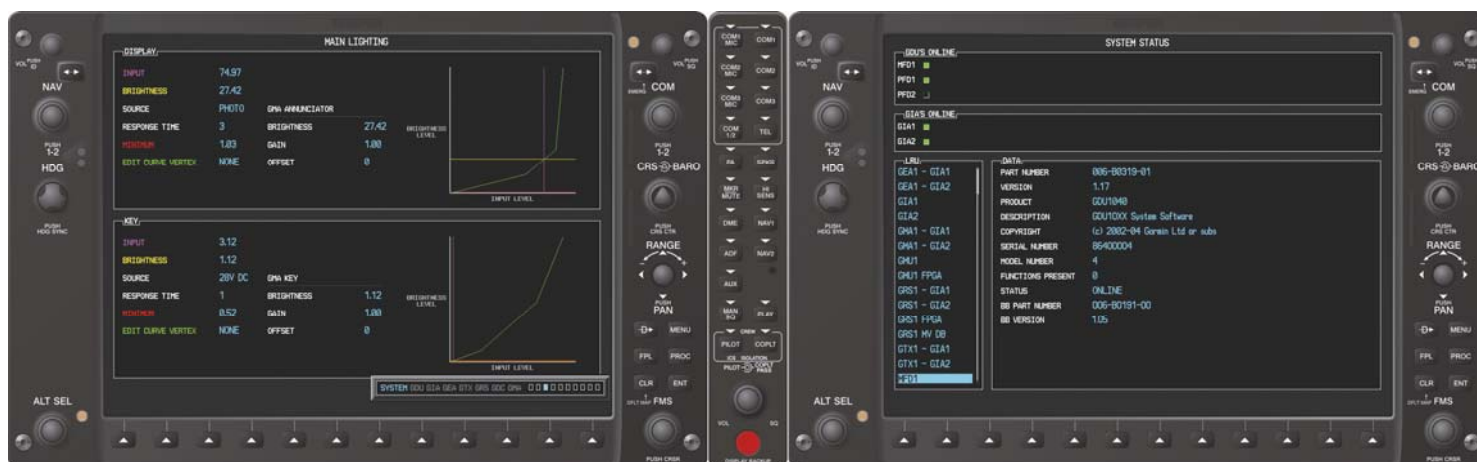


# G1000 / GFC 700 System Maintenance Manual

## Diamond DA 40 & DA 40 F

Contains FAA-Accepted Instructions  
For Continued Airworthiness For  
STC #SA01444WI-D



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#### **RECORD OF REVISIONS**

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|                 |                      |                          |              |

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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.

### **NOTE:**

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.

### **NOTE:**

All references to Diamond DA 40 aircraft made in this manual equally apply to Diamond DA 40 F aircraft, unless otherwise noted.

### **NOTE:**

All references to GIA 63 LRUs made in this manual equally apply to GIA 63W LRUs unless otherwise noted.

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# 1 INTRODUCTION

## 1.1 Content, Scope, Purpose

This document provides Instructions for Continued Airworthiness (ICA) for the Garmin G1000 integrated avionics and GFC700 Automatic Flight Control System (AFCS) as installed in the Diamond Model DA 40 and DA 40 F. 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 and GFC700.

### 1.1.1 Applicability

This document applies to all Diamond Aircraft Industries, Inc., Model DA 40 and DA 40 F aircraft equipped with the G1000 and optional GFC700 AFCS system under this STC.

Modification of an aircraft by this Supplemental Type Certificate (STC) obligates the aircraft operator to include the maintenance information provided by this document in the operator's Aircraft Maintenance Manual and the operator's Aircraft Scheduled Maintenance Program.

This System Maintenance manual and the contained Instructions for Continued Airworthiness supersedes all previous system maintenance manuals and ICAs, including the following Garmin documents:

- 190-00303-03
- 190-00492-01
- 190-00492-03
- 190-00545-00

### 1.1.2 Identifying an MDL Configuration

There are four approved configurations within this STC, each defined as a subset of the Master Drawing List (MDL). Each configuration differs in both hardware and software installation requirements.

Refer to the MDL, Garmin document 005-00400-01 for each configuration type design definition.

**Table 1-1. MDL Configurations Summary**

| MDL Configuration | Aircraft Model                      | Installed System & Autopilot            | G1000 System Software Version |
|-------------------|-------------------------------------|-----------------------------------------|-------------------------------|
| -1 Configuration  | Diamond DA40<br>or<br>Diamond DA40F | G1000 with WAAS<br>GFC 700 Autopilot    | 0369.13                       |
| -2 Configuration  |                                     | G1000 without WAAS<br>GFC 700 Autopilot |                               |
| -3 Configuration  |                                     | G1000 with WAAS<br>No Autopilot         |                               |
| -4 Configuration  |                                     | G1000 without WAAS<br>No Autopilot      |                               |

---

## **IMPORTANT!**

**If the technician is unsure of the G1000/GFC 700 MDL configuration, perform the following steps:**

### Check System Software Version

1. Power on the G1000 system by turning on the BAT master switch, then the AVIONICS MASTER switch.
2. On the MFD power-up page, the G1000 system software version is displayed in the upper right corner in the following format:

Diamond DA40 System XXXX.XX

-or-

Diamond DA40F System XXXX.XX

The system software version is also displayed at the AUX – SYSTEM STATUS page in the upper right corner.

3. This system software version is the primary identifier of which G1000/GFC700 configuration is installed. Refer to Table 1-1.

### **NOTE:**

As of this revision, this STC only has a single approved G1000 system software version. If the system software version differs from that shown in Table 1-1, investigate further to determine which G1000/GFC700 configuration is installed. Refer to the appropriate G1000/GFC700 System Maintenance manual (see list of superseded manuals which may apply in Section 1.1.1).

### Check for GFC 700 AFCS Installation

To verify whether the GFC 700 AFCS is installed, do the following;

1. Check the G1000 MFD for a dedicated AFCS mode control keypad (see Figure 3-2).
2. Check the aircraft throttle lever for installation of a 'Go Around' (GA) button.
3. If the aircraft has these features installed, it is equipped with the Garmin GFC 700 autopilot.
4. The aircraft is either a -1 or a -2 MDL Configuration.

### Check for WAAS Installation

To verify whether WAAS is installed, do the following:

1. On the MFD, go to the AUX – GPS STATUS page.
2. Check to see whether a softkey labeled SBAS is displayed. The SBAS softkey only appears if the G1000 is equipped with GIA 63Ws.
3. If the SBAS softkey is present, the aircraft is either a -1 or a -3 MDL Configuration.

---

## 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 and GFC 700 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 Instructions for Continued Airworthiness

FAA-Approved Instructions for Continued Airworthiness provides airworthiness limitations and scheduled maintenance requirements for the G1000 and GFC 700 systems.

Section 5: Troubleshooting

Provides troubleshooting information to aid in diagnosing and resolving potential problems with the G1000 and GFC 700 systems.

Section 6: G1000 Equipment Removal & Replacement

Gives instructions for the removal and replacement of G1000 and GFC700 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.

---

### 1.3 Definitions/Abbreviations

The following are some common acronyms & definitions found throughout this manual:

|       |                                                     |
|-------|-----------------------------------------------------|
| ADI:  | Attitude Display Indicator                          |
| ADF:  | Automatic Direction Finder                          |
| AFCS: | Automatic Flight Control System                     |
| AFMS: | Airplane Flight Manual Supplement                   |
| AHRS: | Attitude Heading Reference System                   |
| AMM:  | Airplane Maintenance Manual                         |
| CDI:  | Course Deviation Indicator                          |
| CDU:  | Control Display Unit                                |
| CFR:  | Code of Federal Regulations                         |
| DME:  | Distance Measuring Equipment                        |
| EAU:  | Engine/Airframe Unit                                |
| EIS:  | Engine Instrumentation Systems                      |
| GDL:  | Garmin Data Link                                    |
| GDU:  | Garmin Display Unit                                 |
| GEA:  | Garmin Engine Airframe Unit                         |
| GIA:  | Garmin Integrated Avionics                          |
| GMA:  | Garmin Marker Beacon & Audio Panel Unit             |
| GMU:  | Garmin Magnetometer Unit                            |
| GPS:  | Global Positioning System                           |
| GS:   | Glideslope                                          |
| GSA:  | Garmin Servo Actuator                               |
| GSM:  | Garmin Servo Mount                                  |
| GTX:  | Garmin Transponder                                  |
| HIRF: | High Intensity Radiated Fields                      |
| HSDB: | High-Speed Data Bus (Ethernet)                      |
| HSI:  | Horizontal Situation Indicator                      |
| IAU:  | Integrated Avionics Unit                            |
| ICA:  | Instructions for Continued Airworthiness            |
| ICS:  | Inter-Com System                                    |
| ILS:  | Instrument Landing System                           |
| LOC:  | Localizer                                           |
| LPV:  | Localizer Precision with Vertical Guidance approach |
| LRU:  | Line Replaceable Unit                               |
| MET:  | Manual Electric Trim                                |
| MFD:  | Multi-Function Flight Display                       |
| OAT:  | Outside Air Temperature                             |
| OBS:  | Omni-Bearing Selector                               |
| PFD:  | Primary Flight Display                              |

---

STC: Supplemental Type Certificate  
SW: Software  
TC: Type Certificate  
TSO: Technical Standard Order  
TVS: Transient Voltage Suppressor  
WAAS: Wide Area Augmentation System  
VHF: Very High Frequency  
VOR: Very High Frequency Omni-directional Range

### **1.3.1 Units of Measure**

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

## 1.4 Publications

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

**Table 1-2. Required Documents**

| Part Number                            | Document                                                                                     |
|----------------------------------------|----------------------------------------------------------------------------------------------|
| 005-00400-01                           | STC Master Drawing List                                                                      |
| 005-00400-10                           | General Arrangement, G1000/GFC700, WAAS, Diamond DA40/40F<br>(-1 MDL Configuration)          |
| 005-00400-11                           | General Arrangement, G1000/GFC700, no WAAS, Diamond DA40/40F<br>(-2 MDL Configuration)       |
| 005-00400-15                           | General Arrangement, G1000 Only, WAAS, Diamond DA40/40F<br>(-3 MDL Configuration)            |
| 005-00400-16                           | General Arrangement, G1000 Only, no WAAS, Diamond DA40/40F<br>(-4 MDL Configuration)         |
| 005-00400-12                           | Resistor Installation Drawing, G1000, WAAS, Diamond DA40/40F<br>(-1 & -3 MDL Configurations) |
| 005-00400-13                           | Resistor Wiring Diagram, G1000, WAAS, Diamond DA40/40F<br>(-1 & -3 MDL Configurations)       |
| DA4-9231-60-01<br>OR<br>DA4-9231-60-05 | Diamond Wiring Diagram<br>(Diamond Part Number, -05 applies to GFC700 aircraft)              |
| 6.02.01                                | Diamond DA 40 Airplane Maintenance Manual (Diamond Part Number)                              |

The following design drawings are carried over from the prerequisite previously approved STCs for continued airworthiness purposes.

### IMPORTANT!

Previous STC General Arrangement drawings, Required Equipment Lists, and hardware/software equipment lists are obsolete and are now superseded by the new General Arrangement drawings provided in Table 1-2. The following type design data still applies to previously installed equipment.

**Table 1-3. Previously Approved Type Design**

| Part Number  | Document                                                     | STC#        |
|--------------|--------------------------------------------------------------|-------------|
| 005-00304-00 | G1000 Install, Diamond DA40/40F                              | SA01254WI-D |
| 005-00336-17 | Pitch Servo Installation, GFC700 AFCS, Diamond DA40/40F      | SA01389WI   |
| 005-00336-18 | Roll Servo Installation, GFC700 AFCS, Diamond DA40/40F       |             |
| 005-00336-19 | Pitch Trim Servo Installation, GFC700 AFCS, Diamond DA40/40F |             |

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The following publications are recommended to be available during maintenance activities.

**Table 1-4. Reference Publications**

| <b>Part Number</b> | <b>Document</b>                                             |
|--------------------|-------------------------------------------------------------|
| 190-00492-10       | G1000/GFC 700, DA40 Airplane Flight Manual Supplement       |
| 190-00492-11       | G1000, No Autopilot, DA40 Airplane Flight Manual Supplement |
| 190-00324-07       | G1000/DA 40 Cockpit Reference Guide, Phase 6                |
| 190-00355-04       | GDL 69/69A XM Satellite Radio Activation Instructions       |

## **1.5 Distribution**

This document is required for maintaining the continued airworthiness of aircraft equipped with this STC. Revisions to this document will be made by Garmin and will be distributed by Garmin per standard documentation revision procedures.

