5-36.

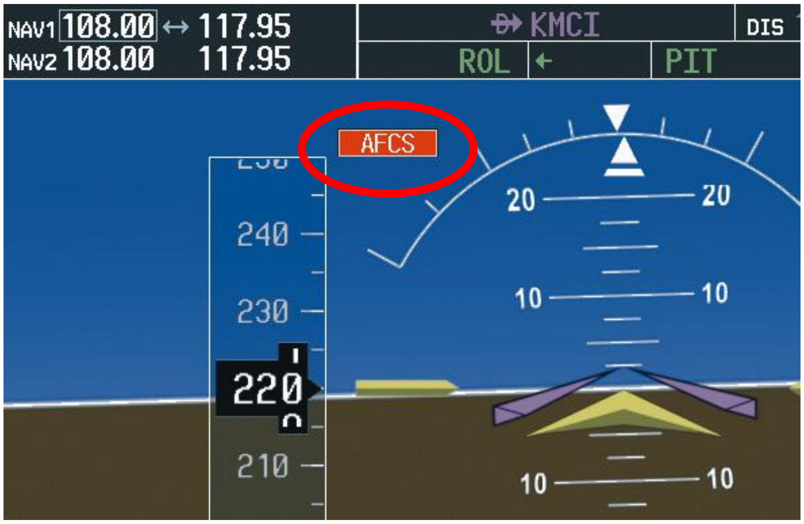


Figure 5-36. GFC 700 Annunciation Field

Table 5-2 lists the annunciations may appear in the AFCS annunciation field.

Table 5-2. AFCS Annunciations

Condition	Annunciation	Recommended Actions
Pitch Failure	PTCH	• Check the AUX – SYSTEM STATUS page to see if the servo is online (green check). • Check that the affected servo is receiving power. • Check the servo wiring and connector. • Ensure PTRM switches are not stuck. • If failure condition still exists, remove and replace the affected servo.
Roll Failure	ROLL	
MET Switch Stuck, or Pitch Trim Axis Control Failure	PTRM	
AFCS System Failure	AFCS	• 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. • Download GIA fault logs per Section 5.1.10.6 and review for failure information. • If the OAT and TAS is Red-X'd and the attitude indication is present, troubleshoot per Section 5.1.2.1.
Emergency Descent Mode	EDM	• AP engaged when aircraft altitude above 30,000 ft and cabin pressurization is lost. • Selected Heading set 90° left of current heading; Selected Altitude set to 15000 ft.
Elevator Mistrim Up	↑ELE	• If mistrim annunciations persist, check the Pitch Trim servo for proper operation. Verify that the servo is online at the AUX – SYSTEM STATUS page. • Check the Pitch Trim servo wiring and connector. Ensure the servo is receiving power. • Check the aircraft trim control rigging. • If mistrim condition still exists, remove and replace the affected servo.
Elevator Mistrim Down	↓ELE	
Aileron Mistrim Left	←AIL	• Check for possible fuel imbalance. • Check aileron control rigging. • If mistrim condition still exists remove and replace the roll servo.
Aileron Mistrim Right	AIL→	
Rudder Mistrim Left	←RUD	• Check the AUX – SYSTEM STATUS page to see if the servo is online (green check). • Check that the affected servo is receiving power. • Check the servo wiring and connector. • If failure condition still exists, remove and replace the affected servo.
Rudder Mistrim Right	RUD→	

<table>
<tr><td rowspan="2">Preflight Test</td><td>PFT</td><td rowspan="2">Reset system power.
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.</td></tr>
<tr><td>PFT</td></tr>
</table>

5.1.11.4 GFC 700 Pre-Flight Testing

This section was created to help determine why the GFC 700 has failed the Pre-Flight Test indicated by the red PFT annunciation, it defines the PFT sequence for the servos and the GFC 700 system and then provides troubleshooting information to help resolve failures. 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, the PFT 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 G1000 system in Configuration mode is recommended before starting this procedure. The GFC Status Page may be used to check the status of the servos and engage them to aid in troubleshooting.

1. To access the GIA and GSA Maintenance Logs, perform the following steps:
2. Start the G1000 in Configuration mode.
3. Use the FMS knob on PFD1 to go to the Diagnostics Terminal page in the System group. This page allows the technician to view maintenance logs associated with the GFC 700.
4. Choose 'GIA 1' or 'GIA 2' in the LRU window.
5. In the SERVO window, choose 'NONE' to view the GIA Maintenance Log, or choose a servo to view their logs.
6. Using the FMS knob, choose 'VIEW MAINTENANCE LOG' in the COMMAND window.
7. Press the ENT key.
8. 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.
9. 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>:
  a. AD TDM Comm Valid: The specified mode has been disengaged because communication with the servos, via the Time Division Multiplexer protocol, has been lost.
  b. AP Pitch MET not stuck: The specified mode has been disengaged due to a stuck pitch MET switch.
  c. Check the MET (trim) switches for proper identification.

GFC Pre-Flight Test Procedure

1. 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.
2. 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.
3. 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.
4. 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.
5. 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 74X are turned on and sending valid data.
6. 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.
7. 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.
8. 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.
9. Verify servo type. This step checks to ensure the servos are correct type. Verify servos are correct type.
10. 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.
11. 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.
12. Updating servo RTC. This step sets the servo system time to the GIA system time.
13. Verify servo PFT status. This step checks to ensure all servos have passed their own pre-flight test.
14. 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.
15. 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.
16. 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.
17. PFT completed. The pre-flight test is successfully completed.
18. PFT failed. The pre-flight test has failed.

5.1.10.5 Servo Troubleshooting

Whenever a servo fault occurs, a status message is logged to the corresponding servo control or monitor 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, it 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 unit.

Monitor Processor

The monitor processor contains the logs that are found in these processors:
2 - Pitch Servo
4 - Roll Servo
6 - Yaw
8 - Pitch Trim Servo
10 - Roll Trim Servo
12 - Yaw Trim Servo

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

a. 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.
b. 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.
c. 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 logs that are found in these processors:
3 - Pitch Servo
5 - Roll Servo
7 - Yaw
9 - Pitch Trim Servo
11 – Roll Trim Servo
13 – Yaw Trim Servo

There are two main groupings of faults that can occur in the control processor.

a. 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.

b. 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.

c. 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

5.1.11.6 GIA and GSA Maintenance Logs

If additional assistance is needed troubleshooting autopilot faults, the Maintenance logs can be downloaded to an SD card as a text file (.txt) and emailed to Garmin Aviation Product Support at avionics@garmin.com. Please call Garmin Aviation Product Support before you send a Maintenance Log to notify them you are sending it to prevent a delay in response. You may download multiple GIA and GSA Maintenance Logs to the same file, however in your email 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 PFD1 before turning on the displays.
2. Power up PFD1/2 and MFD in the configuration mode.
3. On the PFD1 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 PFD1. 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 curser 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.
10. In the LRU box, you may select either “GIA1” or “GIA2”.
11. 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.
12. In the COMMAND box, select “View Maintenance Log” and press the ENT key.
13. 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.

14. Press the LG2CRD softkey to turn off the recording function.
15. Wait 1 minute for the system to save the data from the download to the SD card.
16. 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.
17. Power down the G1000 System and remove the SD card.
18. 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.

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.

5.2 Engine Exceedance and Trend Data

The OEM Diagnostics Page can be used to view engine exceedance and trend data. This diagnostics data can be copied to a text file. GDU software v8.20 and later support the ability to write different file formats directly to the SD card.

Diagnostics File Scripts

Extract the Diagnostics File Scripts to an SD card and insert the card into the top SD card slot on the MFD.

Maintenance Log Page

Power up PFD 1 in configuration mode to view the maintenance log. The maintenance log is accessed on the Maintenance Log sub-page of the System Page (Figure 5-37).

Figure 5-37. Maintenance Log Page

Press the SECTION softkey to select which Section (0 or 1) data to be viewed. Section 0 of the maintenance log contains the trend data and Section 1 (Figure 5-38) contains the exceedance data. To erase the maintenance log file, press the CLEAR softkey. Press the CP2CRD softkey to copy the data to an SD card the file will be named “maint_log.dat”.

Figure 5-38. Exceedance Data

OEM Diagnostics Page

The OEM diagnostics page is the eighth page of the AUX page group, the MFD must be powered on with the Diagnostics File Scripts SD card inserted in the top slot for this page to appear. This page may also be viewed in configuration mode on the eighth System page. On this page you will see a selection box (Figure 5-39) for displaying maintenance log data (exceedance or trend), and a selection box for saving the data to the SD card. Press the SAVE IMG softkey to save a .bmp file of the current screen image (requires a “print” directory on the SD card).

Figure 5-39. Exceedance/Trend Selection Box

Log File

Figure 5-40 is an example of a 10 second exceedance of Ng. The log will list a single entry for each exceedance block of data along with the duration of the exceedance and the maximum value for each parameter during the exceedance.

Figure 5-40. Exceedance Data

Figure 5-41 is an example of a trend log.

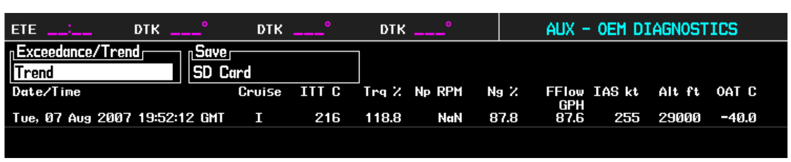


Figure 5-41. Trend Data

Save File to SD Card

Select “SD Card” from the Save Selection Box (Figure 5-42). The data will be written to the SD card. Although only the max values are shown on the MFD, all of the data is written to the SD card.

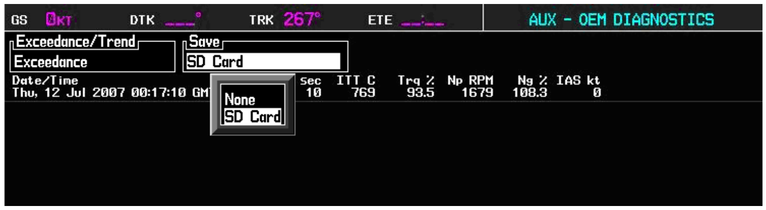


Figure 5-42. Save Selection Box

Maintenance Log File

The data will be stored in text files as follows:

CRUISEI.DAT
CRUISEII.DAT
EXCD-MM_DD_YYYY-HR_MN_SC.DAT.

A separate file will be created for each exceedance block. For the example data provided there is only one block and hence only one exceedance file. The data files will be empty if the log file does not contain data for the particular type of maintenance data.

5.3 CALIBRATION PROCEDURES

5.3.1 GDC 74X Calibration Procedure

This procedure discusses the use of the GDC 74X Field Calibration Utility (software; P/N T06-A0156-00) to adjust the calibration of GDC 74X LRUs that have failed the 14 CFR Part 43 Appendix E tests due to altitude drift or have failed the ICA limits for RVSM certification.

Both the GDC 74X Field Calibration Utility and the GDC 74X Field Calibration Instructions (190-00303-82) can be downloaded from the dealer resource section of the Garmin website at www.garmin.com. First download the GDC 74X Field Calibration Instructions Document, then follow the steps listed in that document to download and run the GDC 74X Field Calibration Tool.

5.3.1.1 Limitations

The following limitations should be noted:

a. These procedures should be performed at room temperature on the bench and not in the aircraft.
b. The 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 utility at any of the test points, the utility will not allow the calibration to continue and the GDC 74X must be returned to Garmin.
c. If the GDC 74X unit does not pass 14 CFR Part 43 Appendix E and the RVSM limits for ICA that apply to the GDC 74X after the calibration utility has been run, the GDC 74X unit should be returned to Garmin.

5.3.1.2 Required Equipment

The following equipment is required to perform calibration.

a. GDC 74X LRU
b. Power supply capable of producing 14/28V at 500mA.
c. PC with a Serial Port or serial port adapter
d. Pressure control system capable of generating the correct static pressures for zero feet, 11,000 feet, 30,000 feet, and 41,000 feet.

NOTE

Field calibration of GDC 74X 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. The pressure control system must control altitude automatically.

e. Fabricate a cable built to interface a GDC 74X to a PC Serial Port (see Figure 5-40). The cable is not available from Garmin.

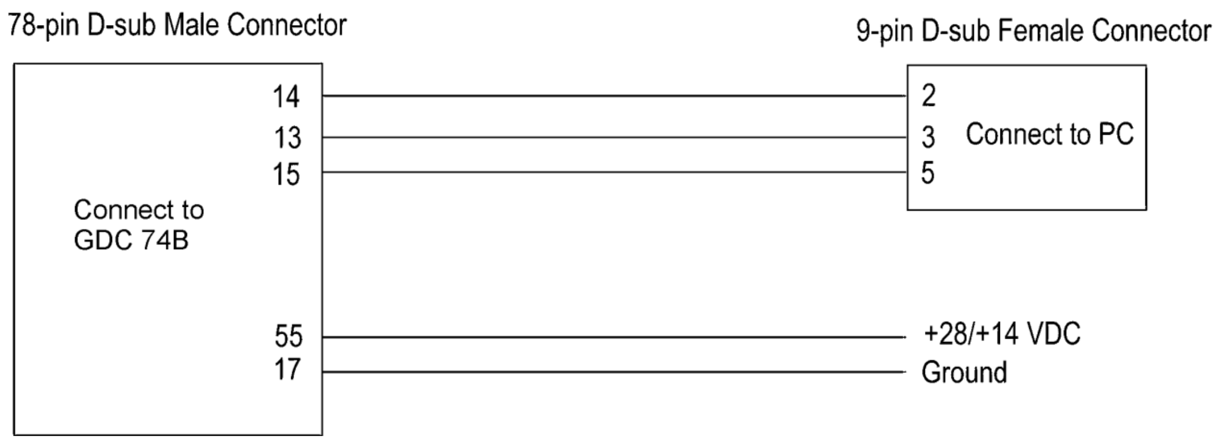


Figure 5-43. GDC 74X PC Interface Cable

5.3.1.3 Software Installation

Before beginning the procedure, the 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 74X 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).

NOTE

Set the airspeed to zero (or unset) during calibration. If the airspeed is >80 knts, SSEC corrections start to apply and could change the results.

5.3.1.4 Procedure

1. Connect the GDC 74X to the pressure control system.
2. Connect the GDC 74X to the PC serial port using the interface cable (Figure 5-40).
3. Connect the interface cable to the power supply (Figure 5-40).
4. Power on the GDC 74X 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 74X Field Calibration utility requires that the GDC 74X and the pressure control system be powered on for a minimum of 20 minutes before calibration.

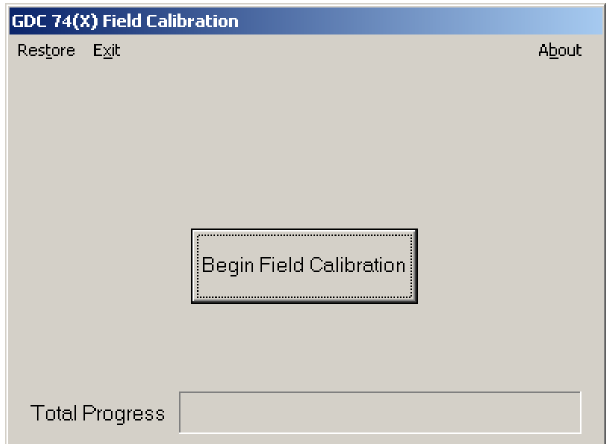


Figure 5-44. GDC 74X Field Calibration Utility, Main Page

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

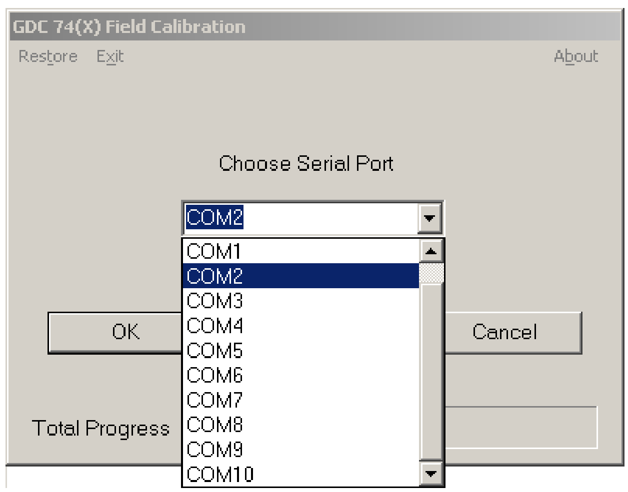


Figure 5-45. Serial Port Pull-Down List

9. After communication with the GDC 74X 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 is displayed while the program retrieves the unit type from the GDC 74X.
11. After the unit type has been determined, the 'Set altitude to 0 ft' screen (Figure 5-43) appears.
12. Set the pressure control system to a pressure altitude of 0 feet according to the on-screen instructions.
13. Allow the on-screen altitude reading to stabilize, then click 'OK'.
14. After the 0 feet calibration is complete, the 'Set altitude to 11,000 ft' screen is displayed.
15. 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 is displayed.
18. 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’.
19. After the 30,000 feet calibration is complete, the ‘Set altitude to 41,000 ft’ screen is displayed.
20. Set the pressure control system to a pressure altitude of 41,000 feet.
21. Allow the on-screen altitude reading to stabilize, then click ‘OK’.
22. After the altitude calibrations are complete, the ‘Program Calibration to Unit?’ screen (Figure 5-44) appears. Click ‘OK’ to program the new calibration to the GDC 74X unit.

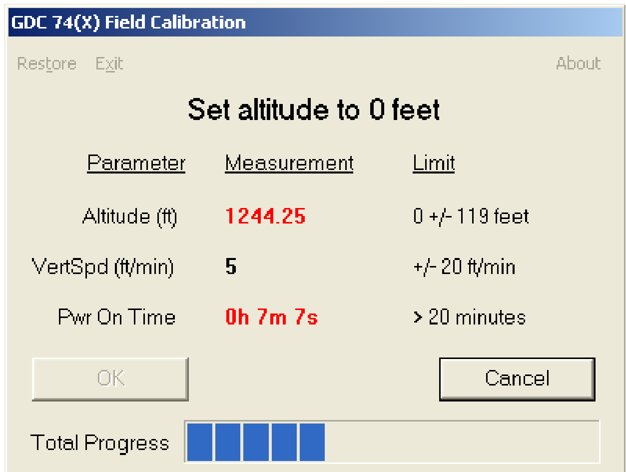


Figure 5-46. '0 Feet' Calibration Screen

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 5-47. 'Calibration Failed' Screen

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.

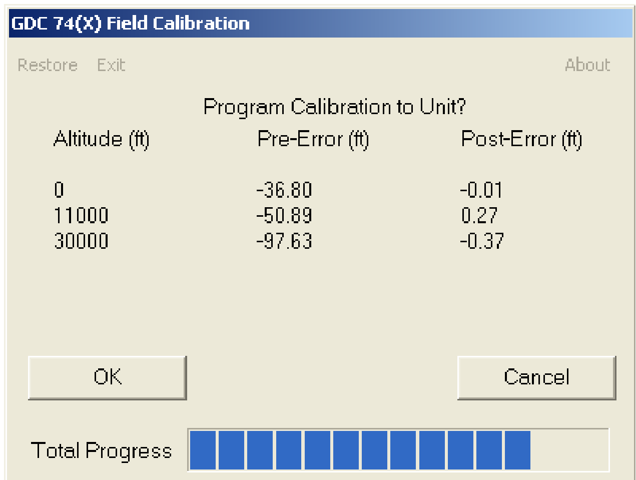


Figure 5-48. 'Program Calibration to Unit' Screen

23. Ensure that the pop-up cal result window shows ‘PASSED’, press ‘OK’ to confirm message.

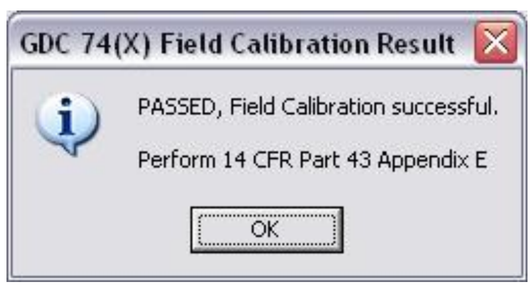


Figure 5-49. 'Field Calibration Result' Screen

24. Return the pressure control system to ambient pressure before disconnecting the pitot and static lines from the GDC 74X.
25. Click on ‘Exit’ in the upper left corner to exit the program.
26. 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 and also the RVSM levels.

5.3.1.5 Restore Original Calibration

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’.

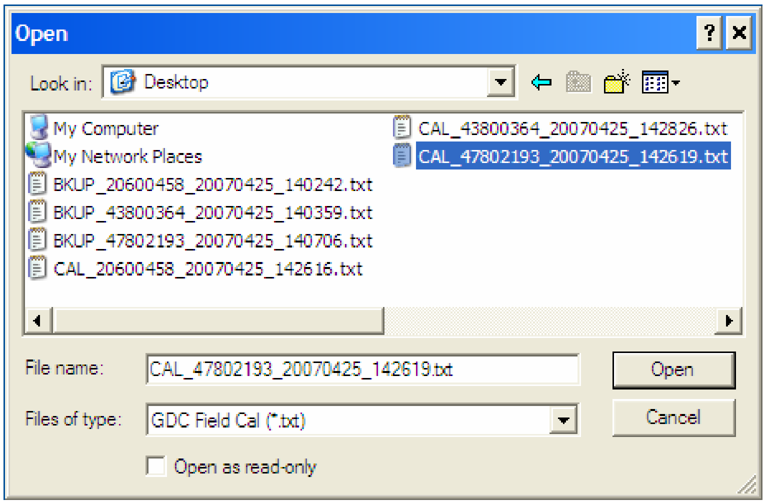


Figure 5-50. Calibration Files Screen

4. Select the Serial Port on the PC that will be used to communicate with the GDC 74X, and click ‘OK’. A progress bar screen appears while the calibration is being restored to the unit.
5. If restoration is successful, the screen will display ‘Completed’ before returning to the main entry screen.
6. Click on ‘Exit’ in the upper left corner to exit the program.
7. 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 and also the RVSM levels.

5.3.1.6 Calibration File Storage

Save copies of the calibration (BKUP and CAL) files for permanent storage. These files are located in the C:\Garmin directory, or in the same directory where the GDC_FieldCal.exe file resides. E-mail copies of these files to avionics@garmin.com. Please enter "GDC 74X Field Calibration Data" in the subject line, as shown in Figure 5-48.

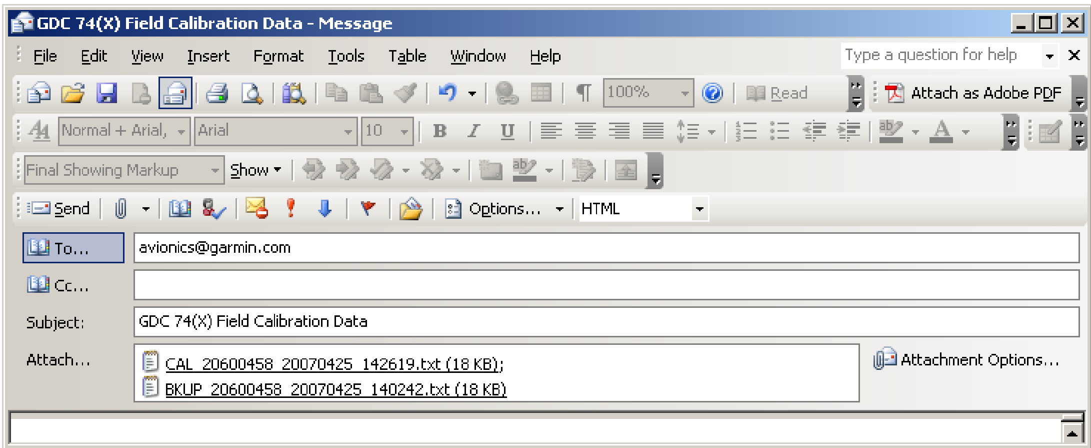


Figure 5-51. Post-Calibration Email Example

5.3.1.7 Software Version

To display the software version of the GDC 74X Calibration Utility follow these steps:

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

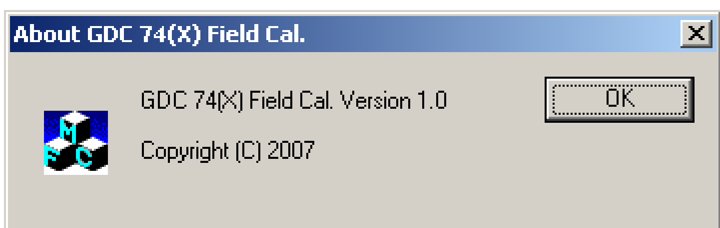


Figure 5-52. The 'About' Screen

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

5.3.2 GEA 71 Standby Battery High-Side Current Monitor Calibration Procedure

In the Aircraft:

1. Make sure that the sensor (shunt) in question has been energized at operating voltage, but is isolated from current flow (both high and low inputs to GEA should be at the same high voltage).

On the MFD:

1. Power up PFD1 and PFD2 in config mode.
2. Power on the MFD in configuration mode, select the HSCM CALIBRATION page (third page in the CAL page group).
3. Unlock the page using the softkey sequence 2, 3, 4, 5.
4. Select the appropriate GEA from the HSCM ENABLED GEA selection box (Figure 5-53).

