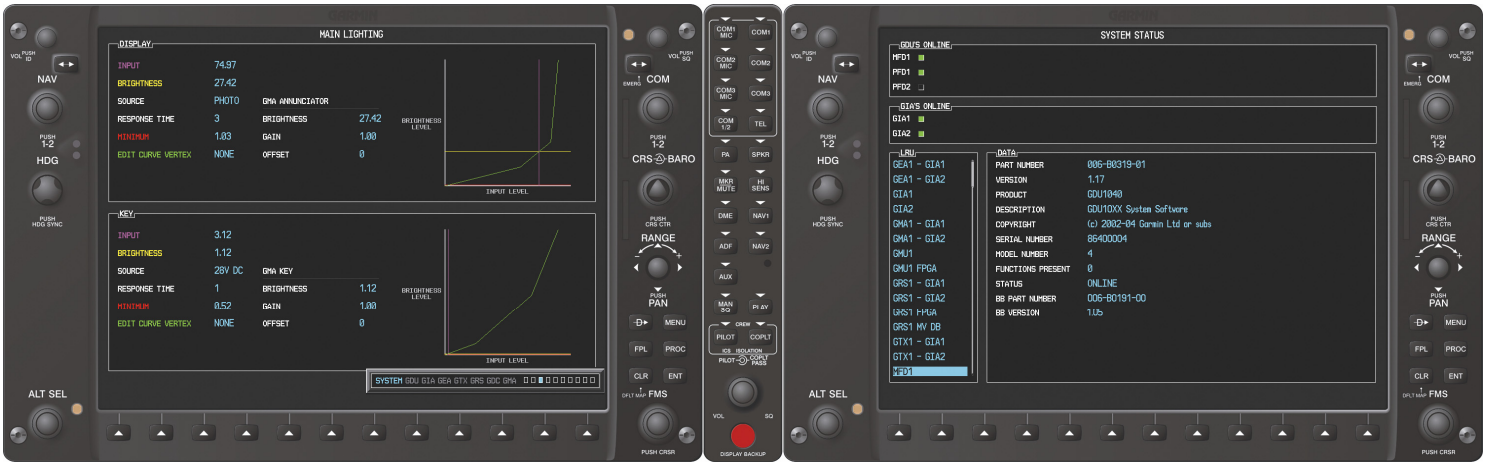
G1000 System Maintenance Manual

Diamond DA 40



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RECORD OF REVISIONS

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2	6/17/04	Update for STC	26291
3	6/21/04	Update AW Limitations, Add Document Pagination Table.	26344
4	8/24/04	Update for new GTX 33 SW	27110
5	9/3/04	Update for optional KAP 140 AFCS	27244
6	1/25/07	Update GDC Testing Process	42752

DOCUMENT PAGINATION

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WARNING

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CAUTION

The GDU 1040s use a lens coated with a special anti-reflective coating that 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.

CAUTION

All G1000 screen shots used in this document are current at the time of publication. Screen shots are intended to provide visual reference only. All information depicted in screen shots, including software file names, versions and part numbers, is subject to change and may not be up to date.

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1 INTRODUCTION

1.1 Content, Scope, Purpose

This document provides Instructions for Continued Airworthiness (ICA) for the Garmin G1000 Integrated Cockpit avionics suite as installed in the Diamond Model DA 40 in accordance with the STC issued under FAA STC SA01254WI. This document satisfies the requirements for continued airworthiness as defined by 14 CFR Part 23.1529 and Appendix G. Information in this document is required to maintain the continued airworthiness of the G1000 integrated cockpit system, as installed in the Diamond DA 40.

1.1.1 Applicability

This document applies to all Diamond Aircraft Industries, Inc., Model DA 40 aircraft equipped with the G1000 cockpit installed in accordance with the STC issued under FAA STC SA01254 "original issue" configuration. G1000 System Maintenance Manual – Diamond DA40 190-00545-00 applies to later configurations.

1.2 Organization

The following outline briefly describes the organization of this manual:

Section 2: System Description
Provides a complete description of the type design change associated with installing the G1000 integrated cockpit system in the Diamond DA 40. An overview of the G1000 system interface is also provided.

Section 3: G1000 Control & Operation
Presents basic control and operation information specifically tailored to maintenance practices. Basic G1000 Configuration Mode operation is also described.

Section 4: G1000 Continued Airworthiness
Provides maintenance instructions for continued airworthiness of the G1000 system.

Section 5: Troubleshooting
Provides troubleshooting information to aid in diagnosing and resolving potential problems with the G1000 system.

Section 6: G1000 Equipment Removal & Replacement
Gives instructions for the removal and replacement of G1000 equipment.

Section 7: G1000 Equipment Configuration & Testing
Gives instructions for loading software, configuring, and testing of G1000 equipment.

Section 8: System Return to Service Procedure
Specifies return-to-service procedures to be performed upon completion of maintenance of the G1000 system.

Appendix A: Installation Data
Gives a complete equipment/parts list and weight/balance data for the G1000 installation in the Diamond DA 40.

Appendix B: G1000 Software/Configuration Procedure
Provides a complete software/configuration loading procedure in cases where the G1000 system as a whole requires complete software/configuration update or reload. This is given in addition to individual LRU configuration instructions presented in Section 7.

1.3 Definitions/Abbreviations

ADI: Attitude Display Indicator

AHRS: Attitude Heading Reference System

AMM: Airplane Maintenance Manual

CDU: Control Display Unit

CFR: Code of Federal Regulations

EAU: Engine/Airframe Unit

EIS: Engine Instrumentation Systems

HIRF: High Intensity Radiated Fields

HSDB: High-Speed Data Bus (Ethernet)

IAU: Integrated Avionics Unit

ICS: Inter-Com System

LRU: Line Replaceable Unit

MFD: Multi-Function Flight Display

OAT: Outside Air Temperature

PFD: Primary Flight Display

STC: Supplemental Type Certificate

S/W: Software

TC: Type Certificate

TSO: Technical Standard Order

TVS: Transient Voltage Suppressor

VHF: Very High Frequency

1.3.1 Units of Measure

Unless otherwise stated, all units of measure are English units.

1.4 Reference Publications

The following documents are required by this maintenance manual to perform maintenance:

Table 1-1. Required Documents

Document	Garmin Part Number
G1000 Cockpit Reference Guide for DA40	190-00324-00
G1000/DA 40 Airplane Flight Manual Supplement	190-00303-02
Diamond DA 40 Wiring Diagram	Diamond P/N: DA4-9231-60-1
Diamond DA 40 Airplane Maintenance Manual	Diamond P/N 6.02.01 (Rev. 4 or later)

The following documents provide additional information above and beyond the scope of this document:

Table 1-2. Reference Documents

Document	Garmin Part Number
G1000/DA 40 Master Drawing List	005-C0004-00
G1000/DA 40 Required Equipment List	005-00149-28
G1000/DA 40 Install Drawing	005-00149-01
G1000/DA 40 Post Installation Checkout Procedure	190-00303-06
G1000 Configuration Manual	190-00303-04
Aircraft Fastener Assembly Torque	005-00249-00
Aircraft Contact and Terminal Crimping	005-00249-01
Heat Shrink Tubing Application	005-00249-02
Aircraft Soldering	005-00249-03

1.5 Distribution

This document is to be a permanent aircraft record and is distributed with a new G1000-equipped Diamond DA 40. Revisions to this document will be made by Garmin and will be distributed by Garmin per standard documentation revision procedures.

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2 SYSTEM DESCRIPTION

G1000 system installation can be accomplished only after the following Diamond aircraft modifications have been installed:

- OAM 40-061 Autopilot (optional)
- OAM 40-68 Essential Bus
- OAM 40-073/b Slick Start System
- OAM 40-082/b IFR Lightning Protection
- OAM 40-146 Remote Avionics Provisions
- OAM 40-161/e G1000 Provisions Provisions with KAP 140 AFCS
  Or OAM 40-196 G1000 Provisions without KAP 140 AFCS
- STC SA1850CH Hartzell Propeller

The G1000 integrated cockpit is installed in the DA 40 using the equipment listed in this section as well as parts listed in Appendix A.

2.1 Equipment Descriptions

2.1.1 GDU 1040 MFD & PFD

Two Garmin GDU 1040 CDUs are installed in the Diamond instrument panel. One is configured as a PFD and the other as a MFD (Configuration is determined by wiring harness). Both displays provide control and display of nearly all functions of the G1000 integrated cockpit system. The displays are located side-by-side with the GMA 1347 Audio Panel located in the middle (See Figure 2-1).

Electrical power to the PFD is from the 'Essential' power bus, whereas the MFD receives power from the 'Main' bus. Therefore, both displays power-up immediately when the aircraft master switch is turned on. To provide proper electrical bonding, beryllium copper 'finger' strips are installed on the lower lip of the display. This provides sufficient contact area to which the displays can be grounded to the airframe.

Both displays are installed in the Diamond panel using built-in ¼-turn fasteners. Each display uses an existing connector per OAM 40-161. The 'GDL 69' and 'WX500' circuit breakers, if installed, are pulled, banded with collars, and associated wires are disconnected and dressed with shrink tube.

Two CDU cooling fans are also installed behind the panel as shown in Figure 2-2.

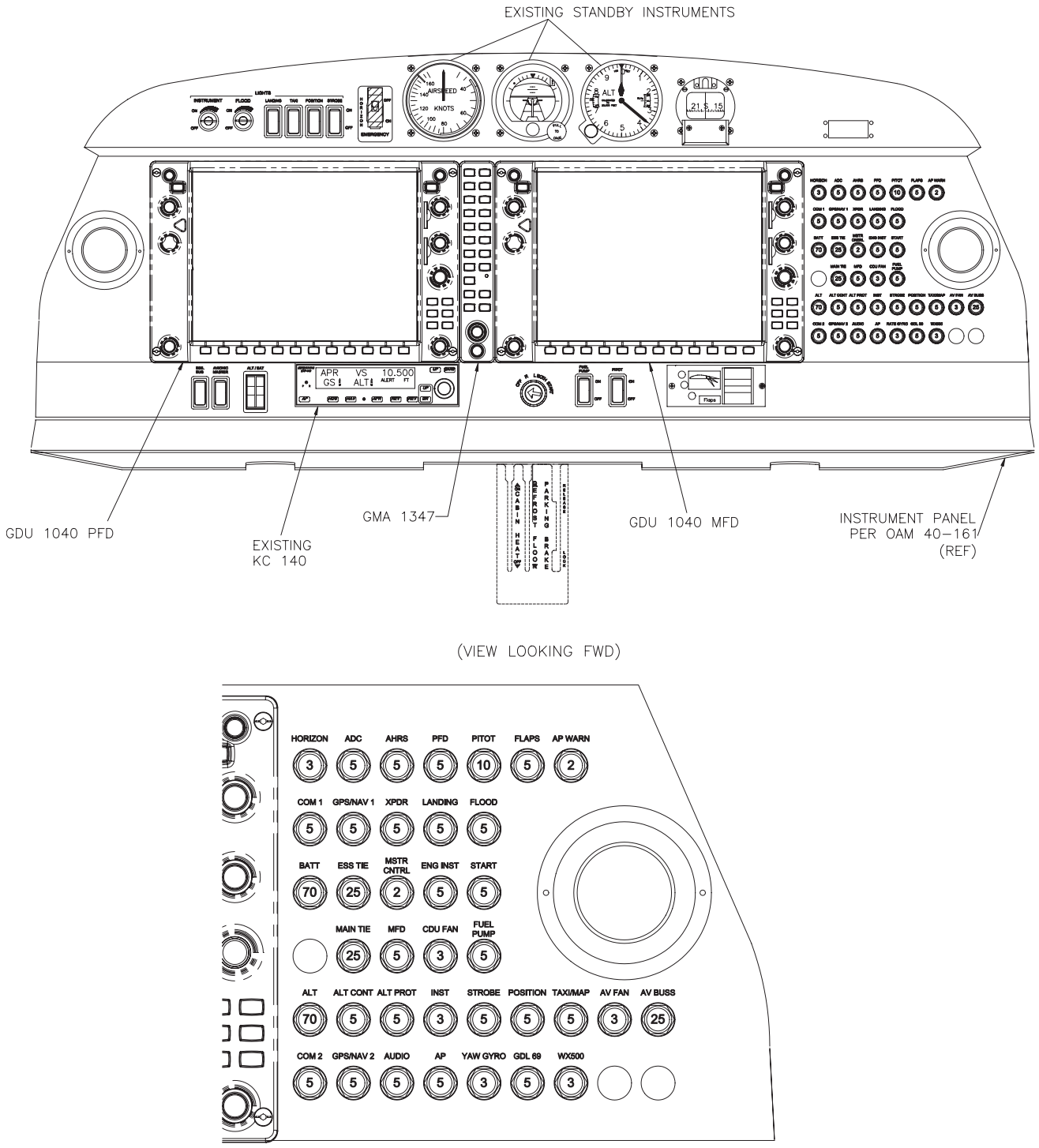

Figure 2-1. G1000 / DA 40 Panel Installation

2.1.2 GMA 1347 Audio Panel

The Garmin GMA 1347 Audio Panel is a digital audio panel with integrated marker beacon receiver. The GMA 1347 provides control of all cockpit intercom/mic systems as well as NAV/COM/ILS audio. The unit also provides display reversion mode control through a large red button. Power is received from the 'Avionics' bus. The unit only powers up when the avionics master switch is turned on. The GMA 1347 interfaces with the existing marker beacon antenna as well as existing mic and phone jacks.

2.1.3 GIA 63 Integrated Avionics Unit (2)

Two Garmin GIA 63 IAUs provide VHF COM, VHF NAV, GPS NAV and other various navigation functions. GIAs provide communication interface to all other G1000 LRUs in the system. Both GIAs are located remotely beneath the baggage compartment in a sheetmetal enclosure, as shown in Figure 2-6 and Figure 2-7. The #1 GIA is powered through the 'Essential' power bus and immediately powers up when the aircraft master switch is turned on. The #2 GIA receives power through the 'Avionics' bus and powers up when the avionics master switch is turned on. Both GIA 63s interface to the following equipment:

- .....Existing KAP 140 Flight Control System (GIA 2)
- .....Existing VOR/LOC/Glideslope Antenna System
- .....Existing VHF COM 1 & 2 Antennas
- .....Existing GPS 1 & 2 Antennas

2.1.4 GEA 71 Engine/Airframe Unit

The Garmin GEA 71 Engine/Airframe Unit provides engine/airframe data to the G1000 system. Data received from transducers/sensors is processed, then sent to GIA 63, and subsequently to the GDU 1040 MFD. In display reversionary mode, engine instrumentation is displayed on the PFD as well. The GEA is located behind the instrument panel and is mounted in a vertical orientation as depicted in Figure 2-2 and Figure 2-6. Power is received from the 'Essential' power bus. The GEA interfaces to the following:

- .....Manifold Pressure Sensor (MAP)
- .....Oil Pressure Sensor
- .....Fuel Pressure Sensor
- .....Tachometer Sensor
- .....Oil Temperature Sensor
- .....Fuel Flow Sensor
- .....4 Cylinder Head Temperature (CHT) Sensors
- .....4 Exhaust Gas Temperature (EGT) Sensors
- .....Alternator Current Sensor
- .....Existing Fuel Probes
- .....Existing Pitot Heat System
- .....Existing Open Door Detection Switches
- .....Existing Starter Engage System

2.1.5 GTX 33 Mode S Transponder

The Garmin GTX 33 provides Mode A, C, and S altitude and position reporting information to the G1000 system. The unit is mounted in the remote avionics enclosure below the baggage compartment (See Figure 2-6 and Figure 2-7). Power is received from the 'Essential' bus. The GTX 33 interfaces with the existing transponder antenna.

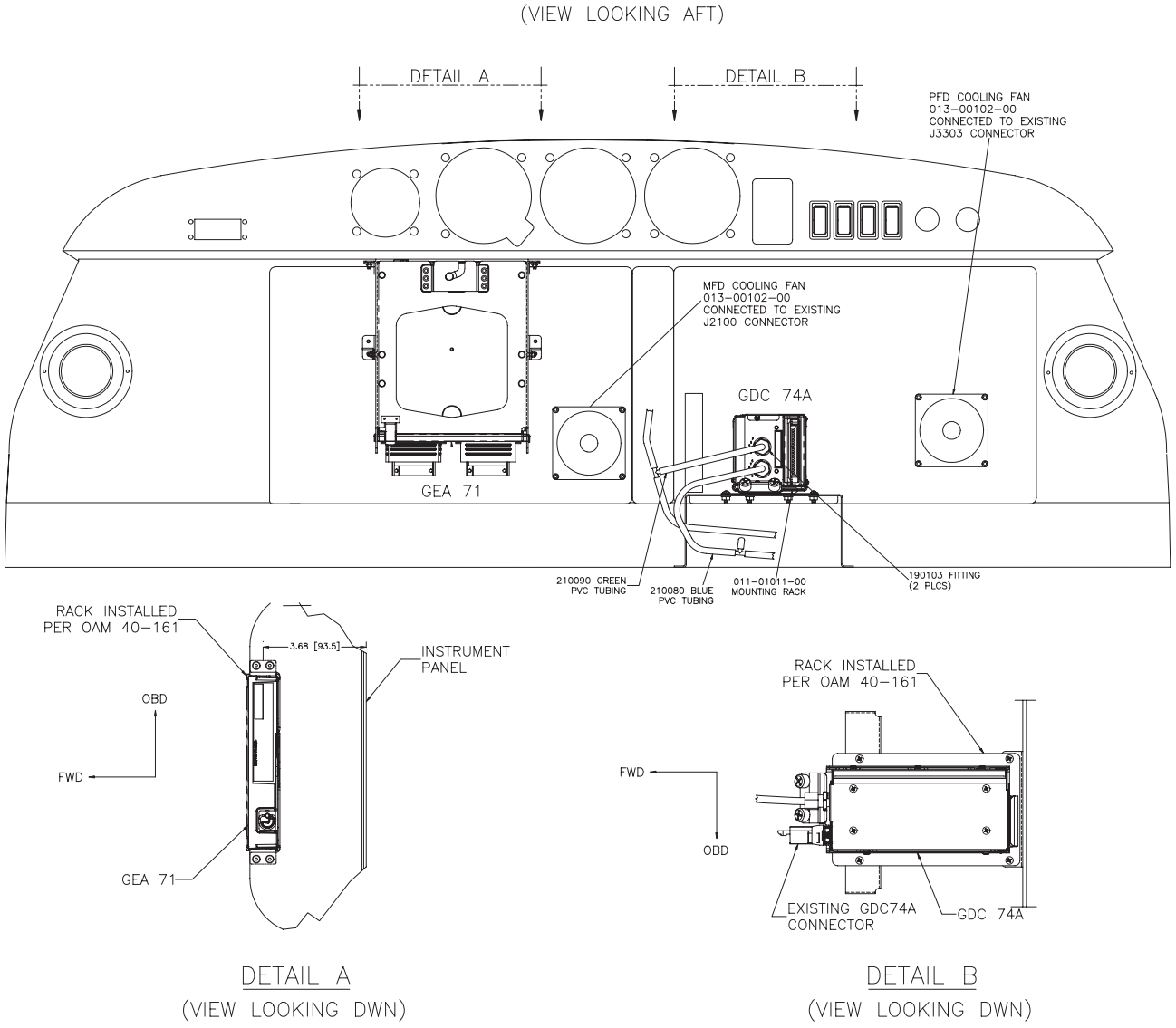

Figure 2-2. DA40 Panel (Rear View)

2.1.6 GDC 74A Digital Air Data Computer

The Garmin GDC 74A provides digital air data computations to the G1000 system. The unit is mounted horizontally behind the instrument panel and is fastened to a sheetmetal rack. Power is received from the 'Essential' bus. The GDC 74A connects to existing pitot/static ports as shown in Figure 2-2 and Figure 2-6.

2.1.7 OAT Probe

The Garmin GTP 59 OAT Probe provides the GDC 74A with air temperature data. The OAT probe is mounted to the bottom starboard side of the DA 40 fuselage as shown in Figure 2-3.

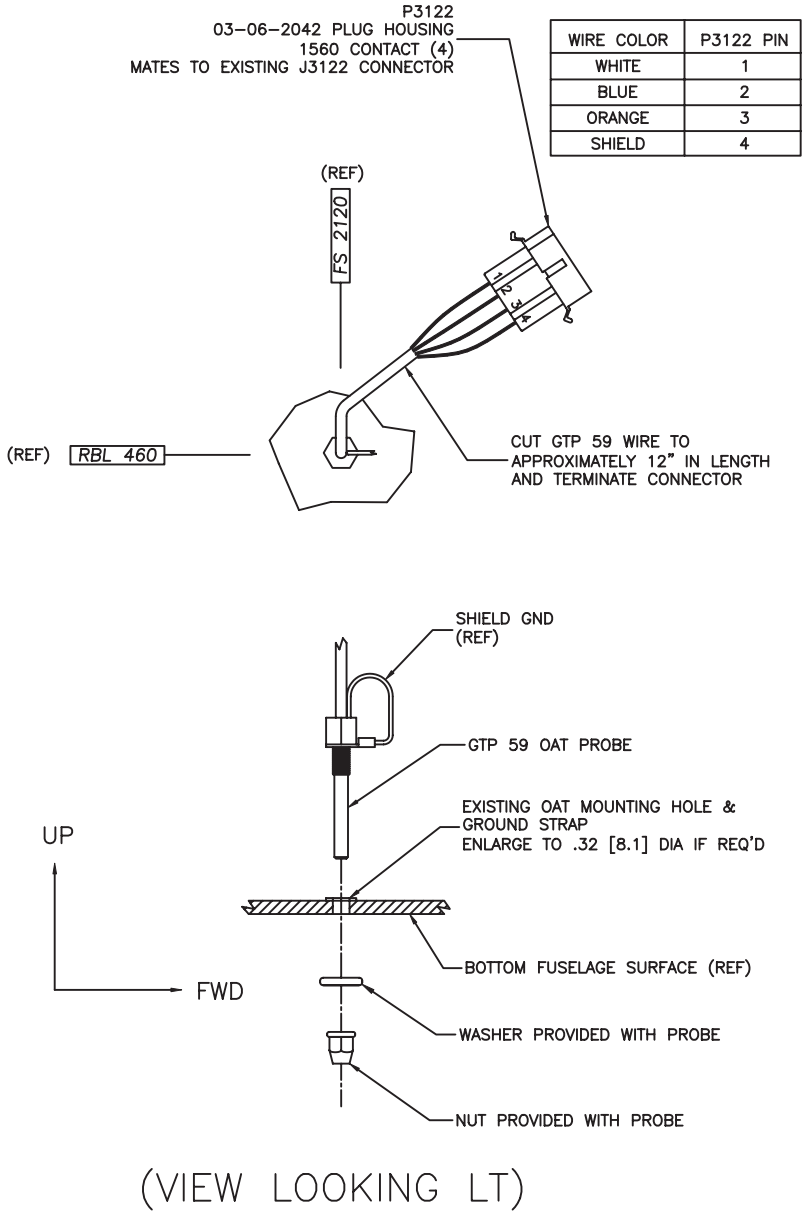

Figure 2-3. GTP 59 OAT Probe

2.1.8 GRS 77 Attitude & Heading Reference System

The Garmin GRS 77 AHRS provides attitude and heading information to the G1000 system. The unit is mounted remotely in the baggage compartment, to the starboard side of the remote avionics enclosure (see Figure 2-4 and Figure 2-6). Power is received from the 'Essential' bus. The GRS 77 interfaces with and provides power to the GMU 44 Magnetometer. The GRS 77 supplies attitude and heading information directly to the PFD, MFD, and to both GIAs.

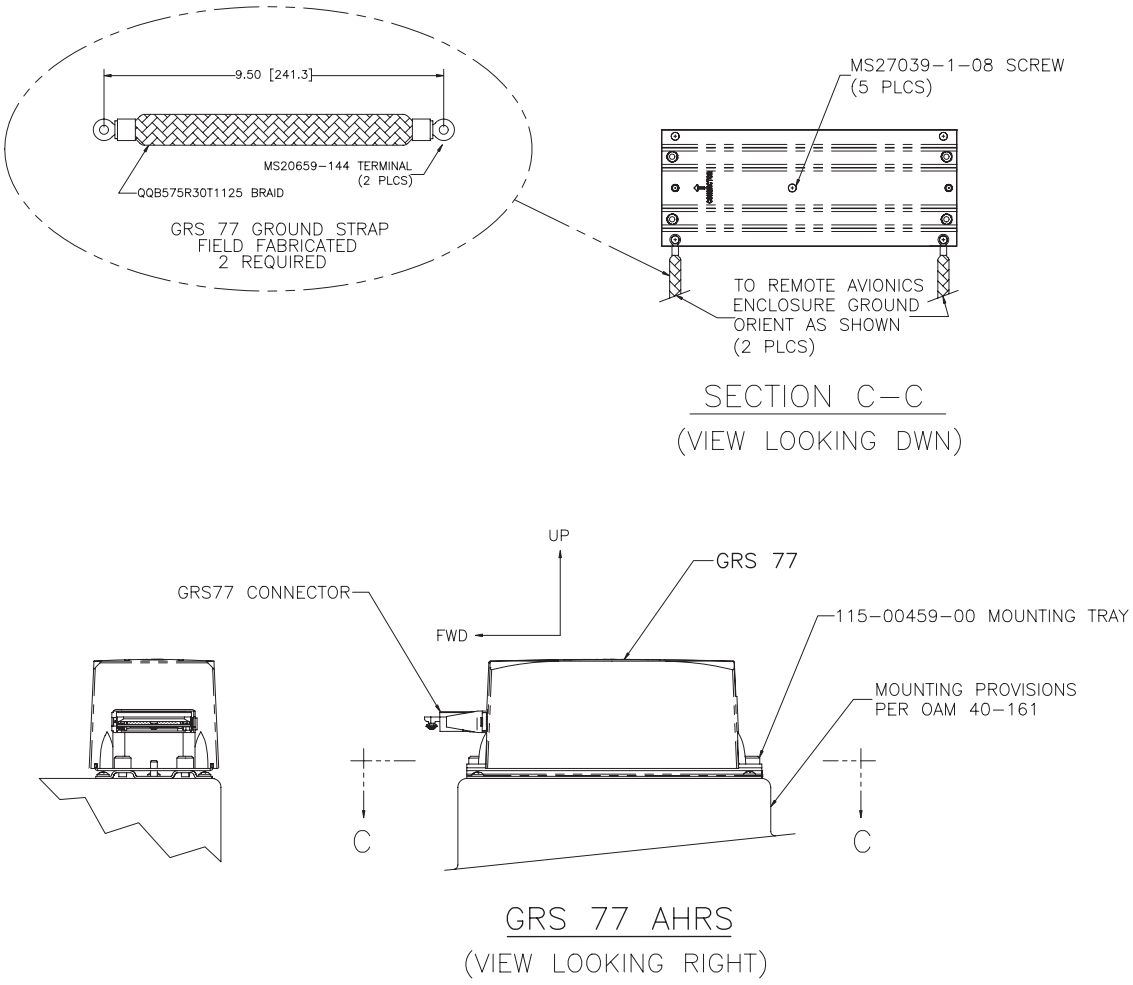

Figure 2-4. GRS 77 Mount

2.1.9 GMU 44 Magnetometer

The GMU 44 provides horizontal and vertical magnetic field information to the GRS 77 AHRS. This allows heading to be calculated and provides assistance during AHRS alignment. The GMU 44 is mounted beneath the starboard wing as shown in Figure 2-5 and Figure 2-6.

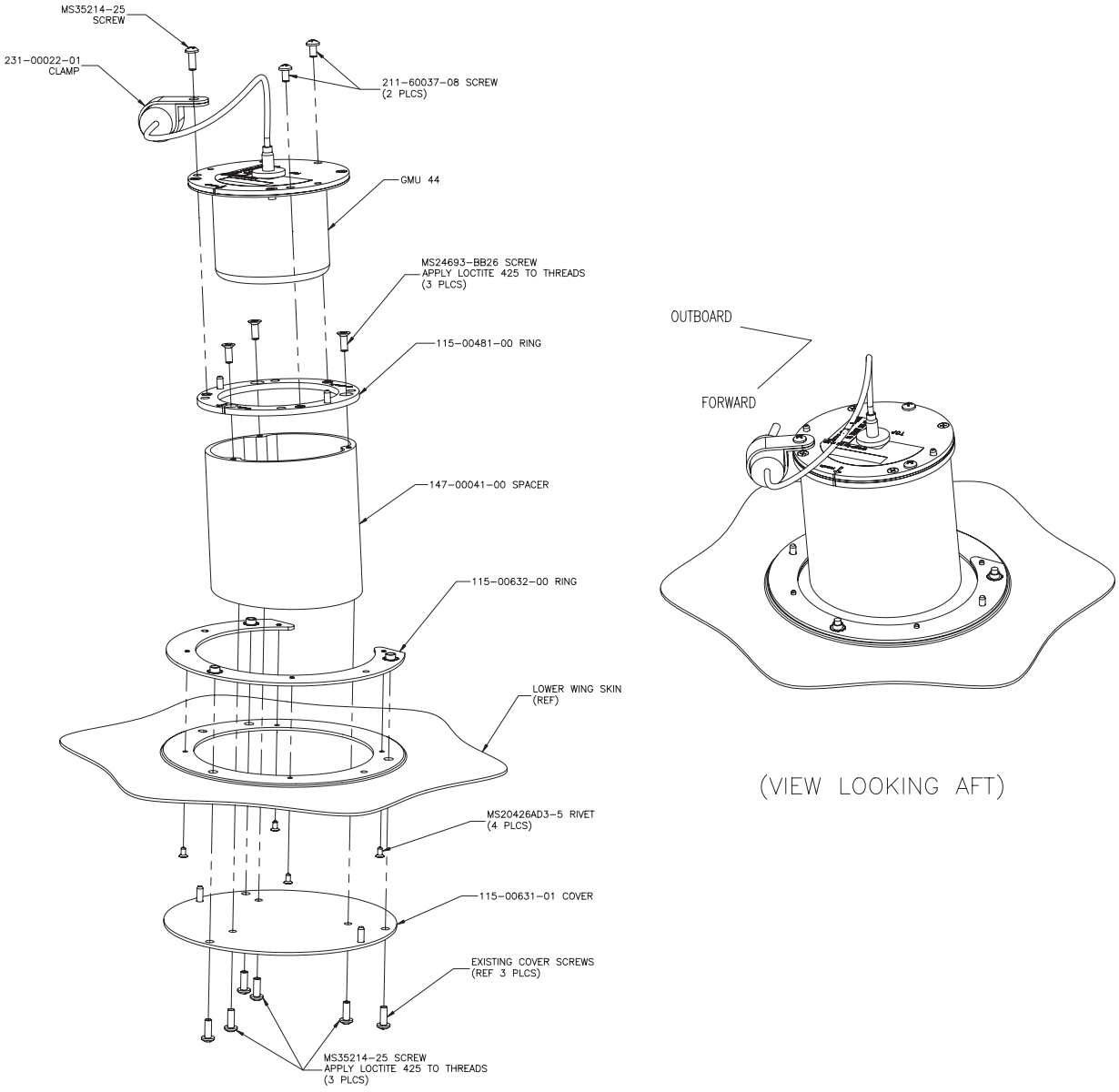

Figure 2-5. GMU 44 Installation

2.2 Equipment Locations

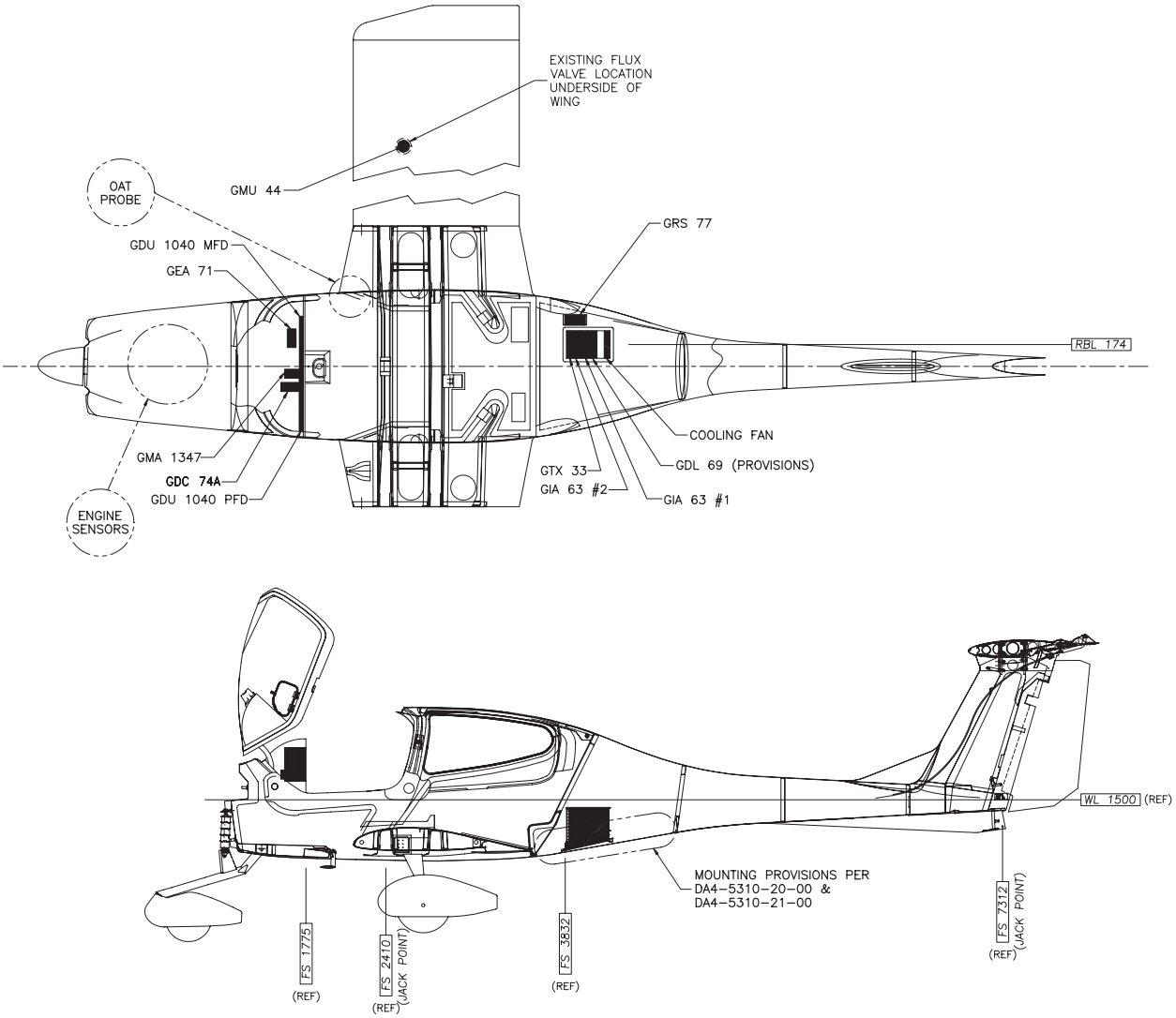

Figure 2-6. G1000 in DA 40 Equipment Locations

2.3 Remote Avionics Enclosure

A remote avionics enclosure allows LRUs to be inserted vertically, from above. The enclosure is also cooled with an avionics fan and duct assembly as shown in Figure 2-6 and Figure 2-7. The enclosure is installed as shown in Figure 2-7. The assembly is grounded to an existing grounding station using a field-fabricated aluminum ground strap. Two braided grounding straps are also attached to the GRS 77 rack from the enclosure. A Comant diplexer is installed on the enclosure as shown. A field-fabricated component bracket with resistors, voltage suppressors and attached wiring is fastened to the forward portion of the enclosure (see Section 2.5).

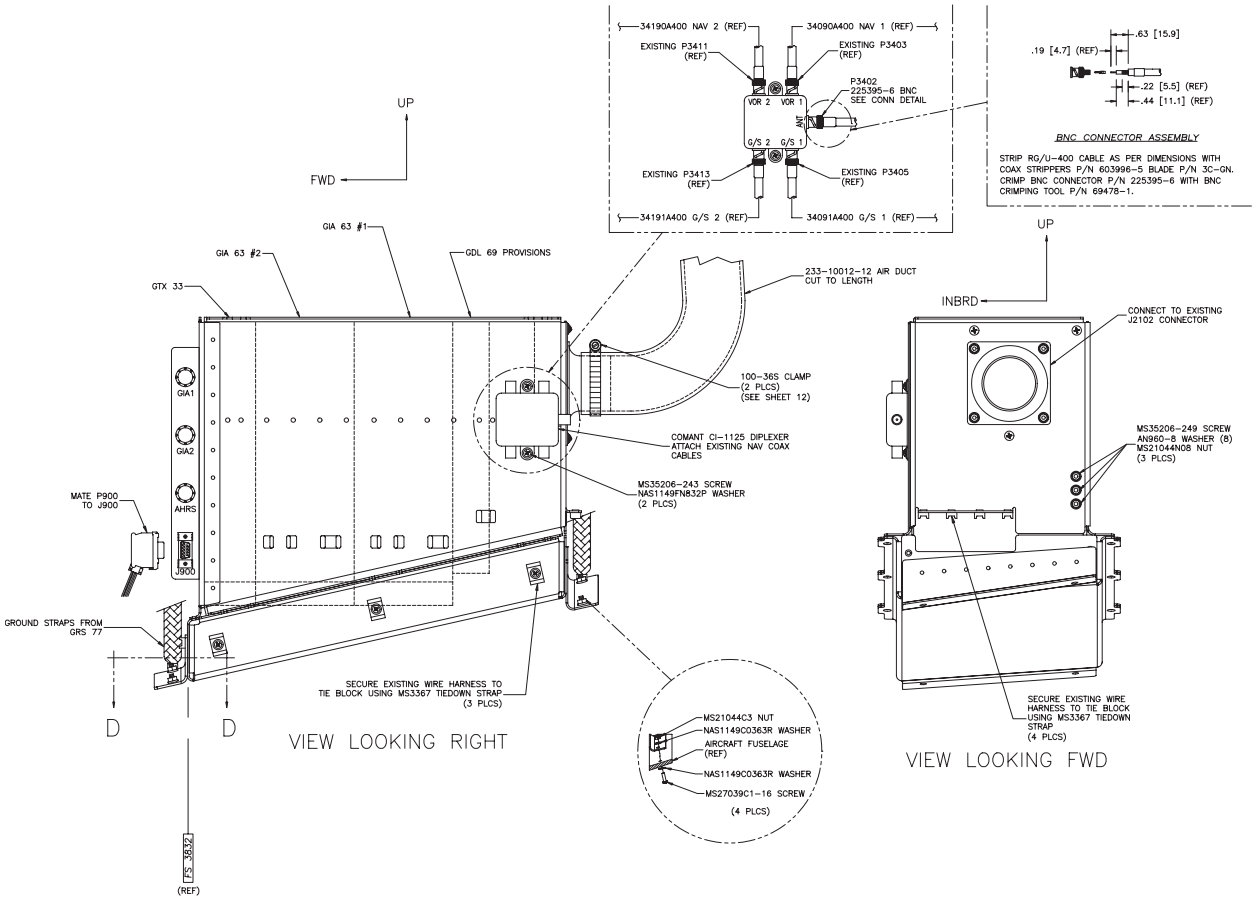

Figure 2-7. Remote Avionics Enclosure

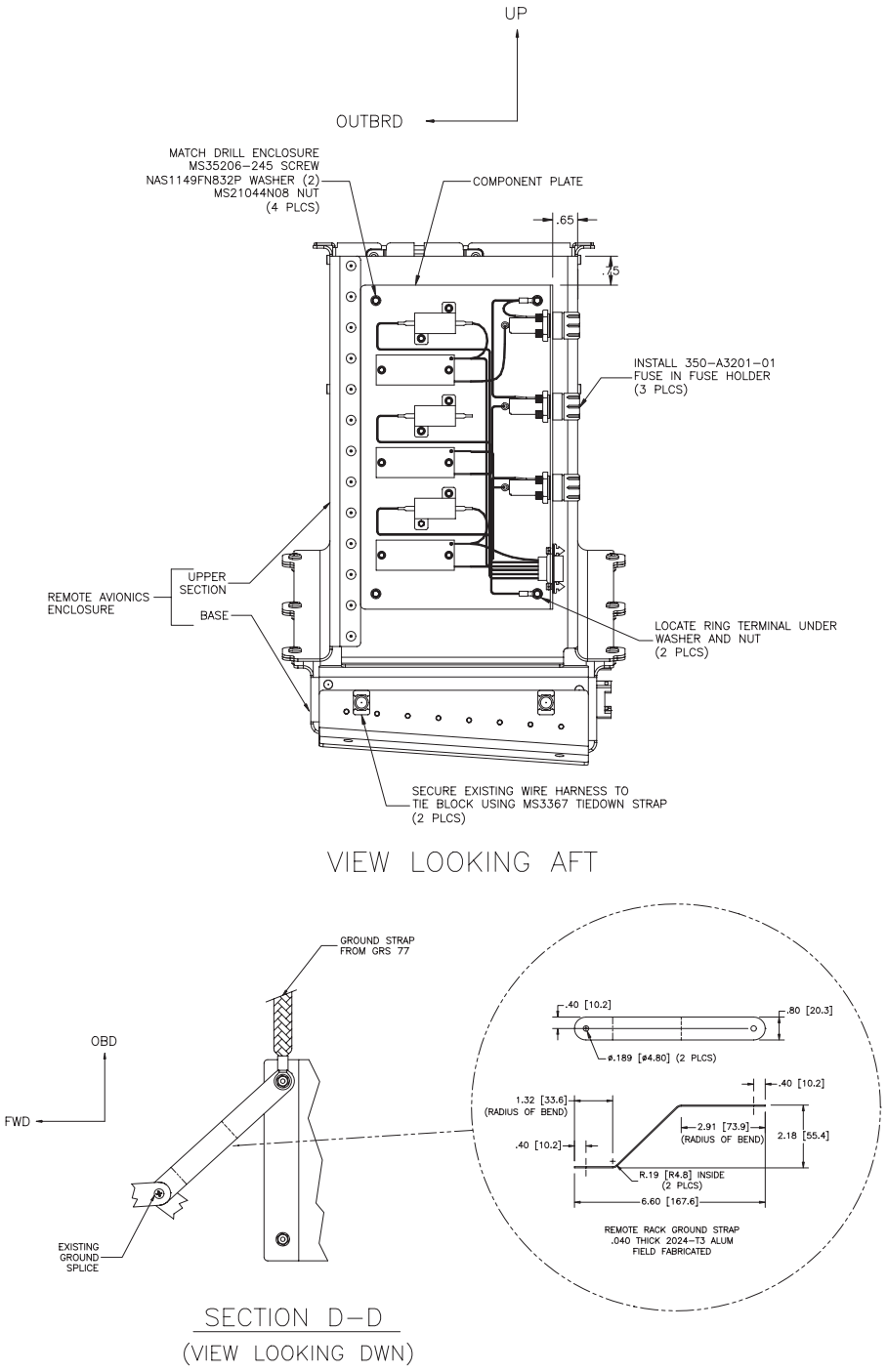

Figure 2-7. Remote Avionics Enclosure, Cont.