For the latest revision to this document, check Garmin's web site at: [www.garmin.com/](http://www.garmin.com/) and click on 'Dealers Only'.

### **NOTE:**

Only Garmin-authorized dealers and service centers are given access to the Dealer portion of the Web Site. If you do not have a Dealer Password, contact Garmin directly to obtain the latest revision of this document.

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## 2 SYSTEM DESCRIPTION

### 2.1 STC Requirements Overview

The -1 and -2 STC configurations require the following STCs to be installed on the aircraft prior or concurrently to the installation of this STC:

STC #SA01254WI-D      Garmin G1000 in Diamond DA40 / 40F

STC #SA01389WI      Garmin GFC 700 in Diamond DA40 / 40F

For the -3 and -4 configurations of this STC, only STC #SA01254WI-D is required to be installed.

Certain Diamond Optional Aircraft Modifications (OAM) are part of the initial type design requirements for the above STCs. These modifications define much of the systems and electrical design for the Garmin G1000 and GFC 700 and are installed by the Diamond factory. The following OAMs may be installed on a DA40 equipped with the G1000, depending on STC configurations:

#### DA40 & DA40F Aircraft:

|            |                                      |
|------------|--------------------------------------|
| OAM 40-226 | G1000/GFC700 Provisions              |
| OAM 40-061 | KAP 140 Autopilot (Optional)*        |
| OAM 40-068 | Essential Bus                        |
| OAM 40-073 | Slick Start System                   |
| OAM 40-082 | IFR Lightning Protection             |
| OAM 40-146 | Remote Avionics Provisions           |
| OAM 40-071 | Extended Range Fuel Tanks            |
| OAM 40-162 | G1000 with Extended Range Fuel Tanks |
| OAM 40-210 | Provisions for Becker RA3502 ADF     |
| OAM 40-211 | Provisions for Honeywell KN63 DME    |
| OAM 40-213 | Provisions for Garmin GDL 69A        |

#### DA40 Aircraft Only:

|               |                                  |
|---------------|----------------------------------|
| OAM 40-161    | G1000 Provisions with KAP 140*   |
| OAM 40-196    | G1000 Provisions without KAP 140 |
| STC #SA1840SC | Hartzell Propeller               |

#### DA40F Aircraft Only

|            |                           |
|------------|---------------------------|
| OAM 40-222 | G1000 in DA40F Provisions |
|------------|---------------------------|

\*Currently not supported by this STC. The KAP140 Autopilot has not been certified for use with G1000 System Software version 0369.13.

---

## **2.2 Equipment Descriptions**

### **2.2.1 GDU 1040 PFD & GDU 1040, 1042, or 1044 MFD**

Two Garmin GDU 1040 displays 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. For GFC 700-equipped aircraft, the MFD is either a GDU 1042 or GDU 1044. Both are distinguished by their dedicated AFCS control keypad on the lower left bezel. The GDU 1044 has an additional VNV key which allows for coupled-VNAV descents.

Electrical power to the PFD is from the 'Essential' power bus, whereas the MFD receives power from the 'Main' power 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 or OAM 40-226.

Two cooling fans are also installed behind the panel for PFD and MFD cooling.

### **2.2.2 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 'Essential' bus. The unit powers up when the aircraft master switch is turned on. The GMA 1347 interfaces with the existing marker beacon antenna as well as existing mic and phone jacks.

### **2.2.3 GIA 63 or GIA 63W Integrated Avionics Unit (2)**

Two Garmin GIA 63 IAU's provide VHF COM, NAV, GS, and GPS navigation functions to the G1000. GIA 63W models include a GPS/WAAS engine. GIAs also serve as a communication interface to all other G1000 LRUs in the system. Both GIAs are located remotely beneath the baggage compartment in a sheetmetal enclosure. 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 'Main Avionics' bus and powers up when the avionics master switch is turned on. Both GIA 63s interface to the following equipment:

- Existing VOR/LOC/Glideslope Antenna System
- Existing VHF COM 1 & 2 Antennas
- Existing Garmin GA56 GPS1 & 2 Antennas (GIA 63 only)
- GA35 GPS/WAAS Antennas (GIA 63W only)

---

## 2.2.4 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. Power is received from the 'Essential' power bus. The GEA interfaces to the following:

- Manifold Pressure Sensor (MAP, DA 40 aircraft only)
- 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

### NOTE:

STC SA01254WI-D provisions engine/airframe sensors for the Diamond DA 40 aircraft only. For DA 40 F aircraft with fixed-pitch propellers, all engine sensors are provisioned and installed per Diamond OAM 40-222.

## 2.2.5 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. Power is received from the 'Essential' bus. The GTX 33 interfaces with the existing transponder antenna.

## 2.2.6 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 rack. Power is received from the 'Essential' bus. The GDC 74A connects to existing pitot/static ports.

## 2.2.7 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.

---

## **2.2.8 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. 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.

## **2.2.9 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.

## **2.3 GDL 69A (Optional)**

The GDL 69A provides optional XM Radio weather and music entertainment through means of a dedicated satellite data link. The GDL 69A is mounted in the remote avionics enclosure. Power to the GDL 69A is received from the 'Main Avionics' bus. The GDL 69A sends weather data through the HSDB bus to the MFD, where the data link interface is controlled. Digital audio is sent directly to the GMA 1347.

## **2.4 Remote Avionics Enclosure**

Refer to 005-00304-00, Sheets 2 & 8:

A remote avionics enclosure allows LRUs to be inserted vertically, from above. The enclosure is also cooled with an avionics fan and duct assembly. 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.

## **2.5 G1000 Optional Interfaces**

Installation of all other optional equipment that interfaces to the G1000, including ADF, DME, and GDL 69A is documented by Diamond OAM factory drawings.

---

## 2.6 GFC 700 AFCS System Description

The GFC 700 is a two-axis fail-safe digital flight control system that is integrated within the G1000 system. The only distinguishing hardware from a standard G1000 installation is the MFD and the GSA 81 Servos and GSM 85 Servo Mounts.

The following functions are provided by the GFC 700 in this installation:

- Flight Director
- Autopilot
- Manual Electric Trim

### Flight Director:

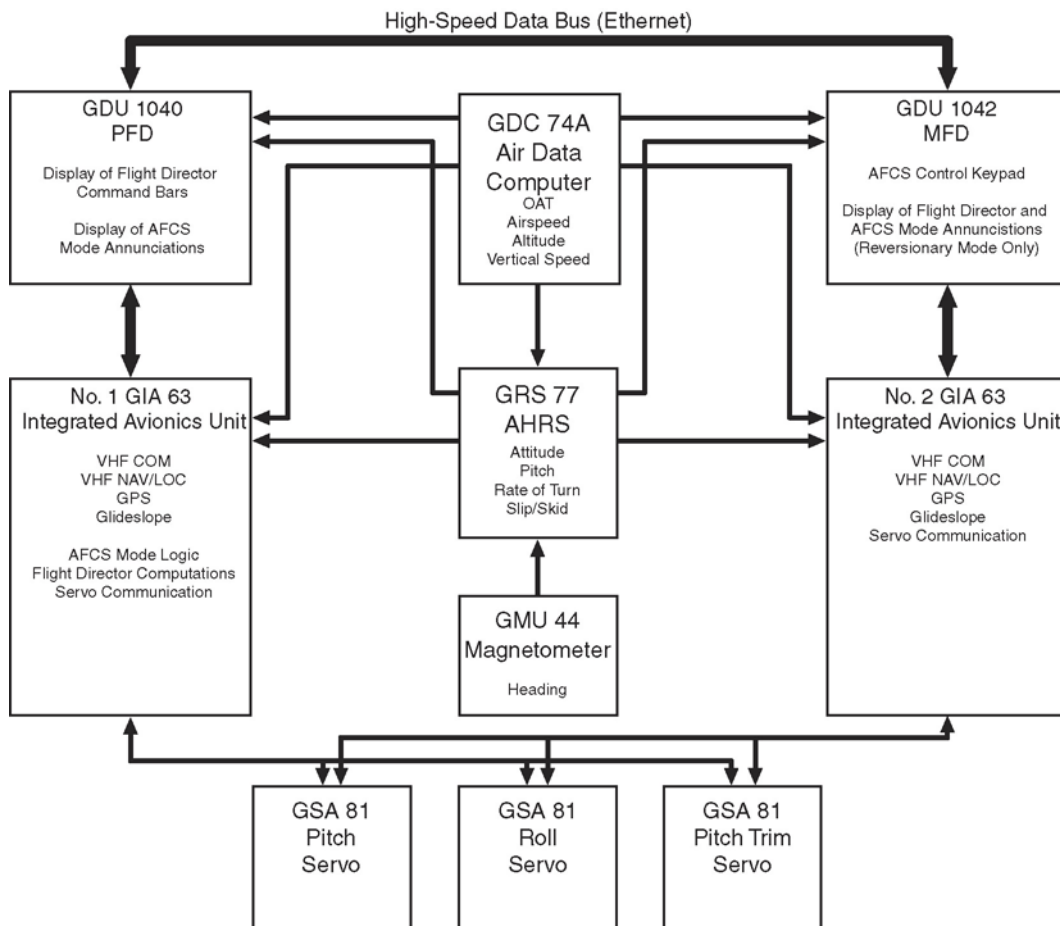
The Flight Director operates within the #1 GIA 63 and uses data from the G1000 system, including air data, attitude, and navigation data, to calculate commands for display to the pilot and for the Autopilot. Flight Director command bars and mode annunciations are sent to the PFD through a high-speed Ethernet connection for display to the pilot. The Flight Director operates independently of the Autopilot, and allows the pilot to hand-fly the command bars, if desired.

### Autopilot:

The Autopilot operates within the three GSA 81 servos. Flight Director data is processed within the three servos and turned into aircraft flight control surface commands. The Autopilot cannot operate unless the Flight Director is engaged.

### Manual Electric Trim:

Independent of the Flight Director and Autopilot, Manual Electric Trim (MET) allows the pilot to control the elevator trim tab by the MET switch located on the pilot control stick. Engaging both sides of the switch in the same direction causes the autopilot to disengage (if engaged) and drives the pitch trim servo in the desired direction. The ARM side of the MET switch may also be used to disconnect the autopilot and cancel the resulting AP DISC alerts.



**Figure 2-1. AFCS System Block Diagram**

---

## 2.6.1 GFC 700 Electrical Aspects

The wiring and switches used by the GFC 700 are provisioned by Diamond under OAM 40-226, and are not included in the Garmin GFC 700 STC design. In general, the pitch and pitch trim servos are wired in parallel to both GIA 63s and use the RS-485 serial protocol to communicate while the pitch servo has its own line to both GIAs. See the Diamond wiring diagrams listed in Table 1-2 for more details on wiring. The Diamond provisions also include the following switches:

### AP DISC Switch

There are two large red AP DISC switches located on the pilot and copilot control sticks. When normally closed, +28 VDC is allowed to pass through to the SERVO ENABLE pins of each servo, allowing the Autopilot and servos to operate. When pushed, the switches break the +28VDC source and the Autopilot disconnects and takes the servos offline.

### CWS Switch

A control wheel steering switch is located on the pilot's control stick. When pressed, this switch activates CWS mode. The Autopilot, if engaged, is temporarily disengaged, and the Flight Director command bars immediately synchronize to the current aircraft pitch and roll attitude. When released, the Autopilot will re-engage (if previously engaged) and the Flight Director will orient itself to the last known pitch and roll reference established during CWS mode. This allows the pilot to hand fly the aircraft when desired and also allows the pilot to reestablish a desired aircraft flight attitude for the Autopilot to maintain.

### MET Switch

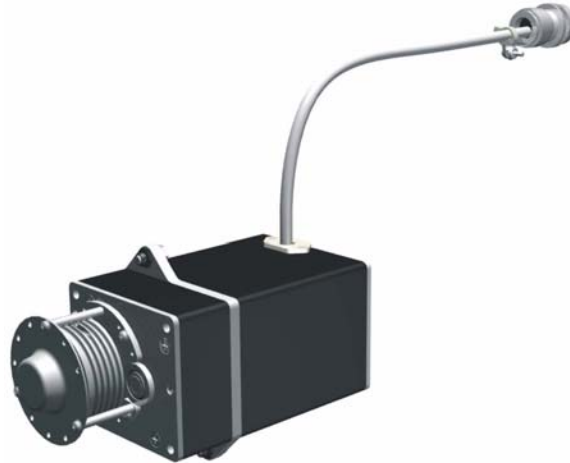
See previous functional description of MET.