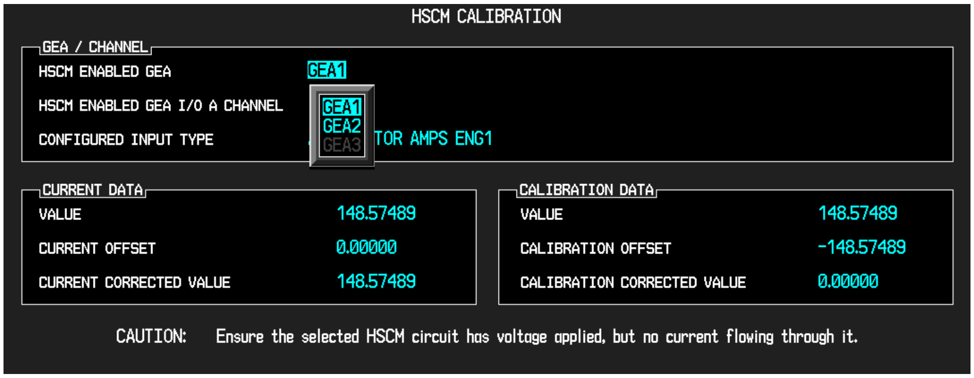


Figure 5-53. HSCM Enabled GEA Selection Box

5. Select the appropriate channel from the HSCM ENABLED GEA I/O CHANNEL selection box. Make sure that the displayed sensor in the CONFIGURED INPUT TYPE field matches the sensor desired for calibration.

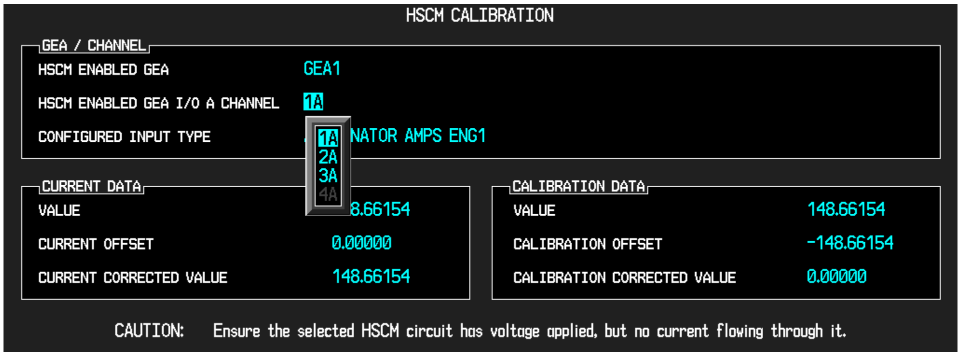


Figure 5-54. HSCM Enabled GEA I/O A Channel Selection Box

6. Check that all displayed Current and Calibration data is appropriate:
   a. CURRENT DATA:
      i. VALUE –the instantaneous reading from the GEA if the current offset were zero (any calibration offset has been taken out)
      ii. CURRENT OFFSET –the calibration offset that is presently loaded on the channel (this will be zero if the channel has never been calibrated)
      iii. CURRENT CORRECTED VALUE – the current output of the GEA channel with the above current offset applied (essentially what would be displayed on the EIS strip if the GDU was in normal mode). If the channel is calibrated and the calibration setup is correct, this parameter should be near zero, and fluctuation should be minimal, take note of the range of fluctuation..
   b. CALIBRATION DATA:
      i. VALUE –the instantaneous current reading from the GEA if the current offset were zero (any calibration has been taken out)
      ii. CALIBRATION OFFSET –the instantaneous calculation of what the offset should be in order to properly calibrate the channel (assuming the shunt is properly set up for calibration, see Step 1)
      iii. CALIBRATION CORRECTED VALUE - the output of the GEA channel if the above offset were applied (should always be zero).
7. Press the STORE softkey, a confirmation box will appear.

Figure 5-55. Calibrate Confirmation Box

8. Press the ENT Key to accept the CALIBRATION OFFSET value, the instantaneous CALIBRATION OFFSET value will be stored as the CURRENT OFFSET.
9. The G1000 will now re-verify the GEA configuration (this may take several minutes). During this time the box shown in Figure 5-56 will be displayed. Do not perform any actions until this is complete.

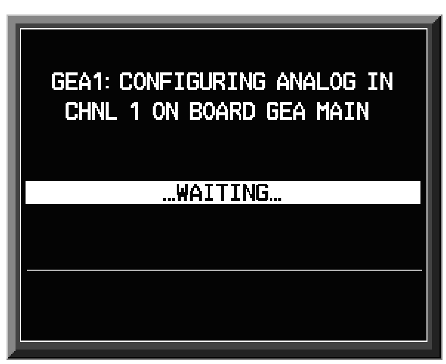


Figure 5-56. Configuration Verification Processing

10. When the configuration is completed, press the ENT Key to confirm.

Figure 5-57. Configured Confirmation Box

11. Once verification is complete, the CURRENT CORRECTED VALUE should be zero, within a range of fluctuation that is equal to or less than noted prior to calibration. If this is the case the calibration has been successfully completed.

5.4 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.

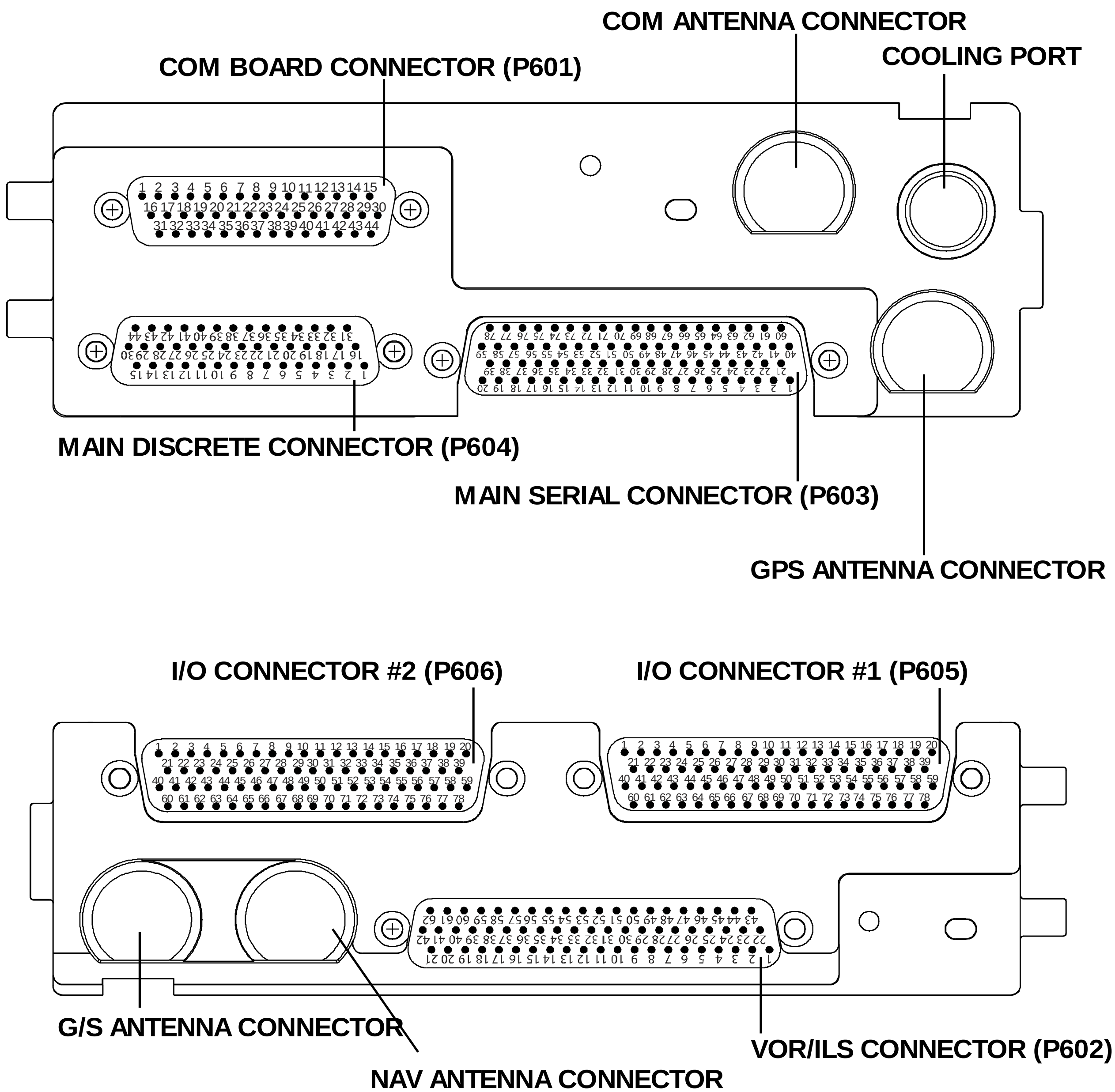


Figure 5-58. GIA 63W Backshell Connectors

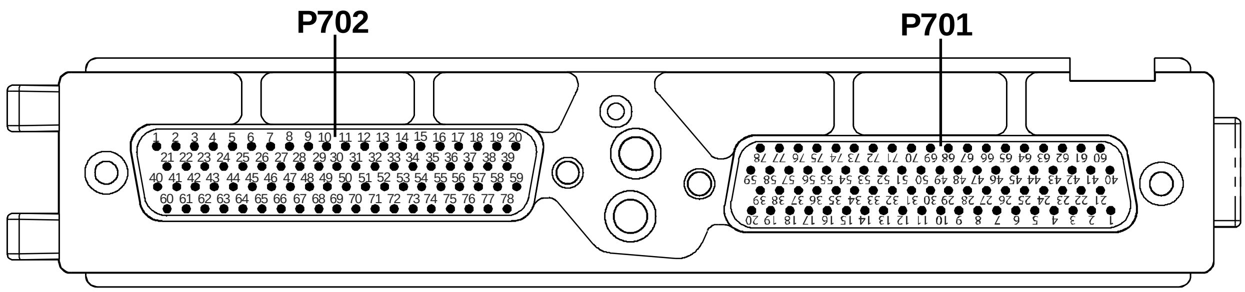


Figure 5-59. GEA 71 Backshell Connectors

NOTE

The GSD 41 Backplate is similar to the GEA 71 Backplate (Figure 5-59). The only difference is the Keyplate. The GSD 41 Backplate contains the "B" Keyplate, the GEA 71 Backplate contains the "A" Keyplate. Refer to the GSD 41 Installation Manual (P/N 190-00303-00), and the G1000 System Installation Manual (190-00303-00) for more information.

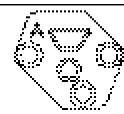
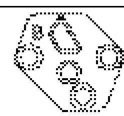
LRU Keyplate
 **GEA 71**
 **GSD 41**

Figure 5-60. GSD 41 Keyplate Information

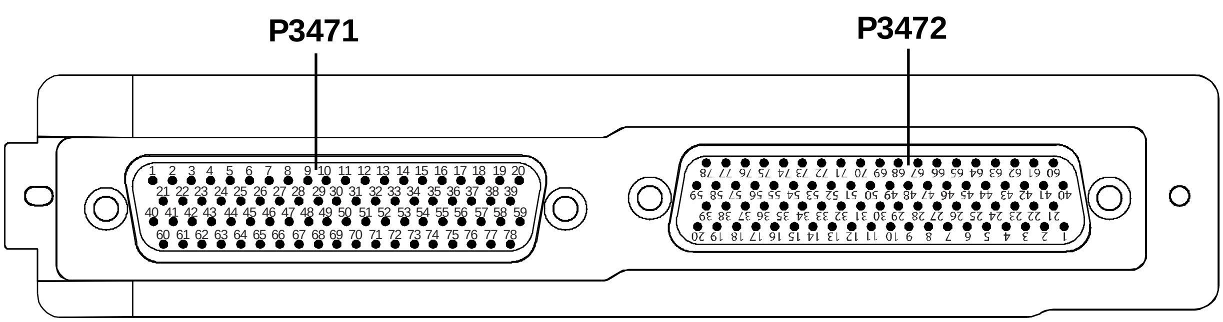


Figure 5-61. GMA Backshell Connectors

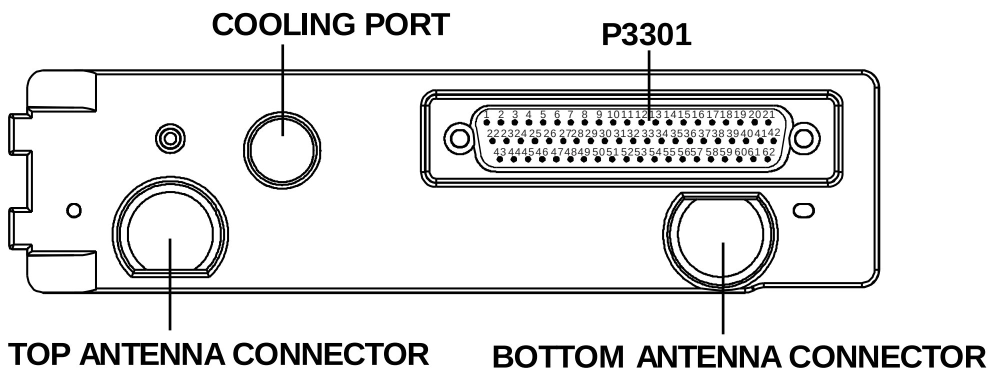


Figure 5-62. GTX 33 Backshell Connectors

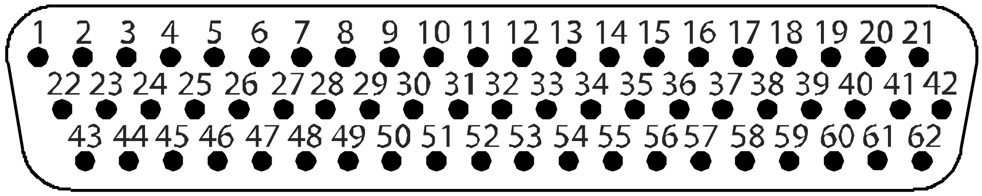


Figure 5-63. GDU 104X Backshell Connector (P10001)

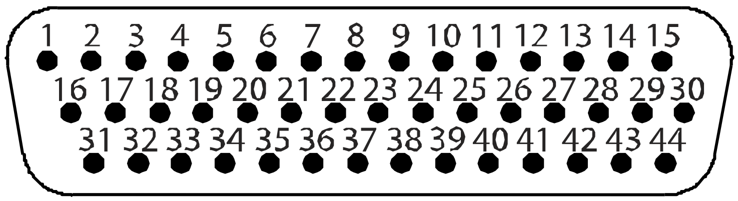


Figure 5-64. GRS 77 Backshell Connector (P771)

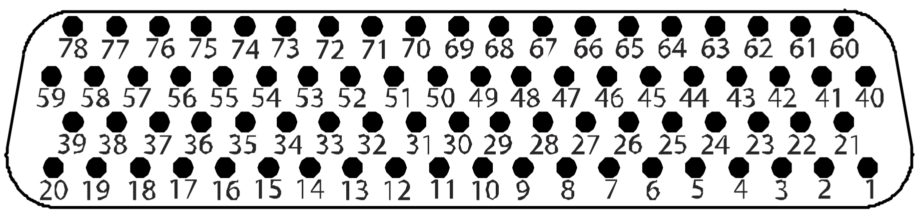


Figure 5-65. GDC 74A Backshell Connector (P741)

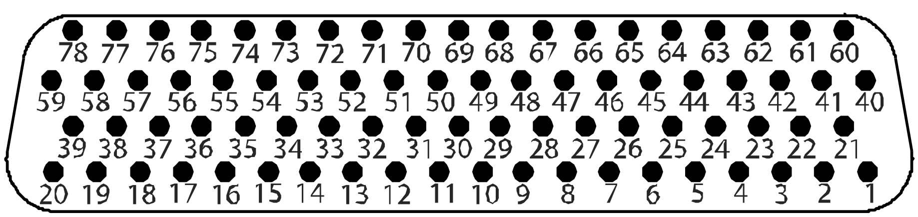


Figure 5-66. GDL 69A Backshell Connector (P691)

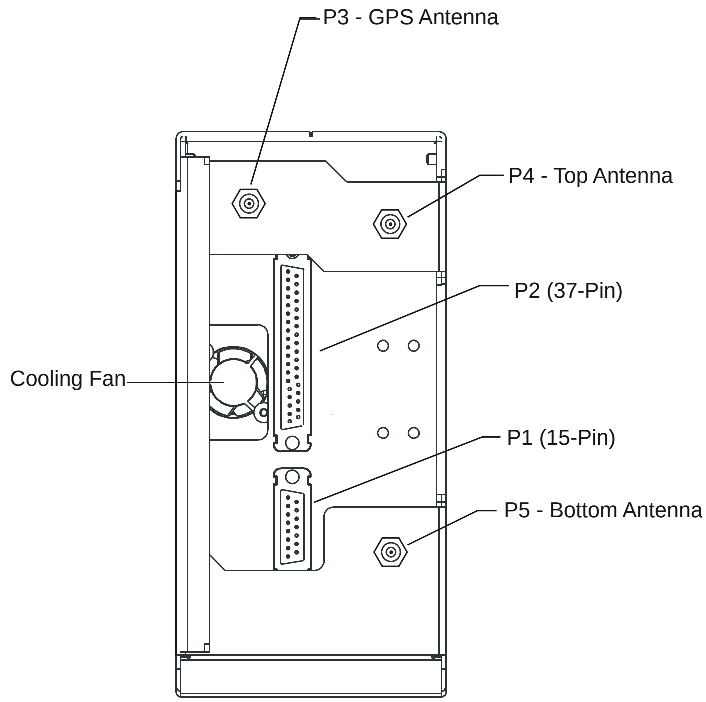


Figure 5-67. GDL 90 Backshell Connectors

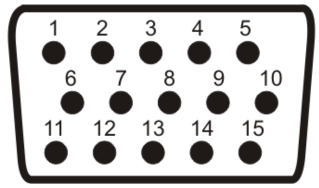


Figure 5-68. GCU 476 Backshell Connector (P4751)

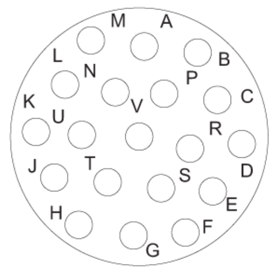


Figure 5-69. GSA 81 Backshell Connector (P801)

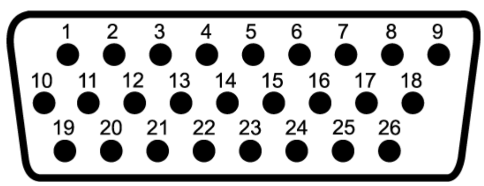


Figure 5-70. GTA 82 Backshell Connector (P821)
Only used on Certain OEM Aircraft

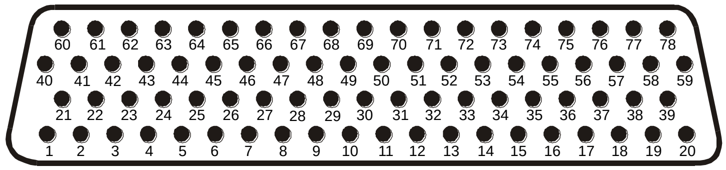


Figure 5-71. GTS 8XX Backplate Connector P8001 (Digital)

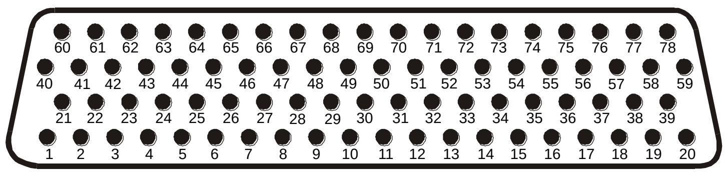


Figure 5-72. GTS 8XX Backplate Connector P8002 (Analog/Discrete)

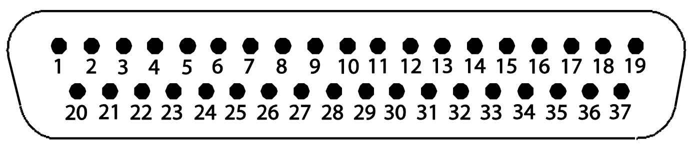


Figure 5-73. GTS 8XX Backplate Connector P8003 (Power Supply)

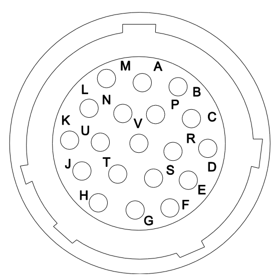


Figure 5-74. GPA 65 Backplate Connector P651

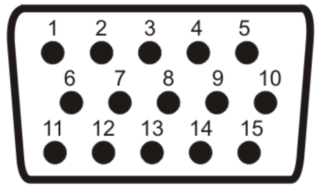


Figure 5-75. GCU 475 Backplate Connector (P4751)

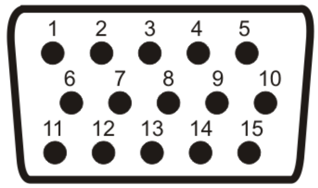


Figure 5-76. GMC 710 or GMC 715 Backplate Connector (P7101)

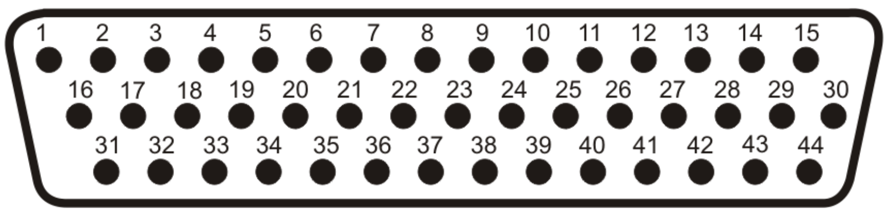


Figure 5-77. GWX 68 Backplate Connector (P400)

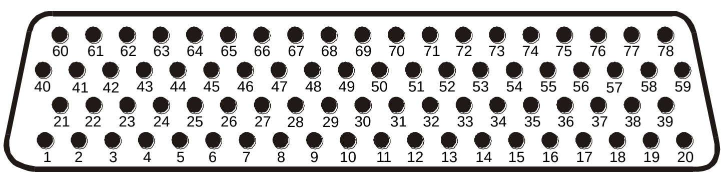


Figure 5-78. GSD 41 Backplate Connector (P411)

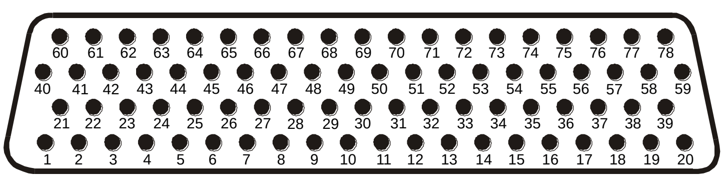


Figure 5-79. GSD 41 Backplate Connector (P412)

SECTION 6
REPLACEMENT PROCEDURES

This section contains replacement procedures for a defective LRU. Replacement of any 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 an LRU, verify its 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.

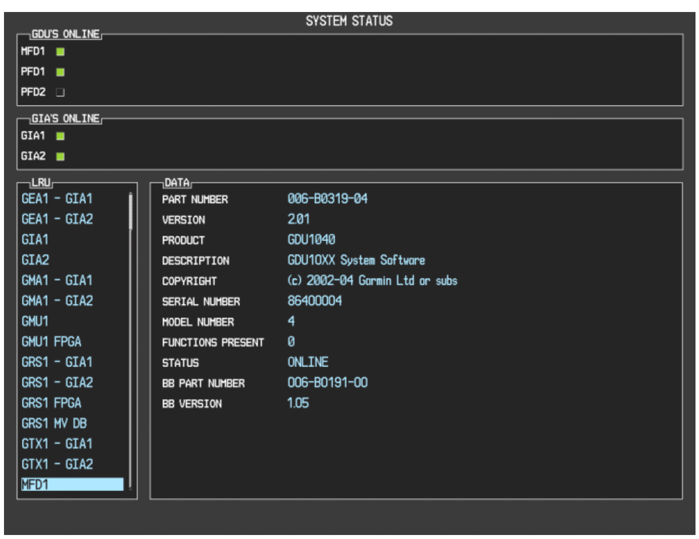


Figure 6-1. System Status Page (Configuration Mode)

6.2 GDU 1XXX Display (includes all 10”, 12” and 15” displays)

To remove:

1. Turn each of the four or six locking sockets one quarter turn counterclockwise until they reach their stops using a 3/32” hex drive tool.
2. Gently pull the display out of the panel. Hold unit tightly to prevent dropping it. The display is only about 2-3 inches thick.
3. Remove the connector from the back of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
4. Remove and save any SD cards to install in the replacement display.

To install:

1. Inspect wire harness connector for damaged pins before installing the new unit.
2. Attach connector to the front of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
3. Hold the GDU flush with the instrument panel and ensure that locking stud alignment marks are in the vertical position.
4. Turn each of the four or six locking sockets one quarter turn clockwise using a 3/32” hex drive tool (this may require applying a small amount of forward pressure to engage the quarter turn sockets).
5. Install unit software and configuration files per Section 7.

6.3 GMA 1347

To remove:

1. 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 rack connectors for damaged pins before installing the new unit.
2. Insert a 3/32” hex drive tool into the access hole and rotate the mechanism 90° counterclockwise to insure correct position before placing the unit in the rack.
3. Gently push unit into the rack and 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. Avoid excessive tightening.
5. Install unit software and configuration files per Section 7.

6.4 GIA 63/GIA 63W

To remove:

1. Loosen 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.
3. Slide unit out of the rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Lift the unit handle, gently push unit into the rack and engage the connectors.
3. Push the GIA lever down towards the bottom of the unit. Avoid excessive force.
4. If lever fails to go down with moderate pressure, stop and make sure the floating backplates in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
5. Lock the handle into the GIA body and tighten the Phillips screw.
6. Install unit software and configuration files per Section 7.