2.4 Electrical Power Distribution

Distribution of power to the G1000 occurs on three buses:

Essential Bus: The 'Essential' bus is tied directly to the aircraft battery via the master switch. When the master switch is turned on, power is immediately supplied the 'Essential' bus. The 'Essential' bus is tied via a relay switch to the 'Main' aircraft bus. There are two circuit breakers on either side of the relay, combined with a single diode, allowing the battery to be charged by the alternator. Only equipment deemed essential for safe flight is connected to this bus.

Main Aircraft Bus: The 'Main' bus receives power from the aircraft battery when tied to the 'Essential' bus. After the aircraft engine is started, the alternator supplies power to the aircraft 'Main' bus, and to the rest of the system. In the event of an alternator or other power failure, the 'Essential' bus can be isolated with the 'Essential Bus' switch. This causes the 'Essential' bus to revert to battery power. Only the MFD receives power from the 'Main' bus.

Main Avionics Bus: A 'Main Avionics' bus is tied to the 'Main' aircraft bus via the 'Avionics Master' switch and switch relay. Only the #2 GIA 63 and the GMA 1347 are connected to this bus.

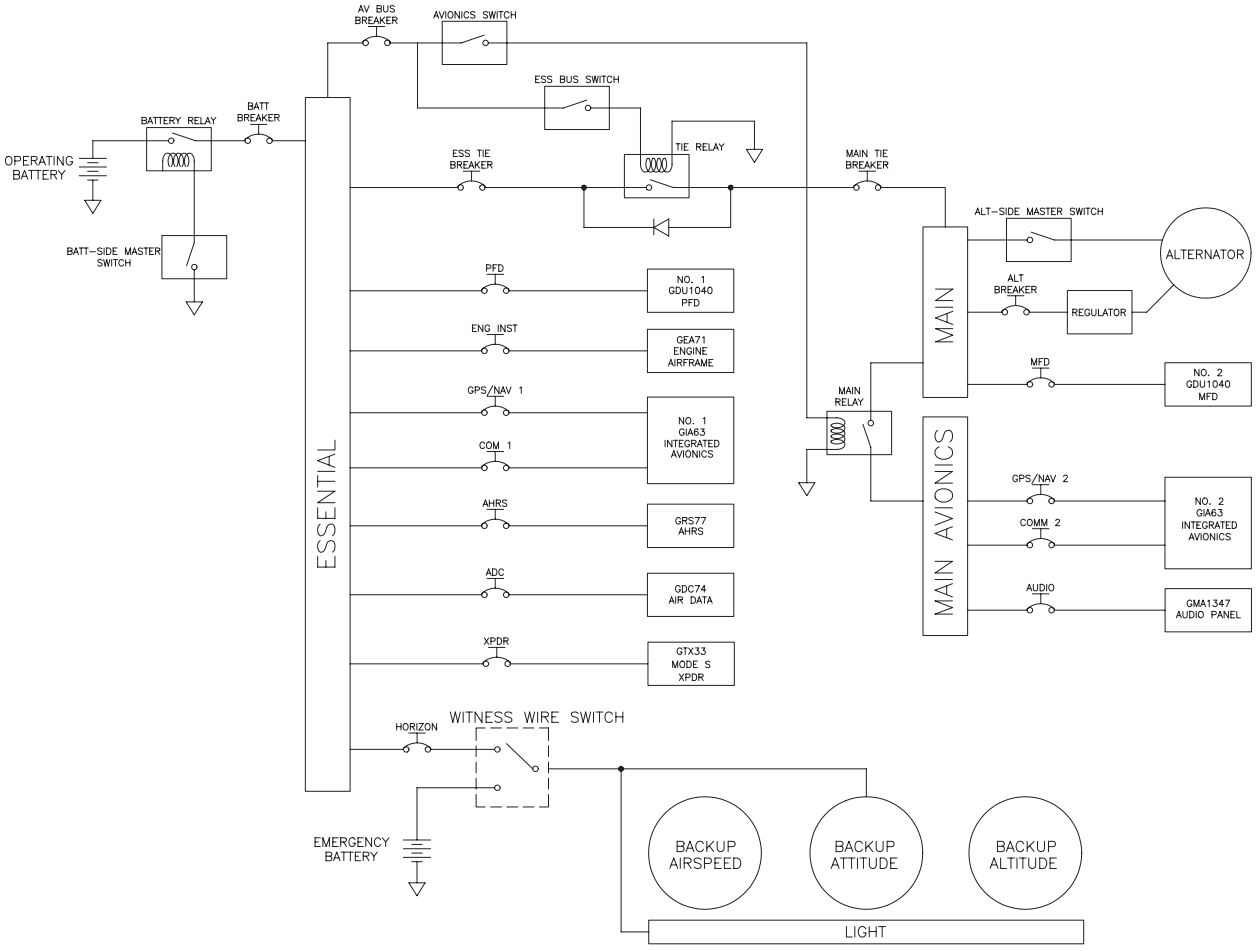

Figure 2-8. G1000/DA40 Electrical Distribution

2.5 Lightning Strike Protection

The following modifications to the aircraft provide additional protection of G1000 equipment from the effects of lightning strike.

2.5.1 Alternator / Battery Voltage Suppressors & Fuses

Two Transient Voltage Suppressors (TVS) are installed behind the instrument panel near the circuit breakers. Voltage suppressors help protect the avionics/electrical equipment against the effects of lighting strike. One voltage suppressor is connected to the load side of the aircraft battery circuit breaker, and the other is connected to the line side of the alternator circuit breaker. One 3.2 Amp slow-blow fuse is wired in line with each voltage suppressor, as shown in Figure 2-9. Fuses are easily removed by twisting the fuse holder cap counter-clockwise and removing the fuse.

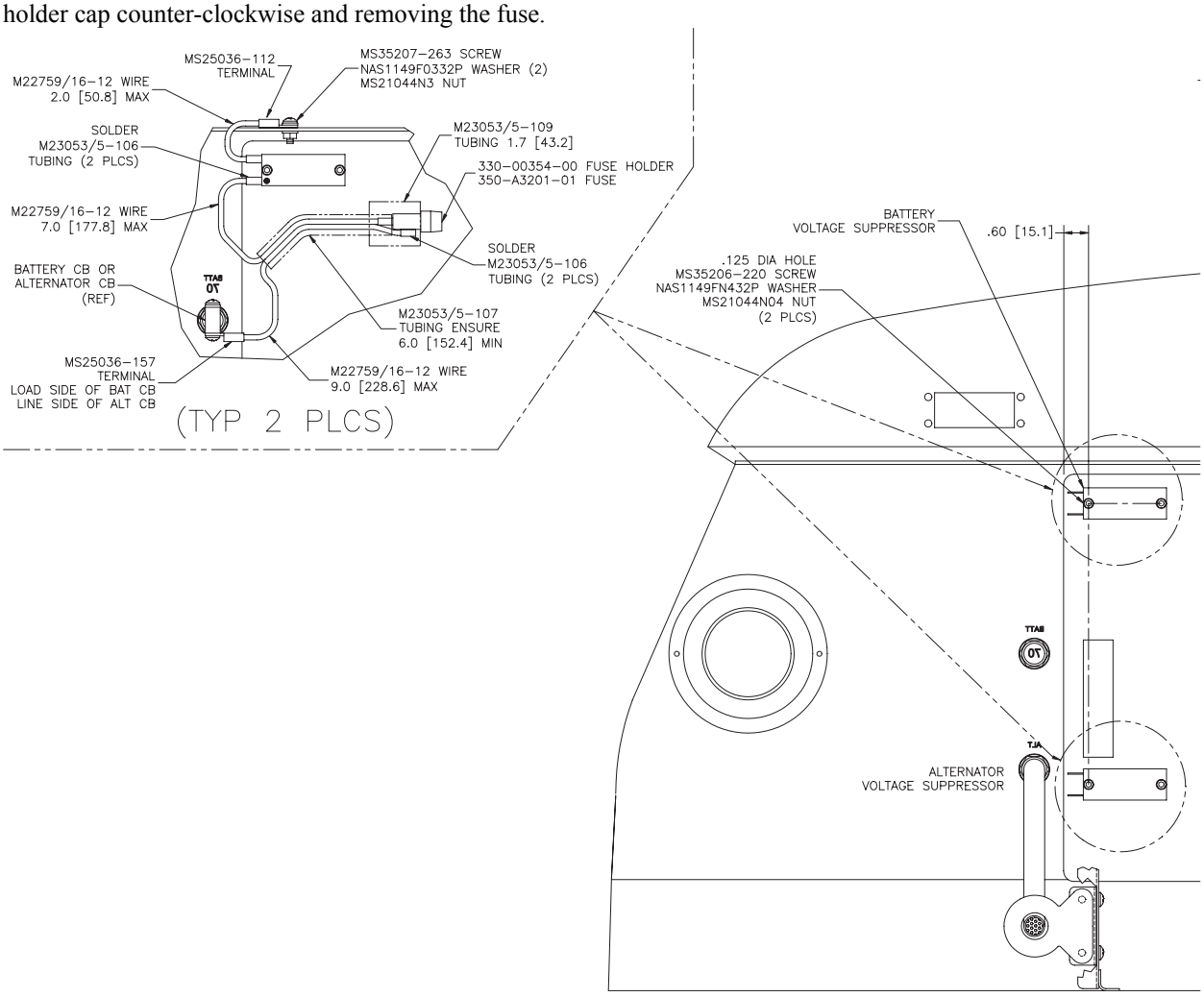

Figure 2-9. TVS & Fuse Installation

2.5.2 GIA / AHRS Lightning Protection

The GRS 77 and both GIA 63s are uniquely protected from the effects of lightning. A 0.499Ω resistor, a transient voltage suppressor, and a 3.2 Amp slow-blow fuse are used for each GIA and the AHRS. These components are installed on a field-fabricated aluminum block, which is mounted to the front of the remote avionics enclosure (see Figure 2-7 and Figure 2-10). The dimensions for the mounting block are provided in Figure 2-11. Power leads for the AHRS and both GIAs are routed from the aircraft harness to a 9-pin connector (P900), whose mating connector is mounted to the fabricated block (J900). Figure 2-12 shows the wiring setup on the block for one set of components. Power is returned to the LRU after passing through the resistor and voltage suppressor.

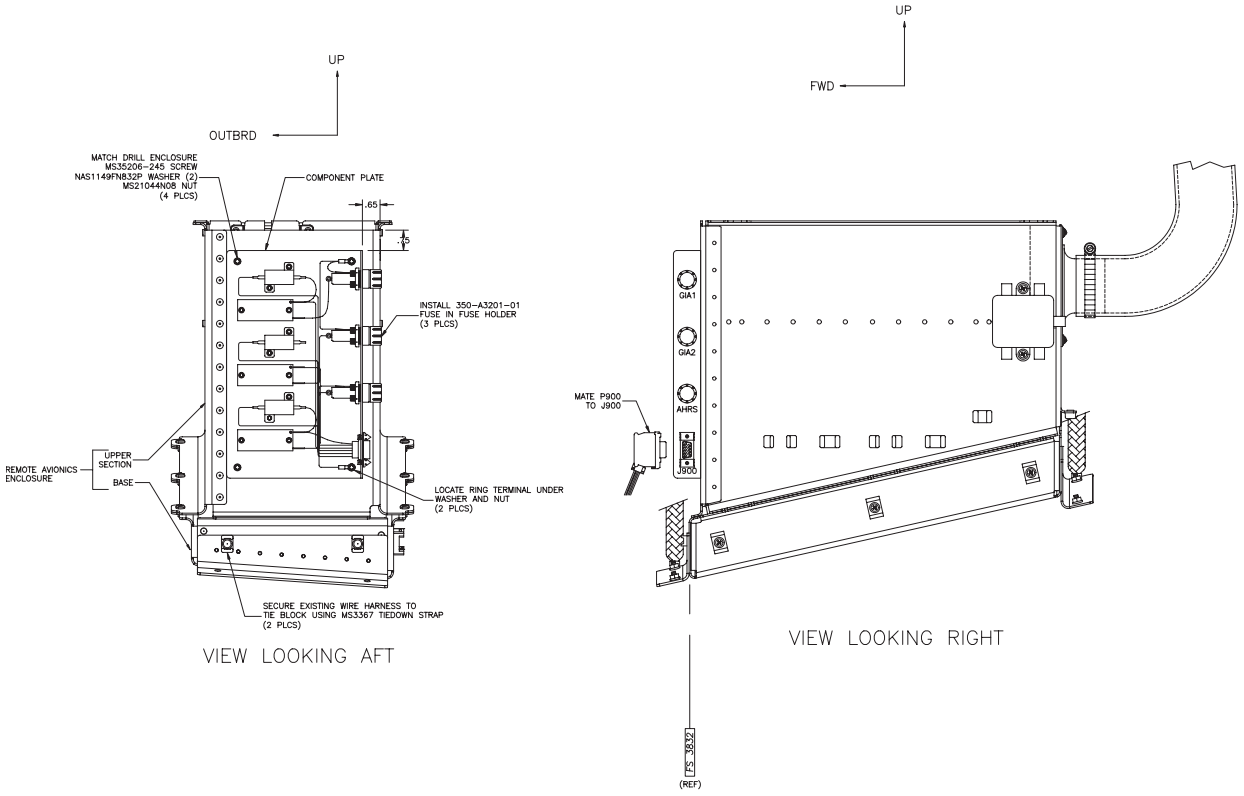

Figure 2-10. Lightning Protection Components

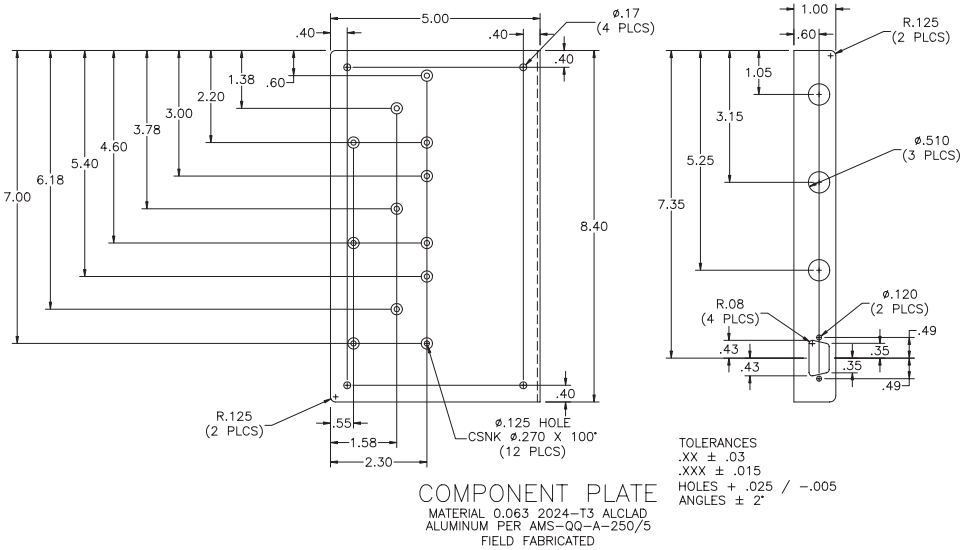

Figure 2-11. Component Plate Dimensions

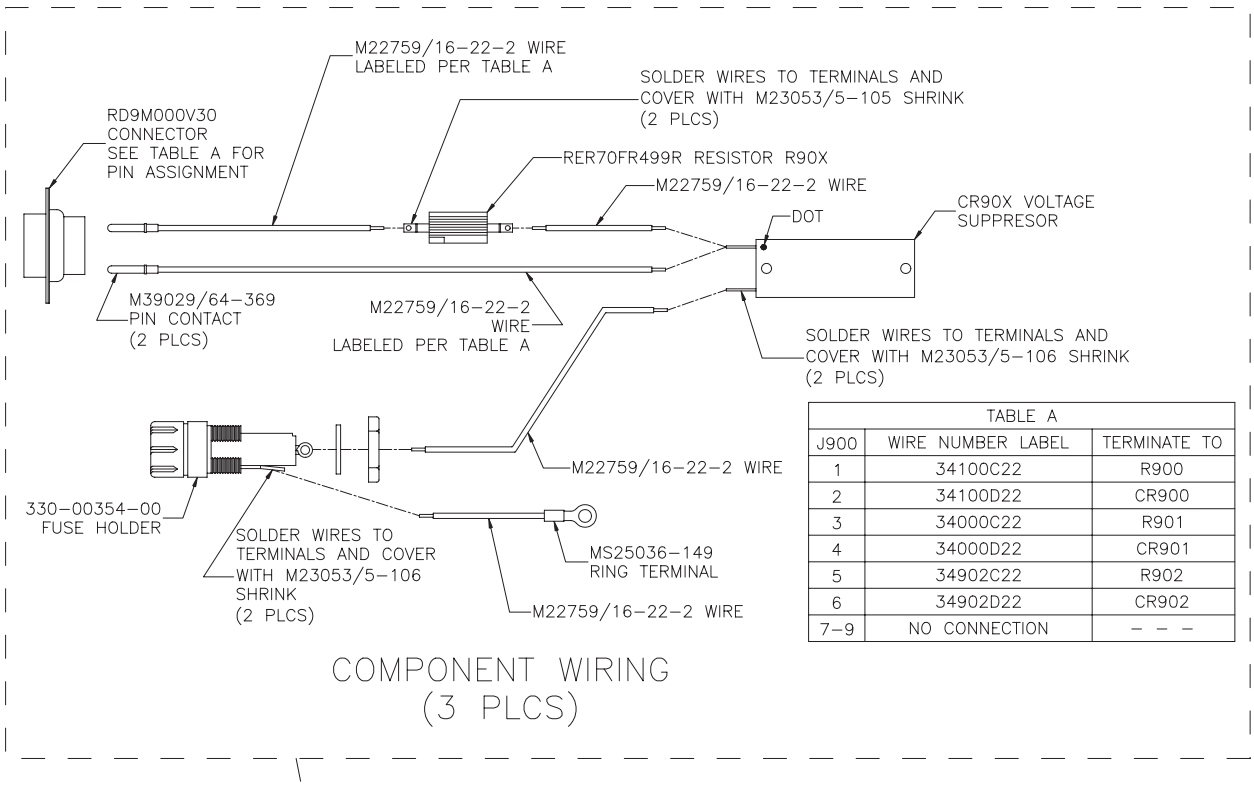

TABLE A		
J900	WIRE NUMBER LABEL	TERMINATE TO
1	34100C22	R900
2	34100D22	CR900
3	34000C22	R901
4	34000D22	CR901
5	34902C22	R902
6	34902D22	CR902
7-9	NO CONNECTION	- - -

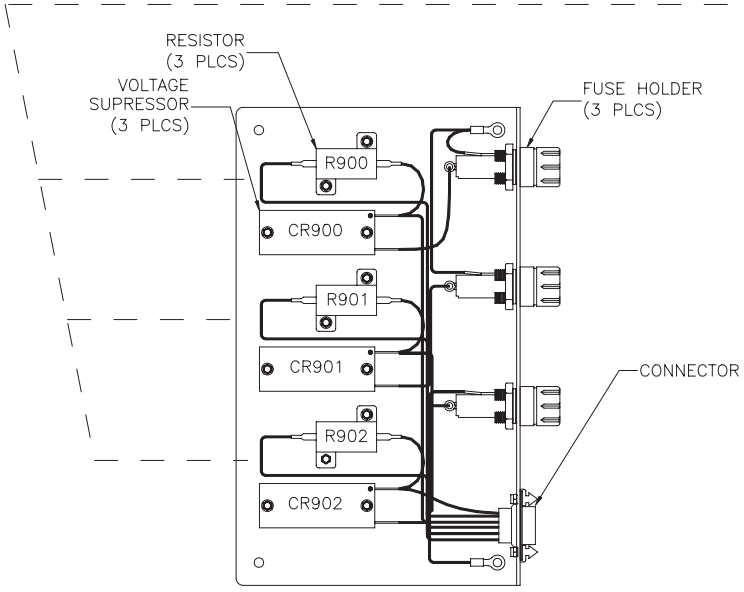

Figure 2-12. Component Wiring Diagram

2.5.3 Lightning Strike Maintenance

Proper electrical bonding of all metallic components is critical for the protection against the effects of lighting. Severe corrosion may inhibit a component's ability to bond to the aircraft's electrical ground plane. The following summarizes maintenance practices which are implemented to maintain adequate lightning protection for the aircraft. See Section 4, Table 4-1 for exact maintenance requirements and associated intervals:

- A 1000-hour visual inspection of all G1000 equipment, including voltage suppressors, resistors, fuses, etc.
- An electrical bonding check of G1000 equipment every 1000 hours or anytime a lightning strike occurs or is suspected.
- Regular replacement (every 2 years) of all five 3.2 Amp slow-blow fuses ensures they are in fresh condition.
- Replacement of voltage suppressors, resistors, and fuses anytime a lightning strike occurs or is suspected.

2.6 SPIDER Grounds

Most G1000 connectors employ a SPIDER grounding system to provide necessary ground reference to shielding and/or transducers. A single 16-gauge wire is connected locally to the airframe. Additional 'spider' wires, 24-gauge, are used to connect shield grounds. The assembly is fastened directly to the backshell housing with two screws. Figure 2-13 shows an example SPIDER installation.

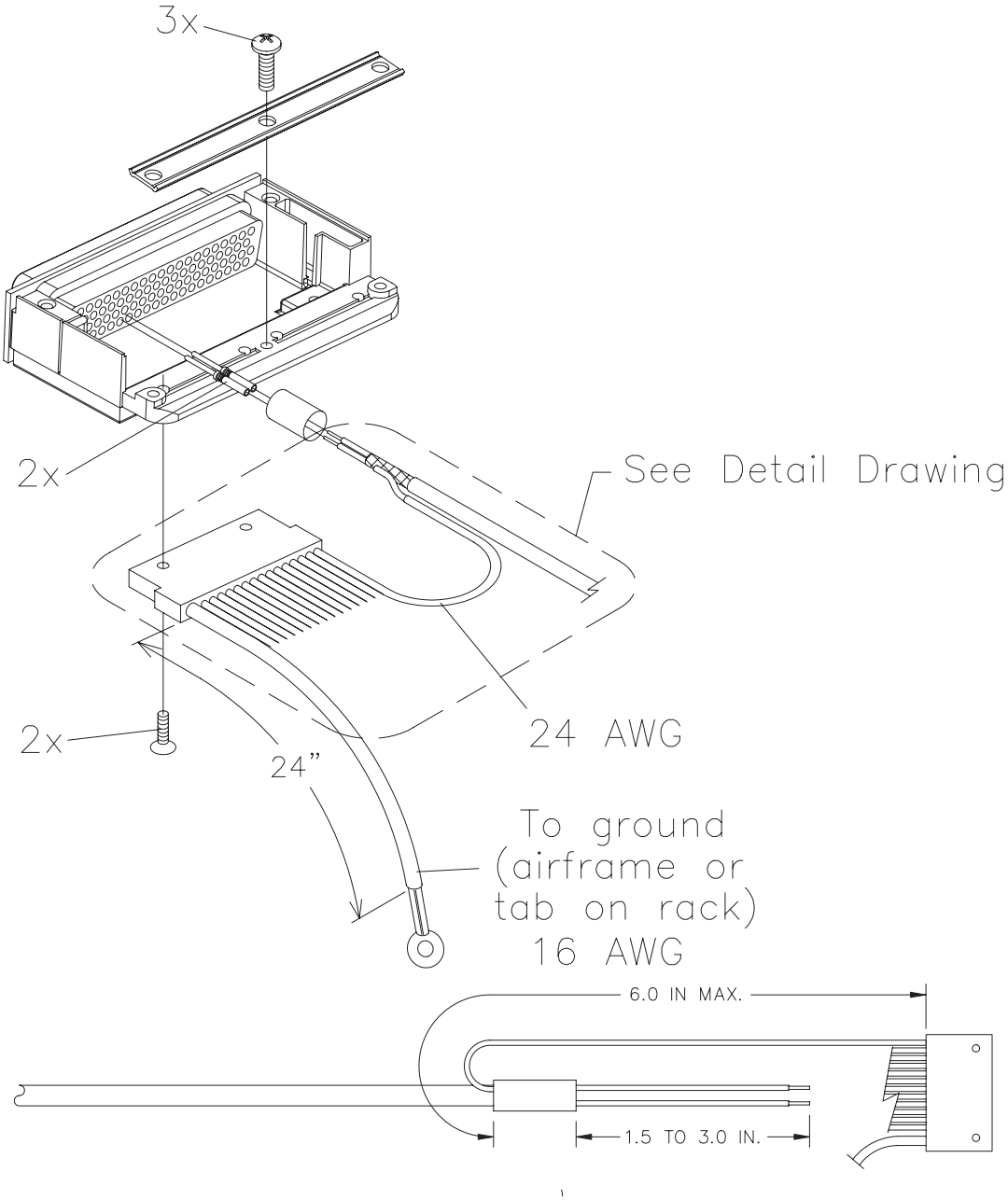

Figure 2-13. SPIDER Ground Installation

2.7 Sensor Installations

2.7.1 Manifold Air Pressure

A Kulite MAP sensor measures manifold air pressure. The sensor, manifold hose, and adapter fittings are installed as shown in Figure 2-14.

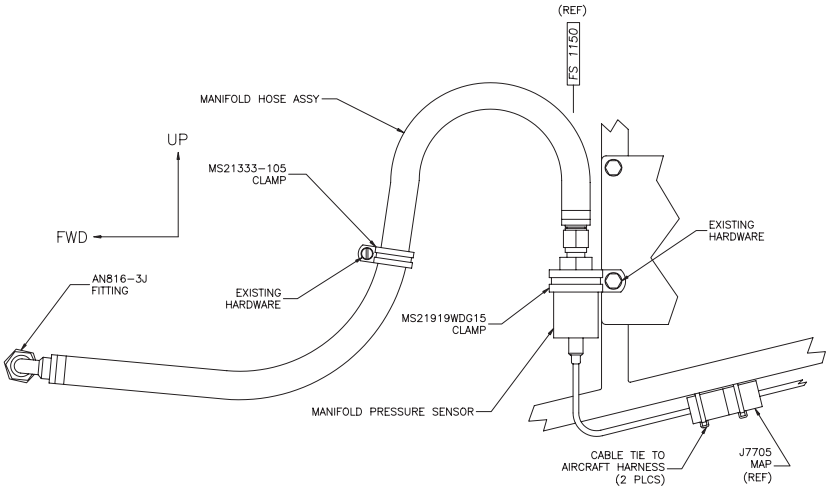

Figure 2-14. MAP Sensor

2.7.2 Oil Pressure

A Kulite pressure sensor measures oil pressure. The sensor, oil pressure hose, and fittings are installed as shown in Figure 2-15.

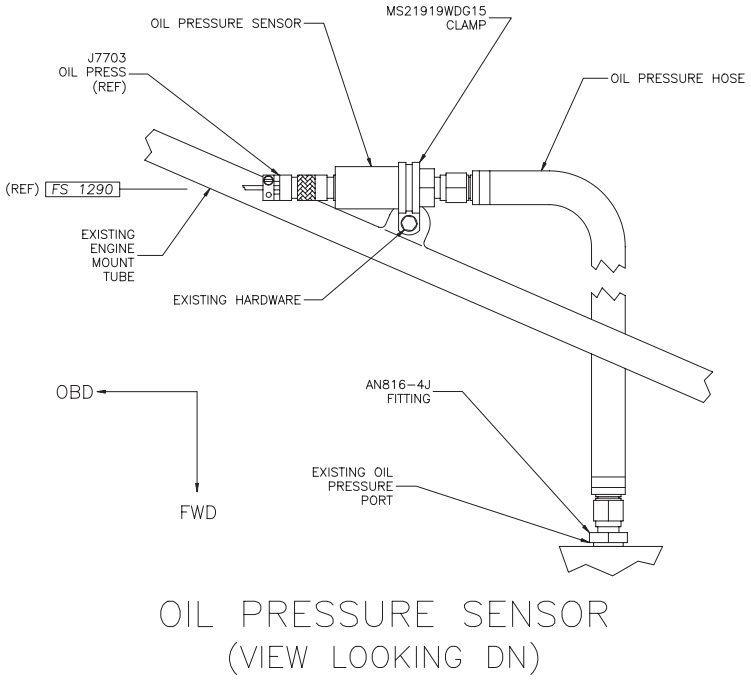

Figure 2-15. Oil Pressure Sensor

2.7.3 Oil Temperature

A Norwich Aero Products oil temperature sensor is used to measure oil temperature. The sensor is installed as shown in Figure 2-16.

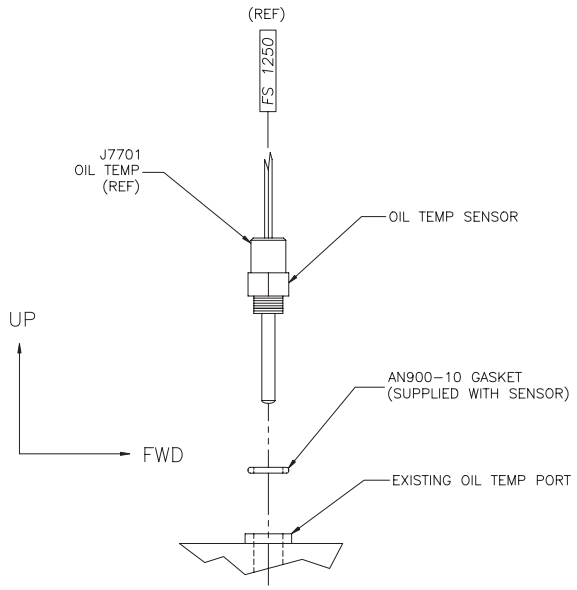

Figure 2-16. Oil Temperature Sensor

2.7.4 Fuel Pressure

A Kulite pressure sensor is used to measure fuel pressure. The sensor, fuel hose, O-rings, and associated fittings are installed as shown in Figure 2-17.

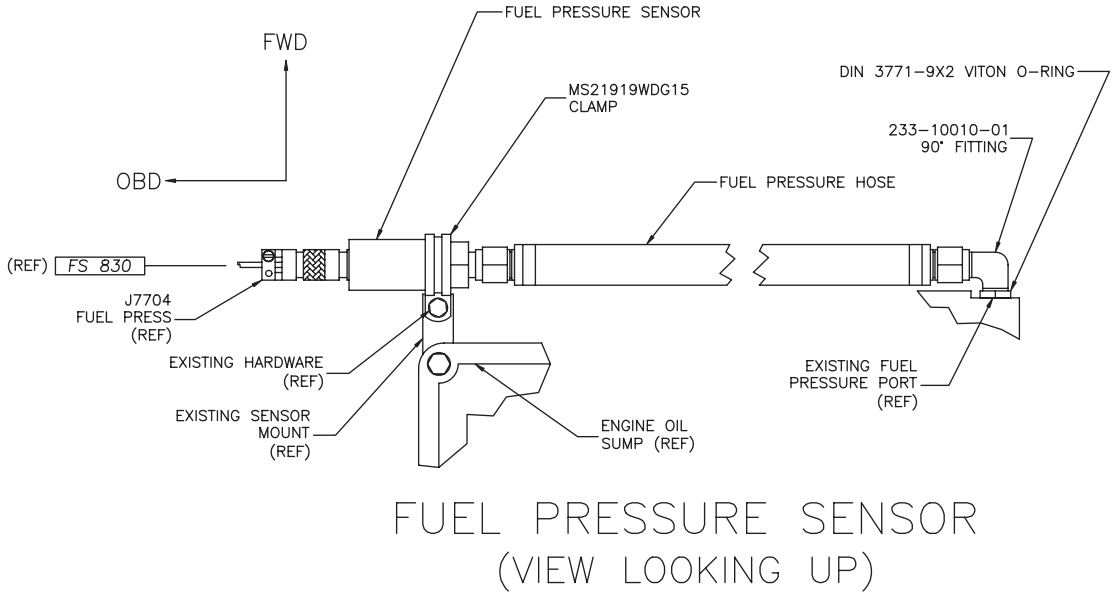

Figure 2-17. Fuel Pressure Sensor

2.7.5 Tachometer

A tachometer provides engine RPM measurements to the G1000 system. The tachometer is installed as shown in Figure 2-18.

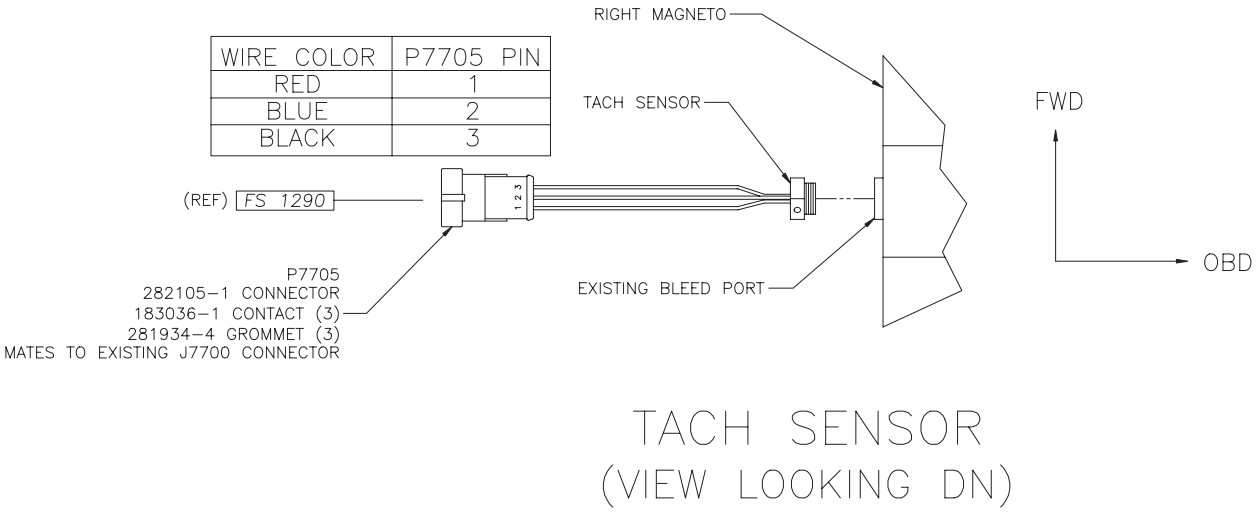

Figure 2-18. Tachometer Sensor

2.7.6 Fuel Flow

A Shadin fuel flow sensor is used to measure fuel flow. The fuel flow sensor/fuel hose assembly is surrounded by a fire-resistant sleeve, as detailed in Figure 2-19 and Figure 2-20. The fuel flow/fire sleeve assembly is mounted to a field-fabricated bracket as shown in Figure 2-21.