### GA Switch

A Go-Around switch is installed within the engine throttle knob and activates the GA Flight Director mode. During this mode, the Autopilot disengages (if engaged) and the Flight Director displays a 7° pitch up nose attitude for reference during a missed approach or go-around procedure.

---

## 2.6.2 GSA 81 Servo and GSM 85 Servo Mount



**Figure 2-2. GSA 81 & GSM 85**

The GSA 81 is mated to the GSM 85 Servo Mount to form a single servo unit. There are three servo units in this installation:

- Pitch
- Pitch Trim
- Roll

The design of the servo assembly allows the servo actuator (GSA 81) to be removed from the servo mount (GSM 85) without the need to de-rig the aircraft control cables. The servo mount contains the capstan (cable for roll/pitch, chain for pitch trim) and the slip clutch which allows a pilot to manually overpower the Autopilot.

## 2.7 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. The #2 GIA 63, the ADF, DME, GFC 700 AFCS, and the GDL 69A are connected to this bus.

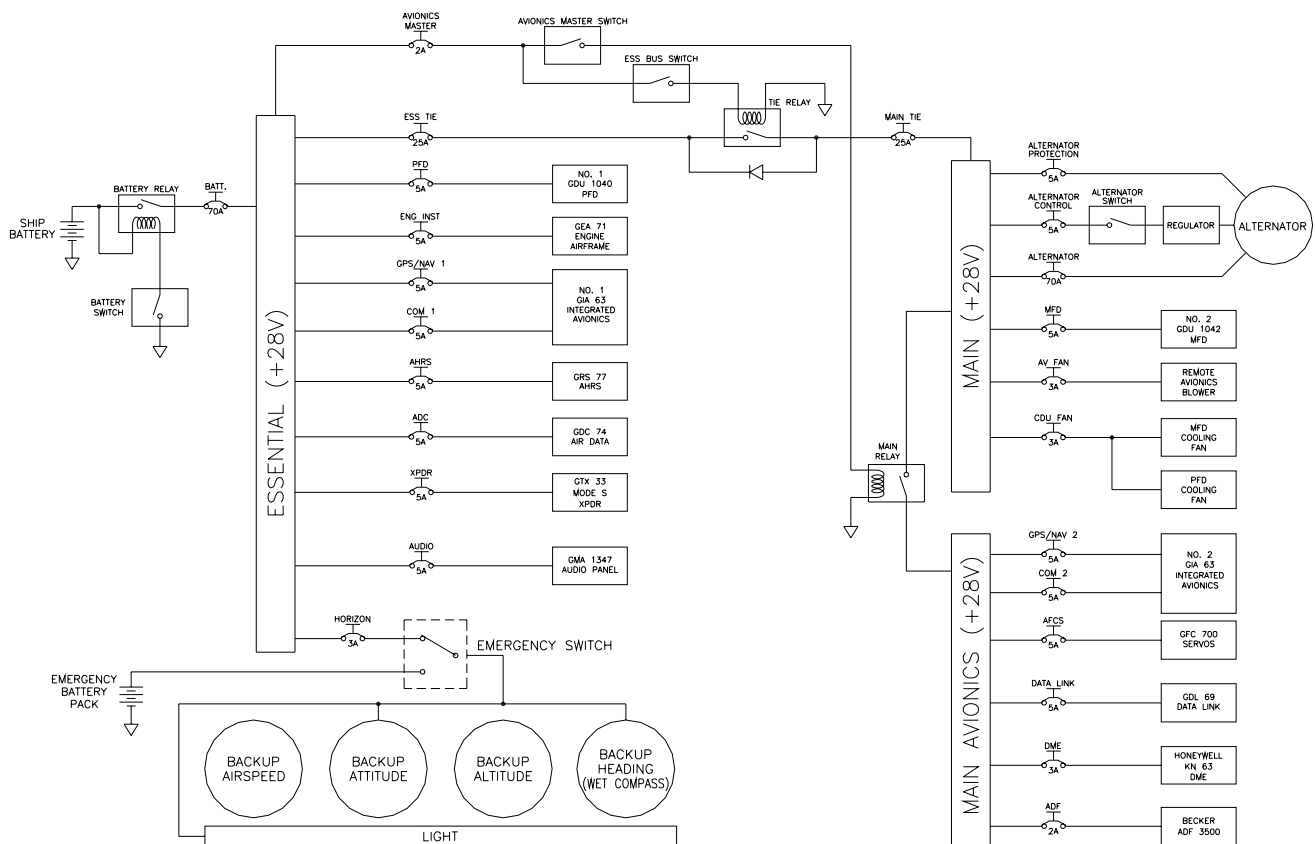


Figure 2-3. G1000/DA40 Electrical Distribution

---

## 2.8 Lightning Strike Protection

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

### 2.8.1 Alternator / Battery Voltage Suppressors & Fuses

Refer to 005-00304-00, Sheet 5:

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 lightning 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. Fuses are easily removed by twisting the fuse holder cap counter-clockwise and removing the fuse.

### 2.8.2 GIA / AHRS Lightning Protection

Refer to 005-00304-00, Sheets 8, 10 & 11:

The GRS 77 and both GIA 63s are uniquely protected from the effects of lightning. A  $0.499\Omega$  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. 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). Power is returned to the LRU after passing through the resistor and voltage suppressor.

Refer to 005-00400-12:

For WAAS-equipped aircraft, seven additional resistors are installed on a sheetmetal bracket on the side of the remote avionics box. Three resistors are inline between the #1 GIA 63W and GRS 77 RS-232 serial communications line and four are inline between the #1 GIA 63W and PFD High Speed Data Bus (HSDB) cable.

### 2.8.3 Lightning Strike Maintenance

Proper electrical bonding of all metallic components is critical for the protection against the effects of lightning. 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:

- Annual 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 24 calendar months) 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.

---

## **2.9 Shield Block Grounds**

Most G1000 connectors employ a Shield Block grounding system to provide necessary ground reference to wire shielding and/or transducers. The shield block termination method allows multiple grounds to be terminated directly to a block mounted to the connector backshell assembly. Refer to G1000/DA40 Install Drawing, 005-00304-00 for installation details. Note that older G1000 installations may employ a slight different 'SPIDER' shield grounding system.

## **2.10 Sensor Installations**

Refer to 005-00304-00, Sheets 5, 9, & 12 for the engine sensor installation drawings.

## 2.11 G1000 / GFC700 Block Diagram

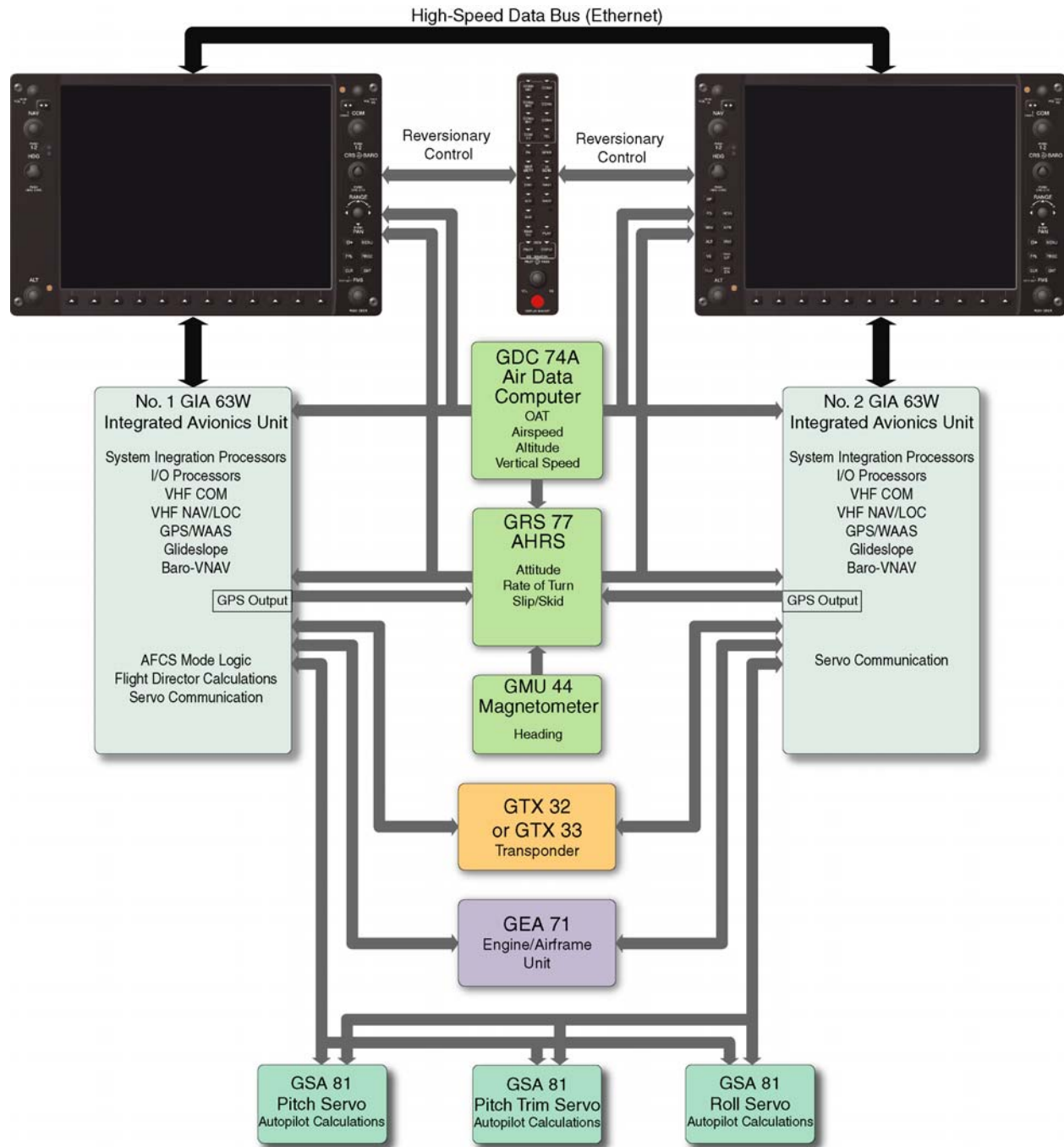
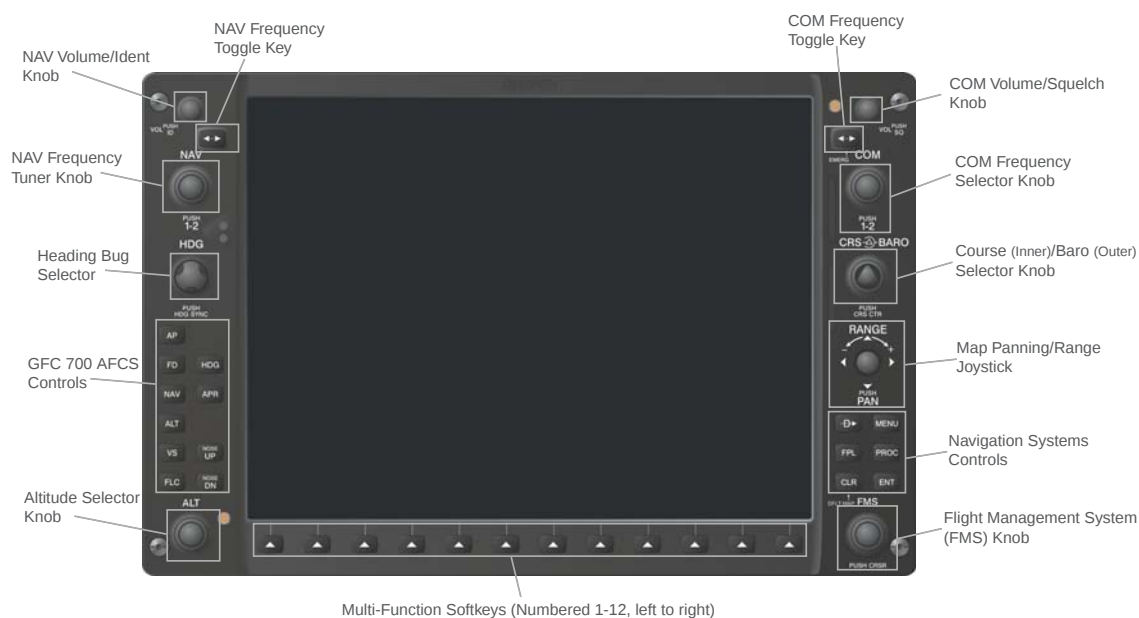


Figure 2-4. G1000/GFC 700 Block Diagram (WAAS shown)

### 3 G1000 Control & Operation

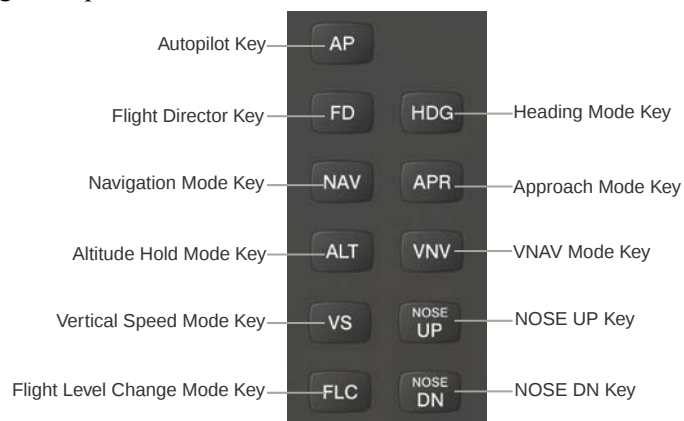
All control and operation of G1000 equipment as normally used in flight occurs through the PFD, MFD and GMA 1347 audio panel. Figure 3-1 identifies GDU 1040 buttons. Figure 3-3 identifies various GMA 1347 buttons.