6.5 GRS 77

To remove:

1. Remove the connector from the front of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
2. Loosen four screws holding the unit to the mounting rack (do not loosen mounting rack bolts).

To install:

1. Inspect wire harness connector for damaged pins before installing the new unit.
2. Fasten unit to mounting rack using a screwdriver. Hand tightening the knurled nuts is insufficient.
3. Attach connector to the front of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
4. Install unit software and configuration files per Section 7.

6.6 GMU 44

NOTE

Do not use a magnetic screwdriver or steel screws to mount the GMU44 or the cover plate.

To remove:

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

To install:

1. Inspect wire harness connector for damaged pins before installing the new unit.
2. Connect cable making sure it is properly secured.
3. Fasten unit to the aircraft mounting rack.
4. Install unit software and configuration files per Section 7.

6.7 GDC 74X

To remove:

1. Loosen two thumb screws securing unit to the mounting rack.
2. Remove the connector from the back of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
3. Disconnect the pitot-static plumbing from unit.
4. 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 wire harness connector and pitot-static plumbing for damage before installing new unit.
2. Connect the pitot-static plumbing to the unit.
3. Attach connector to the back of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
4. Slide the unit fully into the rack.
5. Install the locking bracket and tighten the two thumb screws that secure unit to the mounting rack.
6. Install unit software and configuration files per Section 7.

6.8 GEA 71

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GEA 71 lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.
3. Slide unit out of the rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Pull the handle up, then gently push unit into the rack and engage the connectors.
3. Push the GEA 71 lever down towards the bottom of the unit. Avoid excessive force.
4. If lever fails to go down with moderate pressure, stop and make sure the floating backplate in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
5. Lock the handle into the GEA 71 body and tighten the Phillips screw.
6. Install unit software and configuration files per Section 7.

6.9 GTX 33X

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GTX 33 lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.
3. Slide unit out of the rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Pull the handle up, then gently push unit into the rack and engage the connectors.
3. Push the GTX 33 lever down towards the bottom of the unit. Avoid excessive force.
4. If lever fails to go down with moderate pressure, stop and make sure the floating backplate in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
5. Lock the handle into the GTX 33 body and tighten the Phillips screw.
6. Install unit software and configuration files per Section 7.

6.10 GDL 69X

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.
3. Slide unit out of rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Pull the handle up, then gently push unit into the rack and engage the connectors.
3. Push the GDL lever down towards the bottom of the unit. Avoid excessive force.
4. If lever fails to go down with moderate pressure, stop and make sure the floating backplate in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
5. Lock the handle into the GDL body and tighten the Phillips screw.
6. Install unit software and configuration files per Section 7.

6.11 GDL 90

To remove:

1. Turn the DZUS fastener on the front bottom of the unit counter clockwise ¼ turn to unlock the unit.
2. Slide unit out of rack.

To Install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Gently push unit into rack and engage the connectors.
3. Turn the DZUS fastener on the front bottom of the unit clockwise ¼ turn to lock in the unit. Do NOT use the DZUS fastener to draw the unit into the rack, damage may result.
4. Configure unit per GDL90 Installation manual P/N 560-1049-02.

6.12 GSA 8X

To remove:

1. Disconnect the GSA connector.
2. Loosen and remove the servo attachment bolts using a socket or open-wrench.
3. Carefully remove the servo and place a protective cover on the output gear.
4. Place a protective cover over the GSM 85(A).

To install:

1. Inspect the output gear for abnormal wear and the absence of grease.
2. Carefully place the servo into the capstan, ensuring proper orientation and alignment. Units will be flush when properly seated. No gap should be present. Do not tighten mounting bolts if a gap is present or GSM85(A) damage will occur requiring replacement.
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. Install unit software and configuration files per Section 7.

6.13 GSM 85X

NOTE

If GSM 85(A) removal and installation instructions are present in the OEM Maintenance Manual, follow those instead of this section.

To remove:

1. Remove the GSA 80/81 Servo Motor according to Section 6.10.
2. Refer to the OEM Maintenance Manual instructions to 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:

1. Verify the unit has been set to the correct torque value per the OEM Maintenance Manual.
2. Follow the installation instructions in the OEM Maintenance Manual or respective Garmin servo installation drawing.
3. Reinstall the GSA 80/81 Servo motor according to Section 6.10.
4. No software or configuration file loading is required for the GSM85(A) units as they do not contain electronics.

6.14 GSD 41

To remove:

1. Loosen the Phillips screw to unlock unit handle.
2. Pull the GSD lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.
3. Slide unit from rack.
4. To install:
5. Inspect rack connectors for damaged pins before installing the new unit.
6. Pull the handle up, then gently push unit into the rack and engage the connectors.
7. Push the GSD 41 lever down towards the bottom of the unit. Avoiding excessive force.
8. If lever fails to go down with moderate pressure, stop and make sure the floating backplate in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
9. Lock the handle into the GSD 41 body and tighten the Phillips screw.
10. Install unit software and configuration files per Section 7.

6.15 GRT 10

To remove:

1. Remove the connector from the back of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
2. Remove the four mounting screws that hold the unit to the aircraft structure.

To install:

1. Inspect the wire harness connector for damaged pins before installing unit.
2. Install the unit using four screws to the aircraft structure.
3. Attach connector to the back of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
4. Match the RF frequency with the remote (GRC 10) by following the instructions in the GDL69 Installation Manual P/N 190-00355-02.

6.16 GDL 59

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.
3. Slide unit out of rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Pull the handle up, then gently push unit into the rack and engage the connectors.
3. Push the GDL lever down towards the bottom of the unit. Avoid excessive force.
4. If lever fails to go down with moderate pressure, stop and make sure the floating backplate in the rack can move to align itself with the unit upon insertion. In extreme cases, the wire harness going to the connectors may need to be pressed up or down to allow the backplate to slide and align.
5. Lock the handle into the GDL body and tighten the Phillips screw.
6. Install unit software and configuration files per Section 7.

6.17 GSR 56

To remove:

1. Turn the ratchet mechanism located at the front of the unit counter clockwise until it drops free of the locking pawl on the unit.
2. Slide unit out of rack.

To install:

1. Inspect rack connectors for damaged pins before installing the new unit.
2. Gently push unit into the rack and engage the connectors.
3. Lift the ratchet mechanism to allow the collar to engage the locking pawl on the unit and turn it clockwise.
4. If ratchet mechanism does not turn with moderate force, stop and make sure the unit is aligned in the rack and there is no blockage (i.e. FOD in the rack).
5. The GSR56 does not require software or configuration loading if replaced. Instead, Garmin and/or Iridium need to be contacted to establish service with the new unit.

6.18 GCU 47X (includes the 475, 476 and 477)

To remove:

1. Turn each of the four locking sockets one quarter turn counterclockwise until they reach their stops using a 3/32” hex drive tool.
2. Pull unit up gently to remove unit from the panel.
3. Remove the connector from the back of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit. If the unit connector uses thumb screws instead of a slide lock, they must be disconnected on both sides.

To install:

1. Inspect wire harness connector for damaged pins before installing the new unit.
2. Attach connector to the back of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.** If the unit connector uses thumb screws instead of a slide lock, they must be tightened on both sides securely.
3. Install and hold the unit flush with the instrument panel and ensure that locking stud alignment marks are in the vertical position.
4. Turn each of the four locking sockets one quarter turn clockwise using a 3/32” hex drive tool (this may require applying a small amount of forward pressure to engage the quarter turn sockets).
5. Install unit software and configuration files per Section 7.

6.19 GMC 71X (includes the 710 and 715)

To remove:

1. Turn each of the four locking sockets one quarter turn counterclockwise until they reach their stops using a 3/32” hex drive tool.
2. Pull unit out gently to remove unit from the panel.
3. Remove the connector from the back of the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit. If the unit connector uses thumb screws instead of a slide lock, they must be disconnected on both sides.

To install:

1. Inspect wire harness connector for damaged pins before installing the new unit.
2. Attach connector to the back of the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.** If the unit connector uses thumb screws instead of a slide lock, they must be tightened on both sides securely.

3. Install and hold the unit flush with the instrument panel and ensure that locking stud alignment marks are in the vertical position.
4. Turn each of the four locking sockets one quarter turn clockwise using a 3/32” hex drive tool (this may require applying a small amount of forward pressure to engage the quarter turn sockets).
5. Install unit software and configuration files per Section 7.

6.20 GWX 68

The GWX 68 is located behind the radome. To access the GWX 68, remove the screws holding the radome per aircraft manufacturers instructions. **Be careful not to scratch or damage the radome** as that may affect radar performance**.**

To remove:

1. Remove the connector from the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
2. Remove the four mounting bolts. Note and save the shims or washers behind each mounting bolt location. They will need to reinstalled in the same locations.

NOTE

Special care must be exercised to avoid any contact between any tools that can become magnetized and the magnetron. Even momentary contact of a potentially magnetic object with the magnetron case will cause serious weakening of the magnetic field. Use of non-magnetic tools (typically beryllium copper or titanium) is recommended when installing or servicing the GWX 68.

To install:

1. Place the same shims or washers in the same location as they were removed and install the four mounting bolts. Torque the bolts to the specifications in the OEM Maintenance manual.
2. Attach connector to the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
3. Verify that the wiring harness has been routed and secured in such a way that it cannot be struck by or interfere with unit movement throughout the full range of sweep and tilt.
4. Install the Radome per the OEM Manufacturer’s instructions.
5. Install unit software and configuration files per Section 7.

6.21 GTA 82

To remove:

1. Remove the connector from the unit by pushing on the slide lock tab on the side of the connector to release it and then pull the connector away from the unit.
2. Remove the four mounting screws that hold the unit to the aircraft structure.

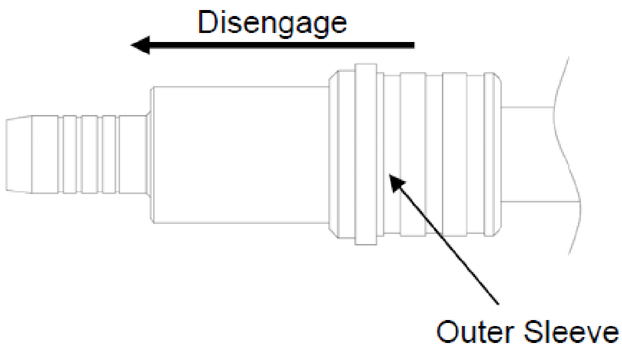
To install:

1. Inspect the wire harness connector for damaged pins before installing unit.
2. Install the unit using four screws to the aircraft structure.
3. Attach connector to the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. **Locking tabs must be engaged on both ends of the connector.**
4. Install unit software and configuration files per Section 7.

6.22 GTS 8XX

To remove:

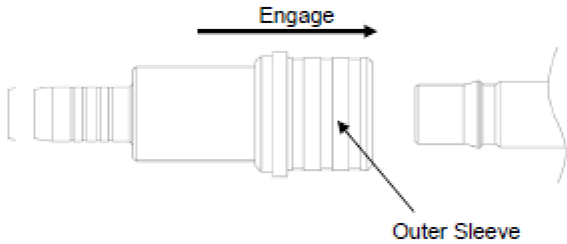
1. If a cooling hose is attached to the unit, remove it from the air fitting and set aside.
2. Turn the harness connector jackscrews counterclockwise to disengage them from the unit.
3. Pull the harness connectors away from the unit to remove them.
4. Disengage the QMA coax connectors by pulling back firmly on the outer sleeve of the QMA plug away from the jack connector. This will disengage the locking mechanism that secures the plug connector to the jack connector. Pulling on or disengaging the QMA connectors in any other way is not recommended and may cause damage to both the connectors and coaxial cable.



5. Loosen the unit hold down clamp by turning counterclockwise until it disengages the unit hold down tab.
6. From the connector end of the unit, pull the unit up slightly at an angle and pull the unit out of the rack.

To install:

1. Hold the unit at a slight angle with the connector end up and slide the back of the unit into the rack engaging the curled up lip at the back of the rack.
2. Fully seat the unit the rest of the way into the rack.
3. Pull the locking clamp up and turn it clockwise to engage the unit hold down tab tightly.
4. Attach the QMA coax connectors by holding the outer sleeve of the QMA plug to align the connectors and insert the plug onto the jack until it snaps into place. There will be an audible “snap” when the connectors are fully engaged. No tools are required for the insertion of a QMA plug onto a QMA jack.

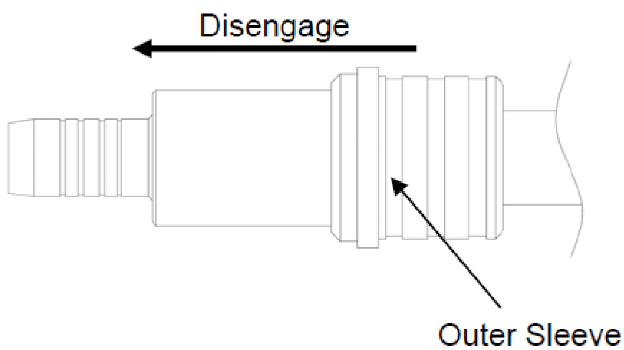


5. Install the harness connectors and tighten the connector jackscrews to secure the connectors.
6. If a cooling hose was attached to the unit, reinstall the cooling hose to the air fitting.

6.23 GPA 65

To remove:

1. Remove the harness connector by rotating the locking barrel until it disengages from the mating connector.
2. Disengage the QMA coax connectors by pulling back firmly on the outer sleeve of the QMA plug away from the jack connector. This will disengage the locking mechanism that secures the plug connector to the jack connector. Pulling on or disengaging the QMA connectors in any other way is not recommended and may cause damage to both the connectors and coaxial cable.



3. Remove the four screws holding the unit to the structure.

To install:

1. Install the four screws to attach the unit to the structure.
2. Attach the QMA coax connectors by holding the outer sleeve of the QMA plug to align the connectors and insert the plug onto the jack until it snaps into place. There will be an audible “snap” when the connectors are fully engaged. No tools are required for the insertion of a QMA plug onto a QMA jack.
3. Reconnect the harness connector and rotate the locking barrel until it stops.

6.24 CONFIGURATION MODULE

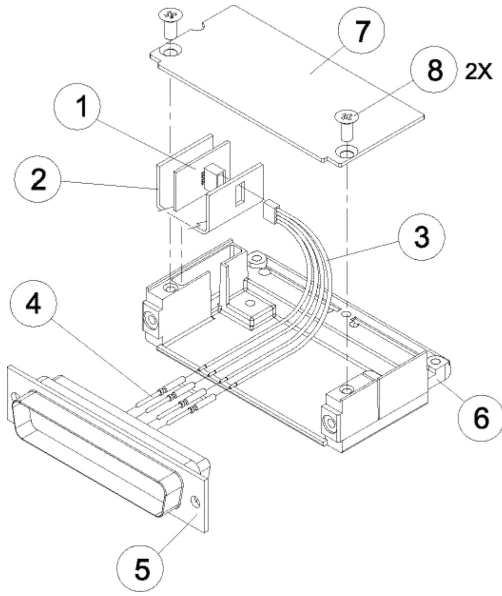


Figure 6-2. Configuration Module

To remove:

1. Remove two screws (item 8) from cover (item 7) and remove cover.
2. Remove configuration module by sliding up out of slot.
3. Unplug connector from configuration module (item 1). Do not use tools as the connector is fragile and may break.

To install:

1. Inspect connector for damaged pins.
2. Insert connector into configuration module (item 1).
3. Slide configuration module (item 1) down into slot.
4. If GRS 77 AHRS configuration module is replaced, proceed to Section 7 to recalibrate unit.
5. If GDC 74 configuration module is replaced, proceed to Section 7 to reload GDC 74 Configuration file.
6. If PFD1 master configuration module is replaced:
    a. Turn the PFD1 on in configuration mode.
    b. Go to the System Upload page in the System page group.
    c. Press the UPDT CFG softkey.

If the PFD1 master configuration module is replaced, the G1000 system ID number will change. The Supplemental Database cards, SVT Unlock, TAWS Unlock, 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. Subscription information with Garmin and Jeppesen will also need to be updated with the new System ID number.

6.25 GEA 71 BACKSHELL THERMOCOUPLE

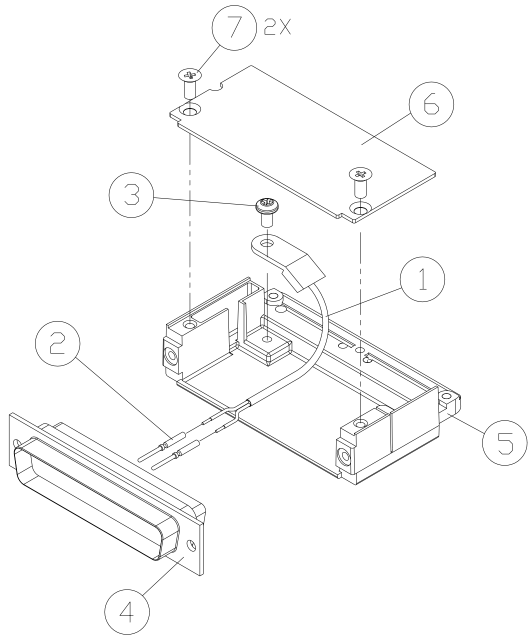


Figure 6-3. GEA 71 Backshell Thermocouple

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 GEA 71. Remove GEA connector backplate.
2. Remove connector J701 (item 5) from backplate.
3. Remove cover (item 6) from backplate.
4. 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). Place thermocouple body (item 1) onto the backshell boss (item 5). Place the thermocouple as shown in Figure 6-3 (the wires exit towards the bottom of the backshell).
3. Fasten thermocouple tightly to backshell using the provided screw (item 6).
4. Fasten cover (item 6) to backshell using the provided screw (item 7).
5. Reinstall connector to backplate and reinstall unit.

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SECTION 7

LRU SOFTWARE INSTALLATION AND TESTING

7.1 INTRODUCTION

Follow the procedures in this section whenever any original, new, repaired, or exchanged G1000 LRU is installed.

CAUTION

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 in the procedure.

GENERAL NOTES:

1. For GDL90 Software Loading and Configuration procedures, refer to the GDL90 Installation Manual P/N 560-1049-02, Section 4.
2. The GRT10 and GRC10 do not require software loading if replaced. However, their RF Pairing ID must be configured. Refer to the GDL69/69A Installation Manual P/N 190-00355-02, Section 4 for instructions.
3. The GSR56 does not require software or configuration loading if replaced. Instead, Garmin and/or Iridium need to be contacted to establish service.
4. The software loader card must have 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.
5. All GDU displays should be 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.
6. 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 a software upload. Replacing corrupted database cards are not covered under warranty.

7. Garmin recommends the use of SanDisk SD cards for loading software and configuration files. Use of other brand cards is not recommended.
8. Determine what optional equipment (i.e. ADF, DME, GWX Radar, WX500, KTA810 TAS, KRA405B RA, GTX #2 XPDR, etc.) is installed in the aircraft before loading software. Optional equipment configuration files will need to be reloaded after an LRU replacement to re-enable them. Failure to load configuration files for optional equipment will prevent them from working properly.
9. Determine what optional features (i.e. 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 according to the instructions in Section 10. Failure to load configuration files for optional features will prevent them from working.
10. Pressing the ENT key will check and uncheck the highlighted configuration box.

NOTE

Verify the presence or non-presence of GIA63W 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.

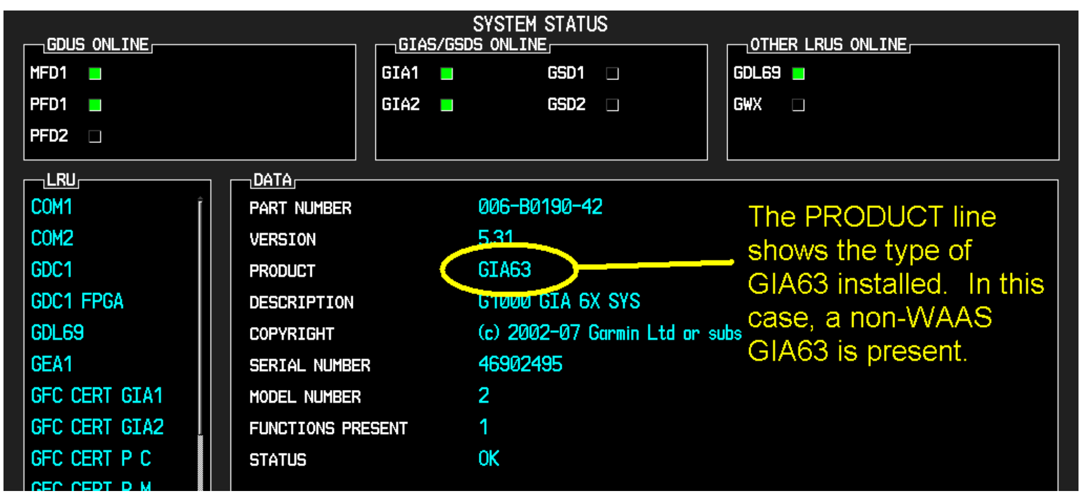


Figure 7-1. Non-WAAS (GIA 63) System Status Page

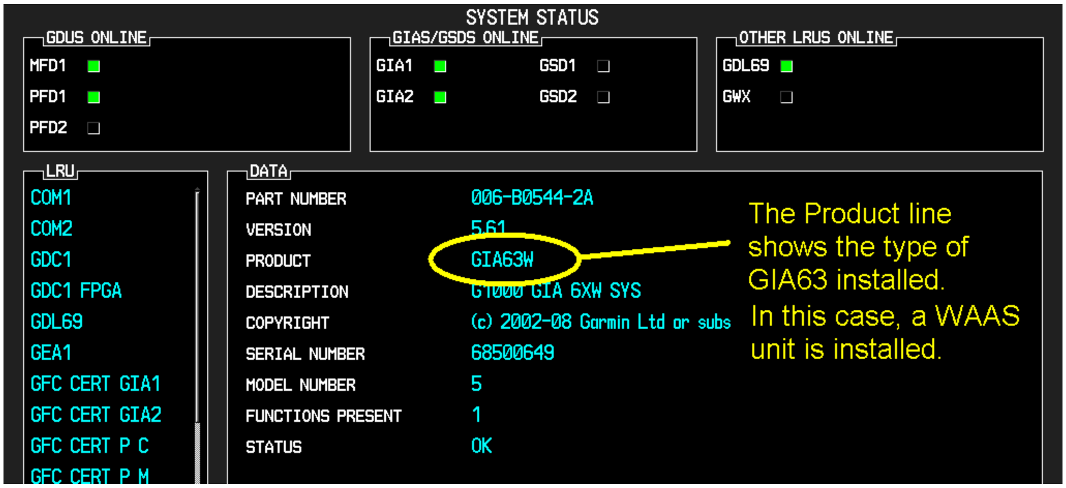


Figure 7-2. WAAS (GIA 63W) System Status Page

7.2 GDU SOFTWARE INSTALLATION AND TESTING (Two Displays)

NOTE

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

<u>Original Display Reinstalled:</u>

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.

<u>New, Repaired or Exchange Display(s) Installed:</u>

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 G1000 software loader card into the top slot of the GDU that was replaced.
3. Power the display on in configuration mode.
4. Press the ENT key to acknowledge the following prompt:

```
DO YOU WANT TO CLEAR USER SETTINGS?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 10 SECONDS BEFORE YES IS RETURNED
```

5. Press the YES softkey at 'DO YOU WANT TO UPDATE SYSTEM FILES?' prompt.
6. 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 all config files (starting with GDU 8.20, all config files need to be loaded after replacing a GDU).
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.

7.2.3 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 GDU SOFTWARE INSTALLATION AND TESTING (Three Displays)

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 since their software and configuration files were deleted during the repair testing process.

Original PFD Displays Installed in Opposite Locations for Troubleshooting

If PFD1, PFD2, or the MFD are installed in opposite locations for troubleshooting, no software or configuration loading is required. The displays do not need to be returned to their original position. **Only swap displays that are the same size**.

New, Repaired or Exchanged Display(s) Installed

If a new, repaired or exchanged 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 Jeppesen aviation database update instructions.

GDU Software

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.

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 could contain a FliteChart or ChartView database which is only used in the MFD.
2. Insert the G1000 Software Loader Card into top slot of the replacement unit.
3. Hold the ENT and CLR keys on the replaced display and restore power by closing the applicable circuit breaker (power up only the replaced unit).
4. When the words INITIALIZING SYSTEM appear in the upper left corner of the display, release the ENT and CLR keys.
5. Press the ENT key to acknowledge the following prompt:

   DO YOU WANT TO CLEAR USER SETTINGS?
   PRESS CLR FOR NO AND ENT FOR YES
   YOU HAVE 10 SECONDS BEFORE YES IS RETURNED

6. When the "DO YOU WANT TO UPDATE SYSTEM FILES?" prompt appears, press the YES softkey.
7. Press any key to confirm update completion after the software has finished loading.

8. When the “DO YOU WANT TO UPDATE SPLASHSCREEN” prompt appears, press the YES softkey (This is optional and may not be displayed).
9. Press any key to confirm update completion after the splash screen has finished loading.
10. When the SYSTEM STATUS page appears, turn off the display.
11. Turn on the display in configuration mode and allow to initialize up to when the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt appears, and then turn off the display. This sets the System ID in the new display.
12. Continue with loading GDU Configuration files.