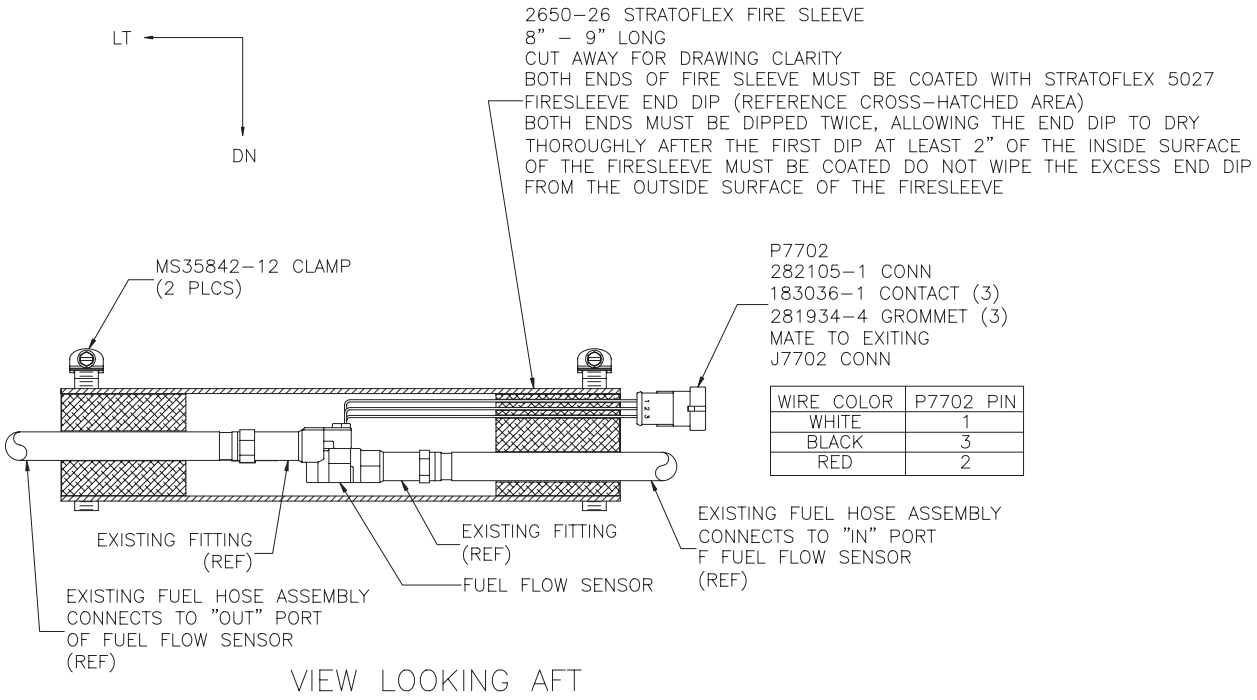

Figure 2-19. Fuel Flow Sensor & Fire Sleeve

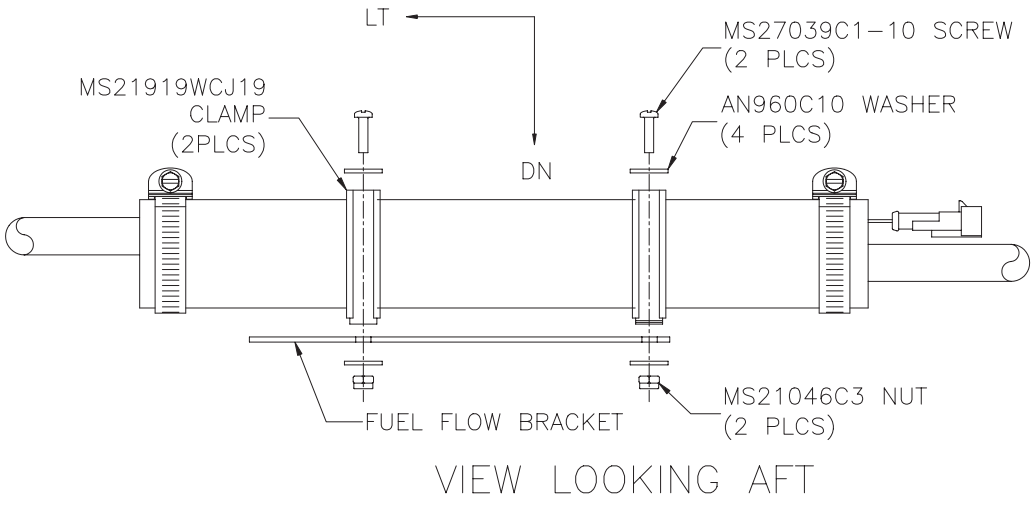

Figure 2-20. Fuel Flow Assembled

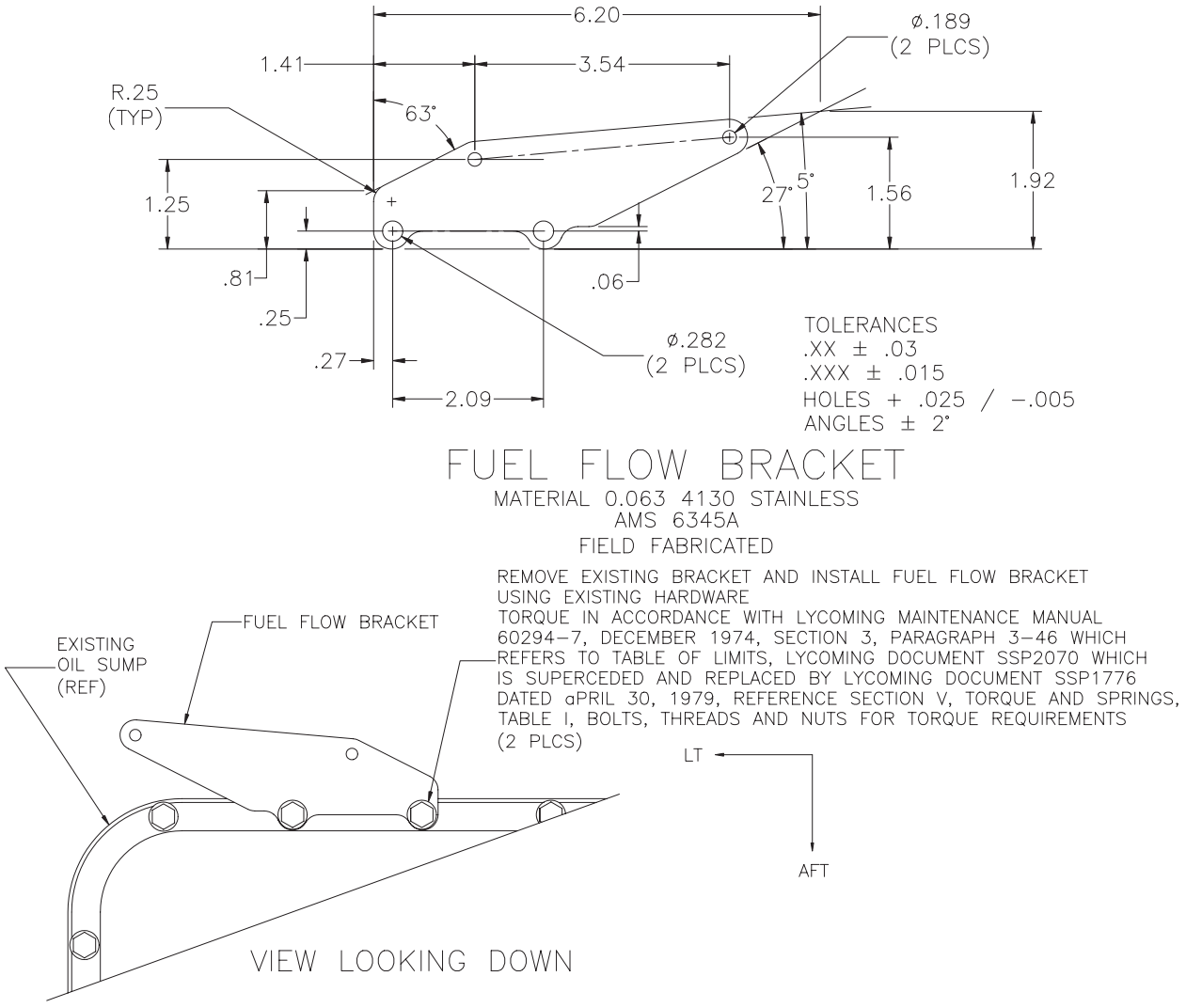

Figure 2-21. Fuel Flow Bracket

2.7.7 Cylinder Head Temperature Thermocouples

Four thermocouples are used to measure cylinder head temperatures. A sensor is installed in each cylinder head. An example is shown in Figure 2-22.

WIRE COLOR	CHT#1	CHT#2	CHT#3	CHT#4
YELLOW	1	1	1	1
RED	2	2	2	2

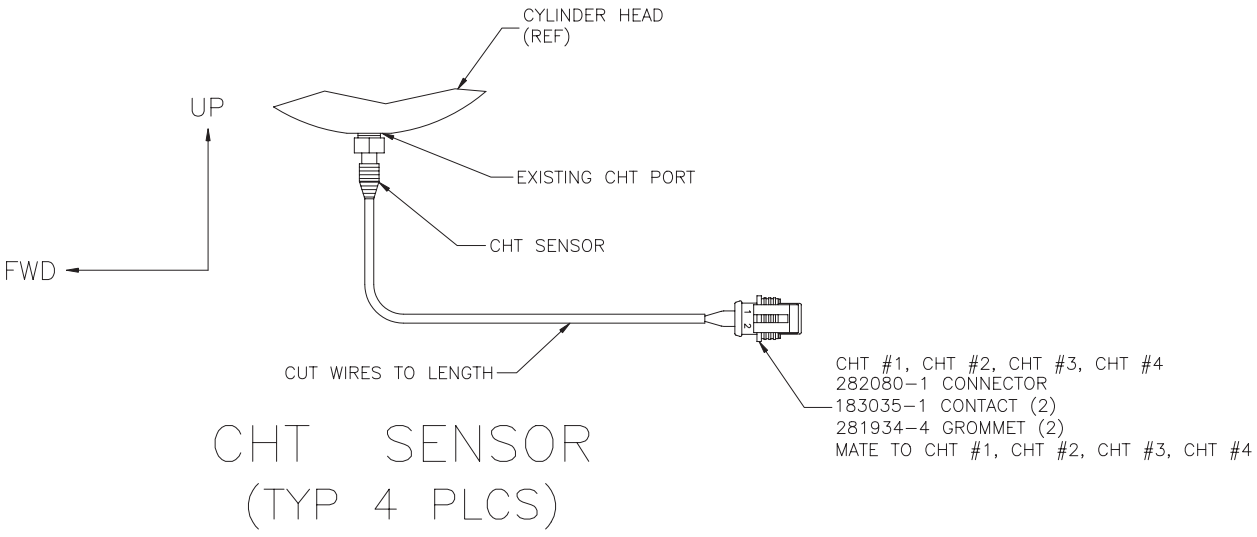

Figure 2-22. CHT Probe

2.7.8 Exhaust Gas Temperature Thermocouples

Four thermocouples are used to measure exhaust gas temperatures. A sensor in installed in each exhaust header primary pipe. An example installation is shown in Figure 2-23.

WIRE COLOR	EGT#1	EGT#2	EGT#3	EGT#4
YELLOW	1	1	1	1
RED	2	2	2	2

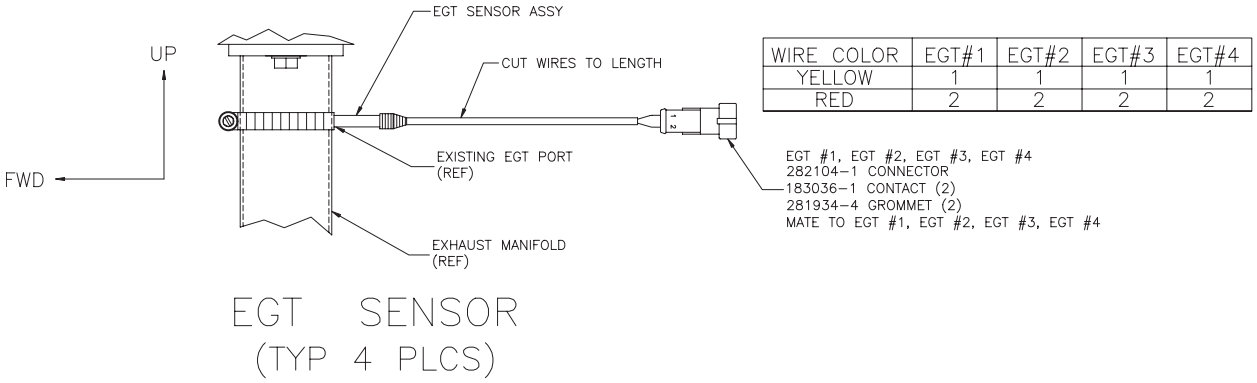

Figure 2-23. EGT Probe

2.7.9 Alternator Current Sensor

A current sensor is used to measure alternator current output. The sensor is installed behind the circuit breaker panel as shown in Figure 2-24.

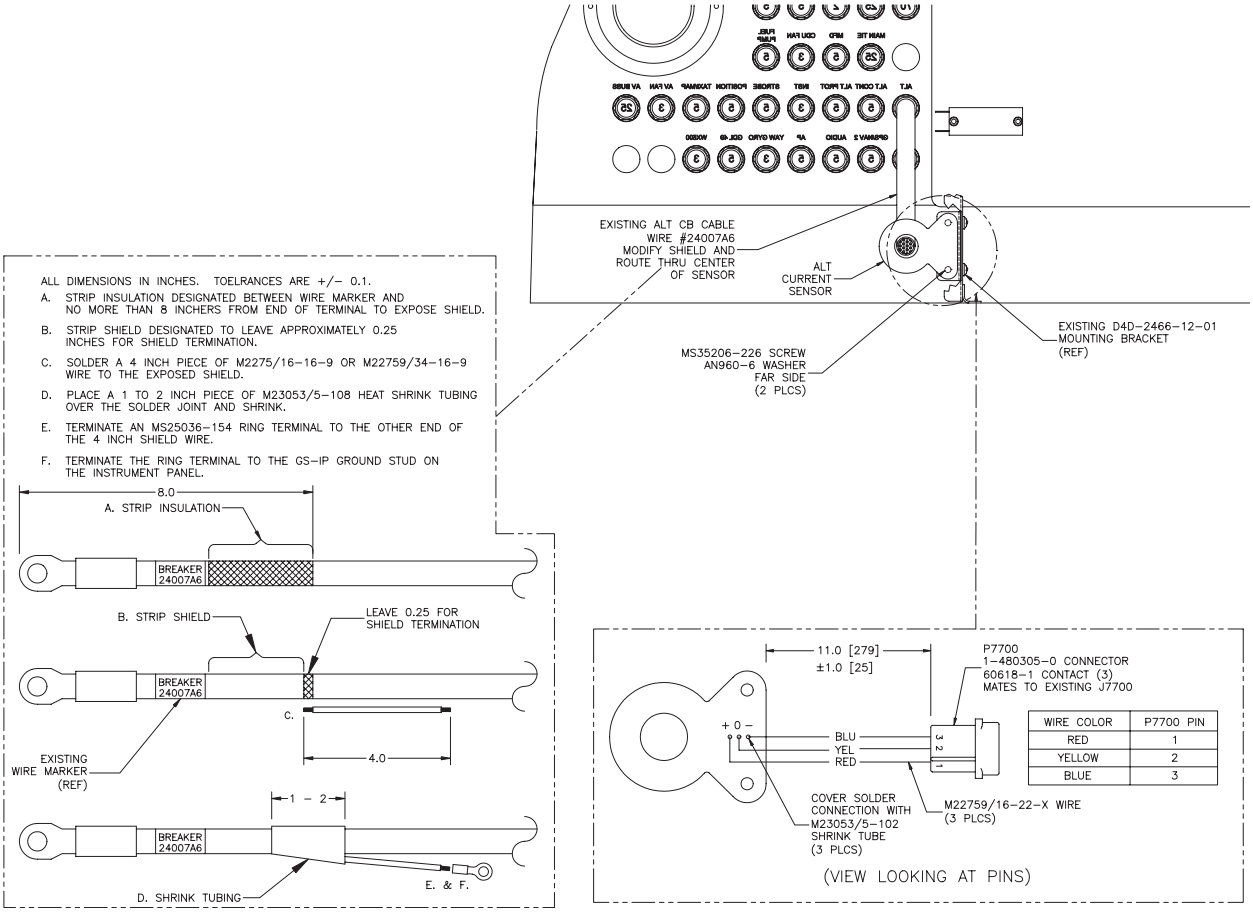

Figure 2-24. Alternator Current Sensor Installation

2.8 G1000 System Communications

2.8.1 Flight Instrumentation

The GRS 77 AHRS, GDC 74A Air Data Computer, and GMU 44 Magnetometer are responsible for providing the G1000 system with flight instrumentation. Data consists 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 only).

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

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

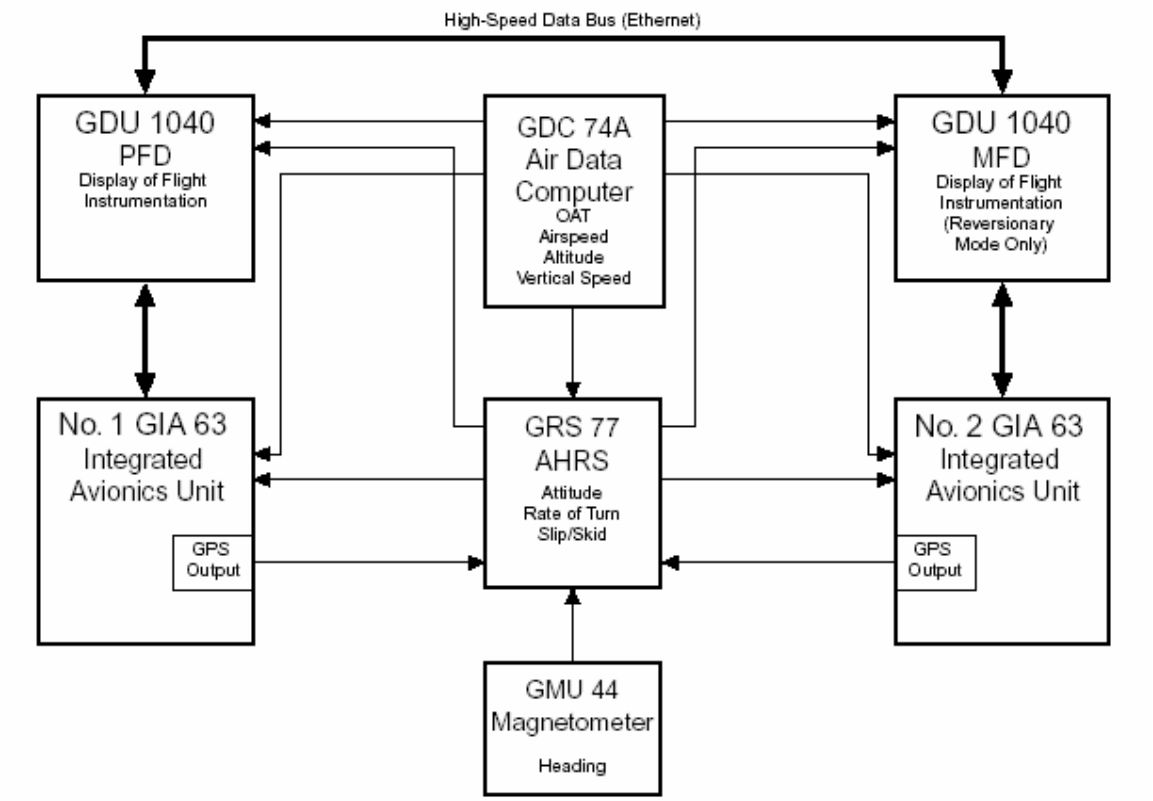

Figure 2-25. Flight Instrumentation Interface

2.8.2 Engine Indicator System

The GEA 71 provides engine/airframe data to the G1000 system. The unit interfaces to transducers shown in Figure 2-25 (see Section 2.1.4). Analog data is received from the transducers and is converted to digital signal by the GEA 71. Digital information is then sent through the primary RS-485 serial path to the #1 GIA 63. From the GIA, data is sent through the HSDB connection to the PFD, then on to the MFD for display. A backup data path from the GEA to the #2 GIA 63, then on to the MFD, exists in the event the primary path fails.

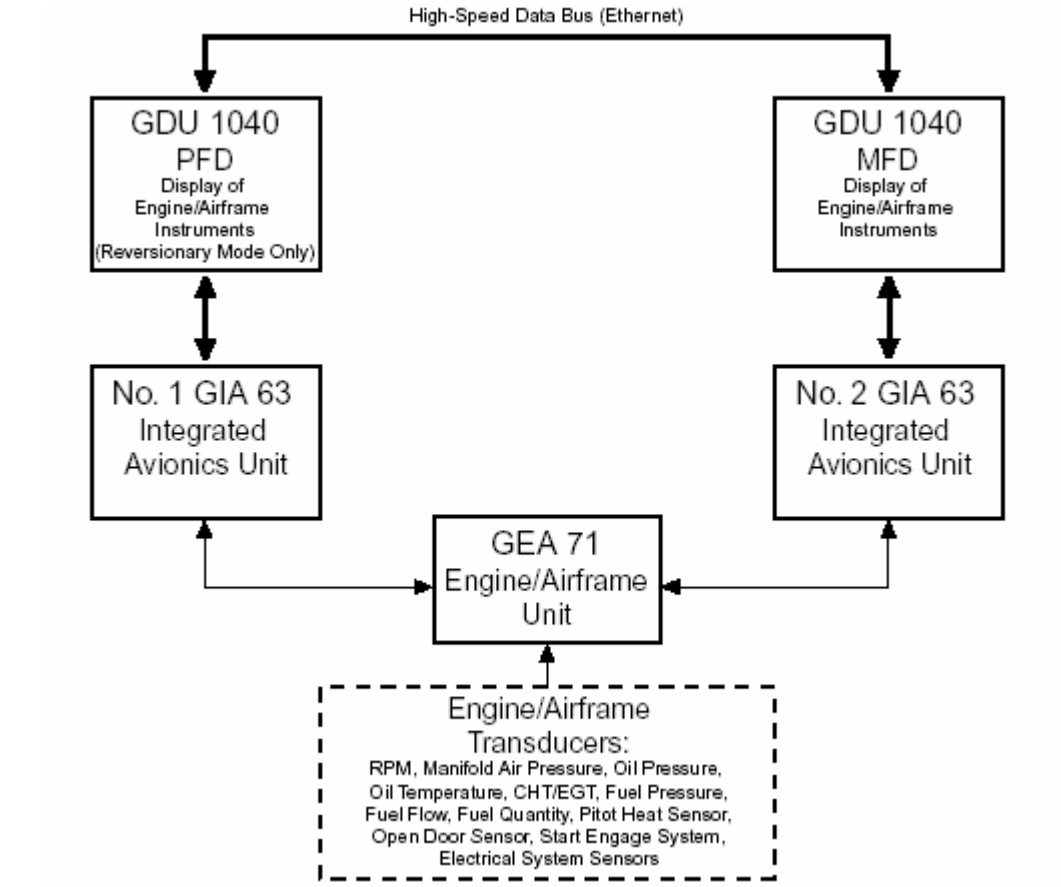

Figure 2-26. G1000 Engine/Airframe Interface

2.8.3 Communications/Navigation Systems

The GIA 63 IAUs contain VHF COM, VHF NAV, and GPS receivers. COM and NAV audio is sent via digital audio to the GMA 1347 Audio Panel.

GPS information is sent to the GRS 77 AHRS and both displays for processing assistance.

The GTX 33 Mode S Transponder communicates with both GIAs. Transponder data is sent from the GIAs to the PFD where control and operation occurs.

The #2 GIA outputs analog HSI signals to the Honeywell KC 140.

The GMA 1347 Audio Panel controls the display reversionary mode.

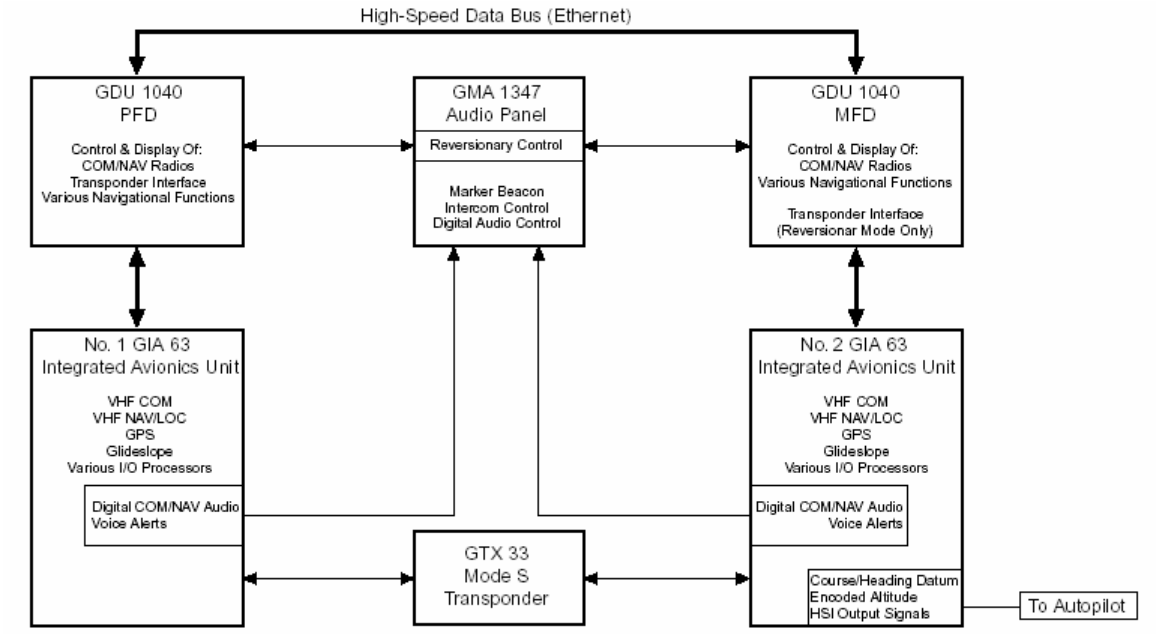

Figure 2-27. G1000 Navigation/Communications

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3 G1000 Control & Operation

All control and operation of G1000 equipment as normally used in flight occurs through the PFD, MFD and GMA 1347 audio panel. Figure 3-1 identifies various GDU 1040 buttons. Figure 3-2 identifies various GMA 1347 buttons.

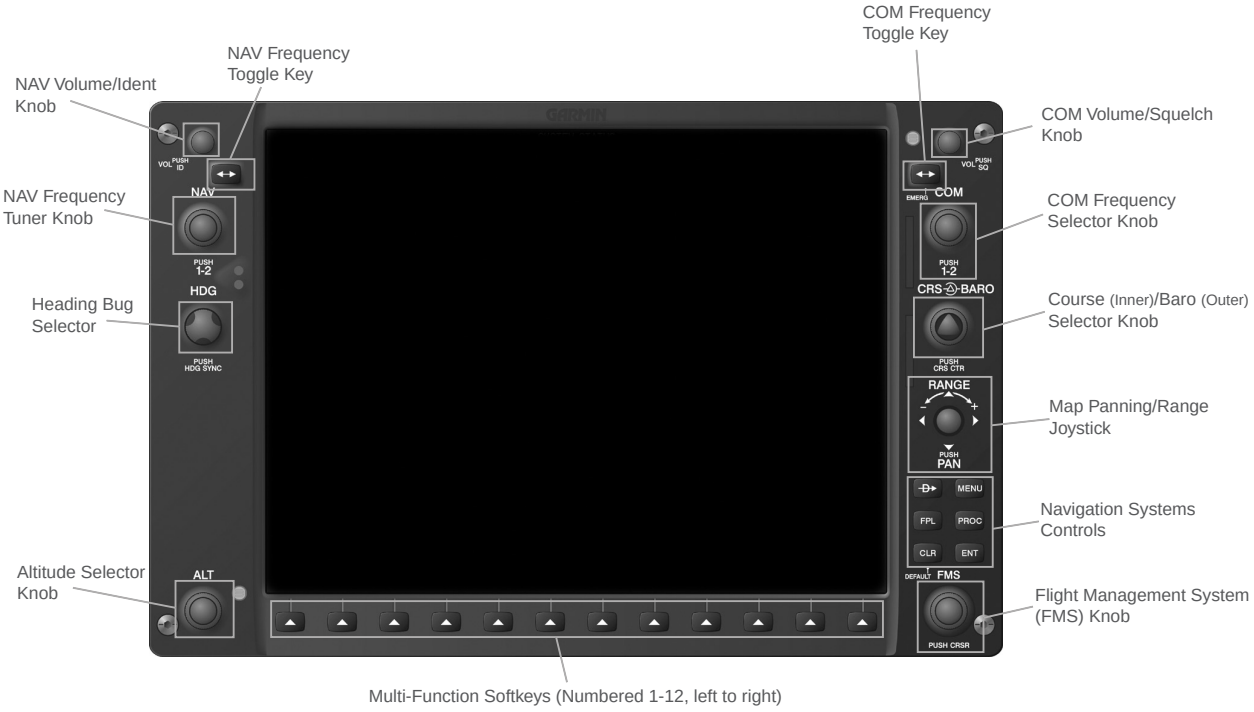

Figure 3-1. GDU 1040 Control Interface

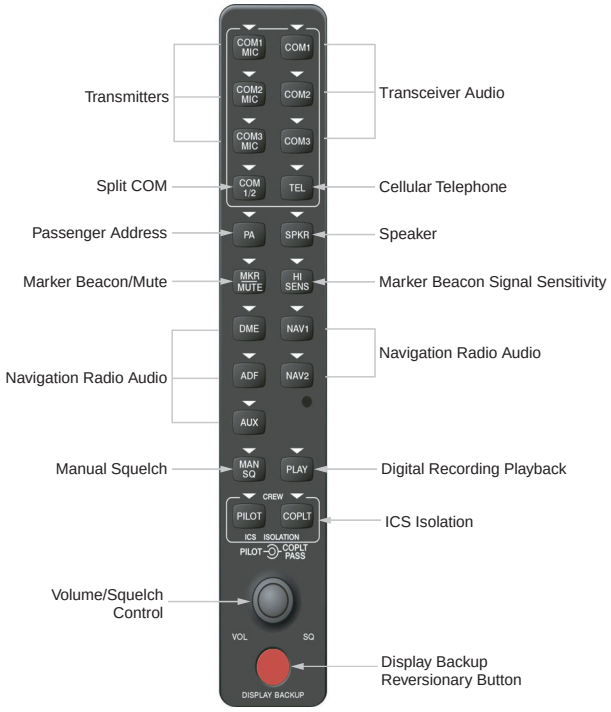

Figure 3-2. GMA 1347 Controls

3.1 User Interface

3.1.1 FMS Knob

The FMS knob is the primary control for the G1000 system. Operation is similar to the Garmin 400/500 Series units.

- To cycle through different configuration screens:

  To change page groups: Rotate the large FMS knob.

  To change pages in a group: Rotate the small FMS knob.
- To activate the cursor for a page, press the small FMS knob directly in, as one would push a regular button.
- 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 either brings up an options menu for the particular field, or in some cases allows the operator to enter data for the field.
- To confirm a selection, press the ENT key.
- To cancel a selection, press the small FMS knob in again, deactivating the cursor. The CLR key may also be used to cancel a selection or deactivate the cursor.

3.1.2 Softkeys

Some pages have commands or selections that are activated by the GDU 1040 softkeys. 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 3-3. G1000 Softkeys

3.2 G1000 Normal Mode

To start the G1000 system in Normal Mode:

1. Turn on the master switch. The following G1000 equipment is powered on:
   - GDU 1040 PFD & MFD (MFD receives power only if 'Essential Bus' switch is OFF)
   - GRS 77 AHRS
   - GDC 74A Air Data Computer
   - No. 1 GIA 63 Integrated Avionics Unit
   - GEA 71 Engine/Airframe Unit
   - GTX 33 Mode S Transponder
2. Turn on the DA 40 avionics switch. The following G1000 equipment is powered on:
   - No. 2 GIA 63 Integrated Avionics Unit
   - GMA 1347 Digital Audio Panel

The G1000 system is now powered in the normal mode. The PFD and MFD will function as specified in the G1000/DA 40 Cockpit Reference Guide, when the system has been correctly installed and configured.

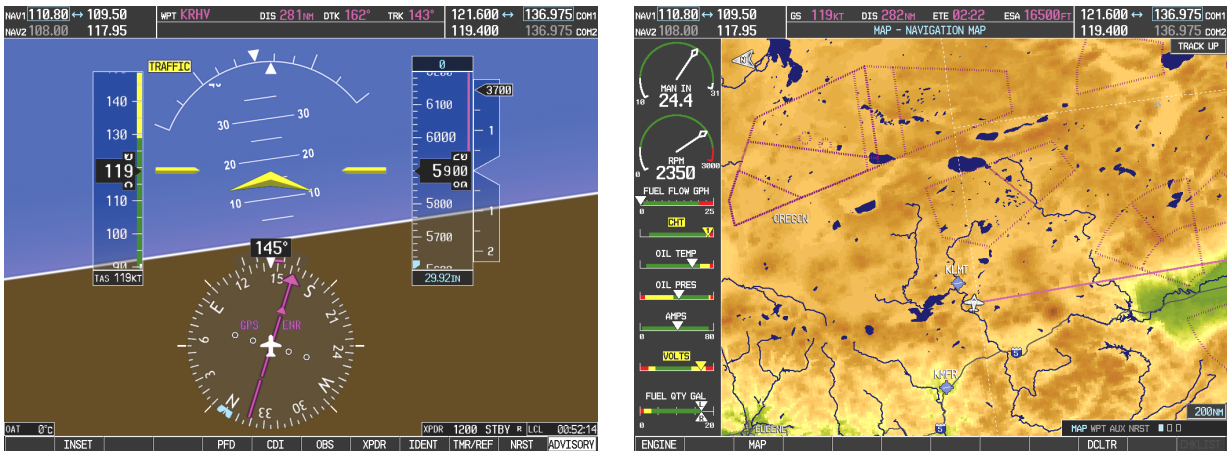

Figure 3-4. Normal Mode

3.3 Reversionary Mode

Should a display communication or hardware failure occur, the G1000 system automatically enters the reversionary mode. The system reversionary mode forces the remaining display into showing all information related to safe flight.

A manual reversionary mode also allows the operator to force the system into reversionary mode in situations where the system does not automatically enter reversionary mode. A large red button on the GMA 1347 audio panel activates the manual reversionary mode.

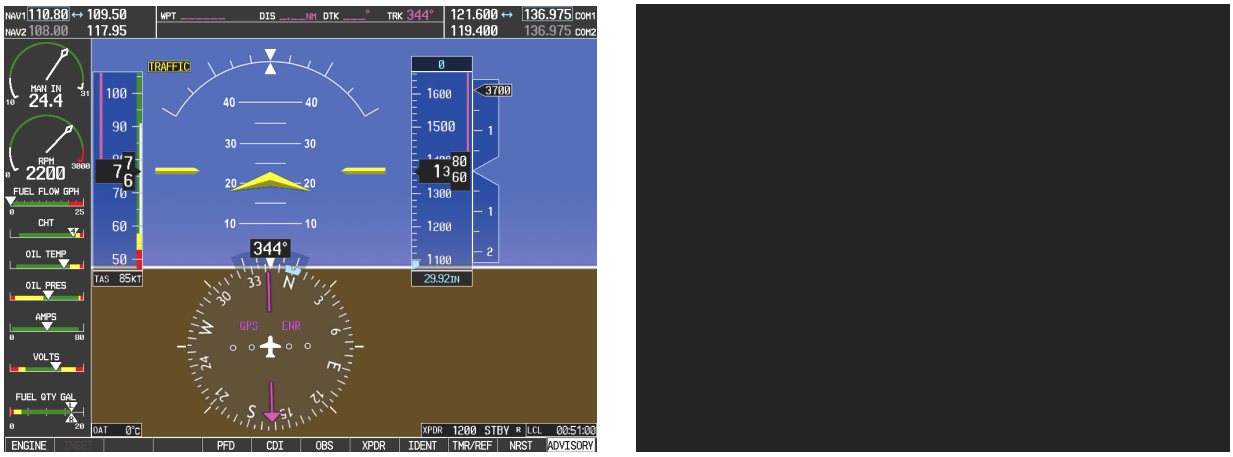

Figure 3-5. MFD Failure Mode

Should the PFD display fail, the MFD automatically enters reversionary mode. In this mode, flight-critical information from the AHRS/Air Data system is displayed on the MFD along with essential engine instrumentation.

Figure 3-6. PFD Failure Mode

3.4 Configuration Mode Overview

The Configuration Mode exists to provide the technician with a means of configuring, checking, and calibrating various G1000 sub-systems. Troubleshooting and diagnostics information can also be viewed in this mode.

To start the system in Configuration Mode:

1. Start the system in normal mode as described in Section 3.2.
2. Remove power to the PFD and MFD by pulling the circuit breakers labeled PFD and MFD.
3. Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
4. Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
5. Power on the MFD in the same manner. It is best to have both displays in Configuration Mode whenever performing post-installation practices.

CAUTION

The Configuration Mode contains certain pages and settings that are critical to aircraft operation and safety. Such 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.

NOTE

For a complete description and breakdown of each Configuration Mode page, refer to the G1000 Configuration Manual, Garmin part number 190-00303-04.

3.4.1 Loader Card Interface

The G1000/DA 40 SW Loader Card interface exists to provide a means of loading software and configuration files to the system and LRUs. The G1000/DA 40 SW Loader Card uses a 128 MB Secure Digital (SD) data card that contains:

- All G1000 LRU Software Files
- All G1000 Configuration Files

All software and configuration files were pre-determined by Garmin and/or Diamond during design of the system. During removal and replacement of LRUs, software and configuration files may need to be reloaded (See Sections 6 & 7). To satisfy TC/STC requirements for the DA 40, it is critical that the technician uses the correct G1000/DA 40 SW Loader Card part number when servicing the G1000 system.

The G1000/DA 40 SW Loader Card part number defines all files specific to the G1000 system as installed in the DA 40. Refer to Appendix A for approved card part numbers. Approved Loader Card part numbers for the DA 40 can also be found in the Required Equipment List, Garmin P/N 005-00149-28.

CAUTION

Always use caution when using SW Loader Cards during maintenance. The G1000 system 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 through procedures given in Sections 5, 6, 7, and/or Appendix B *before* attempting to use the SW Loader Cards.

3.4.2 Configuration Files

A G1000/DA 40 SW Loader Card typically contains the following configuration files:

- AIRFRAME: This file contains data such as airspeed parameters, engine/airframe sensor limitations, fuel tank parameters and alerting system settings that tailor a G1000 PFD or MFD to the DA 40.
- SYSTEM: This file configures the G1000 Ethernet to expect a PFD, MFD, and two GIAs.
- MANIFEST: This file loads a manifest of all software part numbers and versions associated with an approved system configuration.
- MFD1: This file configures MFD serial/discrete communication and alert system settings.
- PFD1: This file configures PFD serial/discrete communication and alert system settings.
- GIA1/GIA2: These files configure GIA1/GIA2 serial/discrete communication settings.
- GMA1: This file configues GMA 1347 audio and serial communication settings.
- GTX1: This file configures GTX 33 transponder and serial communications settings.
- GEA1: This file configures GEA 71 engine/airframe parameters.
- GDC1: This file configures GDC 74A air data values for the DA 40.

The above files are loaded during the configuration processes listed in Section 7 and Appendix B. Each file is sent directly to the applicable LRU. The same file is also stored in PFD internal configuration memory. The PFD also sends a copy of all configuration files to it's connector configuration module. If the PFD is replaced, the configuration module retains all configuration files in the aircraft.

NOTE

The GRS 77 AHRS and GMU 44 Magnetometer do not utilize a configuration file. However, these LRUs do require several calibrations during installation checkout to tailor sensor characteristics to a specific DA 40 airframe. While performing maintenance on these units, re-calibration may be required. See Section 7.7.3 for more information on re-calibration criteria.

3.4.3 Configuration File Storage

The G1000 system is designed to store all configuration settings in various places so that the configuration is retained in the aircraft during maintenance of units. Figure 3-7 and Figure 3-8 illustrate where the various configuration files are stored.