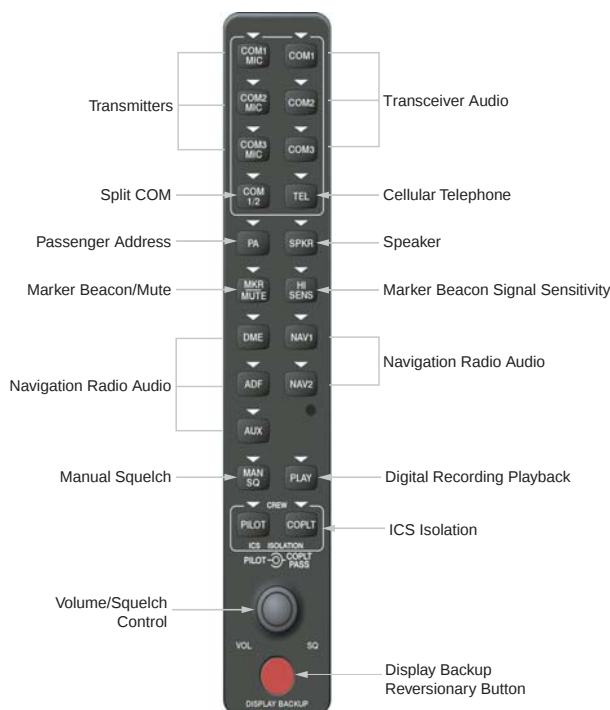
**Figure 3-1. GDU 104X Control Interface (GDU 1042 shown)**

#### 3.1.1 AFCS Controls

The dedicated AFCS controls located on the GDU 1042 and 1044 are discussed in detail in the G1000 CRG. The following figure is provided for reference:



**Figure 3-2. AFCS Controls (GDU 1044 shown)**



**Figure 3-3. GMA 1347 Controls**

### 3.1.2 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.

### 3.1.3 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 3-4. G1000 Softkeys**

## 3.2 G1000 Normal Mode

To start the G1000 system in Normal Mode:

1. Turn on the aircraft master switch. The following G1000 equipment is powered on:
  - 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
  - GMA 1347 Digital Audio Panel
2. Turn on the DA 40 AVIONICS MASTER switch. The following G1000 equipment is powered on:
  - No. 2 GIA 63 Integrated Avionics Unit
  - GFC 700 (if equipped)
  - GDL 69A (if equipped)

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.

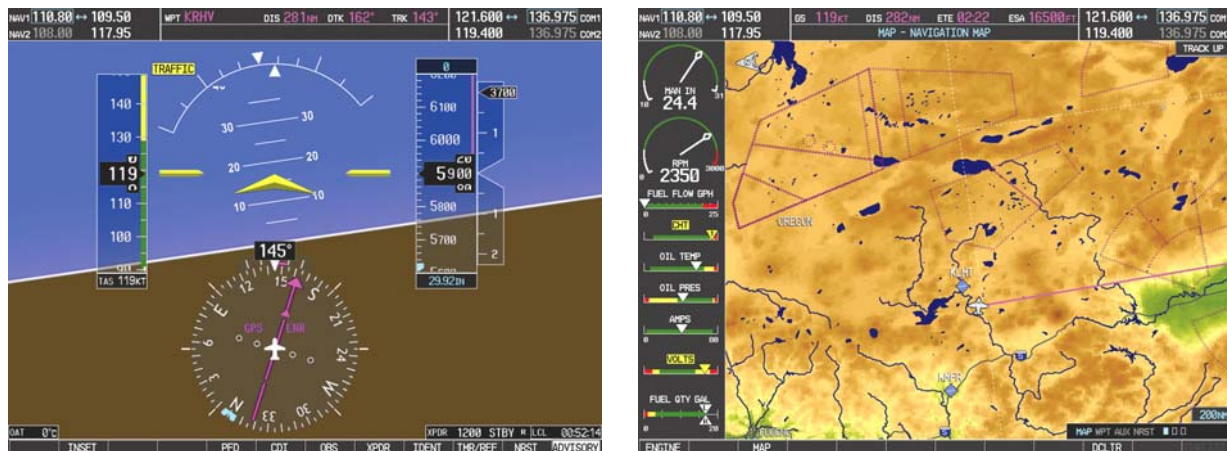


Figure 3-5. Normal Mode

### 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 labeled 'DISPLAY BACKUP' on the GMA 1347 audio panel activates the manual reversionary mode.



Figure 3-6. 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 3-7. PFD Failure Mode

---

### 3.4 Configuration Mode Overview

The Configuration Mode exists to provide the avionics 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.

**NOTE:**

It is good practice to cycle power to the entire G1000 system, not just the displays, anytime software loading, configuration or other maintenance procedures have been performed and a system restart is necessary.

**CAUTION:**

The 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.

**NOTE:**

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

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### 3.4.1 SET>ACTV Configuration

Throughout the 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.

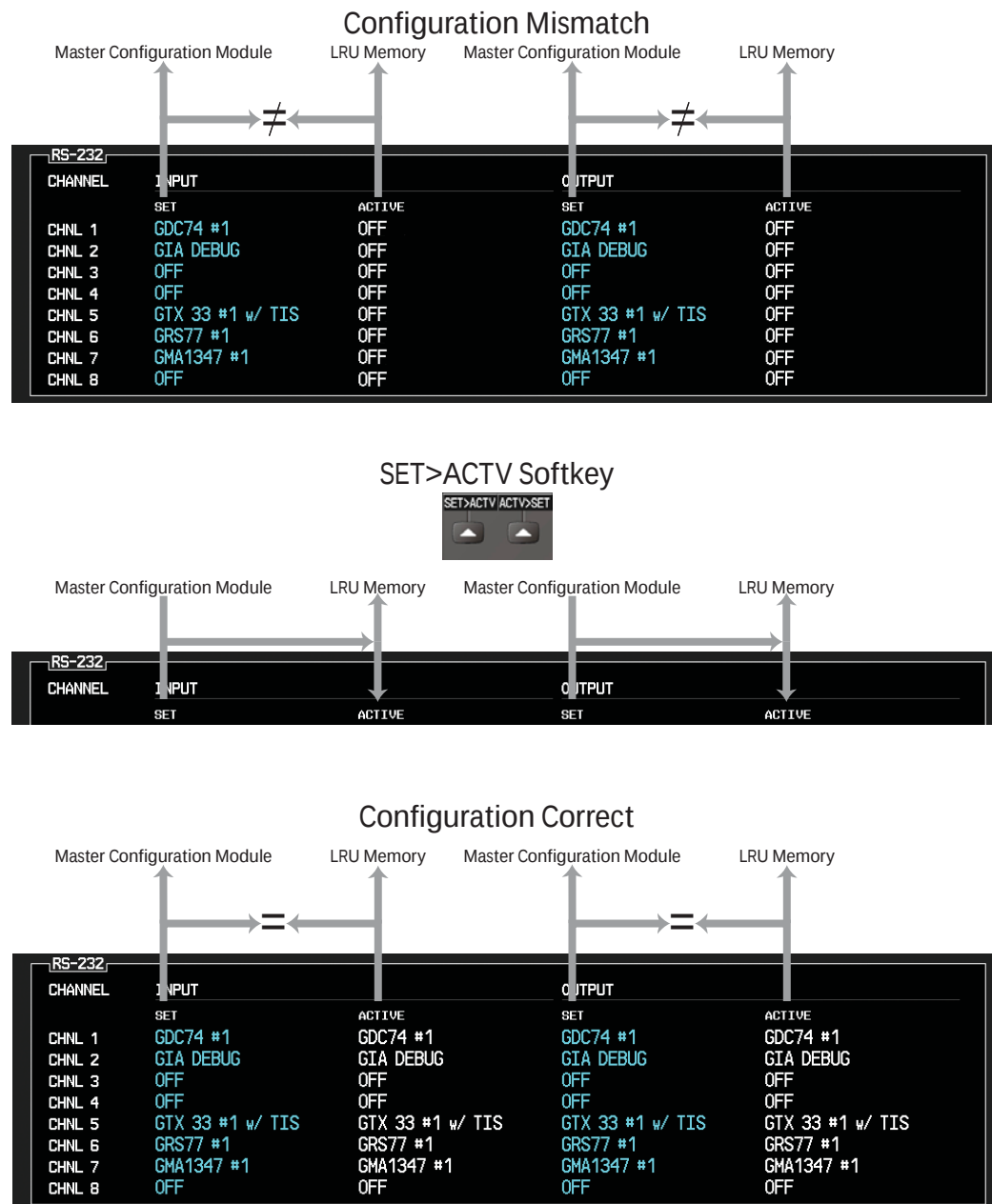
Data can be manually copied from one column to the other (and consequently from PFD memory to the LRU memory and vice-versa) by using the following two softkeys, when available:

- 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.

#### CAUTION:

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 3-8, 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 3-8. 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 software loader card. Section 7 describes this process for each LRU).

A blank active column, as shown in Figure 3-9, represents loss of communication between the display and the particular unit. See Section 5 for more details on troubleshooting.

| RS-232  |                  |        |                  |        |
|---------|------------------|--------|------------------|--------|
| CHANNEL | INPUT            |        | OUTPUT           |        |
|         | SET              | ACTIVE | SET              | ACTIVE |
| CHNL 1  | GDC74 #1         |        | GDC74 #1         |        |
| CHNL 2  | GIA DEBUG        |        | GIA DEBUG        |        |
| CHNL 3  | OFF              |        | OFF              |        |
| CHNL 4  | OFF              |        | OFF              |        |
| CHNL 5  | GTX 33 #1 w/ TIS |        | GTX 33 #1 w/ TIS |        |
| CHNL 6  | GRS77 #1         |        | GRS77 #1         |        |
| CHNL 7  | GMA1347 #1       |        | GMA1347 #1       |        |
| CHNL 8  | OFF              |        | OFF              |        |

**Figure 3-9. Loss of Communication**

### 3.4.2 Configuration Prompts

When configuration settings are changed, the technician receives on-screen prompts and/or confirmations such as those shown in Figure 3-9. Section 7 shows other prompts encountered during the configuration process.



**Figure 3-10. Configuration Status**

### 3.4.3 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.

| STATUS     |                                     |            |                                     |            |                                     |
|------------|-------------------------------------|------------|-------------------------------------|------------|-------------------------------------|
| BOOT BLOCK | <input type="checkbox"/>            | RAM        | <input checked="" type="checkbox"/> | XILINX     | <input checked="" type="checkbox"/> |
| BASE MAP   | <input checked="" type="checkbox"/> | CONFIG     | <input type="checkbox"/>            | DATA       | <input checked="" type="checkbox"/> |
| ETHERNET 1 | <input checked="" type="checkbox"/> | ETHERNET 2 | <input checked="" type="checkbox"/> | ETHERNET 3 | <input checked="" type="checkbox"/> |
| RS-232 1   | <input checked="" type="checkbox"/> | RS-232 2   | <input checked="" type="checkbox"/> | IRDA       | <input checked="" type="checkbox"/> |

**Figure 3-11. Data Transmission Indicators**

---

### 3.4.4 Configuration Mode Navigation

Using the FMS knob as described in Section 3.1.2, 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 Line Maintenance & Configuration manual, Garmin part number 190-00303-04.