GDU Configuration

1. Insert the G1000 software loader card into the top slot of PFD1.
2. Power PFD1, PFD2, and the MFD on in configuration mode.
3. On PFD1, press the NO softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
4. After the SYSTEM STATUS page appears on PFD1, use the small FMS knob to turn to the SYSTEM UPLOAD page.
5. Activate the cursor; rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model option in the AIRFRAME field pop-up box and press the ENT key.
6. Once an airframe type is selected the cursor moves to the FILE window. Rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model “Base Configuration” option file and press the ENT key.
7. Press the CLR ALL softkey.
8. For any GDU replacement, select all config files.
9. Press the LOAD softkey.
10. When the upload is complete, press the ENT key to close the “Upload Complete” window.
11. View the SUMMARY field and ensure that the load is complete.
12. Load configuration files for optional equipment (i.e. ADF, DME, GWX Radar, WX500, KTA810 TAS, KRA405B RA, GTX #2 XPDR, etc.) that list PFD1/2, MFD, Airframe, System, Manifest or Alerts files in them. These must be loaded in order for the optional equipment to function correctly.
13. If the AIRFRAME Configuration File was loaded earlier, use the Optional Feature Unlock cards to unlock optional features such as TAWS, ChartView, SVT, etc. (refer to Section 10). These cards should be with the aircraft.
14. Load Jeppesen Aviation Database (refer to Section 10).
15. Turn off the system and 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.

GDU Testing

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

1. Start all displays in normal mode.
2. Press the YES softkey to acknowledge the agreement on the MFD. Allow the displays to initialize for approximately one minute. The GRS 77 AHRS and GDC 74B Air Data Computers require longer initialization periods than the other LRUs. During startup, this causes the attitude, airspeed, and altitude fields to be invalid during the first ~60 seconds of PFD power-up.
3. Check the PFD1/2 and MFD displays for the following:
   - Check that all COM/NAV display fields are valid in the top corners of both PFDs.
   - Check that altitude, airspeed, vertical speed and OAT fields are valid on both PFDs.
   - Check that attitude and heading are valid (unless an AHRS calibration is required).
   - Check that the engine instrument fields are valid on the MFD.
4. Push the red display reversion button on both GMA 1347 #1 and #2 (if installed). Verify both displays enter reversionary mode (both should have valid altitude, airspeed, vertical speed, and engine instruments).
5. De-activate reversionary mode by pushing the red reversion button.

NOTE

Make sure the Jeppesen aviation database is present. Refer to Section 10 for aviation database update instructions.

7.4 GIA SOFTWARE INSTALLATION AND TESTING

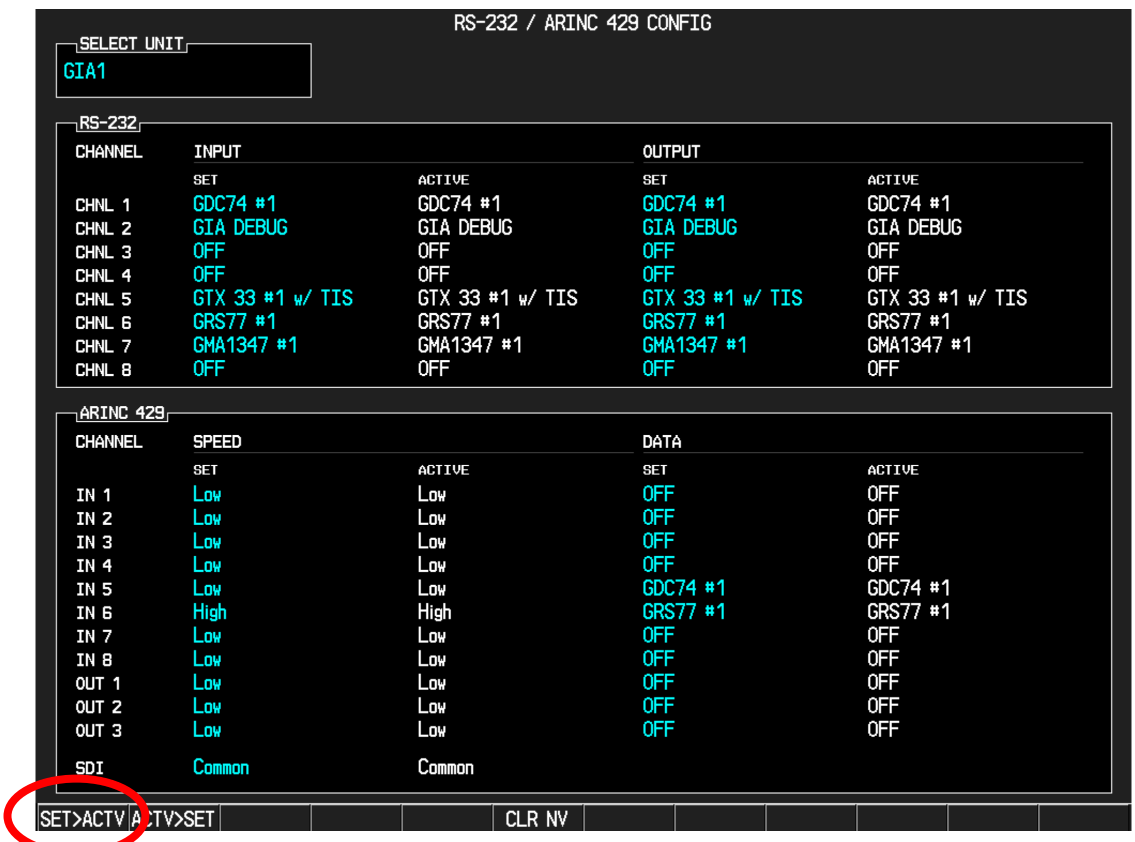
Original GIA Reinstalled:

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
- GIA1/2 Certification Gains for the GFC 700
- GIA1Audio Configuration
- GIA2 Audio Software
- GIA2 Audio Configuration
- 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 LOAD 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 form the PFD.

7.4.1 GIA Testing

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

GPS Signal Acquisition Test

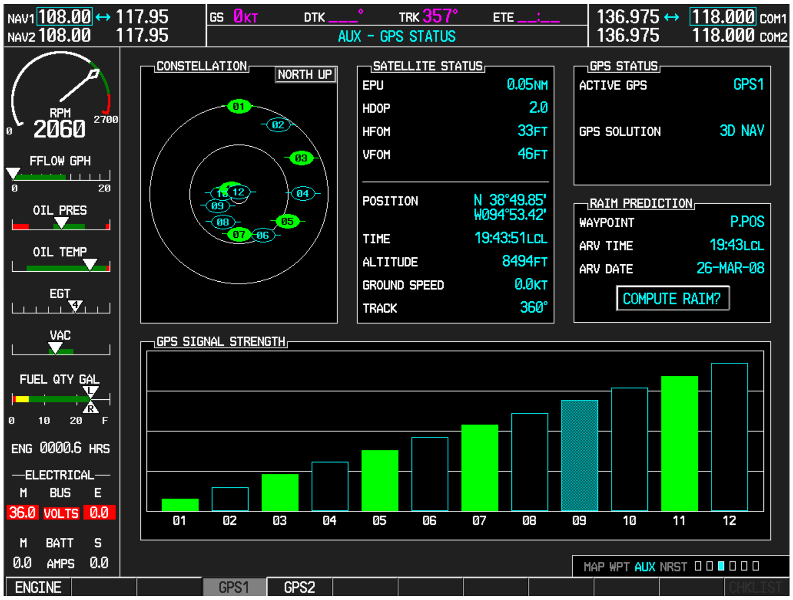


Figure 7-5. AUX-GPS Status Page (Example)

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. One 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.

7.5 GMA SOFTWARE INSTALLATION AND TESTING (Single Audio Panel)

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.).

7.5.1 GMA Testing

If the 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

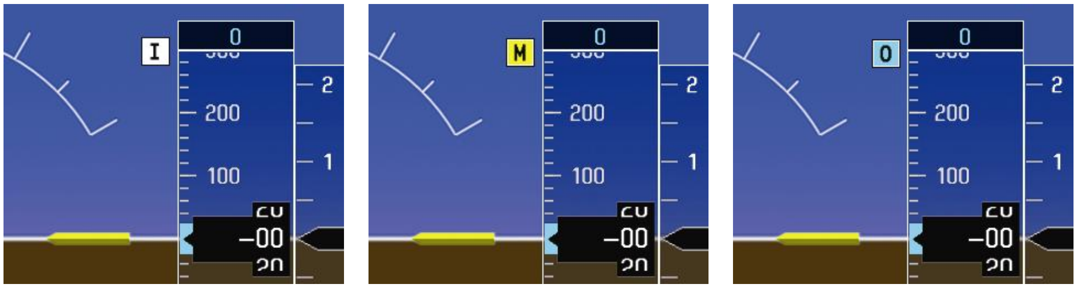


Figure 7-6. Marker Beacon Symbology

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.

DUAL AUDIO PANELS (Optional)

Original GMA 1347 Reinstalled

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

Original GMAs Installed in Opposite Locations for Troubleshooting

1. If the original GMA #1 and GMA #2 are installed in opposite locations for troubleshooting, configuration loading is required.
2. With the system turned off, remove the GMA units and install in the opposite location.
3. Apply system power and place all displays in Configuration Mode.
4. On PFD1, use the large FMS knob to navigate to the GMA Configuration page.
5. In the SELECT UNIT box in the upper left corner of the screen, verify GMA1347 #1 is listed.
6. Press the SET>ACTV softkey in the lower left corner of the screen (see Figure 7-7).

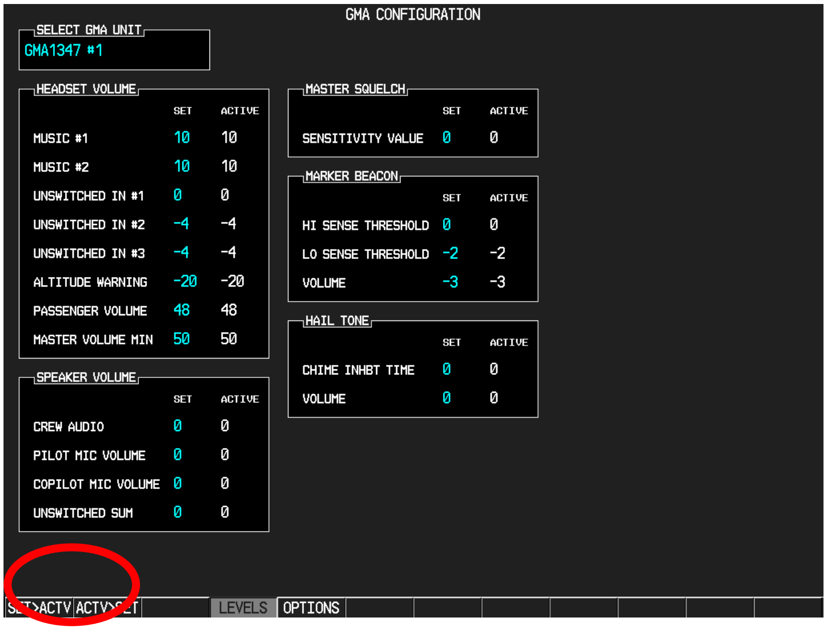


Figure 7-7. SET>ACTV Softkey on GMA Config Page

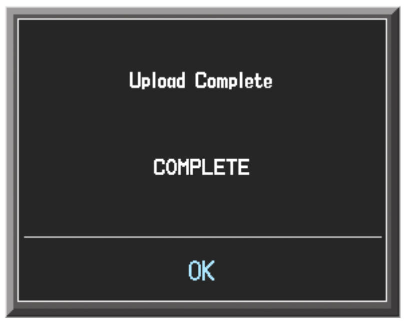
7. When the "Activate parameter settings?" window appears, verify OK is highlighted and press the ENT key.
8. When the "GMA #1 Configured" window shows "Complete", press the ENT key to select OK in the window.
9. Activate the cursor, turn the small FMS knob to show the list of GMA choices, highlight GMA1347 #2 in the pop-up box and press the ENT key.
10. Press the SET>ACTV softkey in the lower left corner of the screen.
11. When the "Activate parameter settings?" window appears, verify OK is highlighted and press the ENT key.
12. When the "GMA #2 Configured" window shows "Complete", press the ENT key to select OK in the window.
13. Turn off the system.

New, Repaired or Exchange GMA 1347 Installed

If a new, repaired or exchange GMA 1347 is installed the correct software and configuration files must be loaded to the unit.

1. Remove the Supplemental Database Cards from the bottom slots of each display. Note which Supplemental Database 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. Place the Software Loading card in the top slot of PFD1.
3. Apply system power and place all displays in Configuration Mode.
4. On PFD1, press the NO softkey at "DO YOU WANT TO UPDATE SYSTEM FILES?" prompt.

5. After the SYSTEM STATUS page appears on PFD1, use the small FMS knob to turn to the SYSTEM UPLOAD page.
6. Activate the cursor; rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model option in the AIRFRAME field pop-up box and press the ENT key.
7. Once an airframe type is selected the cursor moves to the FILE window. Rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model "Base Configuration" option file and press the ENT key.
8. Press the CLR ALL softkey at the bottom of the screen.
9. Using the FMS knob and ENT key, select the following files:
    - GMA (1 or 2) – Software and Configuration files
10. Once the files are selected press the LOAD softkey.
11. When the upload is complete, press the ENT key to select OK in the Upload Complete window.



12. Verify that each column indicates  in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
13. Load the optional config files for optional equipment (i.e. ADF, DME, GDL59, HF, etc.) that list GMA (1 or 2) files in the PRODUCT window for them. These must be loaded in order for the optional equipment to function correctly.
14. After the software and configuration files are loaded, turn off the system and remove the Software Loader Card. 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.

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.

1. Verify that communications are clear and PTT operation is correct for each pilot position.
2. Select the audio source corresponding to each installed avionics unit (i.e. NAV1, NAV2, COM1, COM2) and check for audio over the headsets.
3. Press the SPKR key and verify that the selected audio is heard over the speaker.

Failsafe Operation Check

GMA 1347 #1

1. Turn the GMA 1347 #1 off by pulling the GMA 1347 #1 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 GMA 1347 #1 circuit breaker to continue testing.

GMA 1347 #2

1. Turn the GMA 1347 #2 off by pulling the GMA 1347 #2 circuit breaker. This directs all COM 2 phone audio, MIC audio and MIC key to the co-pilot's position.
2. Check the failsafe operation by exercising the COM 2 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 2 using the failsafe operation.
3. Close the GMA 1347 #2 circuit breaker to continue testing.

Marker Beacon Test

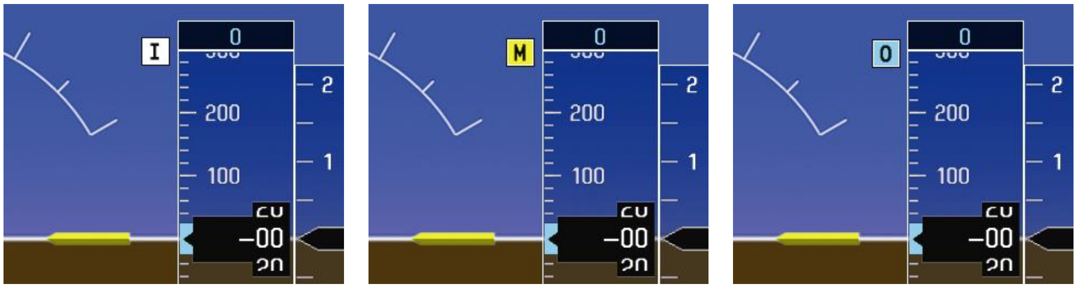


Figure 7-8. Marker Beacon Symbology

1. Using a ramp tester, simulate the outer marker, middle marker and inner marker signals by following the test equipment manufacturer's instructions.
2. Verify that each marker audio signal is present over the headphones and speaker.
3. 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 7-8.
4. Operate the MKR MUTE key on the GMA 1347 and ensure that the audio signal is muted.

7.6 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

7.6.1 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 7-9. 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 ±0.25° 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 7-10.
   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

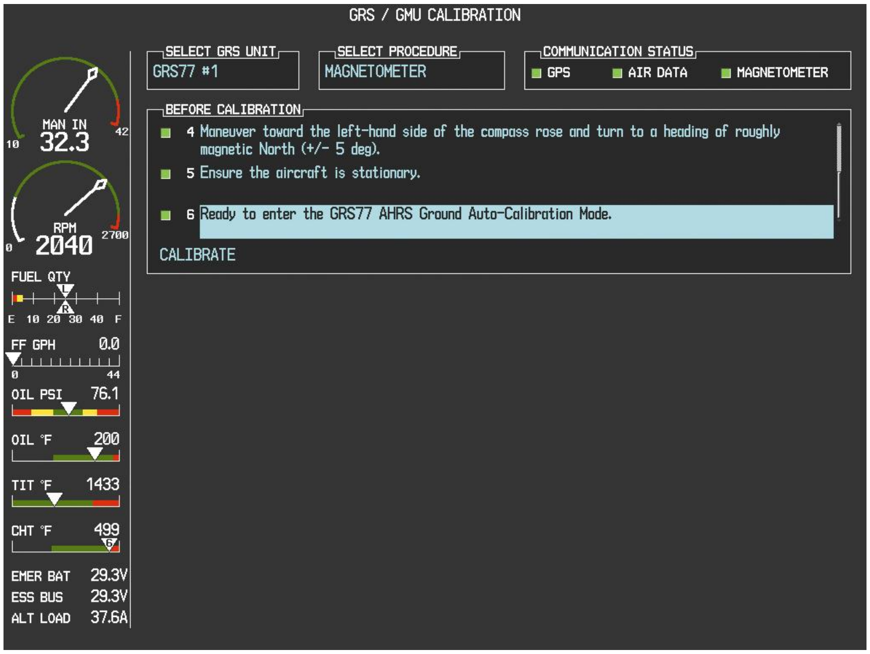


Figure 7-10. Magnetometer Calibration

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.

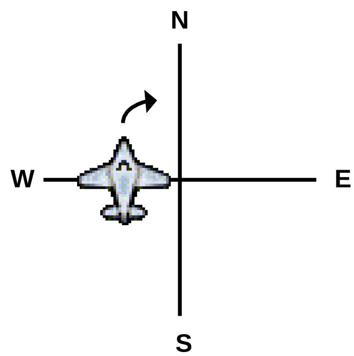
If, upon completion of the Magnetometer Calibration Procedure in each clockwise and counter-clockwise direction, the PFD displays the “CALIBRATION SUCCESSFUL / SITE IS CLEAN” message, then the candidate site is sufficiently free of magnetic disturbances and is acceptable for performing the Magnetometer 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 cannot 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 (±5°) 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.

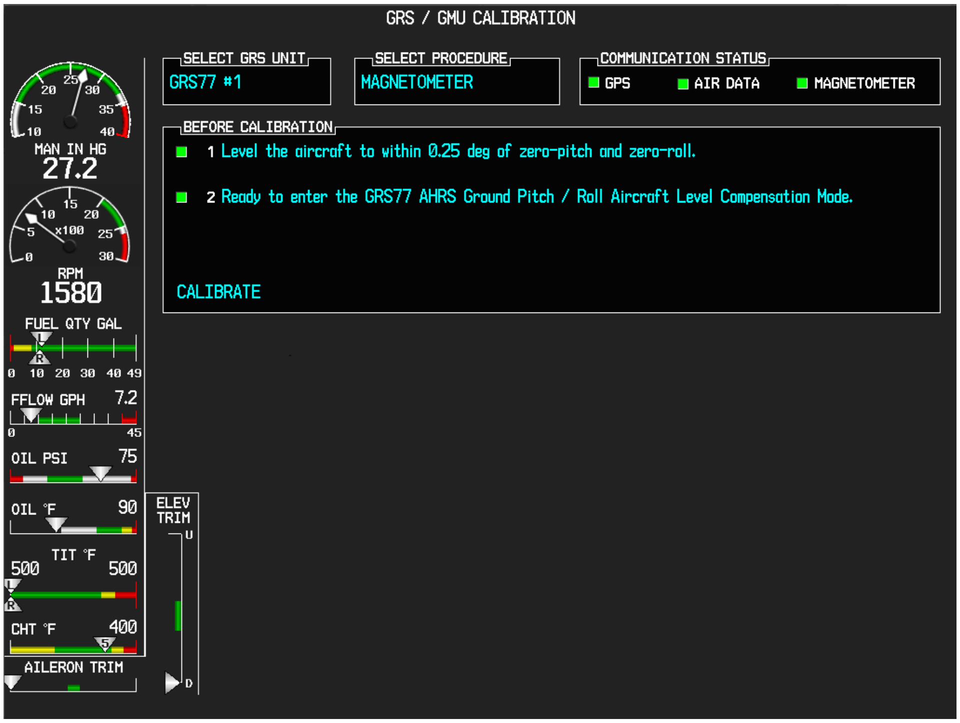


5. Restart the PFD and MFD in configuration mode.

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:
    - 9
    - 10
    - 11
    - 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° (±5°) 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

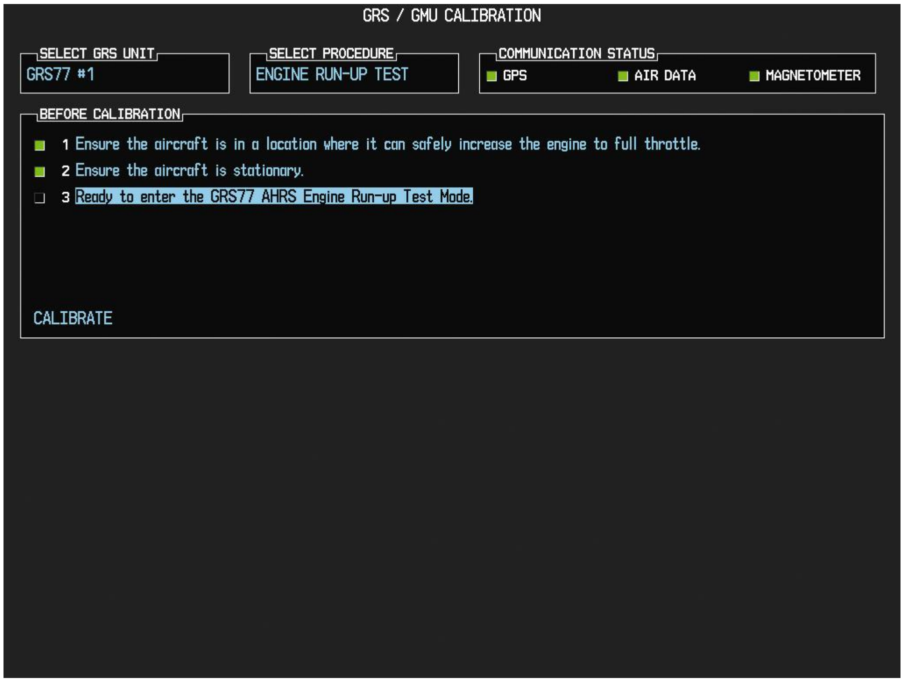


Figure 7-11. Engine Run-Up

Calibration procedures A1 and A2 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:
   - 9
   - 10
   - 11
   - 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.

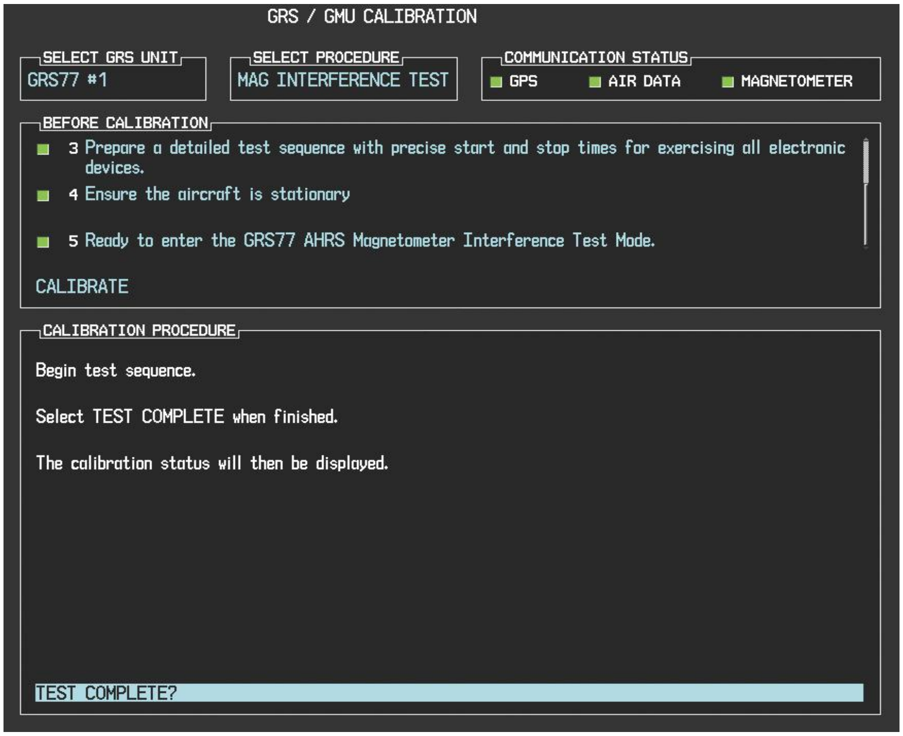


Figure 7-12. Magnetometer Interference

1. Enter Configuration Mode and go to GRS/GMU Calibration page as shown in Figure 7-120.
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.

7.7 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.

7.7.1 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

7.8 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 (any High-Side Current Monitors must be recalibrated after GEA config is reloaded).

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.

7.8.1 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.