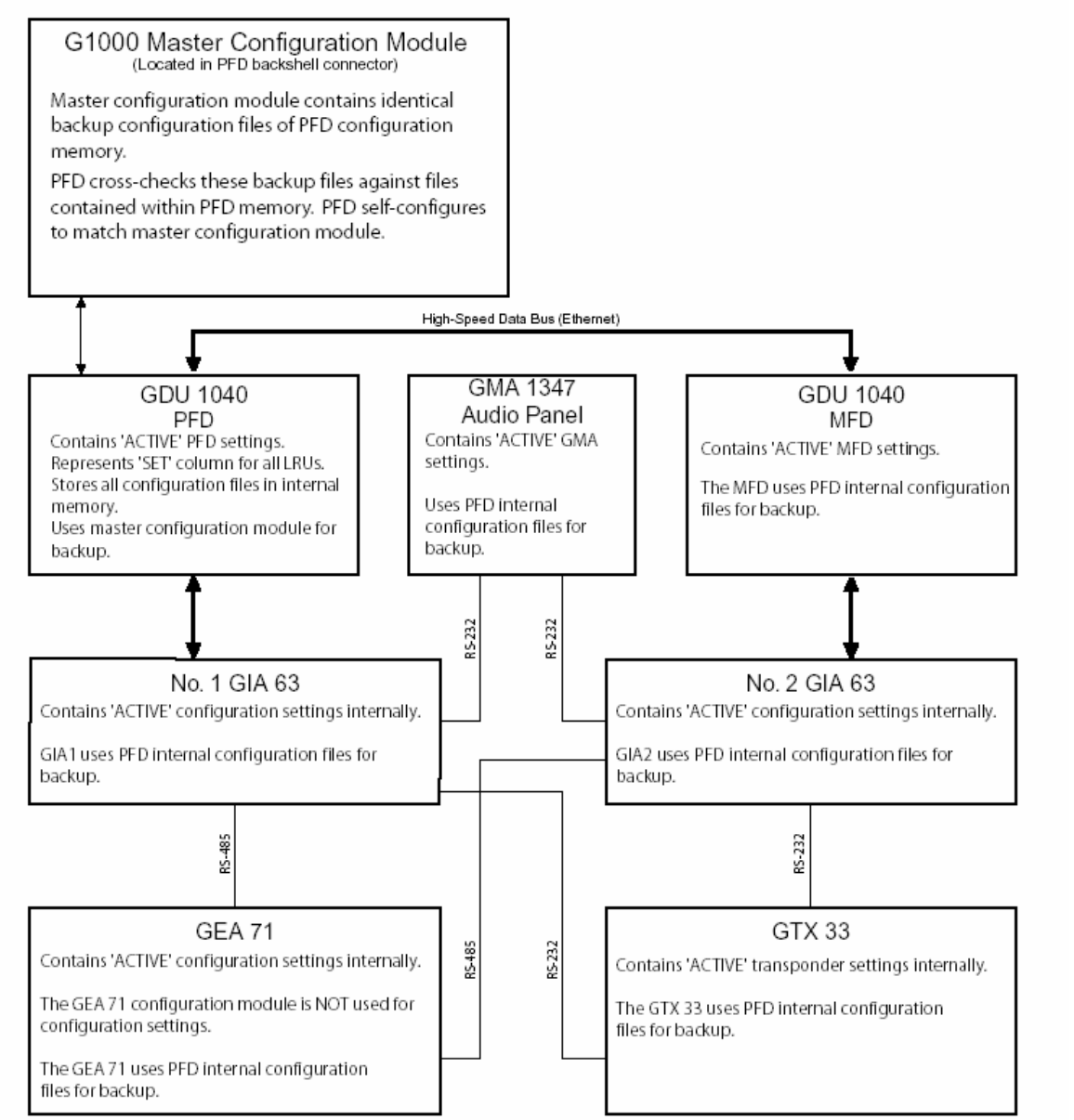

Figure 3-7. G1000 LRU Configuration File Storage

The GRS 77 and GDC 74A configuration modules function differently than the rest of the system. The GDC 74A's configuration file is loaded directly to GDC internal memory. A copy of the file is stored in the GDC configuration module.

The GRS 77 configuration module does not store any configuration settings. Rather, it stores calibration data recorded during installation calibration procedures.

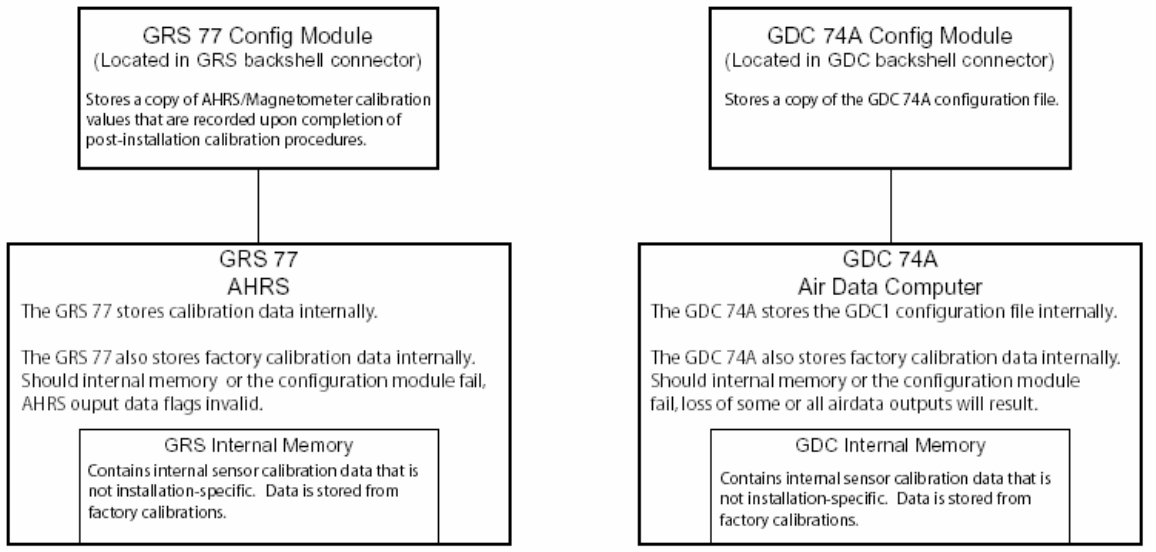

Figure 3-8. GRS/GDC Configuration Settings Storage

3.4.4 SET>ACTV Interface

Throughout various Configuration Mode pages, there are SET and ACTIVE columns for input/output settings and other parameters.

SET: Refers to a setting or group of settings that reside in PFD Internal Memory and/or the Master Configuration Module.

ACTIVE: Refers to an 'active' setting or parameter currently being used by the 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, when available:

- SET>ACTV (read 'Set to Active') softkey: Allows the installer to send the information in the SET column (data stored in the master config module) to the ACTV column (data used by LRU).
- ACTV>SET (read 'Active to Set') softkey: Causes the LRUs current settings to be copied to the master configuration module as SET items.

WARNING

THE ACTV>SET SOFTKEY MUST BE USED WITH CAUTION! IF AN IMPROPERLY CONFIGURED UNIT IS INSTALLED, THIS SOFTKEY CAUSES THE WRONG CONFIGURATION TO REPLACE THE CORRECT AIRCRAFT CONFIGURATION!

In the first example shown in Figure 3-9, the SET columns do not match the ACTIVE columns. The inequality between SET and ACTIVE indicates a configuration mismatch. By pressing the SET>ACTV softkey, this copies the SET column to the LRU unit's configuration memory. The settings then become the ACTIVE settings for the LRU being configured.

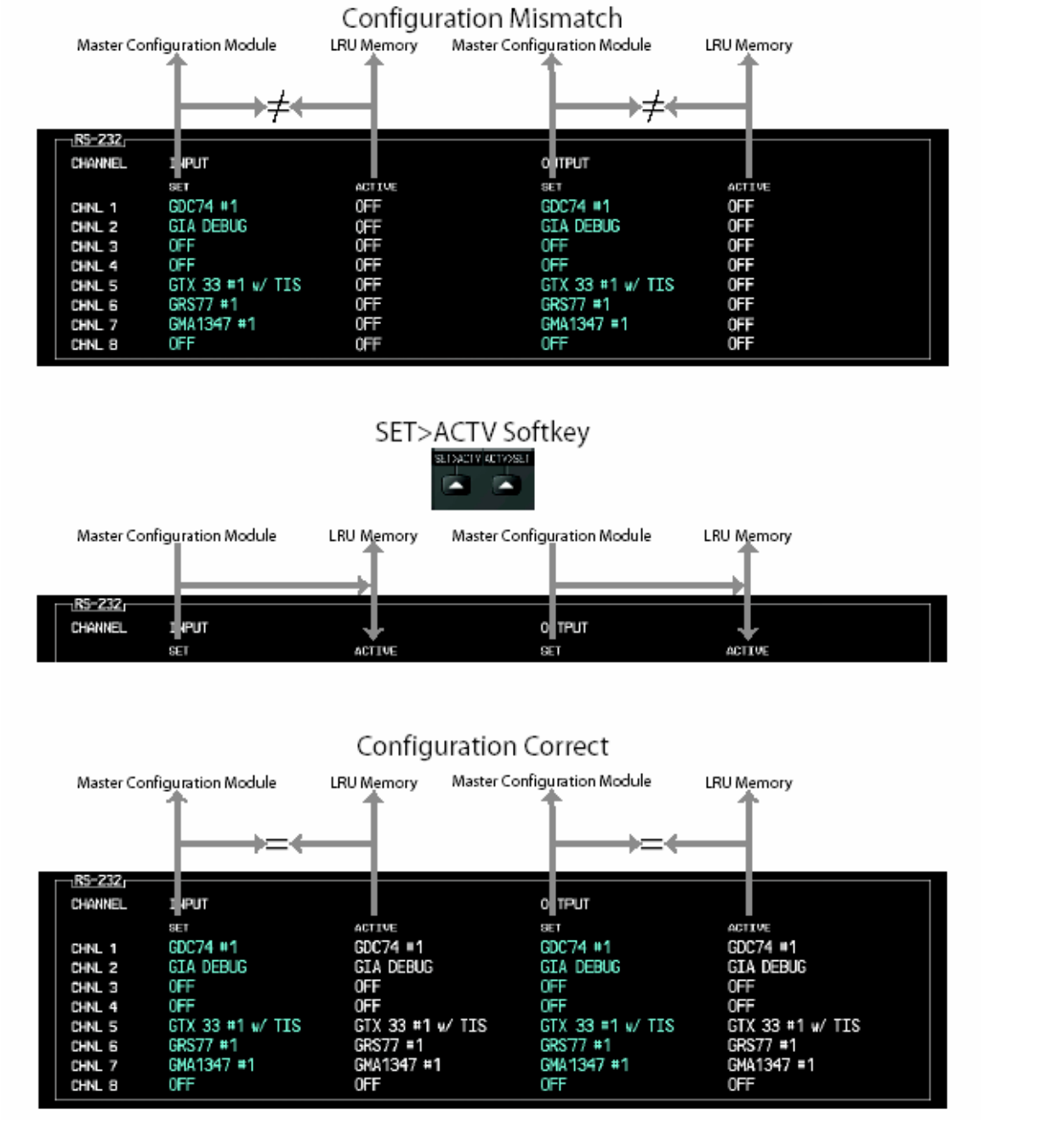

Figure 3-9. SET>ACTV Diagram

When troubleshooting the system, technicians can look for inequalities between SET and ACTIVE columns. Certain problems can be resolved simply by pressing the SET>ACTV softkey, which reloads settings to the specific LRU from the PFD. (Note that this can also be accomplished by reloading the configuration files for the LRU, using the G1000 SW Loader Card. Section 7 describes this method for each LRU).

A blank active column, as shown in Figure 3-10, represents loss of communication between the display and the particular unit. See Section 5 for more details on troubleshooting.

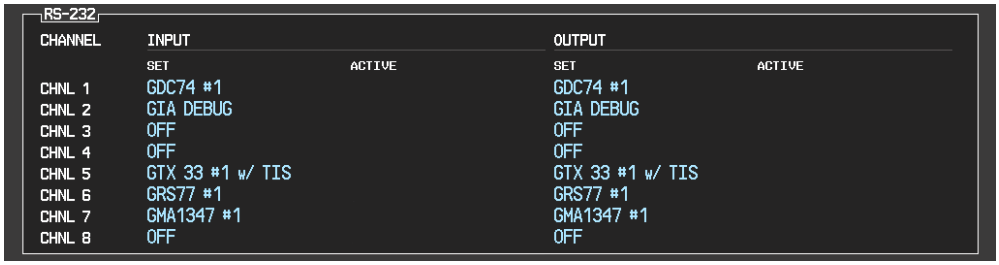

Figure 3-10. Loss of Communication

3.4.5 Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in Figure 3-11. Section 7 and Appendix B show other prompts encountered during the configuration process.

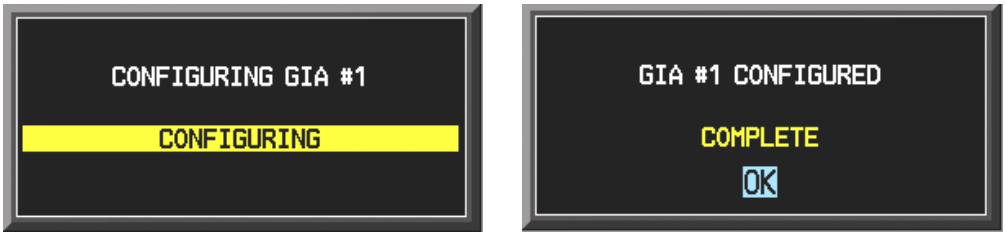

Figure 3-11. Configuration Status

3.4.6 Data Transmission Indicators

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

- Green Light: Expected data is successfully received and is ON. A green light could also indicate that the parameter/component is working correctly.
- Red Light: Expected data is not received. A red light could also indicate that a parameter/component is invalid.
- No Light (Black): Expected data is successfully received and is OFF, or no data is expected. A black light could also indicate that the parameter/component is not responding.

Figure 3-12. Data Transmission Indicators

3.5 Configuration Mode Navigation

Using the FMS knob as described in Section 3.1.1 a user can navigate through different pages and page groups in the Configuration Mode. For complete description and breakdown of each page, refer to the G1000 Configuration manual, Garmin part number 190-00303-04.

The following diagram shows the layout and organization of Configuration Mode page groups and pages.

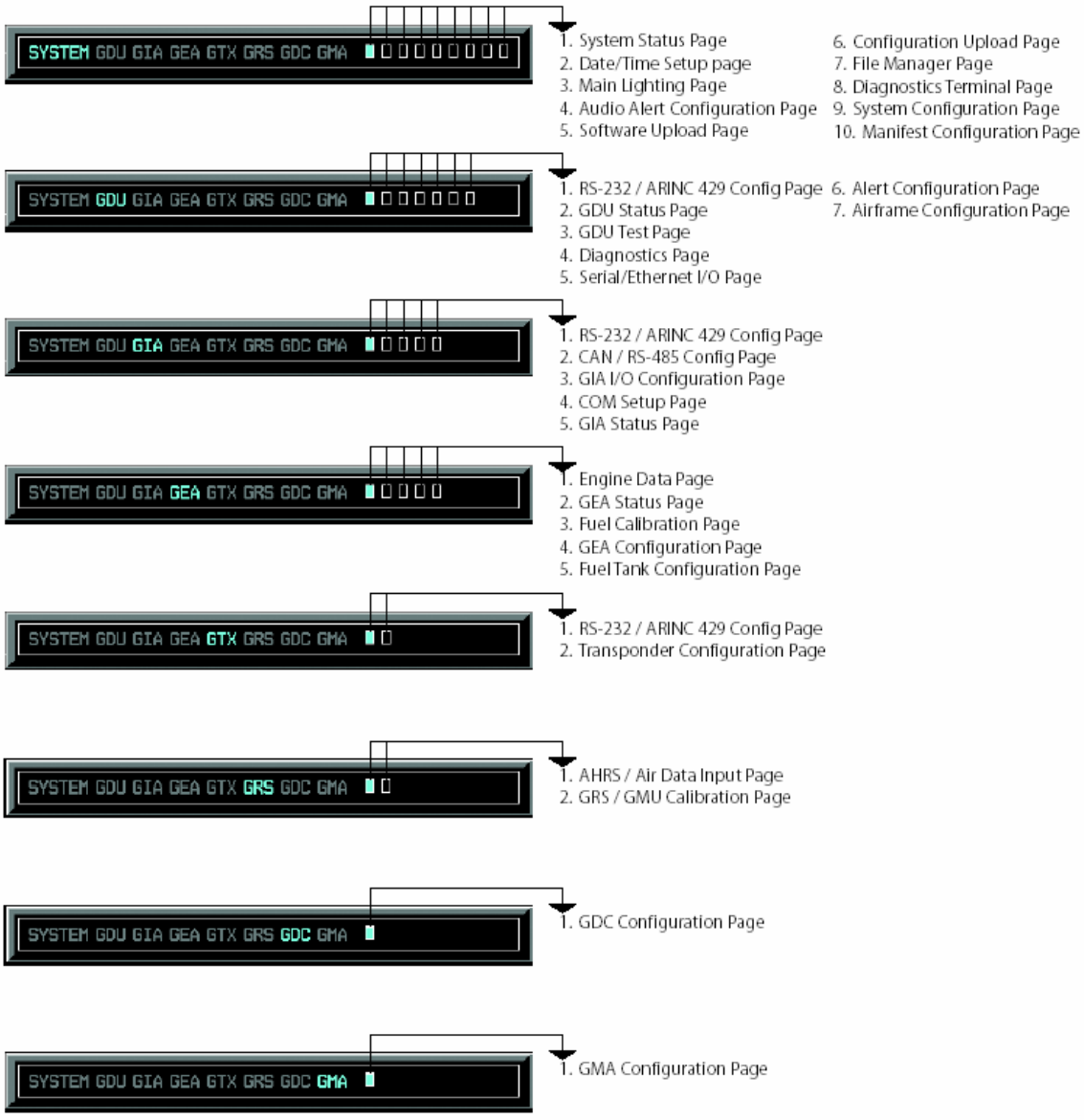

Figure 3-13. Configuration Page Navigator

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4 G1000 Continued Airworthiness

4.1 Airworthiness Limitations

The G1000 integrated cockpit is airworthy when installed and configured in accordance the STC issued under FAA Project #ST3636WI-A. The Airworthiness Limitations section is FAA-approved and specifies maintenance required under §§ 43.16 and 91.403 of Title 14 of the Code of Federal Regulations, unless an alternative program has been FAA-approved.

The G1000 system possesses the following maintenance airworthiness limitations:

Every 2 years, replace all lightning protection 3.2 Amp slow-blow fuses. There are five total fuses in the following locations:

- Two fuses mounted behind the instrument panel, near the circuit breaker panel. Each fuse in wired inline with a voltage suppressor.
- Three fuses mounted on the field-fabricated lightning protection component block, which is attached to the forward portion of the remote avionics enclosure. Each fuse is mounted to the side of the block, and each is labeled.

Replacement consists of twisting each fuse holder cap counter-clockwise, removing each fuse and replacing with a new fuse. For detailed drawings, see Section 2.5.

There are no other maintenance airworthiness limitations associated with this type design change. The G1000/DA 40 Airplane Flight Manual Supplement defines all other airworthiness limitations.

4.2 Servicing Information

G1000 LRU maintenance is 'on condition' only. No component-level overhaul is required for this type design change.

4.3 On Condition Servicing

'On Condition' replacement and/or servicing should occur when an item exhibits conditions, symptoms, and/or abnormalities defined in Section 5 of this manual. Replacement and/or servicing should be made only after the technician troubleshoots the system to the extent determined necessary by using the guidance in this manual along with common maintenance practices.

IMPORTANT

It is impossible to provide guidance for every conceivable failure scenario within the scope of this manual. Every effort has been made to provide comprehensive guidance for possible failures. The information in this document should always be combined with common sense and a thorough knowledge of the system. Use sound avionics maintenance practices when working around or on G1000 equipment.

The remainder of this document is organized in the following fashion:

- Section 4.3 lists maintenance requirements related to the G1000 system.
- Section 6 gives instructions regarding the removal and replacement of G1000 equipment and parts.
- Section 7 gives configuration and testing instructions to be accomplished if G1000 equipment or parts are removed/replaced.
- Section 8 specifies system return-to-service procedures.

Before removing any G1000 LRU, it is required that technicians verify the LRU software version and part numbers against Appendix A. The beginning of Section 6 provides instructions to check the software part number and version of each LRU before removing a unit. Procedures in Section 7 require the same check after LRU replacement and software loading.

4.3.1 Recommended Tools

The following tools are needed to perform maintenance tasks on G1000 equipment:

- Mili-ohm Meter, OR
  - ✓ Agilent 34410A Ammeter or equivalent
  - ✓ Fluke 187 Voltmeter or equivalent
  - ✓ Power Supply capable of providing 1 amp current
- #2 Phillips Screwdriver
- 3/32nd Hex Tool
- Digital Level (Required for AHRS 'Procedure A' Calibration)
- A VHF NAV/COM/ILS ramp tester or equivalent.
- A transponder ramp tester or equivalent.
- A pitot/static ramp tester.
- Outdoor line-of-site to GPS satellite signals or GPS indoor repeater.
- Headset/Microphone.
- Ground Power Unit (Capable of supplying 28 Vdc)

4.4 Maintenance Requirements

The following table shows systems and items that must undergo tests or checks at specific intervals. If the interval is shown to be in flight time as well as calendar years, the first interval reached should be used as the limit.

Table 4-1. Required Maintenance

Item	Description/Procedure	Interval	Initials
G1000 LRUs			
GDU 1040 PFD & MFD	See Section 6.1 for removal & replacement.	**On Condition**	
GMA 1347	See Section 6.2 for removal & replacement.	**On Condition**	
GIA 63 IAU (Qty. 2)	See Section 6.3 for removal & replacement.	**On Condition**	
GEA 71 EAU	See Section 6.4 for removal & replacement.	**On Condition**	
GTX 33 Mode S Transponder	See Section 6.5 for removal & replacement.	**On Condition**	
	Test according to Title 14 CFR §§ 91.411 and 91.413 as well as Part 43 Appendix F. See Section 7.5.3.	**1000 Hours or 2 Years**	
GDC 74A	See Section 6.6 for removal & replacement.	**On Condition**	
	Pitot/Static Leak Test. See Section 7.6.3.	**1000 Hrs or 2 Years**	
	Altimeter Function Test. See Section 7.6.3.	**2000 Hours or 4 Years**	
	Airspeed Function Test. See Section 7.6.3.	**2000 Hours or 4 Years**	
	Vertical Speed Function Test. See Section 7.6.3.	**2000 Hours or 4 Years**	
GRS 77 AHRS	See Section 6.7 for removal & replacement	**On Condition**	
	Magnetic variation database update. See Section 4.7.	**On Condition**	
GMU 44 Magnetometer	See Section 6.7.1 for removal & replacement.	**On Condition**	

G1000 Accessories			
Configuration Module Replacement (Qty 4)	See Section 6.8 for removal & replacement.	**On Condition**	
OAT Probe	See Section 6.6.1 for removal & replacement. Refer to Section 2.1.6.1 for installation drawing.	**On Condition**	
PFD, MFD, & GIA Cooling Fans (Qty 3)	Refer to Figure 2-2 and/or Figure 2-7 for installation drawings.	**On Condition**	

Table 4-1. Required Maintenance, Cont.

Item	Description/Procedure	Interval	Initials
G1000 Lightning Protection			
GIA / AHRS Resistors	Replace all three resistors located at the remote avionics enclosure. Refer to Section 2.5.2 for installation drawings.	**Replace After Suspected / Actual Lighting Event**	
TVS Unit Replacement (Qty 5)	Replace all five voltage suppressor units: ✓ Battery & Alternator Voltage Suppressors are located behind instrument panel near the circuit breakers ✓ GIA1, GIA2, and AHRS Voltage Suppresors are located at the remote avionics enclosure. Refer to Section 2.5 for installation drawings.	**Replace After Suspected / Actual Lighting Event**	
3.2 Amp Slow-blow Fuse Replacement (Qty 5)	Replace all five 3.2 Amp slow-blow fuses: ✓ Battery & Alternator side fuses are located behind the instrument panel near the circuit breakers. ✓ GIA1, GIA2, and AHRS fuses are locate at the remote avionics enclosure. Refer to Section 2.5 for installation drawings.	**Every 2 Years or After Suspected / Actual Lighting Event**	
Visual Inspection	Perform a visual inspection following the procedure given in Section 4.5.	**1000 Hours**	
Electrical Bonding Test	Perform a bonding resistance check of all G1000 equipment as described in Section 4.6.	**1000 Hours or After Suspected / Actual Lighting Event**	
Engine/Airframe Sensors			
MAP Sensor	Refer to Section 2.4.1 for installation drawing.	**On Condition**	
Oil Pressure Sensor	Refer to Section 2.4.2 for installation drawing.	**On Condition**	
Oil Temperature Sensor	Refer to Section 2.4.3 for installation drawing.	**On Condition**	
Fuel Pressure Sensor	Refer to Section 2.4.4 for installation drawing.	**On Condition**	
Tach Sensor	Refer to Section 2.4.5 for installation drawing.	**On Condition**	
Fuel Flow Sensor	Refer to Section 2.7.6 for installation drawing.	**On Condition**	
CHT Probes (Qty 4)	Refer to Section 2.7.7 for installation drawing.	**On Condition**	
EGT Probes (Qty 4)	Refer to Section 2.7.8 for installation drawing.	**On Condition**	
Alternator Current Sensor	Refer to Section 2.7.9 for installation drawing.	**On Condition**	
Fuel Tank Quantity Sending Units	Should one or both fuel quantity transducers fail, replace according to instructions in Diamond DA 40 Aircraft Maintenance Manual. **The new replacement fuel quantity probe(s) must be re-calibrated according to the procedure set forth in Section 4.7.**	**On Condition**	

4.5 1000 Hour Inspection

Perform a visual inspection every 1000 airframe hours and check for corrosion, damage, or other defects for each of the items listed in Table 4-2. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors. Follow guidance in Section 6 for equipment removal and replacement. Refer to the Diamond DA 40 Airplane Maintenance Manual for instructions on removing any access panels.

Table 4-2. 1000 Hour Inspection Procedure

Item	Description/Procedure	Initials
To gain access for the following inspections: 1. Remove the instrument panel cover as described in the DA 40 Aircraft Maintenance Manual.		
GDC 74A Air Data Computer	a) Visually inspect the GDC 74A unit, mount, and connector for corrosion or other defects. b) Ensure that pitot/static plumbing is secure and in good condition.	
GEA 71 Engine/Airframe Unit	a) Inspect the GEA 71 unit, rack, and connectors for corrosion or other defects.	
Battery & Alternator Voltage Suppressors (2)	a) Inspect both voltage suppressors and associated wiring for cracks, chaffing, or other defects. b) Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that the fuse is in good condition.	
CDU Fans	a) Inspect both CDU fans for accumulation of dirt and other damage. Remove excess dirt as required. b) Ensure that both fans are operational.	
GDU 1040 MFD & PFD	a) Remove the MFD and PFD as described in Section 6. b) Inspect the mounting surface, copper bonding fingers and connector for corrosion, heavy oxidation, or other damage. c) Reinstall the MFD and PFD.	
To gain access for the following Inspections: 1. Remove rear baggage compartment floor. 2. Remove baggage compartment shell. Refer to the DA 40 Aircraft Maintenance Manual for removal instructions.		
GRS 77	a) Inspect the GRS 77 unit, rack, and connector for corrosion or other defects. b) Inspect both braided ground straps to the GRS rack and ensure they are in good condition.	
Remote Avionics Enclosure	a) Inspect the outer area around the enclosure for damage. b) Inspect the antenna connection junction. c) Inspect the aluminum ground strap. d) Inspect the GIA/AHRS voltage suppressors, resistors, and fuses mounted to the front of the enclosure (refer to Section 2.5 for drawings): i. Inspect each voltage suppressor and associated wiring for cracks, chaffing, or other defects. ii. Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that each fuse is in good condition. iii. Inspect each lightning protection resistor and associated wiring for cracks, chaffing, or other defects. e) Loosen the screws securing the top half of the avionics enclosure. f) Remove the top half of the enclosure and inspect the bottom mounting tray and all connectors. g) Reinstall the top avionics enclosure.	

Item	Description/Procedure	Initials
GIA Avionics Fan	a) Inspect remote avionics fan for dirt accumulation and other damage. Remove excess dirt as required. b) Ensure that the fan is operational.	
The GMU 44 is mounted below the starboard wing. Refer to Figure 2-5 and Figure 2-6 for the following inspection.		
GMU 44	a) Remove the three Phillips screws holding the GMU access plate to the wing. b) Carefully lower the assembly and inspect the GMU 44 and rack. c) Inspect the mounting hardware and GMU 44 for corrosion or other damage. d) Reinstall the GMU 44 beneath the wing.	

IMPORTANT

For all other equipment installed under this STC listed in this maintenance manual, use the inspection procedures set forth in Chapter 05 of the DA40 Airplane Maintenance Manual.

4.6 Electrical Bonding Test

The airframe bonding test is described in the DA40 AMM in Section 51-80-00 on Page 201. The following bonding test is provided for G1000-equipped DA 40 aircraft as a requirement beyond what is given in Section 51-80-00.

4.6.1 Requirements

All G1000 equipment must be installed. Remove the instrument panel cover, baggage compartment floor, and baggage compartment to gain access to required areas. Remove the co-pilot seat to gain access to the OAT probe base, following instructions in the DA 40 AMM.

4.6.2 Test Equipment

A mili-ohm meter and Kelvin probes are recommended for this test. However, a standard voltmeter, power supply, and ammeter may be substituted. The following procedure is written using the voltmeter, power supply and ammeter. All test equipment must have valid calibration records.

4.6.3 Procedure

1. Connect the positive lead of the power supply to the engine compartment grounding bracket (battery negative connection to the airframe). Connect/touch the positive lead of the voltmeter to the same point.

   NOTE

   Ensure that the voltmeter and power supply probes do not touch, so as not to induce contact resistance.

2. Touch negative lead of power supply to each of the test points listed while performing Step 3. At each point, configure the power supply to produce 1 amp before measuring voltage. (Use an ammeter to ensure current is within 1 amp ±1 mili-amp at each point)
3. Set the voltmeter to measure mili-volts and null the reading. Measure the voltage from the engine grounding bracket to each of the following points and record the voltage. (Perform Step 2 at each point to ensure that exactly 1 amp ±1 mili-amp is present before measuring)
   a) Top metal case of PFD: _____ mili-volts
   b) Top metal case of MFD: _____ mili-volts
   c) Top metal case of GMA 1347: _____ mili-volts
   d) GEA 71 Body: _____ mili-volts
   e) GDC 74A Body: _____ mili-volts
   f) OAT Probe Base Nut (inside fuselage): _____ mili-volts
   g) GIA 1 Top: _____ mili-volts
   h) GIA 2 Top: _____ mili-volts
   i) GTX 33 Top: _____ mili-volts
   j) GRS 77 metal base: _____ mili-volts
4. Ensure that at each point, no more than 2.5 mili-volts (2.5 mΩ) are present. In this case, voltage is equivalent to resistance (Ω), given that precisely 1 amp reference current is present.

4.7 Fuel Tank Probe Re-Calibration

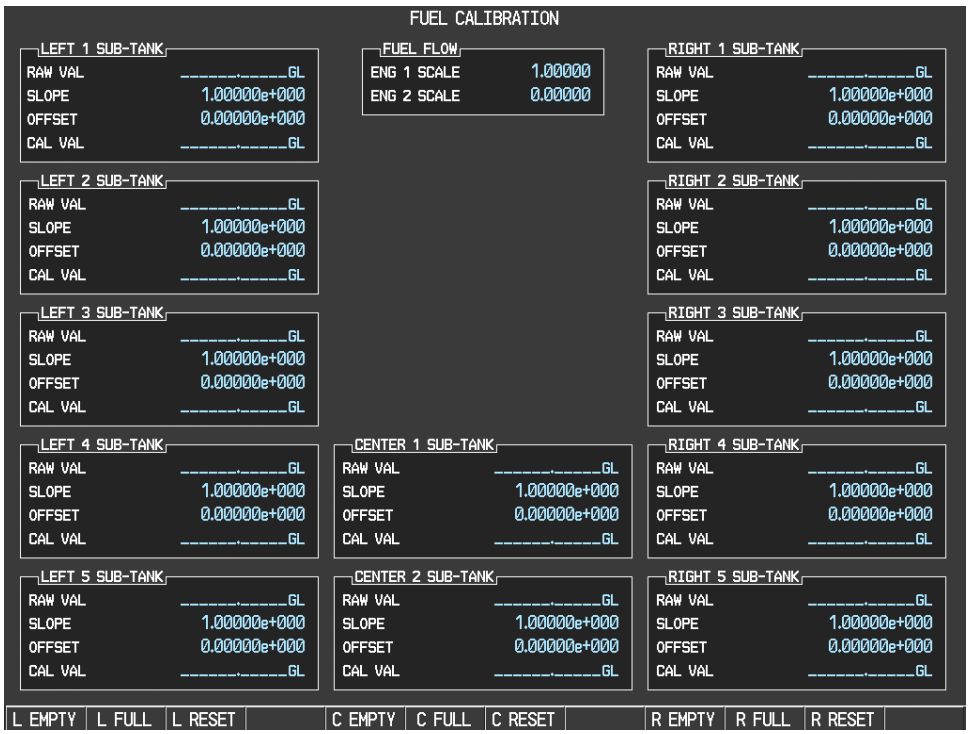
The fuel tank quantity probes are calibrated at the aircraft factory to ensure their measuring accuracy. Should either fuel tank probe fail and require replacement, the new probe(s) must be calibrated by performing the following procedure.

1. Level the aircraft, following instructions in the DA40 Airplane Maintenance Manual.
2. Fill each fuel tank with 0.5 gallons fuel (unusable fuel, refer to DA 40 AFM). Use proper precautions when handling fuel. Ensure that the aircraft is grounded correctly and that there is adequate ventilation.

NOTE

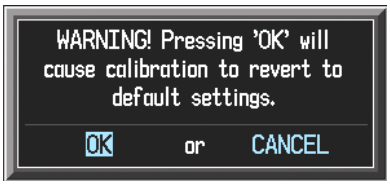
Each time the G1000 system is powered down, it is imperative that the system be allowed to stabilize for *AT LEAST* three minutes before proceeding with the procedure.

3. Start the PFD and MFD in Configuration Mode.
4. On the PFD, go to the GEA Page Group (this procedure must be performed using only the PFD).
5. Select the Fuel Calibration page (3rd page in GEA group), shown below:

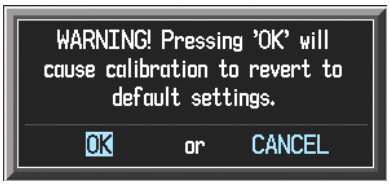


6. This page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence:
    a) softkey 12 (Far Right softkey)
    b) softkey 11
    c) softkey 10
    d) softkey 9

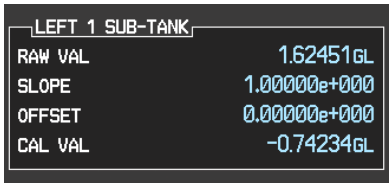
7. Press the L RESET softkey. Press ENTER to acknowledge the following prompt:

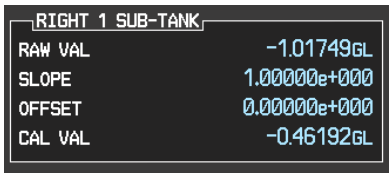


8. Ensure that the CAL VAL indication for the Left 1 Sub-Tank is stable.
9. Press the L EMPTY softkey.
10. Press the R RESET softkey. Press ENTER to acknowledge the following prompt:



11. Ensure that the CAL VAL indication for the Right 1 Sub-Tank is stable.
12. Press the R EMPTY softkey.
13. Observe the CAL VAL indications for both Right 1 and Left 1 Sub-Tanks and record the readings in the following tables. The CAL VAL values should fall between –1 and 0 as shown in the following examples:



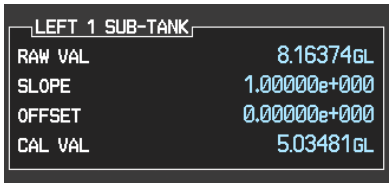


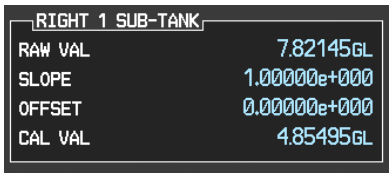
LEFT 1 SUB-TANK				
Actual Useable Fuel	**Calibrated Value (CAL VAL) Range**		**Record Actual Indicated CAL VAL Here**	**Is CAL VAL Within Specified Range? Yes / No**
	Minimum Allowed Indication	Maximum Allowed Indication		
0	-1	0		
5	4	6		

RIGHT 1 SUB-TANK				
Actual Useable Fuel	**Calibrated Value (CAL VAL) Range**		**Record Actual Indicated CAL VAL Here**	**Is CAL VAL Within Specified Range? Yes / No**
	Minimum Allowed Indication	Maximum Allowed Indication		
0	-1	0		
5	4	6		

14. Fill each fuel tank with 5 gallons ± 0.1 gallons usable fuel.
15. Allow the system to stabilize before taking readings.

16. Record '5 gallon' CAL VAL indications for both Right 1 and Left 1 Sub-Tanks in the tables above. The CAL VAL values should fall between 4 and 6 gallons as shown in the following examples:





a) If both CAL VAL values fall within the specified ranges, the calibration is finished.

b) If any CAL VAL value is outside of the specified ranges, perform the full-tank calibration procedure in Section 4.7.1.

4.7.1 Full Tank Calibration

Perform this procedure ONLY if the preliminary calibration failed. Only the failed tank(s) need to be calibrated at full fuel level.

1. Fill the failed fuel tank(s) to maximum capacity.
2. Allow system to stabilize.
3. Ensure that the CAL VAL indication for the failed tank is stable before proceeding.
4. If the right tank failed, press the R FULL softkey. Likewise, if the left tank failed, press the L FULL softkey.
5. Drain the failed fuel tank(s).
6. Add 0.5 gallons (unusable fuel) to the failed tank(s).
7. Observe the CAL VAL indications for the failed tank(s) and record the readings in the following tables. The CAL VAL values should fall between –1 and 0 for the failed tank(s).

FAILED LEFT 1 SUB-TANK				
Actual Useable Fuel	**Calibrated Value (CAL VAL) Range**		**Record Actual Indicated CAL VAL Here**	**Is CAL VAL Within Specified Range? Yes / No**
	Minimum Allowed Indication	Maximum Allowed Indication		
0	-1	0		
5	4	6		

FAILED RIGHT 1 SUB-TANK				
Actual Useable Fuel	**Calibrated Value (CAL VAL) Range**		**Record Actual Indicated CAL VAL Here**	**Is CAL VAL Within Specified Range? Yes / No**
	Minimum Allowed Indication	Maximum Allowed Indication		
0	-1	0		
5	4	6		

8. Fill the failed fuel tank(s) with 5 gallons ± 0.1 gallons usable fuel.
9. Allow the system to stabilize before taking readings.
10. Record '5 gallon' CAL VAL indications for the failed tank(s) in the tables above.

a) If the CAL VAL value(s) fall within the specified ranges, the calibration is finished.

b) If any CAL VAL value is outside of the specified ranges, the fuel quantity system requires service.

4.8 GRS 77 Earth Magnetic Field Updates

The GRS 77 utilizes an Earth magnetic field model which is updated once every five years. The update is expected to be available from Garmin in each of the following years: 2005, 2010, 2015, and every five years thereafter, so long as the GRS 77 remains a Garmin-supported product.

The G1000 system alerts the operator that the magnetic field database is out of date by issuing the message "AHRS SERVICE – AHRS Magnetic-field model needs update" (Ref. Section 5.11). Contact Garmin for update instructions.

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5 TROUBLESHOOTING

This section provides instructions and guidance for G1000 system troubleshooting, as installed in the Diamond Model DA 40.

IMPORTANT

Sections 6, 7 and 8 provide detailed instructions on equipment removal, replacement, configuration, and return-to-service testing. Anytime a G1000 component or LRU is removed, swapped, or replaced, the technician must follow the procedures given in Sections 6, 7 and 8 to ensure proper operation of the system.

Troubleshoot the G1000 system by first identifying, then isolating the specific failure to the responsible LRU. There are several indications that the G1000 presents to the pilot or technician, showing overall system condition. A course of action should be determined based on the information presented on the display. This section shows possible scenarios likely to be encountered during normal operation and gives troubleshooting guidance to the technician to resolve problems.

Figure 5-1. System Status Page (AUX Group Normal Mode)

The 5th AUX group page on the MFD provides LRU health status by means of a green check or a red 'X'. Also, LRU software versions are shown along with other database versions and dates. If a red 'X' is shown for an LRU, see the appropriate LRU troubleshooting section of this chapter for guidance. Typically, the G1000 Alerting system provides alerts/annunciations in conjunction with the information presented at the 5th AUX page.