#### **System Page Group**

- |                              |                         |                            |
|------------------------------|-------------------------|----------------------------|
| 1. System Status             | 5. System Upload        | 9. System Configuration    |
| 2. Date/Time Setup           | 6. Diagnostics Terminal | 10. System Setup           |
| 3. Main Lighting             | 7. Maintenance Log      | 11. Manifest Configuration |
| 4. Audio Alert Configuration | 8. OEM Diagnostics      |                            |

#### **GDU Page Group**

- |                                     |                        |                           |
|-------------------------------------|------------------------|---------------------------|
| 1. RS-232 / ARINC 429 Configuration | 4. Diagnostics         | 7. Alert Configuration    |
| 2. GDU Status                       | 5. Serial/Ethernet I/O | 8. Airframe Configuration |
| 3. GDU Test                         | 6. Alert Configuration |                           |

#### **GIA Page Group**

- |                                     |                          |               |
|-------------------------------------|--------------------------|---------------|
| 1. RS-232 / ARINC 429 Configuration | 3. GIA I/O Configuration | 5. GIA Status |
| 2. CAN / RS-485 Configuration       | 4. COM Setup             |               |

#### **GEA Page Group**

- |                |               |                      |
|----------------|---------------|----------------------|
| 1. Engine Data | 2. GEA Status | 3. GEA Configuration |
|----------------|---------------|----------------------|

#### **GTX Page Group**

- |                                     |                              |
|-------------------------------------|------------------------------|
| 1. RS-232 / ARINC 429 Configuration | 2. Transponder Configuration |
|-------------------------------------|------------------------------|

#### **GRS Page Group**

- |                          |                          |
|--------------------------|--------------------------|
| 1. AHRS / Air Data Input | 2. GRS / GMU Calibration |
|--------------------------|--------------------------|

#### **GDC Page Group**

- |                      |
|----------------------|
| 1. GDC Configuration |
|----------------------|

#### **GFC Page Group**

- |                      |               |
|----------------------|---------------|
| 1. GFC Configuration | 2. GFC Status |
|----------------------|---------------|

#### **GMA Page Group**

- |                      |
|----------------------|
| 1. GMA Configuration |
|----------------------|

#### **GDL Page Group**

- |                         |
|-------------------------|
| 1. GDL 69 Configuration |
|-------------------------|

#### **CAL Page Group**

- |                          |                               |                     |
|--------------------------|-------------------------------|---------------------|
| 1. Fuel Tank Calibration | 2. Flaps and Trim Calibration | 3. HSCM Calibration |
|--------------------------|-------------------------------|---------------------|

---

## 3.5 G1000 / GFC 700 Software Information

### 3.5.1 Loader Card Details

G1000 software is loaded by means of a software loader card. The software loader card uses a Secure Digital (SD) data card which contains:

- All G1000 LRU Software Files
- All G1000 Configuration Files

#### NOTE:

Only SanDisk and Toshiba brand SD cards are recommended for use with the G1000 system.

All software and configuration files were certified by Garmin and/or Diamond and are considered part of FAA-approved Type Design data. Approved software and hardware definitions for each STC Configuration is defined on the appropriate General Arrangement drawing listed in Table 1-2.

#### IMPORTANT!

**To satisfy the G1000/GFC700 STC requirements for the DA 40, it is critical that the technician use the correct software loader card part number when servicing the G1000 system.**

**Approved loader card part numbers are defined on the appropriate General Arrangement drawing (see Table 1-2).**

#### CAUTION:

Be cautious when using software loader cards during maintenance. The G1000 system immediately initializes 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, and 7, *before* attempting to use the software loader cards.

### 3.5.2 Software Files

Software files are defined by part number and version number on the General Arrangement drawing. See Table 1-2 for the correct General Arrangement drawing part numbers. Each G1000 / GFC 700 LRU reports the software version it currently contains to the user in two places.

- Normal System Mode: The AUX – SYSTEM STATUS page lists each LRU and the reported software version.
- Configuration Mode: The SYSTEM STATUS page (SYSTEM page group) reports more detailed LRU information, including software version, part number, and LRU status.

Software files are loaded to LRUs from the SYSTEM UPLOAD page in configuration mode. See Section 3.6.2.

---

### 3.5.3 Configuration Files

Configuration files are divided into groups, and are displayed at the System Upload page during the software/configuration loading process. There are three categories of configuration files:

Default (shown as part of the Software Upload list)

Options (See Section 3.5.3.1)

Calibration (See Section 3.5.3.2)

Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU-specific settings. The following list describes each of the configuration files used by the G1000:

|                        |                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>AIRFRAME</b>        | 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.                                                                                                                                                                                                  |
| <b>AIRFRAME ALERTS</b> | DA40-specific alerts are set when this file is loaded.                                                                                                                                                                                                                                                                                                                                   |
| <b>SYSTEM</b>          | This file configures the G1000 high-speed data bus (HSDB) to expect a PFD, MFD, and two GIAs (and GDL69 if configured).                                                                                                                                                                                                                                                                  |
| <b>MANIFEST</b>        | This file loads a manifest checklist of all software part numbers and versions associated with an approved system configuration. The G1000 performs a software check between each LRU's reported version and the version contained on the manifest. If an inequality is detected for an LRU, this LRU is then excluded from the G1000 and a manifest alert is triggered to the operator. |
| <b>MFD1</b>            | This file configures MFD serial/discrete communication and alert system settings.                                                                                                                                                                                                                                                                                                        |
| <b>PFD1</b>            | This file configures PFD serial/discrete communication and alert system settings.                                                                                                                                                                                                                                                                                                        |
| <b>GIA1 / GIA2</b>     | These files configure GIA1/GIA2 serial/discrete communication settings.                                                                                                                                                                                                                                                                                                                  |
| <b>GMA_PIL</b>         | This file configures GMA 1347 audio and serial communication settings.                                                                                                                                                                                                                                                                                                                   |
| <b>GTX1</b>            | This file configures GTX 33 transponder and serial communications settings.                                                                                                                                                                                                                                                                                                              |
| <b>GEA1</b>            | This file configures GEA 71 engine/airframe parameters.                                                                                                                                                                                                                                                                                                                                  |
| <b>GDC_PIL</b>         | This file configures GDC 74A air data values for the DA 40.                                                                                                                                                                                                                                                                                                                              |
| <b>AUDIO</b>           | This file configures audio alerts for the DA40.                                                                                                                                                                                                                                                                                                                                          |
| <b>CAL:</b>            | This file configures default fuel tank calibrations for the G1000.                                                                                                                                                                                                                                                                                                                       |

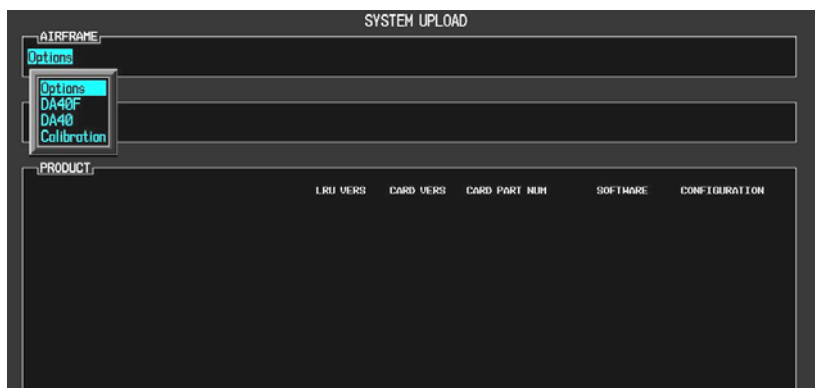
#### **IMPORTANT:**

Every attempt should be made to NOT re-load the CAL (calibration) file. If loaded, these files will reset the fuel probe calibration data to default values and invalidate the fuel tank quantity indications. The fuel calibration procedure is then subsequently required to be performed.

---

### 3.5.3.1 Options Configuration Files

The following optional configurations appear at the System Upload page within the FILE menu, when the “Options” choice is selected from the AIRFRAME menu as shown:



Optional configuration files are generally loaded after the default configuration is established during software loading. Each configuration option contains one or more of previously listed configuration files (and sometimes software files). It is important to note that although these files have the same name as the defaults, they are usually subsets, only providing the necessary configuration changes from the default files to activate the desired option. Each file affects the configuration one or more LRUs. For a summary relationship between configuration files and LRUs, refer to Table 3-1.

*DA40 F Option – Multiple Cylinders*

*DA40 F Option – Single CHT / EGT*

*DA40 F Option – Add Fuel Pressure Sensor*

*DA40 Option – ADF*

*DA40 Option – CO Guardian\**

*DA40 Option – DME*

*DA40 Option – Display Fuel Pressure*

*DA40 Option – EASA Airspeed Tape*

*DA40 Option – Extended Range Tanks*

*DA40 Option – GDL69*

*DA40 Option – GFC 700*

*DA40 Option – No KAP 140*

*DA40 Option – TAS600 Series\**

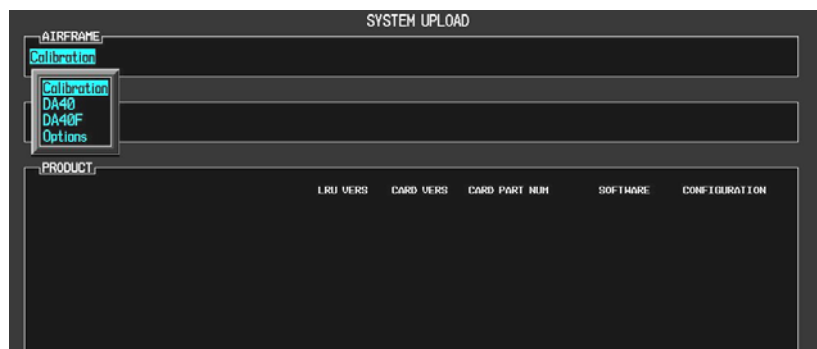
*DA40 Option – Stormscope\**

*DA40 Option – TAWS (Requires a separate TAWS enable SD card)*

\*Note these options not certified for activation under this STC. An alternate additional installation approval must be obtained for these options.

### 3.5.3.2 Calibration File Group

The Calibration file group is selected from the AIRFRAME menu as shown:

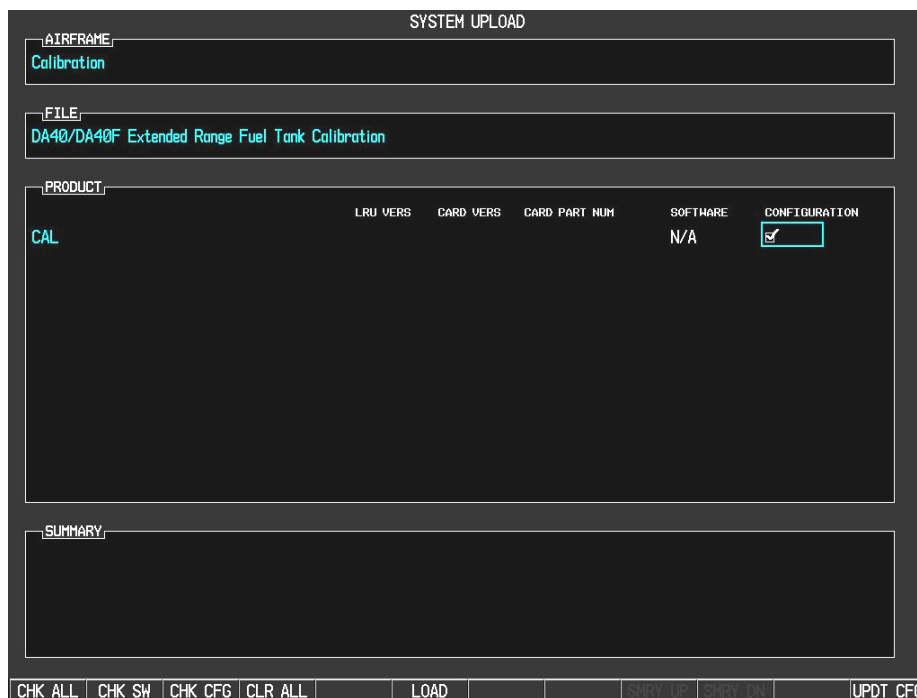


When selected, the Calibration file group displays two CAL configuration options in the FILE menu, one for standard range fuel tanks, and another for long-range fuel tanks.

Fuel tank configuration limits are contained in these files, including preset empty and full calibration points. This file group is intended to be used only during factory calibration procedures and normally is never required to be loaded during maintenance.

#### IMPORTANT!

When the CAL configuration files are loaded, **previous calibration data for the fuel tanks will be erased, causing the fuel quantity indicators to be invalid!** It is critical that the CAL configuration files not be loaded during maintenance unless absolutely necessary. Fuel tank recalibration per Section 4.6 **is required** if these files are loaded.