7.9 GTX SOFTWARE INSTALLATION AND TESTING (Single Unit Installation)

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.

- GTX Software
- GTX Configuration

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

7.9.1 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.

7.9.2 GTX 33X Transponder (Dual Transponder Installation)

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 since their software and configuration files were deleted during the repair testing process.

New, Repaired or Exchange GTX Installed

If a new, repaired or exchange GTX is installed; the correct software and configuration files must be loaded to the unit.

1. Remove the Supplemental Database Cards from the bottom slots of each display. Note which Supplemental Database 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. Place the Software Loading card in the top slot of PFD1.
3. Apply system power and place all displays in Configuration Mode.
4. On PFD1, press the NO softkey at "DO YOU WANT TO UPDATE SYSTEM FILES?" prompt.
5. After the SYSTEM STATUS page appears on PFD, use the small FMS knob to turn to the SYSTEM UPLOAD page.
6. Activate the cursor; rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model option in the AIRFRAME field pop-up box and press the ENT key.
7. Once an airframe type is selected the cursor moves to the FILE window. Rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model "Base Configuration" option file and press the ENT key.
8. Press the CLR ALL softkey at the bottom of the screen.
9. Using the FMS knob and ENT key, select the following files:
   - GTX (1 or 2) – Software and Configuration files

   NOTE

   GTX 2 may be considered optional equipment. The files for GTX 2 may be included in an Option file that you will need to select from the FILE box.
10. Once the files are selected press the LOAD softkey.
11. When the upload is complete, press the ENT key to select OK in the Upload Complete window.

12. Verify that each column indicates 

in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.

13. Enter the Aircraft Registration Number on the GTX configuration page per Section 10.

14. After the file loads and registration configuration are complete, turn off the system and remove the Software Loader Card. 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.

GTX 33/33D 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.

7.10 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.

7.10.1 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.

7.11 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 (not all aircraft will require all of the file loads listed below).

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

7.11.1 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.

Autopilot Operation Checks

To verify the AFCS systems buttons and switches are operating correctly, refer to the Pilot's Guide for operation of autopilot for a specific aircraft.

7.12 GMC 71X Autopilot Controller (includes 710 and 715)

Original GMC 71X Reinstalled

If the removed GMC 71X is re-installed (same serial number), no software loading or configuration is required. This does not include units that were returned for repair since their software and configuration files were deleted during the repair testing process.

New, Repaired or Exchange GMC 71X Installed

If a new, repaired or exchange GMC 71X is installed the correct software and configuration files must be loaded to the unit.

1. Remove the Supplemental Database Cards from the bottom slots of each display. Note which Supplemental Database 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. Place the Software Loading card in the top slot of PFD1.
3. Apply system power and place all displays in Configuration Mode.
4. On PFD1, press the NO softkey at “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
5. After the SYSTEM STATUS page appears on PFD1, use the small FMS knob to turn to the SYSTEM UPLOAD page.
6. Activate the cursor, rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model option in the AIRFRAME field pop-up box and press the ENT key.
7. Once an airframe type is selected the cursor moves to the FILE window. Rotate the small FMS knob to activate the pop-up box. Highlight the correct aircraft model “Base Configuration” option file and press the ENT key.
8. Press the CLR ALL softkey at the bottom of the screen.
9. Using the FMS knob and ENT key, select the following files:
   - GMC – Software and Configuration files
10. Once the files are selected press the LOAD softkey.
11. When the upload is complete, press the ENT key to select OK in the Upload Complete window.

12. Verify that each column indicates PASS in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.
13. After the software and configuration files are loaded, turn off the system and remove the Software Loader Card. 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.

GMC 71X Testing

Perform a basic operational check to verify the buttons and knobs work.

7.13 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

7.13.1 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.

7.13.1.1 G1000/GWX 68 Pitch and Roll Trim Adjustments

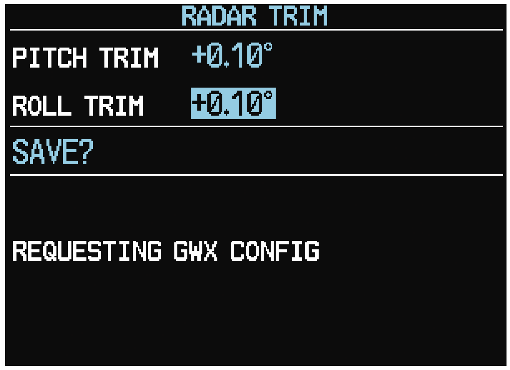


Figure 7-13. Radar Trim Window

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 7-13).
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.

7.14 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.

7.14.1 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.

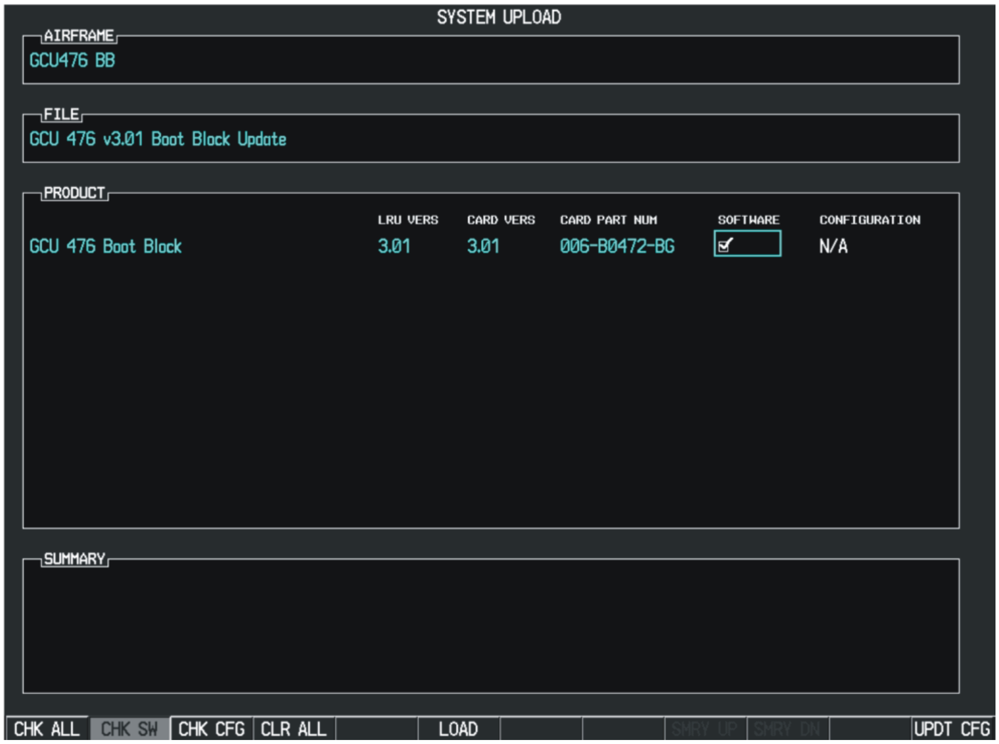
3 Apply system power and place both displays in Configuration Mode.

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.

7.15 GCU 475

Original GCU 475 Reinstalled

If the removed GCU 475 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.

Continue to Section 4.11.1.

New or Repaired GCU 475 Installed

If a new or repaired GCU 475 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.

- GCU Software
- GCU Configuration

Continue to Section 4.11.1.

GCU 475 Testing

Perform a basic operational check on the GCU 475.

7.16 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.

7.16.1 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)

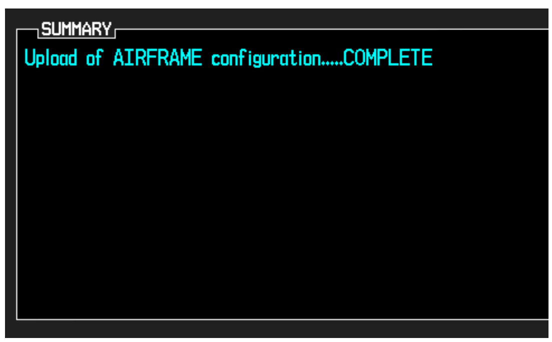
7.16.2 Activation with GDU software version less than 7.00

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.

7.16.3 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.

7.16.4 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.

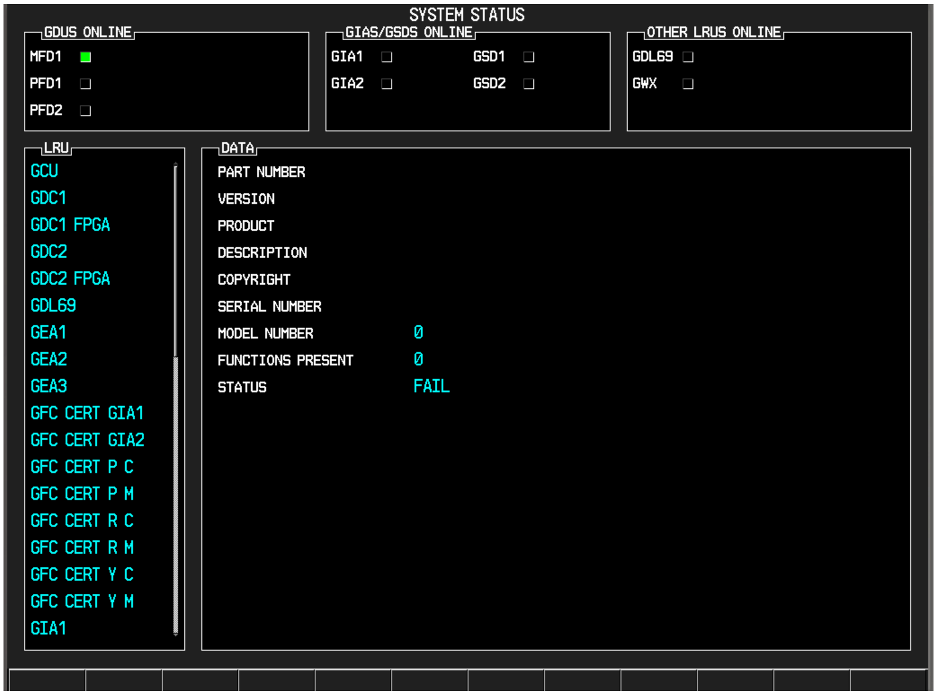

Figure 8-1. System Status Page (Configuration Mode)

NOTE

Sections 8.1, through 8.4 are for three display installations. Sections 8.5 and 8.6 are for two display installations. The desired test results are for typical installations, minor differences may exist for particular airframes.

8.1 WAAS GPS TEST (Three Display)

TEST	DESIRED RESULT
Single GPS Failure Conditions: 1. Place a metal shroud (sufficient enough to block a GPS signal) over the GPS antenna for GIA 1 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 GIA 2 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.	GPS Failure - For each of the specified GPS failure conditions, the following should remain valid on the PFD throughout the procedure: a. Attitude and Heading from AHRS. b. Airspeed, Altitude, Vertical Speed, and OAT from Air Data Computer. c. GPS CDI remains valid on PFD. d. “BOTH ON GPS1” or “BOTH ON GPS2” reversionary sensor annunciations appear on both PFDs.
Dual GPS Failure Conditions: 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.	Dual GPS Failure - For a dual GPS failure, the following will occur: a. GPS CDI flags INTEG on PFD. b. Attitude and Heading remain valid from AHRS. c. Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.

8.2 GIA TEST (Three Display)

TEST	DESIRED RESULT
Single GIA Failure Conditions: 1. Remove power from GIA 1. 2. Check for desired results. 3. Restore power to GIA 1. Allow to re-acquire satellites. 4. Remove power from GIA 2. 5. Check for desired results. 6. Restore power to GIA 2.	GIA 1 Failure - For a GIA 1 failure, only the following should flag invalid: a. COM/NAV 1 field. b. NAV 1 CDI loses deviation bar. c. GIA 2 Power Failure - For a GIA 2 failure, only the following should flag invalid: • COM/NAV 2 field. • NAV 2 CDI loses deviation bar.
Dual GIA Failure Conditions: 1. Remove power from both GIA units. 2. Check for desired results. 3. Restore power to both GIA units.	Dual GIA Failure – For a dual GIA failure, only the following should occur: a. COM/NAV 1 & COM/NAV 2 fields flag invalid. b. GPS CDI flags INTEG on PFD. c. NAV 1, 2 CDI loses deviation bar. d. XPDR field flags invalid on PFD. e. Engine Instrument field flags invalid on MFD. f. All AHRS & ADC fields valid.

8.3 DISPLAY TEST (Three Display)

TEST	DESIRED RESULT
MFD Display Failure Conditions: 1. Remove power from MFD.. 2. Verify desired results. 3. Close MFD CB.	The following shall occur when power is removed from the MFD: a. MFD goes blank. b. All PFD1 and 2 primary flight information is retained. c. The COM 1/2 and NAV 1/2 tuning fields remain valid and can be tuned by rotating the tuning knobs on PFD1 and PFD2. d. XPDR 1/2 fields remain valid and XPDRs can adjusted via PFD softkeys.
PFD2 Display Failure Conditions: 1. Open PFD 2 CB. 2. Verify desired results. 3. Close PFD 2 CB.	The following shall occur when power is removed from PFD2: a. PFD2 goes blank. b. PFD1 and MFD remain in normal display formats. c. GMA2 Fail – GMA2 is inoperative. d. XPDR2 Fail – XPDR2 is Inoperative.
PFD1 Display Failure Conditions: 1. Open PFD 1 PRI and PFD1 SEC circuit breakers. 2. Verify desired results. 3. Close PFD 1 PRI and PFD1 SEC circuit breakers.	The following shall occur when power is removed from PFD1: a. PFD1 goes blank. b. PFD2 and MFD remain in normal display formats. c. GMA1 Fail – GMA1 is inoperative. d. XPDR1 Fail – XPDR1 is Inoperative.

8.4 AHRS/AIR DATA BACKUP PATH TEST (Three Display)

TEST	DESIRED RESULT
Secondary AHRS/ADC path check: 1. Remove power from PFD1. 2. Remove power from GIA2. 3. Check for desired results. 4. Restore power to the PFD and GIA2.	The following should occur on the MFD when power is removed from the PFD1 and GIA2: a. MFD switches to reversion mode. b. Attitude and Heading remain valid from AHRS. c. Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer. d. Engine Instrumentation flags invalid. e. All COM & NAV fields flag invalid.
Secondary AHRS/ADC path check: 1. Remove power from PFD2. 2. Remove power from GIA2. 3. Check for desired results. 4. Restore power to the PFD and GIA2.	The following should occur on the MFD when power is removed from the PFD2 and GIA2: a. MFD switches to reversion mode. b. Attitude and Heading remain valid from AHRS. c. Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer. d. Engine Instrumentation flags invalid. e. All COM & NAV fields flag invalid.

8.5 Display Failure Test (Two Display)

Step	Desired Result
MFD Display Failure Conditions: 1. Remove power from MFD. 2. Restore power to MFD.	The following shall occur when power is removed from the MFD: • PFD 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 appears on PFD. • COM/NAV 2/GPS2 fields flag invalid. • TAWS N/A
PFD Display Failure Conditions: 1. Remove power from PFD. 2. Restore power to PFD.	The following shall occur when power is removed from the PFD: • MFD switches to reversion mode. • Attitude and Heading remain valid from AHRS. • Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer. • MFD retains engine instrumentation. • COM1/NAV 1/GPS1 fields flag invalid. • TAWS N/A

8.6 AHRS/ADC Backup Path Test (Two Display)

Step	Desired Result
Secondary AHRS/ADC path check: 1. Remove power from PFD. 2. Remove power from GIA2. 3. Check for desired results. Restore power to the PFD and GIA2.	The following shall occur on the MFD when power is removed from the PFD and GIA2: 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.

8.7 FLIGHT TEST

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

8.8 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).

8.9 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).

8.10 GTS 8XX TESTS

Perform the following test to verify GTS 8XX operational and surveillance functions. Use a ramp tester such as a TIC TR220 or equivalent to perform the tests.

To select a scenario that will properly converge and intercept the GTS 8XX, the GTS 8XX must be in ground test mode. To enable ground test mode, the aircraft must be on the ground and the GTS 8XX must be in normal system mode and in standby.

Position the test set directional antenna with a clear line of sight to the GTS 8XX antenna at 90 degrees. With the GTS 8XX powered up and in Standby mode indicated on the CDTI, cycle the GTS 8XX to 'Operate'.

Select the following:

- Set the intruder type as ATCRBS.
- Intruder Start Distance: 10 nm.
- Intruder Start Altitude: 50,000 ft.
- Vertical Speed: 0 fpm.
- Velocity: 360 kts.

Initiate the intruder scenario and observe the following:

- Traffic should be acquired at approximately 10 NM at 90 degree bearing and co-altitude. Observe intruder closes on own aircraft at a rate of 0.1 NM/sec.
- The intruder should transition from Other Traffic (displayed as an open diamond with 00 displayed above), to proximate traffic (displayed as a filled white diamond with 00 displayed above), to a Traffic Advisory (TA) alarm.
- The appropriate TA symbology (yellow filled circle with 00 displayed above, and an audio annunciation of "Traffic! 3 O'clock! At Altitude! 3 Miles!"), displayed when the intruder approaches within 3 NM.

8.11 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.

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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 MAINTENANCE INTERVALS

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

9.2 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

9.3 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.

GDL 90

Refer to the GDL 90 Installation Manual for periodic maintenance information (P/N 560-1049-02).

GSA 8X 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 85A 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.

9.4 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.

9.5 GSA GREASING PROCEDURE

1. Remove each servo.
2. Remove excess grease build-up from the single servo output gear using a lint-free cloth.

   IMPORTANT: 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!
3. Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33MS.
4. Re-install the servos.
5. Rotate control surfaces through their range of motion.

9.6 GSM 85(A) SERVO GEARBOX SEMI-AUTOMATED SLIP CLUTCH TEST PROCEDURE

NOTE

All G1000 and GFC 700 equipment must be installed and operational to perform the semi-automated slip clutch test procedure.

The semi-automated slip clutch test procedure is to be used as a baseline only. Aircraft-specific customization will be required based on the actual number and configuration of GSM 85(A) gearboxes installed, as well as the appropriate minimum and maximum allowable torque thresholds for each axis. Refer to the OEM maintenance documentation for aircraft specific procedures. The purpose of the test is to verify that the pitch, roll, yaw, and pitch trim of the GSM 85(A) slip clutches are within acceptable limits. The test also verifies servo load cell integrity.

NOTE

The displayed test results are not stored in G1000 memory. If power is cycled, these values will be lost. The test values are not lost when changing configuration mode pages on PFD1.

NOTE

Perform the test at temperatures between 50° F and 120° F.

NOTE

Refer to Section 5 for a detailed explanation of the GFC Status Page (Figure 9-1).

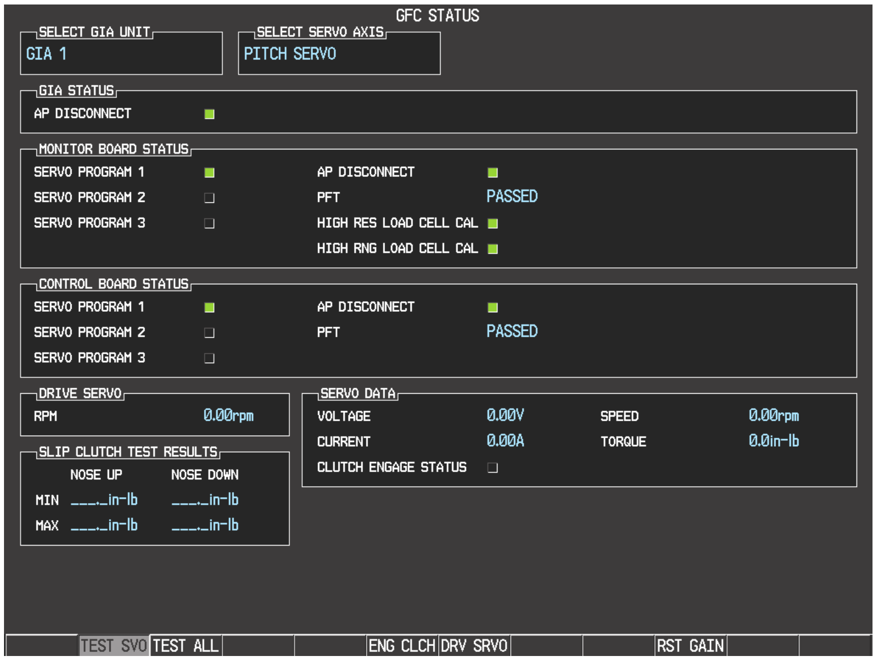


Figure 9-1. GFC Status Page

NOTE

Once the test starts the servo will begin to drive. If, for any reason, the test must be stopped, firmly grasp the aircraft control being moved and press the red AP DISC switch on the aircraft control stick.

1. Start PFD1 in Configuration Mode.
2. Start the MFD and PFD2 in Normal Mode.
3. Press the red reversionary button on the left-side GMA 1347 to force the MFD into reversionary mode.
4. Select the GFC STATUS Configuration Page (GFC Page Group) on PFD1 using the FMS knob (Figure 9-1). Observe the MFD and acknowledge any flashing CAS messages.
5. Select the desired servo on the GFC Status Page.
6. Verify that the PFT status field on the GFC Status Page displays PASSED.
7. Pin in place the aircraft control to be checked by following the OEM's instructions.
8. Press the TEST SVO softkey.
9. Highlight YES and press the ENT key. The test begins a 50 second data collection period, where the servo is commanded to drive at ~2.5 rpm while the servo load cell

measures clutch torque. During the test, the MFD will display the CAS message "CLUTCH [PIT/ROL/YAW] PROG" indicating the test for the stated axis is in progress.

10. Monitor the CURRENT field and verify that the current displayed is greater than zero.
11. After the data is collected and processed, the test displays the min and max torque readings of the first direction on the PFD. The servo immediately reverses direction and performs the test in the opposite direction.
12. At the completion of the test, the MFD will display one of the following CAS messages:
    a. CLUTCH [PIT/ROL/YAW] PASS
    b. CLUTCH [PIT/ROL/YAW] FAIL
13. Press the red AP DISC button to relieve any control tension.
14. Press the ENT key to acknowledge the COMPLETE prompt on the PFD.
15. If the CAS message CLUTCH [PIT/ROL/YAW] PASS is displayed, the test has passed. If the CAS message CLUTCH [PIT/ROL/YAW] FAIL is displayed, the servo must be removed from the aircraft and tested/adjusted per the in Section 9.7.
16. Record whether the test result (pass or fail, from the CAS messages displayed on the MFD) and the clutch measurement values (from PFD1) in Table 9-2, or in appropriate aircraft maintenance records.
17. Repeat this procedure for each servo axis.

NOTE

The Min and Max Torque values displayed on the GFC Status Page should not be used to determine whether or not the test passed. Only the appearance of the CAS message CLUTCH [PIT/ROL/YAW] PASS on the MFD should be relied on as an indication that the test passed in a given axis.

Table 9-1. Test Results

Axis	Direction	Min Measured Torque (in-lbs)	Max Measured Torque (in-lbs)	Min Allowed Torque (in-lbs)	Max Allowed Torque (in-lbs)	Pass or Fail
Pitch	Up			TBD	TBD	
	Down					
Roll	Left			TBD	TBD	
	Right					
Yaw	Left			TBD	TBD	
	Right					

Min/Max Test Threshold Determination

In order to account for individual GSA 8X load cell measurement tolerance, as well as possible GSM 85(A) slip clutch variation over temperature, specific minimum and maximum torque limits must be established for each axis. To establish these thresholds, Garmin has developed a procedure that yields a 99% confidence level based on a significant sample size of fielded and production units. These thresholds vary based on whether the applicable GSM 85(A) contains either a ball bearing or a bronze bearing on its output shaft, and also whether or not the GSM 85(A) has an idler pulley.

In order to establish appropriate thresholds for the semi-automated check, Garmin has examined data from its factory, field inspections of slip clutch, and extensive lab tests and life tests. As part of that evaluation, Garmin considered both GSA 8X load cell variation, GSM 85(A) slip clutch tolerance over temperature, and friction differences between ball and bronze bearings among other things. Based on that data, the calculations below can be used to calculate the semi-automated slip clutch test tolerances based on a given nominal slip clutch setting.

It should be noted that if specific axes are considered not load critical, increased tolerance at the low end could be utilized beyond that recommended below. If it is desired to take advantage of this in order to reduce removals, Garmin should be contacted to determine if this can be accomplished and if flight test data exists to substantiate such a reduction.

GSM 85(A) Units with Ball Bearing, no Idler Pulley

This determination method is applicable to the following GSM 85(A) part numbers:

- 011-01436-( ) (except -07 and -08)
- 011-00894-01
- 011-00894-04
- 011-00894-05
- 011-00894-06
- 011-00894-09
- 011-00894-11
- 011-00894-14

The allowable limits of the test results can be determined as follows:

- Upper limit = Nominal Slip Clutch Setting * 1.120
- Lower limit = Nominal Slip Clutch Setting * 0.942

GSM 85(A) Units with Ball Bearing, with Idler Pulley

This determination method is applicable to the following GSM 85(A) part numbers:

- 011-01436-07
- 011-01436-08
- 011-00894-12

The allowable limits of the test results can be determined as follows:

- Upper limit = Nominal Slip Clutch Setting * 1.030
- Lower limit = Nominal Slip Clutch Setting * 0.867

GSM 85(A) Units with Bronze Bearing, no Idler Pulley

This determination method is applicable to the following GSM 85(A) part numbers:

- 011-00894-00
- 011-00894-07
- 011-00894-08
- 011-00894-10

The allowable limits of the test results can be determined as follows:

- Upper limit = Nominal Slip Clutch Setting * 1.181
- Lower limit = Nominal Slip Clutch Setting * 1.036

GSM 85(A) Units with Bronze Bearing, with Idler Pulley

This determination method is applicable to the following GSM 85(A) part numbers:

- 011-00894-02

The allowable limits of the test results can be determined as follows:

- Upper limit = Nominal Slip Clutch Setting * 1.087
- Lower limit = Nominal Slip Clutch Setting * 0.953

9.6.1 Abnormal Test Message Prompts

The following prompts may be displayed indicating an abnormality encountered during testing. Use the following guidelines to troubleshoot the problem.