5.1 G1000 Alerting System

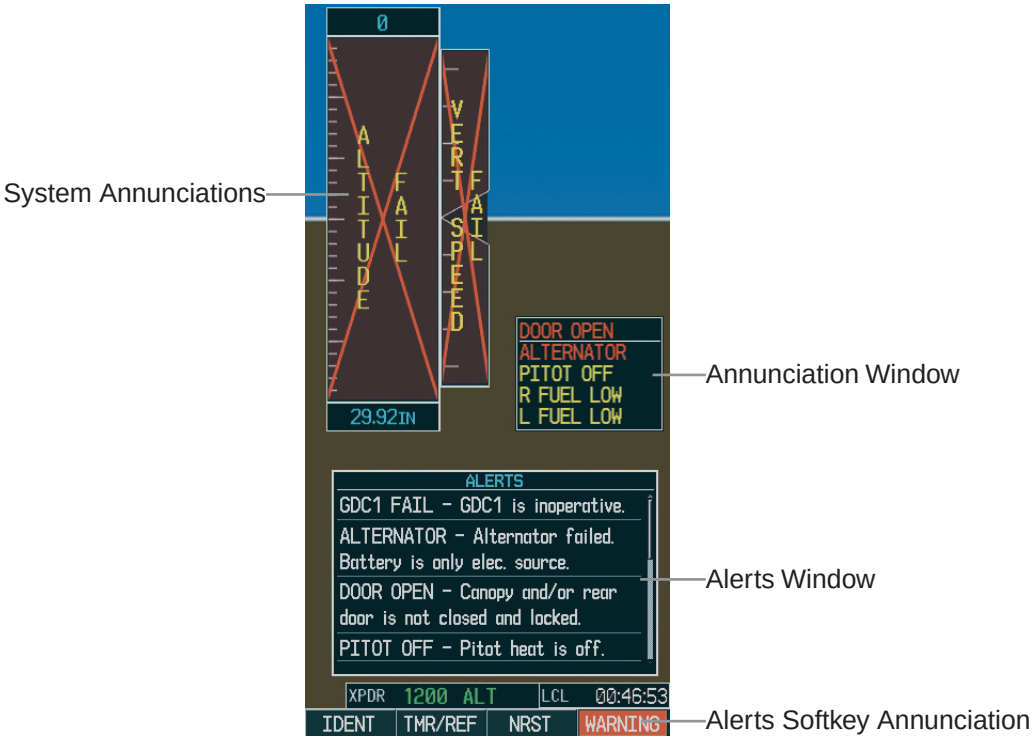


Figure 5-2. Alerts & Annunciations

The G1000 Alert System conveys alerts to the pilot using combinations of the following features:

Annunciation Window:

The Annunciation Window displays abbreviated annunciation text. The Annunciation window is located to the right of the Altitude and Vertical Speed windows on the display. All 12 DA 40-specific annunciations can be displayed simultaneously.

Alert Window:

The Alert window displays alert text messages. Up to 64 prioritized alerts can be displayed in the Alert window. Pressing the ALERTS softkey displays the Alerts window. Pressing the ALERTS softkey again removes the Alerts window from the display.

Softkey Annuncation:

When the G1000 Alerting System issues an alert, the ALERTS softkey is used as a flashing annunciation to accompany the alert. During the alert, the ALERTS softkey assumes a new label consistent with the alert level (WARNING, CAUTION, or ADVISORY). Pressing the softkey annunciation acknowledges the presence of the alert and returns the softkey to its previous ALERTS label.

System Failure Annunciations:

Typically, a large red X appears in windows when a failure is detected in the LRU providing the information to the window.

The G1000/DA 40 Alert System uses three levels:

WARNING:

This level of alert requires immediate pilot attention. A warning alert is accompanied by an annunciation in the Annunciation Window. Warning alert text appearing in the Annunciation Window is always RED. A warning alert is also accompanied by a flashing WARNING softkey annunciation, as shown in Figure 5-3, along with a continuos aural tone. Pressing the WARNING softkey acknowledges the presence of the warning alert and stops the aural tone. Pressing the ALERTS softkey displays the related alert message in the Alert Window.

Figure 5-3. WARNING Softkey Annunciation

CAUTION:

This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. A caution alert is accompanied by an annunciation in the Annunciation Window. Caution alert text appearing in the Annunciation Window is yellow. A caution alert is also accompanied by a flashing CAUTION softkey annunciation, as shown in Figure 5-4, along with a single aural tone. Pressing the CAUTION softkey acknowledges the presence of the caution alert. Pressing the ALERTS sofkey displays the related alert message in the Alert Window.

Figure 5-4. CAUTION Softkey Annunciation

MESSAGE ADVISORY:

This level of alert provides general information to the pilot. A message advisory alert does not appear in the Annunciation Window. A message advisory alert is only accompanied by a flashing **ADVISORY** softkey annunciation, as shown in Figure 5-5. Pressing the **ADVISORY** softkey acknowledges the presence of the message advisory alert and displays the advisory message in the Alert Window.

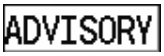


Figure 5-5. ADVISORY Softkey Annunciation

5.2 System Annunciations

If data fields become invalid due to an LRU failure, the PFD/MFD typically annunciates the failure with a large red X, as shown in Figure 5-6.

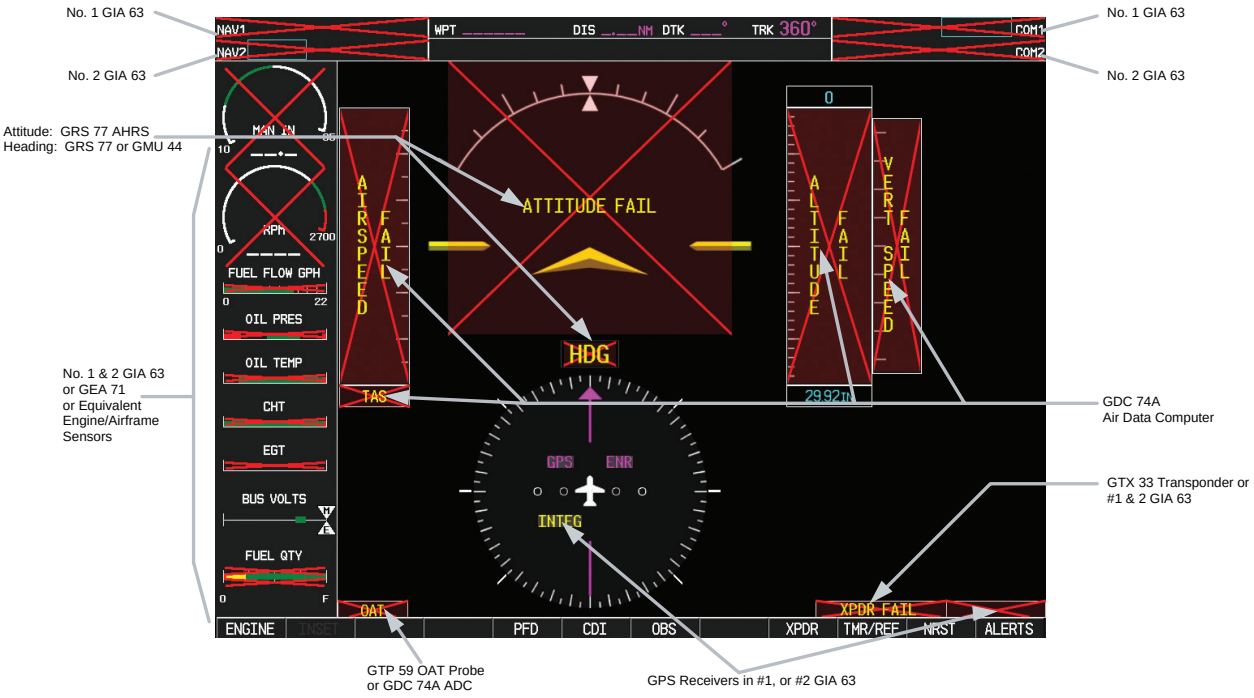
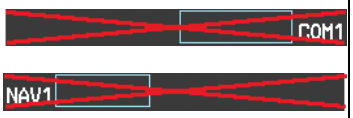
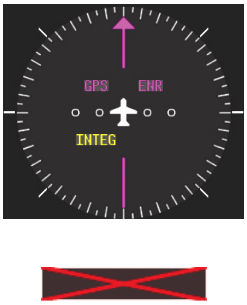
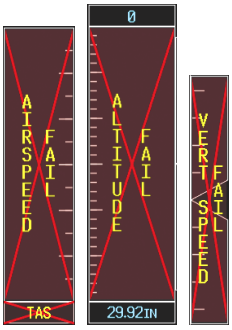
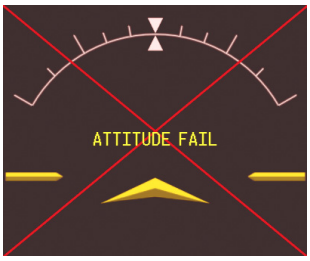
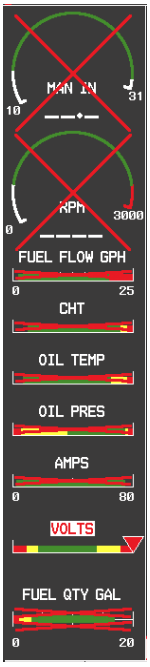


Figure 5-6. System Annunciations

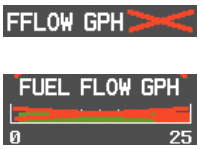
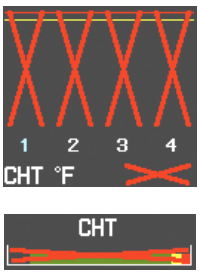
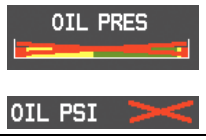
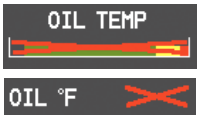
The following table provides basic troubleshooting guidance for LRU failures:

Invalid Data Field	Associated LRU(s)	Solution
NAV1 & COM1 	GIA1	• Check configuration settings for GIA1 and the PFD. Check Ethernet interconnect from GIA1 to the PFD. Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace defective unit. ✓ If problem persists, replace defective PFD.
NAV2 & COM2 	GIA2	Check configuration settings for GIA2 and the MFD. Check Ethernet interconnect from GIA2 to the MFD. Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace defective unit. ✓ If problem persists, replace defective MFD.
GPS INTEG & Time 	GIA1 or GIA2	Check GPS1 and GPS2 signal strength on the 3rd AUX page. Check corresponding GPS antenna and cable. Check Ethernet interconnect from PFD to GIA1 or MFD to GIA2. Switch GIA1 and GIA2, to verify location of problem: ✓ If problem follows unit, replace defective unit. ✓ If problem persists, replace defective MFD or PFD.
XPDR FAIL 	GTX 33	Check GTX RS-232 configuration settings for GIA1, GIA2, and GTX 33. Replace defective GTX 33.
TAS FAIL AIRSPEED FAIL ALTITUDE FAIL VERT SPEED FAIL 	GDC 74A	Inspect GDC 74A pitot/static plumbing integrity. Inspect pitot/static ports and associated equipment. For TAS failure, also check GTP 59 OAT probe as stated below. Check GDC ARINC 429 configuration settings for the PFD, MFD, GIA1, and GIA2. ✓ If PFD, MFD, and GIA configuration settings are correct, replace defective GDC configuration module according to Section 6.8. ✓ If problem persists, replace defective GDC 74A.
OAT 	GTP 59	See above guidance for GDC 74A troubleshooting. Replace GTP 59 probe: ✓ If problem persists replace GDC 74A with a known good unit.

Invalid Data Field	Associated LRU(s)	Solution
ATTITUDE FAIL 	GRS 77	Check GRS ARINC 429 configuration settings for the PFD, MFD, GIA1, and GIA2. Replace defective GRS 77.
HDG FAIL 	GRS 77 & GMU 44	Replace the GMU 44 with a known good unit: ✓ If problem persists, replace defective GRS 77.
	GRS 77 & GMU 44	If this message persists, perform AHRS calibration procedures as described in Section 7.7.3.
Engine/Airframe Sensors (All Invalid) 	GEA 71	Check GEA 71 RS-485 configuration settings for GIA1 and GIA2. Reconfigure the GEA 71 per Section 7.4.2. Check GEA – GIA1 and GEA – GIA2 Wiring. Replace defective GEA 71.

The following table provides guidance for troubleshooting individual engine/airframe sensor failures. Be sure to also follow previous guidance given for the GEA 71.

The technician should troubleshoot to isolate the fault by checking sensor-to-GEA wiring, replacing the suspect sensor, and finally by replacing the GEA 71. Replace one part at a time. Refer to Section 7.4.3 to check for correct operation of the sensors and GEA 71 after any part has been replaced.

Invalid Field	Sensor	Solution
	Tachometer	Check tachometer – GEA wiring. Replace tachometer sensor. Refer to Figure 2-18. Replace defective GEA 71.
	MAP Sensor	Check MAP sensor – GEA wiring. Replace MAP sensor. Refer to Figure 2-14. Replace defective GEA 71.
	Fuel Flow	Check fuel flow sensor – GEA wiring. Replace fuel flow sensor. Refer to Figure 2-20 and Figure 2-21. Replace defective GEA 71.
	CHT Probes (4)	Check CHT probe – GEA wiring. Replace CHT probe. Refer to Figure 2-22. *If all 4 CHT indicators are flagged, check the following:* Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.10 & 6.11. Replace defective GEA 71.
	EGT Probes (4)	Check EGT probe – GEA wiring. Replace EGT probe. Refer to Figure 2-23. *If all 4 EGT indicators are flagged, try the following:* Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.10 & 6.11. Replace defective GEA 71.
	Oil Pressure Sensor	Check oil pressure sensor – GEA wiring. Replace oil pressure sensor. Refer to Figure 2-15. Replace defective GEA 71.
	Oil Temperature Sensor	Check oil temperature sensor – GEA wiring. Replace oil temperature sensor. Refer to Figure 2-16. Replace defective GEA 71.
	Alternator Current Sensor	Check current sensor sensor – GEA wiring. Replace current sensor. Refer to Figure 2-24. Replace defective GEA 71.
	Fuel Quantity Sensors (2)	Check fuel quantity sensor – GEA wiring. Replace fuel quantity sensor. Refer to the DA40 AMM. Replace defective GEA 71.

5.3 DA 40-Specific Alerts

The following alerts are configured specifically for the DA 40:

WARNING Alerts:

Annunciation Window	Alert Message	Solution
ALTERNATOR	Alternator failed. Battery is only elec. source.	• Check alternator current sensor for proper operation. If current sensor is OK, troubleshoot alternator & aircraft electrical system according to DA 40 Airplane Maintenance Manual instructions.
OIL PRES LO	Oil pressure is below 25 psi.	Check aircraft oil level. Troubleshoot oil pressure sensor for proper operation. If oil pressure sensor is OK, troubleshoot engine oiling system according to DA 40 Airplane Maintenance Manual instructions.
FUEL PRES LO:	Fuel pressure is below 14 psi.	Troubleshoot fuel pressure sensor for proper operation. If fuel pressure sensor is OK, troubleshoot fuel pump and associated fuel systems per DA 40 Airplane Maintenance Manual instructions.
FUEL PRES HI	Fuel pressure is greater than 35 psi.	
STARTER ENGD	Starter is engaged.	Prepare to start aircraft engine.
DOOR OPEN	Canopy and/or rear door is not closed and locked.	Close canopy and/or rear door. If alert does not disappear, check canopy/door discrete sensor for proper operation.
TRIM FAIL	Autopilot automatic trim has failed.	Troubleshoot autopilot per DA 40 Airplane Maintenance Manual instructions.

CAUTION Alerts

Annunciation Window	Alert Message	Solution
L FUEL LOW	Left fuel quantity is less than 3 gallons.	Check fuel level. If reading is inaccurate, recalibrate fuel probes per Section 4.6.
R FUEL LOW	Right fuel quantity is less than 3 gallons.	
LOW VOLTS	On-board voltage is below 24 volts.	Inspect GEA 71 connector & wiring. Troubleshoot aircraft electrical system according to DA 40 Airplane Maintenance Manual instructions.
PITOT FAIL	Pitot heat is inoperative.	Check pitot heat switch position. Inspect GEA 71 connector & wiring. Troubleshoot pitot heat system per DA 40 Airplane Maintenance Manual instructions.
PITOT OFF	Pitot heat is off.	

MESSAGE ADVISORY Alerts

Message Advisory	Solution
PFD FAN FAIL – The cooling fan for the PFD is inoperative.	Ensure that the CDU FAN and/or AV FAN circuit breakers are closed. Check cooling fan wiring. Replace cooling fan. Refer to Figure 2-2 and/or Figure 2-7 for installation drawings.
MFD FAN FAIL – The cooling fan for the MFD is inoperative.	
GIA FAN FAIL – The cooling fan for the GIAs is inoperative.	

NOTE

From this point forward, all other message advisory alerts are standard to the G1000 system and are not specific to the DA 40. Messages are grouped according to LRU.

5.4 GDU 1040 Troubleshooting

5.4.1 GDU 1040 Common Problems

Symptom	Recommended Action
Display will not track photocell	Check display lighting settings on the Main Lighting page: ✓ If problem persists, replace defective unit.
Keypad/bezel will not track photocell	Check keyboard lighting settings on the Main Lighting page: ✓ If problem persists, replace defective unit.
Display will not track dimmer bus	Check display lighting settings on the Main Lighting page. Switch MFD and PFD: ✓ If problem follows unit, replace defective unit.
Keypad/bezel will not track dimmer bus	Check keyboard lighting settings on the Main Lighting page. Switch MFD and PFD: ✓ If problem follows unit, replace defective unit.

5.5 GDU 1040 Alerts

5.5.1 Software/Configuration Alerts

Failure Message	Cause	Solution
SW MISMATCH – GDU software version mismatch. Xtalk is off.	The system has found the PFD and MFD software versions do not match.	Load correct software version. See Section 7.1 for GDU 1040 Software Loading procedure.
MANIFEST – PFD1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in the PFD.	
MANIFEST – MFD software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in MFD.	
MFD1 CONFIG – configuration error. Config service req'd.	A configuration mismatch has occurred between the display and the Master Configuration Module.	Reconfigure MFD and/or PFD as described in Section 7.1.2. If unable to reconfigure, replace defective master configuration module as described in Section 6.8.
PFD1 CONFIG – configuration error. Config service req'd.		

5.5.2 Database Alerts

Failure Message	Cause	Solution
MFD1 DB ERR – MFD1 aviation database error exists.	The MFD has encountered an error in the Jeppesen aviation database.	Reload Jeppesen database. Replace the MFD.

PFD1 DB ERR – PFD1 aviation database error exists.	The PFD has encountered an error in the Jeppesen database.	Reload Jeppesen database. Replace the PFD.
MFD1 DB ERR – MFD1 basemap database error exists.	The MFD has encountered an error in the basemap database.	Replace the MFD.
PFD1 DB ERR – PFD1 basemap database error exists.	The PFD has encountered an error in the basemap database.	Replace the PFD.
MFD1 DB ERR – MFD1 terrain database error exists.	The MFD has encountered an error in the terrain database.	Confirm terrain datacard is inserted properly. Replace terrain datacard. Replace the MFD.
PFD1 DB ERR – PFD1 terrain database error exists.	The PFD has encountered an error in the terrain database.	Confirm terrain datacard is inserted properly. Replace terrain datacard. Replace the PFD.
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The system has found the Jeppesen aviation database cycles in the PFD and MFD do not match.	Load current database versions.

5.5.3 Cooling Alerts

Failure Message	Cause	Solution
MFD1 COOLING – has poor cooling. Reducing power usage.	MFD1 has exceeded its operating temperature range.	Check MFD Fan for proper operation. Replace the MFD. If problem persists contact Garmin.
PFD1 COOLING – has poor cooling. Reducing power usage.	The PFD has exceeded it's operating temperature range.	Check PFD Fan for proper operation. Replace the PFD. If problem persists contact Garmin.

5.5.4 Key Alerts

Failure Message	Cause	Solution
MFD1 "key" KEYSTK – key is stuck.	The SYSTEM has determined a key is stuck on MFD1.	Exercise stuck key. Replace the MFD.
PFD1 "key" KEYSTK – key is stuck.	The system has determined a key is stuck on the PFD.	Exercise stuck key. Replace the PFD.

5.5.5 Miscellaneous Alerts

Failure Message	Cause	Solution
XTALK ERROR – A flight display cross talk error has occurred.	A communication error has occurred between the MFD and PFD.	Check the System Configuration page: ✓ Ensure that MFD1 and PFD1 are green. ✓ If configuration is not correct, reconfigure the PFD and MFD per instructions in Section 7.1.2. Check Ethernet interconnect. Replace PFD with a known good unit to verify location of problem: ✓ If problem persists, replace MFD. ✓ If problem does not persist, replace PFD.
DATA LOST – Pilot stored data lost. Recheck settings.	Pilot stored data has been lost.	Cycle power to PFD: ✓ If problem persists, replace PFD.
MFD1 SERVICE – needs service. Return unit for repair.	The system has determined MFD1 needs service.	Replace MFD.
PFD1 SERVICE – needs service. Return unit for repair.	The system has determined the PFD needs service.	Replace the PFD.

5.6 GMA Alerts

Failure Message	Cause	Solution
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The system has determined that the GMA 1347 needs service.	Replace GMA 1347.
GMA1 FAIL – GMA1 in inoperative.	The system has detected a failure in the GMA 1347.	
MANIFEST – GMA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMA 1347.	See Section 7.2.1 for GMA 1347 Software Loading procedure.
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The system has detected a GMA 1347 configuration mismatch.	See Section 7.2.2 for GMA 1347 Configuration Loading procedure.

5.6.1 GMA Redundant Paths

Failure Message	Cause	Solutions
BACKUP PATH – Audio panel using backup data path.	The GMA 1347 is using a backup RS-232 data path.	Check GIA RS-232 configuration settings: ✓ If configuration is not correct, reconfigure GIAs as described in Section 7.3.2. Check wiring. Replace GMA 1347 with a known good unit, to verify location of problem: ✓ If problem persists, replaced GIA1. ✓ If problem does not persist, replace GMA 1347.

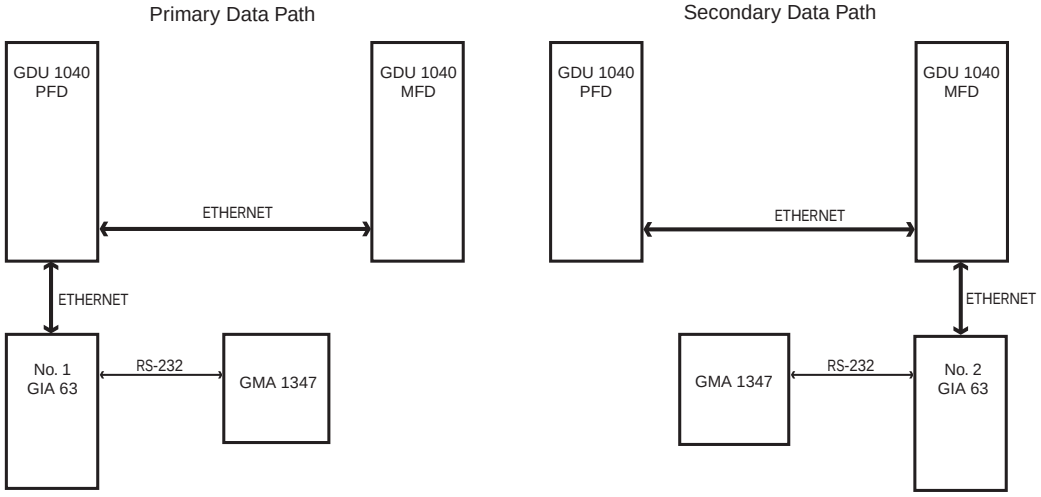


Figure 5-7. GMA 1347 Data Paths

5.7 GIA 63 Troubleshooting

5.7.1 COM

Symptom	Recommended Action
Weak COM transmit power	Check COM antenna and cabling. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace defective unit per Section 6.3.
Weak COM receiver	Check COM antenna and cabling. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace defective unit per Section 6.3.
No COM sidetone	Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows GIA, replace defective GIA per Section 6.3. ✓ If problem persists, replace defective GMA per Section 6.3.

5.7.2 NAV

Symptom	Recommended Action
Weak NAV receiver	Check NAV antenna, coupler, and cabling. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace defective unit per Section 6.3.

5.7.3 G/S

Symptom	Recommended Action
Weak G/S receiver	Check G/S antenna, coupler, and cabling. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace defective unit per Section 6.3

5.7.4 GPS

Symptom	Recommended Action
Will Not Acquire Satellites	Go to AUX 3 Page on MFD and confirm which GPS receiver is inoperative (GPS 1 or GPS 2). Check appropriate GPS Antenna and Cabling. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace defective unit per Section 6.3.

5.8 GIA Alert Messages

5.8.1 COM Alerts

Failure Message	Cause	Solutions
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has determined COM1 needs service.	Replace GIA1 according to instructions in Section 6.
COM2 SERVICE – COM2 needs service. Return unit for repair.	The system has determined COM2 needs service.	Replace GIA2 according to instructions in Section 6.
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 interconnect. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Section 7.3): ✓ If problem follows the unit, replace GIA1. ✓ If problem persists replace defective GMA 1347.
COM2 PTT – COM2 push-to-talk key is stuck.	The COM2 external push-to-talk (PTT) switch is stuck in the enabled (or “pressed”) state.	Press the push-to-talk switch(s) again to cycle its operation. Check push-to-talk switch(s) and wiring. Check GIA2/GMA 1347 interconnect. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists replace defective GMA 1347.

COM Related Alerts, Continued		
Failure Message	Cause	Solutions
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM1 external remote transfer switch again to cycle its operation. Check COM1 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2) ✓ If problem follows the unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
COM2 RMT XFR – COM2 remote transfer key is stuck.	The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.	Press the COM2 external remote transfer switch again to cycle its operation. Check COM2 external remote transfer switch and wiring. Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows the unit, replace GIA2. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.

5.8.2 NAV Alerts

Failure Message	Cause	Solution
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	The system has detected a failure in NAV1 receiver.	Replace GIA1.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	The system 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 identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.
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 identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 7.3.2): ✓ If problem follows unit, replace GIA1. ✓ If problem persists, continue to troubleshoot remote transfer switch & wiring.

5.8.3 Glideslope Alerts

Failure Message	Cause	Solution
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	Replace GIA1.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	The system has detected a failure in G/S1 receiver.	Replace GIA2.
G/S1 FAIL – G/S1 is inoperative.	The system has detected a failure in G/S1 receiver.	Check G/S1 antenna and cabling. Replace GIA1 if problem persists.
G/S2 FAIL – G/S2 is inoperative.	The system has detected a failure in G/S2 receiver.	Check G/S2 antenna and cabling. Replace GIA2 if problem persists.

5.8.4 GPS Alerts

Failure Message	Cause	Solution
MANIFEST – GPS1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	See Section 7.3.1 for GIA 63 Software Loading procedure.
MANIFEST – GPS2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	See Section 7.3.1 for GIA 63 Software Loading procedure.
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	The system has detected a failure in GPS1 receiver.	Replace GIA1.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	The system has detected a failure in GPS2 receiver.	Replace GIA2.
GPS1 FAIL – GPS1 is inoperative.	The system has detected a failure in GPS1 receiver.	Check GPS1 antenna and cabling. Replace GIA1 if problem persists.
GPS2 FAIL – GPS2 is inoperative.	The system has detected a failure in GPS2 receiver.	Check GPS2 antenna and cabling. Replace GIA2 if problem persists.

5.8.5 GIA Cooling Alerts

Failure Message	Cause	Solution
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.	Check Avionics Fan for proper operation. Replace GIA1. If problem persists contact Garmin.
GIA2 COOLING – GIA2 over temperature.	GIA2 has exceeded its operating temperature range.	Check Avionics Fan for proper operation. Replace GIA2. If problem persists contact Garmin.

5.8.6 GIA Configuration Alerts

Failure Message	Cause	Solution
MANIFEST – GIA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA1.	See Section 7.3.1 for GIA 63 Software Loading procedure.
MANIFEST – GIA2 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GIA2.	
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The system has detected a GIA configuration mismatch. If GIAs are not properly configured after being swapped/replaced, this message appears.	See Section 7.3.2 for GIA 63 Configuration Loading procedure.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.		

5.9 GEA Troubleshooting

5.9.1 GEA Alerts

Failure Message	Cause	Solution
MANIFEST – GEA1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GEA 71.	See Section 7 for GEA 71 Software Load Procedure.
GEA1 CONFIG – GEA1 configuration error. Config service req'd.	The system has detected a GEA 71 configuration mismatch.	See Section 7 for GEA 71 Configuration Procedure.

5.9.2 GEA Redundant Paths

Failure Message	Cause	Solutions
BACKUP PATH – EIS using backup data path.	The GEA 71 is using a backup RS-485 data path.	Check RS-485 configuration settings at the GIA page group: ✓ If configuration is not correct, reconfigure GIA as described in Section 7. Check wiring. Replace GIA1 with a known good unit, to verify location of problem: ✓ If problem persists, replace the GEA 71. ✓ If problem does not persist, replace GIA1.

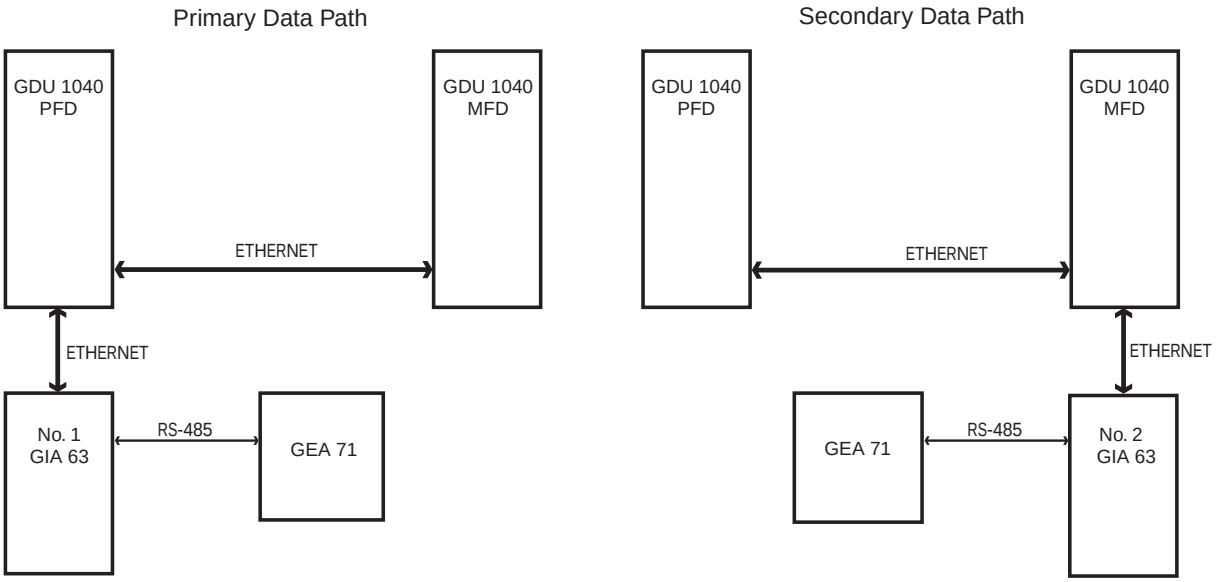


Figure 5-8. GEA 71 Data Paths

5.10 GTX Troubleshooting

5.10.1 GTX Alerts

Failure Message	Cause	Solutions
MANIFEST – GTX1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GTX 33.	Reload software. See Section 7 for GTX 33 Software Load Procedure.
XPDR1 CONFIG – XPDR1 configuration error. Config service req'd.	The system has detected a GTX 33 configuration mismatch.	Reload configuration file. See Section 7 for GTX 33 Configuration Procedure.

5.10.2 GTX Redundant Paths

Failure Message	Cause	Solutions
BACKUP PATH – Transponder using backup data path.	The GTX 33 is using a backup RS-232 data path.	Check RS-232 configuration settings at GIA and GTX page groups: ✓ If configuration is not correct, reconfigure GIA or GTX as described in Section 7. Check wiring. Replace GIA1 with a known good unit, to verify location of problem: ✓ If problem persists, replace the GTX 33. ✓ If problem does not persist, replaced GIA1.

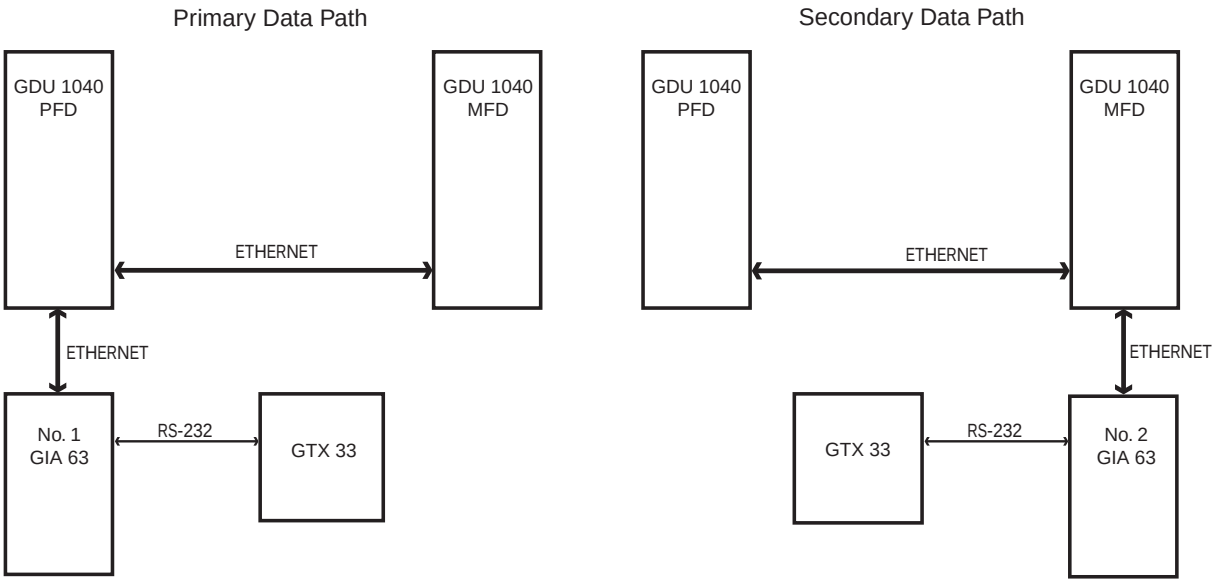


Figure 5-9. GTX 33 Data Paths

5.11 GRS 77/GMU 44 Troubleshooting

5.11.1 GRS Alerts

Failure Message	Cause	Solutions
MANIFEST – GRS1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GRS 77.	• Reload software. See Section 7 for GRS 77 Software Load Procedure.
AHRS SERVICE – AHRS Magnetic-field model needs update.	The AHRS magnetic field model should be updated. Appears on ground only.	See Section 4.7.
GEO LIMITS – Too far North/South, no magnetic compass.	The aircraft is outside of its operating limits; i.e., too far North or South. Heading will be flagged invalid.	Operate the aircraft only within the limits as specified in the G1000/DA 40 AFMS.
AHRS TAS – AHRS not receiving airspeed.	The GRS 77 is not receiving airspeed from the GDC 74A.	Check GRS/GDC interconnect.
AHRS GPS – AHRS not receiving GPS information.	The GRS 77 is not receiving GPS data from the GPS receivers.	Ensure that both GPS1 and GPS2 can lock on to GPS signals: ✓ If GPS receivers are faulty, replace GIA unit(s). If GPS receivers operate correctly, check GRS/GIA interconnects: ✓ If interconnects operate correctly, replace GRS 77.
AHRS GPS – AHRS using backup GPS source.	The GRS 77 is using the backup GPS data path.	

5.11.2 GMU Alerts

Failure Message	Cause	Solutions
MANIFEST – GMU1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GMU 44.	Reload software. See Section 7 for GMU 44 Software Load Procedure.
HDG FAULT – A magnetometer fault has occurred.	A fault has occurred in the magnetometer; heading will be flagged invalid.	Replace GMU 44.

5.11.3 GRS Redundant Paths

Failure Message	Cause	Solutions
BACKUP PATH – AHRS using backup data path.	The GRS 77 is using a backup ARINC 429 data path.	• Check ARINC 429 configuration settings at the GDU and GIA page groups: ✓ If configuration is not correct, reconfigure GDU or GIA as described in Section 7. Check wiring. Replace PFD1 with a known good unit, to verify location of problem: ✓ If problem persists, replace the GRS 77. ✓ If problem does not persist, replace PFD1.

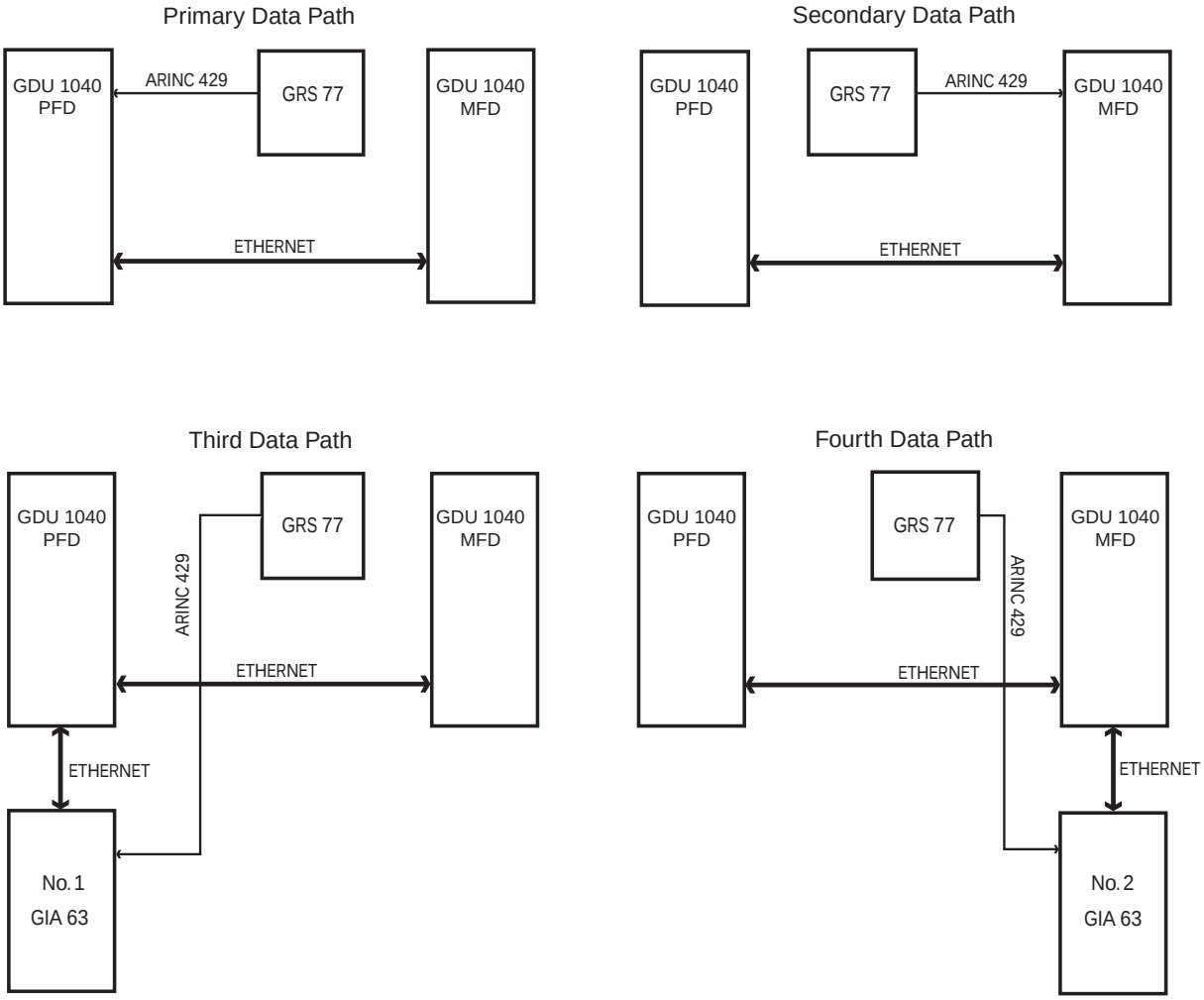


Figure 5-10. GRS 77 Data Paths

5.12 GDC 74A Troubleshooting

5.12.1 GDC Alerts

Failure Message	Cause	Solutions
MANIFEST – GDC1 software mismatch. Communication Halted.	The system has detected an incorrect software version loaded in GDC 74A.	• Reload software. See Section 7 for GDC 74A Software Load Procedure.
BACKUP PATH – Airdata using backup data path.	The GDC 74A is using a backup ARINC 429 data path.	Check ARINC 429 configuration settings at GDU and GIA page groups: ✓ If configuration is not correct, reconfigure GIA or GDU as described in Section 7. Check wiring. Replace PFD1 with a known good unit, to verify location of problem: ✓ If problem persists, replace the GDC 74A. ✓ If problem does not persist, replace PFD1.