The following table summarizes the G1000 configuration file structure, including default and optional configurations, and the LRUs affected by each.

**Table 3-1. LRU to Configuration File Relationship Summary**

| LRU            |                       | PFD                               |                    |        |       |          |        | MFD | #1<br>GIA1 63 |       | #2<br>GIA 63 |       | GMA<br>1347 | GTX 33 | GEA<br>71 | GDC<br>74B | GDL 69A |   |
|----------------|-----------------------|-----------------------------------|--------------------|--------|-------|----------|--------|-----|---------------|-------|--------------|-------|-------------|--------|-----------|------------|---------|---|
| FILE NAME      |                       | AIRFRAME                          | AIRFRAME<br>ALERTS | SYSTEM | PFD 1 | MANIFEST | CAL ** | MFD | GIA 1         | AUDIO | GIA 2        | AUDIO | GMA         | GTX 1  | GEA 1     | GDC 1      | GDL     |   |
| CONFIGURATIONS | Default Config**      | X                                 | X                  | X      |       | X        |        | X   | X             | X     | X            | X     | X           | X      | X         | X          |         |   |
|                | Calibration**         | Std Range<br>Fuel Tank **         |                    |        |       |          | X      |     |               |       |              |       |             |        |           |            |         |   |
|                |                       | Extended<br>Range Fuel<br>Tank ** |                    |        |       |          |        | X   |               |       |              |       |             |        |           |            |         |   |
|                | Options Configuration | Multiple<br>Cylinders             | X                  |        |       |          |        |     |               |       |              |       |             |        |           | X          |         |   |
|                |                       | Single CHT                        | X                  |        |       |          |        |     |               |       |              |       |             |        |           | X          |         |   |
|                |                       | Single EGT                        | X                  |        |       |          |        |     |               |       |              |       |             |        |           | X          |         |   |
|                |                       | Add Fuel<br>Pressure<br>Sensor    |                    |        |       |          |        |     |               |       |              |       |             |        |           | X          |         |   |
|                |                       | ADF                               |                    |        |       |          |        |     |               |       |              | X     |             |        |           |            |         |   |
|                |                       | CO<br>Guardian*                   | X                  | X      |       |          |        |     |               |       |              | X     |             |        |           |            |         |   |
|                |                       | DME                               |                    |        |       |          |        |     |               |       |              | X     |             |        |           |            |         |   |
|                |                       | Display Fuel<br>Pressure          | X                  |        |       |          |        |     |               |       |              |       |             |        |           |            |         |   |
|                |                       | EASA<br>Airspeed<br>Tape          | X                  |        |       |          |        |     |               |       |              |       |             |        |           |            |         |   |
|                |                       | Extended<br>Range<br>Tanks**      | X                  |        |       |          |        | X   |               | X     |              | X     |             |        |           | X          |         |   |
|                |                       | GDL69                             | X                  |        |       | X        |        |     |               |       |              |       |             |        |           |            |         | X |
|                |                       | GFC700                            | X                  |        |       |          |        |     | X             | X     |              | X     |             |        |           |            |         |   |
|                |                       | NO KAP 140                        | X                  |        |       |          |        |     |               | X     |              | X     |             |        |           |            |         |   |
|                |                       | TAS600<br>Series*                 |                    |        |       |          |        |     |               |       |              | X     |             |        |           |            |         |   |
|                |                       | Stormscope*                       |                    |        |       |          |        |     |               |       |              | X     |             |        |           |            |         |   |
|                |                       | TAWS***                           | X                  | X      |       |          |        |     |               |       |              |       |             |        |           |            |         |   |

\*Noted options are not certified for activation under this STC. An alternate additional installation approval must be obtained for these options.

\*\*IMPORTANT! RELOADING THE CAL FILE REQUIRES FUEL TANK RECALIBRATION!

\*\*\*NOTE: To enable the TAWS function, a separate "TAWS Enable" SD Card is required. See the appropriate General Arrangement drawing for card part number. When the TAWS option is loaded, note that it overwrites the AIRFRAME and AIRFRAME ALERTS configuration files. If, during maintenance, the default PFD configuration files are ever reloaded, the TAWS option must be reactivated. See Section 3.6.6 for instructions on reactivating TAWS.

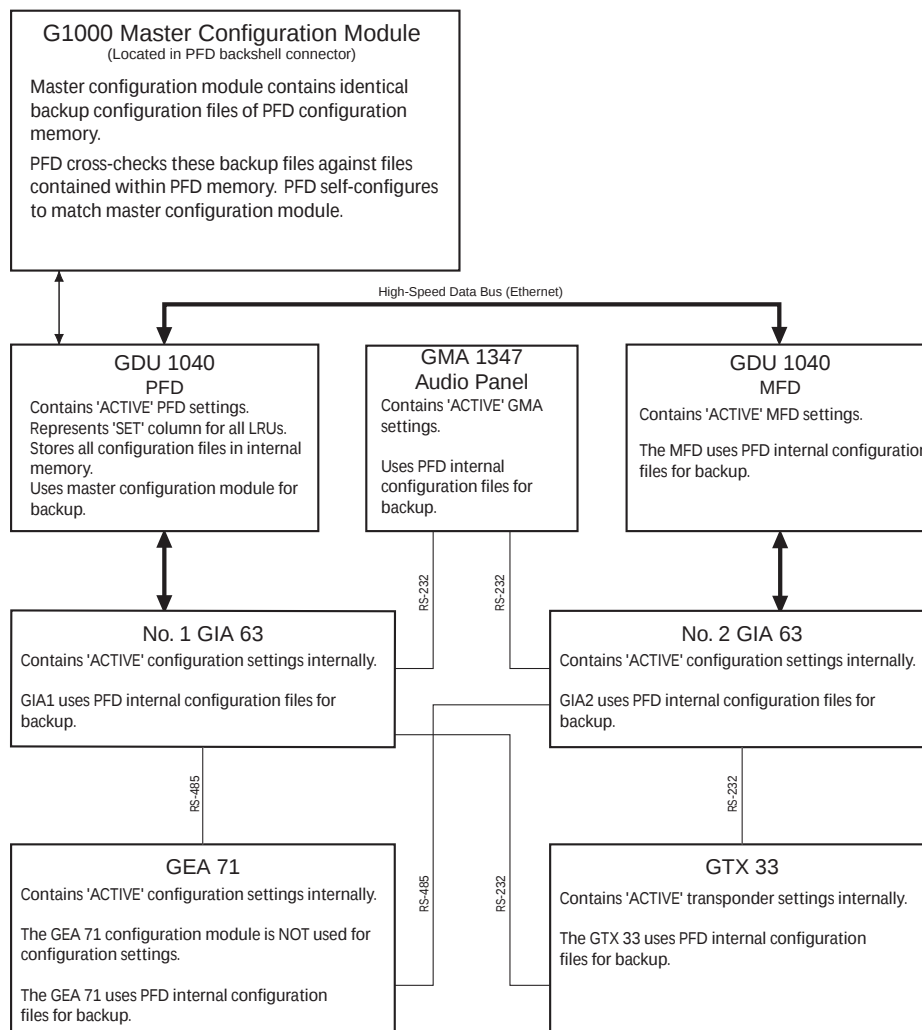
### 3.5.4 Configuration File Storage

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.

During system configuration, each file is sent directly to the applicable LRU where it is stored in local LRU memory (except GRS 77 & GDC 74A). Each file is also stored in PFD internal memory. The PFD also sends a copy of all configuration files to the 'Master Configuration module', located in the connector backshell (see Section 6.13). If the PFD is replaced, the configuration module retains all configuration files in the aircraft.

#### NOTE:

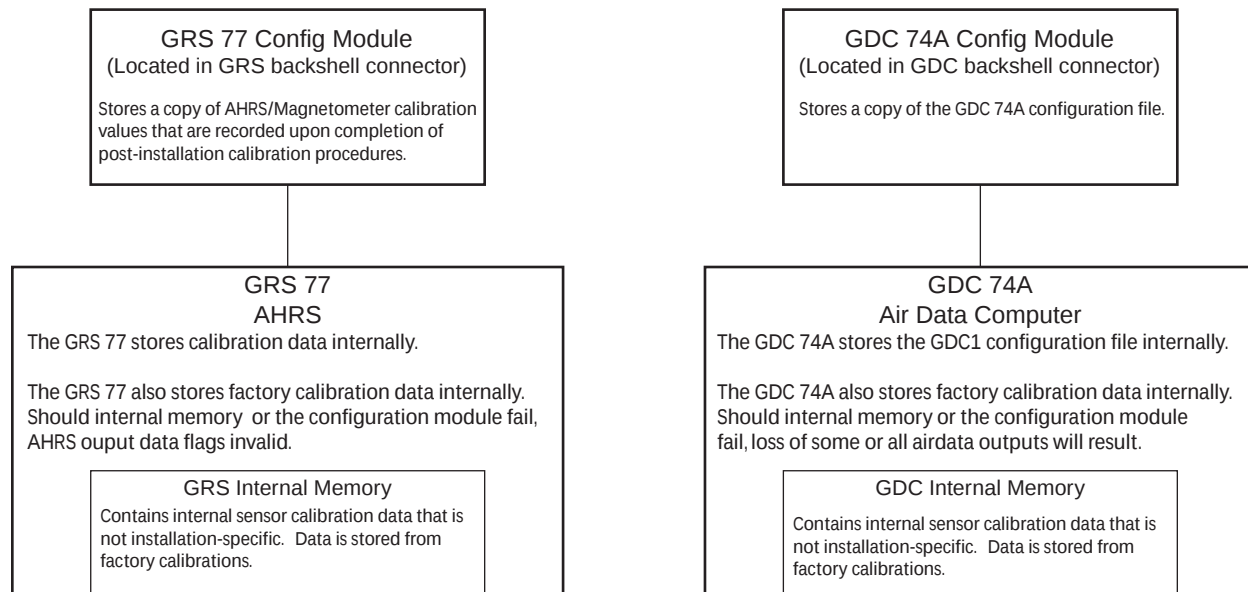
The GRS 77 AHRS and GMU 44 Magnetometer do not have a configuration file. However, these LRUs do store calibration data acquired during the post installation checkout, which are characteristic to the specific installation. While performing maintenance on these units, re-calibration may be required. See Section 7.7.1 for more information on re-calibration criteria.



**Figure 3-12. 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. Instead, it stores calibration data recorded during installation calibration procedures.



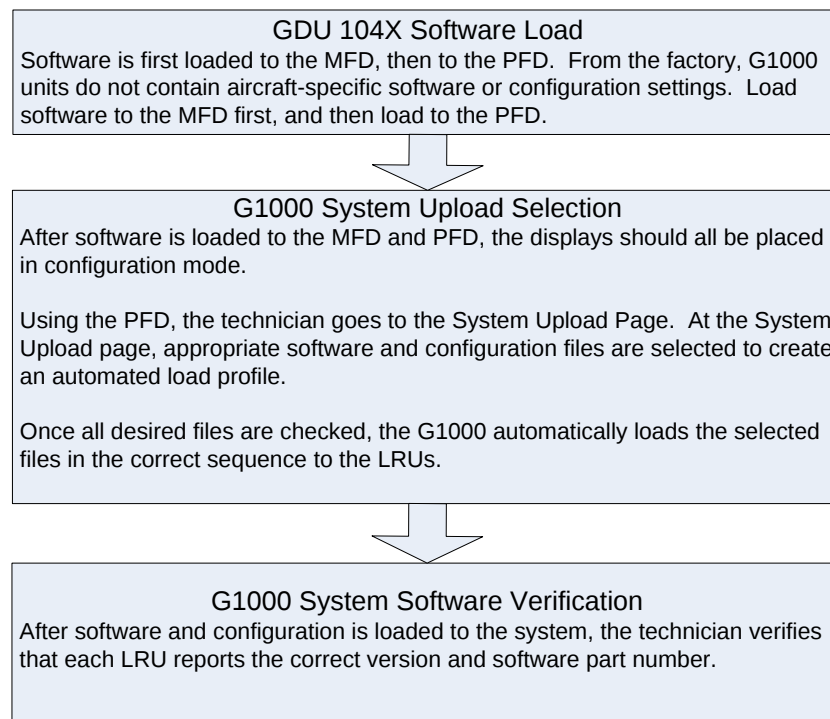
**Figure 3-13. GRS/GDC Configuration Settings Storage**

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### 3.6 G1000 Software/Configuration Procedure

This section summarizes the procedures required to load software and configuration files to the G1000. It is intended to work as a central guide for technicians to use while performing maintenance on the aircraft. In sections of this manual where software is required to be reloaded, these sections will make reference back to this Section for instructions. The technician should use proper judgment regarding the context of maintenance required while following this section.