Message Prompt	Probable Cause	Action
STOP NOT REACHED	The servo did not detect a torque value which exceeded 70% of the established mechanical torque limit within 1 minute of starting the test. A low slip clutch setting is the probable cause.	a. Repeat test. b. If the same result is received, remove servo mount and check/set clutch on stand.
SERVO TORQUE TOO HIGH	The servo detected an average torque value which exceeded 130% of the established mechanical torque limit. Probable causes include a high slip clutch setting, or excess friction encountered during the control surface travel.	a. Engage the autopilot for the axis which reported torque too high. Manually operate the controls and verify that the clutch can be overridden. If the clutch can slip, repeat the test again. Otherwise remove the servo mount and reset the clutch. b. Check control friction against aircraft maintenance specifications. c. If the same result is received on retest, remove servo mount and check/set clutch on stand.

SERVO TORQUE TOO LOW	The servo detected an average torque value which fell below 70% of the established mechanical torque limit after detecting that the stop was reached. Likely causes include a low slip clutch setting or a disturbance in the controls before reaching the stop.	Repeat test again. If the same result is received, remove servo mount and check/set clutch on stand.
INVALID SERVO SPEED	The servo is unable to maintain the required ~2.5 RPM during the test (Speed drops below 2 RPM or exceeds 3 RPM)	a. Repeat test again. b. If the same result is received, remove servo mount and check/set clutch on stand.
TEST SPEED FAIL	Servo has not responded to the test initialization command.	a. Repeat test again. b. If message does not clear, troubleshoot the servo and it's wiring for the source of the failure. c. Repeat test when the source of the servo failure has been corrected.
SERVO TEST TIMED OUT	Servo not responding for over 60 seconds during testing.	
SERVO DATA TIMED OUT	The servo has failed to transmit load cell sensor status.	
LOAD CELL INVALID	A special test monitor has detected an inequality between motor torque and load cell torque greater than the specified threshold. An out-of-calibration load cell may be the cause.	Replace servo motor and repeat test.
AIRBORNE STATUS	The G1000 system has detected airborne status, (determined by true airspeed) and has cancelled the test.	a. Verify the ADC is online. b. Check pitot/static system is free of obstructions and plumbing kinks. c. Repeat test.

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. Table 9-2 provides the criteria and associated action for altitude inspection.

Table 9-2. GDC RVSM Altitude Inspection Criteria

Inspection Pressure-Altitude (ft)	Error, |x| (ft) at Inspection	Action for associated Error
29,000	x ≤ 40	No action
	40 < x ≤ 120	Use Field Calibration Tool (see Section 2.7.3)
	120 < x	Replace unit
35,000	x ≤ 40	No action
	40 < x ≤ 120	Use Field Calibration Tool
	120 < x	Return unit to Garmin
41,000	x ≤ 40	No action
	40 < x ≤ 120	Use Field Calibration Tool
	120 < x	Return unit to Garmin

9.8 CATEGORY B LONG TERM POWER INTERRUPT ANNUAL INSPECTION PROCEDURE

NOTE

Refer to the GDU 104X Installation Manual for part numbers and mod levels.

NOTE

Loading “GDU Backup Cap Test Software" (006-B0380-15) to the GDUs temporarily changes the GDU software version. The system must be returned the system to the currently approved system software version and configuration following the Long Term Power Interrupt Test.

NOTE

For GDU software greater than version 8.20 (but excluding GDU software versions 9.11 through 9.15) 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.

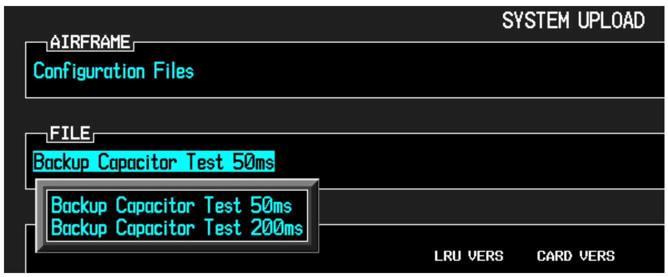


Figure 9-2. System Upload Page

Figure 9-3. Upload 'Complete' Window

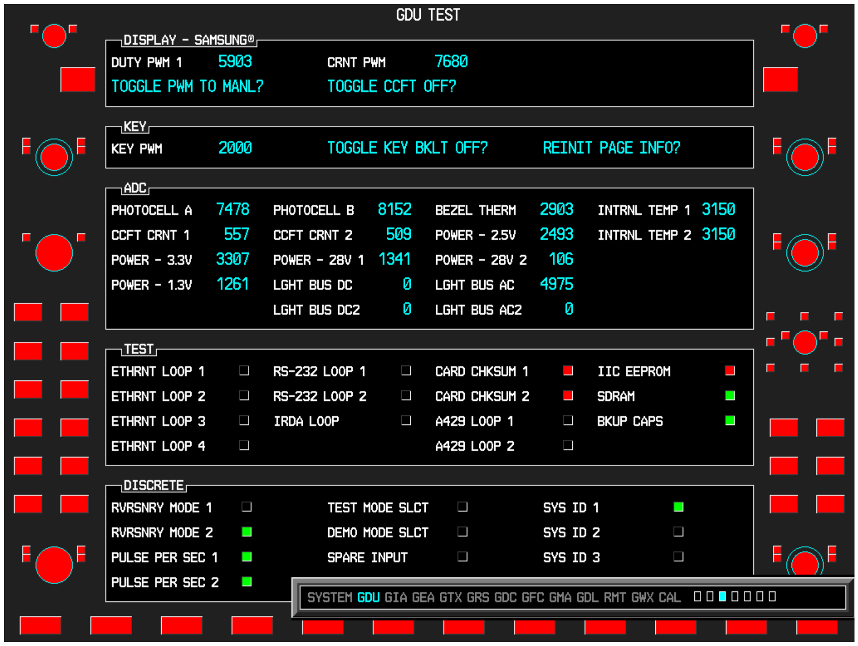


Figure 9-4. BKUP CAPS Checkbox on GDU TEST Page

Blank Page

SECTION 10
SYSTEM RECONFIGURATION

The initial G1000 software upload and configuration took place at the time of installation as described in the installation manual. Section 7 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 a G1000 system if it becomes necessary.

Software part numbers and software versions are not listed in this section, for actual software versions and part numbers exist in OEM controlled maintenance documentation.

Perform system reconfiguration only after talking with Garmin Field Service to find out if there is an alternate solution to a problem. System reconfiguration is a last resort when all other troubleshooting efforts have been exhausted.

This section is organized as follows:

- System Reconfiguration Overview
- System Reconfiguration Procedure
    - MFD and PFD Software Load
    - System Software Upload
    - Main Loader Card *Possible* Options (not a complete list):
        - KR87 ADF Installation Option
        - Artex C406-N ELT Installation Option
        - FDR / CVR Installation Option
        - KN 63 DME Option
        - GDL 69A Installation Option
        - Dual GTX 33 Installation Option
        - GWX 68 Installation Option
        - HF Installation Option
        - KRA 405B RA Installation Option
        - KTA 870 TAS Installation Option
        - TKS Installation Option
        - WX 500 Installation Option
        - Skywatch Option

- Enable/Unlock Card Options:
  - Terrain-Synthetic Vision (SVT)
  - TAWS
  - ChartView
- Final Configuration Items:
  - Aircraft Registration Number Entry

- Software Load Confirmation
- Navigation Databases
  - Dual Navigation Database Feature
- Other G1000 Databases
- Software/Configuration Troubleshooting

10.1 SYSTEM RECONFIGURATION OVERVIEW

Figure B-1 gives a generic overview of the software/configuration sequence for the system.

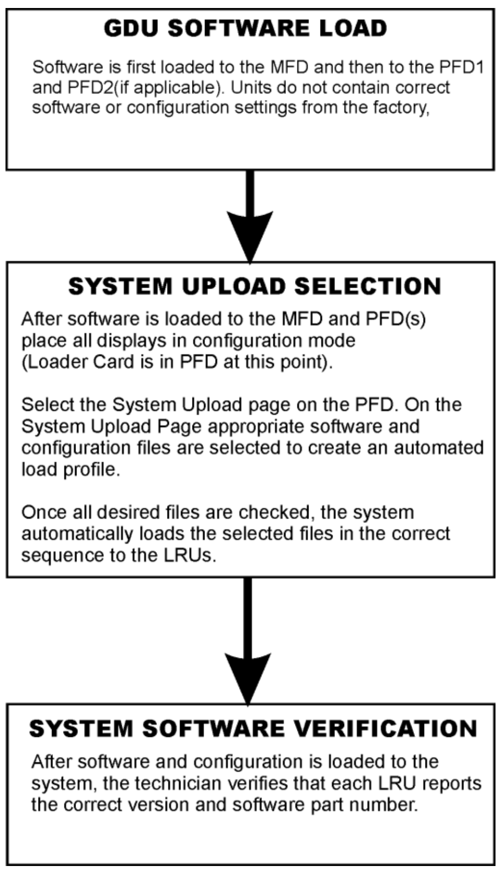


Figure 10-1. Generic Software/Configuration Sequence Overview

10.2 SYSTEM RECONFIGURATION PROCEDURE

NOTES

Connect a ground power unit to the aircraft for software loading. Do not rely on only the aircraft batteries to prevent loss of power during the software loading process. DO NOT REMOVE POWER FROM THE SYSTEM WHEN LOADING SOFTWARE. Remove power only when told to do so by the procedure. As a general rule, all displays should be in the same mode (configuration or normal), unless instructed differently.

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

10.2.1 MFD and PFD Software Load (Two Display)

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. Place Loader Card in Top Slot of the MFD.
3. While holding the ENT key on the MFD, restore power by closing the MFD circuit breaker.
4. When the words INITIALIZING SYSTEM appear in the upper left corner of MFD release the ENT key. The Software Loader Card should be inserted before applying power.
5. Press the YES softkey to acknowledge the 'Initializing System' prompt.
6. Repeat the steps above for the PFD.

10.2.2 MFD and PFD Software Load (Three Display)

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. Place Loader Card in Top Slot of Display.
3. While holding the ENT key on PFD #2, restore power by closing the PFD #2 circuit breaker. Softkey 12 may also be held during power-up to place the GDU in configuration mode (This is necessary if the GDU model does not contain an 'ENT' key).
4. When the words INITIALIZING SYSTEM appear in the upper left corner of PFD #2, release the ENT key. The Software Loader Card should be inserted before applying power.
5. Press the YES softkey to acknowledge the 'Initializing System' prompt:
6. New software is loaded to PFD #2. When complete, PFD #2 starts in configuration mode.
7. Remove power to PFD #2 by pulling the PFD #2 circuit breaker.
8. Remove the Software/Configuration card loader from PFD #2 and insert it into the top card slot on the MFD. Repeat Steps 2 through 6 for the MFD.
9. When MFD update is complete, it starts in the configuration mode.
10. Remove power to the MFD by pulling the MFD circuit breaker.
11. Remove the Software/Configuration card loader from the MFD and insert it into the top card slot on PFD #1. Repeat Steps 2 through 6 for PFD #1.
12. While holding down the ENT key or Softkey 12 on the MFD, restore power to the MFD by closing the MFD circuit breaker.
13. While holding down the ENT key on PFD2, restore power to PFD2 by closing the PFD2 circuit breaker.

NOTE

For the rest of the software/configuration procedure, do not operate the MFD while loading software or configuration unless specifically instructed to do so. A failed or cancelled load may result.

10.2.3 Initial G1000 Software and Configuration Upload

1. Select the SYSTEM UPLOAD page using the FMS knob.
2. Activate the cursor and highlight the appropriate airframe in the AIRFRAME field.
3. Press the ENT key.
4. Highlight the appropriate baseline upload in the FILE field. See the aircraft documentation for appropriate files to upload.
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. Verify that each step of the baseline upload completes with a green "PASS" indication.

10.2.4 Optional Systems Configuration

This section describes the steps that must be completed in order to configure the system with optional equipment.

NOTE

If the configuration for an optional system is inadvertently loaded for a system that is NOT installed, the aircraft configuration files must be reloaded. For example, if the ADF option is loaded, and the aircraft is not equipped with an ADF, the default configuration files (not software files) must be reloaded. All optional systems must then be reconfigured after reloading the default configuration files.

Enabling Locked Features

The following features must be re-enabled via enable/unlock cards after loading airframe configuration (additional unlockable features may apply that are not listed below. See aircraft maintenance documentation for applicable unlockable features):

- SVT
- TAWS-A, TAWS-B
- Chartview

NOTE

SD/Unlock Card part numbers are not listed in this manual. For part numbers refer to the OEM maintenance documentation.

Synthetic Vision Technology (SVT) Configuration

The Garmin Synthetic Vision Technology feature requires GDU software version 9.01 or later to be installed with the aircraft software/configuration image prior to activation.

Generic Unlock Procedure

Follow the procedure below if the aircraft being updated is equipped with options. Skip this procedure if the aircraft is not equipped with these options. **The same procedure is used for all of the options.**

1. Insert Options (SVT, TAWS, etc.) Card into the top slot of PFD1.
2. While holding the ENT key on PFD1, apply power by closing PFD1 circuit breaker.
3. When the words 'INITIALIZING SYSTEM' appear in the upper left corner of the PFD, release the ENT key.
4. Repeat steps 2 and 3 for the MFD and PFD2 (if installed).
5. On the PFD, select 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 applicable 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. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the upload complete confirmation.
9. View the SUMMARY field and ensure that the item is 'COMPLETE'.
10. De-activate the cursor.
11. Cycle power to all displays to reboot the system.

NOTE

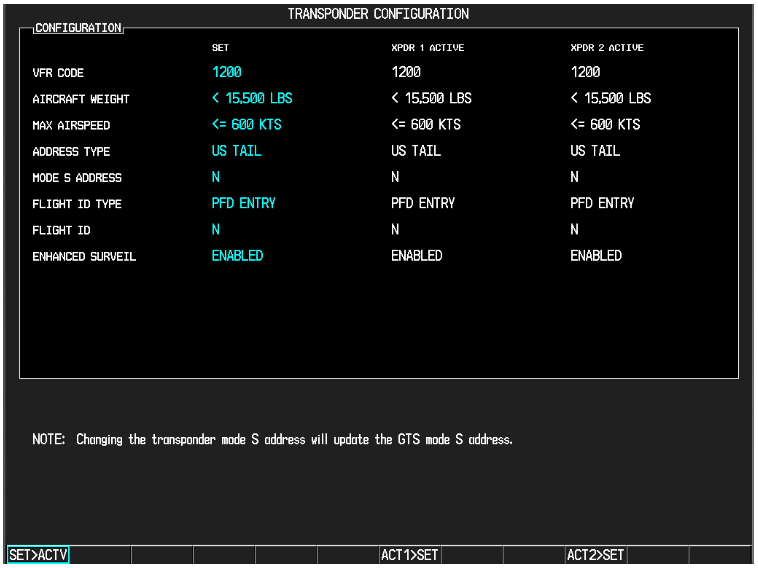
When the SVS option is enabled for the first time (normally at the OEM aircraft factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the SVS unlock card from ever being used to activate the SVS feature in other G1000 systems. The unlock card is forever tied to the specific aircraft in which it was used for the first time. This card MUST be kept with the aircraft for situations where SVS must be re-activated.

NOTE

SVS does not need to enabled on each display – only PFD1 as with TAWS and Chartview. The other displays need to be in configuration mode.

10.2.5 Final Configuration Items

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. The default setting for ‘FLIGHT ID TYPE’ is ‘PFD ENTRY’ (see figure above) under the ‘SET’ and ‘ACTIVE’ columns. Refer to the OEM aircraft Pilot’s Guide for instructions on entering a flight ID from the PFD (note: PFD entry is not the default for some airframes (this can be set in configuration).
4. Activate the cursor and highlight the ‘FLIGHT ID’ field. Use the small/large FMS knob to enter the aircraft registration number.
5. Once the correct registration number is entered, press the ENT key.
6. The transponder is configuring:

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

8. 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 ‘MODE S 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.

10.2.6 Software Load Confirmation

1. Select the SYSTEM STATUS page using the FMS knob and activate the cursor.
2. Highlight the specified items in the LRU window and verify the software part numbers and versions against the ones listed in the front of this manual.
3. De-activate the cursor.
4. Remove the OEM aircraft specific card loader from the PFD top slot and set aside.

NOTE

If any software version and/or part number does not match, or is not successfully loaded, do not continue with post-installation procedures. Troubleshoot and resolve the issue before continuing.

LRU	SW OK	LRU	SW OK
PFD1	_____	GTX1 – GIA1	_____
PFD2	_____	GTX2 – GIA2	_____
MFD1	_____	GEA1 – GIA1	_____
GIA1	_____	GEA2 – GIA2	_____
GIA2	_____	GDC1 – GIA1	_____
COM1	_____	GDC2 – GIA2	_____
COM2	_____	GMU1	_____
COM2	_____	GMU2	_____
GRS1 – GIA1	_____	NAV1	_____
GRS2 – GIA2	_____	NAV2	_____
GMA1 – GIA1	_____	GPS1	_____
GMA2 – GIA2	_____	GPS2	_____
GMC – PFD1	_____	GDL	_____
GCU	_____	GWX	_____
GSA	_____	Cert Gains	_____
GSD	_____		

10.2.7 Navigation Databases

Features

G1000 systems with GDU software version 10.0 and above may utilize the following database features:

Dual Navigation Database Support: the GDU is able to store an upcoming navigation database on the bottom SD card so that the system can automatically load it to replace the active database when the new database becomes effective.

Automatic Database Synchronization: the G1000 is able to automatically check all databases stored on the bottom SD cards in each GDU and transfer the most recent cycle of each database to any cards that do not have the most recent cycle. This gives users the option of downloading database updates to the database card from only one GDU and letting the system synchronize the updates to the cards on the other GDU(s).

See the Garmin Pilot's Guide for complete details regarding these features.

NOTE

Use only blank SD cards to load the Navigation Database into the GDUs. Do not copy the navigation database onto 010-00330-42 (or -43) 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.

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

NOTE

Do not load the Navigation Database to a Supplemental Database Card to load into the displays. SD cards used for loading the navigation database are formatted differently (FAT) than the Supplemental Database cards (FAT32). This may corrupt the Supplemental Database Card rendering it unusable. Replacing corrupted cards are not covered under warranty.

To Upload the Navigation Database:

NOTE

The following steps are used by both traditional loading of the NAV DB and by the dual NAV DB (to load the backup DB; GDU 10.0). If the synch feature is also enabled, this only needs to be performed on one GDU. Otherwise, it needs to be performed on all GDUs.

1. With the G1000 system off, insert the navigation database SD Card into the top card slot of PFD2.
2. Turn the G1000 system on. The following prompt is displayed in the upper left corner of PFD2:
3. Press the ENT key to confirm the database update. The update screen is displayed.
4. After the update completes, PFD2 starts in normal mode. Remove the navigation database update SD Card from PFD2.
5. Power the G1000 system down.
6. Repeat steps 1 through 4 for the MFD. On the MFD, pressing the ENT key will not work. Press the YES Softkey.
7. Repeat steps 1 through 4 for PFD1.
8. Confirm that the correct update cycle and version is loaded during startup of the MFD.

10.2.8 Other G1000 Databases

Terrain/Obstacle/SafeTaxi®/FliteCharts® Database Cards

There is no unlock card required for Garmin FliteCharts®. A single cycle of Garmin FliteCharts® is loaded on the database cards when they are manufactured at Garmin. Additional FliteChart® database updates are obtained directly from Garmin's web site and are updated on a periodic basis. The system automatically detects the FliteChart® databases and activates the display feature. Once Jepp ChartView is unlocked the system will make use of the Jepp data and will not display FliteChart® data or version.

1. Remove power from the PFD and MFD using the respectively labeled breakers.
2. Remove the Garmin software loader card.
3. Insert two Terrain/Obstacle/SafeTaxi®/FliteChart® database cards into the bottom slots of each GDU. Refer to the appropriate OEM aircraft drawing for correct database card part numbers.

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 updates 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.

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.

AOPA Airport Directory Database

The Aircraft Owners and Pilots Association (AOPA) Airport Directory database offers detailed information regarding services, hours of operation, lodging options, and more. This information is viewed on the Airport Information Page by selecting the INFO Softkey until INFO-2 is displayed. The AOPA Airport Directory database is revised four times per year. Check fly.garmin.com for the current database. The Airport Directory is always available for use after the expiration date. When turning on the system, the Power-up Page indicates whether the databases are current, out of date, or not available. The AOPA Airport Directory database should be copied to the Garmin supplied Supplemental Data Card which will reside in the bottom card slot of the MFD.

10.3 Software/Configuration Troubleshooting

System Communication Hierarchy

The following criteria must be satisfied to be able to perform the following desired options. If not successful, perform the troubleshooting described in the following tables.

Desired Operation	Criteria for Success
Load Software to MFD or PFD Displays	• G1000 SW Loader Card must be inserted in top slot for each display to be loaded. • CLR & ENT softkey# 12 must be held during power up of display. • Power only one display on at a time during software loading.
Load AIRFRAME, SYSTEM, MFD1, PFD1, PFD2, MANIFEST, and ALERTS configuration files	• G1000 SW Loader Card must be inserted in top slot of PFD #1. • PFDs and MFD must be powered on. • PFDs and MFD must have correct software.

Load Software/Configuration files to GIA 63Ws	• G1000 SW Loader Card must be inserted in top slot of PFD #1. • G1000 system must be powered on. • PFDs and MFD must have correct software. • PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MFD1, PFD1, and PFD2 configuration files.
Load Software/Configuration files to: - GMA 1347X, 1 and 2 - GDC 74X 1and 2 - GEA 71, 1 and 2 - GRS 77 (software only) 1and 2 - GMU 44 (software only) 1 and 2 - GTX 33, 1 and 2 - GSA -GMC 710 -GWX 68 - GDL 69A - GSD 41 - GTS 8XX - GMC 7XX - GSA 8X	• G1000 must be powered on. • Aircraft specific card loader must be inserted into PFD #1 top slot. • PFDs and MFD must have correct software and configuration settings. • GIA 63Xs must have correct software. • GIA 63Xs must be successfully configured with GIA1 and GIA2 configuration files. • Data paths to each LRU must be operational.

Problem	Solutions
MFD or PFD displays do not power up	• Ensure that the criteria listed in 10.3.1 are fulfilled for the applicable situation. • Ensure power is present at display backshell connector. • Replace display.
Software file load fails:  	• Ensure that criteria listed in 10.3.1 are fulfilled for the applicable situation. • 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.
Configuration file load fails:  	• Ensure that criteria listed in 10.3.1 are fulfilled for the applicable situation. • 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.

Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode:  	• 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. Note: this also requires that the manifest configuration be reloaded for any optional uploads that apply to the aircraft.
Optional Equipment (ADF, TAS, radar altimeter, WX500, etc.) does not work.	• Load optional config file to enable G1000 to interface with the optional unit. See 4.3 for optional equipment installation instructions. • If optional equipment still does not operate, reference optional equipment documentation for further troubleshooting.
"SYN VIS" softkey does not appear on PFD softkey tier.	• Verify that the PFD and MFD software versions are shown to be 9.01 or above by checking the AUX – System Status Page on the MFD. • If version 9.01 or above software is installed in the MFD and PFD, follow the steps in Section 2.1 to reactivate the SVS/Pathways feature.

3D terrain presentation does not appear on PFD.	• Verify that P/N 010-00442-43 terrain data cards are installed in the lower slot of the PFD and MFD. • Verify that the alert messages shown in Table B-1 are not displayed on the PFD Alerts Window. If so, follow the solutions described in Table B-1. • Verify that the G1000 AHRS, and heading data are valid on the PFD. • Verify that a valid GPS 3D position solution is being received. • If a terrain database update has just been performed, allow the system time to initialize and verify the data. When the databases have been verified, the current database cycle and version are reported on the MFD AUX – System Status page.

The following table provides SVS specific alert messages which may appear in the Alerts Window on the PFD (press the ALERTS softkey on the PFD to view the Alerts Window):

Table B-1. SVS-Related Alert Messages

Failure Message	Cause	Solution
SVS – SVS DISABLED: Out of available terrain region.	SVS is disabled because the aircraft exceeded the boundaries of the loaded terrain database.	Ensure that operations are within the required geographic area.
SVS – SVS DISABLED: Terrain DB resolution too low	SVS is disabled because a 9 Arc-Second or better database is not currently loaded.	Ensure the P/N 010-00330-43 Terrain Cards are installed in the lower slot of each display. If terrain data has been recently updated, ensure that the correct 9 Arc-Second databases were used.

APPENDIX A

LRU PIN LISTS

This section provides example LRU pin lists for the G1000.