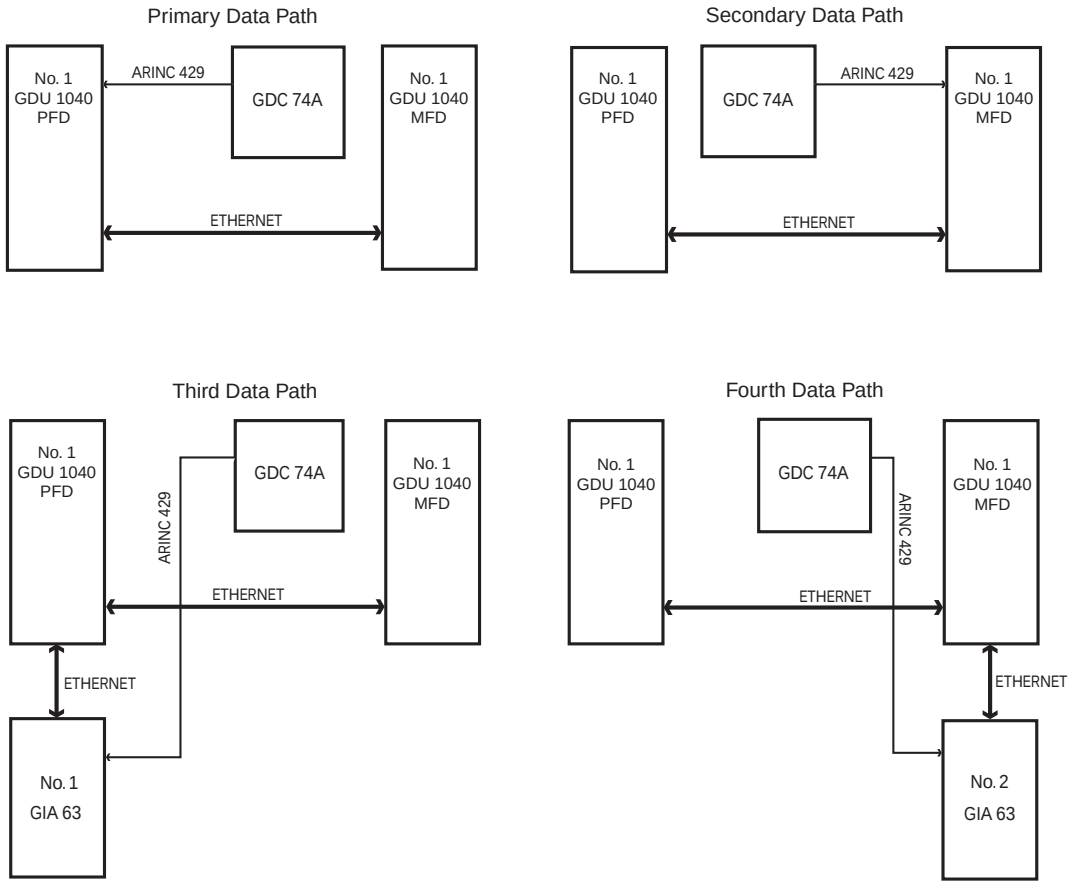


Figure 5-11. GDC 74A Data Paths

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6 G1000 Equipment Removal & Replacement

This section describes how to remove and replace G1000 equipment in the Diamond DA 40. After removal and replacement, LRUs must be configured and tested as described in Section 7.

CAUTION

When removing and/or replacing any G1000 component, always ensure that aircraft power is off. Unplug any auxiliary power supplies.

Before removing any G1000 LRU, it is required that the technician verify the LRU software part number and version against Appendix A.

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

1. Start the G1000 system in configuration mode as described in Section 3.3.
2. The System Status page shows a list of LRUs in the LRU window. Activate the cursor and highlight the LRU window.
3. Use the FMS knob to scroll through the list in the window and select the desired LRU.
4. The software part number and version is displayed in the DATA window. Compare this to the data in Appendix A.

NOTE

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 Appendix A. The Software Manifest page may also be used to check part numbers and versions.

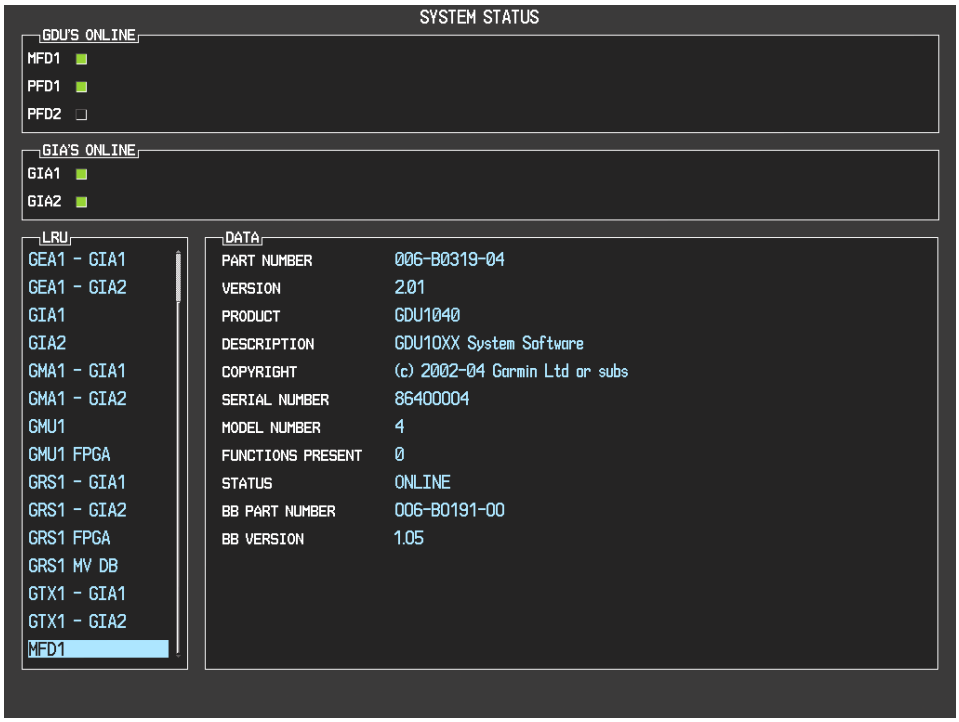

Figure 6-1. System Status Page (Configuration Mode)

6.1 GDU 1040 MFD & PFD

Removal:

1. Using a 3/32nd hex tool, rotate all four ¼-turn fasteners counter-clockwise until they reach their stops.
2. Carefully remove the display from the panel.
3. While supporting the display, disconnect the connector.

Replacement:

1. Visually inspect the connector and pins for signs of damage. Repair any damage. While supporting the display, connect the connector to the rear of the unit.
2. Carefully insert the display into the panel cutout, ensuring that all 4 ¼-turn fasteners align with the corresponding holes.
3. Seat the display in the panel cutout. Do not use excessive force while inserting the display.
4. Once seated, rotate all four ¼-turn fasteners clockwise to lock the display to the panel.
5. Configure and test the MFD and/or PFD according to Section 7.1.

6.2 GMA 1347 Audio Panel

Removal:

1. Using a 3/32nd hex tool, turn the hex nut counter-clockwise until the GMA 1347 is unlocked from its location.
2. Carefully remove the GMA 1347 from its rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GMA 1347 into the rack until the locking tab engages the rack.
3. Begin to turn the hex nut clockwise. This draws the unit into the rack until seated. Do not over-tighten the nut.
4. Configure and test the GMA 1347 according to Section 7.2.

6.3 GIA 63 Integrated Avionics Units

Removal:

1. Remove the baggage compartment cover to gain access to the remote avionics enclosure.
2. Remove the remote avionics enclosure cover. Removal process is identical for GIA #1 or #2. Remove and replace only one GIA 63 at a time.
3. Unlock the GIA 63 handle by loosening the Phillips screw on the handle.
4. Pull the handle upward to unlock the GIA 63. Gently remove the unit from the rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GIA 63 into its rack. The handle should engage the dogleg track.
3. Press down on the GIA 63 hand to lock the unit into the rack.
4. Lock the handle to the GIA 63 body using the Philips screw.
5. Configure and test the GIA 63(s) according to Section 7.3.

6.4 GEA 71 Engine/Airframe Unit

Removal:

1. Gain access to the space behind the instrument panel by removing the panel cover.
2. Unlock the GEA 71 handle by unscrewing the Phillips screw.
3. Firmly grasp the GEA 71 handle and pull it up vertically. This unlocks the unit from the rack.
4. Gently remove the GEA 71 from its rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GEA 71 into the rack. The handle should engage the dogleg track.
3. Press down on the handle to lock the unit into place.
4. Lock the handle to the GEA 71 body using the Philips screw.
5. Configure and test the GEA 71 according to Section 7.4.

6.5 GTX 33 Transponder

Removal:

1. Remove the baggage compartment floor and compartment to gain access to the remote avionics enclosure.
2. Unlock the GTX 33 handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GTX 33. Gently remove the unit from the rack.

Replacement:

1. Visually inspect the connectors using a flashlight to ensure there are no bent or damaged pins. Repair any damage.
2. Gently insert the GTX 33 into its rack. The handle should engage the dogleg track.
3. Press down on the GTX 33 hand to lock the unit into the rack.
4. Lock the handle to the GTX 33 body using the Philips screw.
5. Configure and test the GTX 33 according to Section 7.5.

6.6 GDC 74A Air Data Computer

Removal:

1. Gain access to the space behind the instrument panel by removing the panel cover.
2. Disconnect the pitot/static plumbing from the rear of the unit. Disconnect the single connector.
3. Loosen each thumbscrew on the hold-down clamp and remove the clamp.
4. Carefully remove the unit from its mount.

Replacement:

1. Place the unit in the mounting tray.
2. Position the locking clamp and fasten using the thumbscrews.
3. Connect the pitot/static plumbing.
4. Inspect the connector and pins for damage. Repair any damage. Connect the connector to the unit.
5. Configure and test the GDC 74A according to Section 7.6.

6.7 GTP 59 OAT Probe

Removal:

1. Remove the co-pilot seat per the DA 40 Aircraft Maintenance Manual.
2. Use a deep-socket to hold the probe in place on the outside of the aircraft. Inside the cockpit, loosen the GTP 59 mounting nut and remove the GTP 59.

Replacement:

1. Replacement is the reverse of removal.
2. No configuration is required for the GTP 59. Test according to Section 7.6.

6.8 GRS 77 AHRS

Removal:

1. Remove baggage compartment floor, then remove the baggage compartment.
2. Disconnect the AHRS connector.
3. Remove the four Phillips thumbscrews with a screwdriver and set them aside.
4. Gently lift the GRS 77 from the mounting plate. (If the mounting plate is removed, the GRS 77 must be re-calibrated. See Section 7.7.3)

Replacement:

1. Place the GRS 77 on the mounting plate, ensuring the orientation is correct.
2. Fasten the unit to the plate using the Phillips thumbscrews.
3. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the connector to the GRS 77.
4. Calibrate, and test the GRS 77 according to Section 7.7.

6.9 GMU 44 Magnetometer

Removal:

1. Remove GMU access plate below starboard wing by unscrewing the three Phillips screws.
2. Carefully lower the plate, which contains the GMU 44, a phenolic spacer, and the GMU rack.
3. Disconnect the wiring harness.

Replacement:

1. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage. Connect the wiring harness to the GMU 44.
2. Place the GMU in the bay and secure the plate with the 3 Phillips screws.
3. Calibrate and test the GMU 44 according to Section 7.7.

6.10 Configuration Module Removal & Replacement

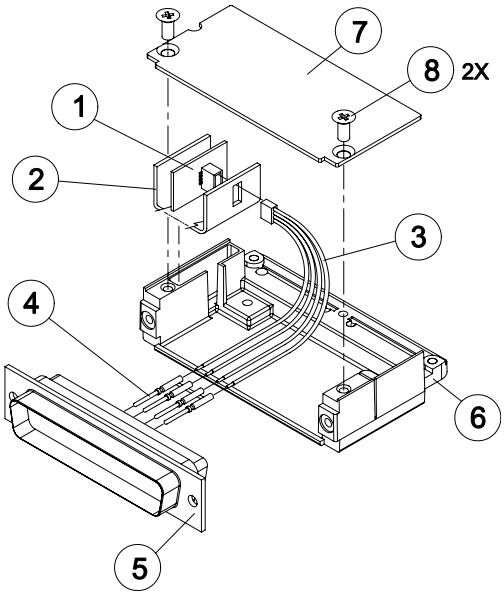

Figure 6-2. Configuration Module Installation

Removal:

1. Disconnect connector from LRU.
2. Remove 2 screws (8) from cover (7) and remove cover.
3. Unplug connector from configuration module (1).
4. Remove configuration module.

Replacement:

1. Inspect connector for damaged pins (4).
2. Place configuration module (1) in position.
3. Insert connector into configuration module (1).
4. Assembly of the connector is the reverse of disassembly.

If the GRS 77 AHRS Configuration Module is replaced:

All three GRS 77/GMU 44 calibration procedures must be performed. Proceed to Section 7.7.3.

If GDC 74 Configuration Module is replaced:

Configuration settings must be reloaded to the GDC 74A. Proceed to Section 7.6.2.

If the Master Configuration Module is replaced:

i. Start the G1000 system in configuration mode.

ii. Go to the Configuration Upload Page on the PFD.

iii. Press the UPDT CFG softkey.

If both the PFD and Master Configuration Module is replaced:

The G1000 system (except GRS 77/GMU 44 and GDC 74A) must be re-configured. Proceed to Section 7.1.1.

6.11 GEA 71 Backshell Thermocouple Removal & Replacement

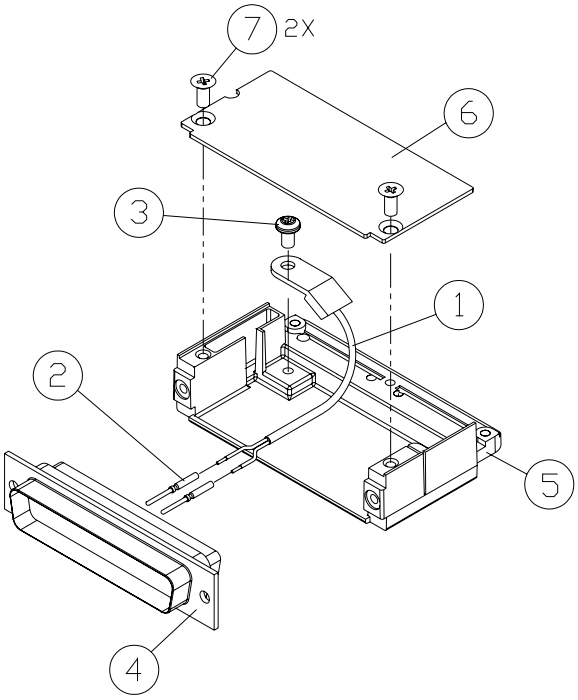

Figure 6-3. GEA Backshell Thermocouple

Table 6-1. Thermocouple Kit (011-00981-00)

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

Removal

1. Remove GEA 71 per Section 6.4.
2. Remove GEA connector backplate.
3. Remove connector J701, item 5, from the backplate.
4. Remove cover, item 6 from the backshell.
5. Unscrew thermocouple from boss on backshell. Extract the thermocouple pins from the connector.

Replacement

1. Crimp pins, item 2, onto each of the thermocouple 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 4, as specified by the Diamond wiring diagram.
3. Place thermocouple body, item 1, onto the backshell boss, item 5. Place the thermocouple as shown in Figure 6-3 so that the wires exit towards the bottom of the backshell.
4. Fasten thermocouple tightly to backshell using the provided screw, item 3.
5. Fasten cover, item 6, to backshell using the provided screws, item 7.

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7 G1000 Equipment Configuration & Testing

This section provides procedures to be followed after a piece of G1000 equipment is replaced. At the beginning of each LRU section, instructions are given to guide the technician for various removal/replacement scenarios. These instructions define necessary procedures to be followed for situations where original equipment was reinstalled as well as for situations where new equipment (new serial number) is installed.

7.1 GDU 1040 MFD & PFD

Original Display Reinstalled

If the removed display(s) are re-installed in their original positions, no software or configuration loading is required. Continue to the PFD/MFD Test procedure.

Original Displays Installed in Opposite Configurations

If the PFD and MFD are installed in opposite positions, no software or configuration loading is required. Continue to the PFD/MFD Test procedure.

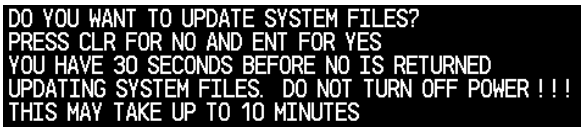
New Display(s) Installed

If a new GDU 1040 (new serial number) is installed, the correct software and configuration files must be loaded to the unit.

7.1.1 PFD/MFD Software Loading

1. Apply power to the G1000 system by turning the master switch on. The ground power unit may now be powered up, if desired. Pull the MFD and PFD circuit breakers.
2. Insert the correct G1000/DA 40 SW Loader Card into the replaced display top card slot. See Appendix A for correct Loader Card part number.
3. Hold the ENT key on the replaced display and restore power by closing the applicable circuit breaker (power only the replaced unit).
4. When the words INITIALIZING SYSTEM appear in the upper left corner of the display, release the ENT key.
5. Press the ENT key to acknowledge the following prompt:

6. The following screen is displayed.



7. Software is loaded to the replaced display. When complete, the display starts in configuration mode.
8. If both displays were replaced, repeat steps 1-7 for the opposite display.
9. Continue to the PFD/MFD Configuration procedure.

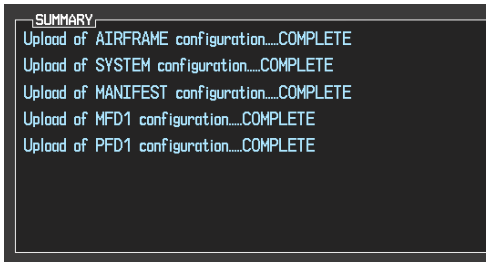
7.1.2 PFD/MFD Configuration

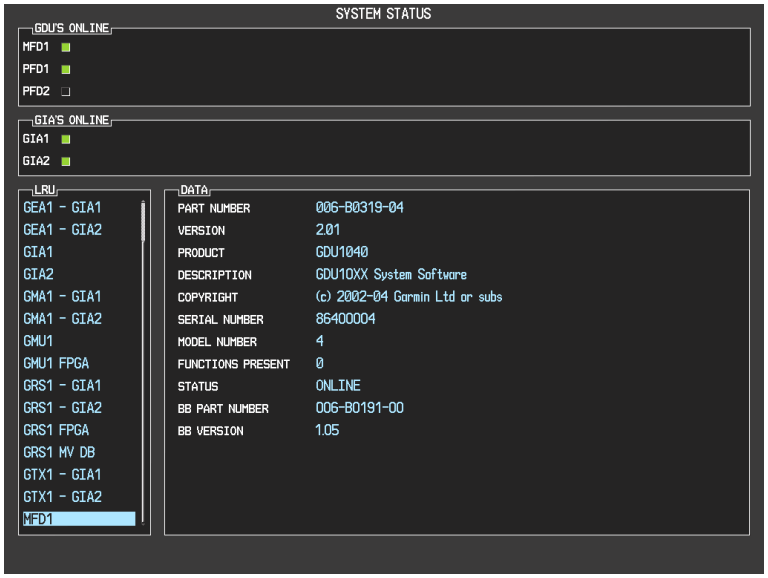
1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into the PFD top card slot, if it is not already in the PFD.
2. Start both the MFD and PFD in Configuration mode, if they are not yet in Configuration mode.
3. At the PFD, go to the Configuration Upload page using the FMS knob:

4. Activate the cursor and highlight ‘AIRFRAME’ in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:

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

8. Highlight ‘SYSTEM’ in the FILE LIST field and repeat steps 5 through 7.
9. Highlight ‘MANIFEST’ in the FILE LIST field and repeat steps 5 through 7.
10. Highlight ‘MFD1’ in the FILE LIST field and repeat steps 5 through 7.
11. Highlight ‘PFD1’ in the FILE LIST field and repeat steps 5 through 7.
12. View the SUMMARY field and ensure that all items are ‘COMPLETE’, then de-activate the cursor:





13. At the System Status page, activate the cursor and highlight 'PFD1' and 'MFD1' in the LRU window.
14. Verify that the part number and version of the software reported matches the data in Appendix A.
15. Continue to the Aviation Database Loading procedure.

7.1.3 Aviation Database Loading

1. Remove the G1000/DA 40 SW Loader Card from the display and remove power both displays.
2. Insert an aviation database update SD card into the top slot of the PFD.
3. Apply power to the PFD. The following prompt is displayed in the upper left corner of the PFD:

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

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

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

5. After the update completes, the PFD starts in normal mode. Remove the aviation database update SD Card from the PFD.
6. Remove power from the MFD.
7. Repeat steps 2 through 4 for the MFD. The MFD and PFD aviation databases are now updated.
8. Confirm that the correct update cycle and version is loaded during startup of the MFD.
9. Remove the aviation database update SD Card from the MFD.
10. Continue to the PFD/MFD Test procedure.

7.1.4 PFD/MFD Test

1. Allow displays to initialize for ~1 minute.
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.

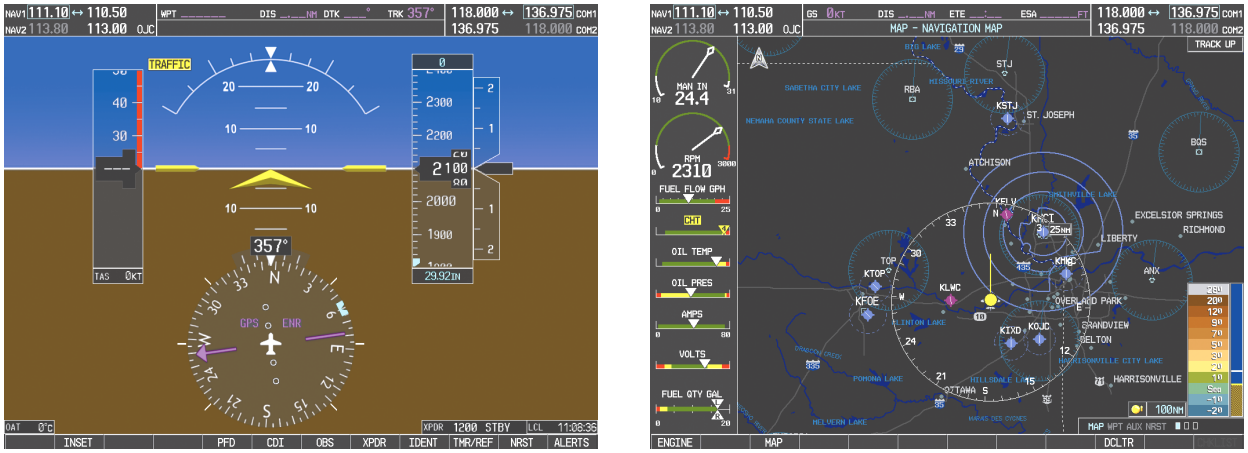


Figure 7-1. G1000 Normal Mode Check

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):

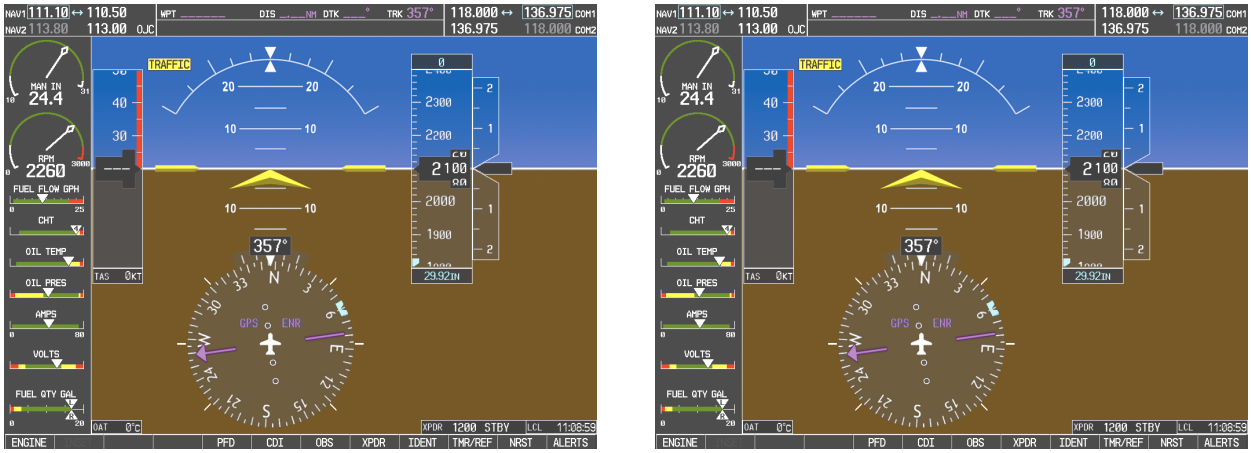


Figure 7-2. G1000 Reversionary Mode Check

4. De-activate reversion mode by pushing the red reversion button again.
5. If no other service is to be performed, perform final return-to-service test as specified in Section 8.

7.2 GMA 1347 Audio Panel

Original GMA 1347 Reinstalled

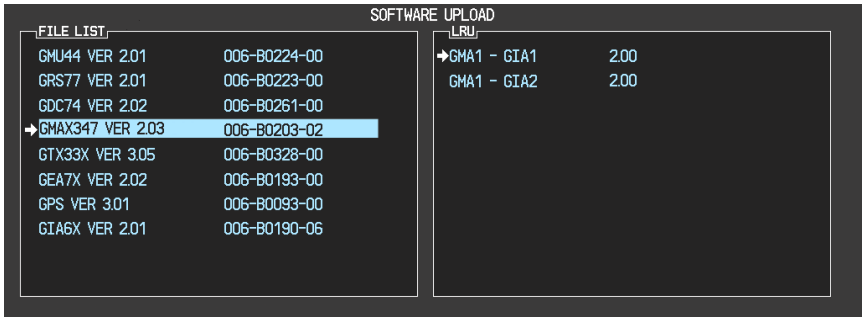
No software/configuration loading or testing is required if the removed GMA 1347 is re-installed. Continue to the final return-to-service checks in Section 8.

New GMA 1347 Installed

If a new GMA 1347 (new serial number) is installed, the correct software and configuration files must be loaded to the unit.

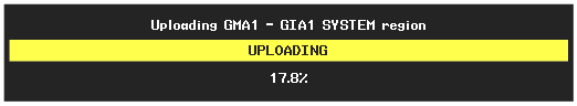
7.2.1 GMA 1347 Software Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into the top slot of the PFD.
2. Start the G1000 system in Configuration mode.
3. At the PFD, go to the Software Upload page using the FMS knob.
4. Highlight the GMA software file. Ensure that both paths to the GMA through GIA1 and GIA 2 appear in the LRU field as shown:

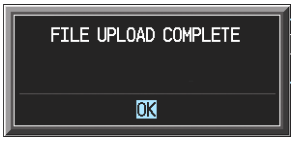


5. Press the LRU softkey. Select the GMA1 - GIA1 data path to load software. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:

7. The software for the GMA 1347 Audio Panel begins to load. Monitor the upload status as it progresses:



8. After the file finishes loading, press ENT to acknowledge the following prompt:

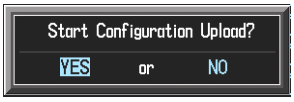


9. Check the SUMMARY field to ensure the load is 'COMPLETE'.
10. Continue to the GMA 1347 Configuration procedure.

7.2.2 GMA 1347 Configuration

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system Configuration mode, if the system is not already in Configuration mode.
3. At the PFD, go to the Configuration Upload page using the FMS knob:

4. Activate the cursor and highlight 'GMA 1' in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



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

8. View the SUMMARY field and ensure that the load is 'COMPLETE', then de-activate the cursor.
9. Go to the System Status page.
10. Activate the cursor and highlight 'GMA1 – GIA1', then 'GMA1 – GIA2' in the LRU window.
11. Verify that the reported part number and version of the software file matches the data in Appendix A.
12. Continue to the GMA 1347 Test procedure.

7.2.3 GMA 1347 Test

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

Intercom System (ICS) Check:

1. Plug in headsets at each ICS position.
2. Ensure that the MAN SQ key 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 speaker 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.

Failsafe Operation Check:

1. Turn the GMA 1347 off by pulling the AUDIO 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 through the PFD/MFD volume control. Verify proper operation of COM 1 using the failsafe operation.
3. Close the AUDIO circuit breaker to continue testing.

Marker Beacon Test:

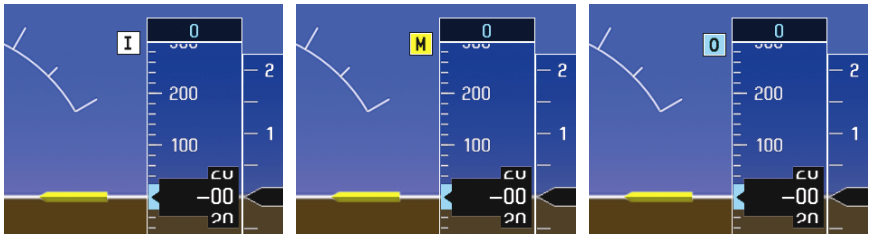


Figure 7-3. Marker Beacon Symbology

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 (Figure 7-3). Operate the MKR MUTE key on the GMA 1347 and ensure that the audio signal is muted.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.3 GIA 63 Integrated Avionics Unit

Original GIA 63(s) Reinstalled:

No software or configuration loading is required if the removed GIA is re-installed in its original position (GIA1 and GIA2 in their original racks). Continue to the return-to-service checks in Section 8.

Original GIA 63s Swapped:

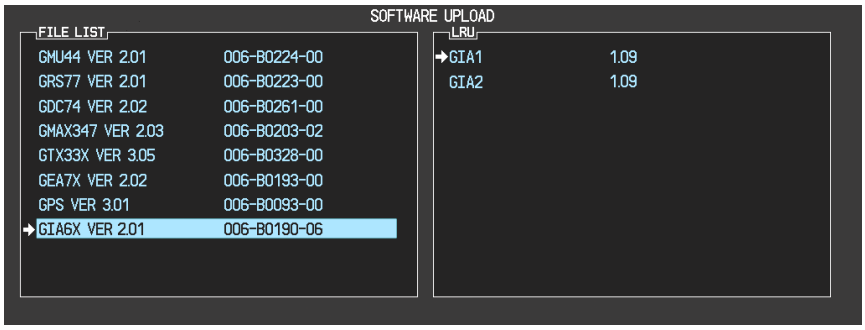
No software loading is required if the originally installed GIA units are re-installed in opposite positions (GIA1 and GIA2 in opposite unit racks). However, the units must be re-configured. Continue to the GIA 63 Configuration Loading procedure.

New GIA 63(s) Installed

If a new GIA 63 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Continue to the GIA 63 Software Loading procedure.

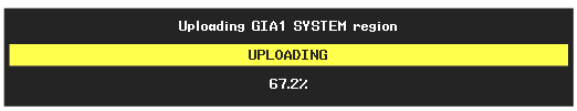
7.3.1 GIA 63 Software Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Activate the cursor and select the GIA software file. Verify that GIA1 and GIA2 appear in the LRU field as shown:



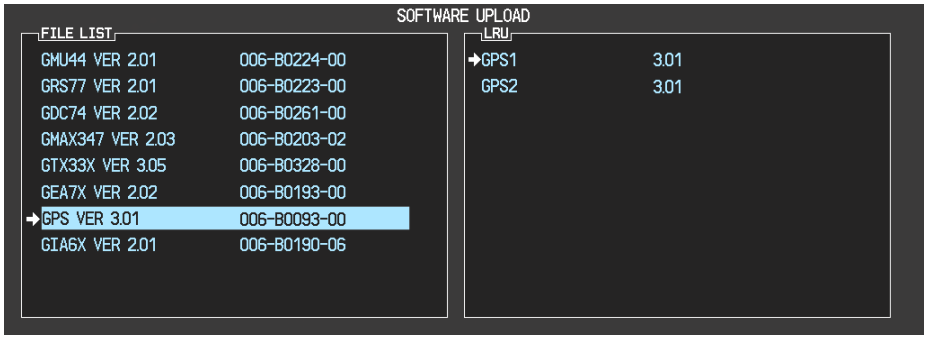
5. Press the LRU softkey and select the appropriate replaced GIA. Press the LOAD softkey.
6. Select YES and press ENT to acknowledge the following prompt:

7. The software for GIA1 begins to load. GIA2 software loads immediately after GIA1 software finishes loading. Monitor the upload status as it progresses:

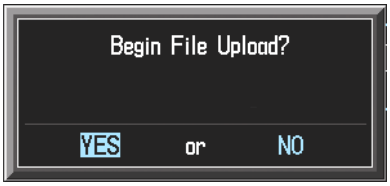


8. After the files finish loading, press ENT to acknowledge the following prompt:

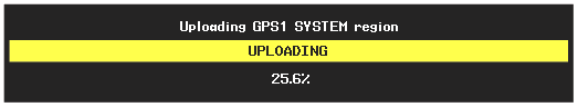
9. View the SUMMARY field and verify that both GIA1 and GIA2 software loading is complete.
10. Highlight the GPS software file. Ensure that GPS1 and GPS2 appear in the LRU field as shown:



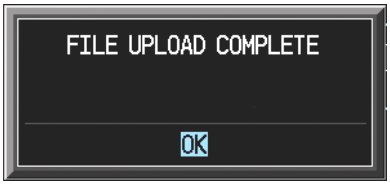
11. Press the LOAD softkey.
12. Select YES and press the ENT key to acknowledge the following prompt:



13. The software for GPS1 begins to load. GPS2 software loads immediately after GPS1 software finishes loading. Monitor the upload status as it progresses:



14. After the files finish loading, press ENT to acknowledge the following prompt:



15. Check the SUMMARY field to ensure the load is ‘COMPLETE’.
16. De-activate the cursor.
17. Continue to the GIA 63 Configuration Loading procedure.

7.3.2 GIA 63 Configuration Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode, if not already in Configuration mode.
3. Go to the Configuration Upload page using the FMS knob:

4. Activate the cursor and highlight GIA1 in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press ENT to acknowledge the following prompt:

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

8. Highlight GIA2 in the FILE LIST field and repeat Steps 3 through 5.
9. View the SUMMARY field and ensure that all items are 'COMPLETE':

10. De-activate the cursor.

11. Go to the System Status page.
12. Activate the cursor and highlight each of the following items in the LRU window:

    -GIA1
    -GIA2
    -GPS1
    -GPS2

13. Check the reported part number/version of each software file and compare to the data in Appendix A.
14. Continue to the GIA 63 Test procedure.

7.3.3 GIA 63 Test

GPS Signal Acquisition:

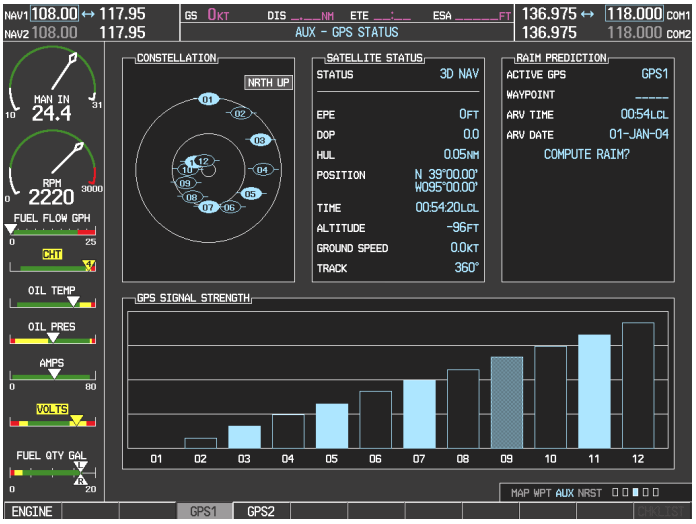


Figure 7-4. GPS Signal Status

The GIA 63 units should normally acquire a 3D GPS navigation solution within 5 to 10 minutes of startup, provided the aircraft is outside (or indoors with a GPS repeater). Select the satellite status page on the MFD (3rd 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 on the MFD.

Continue to the VHF COM Interference test.

VHF COM Interference Test:

This test must be conducted outside. Use of a GPS repeater inside a hangar may result in a failed test. This procedure assumes that the system is currently set to 25 kHz COM channel spacing. Once the signal acquisition test has been completed successfully, perform the following steps:

1. On the MFD, monitor GPS signal strength bars on the 3rd 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 35 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 and 6 and re-transmit while monitoring GPS 2 signal levels on the MFD.
8. Repeat steps 4 through 7 for each of the following frequencies:

- 121.175 MHz
- 121.200 MHz
- 131.250 MHz
- 131.275 MHz
- 131.300 MHz

9. Repeat steps 4 through 8 for the No. 2 COM transceiver (GIA2).
10. On the MFD, select the 4th 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 3rd AUX page.
13. Select 121.185 MHz on the No. 1 COM transceiver.
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 and re-transmit while monitoring GPS 2 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 4th AUX page and change the COM channel spacing back to 25 kHz.
20. Continue to the VOR/LOC/GS Test.

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. Select the appropriate HSI source by using the CDI softkey.

NOTE

The PFD HSI does 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 deviation indicator with up and down deviation indications.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.4 GEA 71 Engine/Airframe Unit

Original GEA 71 Reinstalled

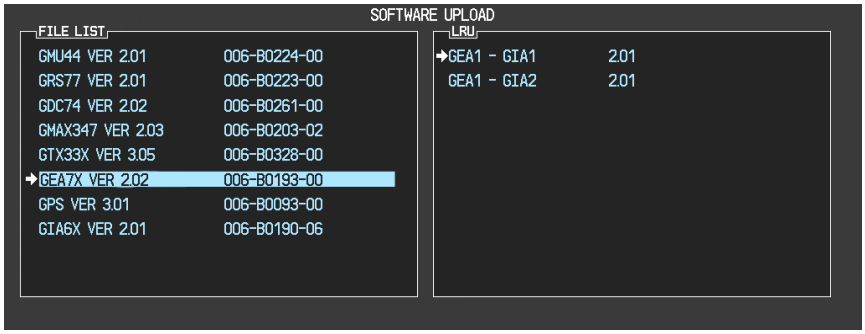
No software or configuration loading is required if the removed GEA 71 is re-installed. Continue to the return-to-service checks in Section 8.

New GEA 71 Installed

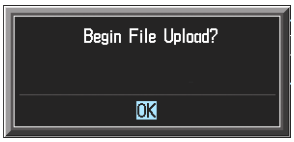
If a new GEA 71 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Continue to the GEA 71 Software Loading procedure.

7.4.1 GEA 71 Software Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Highlight the GEA software file. Ensure that both paths to the GEA 71 through GIA1 and GIA 2 appear in the LRU field as shown:



5. Press the LRU softkey. Select the GEA - GIA1 data path to load software. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



7. The software for the GEA 71 Engine/Airframe Unit begins to load. Monitor the upload status as it progresses:

8. After the files finish loading, press ENT to acknowledge the following prompt:

9. Check the SUMMARY field to ensure the all software loads are 'COMPLETE'.
10. De-activate the cursor.
11. Continue to the GEA 71 Configuration Loading procedure.