The following diagram depicts an overview of the software/configuration sequence for the G1000 system. This applies mostly to a new G1000 system which has not previously been powered up and is for informative purposes only.



**Figure 3-14. Software/Configuration Overview**

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### 3.6.1 MFD & PFD Software Load

Follow this procedure to load software to either MFD or PFD.

1. With the G1000 and GFC 700 powered on, pull the MFD and PFD circuit breakers.
2. Insert the correct software loader card into the MFD or PFD top card slot.
3. While holding the ENT key on the display, restore power by closing the appropriate circuit breaker.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the display, release the ENT key.
5. The system first automatically compares the existing GDU 104X boot block with the version on the loader card. If a difference exists, the GDU prompts to load new boot block. If boot block is current the prompt in Step 7 is shown.

```
INITIALIZING SYSTEM.  
DO YOU WANT TO UPDATE THE BOOT BLOCK FROM 2.00 TO 2.03?  
NO WILL BE ASSUMED IN 30 SECONDS.
```

6. ENSURE that power will remain applied to the system. Press the ENT key and new boot block will be loaded:

```
INITIALIZING SYSTEM.  
DO YOU WANT TO UPDATE THE BOOT BLOCK FROM 2.00 TO 2.03?  
NO WILL BE ASSUMED IN 30 SECONDS.  
  
UPDATING BOOT BLOCK. DO NOT TURN OFF POWER!!!
```

7. Press the ENT key to acknowledge the following prompt to load new software (NOTE: A softkey labeled 'YES' appears in the lower right corner and may be used in lieu of the ENT key):

```
INITIALIZING SYSTEM.  
  
LOADER CARD:  
- DIAMOND DA 40/40F -  
GPN 010-00321-13  
  
DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.
```

8. The following screen is displayed:

```
INITIALIZING SYSTEM.  
  
LOADER CARD:  
- DIAMOND DA 40/40F -  
GPN 010-00321-13  
  
DO YOU WANT TO UPDATE SYSTEM FILES?  
NO WILL BE ASSUMED IN 30 SECONDS.  
  
UPDATING SYSTEM FILES, PLEASE WAIT.  
.....  
UPDATED 88 FILES SUCCESSFULLY!  
PRESS ANY KEY TO CONTINUE.  
CONTINUING IN 10 SECONDS.
```

9. New software is loaded to display. When complete, the display starts in configuration mode.
10. If necessary, remove the software loader card from the display and insert it into the top card slot of the opposite display. Repeat Steps 3 through 7 for the opposite display.
11. When the display software load is complete, it starts in the configuration mode.

### 3.6.2 G1000 System Software Upload

The System Upload page allows a technician to load LRU software and system configuration files individually or in an automated sequence. Depending on what maintenance is performed, software and/or configuration files may need to be reloaded to LRUs. Follow the steps below as a guide to use the System Upload page.

1. On the PFD, go to the System Upload page using the small FMS knob.

#### IMPORTANT!

It is at this step where the G1000 will be configured as a DA 40 or DA 40F.  
Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded.

2. Activate the cursor and use the small FMS knob to highlight the airframe type in the AIRFRAME field. Select the appropriate aircraft type (DA 40 or DA 40F) and press the ENT key.

#### IMPORTANT!

It is at this step where the choice is given to load WAAS or non-WAAS G1000 software. Be sure to select the correct option.

3. Once an airframe type is selected the cursor moves to the FILE window. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate aircraft model (WAAS or non-WAAS) and press ENT.

| LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE                            | CONFIGURATION                       |
|----------|-----------|---------------|-------------------------------------|-------------------------------------|
|          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
|          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
|          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
|          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
|          |           |               | N/A                                 | <input checked="" type="checkbox"/> |
| T5.10e   | 5.10      | 006-B0544-XX  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| T5.10e   | 5.10      | 006-B0544-XX  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> |
| 2.4      | 2.4       | 006-B0339-04  | <input type="checkbox"/>            | N/A                                 |
| 3.03     | 3.03      | 006-B0203-33  | <input type="checkbox"/>            | <input checked="" type="checkbox"/> |

4. The PRODUCT window will populate and display software and default configuration file lists for each G1000 LRU. The LRU VERS column shows the currently loaded software version in the LRU, whereas the CARD VERS column shows the LRU software version stored on the loader card. Each check designates a file to be loaded to the G1000.

If an inequality between the LRU VERS and CARD VERS columns is detected, the SOFTWARE and CONFIGURATION boxes will be pre-selected (checked) for each LRU reporting a different

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software version than the one on the card.

The following softkeys provide an easy way to select files:

CHK ALL: Selects all files, both configuration and software

CHK SW: Selects all SW files only.

CHK CFG: Selects all configuration files only.

CLR ALL: Clears all selections.

LOAD: Starts the software loading process.

#### NOTE:

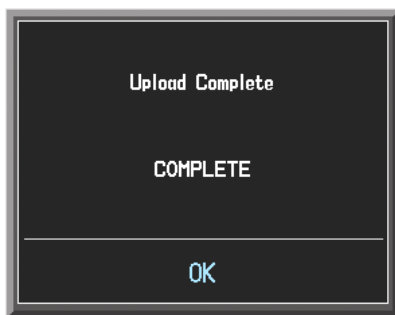
If this is the first time loading software and configuration to a new installation, it is advised to leave all check boxes selected. However, for maintenance purposes, it may not be necessary to reload all software and configuration files. The technician should be sure of the software requirements and load the appropriate files, including any options (see Section 3.6.3). If there is any doubt, the CHK ALL softkey is recommended. **It is also highly recommended that the CAL configuration file NOT be loaded unless replacing the fuel probes. If this file is inadvertently reloaded, the fuel probes MUST be recalibrated per Section 4.6.**

5. After verifying that the desired software and configuration files are checked, press the LOAD softkey. The G1000 system automatically begins loading software and default configuration files to the selected LRUs in the proper order.

#### IMPORTANT!

If non-WAAS GIA 63s are installed, the software boot block version must be checked *while software is being loaded to EACH GIA 63*. Wait until the software loading process begins to load the GIA 63 software. On the MFD, go to the System Status page and activate the cursor. Highlight GIA1. Observe the DESCRIPTION field. When it changes to read 'G1000 GIA 6X BBL', verify that the reported VERSION is 4.01 or higher. Repeat this for GIA2. If either GIA 63 has software boot block less than version 4.01, current boot block software must be loaded per Section 3.6.4 *after* the current GIA software load process completes. There is no need to interrupt the GIA system software from loading.

6. When the system finishes loading, it prompts the technician accordingly. Press the ENT key to acknowledge that the upload is finished:



7. Verify that each column indicates ☐ **PASS** in green when the loading process has finished and inspect the SUMMARY window as well to ensure that the load is successful.

---

### 3.6.3 Loading Airframe Options

After the base factory defaults are loaded to the G1000, the technician must check and verify which equipment or installation options exist on the aircraft. See the options list in 3.5.3.

If the DA 40 aircraft being updated is equipped any additional equipment options, follow this procedure to load them.

#### **NOTE:**

TAWS and ChartView options are covered in a separate section. See Sections 3.6.6 and 3.6.7 for TAWS and ChartView, respectively.

1. At the System Upload page, activate cursor and rotate the FMS knob once to activate the AIRFRAME menu.
2. Select 'Options' from the AIRFRAME window and press ENT.
3. From the FILE window, and select the desired airframe option to load.
4. Press the ENT key.
5. At this point, any applicable configuration and software files will be displayed in the PRODUCT window.
6. After reviewing the files to be loaded, press the LOAD ALL softkey.
7. Monitor the status of the upload. When the upload is finished, press ENT to acknowledge.
8. View the SUMMARY field and ensure that all items are 'complete': Verify that PASS appears in green at the check box for each file.
9. Repeat for each additional option configuration.

### 3.6.4 GIA 63 Boot Block Update

For GIA 63s, boot block version 4.01 or higher is required to work with version 5.31 operating system software. There may be instances during maintenance where an older GIA may be installed from a spares pool or as a replacement. It is important to verify boot block during operating system software loading to ensure version 4.01 or higher is present (refer to Step 5 of 3.6.2).

If it was determined in the software loading procedure that the GIA 63s did not have boot block version 4.01 or higher, follow this procedure to update the GIA 63's software boot block. Note that this does not apply to GIA 63Ws.

#### IMPORTANT!

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

1. Obtain the required GIA 63 Boot Block loader card from Garmin. The card part number is listed on the applicable General Arrangement drawing.
2. Insert the card into the top slot of the PFD and apply system power to the G1000.
3. On the PFD, go to the System Upload page using the FMS knob.
4. Activate the cursor and in the AIRFRAME field select GIA Boot Block. Press the ENT key.
5. The cursor drops down to the FILE field. Rotate the small FMS knob and select GIA Boot Block 4.01 and press the ENT key.

| SYSTEM UPLOAD                                |          |           |               |                                     |               |
|----------------------------------------------|----------|-----------|---------------|-------------------------------------|---------------|
| AIRFRAME                                     |          |           |               |                                     |               |
| GIA Boot Block                               |          |           |               |                                     |               |
| FILE                                         |          |           |               |                                     |               |
| GIA Boot Block 4.01                          |          |           |               |                                     |               |
| PRODUCT                                      |          |           |               |                                     |               |
|                                              | LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE                            | CONFIGURATION |
| GIA 1                                        | T5.21n   | ALL       | 006-B0190-BE  | <input checked="" type="checkbox"/> | N/A           |
| GIA 2                                        | T5.21n   | ALL       | 006-B0190-BE  | <input checked="" type="checkbox"/> | N/A           |
| SUMMARY                                      |          |           |               |                                     |               |
|                                              |          |           |               |                                     |               |
| CHK ALL CHK SW CHK CFG CLR ALL LOAD UPDT CFG |          |           |               |                                     |               |

6. Verify that the SOFTWARE boxes are checked for both GIA 1 and GIA 2. Press the LOAD softkey.
7. The GIA boot block software is loaded. Be sure to not remove electrical power from the G1000 during this update.

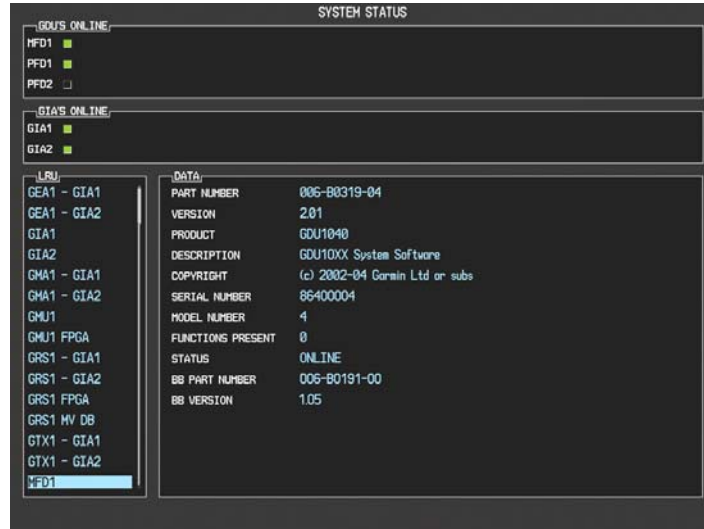
8. When the boot block software finishes loading, acknowledge the following prompt by pressing the ENT key:



9. The boot block update procedure is complete. On the MFD System Status Page, highlight GIA1 and GIA2 and verify both units are reporting 'OK' status and that the GIAS ONLINE field shows two green boxes.
10. Remove the GIA Boot Block loader card from the PFD and re-insert the correct G1000/GFC700 Software Loader card.
11. Restart the PFD and MFD in configuration mode by cycling the PFD and MFD circuit breakers. Hold the ENT key on both displays while they power up until the words INITIALIZING SYSTEM appear in white. The PFD may show a prompt to load system software files. Press the NO softkey or press CLR.
12. Continue with the software loading and configuration procedure and load any remaining files according to the procedures in Section 3.6.2.

### 3.6.5 Software Check

Anytime software and configuration loading procedures are accomplished during maintenance, it is highly recommended to conduct a final software review of the system.