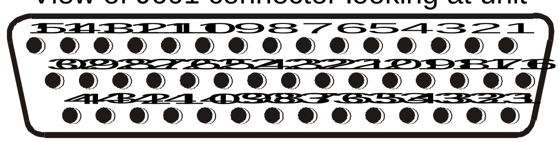
NOTE

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 $\overline{\text{INTERLOCK}}$” on installation wiring diagrams.

A.1 GIA 63/W

P601 (COM)

View of J601 connector looking at unit

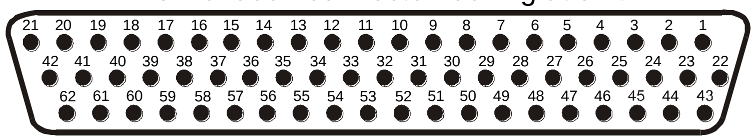


Pin	Pin Name	I/O
1	RESERVED (UNSQUELCHED AUDIO TEST)	--
2	RESERVED (COM IF AGC TEST)	--
3	RESERVED (SQUELCH/COMPRESSOR TEST)	--
4	COM MIC KEY*	In
5	INTERCOM MIC IN HI	In
6	INTERCOM MIC IN LO (GROUND)	--
7	COM MIC AUDIO IN HI	In
8	COM MIC AUDIO IN LO (GROUND)	--
9	COM 500Ω AUDIO OUT HI	Out
10	COM 500Ω AUDIO OUT LO (GROUND)	--
11	TRANSMIT INTERLOCK*	In
12	COM REMOTE TRANSFER*	In
13	COM DIGITAL AUDIO OUT	Out
14	ON-SIDE COM MIC DIGITAL AUDIO IN	In
15	SIGNAL GROUND	--
16	COM REMOTE POWER OFF	In
17	AIRCRAFT POWER 1	In
18	SPARE (CROSS-SIDE COM MIC DIGITAL AUDIO IN (GIA 63W -20 ONLY))	--
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 (REMOTE CONTROL OUT)	--
29	RESERVED (REMOTE CONTROL IN)	--
30	POWER GROUND	--
31	POWER GROUND	--
32	RESERVED (COM RS-232 OUT 1 (REMOTE TUNE))	--
33	RESERVED (COM RS-232 IN 1 (REMOTE TUNE))	--
34	RESERVED (COM REMOTE TUNE ENABLE*)	--
35	RESERVED (COM AUDIO IN HI)	--
36	RESERVED (COM AUDIO IN LO (GROUND))	--
37	RESERVED (VOR/LOC AUDIO IN HI)	--
38	RESERVED (VOR/LOC AUDIO IN LO (GROUND))	--
39	RESERVED (AUX AUDIO IN HI)	--
40	RESERVED (AUX AUDIO IN LO (GROUND))	--
41	RESERVED (SUMMED 4Ω AUDIO OUT HI)	--
42	RESERVED (SUMMED 4Ω AUDIO OUT LO (GROUND))	--
43	POWER GROUND	--
44	POWER GROUND	--

P602 (VOR/ILS)

View of J602 connector looking at unit

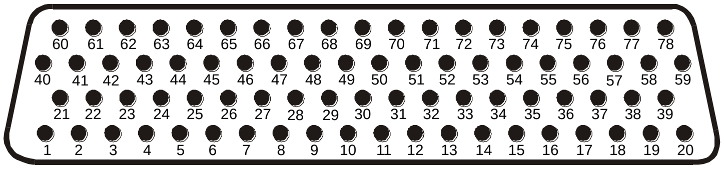


Pin	Pin Name	I/O
1	VOR/LOC +TO	Out
2	VOR/LOC +FROM (VOR/LOC COMMON)	--
3	VOR/LOC +FLAG	Out
4	VOR/LOC -FLAG (VOR/LOC COMMON)	--
5	VOR/LOC +LEFT	Out
6	VOR/LOC +RIGHT (VOR/LOC COMMON)	--
7	RESERVED	--
8	VOR/LOC COMPOSITE OUT	Out
9	VOR OBS ROTOR C	Out
10	VOR OBS ROTOR H (GROUND)	--
11	VOR OBS STATOR E (VOR/LOC 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	KING SERIAL DME REQUEST	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	GLIDESLOPE COMPOSITE OUT	Out
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

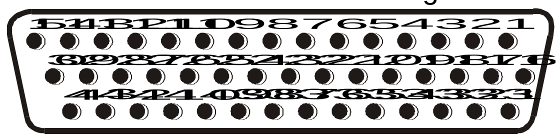


Pin	Pin Name	I/O
1	RESERVED	--
2	ETHERNET OUT A	Out
3	ETHERNET OUT B	Out
4	RS-485 4 A	I/O
5	RS-485 4 A	I/O
6	RS-485 4 B	I/O
7	RS-485 4 B	I/O
8	MAIN ARINC 429 IN 3 A	In
9	MAIN ARINC 429 IN 3 B	In
10	MAIN ARINC 429 IN 4 A	In
11	MAIN ARINC 429 IN 4 B	In
12	MAIN ARINC 429 IN 5 A	In
13	MAIN ARINC 429 IN 5 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

GIA 63/W, 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

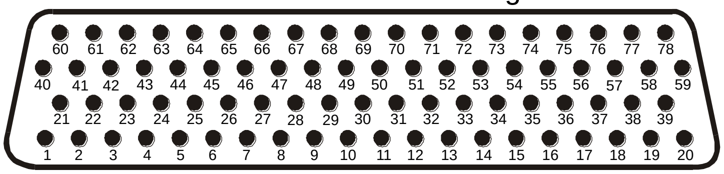


Pin	Pin Name	I/O
1	ANNUNCIATE* 22	Out
2	VOICE ALERT 500Ω AUDIO OUT HI	Out
3	VOICE ALERT 500Ω AUDIO OUT LO (GROUND)	--
4	DISCRETE IN 13	In
5	DISCRETE IN 14	In
6	ANNUNCIATE* 1	Out
7	DISCRETE IN* 1	In
8	DISCRETE IN* 2	In
9	DISCRETE IN* 3	In
10	DISCRETE IN 15	In
11	AP DISCONNECT IN	In
12	DISCRETE IN* 4	In
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

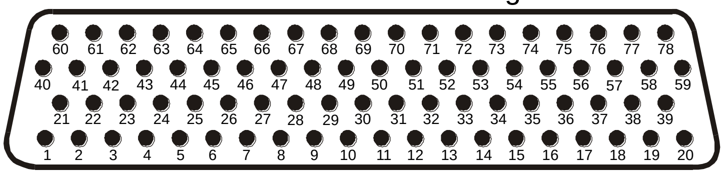


Pin	Pin Name	I/O
1	RADAR ALTIMETER DC HI	In
2	RADAR ALTIMETER DC LO	In
3	DISCRETE IN 18A	In
4	SPARE	--
5	SPARE	--
6	SPARE	--
7	SPARE	--
8	FLIGHT DIRECTOR PITCH +UP	In
9	FLIGHT DIRECTOR PITCH +DOWN	In
10	FLIGHT DIRECTOR ROLL +RIGHT	In
11	FLIGHT DIRECTOR ROLL +LEFT	In
12	DISCRETE IN 19A	In
13	POTENTIOMETER 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

GIA 63/W, 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



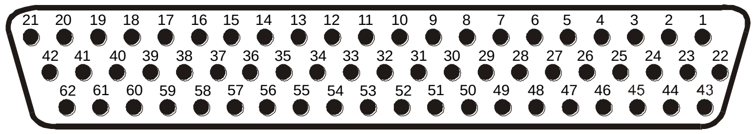
Pin	Pin Name	I/O
1	26 VAC VERTICAL GYRO REF HI	In
2	26 VAC VERTICAL GYRO REF LO	In
3	26 VAC ADF REF HI	In
4	26 VAC ADF REF LO	In
5	26 VAC AFCS REF HI	In
6	26 VAC AFCS REF LO	In
7	DIRECTIONAL GYRO MOTOR A	In
8	DIRECTIONAL GYRO MOTOR B	In
9	SIGNAL GROUND	--
10	ADF X/COS	In
11	ADF Y/SIN	In
12	ADF Z (GROUND)	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

GIA 63/W, 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 10XX/1500

P10001

View of J10001 connector from back of unit



Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
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	--
21	RESERVED	--
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	--

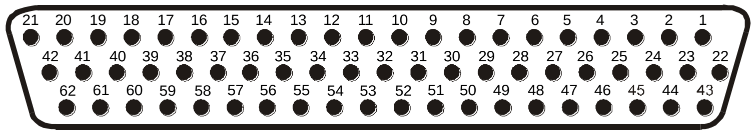
39	AIRCRAFT POWER 2	In
40	SIGNAL GROUND	--
41	AIRCRAFT POWER 2	In
42	SIGNAL GROUND	--

GDU 10XX/1500, 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	--
49	UNIT 4 REMOTE POWER OFF	--
50	UNIT 3 REMOTE POWER OFF	--
51	UNIT 2 REMOTE POWER OFF	--
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	--

A.3 GDU 10XX/1500 (Ethernet/Video Upgrade)

P10001 (refer to the 10XX Installation Manual for applicable part numbers)

View of J10001 connector from back of unit



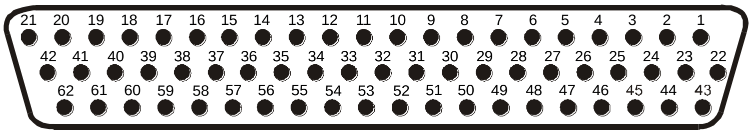
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	Out
2	ETHERNET OUT 1 A	Out
3	ETHERNET OUT 1 B	Out
4	ETHERNET IN 1 A	In
5	ETHERNET IN 1 B	In
6	ETHERNET OUT 2 A	Out
7	ETHERNET OUT 2 B	Out
8	ETHERNET IN 2 A	In
9	ETHERNET IN 2 B	In
10	ETHERNET OUT 3 A	Out
11	ETHERNET OUT 3 B	Out
12	ETHERNET IN 3 A	In
13	ETHERNET 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	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	--

GDU 10XX/1500, 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	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.4 GDU 12XX

P12001

View of J12001 connector from back of unit



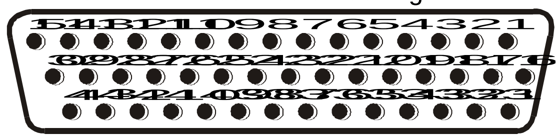
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	ETHERNET OUT 1 A	Out
3	ETHERNET OUT 1 B	Out
4	ETHERNET IN 1 A	In
5	ETHERNET IN 1 B	In
6	ETHERNET OUT 2 A	Out
7	ETHERNET OUT 2 B	Out
8	ETHERNET IN 2 A	In
9	ETHERNET IN 2 B	In
10	ETHERNET OUT 3 A	Out
11	ETHERNET OUT 3 B	Out
12	ETHERNET IN 3 A	In
13	ETHERNET IN 3 B	In
14	SPARE DISCRETE IN*	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	--

GDU 12XX, 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.5 GRS 77

P771

View of J771 connector looking at unit



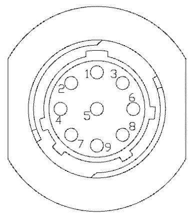
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	AHRS SYSTEM ID PROGRAM* 1	In
3	AHRS SYSTEM ID PROGRAM* 2	In
4	RESERVED	--
5	SPARE	--
6	GPS 2 RS-232 IN	In
7	RESERVED	--
8	SPARE RS-232 IN 1	In
9	MAGNETOMETER POWER OUT	Out
10	MAGNETOMETER RS-232 OUT	Out
11	GPS 1 RS-232 IN	In
12	ARINC 429 OUT 3 A	Out
13	ARINC 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	--
9	MAGNETOMETER RS-485 IN B	In

40	MAGNETOMETER GROUND	--
41	SIGNAL GROUND	--
42	SIGNAL GROUND	--
43	SIGNAL GROUND	--
44	SIGNAL GROUND	--

A.6 GMU 44

P441

View of J441 connector looking at pigtail

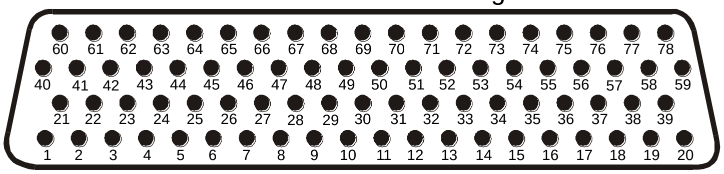


Pin	Pin Name	I/O
1	SIGNAL GROUND	--
2	RS-485 OUT B	Out
3	SIGNAL GROUND	--
4	RS-485 OUT A	Out
5	SPARE	--
6	POWER GROUND	--
7	SPARE	--
8	RS-232 IN	In
9	+12 VDC POWER	In

A.7 GDC 74X

P741

View of J741 connector looking at unit



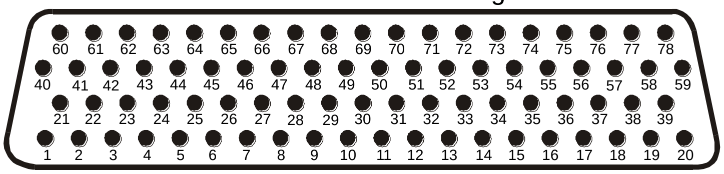
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	OAT PROBE POWER OUT	Out
3	OAT PROBE IN HI	In
4	OAT PROBE IN LO	In
5	SIGNAL GROUND	--
6	ADC SYSTEM ID PROGRAM* 1	In
7	SIGNAL GROUND	--
8	DISCRETE IN* 6	In
9	SIGNAL GROUND	--
10	RS-232 IN 1	In
11	RS-232 OUT 1	Out
12	SIGNAL GROUND	--
13	RS-232 IN 2	In
14	RS-232 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

GDC 74A/B, 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.8 GEA 71

P701

View of J701 connector looking at unit

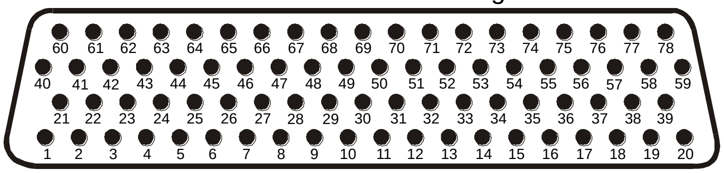


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	DIGITAL IN* 1	In
3	DIGITAL IN* 2	In
4	SIGNAL GROUND	--
5	RS-485 1 A	I/O
6	RS-485 1 B	I/O
7	RS-485 2 A	I/O
8	RS-485 2 B	I/O
9	GEA SYSTEM ID PROGRAM* 1	In
10	GEA SYSTEM ID PROGRAM* 2	In
11	TRANSDUCER POWER OUT LO (GROUND)	--
12	TRANSDUCER POWER OUT LO (GROUND)	--
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
8	ENGINE TEMP ANALOG IN 5 LO	In

GEA 71, 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



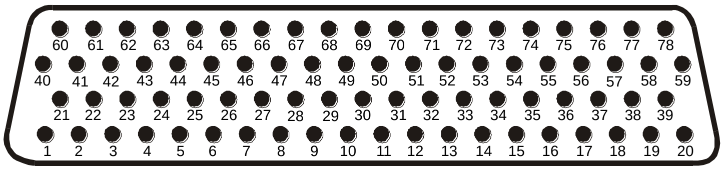
Pin	Pin Name	I/O
1	ANNUNCIATE* 1A	Out
2	ANNUNCIATE* 2A	Out
3	ANNUNCIATE* 3A	Out
4	ANNUNCIATE* 4A	Out
5	ANNUNCIATE* 5A	Out
6	ANNUNCIATE* 6A	Out
7	ANNUNCIATE* 7A	Out
8	ANNUNCIATE* 8A	Out
9	ANNUNCIATE* 9A	Out
10	ANNUNCIATE* 10A	Out
11	TRANSDUCER POWER OUT LO (GROUND)	--
12	TRANSDUCER POWER OUT LO (GROUND)	--
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	--

GEA 71, 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.9 GMA 1347X

P3471

View of J3471 connector from back of unit

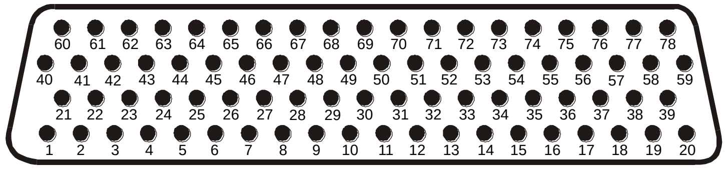


Pin	Pin Name	I/O
1	FAIL SAFE PILOT SUMMED AUDIO OUT HI (GMA 1347D) FAIL SAFE WARN AUDIO IN (GMA 1347)	Out In
2	OXYGEN MASK MIC SELECT* (GMA 1347D) RESERVED (GMA 1347)	In --
3	TEL RINGER AUDIO IN HI	In
4	TEL RINGER AUDIO IN LO	In
5	REMOTE PASS ICS OUT HI	Out
6	ON-SIDE NAV AUDIO IN HI	In
7	ON-SIDE COM 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 1 IN LEFT	In
18	MUSIC 1 IN 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
6	ADF AUDIO IN LO	In

GMA 1347/D, Connector P3471, continued		
Pin	**Pin Name**	**I/O**
37	MUSIC 1 IN 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 2 IN LEFT	In
57	MUSIC 2 IN 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 2 IN 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



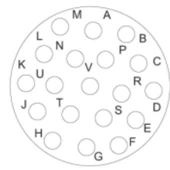
Pin	Pin Name	I/O
1	RESERVED	--
2	RESERVED	--
3	PROGRAM GROUND	--
4	RECORDER PLAY* (GMA 1347) RESERVED (GMA 1347D)	In --
5	PROGRAM GROUND	--
6	RS-232 OUT 1	Out
7	RS-232 IN 1	In
8	ON-SIDE COM MIC DIGITAL AUDIO OUT	Out
9	ON-SIDE COM DIGITAL AUDIO IN	In
10	RESERVED	--
11	PROGRAM GROUND	--
12	RESERVED	--
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 1347/1347D -20) RESERVED (GMA 1347D -00)	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 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	--

GMA 1347/D, 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 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 1347D -20) AIRWAY/INNER MARKER EXT LAMP OUT (GMA 1347/1347D -00)	Out Out
75	MIDDLE MARKER EXT LAMP OUT	Out
76	OUTER MARKER EXT LAMP OUT	Out
77	COCKPIT CALL SELECT* (GMA 1347D -20) RESERVED (GMA 1347/1347D -00)	In --
78	MARKER ANTENNA HI	In

A.10 GSA 8X

P801

View of J801 connector looking at unit

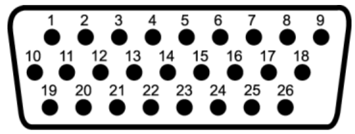


Pin	Pin Name	I/O
A	SPARE	--
B	SPARE	--
C	SPARE	--
D	SPARE	--
E	RS-485 2 B	I/O
F	SERVO PROGRAM 3	In
G	SERVO PROGRAM 2	In
H	SERVO PROGRAM 1	In
J	RS-485 1 A	I/O
K	SPARE	--
L	SPARE	--
M	SPARE	--
N	AIRCRAFT POWER	In
P	AP DISCONNECT	In
R	PROGRAM GROUND	
S	RS-485 2 A	I/O
T	RS-485 1 B	I/O
U	PROGRAM GROUND	
V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

A.11 GTA 82

P821

View of J821 connector looking at unit

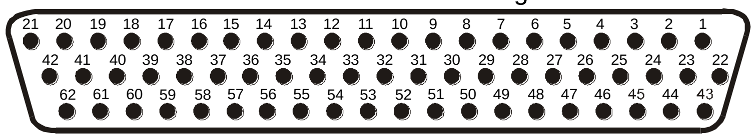


Pin	Pin Name	I/O
1	MANUAL TRIM CW*	In
2	AIRCRAFT POWER	In
3	POWER GROUND	--
4	SERVO ENABLE 1	In
5	AP DISCONNECT	In
6	SERVO PROGRAM 1	In
7	SERVO PROGRAM 2	In
8	SERVO PROGRAM 3	In
9	MOTOR CW	Out
10	MANUAL TRIM ARM*	In
11	MANUAL TRIM CCW*	In
12	RESERVED	--
13	RESERVED	--
14	RESERVED	--
15	RESERVED	--
16	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.12 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	--

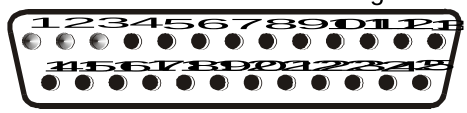
39	RESERVED	--
40	SPARE	--
41	CURRENT TEMPERATURE PROBE OUT	Out
42	AIRCRAFT POWER 1	In

GTX 33/D, 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.13 GTX 32

P3271

View of J3271 connector looking at unit

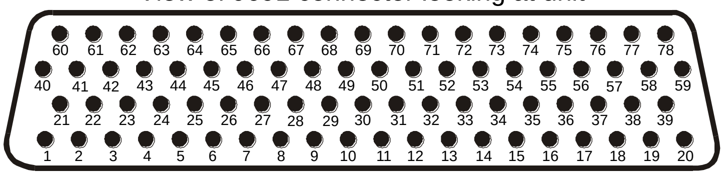


Pin	Pin Name	I/O
1	XPDR REMOTE POWER OFF	In
2	RS-232 IN 2	In
3	ALTITUDE A1	In
4	ALTITUDE C2	In
5	ALTITUDE A2	In
6	ALTITUDE A4	In
7	ALTITUDE C4	In
8	EXTERNAL IDENT SELECT*	In
9	ALTITUDE B1	In
10	ALTITUDE C1	In
11	ALTITUDE B2	In
12	ALTITUDE B4	In
13	POWER GROUND	--
14	SWITCHED POWER OUT	Out
15	AIRCRAFT POWER 1	In
16	EXTERNAL STANDBY SELECT*	In
17	EXTERNAL SUPPRESSION I/O	I/O
18	ALTITUDE D4	In
19	RS-232 IN 1	In
20	RS-232 OUT 1	Out
21	RESERVED	--
22	SQUAT SWITCH	In
23	AIRCRAFT POWER 2	In
24	RS-232 OUT 2	Out
25	SIGNAL GROUND	--

A.14 GDL 69X

P691

View of J691 connector looking at unit



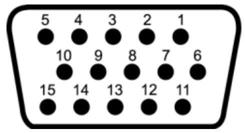
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RS-232 OUT 2	Out
3	RS-232 OUT 3	Out
4	SIGNAL GROUND	--
5	RS-232 IN 2	In
6	RS-232 IN 3	In
7	RESERVED	--
8	RESERVED	--
9	DATA LINK SYSTEM ID PROGRAM* 1	In
10	DATA LINK SYSTEM ID PROGRAM* 2	In
11	SIGNAL GROUND	--
12	SPARE	--
13	SIGNAL GROUND	--
14	SPARE	--
15	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	--

GDL 69/69A, 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	(LINE) AUDIO OUT 2 LO (SPARE FOR GDL 69)	Out
53	(LINE) AUDIO OUT 2 RIGHT (SPARE FOR GDL 69)	Out
54	(LINE) AUDIO OUT 2 LEFT (SPARE FOR GDL 69)	Out
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.15 GMC 705/710/715

P7101

View of J7101 connector looking at unit

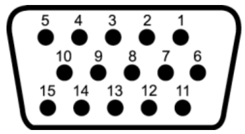


Pin	Pin Name	I/O
1	RS-232 OUT 1	Out
2	RS-232 IN 1	In
3	RS-232 OUT 2	Out
4	RS-232 IN 2	In
5	POWER GROUND	--
6	SIGNAL GROUND	--
7	AIRCRAFT POWER 1	In
8	SIGNAL GROUND	--
9	AIRCRAFT POWER 2	In
10	CONTROL UNIT REMOTE POWER OFF	In
11	LIGHTING BUS HI	In
12	LIGHTING BUS LO	In
13	RESERVED	--
14	RESERVED	--
15	POWER GROUND	--

A.16 GCU 475/476/477/478

P4751

View of J4751 connector looking at unit

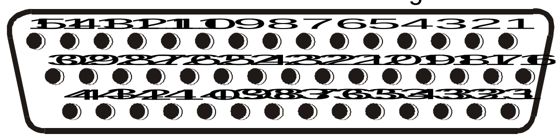


Pin	Pin Name	I/O
1	RS-232 OUT 1	Out
2	RS-232 IN 1	In
3	RS-232 OUT 2	Out
4	RS-232 IN 2	In
5	POWER GROUND	--
6	SIGNAL GROUND	--
7	AIRCRAFT POWER 1	In
8	SIGNAL GROUND	--
9	AIRCRAFT POWER 2	In
10	CONTROL UNIT REMOTE POWER OFF	In
11	LIGHTING BUS HI	In
12	LIGHTING BUS LO	In
13	RESERVED	--
14	RESERVED	--
15	POWER GROUND	--

A.17 GWX 68

P400

View of J400 connector looking at unit



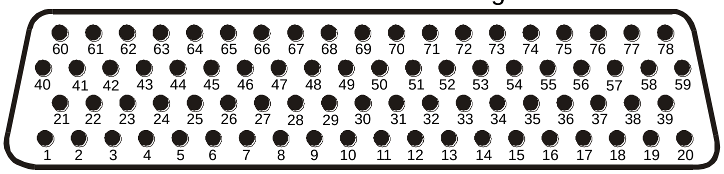
Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RESERVED	--
3	RESERVED	--
4	ARINC 453 OUT A	Out
5	ARINC 453 OUT B	Out
6	RESERVED	--
7	AIRCRAFT POWER 1	In
8	RESERVED	--
9	AIRCRAFT POWER 1	In
10	AIRCRAFT POWER 2	In
11	RESERVED	--
12	AIRCRAFT POWER 2	In
13	POWER GROUND	--
14	RESERVED	--
15	POWER GROUND	--
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