7.4.2 GEA 71 Configuration Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode, if not already in Configuration mode.
3. At the PFD, go to the Configuration Upload page using the FMS knob:

4. Activate cursor and highlight 'GEA 1' in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:

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

8. View the SUMMARY field and ensure that all items are 'COMPLETE', then de-activate the cursor.
9. Go to the System Status page.
10. Activate the cursor and highlight 'GEA1 – GIA1' and 'GEA1 - GIA2' in the LRU window.
11. Verify that the reported part number and version of the software file matches the data in Appendix A.
12. Continue to the GEA 71 Test procedure.

7.4.3 GEA 71 Test

All engine/airframe transducers must be checked to ensure proper operation. Restart both displays in normal mode.

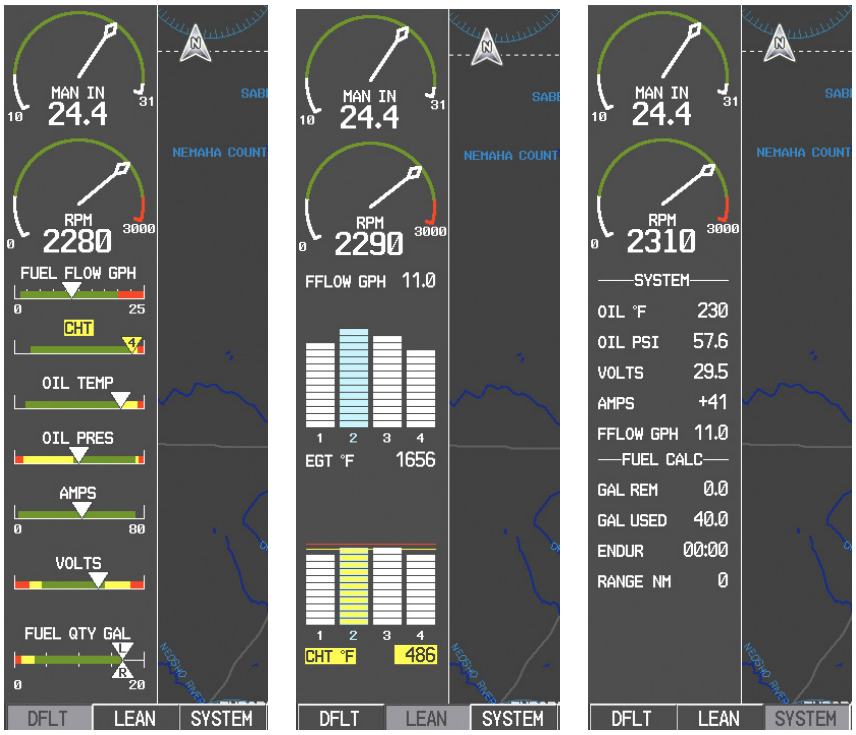


Figure 7-5. G1000 Engine/Airframe Indicators

On the MFD, check the indication for each of the sensor or monitor inputs with the aircraft engine off. Observe the 'Default' page, 'Lean' page, and 'System' pages by using the DFLT, LEAN, and SYSTEM softkeys on the MFD

At the appropriate EIS group (System, Lean, or Default), observe the following sensor indications (see Figure 7-5):

Sensor	Reading with Aircraft Engine OFF
• Oil Pressure	Approximately 0 and Low Oil Pressure Annunciation. 'System' page.
• Oil Temperature	Ambient. 'System' page.
• CHT	Ambient. 'Lean' page.
• EGT	Ambient. 'Lean' page.
• MAP	Atmosphere Pressure
• Tachometer	'0'
• Fuel Pressure	Low Fuel Pressure Annunciation. (Shown on the PFD)
• Fuel Flow	'0'
• Alternator Amps	Approximately '0'. 'System' page.
• Volts	GPU voltage (Battery volts when GPU disconnected) 'System' page.
• Fuel Qty Gal	'Full' on MFD with fully fuelled tanks. 'System page.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.5 GTX 33 Transponder

Original GTX 33 is Reinstalled

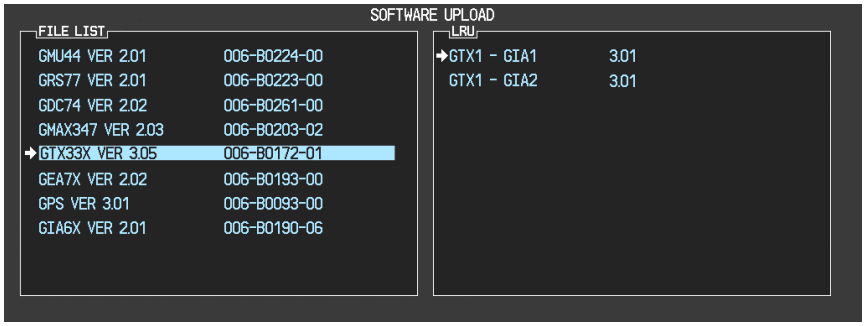
No software or configuration loading is required if the removed GTX 33 is re-installed. Continue to the GTX 33 Test procedure.

New GTX 33 is Installed

If a new GTX 33 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Continue to the GTX 33 Software Loading procedure.

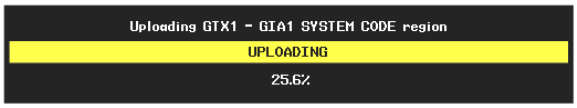
7.5.1 GTX 33 Software Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Highlight the GTX software file. Ensure that both paths to the GTX 33 through GIA1 and GIA 2 appear in the LRU field as shown:



5. Press the LRU softkey. Select the GTX1 - GIA1 data path to load software. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:

7. The software for the GTX 33 transponder begins to load. Monitor the upload status as it progresses:



8. After the files finish loading, press ENT to acknowledge the following prompt:

9. Check the SUMMARY field to ensure the load is 'COMPLETE'.
10. Continue to the GTX 33 Configuration procedure.

7.5.2 GTX 33 Configuration Loading

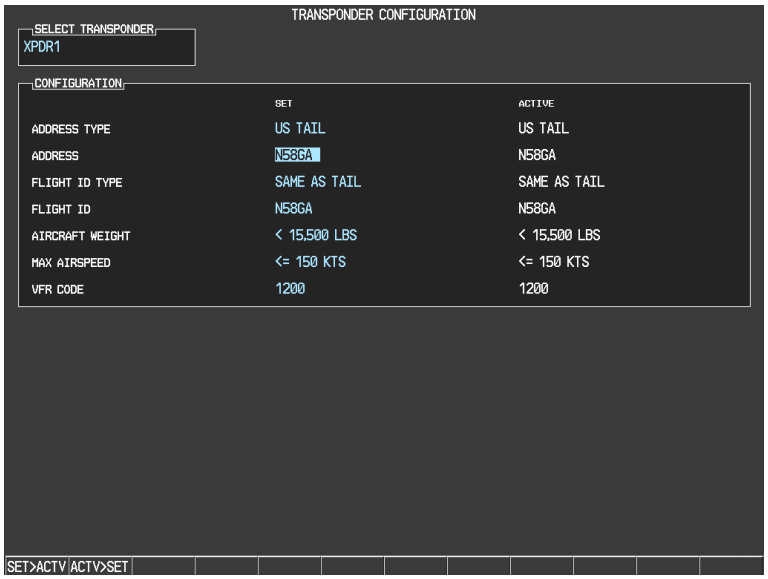
1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode, if not already in Configuration mode.
3. At the PFD, go to the Configuration Upload page using the FMS knob:

4. Activate cursor and highlight 'GTX 1' in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:

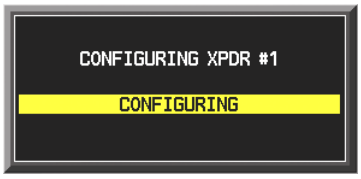
7. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:

8. View the SUMMARY field and ensure that all items are 'complete', then de-activate the cursor.
9. Go to the System Status page.
10. Activate the cursor and highlight 'GTX1 – GIA1' and 'GTX1 - GIA2' in the LRU window.
11. Verify that the reported part number and version of the software matches the data in Appendix A.

12. Select the GTX page group, then select the Transponder Configuration page on the PFD:



13. Ensure that the ‘ADDRESS TYPE’ is ‘US TAIL’ under the ‘SET’ and ‘ACTIVE’ columns.
14. Activate the cursor and highlight the ‘ADDRESS’ field. Use the small/large FMS knobs to enter the aircraft registration number.
15. Once the correct registration number is entered, press the ENTER key. The transponder is configured:



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

17. Press the ENTER key on the PFD and deactivate the cursor
18. Continue to the GTX 33 Test procedure.

7.5.3 GTX 33 Test

Operation of the GTX 33 Mode-S transponder is accomplished using the G1000 PFD. Refer to Garmin part number 190-00324-00, G1000 for DA40 Cockpit Reference Guide, for basic operation. Perform a basic operational check on the transponder.

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. 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.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.6 GDC 74A Air Data Computer

Original GDC 74A is Reinstalled

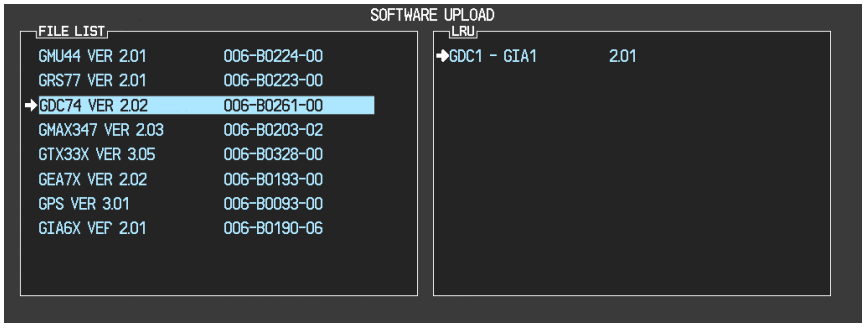
No software or configuration loading is required if the removed GDC 74A is re-installed. Continue to the GDC 74A Test procedure.

New GDC 74A is Installed

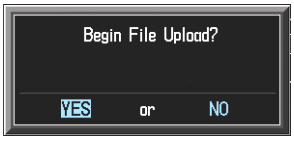
If a new GDC 74A (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Continue to the GDC 74A Software Loading procedure.

7.6.1 GDC 74A Software Loading

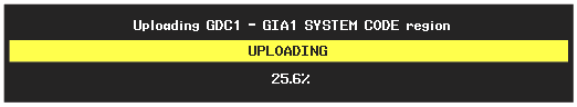
1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Highlight the GDC software file. Ensure that GDC to GIA data path appears in the LRU field as shown:



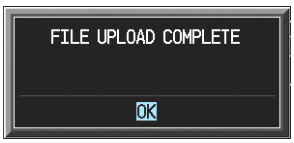
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



7. The software for the GDC 74A Air Data Computer begins to load. Monitor the upload status as it progresses:



8. After the files finish loading, press ENT to acknowledge the following prompt:

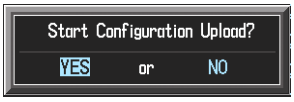


9. Check the SUMMARY field to ensure the load is 'COMPLETE'.
10. Continue to the GDC 74A Configuration Loading procedure.

7.6.2 GDC 74A Configuration Loading

1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode, if not already in Configuration mode.
3. At the PFD, go to the Configuration Upload page using the FMS knob:

4. Activate cursor and highlight 'GDC 1' in the FILE LIST field.
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



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

8. View the SUMMARY field and ensure that all items are 'complete', then de-activate the cursor.
9. Go to the System Status page.
10. Activate the cursor and highlight 'GDC1 – GIA1', then highlight 'GDC1 FPGA' in the LRU window.
11. Verify that the reported part number and version of both software files matches the data in Appendix A.
12. Go to the GDC page group. The GDC CONFIGURATION page is shown by default.
13. Verify that 'CBBSQ7'appears to the right of the 'SELECT AIRCRAFT' field.
14. Verify that 'GTP 59' appears to the right of the 'SELECT OAT' field.
15. Continue to the GDC 74A Test procedure.

7.6.3 GDC 74A Test

Verification of the altimeter and airspeed must be performed using a pitot/static ramp tester. 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:

1. Start the G1000 system in normal mode.
2. Remove power to the PFD by pulling the circuit breaker labeled PFD.
3. Turn the PFD 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.

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.

5. Using the outer 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 1347 Audio Panel. Baro settings can then be read from the MFD for the CFR Part 43 Appendix E tests.

After completing the tests specified by § 91.411 and Part 43 Appendix E, return the MFD to normal mode by pressing the red "display backup" button on the GMA 1347. Return the PFD to normal mode by shutting off the master switch. Upon restart the PFD will enter normal mode.

NOTE

The following tests are above and beyond the requirements set forth in Appendix E.

Pitot/Static Airspeed Test

1. Command the pitot/static ramp tester to simulate air speeds shown in the table below.
2. Wait for the ramp tester 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 table below:

Calibrated air speed, knots	Allowed tolerance, ±knots
50	5.0
80	3.5
100	2.0
120	2.0
150	2.0

Static Port Vertical Speed (Rate of Climb) Test

1. Command ramp tester to change the altitude at the rates shown in the table below.
2. Wait for ramp tester 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

OAT Probe Check

Check the outside air temperature (OAT) measurement shown on the PFD to ensure it reads ambient temperature.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.7 GRS 77 AHRS / GMU 44 Magnetometer

Original GRS 77 is Reinstalled

If the original GRS 77 was reinstalled, then no software loading is required. Continue to the GRS/GMU Calibration section.

New GRS 77 is Installed

If the GRS 77 was replaced with a new unit (new serial number) then software must be loaded. Continue to the GRS 77 Software Loading procedure.

Original GMU 44 is Reinstalled

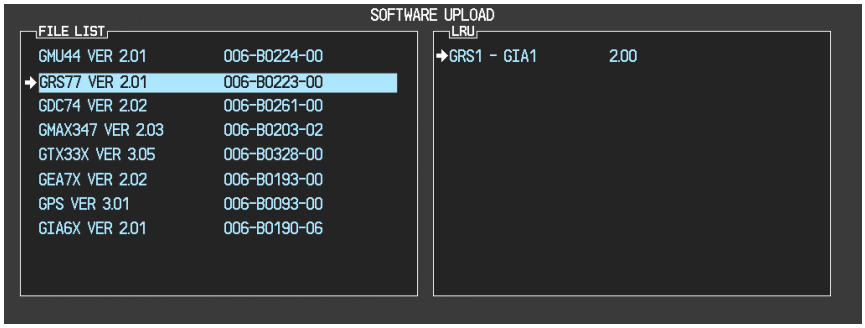
If the original GMU 44 was reinstalled, then no software loading is required. Continue to the GRS/GMU Calibration section.

New GMU 44 is Installed

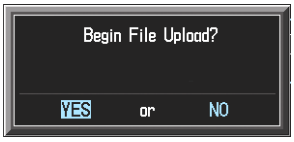
If the GMU 44 was replaced with a new unit (new serial number) then software must be loaded. Continue to the GMU 44 Software Loading procedure.

7.7.1 GRS 77 Software Loading

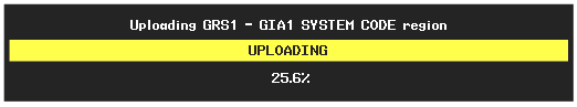
1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Highlight the GRS software file. Ensure that the GRS to GIA data path appears in the LRU field as shown:



5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



7. The software for the GRS 77 AHRS begins to load. Monitor the upload status as it progresses:

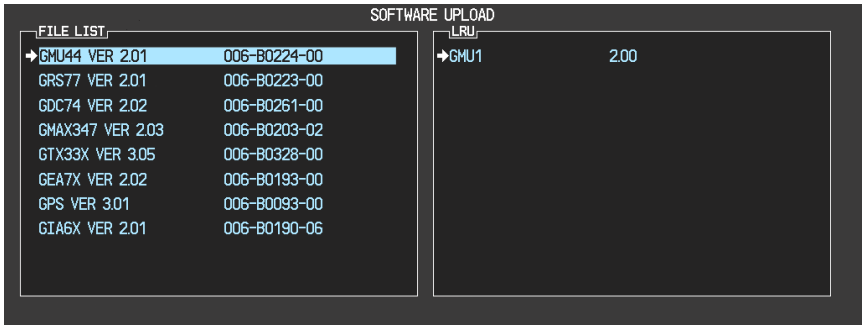


8. After the files finish loading, press the ENT key to acknowledge the following prompt:

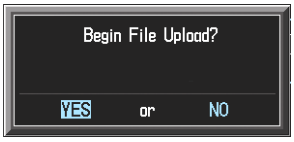
9. Check the SUMMARY field to ensure the load is ‘COMPLETE’.
10. Go to the System Status page.
11. Activate the cursor and highlight ‘GRS1 – GIA1’, then ‘GRS1 – GIA2’, and finally, ‘GRS1 FPGA’ in the LRU window.
12. Verify that the reported part numbers and versions of the software files match the data in Appendix A.
13. Continue to the GRS/GMU Calibration section.

7.7.2 GMU 44 Software Loading:

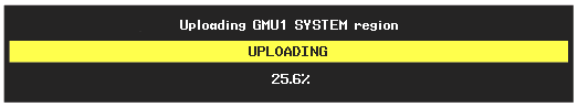
1. Insert the correct G1000/DA 40 SW Loader Card (see Appendix A) into top slot of PFD.
2. Start the G1000 system in Configuration mode.
3. Go to the Software Upload page using the FMS knob.
4. Highlight the GMU software file. Ensure that GMU1 appears in the LRU field as shown:



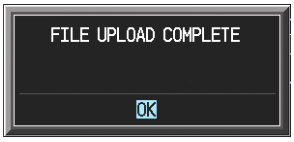
5. Press the LOAD softkey.
6. Select YES and press the ENT key to acknowledge the following prompt:



7. The software for the GMU 44 Magnetometer begins to load. Monitor the upload status as it progresses:



8. After the files finish loading, press the ENT key to acknowledge the following prompt:



9. Check the SUMMARY field to ensure the load is 'COMPLETE'.
10. Go to the System Status page.
11. Activate the cursor and highlight 'GMU1', then 'GMU1 FPGA' in the LRU window.
12. Verify that the reported part number and version of the software files match the data in Appendix A.
13. Continue to the GRS/GMU Calibration section.

7.7.3 GRS/GMU Calibration

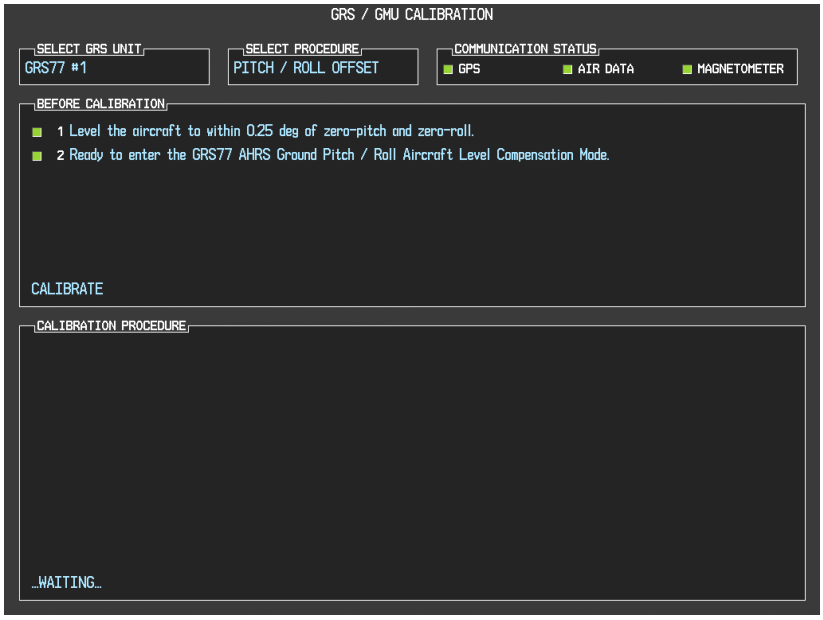
GRS/GMU Recalibration Criteria

Condition	Calibrations Required		
	Procedure A: GRS 77 Pitch/Roll Offset	**Procedure B: GRS/GMU Magnetic Calibration**	**Procedure C: Engine Run-up Vibration Test**
GMU 44 was removed and reinstalled. (no change in serial number)	None Required. Continue to GRS/GMU Test section.		
GMU 44 was replaced with new unit. (New serial number)		X	
GRS 77 AHRS was removed and/or replaced. The mounting tray was NOT removed and the mounting tray bolts were NOT loosened.	None Required. Continue to GRS/GMU Test section.		
GRS 77 AHRS was removed and/or replaced. The mounting tray WAS removed and/or mounting tray bolts WERE loosened.	X	X	X
GRS 77 AHRS Configuration Module was replaced.	X	X	X

7.7.4 Procedure A: GRS 77 Pitch/Roll Offset Calibration

This first procedure must be carried out with the engine off.

1. Level the aircraft to within ±0.25° of zero pitch and zero roll using a digital level. (Follow instructions in DA 40 Aircraft Maintenance Manual for leveling)
2. Start the G1000 system in Configuration mode.
3. Go to the GRS Page Group and select the GRS/GMU Calibration page at the PFD. This page is protected and the following softkey password must be entered at the PFD to continue:
    a) 9
    b) 10
    c) 11
    d) 12 (Far Right softkey)



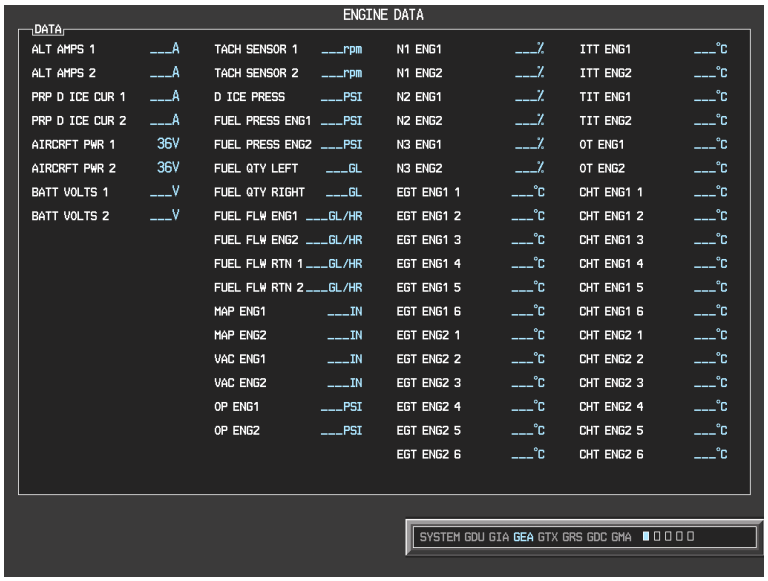
4. Ensure that the No. 1 GRS 77 is selected in the SELECT GRS UNIT window on the PFD.
    a) Activate the cursor and highlight the SELECT PROCEDURE window and select PITCH/ROLL OFFSET.
    b) Press the ENT key.
    c) Use the cursor to highlight the BEFORE CALIBRATION window.
    d) Follow the checklist items displayed on the PFD and press the ENT key as each step is completed or confirmed.
    e) When the CALIBRATE field is blinking, press the ENT button 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 step is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is blinking, press the ENT key to continue.
5. 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.
6. Press the ENT key on the PFD to conclude this procedure.

7.7.5 Procedure B: GRS/GMU Magnetic Calibration

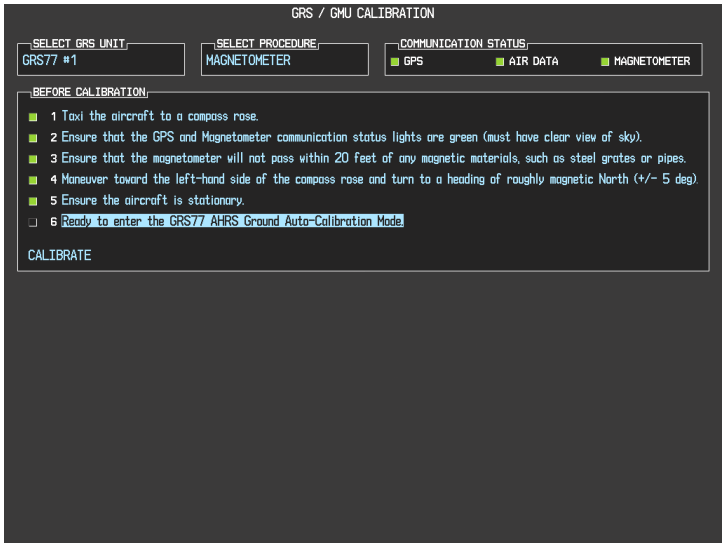
CAUTION

CALIBRATION PROCEDURE B MUST BE CARRIED OUT ON A COMPASS ROSE IN ORDER TO GUARANTEE MEASUREMENTS FREE OF ENVIRONMENTAL MAGNETIC DISTURBANCES. ATTEMPTING TO CARRY OUT THIS MANEUVER ON A TYPICAL RAMP AREA MAY NOT YIELD A SUCCESSFUL CALIBRATION. THE ACCURACY OF THE AHRS CANNOT BE GUARANTEED IF THIS CALIBRATION IS NOT PERFORMED ON A MAGNETICALLY CLEAN COMPASS ROSE OR EQUIVALENT.

1. Start both displays in normal mode.
2. Start the aircraft engine following the procedures in the G1000/DA40 Airplane Flight Manual Supplement.
3. After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose. At the compass rose, align the aircraft to a heading of magnetic north (±5°).
4. Restart the PFD and MFD in configuration mode.
5. On the MFD, select the GEA page group. The technician may monitor engine performance at the Engine Data page during the procedure:



6. Go to the GRS Page Group on the PFD.
7. Select the GRS/GMU Calibration page and enter the following softkey password:
    a) 9
    b) 10
    c) 11
    d) 12 (Far Right softkey)



8. 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."

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.

7.7.6 Procedure C: Engine Run-Up Vibration Procedure

Calibration Procedures A and B are not required prior to this procedure.

1. Start both displays in normal mode.
2. Start the aircraft engine following the procedures in the G1000/DA40 Airplane Flight Manual Supplement.
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. At the Engine Data page, monitor engine performance during the procedure:
6. Go to the GRS Page Group on the PFD.
7. Select the GRS/GMU Calibration page and enter the following softkey password:

    a) 9

    b) 10

    c) 11

    d) 12 (Far Right softkey)

8. Initiate the AHRS engine run-up vibration test procedure by performing the following steps:
    a) Select the ENGINE RUN-UP TEST procedure and press the ENT key.
    b) Follow the checklist items displayed on the PFD, and press the ENT key as each step is completed or confirmed.
    c) When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
9. The PFD instructs the operator to gradually increase power from idle to full throttle and back to idle over a period of 2-4 minutes.
10. When the operator has completed the engine run-up and the engine is back to an idle setting, press the ENT key to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
11. The PFD informs the operator if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified and numeric values are displayed on the PFD.
12. Press the ENT button on the PFD to conclude this procedure.

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:

a) Vibration motion of GRS77 and/or GMU44 caused by neighboring equipment and/or supports.
b) Mounting screws and other hardware for GRS77 and/or GMU44 not firmly attached.
c) GRS77 connector not firmly attached to unit.
d) Cabling leading to GRS77 or GMU44 not firmly secured to supporting structure.
e) An engine / propeller that is significantly out of balance.

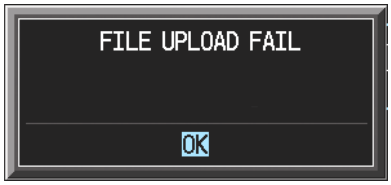
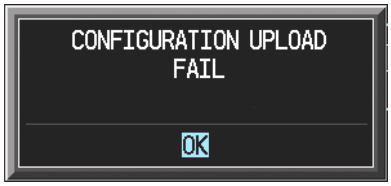
7.7.7 GRS/GMU Test

The aircraft can now be taxied back and the engine can be shut down for final checkout.

When the PFD powers up in normal mode, the AHRS attitude and heading information displayed should become valid within 1 minute of power-up. This confirms that the GRS 77 and GMU 44 work correctly.

If no other service is to be performed, continue to the return-to-service checks in Section 8.

7.8 Software/Configuration Troubleshooting

Problem	Solutions
GDU 1040 MFD or PFD displays do not power up	• Ensure that the criteria listed in 7.8.1 are fulfilled for the applicable situation. • Ensure power is present at display connector. • Replace display.
Software file load fails: 	• Ensure that criteria listed in 7.8.1 are fulfilled for the applicable situation. • Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry software file load or try using a different card. • Ensure that the MFD is not touched during the loading process, unless specifically instructed to do so. • Ensure that LRU part number is compatible with software version and Loader Card. Refer to Appendix A. • Replace LRU.
Configuration file load fails: 	• Ensure that criteria listed in 7.8.1 are fulfilled for the applicable situation. • Ensure that LRU is reporting data on System Status page (LRU is 'ONLINE'). Check data path wiring as needed. • Retry configuration file load or try using a different card. • Ensure that the MFD is not touched during the loading process, unless specifically instructed to do so. • Ensure that LRU part number is compatible with Card Loader. Refer to Appendix A. • Replace LRU.
GIA1 and/or GIA2 to 'LRU' data path not working	• Ensure that criteria listed in 7.8.1 are fulfilled for the applicable situation. • Ensure GIA1 and GIA2 are configured correctly. • Check wiring, connectors & pins as needed.
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. Refer to Appendix A. • Check and ensure that correct Card Loader was used during load process. Refer to Appendix A of this document. • Reload software to LRU. • Reload 'MANIFEST' configuration file to PFD.

7.8.1 System Communication Hierarchy

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

Desired Operation	Criteria for Success
Load Software to GDU 1040 MFD or PFD Displays	• G1000/DA 40 SW Loader Card must be inserted in top slot for each display to be loaded. • CLR & ENT keys must be held during power up of display. • Power on only one display at a time during software loading.
Load AIRFRAME, SYSTEM, MFD1, PFD1, and MANIFEST configuration files to MFD and PFD	• G1000/DA 40 SW Loader Card must be inserted in top slot of PFD. • PFD and MFD must be powered on. • PFD and MFD must have correct software.
Load Software/Configuration files to GIA 63s	• G1000/DA 40 SW Loader Card must be inserted in top slot of PFD. • G1000 system must be powered on. • PFD and MFD must have correct software. • PFD and MFD must be successfully configured with AIRFRAME, SYSTEM, MANIFEST, MFD1, and PFD1 configuration files.
Load Software/Configuration files to: - GMA 1347 - GDC 74A - GEA 71 - GRS 77 (software only) - GMU 44 (software only) - GTX 33	• G1000/DA 40 SW Loader Card must be inserted into PFD top slot. • G1000 must be powered on. • PFD and MFD must have correct software and configuration settings. • GIA 63s must have correct software. • GIA 63s must be successfully configured with GIA1 and GIA2 configuration files. • Data path from GIA1 to each LRU must be operational.

8 System Return to Service Procedure

This final checkout tests various secondary communications paths to ensure that the paths function correctly. Perform the following steps and verify the results of each test.

8.1 GPS Failure Test

Step	Desired Result
Single GPS Failure Conditions: 1. Place a shroud over the GPS antenna for GIA1 to prevent signal reception. Verify loss of signal on MFD AUX page 3. 2. Check for desired results. 3. Remove shroud from the GIA1 GPS antenna. 4. Place a shroud over the GPS antenna for GIA2 to prevent signal reception. Verify loss of signal on MFD AUX page 3. 5. Check for desired results. 6. Remove shroud from the GIA2 GPS antenna.	GPS Failure – For each of the specified GPS failure conditions, the following shall remain valid on the PFD throughout the procedure: ✓ Attitude and Heading from AHRS. ✓ Airspeed, Altitude, Vertical Speed, and OAT from Air Data Computer. ✓ GPS CDI remains valid on PFD.
Dual GPS Failure Conditions: 1. Cover both GPS antennas. Verify loss of signal on MFD AUX page 3. 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 shall occur: ✓ GPS CDI flags INTEG on PFD. ✓ Attitude and Heading remain valid from AHRS. ✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.

8.2 GIA Failure Test

Step	Desired Result
Single GIA Failure Conditions: 1. Remove power from GIA1 by pulling NAV/GPS1 and COM1 breakers. 2. Check for desired results. 3. Restore power to GIA1. Allow GPS1 to re-acquire satellites. 4. Remove power from GIA2 by pulling NAV/GPS2 and COM2 breakers. 5. Check for desired results. 6. Restore power to GIA2. Allow GPS2 to re-acquire satellites.	GIA1 Failure – For a GIA1 failure, only the following shall flag invalid: ✓ COM1/NAV1 field (PFD & MFD). ✓ NAV1 CDI loses deviation bar (PFD only). GIA2 Power Failure – For a GIA2 failure, only the following shall flag invalid: ✓ COM2/NAV 2 field (PFD & MFD). ✓ NAV2 CDI loses deviation bar (PFD only).
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, the following shall occur: ✓ COM1/NAV1 & COM2/NAV2 fields flag invalid. ✓ GPS CDI flags INTEG on PFD. ✓ NAV1 & NAV2 CDI loses deviation bar. ✓ XPDR field flags invalid on PFD. ✓ Engine Instrument field flags invalid on MFD. ✓ All AHRS & ADC fields remain valid.

8.3 Display Failure Test

Step	Desired Result
MFD Display Failure Conditions: 1. Remove power from MFD. 2. Check for desired results. 3. 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. ✓ Valid Engine Instrumentation appears on PFD. ✓ XPDR field remains valid on PFD. ✓ COM2/NAV2 fields flag invalid.
PFD Display Failure Conditions: 1. Remove power from PFD. 2. Check for desired results. 3. Replace 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. ✓ Valid XPDR field appears on MFD ✓ COM1/NAV 1 fields flag invalid.

8.4 AHRS/ADC Backup Path Test

Step	Desired Result
Secondary AHRS/ADC path check: 1. Remove power from PFD. 2. Remove power from GIA2. 3. Check for desired results. 4. Restore power to the PFD and GIA2.	The following shall occur on the MFD when power is removed from the PFD and GIA2: ✓ MFD switches to reversion mode. ✓ Attitude and Heading remain valid from AHRS. ✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer. ✓ Engine Instrumentation flags invalid. ✓ All COM & NAV fields flag invalid.

8.5 Flight Test

Perform a Function Check Flight (FCF) at the end of maintenance as required by the DA 40 Airplane Maintenance Manual. Refer to the DA 40 Airplane Maintenance Manual for check flight procedures and guidance. Always be thoroughly familiar with the G1000/DA40 Airplane Flight Manual Supplement and Cockpit Reference Guide before performing a flight test.

8.5.1 VHF COM Tests

To check the communications transceivers, maintain an appropriate altitude and contact a ground station facility at a range of at least 50 nautical miles. Contact a ground station that is in close proximity. Press the squelch disable button to defeat the automatic squelch feature and listen for any unusual electrical noise that would increase the squelch threshold. If possible, verify the communications capability on both the high and low ends of the VFH 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)

8.5.2 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)

8.6 Maintenance Records

After conducting the function check flight in accordance with the Diamond DA 40 Airplane Maintenance Manual, the aircraft may be returned to service.

Record the following information in appropriate aircraft maintenance logs:

- Part number of the G1000/DA 40 SW Loader Card used to perform software loading or software updates.
- Part numbers and versions of LRU software files reported after maintenance is complete (found at the System Status page in Configuration Mode).
- Any other applicable information related to the maintenance work performed on the aircraft.

Appendix A Installation Data

A.1 G1000 Equipment List

The following table shows all available G1000 LRUs and compatible software versions/part numbers. Any time a software file is changed or reloaded, the part number and version must be checked against the following table for correctness.