A.18 GSD 41

P411

View of J411 connector looking at unit

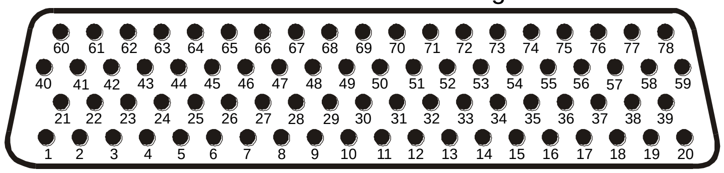


Pin	Pin Name	I/O
1	RESERVED	--
2	ETHERNET IN 1 B	In
3	ETHERNET IN 1 A	In
4	ETHERNET OUT 1 B	Out
5	ETHERNET OUT 1 A	Out
6	ETHERNET IN 2 B	In
7	ETHERNET IN 2 A	In
8	ETHERNET OUT 2 B	Out
9	ETHERNET OUT 2 A	Out
10	ETHERNET IN 3 B	In
11	ETHERNET IN 3 A	In
12	ETHERNET OUT 3 B	Out
13	ETHERNET OUT 3 A	Out
14	ETHERNET IN 4 B	In
15	ETHERNET IN 4 A	In
16	ETHERNET OUT 4 B	Out
17	ETHERNET OUT 4 A	Out
18	DISCRETE IN* 1	In
19	DISCRETE IN* 2	In
20	DISCRETE IN* 3	In
21	RESERVED	--
22	MAIN1 ARINC 429 IN 1 A	In
23	MAIN1 ARINC 429 IN 1 B	In
24	MAIN1 ARINC 429 IN 2 A	In
25	MAIN1 ARINC 429 IN 2 B	In
26	MAIN1 ARINC 429 IN 3 A	In
27	MAIN1 ARINC 429 IN 3 B	In
28	MAIN1 ARINC 429 IN 4 A	In
29	MAIN1 ARINC 429 IN 4 B	In
30	MAIN1 ARINC 429 IN 5 A	In
31	MAIN1 ARINC 429 IN 5 B	In
32	MAIN1 ARINC 429 IN 6 A	In
33	MAIN1 ARINC 429 IN 6 B	In
34	MAIN1 ARINC 429 IN 7 A	In
35	MAIN1 ARINC 429 IN 7 B	In
36	MAIN1 ARINC 429 IN 8 A	In
37	MAIN1 ARINC 429 IN 8 B	In
38	DISCRETE IN* 4	In

GSD 41, Connector P411, continued		
Pin	**Pin Name**	**I/O**
39	DISCRETE IN* 5	In
40	RESERVED	--
41	DISCRETE IN* 6	In
42	DISCRETE IN* 7	In
43	DISCRETE IN* 8	In
44	DISCRETE IN* 9	In
45	DISCRETE IN* 10	In
46	POWER GROUND	--
47	POWER GROUND	--
48	SIGNAL GROUND	--
49	SIGNAL GROUND	--
50	SIGNAL GROUND	--
51	DISCRETE IN* 11	In
52	DISCRETE IN* 12	In
53	DISCRETE IN* 13	In
54	DISCRETE IN* 14	In
55	DISCRETE IN* 15	In
56	DISCRETE IN* 16	In
57	DISCRETE IN* 17	In
58	DISCRETE IN* 18	In
59	DISCRETE IN* 19	In
60	RESERVED	--
61	DISCRETE IN* 20	In
62	DISCRETE IN* 21	In
63	DISCRETE IN* 22	In
64	DISCRETE IN* 23	In
65	DISCRETE IN* 24	In
66	MAIN1 ARINC 429 OUT 4 A	Out
67	MAIN1 ARINC 429 OUT 4 B	Out
68	AIRCRAFT POWER 1	In
69	GSD SYSTEM ID PROGRAM* 1	In
70	GSD SYSTEM ID PROGRAM* 2	In
71	AIRCRAFT POWER 2	In
72	MAIN1 ARINC 429 OUT 1 A	Out
73	MAIN1 ARINC 429 OUT 1 B	Out
74	MAIN1 ARINC 429 OUT 2 A	Out
75	MAIN1 ARINC 429 OUT 2 B	Out
76	MAIN1 ARINC 429 OUT 3 A	Out
77	MAIN1 ARINC 429 OUT 3 B	Out
78	GSD REMOTE POWER OFF	In

P412

View of J412 connector looking at unit



Pin	Pin Name	I/O
1	MAIN2 RS-485/RS-422 1 A	I/O
2	MAIN2 RS-485/RS-422 1 B	I/O
3	MAIN2 RS-485/RS-422 2 A	I/O
4	MAIN2 RS-485/RS-422 2 B	I/O
5	MAIN2 RS-485/RS-422 3 A	I/O
6	MAIN2 RS-485/RS-422 3 B	I/O
7	MAIN2 RS-485/RS-422 4 A	I/O
8	MAIN2 RS-485/RS-422 4 B	I/O
9	MAIN2 RS-485/RS-422 5 A	I/O
10	MAIN2 RS-485/RS-422 5 B	I/O
11	MAIN2 RS-485/RS-422 6 A	I/O
12	MAIN2 RS-485/RS-422 6 B	I/O
13	MAIN2 RS-485/RS-422 7 A	I/O
14	MAIN2 RS-485/RS-422 7 B	I/O
15	MAIN2 RS-485/RS-422 8 A	I/O
16	MAIN2 RS-485/RS-422 8 B	I/O
17	MAIN2 RS-485/RS-422 9 A	I/O
18	MAIN2 RS-485/RS-422 9 B	I/O
19	MAIN2 RS-485/RS-422 10 A	I/O
20	MAIN2 RS-485/RS-422 10 B	I/O
21	MAIN2 RS-485/RS-422 11 A	I/O
22	MAIN2 RS-485/RS-422 11 B	I/O
23	MAIN2 RS-485/RS-422 12 A	I/O
24	MAIN2 RS-485/RS-422 12 B	I/O
25	MAIN2 RS-485/RS-422 13 A	I/O
26	MAIN2 RS-485/RS-422 13 B	I/O
27	MAIN2 RS-485/RS-422 14 A	I/O
28	MAIN2 RS-485/RS-422 14 B	I/O
29	MAIN2 ARINC 429 OUT 4 A	Out
30	MAIN2 ARINC 429 OUT 4 B	Out
31	DISCRETE IN* 20A	In
32	DISCRETE IN* 21A	In
33	DISCRETE IN* 1A	In
34	DISCRETE IN* 2A	In
35	DISCRETE IN* 3A	In
36	DISCRETE IN* 4A	In
37	DISCRETE IN* 5A	In
38	DISCRETE IN* 6A	In
39	DISCRETE IN* 7A	In

GSD 41, Connector P412, continued		
Pin	**Pin Name**	**I/O**
40	DISCRETE IN 8A	In
41	DISCRETE IN 9A	In
42	DISCRETE IN 10A	In
43	DISCRETE IN 11A	In
44	DISCRETE IN 12A	In
45	DISCRETE IN 13A	In
46	DISCRETE IN 14A	In
47	DISCRETE IN 15A	In
48	SIGNAL GROUND	--
49	SIGNAL GROUND	--
50	SIGNAL GROUND	--
51	MAIN2 ARINC 429 IN 1 A	In
52	MAIN2 ARINC 429 IN 1 B	In
53	MAIN2 ARINC 429 IN 2 A	In
54	MAIN2 ARINC 429 IN 2 B	In
55	MAIN2 ARINC 429 IN 3 A	In
56	MAIN2 ARINC 429 IN 3 B	In
57	MAIN2 ARINC 429 IN 4 A	In
58	MAIN2 ARINC 429 IN 4 B	In
59	DISCRETE IN 16A	In
60	MAIN2 ARINC 429 IN 5 A	In
61	MAIN2 ARINC 429 IN 5 B	In
62	MAIN2 ARINC 429 IN 6 A	In
63	MAIN2 ARINC 429 IN 6 B	In
64	MAIN2 ARINC 429 IN 7 A	In
65	MAIN2 ARINC 429 IN 7 B	In
66	MAIN2 ARINC 429 OUT 1 A	Out
67	MAIN2 ARINC 429 OUT 1 B	Out
68	DISCRETE IN 17A	In
69	MAIN2 ARINC 429 OUT 2 A	Out
70	MAIN2 ARINC 429 OUT 2 B	Out
71	DISCRETE IN 18A	In
72	MAIN2 ARINC 429 OUT 3 A	Out
73	MAIN2 ARINC 429 OUT 3 B	Out
74	MAIN2 ARINC 717 IN 1 A	In
75	MAIN2 ARINC 717 IN 1 B	In
76	MAIN2 ARINC 717 OUT 1 A	Out
77	MAIN2 ARINC 717 OUT 1 B	Out
78	DISCRETE IN 19A	In

A.19 GRT 10

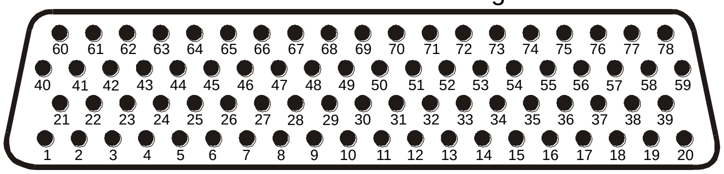
P101

Pin	Pin Name	I/O
1	SPARE	--
2	RS-232 OUT	Out
3	RS-232 IN	In
4	SIGNAL GROUND	--
5	SPARE	--
6	SPARE	--
7	POWER GROUND	--
8	AIRCRAFT POWER	In
9	VOLUME LOCK ENABLE*	In

A.20 GDL 59

P591

View of J591 connector looking at unit



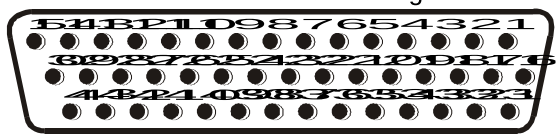
Pin	Pin Name	I/O
1	USER ETHERNET OUT 5 A	Out
2	USER ETHERNET IN 5 A	In
3	AVIONICS ETHERNET OUT 2 A	Out
4	AVIONICS ETHERNET IN 2 A	In
5	USER ETHERNET OUT 3 A	Out
6	USER ETHERNET IN 3 A	In
7	USER ETHERNET OUT 4 A	Out
8	USER ETHERNET IN 4 A	In
9	AVIONICS ETHERNET OUT 1 A	Out
10	AVIONICS ETHERNET IN 1 A	In
11	SIGNAL GROUND	--
12	SPARE	--
13	IRIDIUM AUDIO IN 2 HI	In
14	IRIDIUM AUDIO OUT 2 HI	Out
15	IRIDIUM AUDIO IN 1 HI	In
16	IRIDIUM AUDIO OUT 1 HI	Out
17	AUDIO SYSTEM 2 AUDIO IN HI	In
18	AUDIO SYSTEM 2 AUDIO OUT HI	Out
19	AUDIO SYSTEM 1 AUDIO IN HI	In
20	AUDIO SYSTEM 1 AUDIO OUT HI	Out
21	USER ETHERNET OUT 5 B	Out
22	USER ETHERNET IN 5 B	In
23	AVIONICS ETHERNET OUT 2 B	Out
24	AVIONICS ETHERNET IN 2 B	In
25	USER ETHERNET OUT 3 B	Out
26	USER ETHERNET IN 3 B	In
27	USER ETHERNET OUT 4 B	Out
28	USER ETHERNET IN 4 B	In
29	AVIONICS ETHERNET OUT 1 B	Out
30	AVIONICS ETHERNET IN 1 B	In
31	SIGNAL GROUND	--
32	IRIDIUM AUDIO IN 2 LO	In
33	IRIDIUM AUDIO OUT 2 LO	Out
34	IRIDIUM AUDIO IN 1 LO	In
35	IRIDIUM AUDIO OUT 1 LO	Out
36	AUDIO SYSTEM 2 AUDIO IN LO	In

GDL 59, Connector P591, continued		
Pin	**Pin Name**	**I/O**
37	AUDIO SYSTEM 2 AUDIO OUT LO	Out
38	AUDIO SYSTEM 1 AUDIO IN LO	In
39	AUDIO SYSTEM 1 AUDIO OUT LO	Out
40	RESERVED (USB DATA HI)	--
41	RESERVED	--
42	RESERVED	--
43	RESERVED	--
44	SIGNAL GROUND	--
45	SIGNAL GROUND	--
46	SIGNAL GROUND	--
47	RESERVED	--
48	AIRCRAFT POWER 2	In
49	AIRCRAFT POWER 2	In
50	RESERVED	--
51	SIGNAL GROUND	--
52	POWER GROUND	--
53	POWER GROUND	--
54	POWER GROUND	--
55	POWER GROUND	--
56	IRIDIUM 1 STATUS DISCRETE* IN	In
57	SPARE	--
58	RESERVED	--
59	POTS HANDSET RING	I/O
60	RESERVED	--
61	RESERVED	--
62	RESERVED	--
63	RS-232 OUT 1	Out
64	RS-232 IN 1	In
65	RS-232 OUT 2	Out
66	RS-232 IN 2	In
67	RS-232 OUT 3	Out
68	RS-232 IN 3	In
69	RESERVED	--
70	RESERVED	--
71	AIRCRAFT POWER 1	In
72	AIRCRAFT POWER 1	In
73	IRIDIUM 1 REMOTE POWER ON*	Out
74	IRIDIUM 2 REMOTE POWER ON*	Out
75	DATA LINK REMOTE POWER OFF	In
76	IRIDIUM 2 STATUS DISCRETE* IN	In
77	RESERVED	--
78	POTS HANDSET TIP	I/O

A.21 GSR 56

P561

View of J561 connector looking at unit

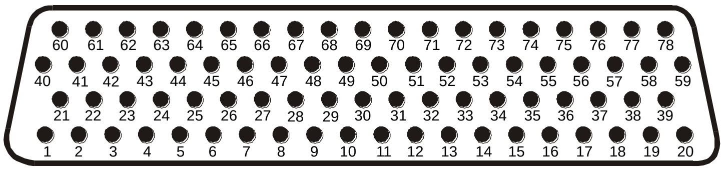


Pin	Pin Name	I/O
1	AUDIO OUT HI	Out
2	AUDIO OUT LO	Out
3	POWER GROUND	--
4	AUDIO IN HI	In
5	AUDIO IN LO	In
6	POWER GROUND	--
7	RESERVED	--
8	RESERVED	--
9	RESERVED	--
10	RESERVED	--
11	SIGNAL GROUND	--
12	RS-232 OUT	Out
13	RS-232 IN	In
14	SIGNAL GROUND	--
15	RESERVED	--
16	IRIDIUM REMOTE POWER ON*	In
17	POWER GROUND	--
18	RESERVED	--
19	POWER GROUND	--
20	RESERVED	--
21	HEATER POWER	In
22	HEATER 1 HI	--
23	POWER GROUND	--
24	SPARE	--
25	RESERVED	--
26	RESERVED	--
27	RESERVED	--
28	RESERVED	--
29	RESERVED	--
30	RESERVED	--
31	STATUS DISCRETE* OUT	Out
32	AIRCRAFT POWER 1	In
33	AIRCRAFT POWER 1	In
34	AIRCRAFT POWER 2	In
35	AIRCRAFT POWER 2	In
36	HEATER POWER	In
37	HEATER 2 HI	--

38	HEATER 1 LO	--
39	RESERVED	--
40	RESERVED	--
41	RESERVED	--
42	RESERVED	--
43	SIGNAL GROUND	--
44	RESERVED	--

A.22 GTS 8XX
P8001 (Digital)

View of J8001 connector from back of unit

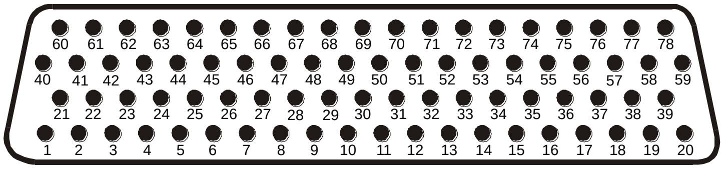


Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	--
2	RS-232 OUT 1	Out
3	RS-232 IN 1	In
4	SIGNAL GROUND	--
5	RS-232 OUT 2	Out
6	RS-232 IN 2	In
7	SIGNAL GROUND	--
8	RS-232 OUT 3	Out
9	RS-232 IN 3	In
10	SIGNAL GROUND	--
11	RS-232 OUT 4	Out
12	RS-232 IN 4	In
13	SIGNAL GROUND	--
14	ARINC 429 OUT 1 A	Out
15	ARINC 429 OUT 1 B	Out
16	ARINC 429 IN 1 A	In
17	ARINC 429 IN 1 B	In
18	SIGNAL GROUND	--
19	GPS PPS 1 IN	In
20	SIGNAL GROUND	--
21	CONFIG MODULE POWER OUT	Out
22	SIGNAL GROUND	--
23	ARINC 429 OUT 2 A	Out
24	ARINC 429 OUT 2 B	Out
25	ARINC 429 IN 2 A	In
26	ARINC 429 IN 2 B	In
27	SIGNAL GROUND	--
28	ARINC 429 OUT 3 A	Out
29	ARINC 429 OUT 3 B	Out
30	ARINC 429 IN 3 A	In
31	ARINC 429 IN 3 B	In
32	SIGNAL GROUND	--
33	ARINC 429 OUT 4 A	Out
34	ARINC 429 OUT 4 B	Out
35	ARINC 429 IN 4 A	In
36	ARINC 429 IN 4 B	In
37	RS-422 IN A	In
38	RS-422 IN B	In

Connector P8001, continued		
Pin	**Pin Name**	**I/O**
39	SIGNAL GROUND	--
40	CONFIG MODULE DATA	I/O
41	SIGNAL GROUND	--
42	ARINC 429 OUT 5 A	Out
43	ARINC 429 OUT 5 B	Out
44	ARINC 429 IN 5 A	In
45	ARINC 429 IN 5 B	In
46	SIGNAL GROUND	--
47	ARINC 429 OUT 6 A	Out
48	ARINC 429 OUT 6 B	Out
49	ARINC 429 IN 6 A	In
50	ARINC 429 IN 6 B	In
51	SIGNAL GROUND	--
52	ETHERNET OUT A	Out
53	ETHERNET OUT B	Out
54	ETHERNET IN A	Out
55	ETHERNET IN B	Out
56	SIGNAL GROUND	--
57	RS-422 OUT A	Out
58	RS-422 OUT B	Out
59	SIGNAL GROUND	--
60	CONFIG MODULE CLOCK	Out
61	TOP PA/LNA DATA RS-422 OUT A	Out
62	TOP PA/LNA DATA RS-422 OUT B	Out
63	TOP PA/LNA DATA RS-422 IN A	In
64	TOP PA/LNA DATA RS-422 IN B	In
65	RESERVED	--
66	RESERVED	--
67	RESERVED	--
68	RESERVED	--
69	SPARE	--
70	SPARE	--
71	SPARE	--
72	SPARE	--
73	GPS PPS IN 2 HI	In
74	GPS PPS IN 2 LO	In
75	USB VBUS POWER	In
76	USB DATA HI	I/O
77	USB DATA LO	I/O
78	USB GROUND	--

P8002 (Analog/Discrete)

View of J8002 connector from back of unit



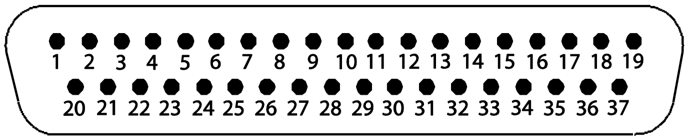
Pin	Pin Name	I/O
1	SIGNAL GROUND	--
2	RESERVED	--
3	RESERVED	--
4	RESERVED	--
5	SIGNAL GROUND	--
6	AIR/GROUND*	In
7	SPARE	--
8	TRAFFIC DISPLAY 1 STATUS VALID*	In
9	TRAFFIC DISPLAY 2 STATUS VALID*	In
10	GEAR DOWN AND LOCKED*	In
11	TA INHIBIT* 1	In
12	TA INHIBIT* 2	In
13	RESERVED	--
14	SELF TEST INHIBIT PROGRAM*	In
15	TA INTRUDER DISPLAY LIMIT 16 PROGRAM *	In
16	TA INTRUDER DISPLAY LIMIT 8 PROGRAM *	In
17	TA INTRUDER DISPLAY LIMIT 4 PROGRAM *	In
18	TA INTRUDER DISPLAY LIMIT 2 PROGRAM *	In
19	TA INTRUDER DISPLAY LIMIT 1 PROGRAM *	In
20	RESERVED	In
21	SIGNAL GROUND	--
22	RESERVED	--
23	RESERVED	--
24	RESERVED	--
25	RESERVED	--
26	RESERVED	--
27	RESERVED	--
28	RESERVED	--
29	RESERVED	--
30	RESERVED	--
31	RESERVED	--
32	RESERVED	--
33	RESERVED	--
34	RESERVED	--
35	RESERVED	--
36	RESERVED	--
37	RESERVED	--
38	RESERVED	--
39	SIGNAL GROUND	--
40	SIGNAL GROUND	--
41	HEADING X HI	In

Connector P8002, continued		
Pin	**Pin Name**	**I/O**
42	HEADING X LO (GROUND)	--
43	SIGNAL GROUND	--
44	HEADING Y HI	In
45	HEADING Y LO (GROUND)	--
46	SIGNAL GROUND	--
47	SPARE	--
48	EXTERNAL SUPPRESSION I/O	I/O
49	SIGNAL GROUND	--
50	TA DISPLAY ENABLE*	Out
51	AURAL TA ALERT*	Out
52	SPARE	--
53	VISUAL TA ALERT*	Out
54	TRAFFIC SYSTEM STATUS VALID*	Out
55	RESERVED	--
56	RESERVED	--
57	SIGNAL GROUND	--
58	ALERT AUDIO OUT HI	Out
59	ALERT AUDIO OUT LO	Out
60	HEADING Z HI (GROUND)	In
61	HEADING Z LO (GROUND)	--
62	SIGNAL GROUND	--
63	26 VAC HEADING REF HI	In
64	26 VAC HEADING REF LO	In
65	SIGNAL GROUND	--
66	RESERVED	--
67	RESERVED	--
68	HEADING VALID	In
69	HEADING VALID*	In
70	SIGNAL GROUND	--
71	ANALOG RADAR ALTIMETER HI	In
72	ANALOG RADAR ALTIMETER LO	In
73	SIGNAL GROUND	--
74	SELF TEST INITIALIZE SELECT*	In
75	TRAFFIC OPERATE/STANDBY*	In
76	ANALOG RADAR ALTIMETER VALID	In
77	SPARE	--
78	SIGNAL GROUND	--

An asterisk (*) following a signal name denotes that the signal is Active Low.

P8003 (Power Supply)

View of J8003 connector from back of unit

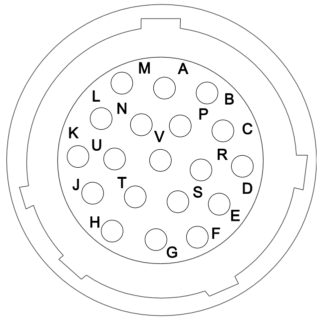


Pin	Pin Name	I/O
1	POWER GROUND	--
2	AIRCRAFT POWER 1	In
3	AIRCRAFT POWER 1	In
4	AIRCRAFT POWER 2	In
5	AIRCRAFT POWER 2	In
6	POWER GROUND	--
7	+6 VDC PA/LNA POWER OUT	Out
8	+6 VDC PA/LNA POWER OUT	Out
9	RESERVED	--
10	RESERVED	--
11	POWER GROUND	--
12	+35 VDC PA/LNA POWER OUT	Out
13	+35 VDC PA/LNA POWER OUT	Out
14	POWER GROUND	--
15	-5 VDC PA/LNA POWER OUT	Out
16	-5 VDC PA/LNA POWER OUT	Out
17	POWER GROUND	--
18	TRAFFIC SYSTEM REMOTE POWER ON*	In
19	POWER GROUND	--
20	POWER GROUND	--
21	POWER GROUND	--
22	POWER GROUND	--
23	POWER GROUND	--
24	POWER GROUND	--
25	POWER GROUND	--
26	POWER GROUND	--
27	POWER GROUND	--
28	POWER GROUND	--
29	POWER GROUND	--
30	POWER GROUND	--
31	POWER GROUND	--
32	POWER GROUND	--
33	POWER GROUND	--
34	POWER GROUND	--
35	POWER GROUND	--
36	TRAFFIC SYSTEM REMOTE POWER OFF	In
37	POWER GROUND	--

An asterisk (*) following a signal name denotes that the signal is Active Low.

GPA 65 Pin Function List (P651)

View of J651 connector from back of unit



Pin	Pin Name	I/O
A	POWER GROUND	--
B	+35 VDC POWER IN	In
C	POWER GROUND	--
D	RESERVED	--
E	-5 VDC POWER IN	In
F	PA/LNA DATA RS-422 OUT B	Out
G	PA/LNA DATA RS-422 OUT A	Out
H	PA/LNA DATA RS-422 IN B	In
J	PA/LNA DATA RS-422 IN A	In
K	POWER GROUND	--
L	+6 VDC POWER IN	In
M	+35 VDC POWER IN	In
N	RESERVED	--
P	+6 VDC POWER IN	In
R	RESERVED	--
S	-5 VDC POWER IN	In
T	RESERVED	--
U	RESERVED	--
V	RESERVED	--

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