Equipment	LRU PART NUMBER	CODE LOADER PART NUMBER	SOFTWARE PART NUMBER	SOFTWARE VERSION
GTX 33 Mode S Transponder	011-00779-00	010–00369–04	006-B0172-XX	3.06
GEA 71 Engine/Airframe Unit	011-00831-00		006-B0193-01	2.03
GDC 74A Air Data Computer	011-00882-00		006-B0261-01 & 006-C0055-00	2.03 1.05
GMU 44 Magnetometer	011-00870-00		006-B0224-00 & 006-C0048-00	2.01 2.00
GDU 1040 PFD	011-00972-00		006-B0319-05	2.02
GDU 1040 MFD	011-00972-00		006-B0319-05	2.02
GIA 63 Integrated Avionics Unit No. 1	011-00781-00		006-B0190-07 & 006-B0093-XX	2.02 3.01
GIA 63 Integrated Avionics Unit No. 2	011-00781-00		006-B0190-07 & 006-B0093-XX	2.02 3.01
GRS 77 AHRS	011-00868-00		006-B0223-00 006-C0049-00	2.01 2.00
GMA 1347 Audio Panel	011-00809-00		006-B0203-02	2.03

A.2 Additional Equipment Required

Qty	Description	Part Number	Vendor
1	Tachometer Sensor	494-00024-00	Garmin International 1200 E 151st Street Olathe, KS 66062 U.S.A. TEL: 913-397-8200 FAX: 913-3978282 www.garmin.com
1	Alternator Current Sensor	494-00025-00	
4	Cylinder Head Temp Sensor	494-00026-01	
4	Exhaust Gas Temp Sensor	494-00026-00	
5	Voltage Suppressors	682-00002-00	
1	Remote Avionics Enclosure	011-01015-00	
1	GTP 59 OAT Probe	011-00978-00	
2	CDU Fan	013-00102-00	
1	Oil Pressure Sensor	IPT-20RT1-1000-100G	Kulite Semiconductor Products, Inc. 889 North Maize Road, Suite 101 Wichita, KS 67212 U.S.A. Telephone: 316-773-6194 Fax: 316-773-1115 www.kulite.com
1	Fuel Pressure Sensor	IPT-20RT1-1000-100G	
1	Manifold Pressure Sensor	APT-151B-1000-20A	
1	Oil Pressure Hose	AE3660001E0112	Eaton Aerospace Aeroquip Engineered Systems Division To locate an authorized Aeroquip dealer, go to the following web site: www.aeroquip.com
1	Fuel Pressure Hose	AE3660001E0066	
1	Manifold Pressure Hose	AE3660121B0195	
1	VOR/LOC/GS Diplexer	CI-1125	Diamond Aircraft Telephone: 519-457-4051 Fax: 800-934-3519 or 519-457-4045 www.diamondair.com
1	Fuel Flow Sensor	680501-1(29.8)	Shadin Company Incorporated 6831 Oxford Street St. Louis Park, MN 55426-4414 U.S.A. Telephone: 952-927-6500 Fax: 952-924-1111
1	Oil Temperature Sensor	MS28034-1	Norwich Aero Products, Inc. 50 O'Hara Drive Norwich, NY 13815 U.S.A. Telephone: 604-336-7636 Fax: 607-336-2610

A.3 Optional Equipment

Qty	Description	Part Number	Vendor
2	Terrain Database Card (Installed in lower card slot on PFD and MFD)	010-00330-40	Garmin International 1200 E 151st Street Olathe, KS 66062 U.S.A. TEL: 913-397-8200 FAX: 913-3978282 www.garmin.com

A.4 Parts List

PART NUMBER	DESCRIPTION	VENDOR	QTY
MS35206-220	SCREW	MIL SPEC PART	4
NAS1149FN432P	WASHER	MIL SPEC PART	6
MS21044N04	NUT	MIL SPEC PART	4
MS35206-226	SCREW	MIL SPEC PART	2
AN960-6	WASHER	MIL SPEC PART	2
MS35214-25	SCREW	MIL SPEC PART	4
MS24693-BB26	SCREW	MIL SPEC PART	3
QQB575R30T1125	WIRE BRAID	MIL SPEC PART	AR
QQB575F30T1375	WIRE BRAID	MIL SPEC PART	AR
AN960-8	WASHER	MIL SPEC PART	8
MS27039C1-16	SCREW	MIL SPEC PART	4
NAS1149C0363R	WASHER	MIL SPEC PART	8
MS21044C3	NUT	MIL SPEC PART	4
MS21044N08	NUT	MIL SPEC PART	7
M22759/16-22-2	WIRE, 22 AWG, RED	MIL SPEC PART	AR
M22759/16-22-9	WIRE, 22 AWG, WHITE	MIL SPEC PART	AR
M22759/16-22-4	WIRE, 22 AWG, YELLOW	MIL SPEC PART	AR
M22759/16-22-6	WIRE, 22 AWG, BLUE	MIL SPEC PART	AR
M22759/16-12-9	WIRE, 12 AWG, WHITE	MIL SPEC PART	AR
M22759/16-16-2 OR M22759/34-16-2	WIRE, 16 AWG, WHITE	MIL SPEC PART	AR
M23053/5-102-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-104-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-105-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-106-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-107-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-108-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
M23053/5-109-X	HEAT SHRINK TUBING	MIL SPEC PART	AR
MS35207-263	SCREW	MIL SPEC PART	2
NAS1149F0332P	WASHER	MIL SPEC PART	4
MS21044N3	NUT	MIL SPEC PART	2
MS25036-112	RING TERMINAL	MIL SPEC PART	2
MS25036-157	RING TERMINAL	MIL SPEC PART	2
MS25036-154	RING TERMINAL	MIL SPEC PART	1
MS20659-144	RING TERMINAL	MIL SPEC PART	5
MS25036-149	RING TERMINAL, #8 (M4), 18-22	MIL SPEC PART	3
AN816-4J	FITTING	MIL SPEC PART	1
AN816-3J	FITTING	MIL SPEC PART	1
MS35206-249	SCREW	MIL SPEC PART	3
MS35206-243	SCREW	MIL SPEC PART	2
NAS1149FN832P	WASHER	MIL SPEC PART	4
MS20426AD3-5	RIVET	MIL SPEC PART	4
MS27039-1-08	SCREW	MIL SPEC PART	5
RE70FR499R	RESISTOR, FIXED, WIRE-WOUND	MIL SPEC PART	3
M39029/63-368	SOCKET CONTACT, CRIMP, 22G	MIL SPEC PART	6
M39029/64-369	PIN CONTACT, CRIMP, 22G	MIL SPEC PART	9
MS35842-12	CLAMP, HOSE, LOW PRES, TYPE "F"	MIL SPEC PART	2
MS21919WCJ19	CLAMP, LOOP, HIGH TEMP	MIL SPEC PART	2
MS21919WDG15	CLAMP	MIL SPEC PART	3
MS21333-105	CLAMP	MIL SPEC PART	1
MS3367	TIEDOWN STRAP	MIL SPEC PART	AR
MS30526-245	SCREW	MIL SPEC PART	4
MS21042-4	NUT	MIL SPEC PART	12
MS24693-S3	SCREW	MIL SPEC PART	6
MS24693-S8	SCREW	MIL SPEC PART	6
MS27039C1-10	SCREW	MIL SPEC PART	2
AN960C10	WASHER	MIL SPEC PART	4
MS21046C3	NUT	MIL SPEC PART	2

PART NUMBER	DESCRIPTION	VENDOR	QTY
115-00631-01	COVER PLATE	GARMIN	1
115-00459-00	MOUNTING TRAY	GARMIN	1
211-60037-08	SCREW	GARMIN	2
115-00481-00	MOUNTING RING	GARMIN	1
147-00041-00	SPACER	GARMIN	1
115-00632-00	MOUNTING RING	GARMIN	1
231-00022-01	CLAMP, NYLON	GARMIN	1
233-10010-01	FITTING	GARMIN	1
231-00038-00	CLAMP, WORM GEAR	GARMIN	1
252-00125-00	GROMMET STRIP	GARMIN	AR
253-00113-01	FINGER STOCK	GARMIN	2
233-10012-00	2.0" [50.8] AIRDUCT TUBING	GARMIN	AR
350-A3201-01	FUSE, 3.2 AMP	GARMIN	5
330-00354-00	FUSE HOLDER	GARMIN	5
901-00162-J0	RESISTOR, 1.6k, .25W, 5%	GARMIN	1
901-00682-J0	RESISTOR, 6.8k, .25W, 5%	GARMIN	1
225395-6	CONNECTOR, RF, BNC	DIAMOND AIRCRAFT	1
60618-1	CONTACT	DIAMOND AIRCRAFT	3
1-480305-0	CONNECTOR	DIAMOND AIRCRAFT	1
190130	AIR FITTING	DIAMOND AIRCRAFT	2
282105-1	CONNECTOR	DIAMOND AIRCRAFT	2
183036-1	CONTACT	DIAMOND AIRCRAFT	14
281934-4	GROMMET	DIAMOND AIRCRAFT	22
282080-1	CONNECTOR	DIAMOND AIRCRAFT	4
183035-1	CONTACT	DIAMOND AIRCRAFT	8
282104-1	CONNECTOR	DIAMOND AIRCRAFT	4
DIN3771-9X2	VITON O-RING	DIAMOND AIRCRAFT	1
RD9M000V30	CONNECTOR W/VIBRATION MOUNT	POSITRONIC	1
RD9F00LVL0	CONNECTOR W/HOOD & LEVER	POSITRONIC	1
03-06-2042	PLUG HOUSING, 4P	MOLEX	1
1560	MALE TERMINAL	MOLEX	4
100-36S	DUCT CLAMP	AERO SEAL BREEZE	2
2650-26, TYPE F	FIRESLEEVE	STRATOFLEX DEALER	9"
5027	FIRESLEEVE END DIP	STRATOFLEX DEALER	AR
SW-30	1/8" SPIRAL WRAP TUBING, HI TEMP	ALPHA WIRE	AR
LOCKTITE 425	THREAD LOCK COMPOUND	BEST SOURCE	AR
DYNAMARK II	CUSTOM IMAGING SYSTEM	3M	AR
.063 6061-T6 ALUMINUM	ALUMINUM PER AMS-QQ-A-250/11	BEST SOURCE	AR
.040 2024-T3 ALUMINUM	ALUMINUM PER AMS-QQ-A-250/5	BEST SOURCE	AR
.06 TYPE 304 STAINLESS STEEL	TYPE 304 STAINLESS STEEL PER ASTM A240 OR AMS 5513	BEST SOURCE	AR

A.5 Weight & Balance

EQUIPMENT WEIGHT & BALANCE			
UNIT	WEIGHT (kg)	ARM (mm)	MOMENT (kg/mm)
GDU 1040 PFD	3.06	1775	5426.6
GDU 1040 MFD	3.06	1775	5426.6
GIA 63 #1	3.16	4030	12741.0
GIA 63 #2	3.16	3939	12447.2
GDL 69/69A	1.13	4092	4621.7
GEA 71	1.01	1681	762.5
GDC 74A	0.99	1678	1659.3
GRS 77	1.37	3942	5417.8
GMU 44	0.29	2600	743.0
GTX 33	1.72	3871	6672.3
GMA 1347	1.09	1775	1932.3
GTP 59	0.09	2120	192.3
CYL 1 EGT SENSOR	0.04	720	26.1
CYL 2 EGT SENSOR	0.04	890	35.6
CYL 3 EGT SENSOR	0.04	910	36.4
CYL 4 EGT SENSOR	0.04	1070	42.8
CYL 1 CHT SENSOR	0.03	780	21.2
CYL 2 CHT SENSOR	0.03	820	24.6
CYL 3 CHT SENSOR	0.03	960	28.8
CYL 4 CHT SENSOR	0.03	1000	30.0
OIL PRESS SENSOR	0.10	1290	122.9
FUEL PRESS SENSOR	0.10	830	83.0
OIL TEMP SENSOR	0.06	1250	79.4
MANIFOLD PRESS SENSOR	0.12	1150	135.6
TACH SENSOR	0.03	1290	41.0
FUEL FLOW SENSOR	0.07	870	63.1
CDU 1 FAN	0.09	1724	148.6
CDU 2 FAN	0.09	1724	148.6
ALT CURRENT SENSOR	0.06	1592	93.9
DIPLEXER	0.09	4144	357.1
REM AV ENCLOSURE W/FAN	2.49	4012	9990.8
OIL PRESS HOSE	0.12	1140	134.4
MANIFOLD PRESS HOSE	0.14	950	133.6
FUEL PRESS HOSE	0.10	830	79.1

NOTE

The GDL 69/69A are shown as provisions only.

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Appendix B G1000 Software/Configuration Procedure

This section provides a complete software/configuration procedure for instances where the entire G1000 system software version is to be re-loaded and/or updated. The following diagram depicts an overview of the entire software/configuration sequence for the G1000 system. It should be noted that in some cases, not all LRU software versions are updated at the same time. LRUs with unchanged S/W versions may be skipped during the process. All software versions must be verified at the beginning and end of the procedure and must agree with the data presented in Appendix A.1. If any problems are encountered during the loading process, see Section 7.8 for troubleshooting.

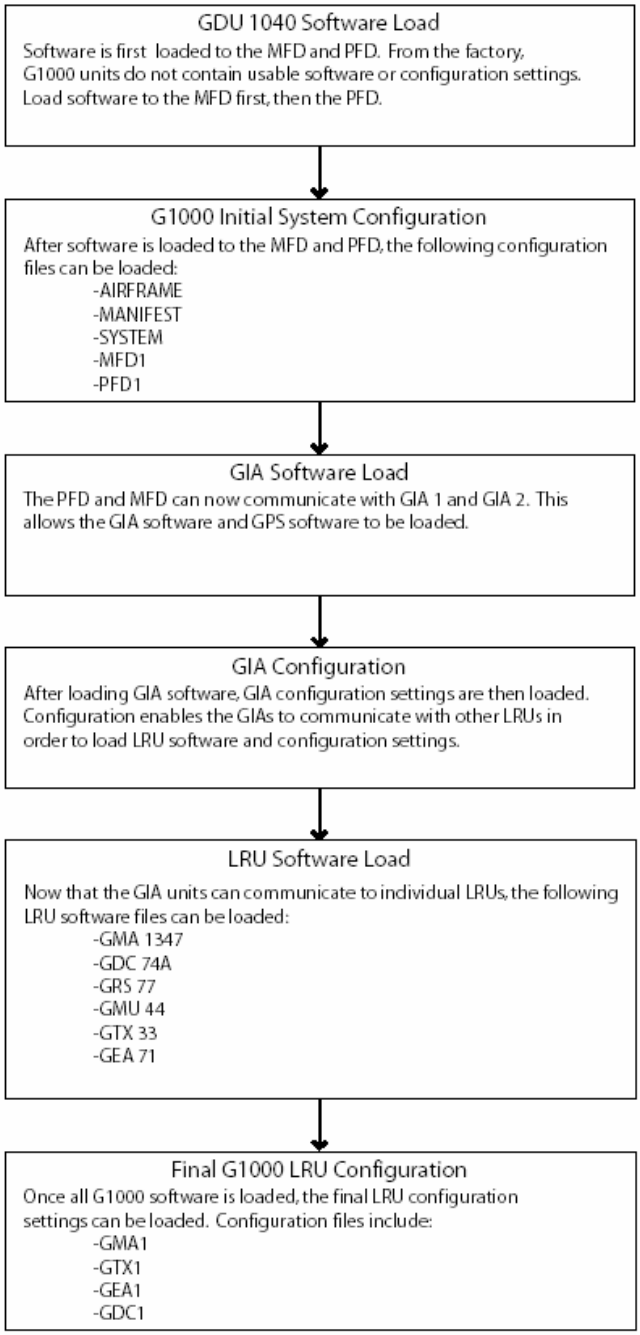


Figure B-1. Software/Configuration Overview

B.1 System Power Up

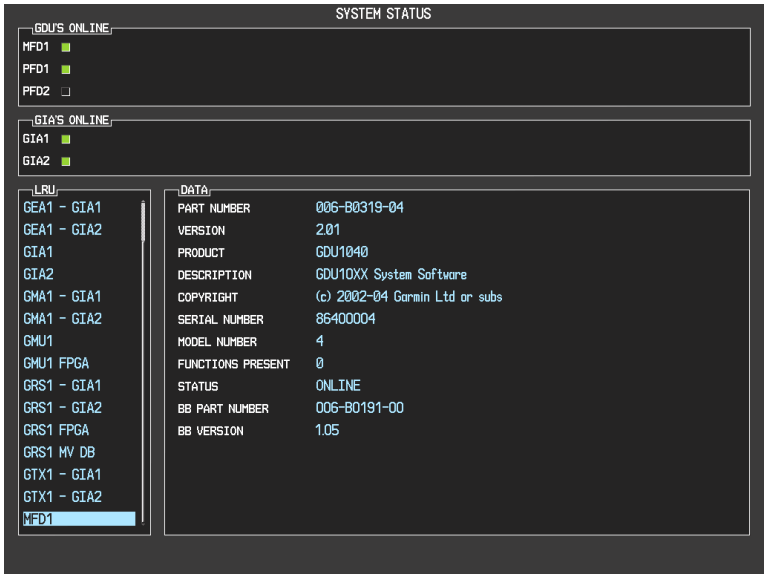
Apply power to the G1000 by doing the following:

1. Turn on the BATT side master switch.
2. Turn on the ground power unit, if utilized.
3. Turn on the AVIONICS master switch. At this moment, all G1000 equipment is receiving power.

B.1.1 System Software Verification

Before loading any software files, the existing files are to be checked and verified against aircraft maintenance logs.

1. Remove power from the MFD and PFD by pulling the MFD and PFD circuit breakers.
2. Start the PFD in configuration mode by holding down the ENT key and closing the PFD circuit breaker. Hold the ENT key until the words INITIALIZING SYSTEM are displayed in the upper left corner of the PFD.
3. Start the MFD in the same manner as the PFD.
4. The PFD shows the System Status configuration page by default:

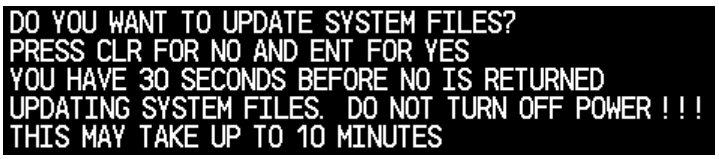


5. Activate the cursor and use the FMS knob to scroll down the items listed in the LRU window.
6. Highlight each LRU and verify the installed software version and part number against the information recorded in the aircraft maintenance logs.
7. After software versions and part numbers have been verified, the new software may be loaded to the system. Continue to the MFD & PFD Software Load section.

B.2 MFD & PFD Software Load

1. Remove power to the MFD and PFD by pulling the MFD and PFD circuit breakers.
2. Insert the correct G1000/DA 40 Card Loader (see Appendix A) into the MFD top card slot.
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 the MFD, release the ENT key.
5. Press the ENT key to acknowledge the following prompt:

6. The following screen is displayed.



7. New software is loaded to the MFD. When complete, the MFD starts in configuration mode.
8. Remove the G1000/DA 40 Card Loader from the MFD and insert it into the top card slot on the PFD. Repeat Steps 3 through 7 for the PFD.
9. When PFD update is complete, it starts in the configuration mode. Do not remove power.

IMPORTANT

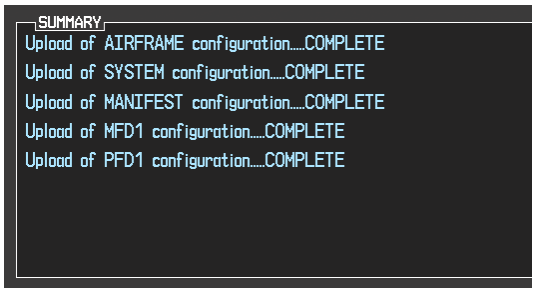
For the rest of the software/configuration procedure, do not operate the MFD while loading software or configuration files unless specifically instructed to do so. A failed or cancelled load may result.

B.3 Initial G1000 Configuration

1. At the PFD, go to the Configuration Upload page using the FMS knob.
2. Activate the cursor and highlight 'AIRFRAME' in the FILE LIST field.
3. Press the LOAD softkey.
4. Select YES and press the ENT key to acknowledge the following prompt:

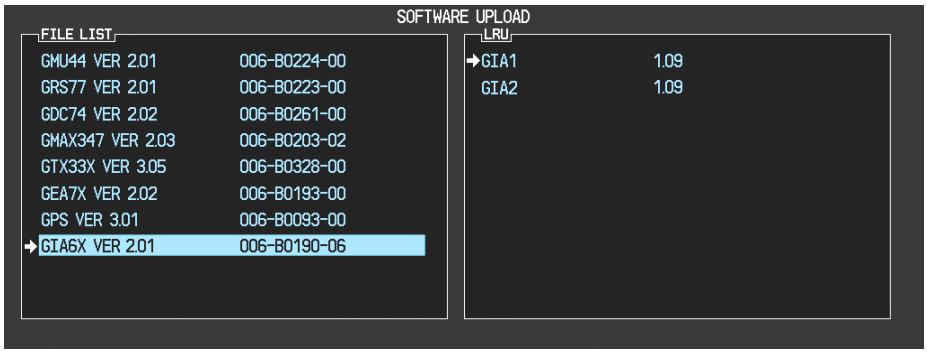
5. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:

6. Highlight 'SYSTEM' in the FILE LIST field and repeat steps 3 through 5.
7. Highlight 'MANIFEST' in the FILE LIST field and repeat steps 3 through 5.
8. Highlight 'MFD1' in the FILE LIST field and repeat steps 3 through 5.
9. Highlight 'PFD1' in the FILE LIST field and repeat steps 3 through 5.
10. View the SUMMARY field and ensure that all items are 'complete', then de-activate the cursor:

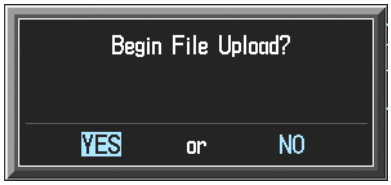


B.4 GIA Software Load

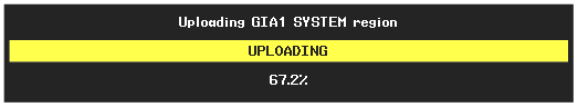
1. Go to the Software Upload page using the FMS knob.
2. Activate the cursor and select the GIA 63 software file. Verify that GIA1 and GIA2 appear in the LRU field as shown:



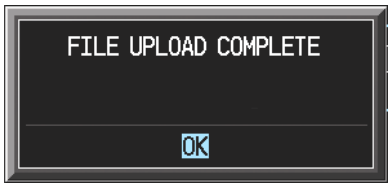
3. Press the LOAD softkey.
4. Select YES and press ENT to acknowledge the following prompt:



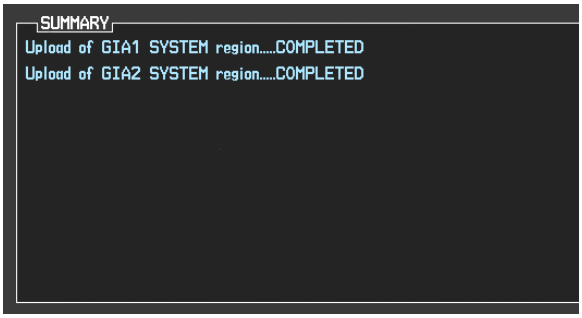
5. The software for GIA1 begins to load. GIA2 software loads immediately after GIA1 software finishes loading. Monitor the upload status as it progresses:



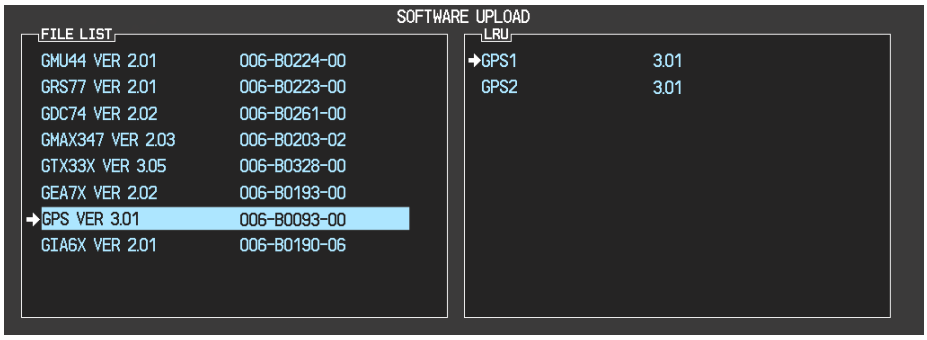
6. After the files finish loading, press ENT to acknowledge the following prompt:



7. View the SUMMARY field and verify that both GIA1 and GIA2 software loading is complete.

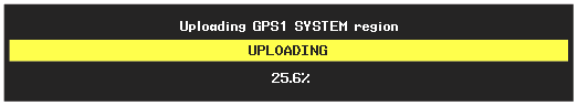


8. Highlight the GPS software file. Ensure that GPS1 and GPS2 appear in the LRU field as shown:

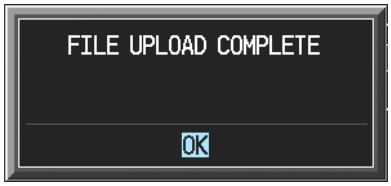


9. Press the LOAD softkey.
10. Select YES and press the ENT key to acknowledge the following prompt:

11. The software for GPS1 begins to load. GPS2 software loads immediately after GPS1 software finishes loading. Monitor the upload status as it progresses:



12. After the files finish loading, press ENT to acknowledge the following prompt:



13. Check the SUMMARY field to ensure the load is ‘COMPLETE’.

B.5 GIA Configuration

1. Go to the Configuration Upload page using the FMS knob.
2. Activate the cursor and highlight GIA1 in the FILE LIST field.
3. Press the LOAD softkey.
4. Select YES and press ENT to acknowledge the following prompt:

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

6. Highlight GIA2 in the FILE LIST field and repeat Steps 3 through 5.
7. View the SUMMARY field and ensure that all items are 'complete':

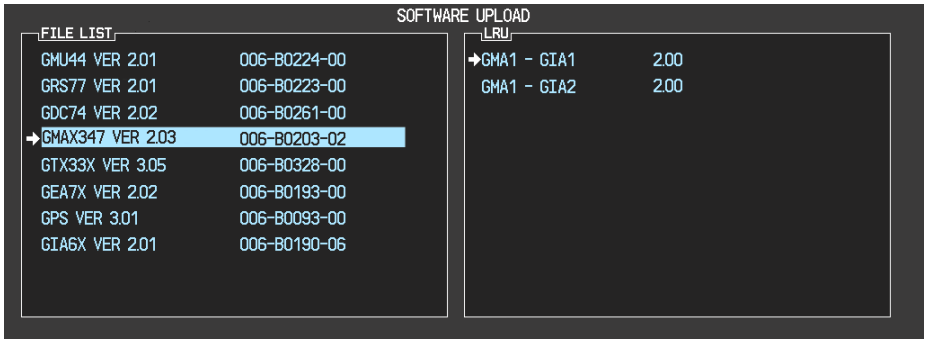
8. De-activate the cursor.

B.6 Final LRU Software Load

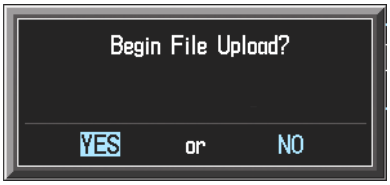
1. Go to the Software Upload page using the FMS knob.

B.6.1 GMA 1347 Audio Panel Software

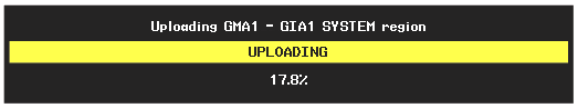
1. Highlight the GMA software file. Ensure that both paths to the GMA through GIA1 and GIA 2 appear in the LRU field as shown:



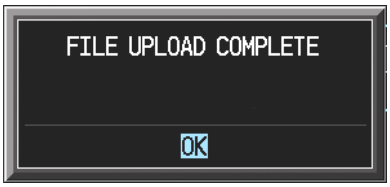
2. Press the LRU softkey. Select the GMA1 - GIA1 data path to load software. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:



4. The software for the GMA 1347 Audio Panel begins to load. Monitor the upload status as it progresses:



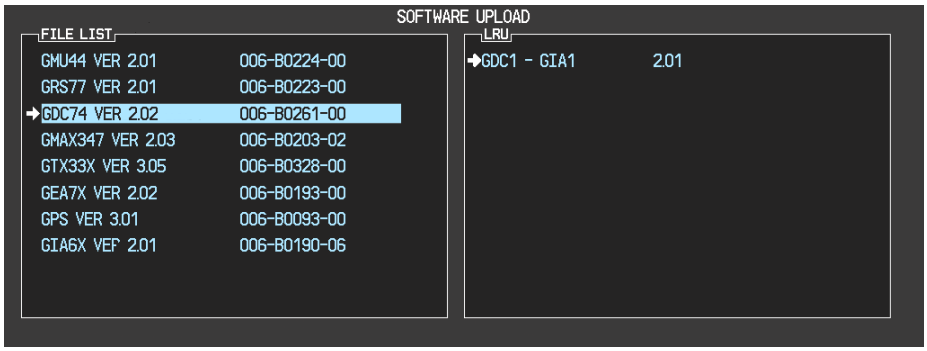
5. After the files finish loading, press ENT to acknowledge the following prompt:



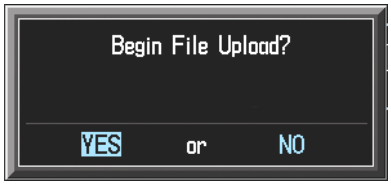
6. Check the SUMMARY field to ensure the load is ‘COMPLETE’.

B.6.2 GDC 74A Air Data Computer Software

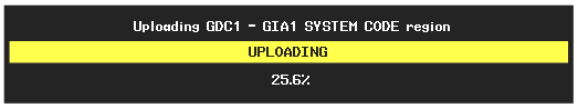
1. Highlight the GDC74 software file. Ensure that GDC to GIA data path appears in the LRU field as shown:



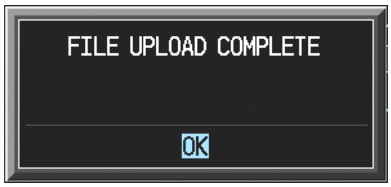
2. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:



4. The software for the GDC 74A Air Data Computer begins to load. Monitor the upload status as it progresses:



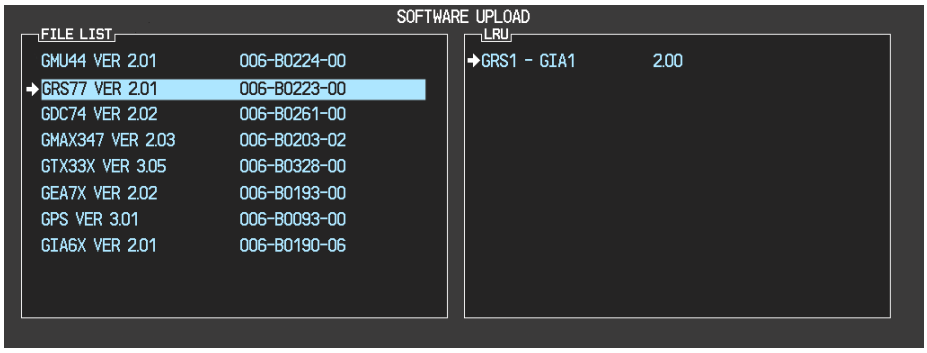
5. After the files finish loading, press ENT to acknowledge the following prompt:



6. Check the SUMMARY field to ensure the load is 'COMPLETE'.

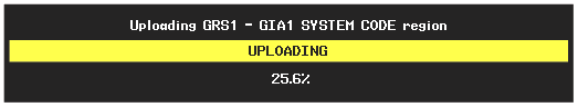
B.6.3 GRS 77 AHRS Software

1. Highlight the GRS77 software file. Ensure that the GRS to GIA data path appears in the LRU field as shown:

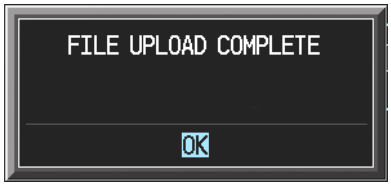


2. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:

4. The software for the GRS 77 AHRS begins to load. Monitor the upload status as it progresses:



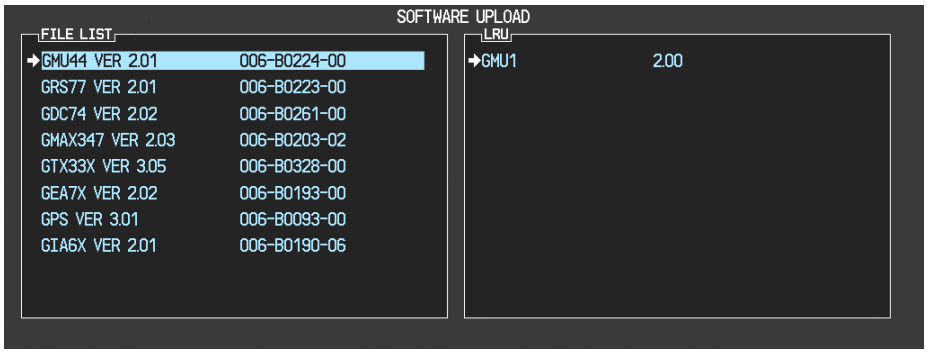
5. After the files finish loading, press the ENT key to acknowledge the following prompt:



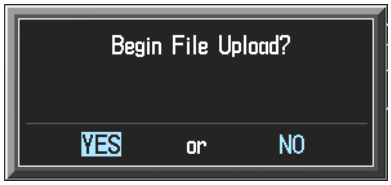
6. Check the SUMMARY field to ensure the load is 'COMPLETE'.

B.6.4 GMU 44 Magnetometer Software

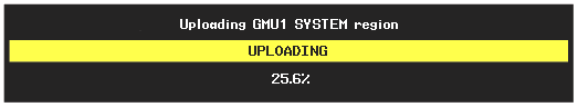
1. Highlight the GMU44 software file. Ensure that GMU1 appears in the LRU field as shown:



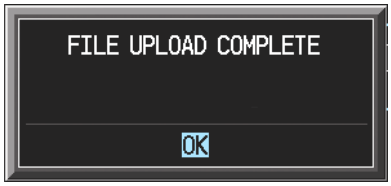
2. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:



4. The software for the GMU 44 Magnetometer begins to load. Monitor the upload status as it progresses:



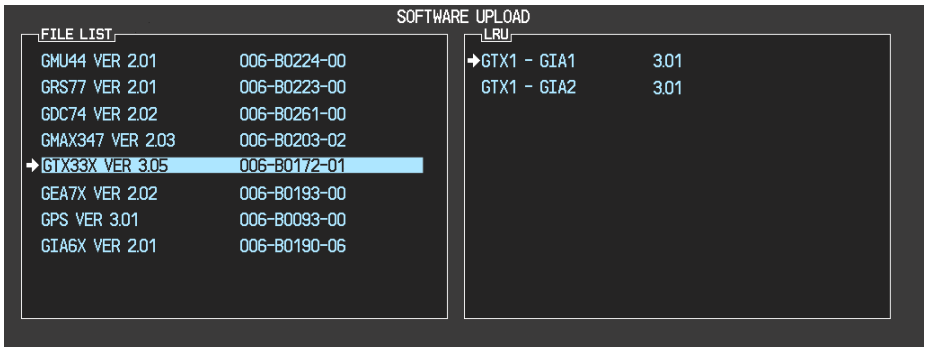
5. After the files finish loading, press the ENT key to acknowledge the following prompt:



6. Check the SUMMARY field to ensure the load is 'COMPLETE'.

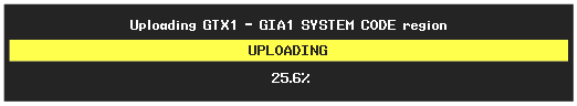
B.6.5 GTX 33 Transponder Software

1. Highlight the GTX33 software file. Ensure that both paths to the GTX 33 through GIA1 and GIA2 appear in the LRU field as shown:



2. Press the LRU softkey. Select the GTX1 - GIA1 data path to load software. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:

4. The software for the GTX 33 transponder begins to load. Monitor the upload status as it progresses:

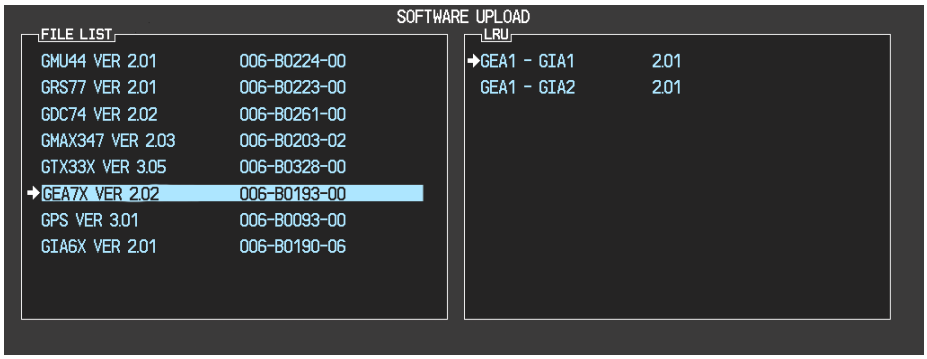


5. After the files finish loading, press ENT to acknowledge the following prompt:

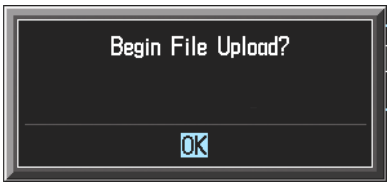
6. Check the SUMMARY field to ensure that load is 'COMPLETE'.

B.6.6 GEA 71 Engine/Airframe Unit Software

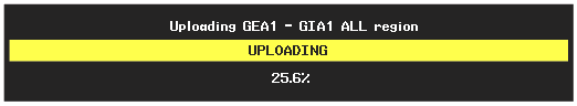
1. Highlight the GEA7X software file. Ensure that both paths to the GEA 71 through GIA1 and GIA 2 appear in the LRU field as shown:



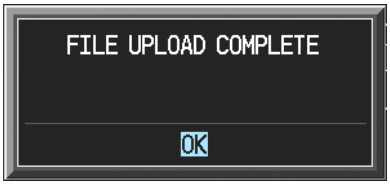
2. Press the LRU softkey. Select the GEA - GIA1 data path to load software. Press the LOAD softkey.
3. Select YES and press the ENT key to acknowledge the following prompt:



4. The software for the GEA 71 Engine/Airframe Unit begins to load. Monitor the upload status as it progresses:

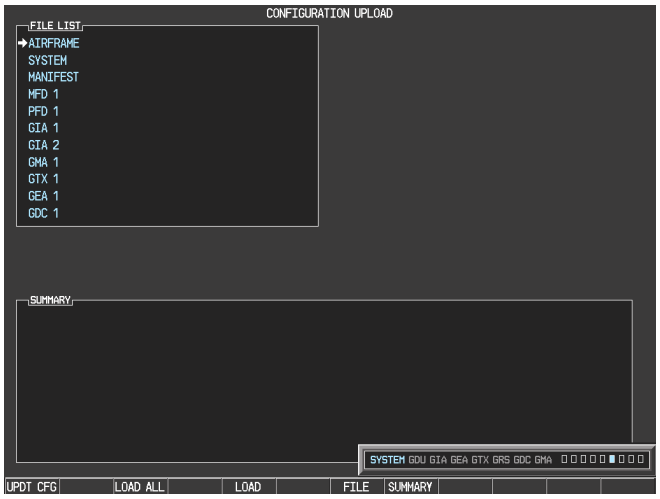


5. After the files finish loading, press ENT to acknowledge the following prompt:

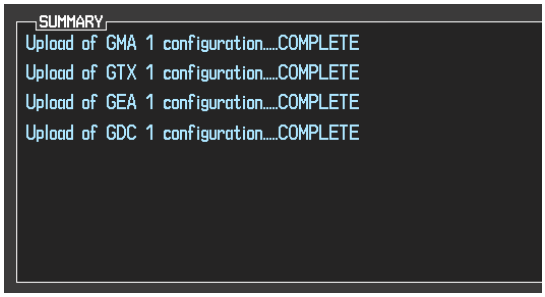


6. Check the SUMMARY field to ensure the all software loads are ‘COMPLETE’.
7. De-activate the cursor.

B.7 Final LRU Configuration

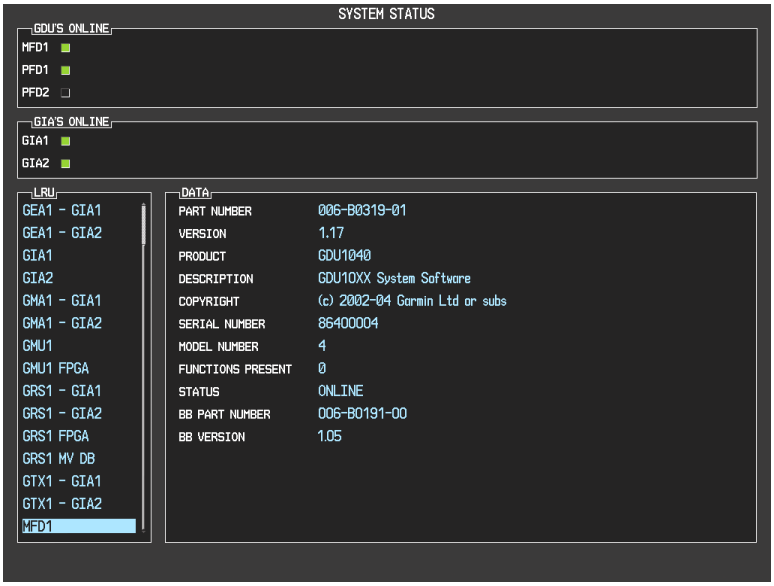


1. Go to the Configuration Upload page using the FMS knob.
2. Activate the cursor.
3. Highlight the following LRUs in the FILE LIST field:
    a) GMA1
        i. Press the LOAD softkey.
        ii. Press ENT at the START CONFIGURATION UPLOAD prompt.
        iii. Press ENT at the CONFIGURATION UPLOAD COMPLETE prompt.
    b) GTX1
        i. Press the LOAD softkey.
        ii. Press ENT at the START CONFIGURATION UPLOAD prompt.
        iii. Press ENT at the CONFIGURATION UPLOAD COMPLETE prompt.
    c) GEA1
        i. Press the LOAD softkey.
        ii. Press ENT at the START CONFIGURATION UPLOAD prompt.
        iii. Press ENT at the CONFIGURATION UPLOAD COMPLETE prompt.
    d) GDC1
        i. Press the LOAD softkey.
        ii. Press ENT at the START CONFIGURATION UPLOAD prompt.
        iii. Press ENT at the CONFIGURATION UPLOAD COMPLETE prompt.
4. Ensure that all Configuration files are ‘Complete’ in the SUMMARY field as shown:



5. Deactivate the cursor.

B.8 Software Load Confirmation



1. Go to the System Status page using the FMS knob. Activate the cursor and highlight the LRU window.
2. Highlight each of the following items in the LRU window and verify that the reported software part number and version matches the information in Appendix A:

   -MFD1
   -PFD1
   -GIA1
   -GIA2
   -GPS1
   -GPS2
   -GRS1 – GIA1, GRS1 – GIA2, & GRS1 FPGA
   -GMU1 & GMU1 FPGA
   -GDC1 – GIA1 & GDC1 FPGA
   -GTX1 – GIA1 & GTX1 – GIA2
   -GEA1 – GIA1 & GEA1 – GIA2
   -GMA1 – GIA1 & GMA1 – GIA2
3. De-activate the cursor.
4. Remove the G1000/DA 40 Card Loader from the PFD top slot and set aside.

IMPORTANT

If any software version and/or part number does not match the data in Appendix A, or if the software is not successfully loaded, do not continue with maintenance checkouts. Troubleshoot and resolve the issue before continuing (see Section 7.8).

B.9 Aviation Database Loading

1. Remove power from the system.
2. Insert an aviation database update SD card into the top slot of the PFD.
3. Turn the G1000 system on. The following prompt is displayed in the upper left corner of the PFD:

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

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

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

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

B.10 Final System Testing

After completion of system software loading, perform the tests for each LRU as specified in Section 7, as applicable.

After completing all LRU tests, perform the final system checkout as specified in Section 8.

Be sure to record the maintenance performed in the appropriate aircraft maintenance documentation.