1. Go to the System Status page using the FMS knob. Activate the cursor.
2. Highlight each of the following items in the LRU window, and verify that the software part number and version matches the information in the appropriate General Arrangement drawing:

| <u>LRU</u>     | <u>SW VER OK</u> | <u>LRU</u>             | <u>SW VER OK</u> |
|----------------|------------------|------------------------|------------------|
| PFD1           | _____            | GMA1                   | _____            |
| PFD1 FPGA      | _____            | GMU1                   | _____            |
| MFD1           | _____            | GMU1 FPGA              | _____            |
| MFD1 FPGA      | _____            | GDL69                  | _____            |
| GIA1           | _____            | GFC CERT R M*          | _____            |
| GIA2           | _____            | GFC CERT R C*          | _____            |
| GPS1           | _____            | GFC CERT PT M*         | _____            |
| GPS2           | _____            | GFC CERT PT C*         | _____            |
| GRS1           | _____            | GFC CERT P M*          | _____            |
| GRS1 FPGA      | _____            | GFC CERT P C*          | _____            |
| GIA1 AUDIO     | _____            | GSA PTCH C – GIA1*     | _____            |
| GIA2 AUDIO     | _____            | GSA PTCH M – GIA1*     | _____            |
| GFC CERT GIA1* | _____            | GSA PTCH TRM C – GIA1* | _____            |
| GFC CERT GIA2* | _____            | GSA PTCH TRM M – GIA1* | _____            |
| GTX1           | _____            | GSA ROLL C – GIA1*     | _____            |
| GEA1           | _____            | GSA ROLL M – GIA1*     | _____            |
| GDC1           | _____            |                        |                  |
| GDC1 FPGA      | _____            |                        |                  |

\*GFC 700-equipped aircraft only.

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### 3.6.6 TAWS Reactivation

If the TAWS option was previously enabled and the G1000 was reconfigured (default AIRFRAME configuration file was loaded), it is necessary to reactivate TAWS.

Perform this procedure to reactivate TAWS.

#### NOTE:

When the TAWS option is enabled for the first time (normally at Diamond factory), the G1000 writes its unique system ID to the physical card and locks the files to this unique ID. This prevents the unlock card from ever being used to activate TAWS in another G1000 system. This unlock card is tied to the specific aircraft in which it was used for the first time. For situations where TAWS must be re-activated, this card must be used.

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

---

### 3.6.7 ChartView Reactivation

If the ChartView option was previously enabled and the G1000 was reconfigured (default AIRFRAME configuration file was loaded), it is necessary to reactivate ChartView.

Perform this procedure to reactivate ChartView.

#### **NOTE:**

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

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

#### **NOTE:**

ChartView databases are required to be installed on the terrain database cards to function (see Section 3.6.8 ). ChartView databases are subscription-based and are to be procured by the aircraft owner directly from Jeppesen.

---

### 3.6.8 Terrain/Obstacle Database Cards

#### NOTE:

If the G1000 is to be equipped with the FliteChart or ChartView display options, the appropriate databases are required to be loaded onto the Terrain/Obstacle cards before they are installed in the displays. ChartView database subscription services must be procured directly from Jeppesen and are usually sourced by the aircraft owner. Further, the ChartView feature must be 'unlocked' before the G1000 can use the databases (see 3.6.7).

There is no unlock card for Garmin FliteCharts. A single cycle of Garmin FliteCharts is loaded on the database cards when they are manufactured at Garmin. Additional FliteChart database updates are obtained directly from Garmin's web site and are updated on a periodic basis. The G1000 automatically detects the FliteChart databases and activates the display feature. If the G1000 detects a ChartView database and a FliteCharts database, it will always activate the ChartView database.

1. Remove power from the PFD and MFD using the respectively labeled breakers.
2. Insert the two database cards into the lower slots of the MFD and PFD, respectively. Refer to the appropriate General Arrangement drawing for correct card part numbers.

### 3.6.9 Aviation Database Loading & Update

1. Insert a database card containing the Jeppesen aviation database (database supplied by Jeppesen) into the top slot of the PFD.
2. 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
```

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

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

4. After the update completes, the PFD starts in normal mode. Remove the aviation database update card from the PFD.
5. Repeat steps 2 through 4 for the MFD. The MFD and PFD aviation databases are now updated.
6. Confirm that the correct update cycle and version is loaded at the power-up page of the MFD.
7. Remove the aviation database update card from the MFD.

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## 4 Instructions for Continued Airworthiness

### 4.1 Airworthiness Limitations

The G1000 integrated cockpit is airworthy when installed, configured, and maintained in accordance with this section.

The G1000 and GFC 700 systems possess the following maintenance airworthiness limitations:

G1000 (Carryover from STC #SA01254WI-D):

Every 24 calendar months, 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 is 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. Refer to the G1000/DA40 Install Drawing, 005-00304-00 for installation diagrams.

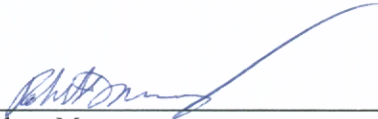
GFC 700 Limitations (Carried Over from STC #SA01389WI):

Every 100 hours or Aircraft Annual Inspection, whichever comes first, perform a check to verify that flap-in-motion discrete inputs function correctly. Refer to Section 4.9.

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

**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.**

FAA APPROVED

  
Robert Murray  
DAS Administrator  
DAS-240087-CE

7-26-2007  
Date

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## 4.2 Servicing Information

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

### 4.2.1 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 avionics 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 physical 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.

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.

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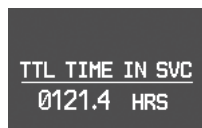
## 4.2.2 Recommended Tools

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

- Milli-ohm Meter, OR
  - ✓ Agilent 34410A Ammeter or equivalent
  - ✓ Fluke 187 Voltmeter or equivalent
  - ✓ Power Supply capable of providing 1 amp current
- #2 Phillips Screwdriver
- 3/32" 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)
- Flight Control Cable Tension Meter or equivalent
- Servo Mount Slip Clutch Adjustment Tool – P/N 011-01085-00 or -01
- Calibrated Torque Wrench capable of measuring 0 – 70 in/lbs
- Standard Sockets & Wrenches (3/8", 9/16", and 13/16")
- Calibrated Weighing Scale able to display to the nearest hundredth (for use during fuel probe calibration)
- Thermometer (for air data OAT probe temperature comparison)

## 4.2.3 Total Time In Service Timer

Effective System Software Version 0369.06 or later, the G1000 now stores an airframe time-in-service timer and displays this time on the MFD EIS window. To access the timer, press the ENGINE softkey, then press the SYSTEM softkey. Airframe Total Time In Service is determined by on-ground and off-ground states within the G1000. When the aircraft is determined to be airborne, the timer starts.



**Figure 4-1. Total Time In Service**

### 4.3 Maintenance Intervals

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 months, the first interval reached should be used as the limit.

**Table 4-1. Maintenance Intervals**

| Item                                          | Description/Procedure                                                                     | Manual Section No. | Interval                |
|-----------------------------------------------|-------------------------------------------------------------------------------------------|--------------------|-------------------------|
| G1000 Equipment                               |                                                                                           |                    |                         |
| G1000 System                                  | Complete Visual Inspection                                                                | 4.4                | Aircraft Annual         |
| GDU 1040 PFD &<br>GDU 1040, 1042, or 1044 MFD | Removal & Replacement.                                                                    | 6.1                | On Condition            |
|                                               | GDU Power Interrupt Function Check                                                        | 4.11               | Aircraft Annual         |
| GMA 1347                                      | Removal & Replacement.                                                                    | 6.2                | On Condition            |
| GIA 63(W) IAU (Qty. 2)                        |                                                                                           | 6.3                |                         |
| GEA 71 EAU                                    |                                                                                           | 6.4                |                         |
| GTX 33 Mode S Transponder                     | Removal & Replacement.                                                                    | 6.5                | 24 Calendar Months      |
|                                               | Test according to Title 14 CFR §§ 91.411 and 91.413 as well as Part 43 Appendix F.        | 7.5                |                         |
| GDC 74A                                       | Removal & Replacement.                                                                    | 6.6                | On Condition            |
|                                               | Test according to Title 14 CFR § 91.411 and Part 43 Appendix E.                           | 7.6                | 24 Calendar Months      |
|                                               | Airspeed Function Test.                                                                   |                    | 2000 Hours or 48 Months |
|                                               | Vertical Speed Function Test.                                                             |                    | 2000 Hours or 48 Months |
| GRS 77 AHRS                                   | Removal & Replacement.                                                                    | 6.8                | On Condition            |
|                                               | Magnetic variation database update.                                                       | 4.7                |                         |
| GMU 44 Magnetometer                           | Removal & Replacement.                                                                    | 6.9                |                         |
| GDL 69/69A (Optional)                         |                                                                                           | 6.10               |                         |
| GA 35 GPS/WAAS Antennas                       | Removal & Replacement; Refer to General Arrangement drawing 005-00400-10 or 005-00400-15. | 6.15               |                         |
| G1000 Accessories                             |                                                                                           |                    |                         |
| Configuration Module Replacement (Qty 4)      | Removal & Replacement.                                                                    | 6.13               | On Condition            |
| GEA 71 Backshell Thermocouple                 | Removal & Replacement.                                                                    | 6.14               |                         |
| OAT Probe                                     | Removal & Replacement.                                                                    | 6.7                |                         |
| PFD, MFD, & GIA Cooling Fans (Qty 3)          | Removal & Replacement; Refer to G1000/DA40 Installation Drawing, 005-00304-00.            | N/A                |                         |

**Table 4-1. Maintenance Intervals, Cont.**

| <b>Item</b>                                                        | <b>Description/Procedure</b>                                                                        | <b>Manual Section No.</b> | <b>Interval</b>                |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------------------|--------------------------------|
| <b>GFC 700 AFCS</b>                                                |                                                                                                     |                           |                                |
| GFC 700 AFCS System                                                | Complete Visual Inspection                                                                          | <b>4.4</b>                | <b>Aircraft Annual</b>         |
| GSA 81 Servos (all)                                                | Removal & Replacement. Refer to the servo install drawings listed in Table 1-3.                     | <b>6.11</b>               | <b>On Condition</b>            |
|                                                                    | Clean and Apply Grease to Output Gears.                                                             | <b>4.8</b>                | <b>1000 Hours or 36 Months</b> |
| GSM 85 Servo Mounts (all)                                          | Removal & Replacement. Refer to the servo install drawings listed in Table 1-3.                     | <b>6.12</b>               | <b>On Condition</b>            |
|                                                                    | Check Slip Clutch Torque (adjust if necessary)                                                      | <b>4.10</b>               | <b>500 Hours or 12 Months</b>  |
| Pitch Trim Control Chain                                           | Removal & Replacement; Refer to the pitch trim installation drawing listed in Table 1-3.            | <b>N/A</b>                | <b>On Condition</b>            |
| Pitch & Roll Control Cable/Phenolic Isolator Assemblies and Clamps | Removal & Replacement; Refer to the pitch and roll servo installation drawings listed in Table 1-3. | <b>N/A</b>                | <b>On Condition</b>            |

**Table 4-1. Maintenance Intervals, Cont.**

| Item                              | Description/Procedure                                                                                                                                                                                                                                                                                                                                                                                                  | Manual Section No. | Interval                                                |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|---------------------------------------------------------|
| <b>G1000 Lightning Protection</b> |                                                                                                                                                                                                                                                                                                                                                                                                                        |                    |                                                         |
| GIA / AHRS Resistors              | <p>Replace all 3 resistors located on the front of the remote avionics enclosure. Refer to G1000/DA40 Installation Drawing, 005-00304-00.</p> <p><u>For WAAS aircraft:</u></p> <p>In addition to the above 3 resistors, replace all 7 resistors located on the resistor bracket installed on the side of the remote avionics enclosure. See the Resistor Install Drawing, 005-00400-12.</p>                            | N/A                | Replace After Suspected / Actual Lightning Event        |
| TVS Unit Replacement (Qty 7)      | <p>Replace all five voltage suppressor units.</p> <p>Refer to G1000/DA40 Installation Drawing, 005-00304-00:</p> <ul style="list-style-type: none"> <li>✓ Battery, Alternator, GMA 1347, and Standby Attitude Indicator Voltage Suppressors are located behind instrument panel near the circuit breakers</li> <li>✓ GIA1, GIA2, and AHRS Voltage Suppressors are located at the remote avionics enclosure.</li> </ul> | N/A                | Replace After Suspected / Actual Lightning Event        |
| Visual Inspection                 | Complete Visual Inspection                                                                                                                                                                                                                                                                                                                                                                                             | 4.4                | Aircraft Annual                                         |
| Electrical Bonding Test           | Perform an electrical bonding resistance check of all G1000 equipment.                                                                                                                                                                                                                                                                                                                                                 | 4.5                | 1000 Hours and After Suspected / Actual Lightning Event |

**Table 4-1. Maintenance Intervals, Cont.**

| Item                                                             | Description/Procedure                                                                                                                                                                                                                                                                  | Manual Section No. | Interval     |
|------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|--------------|
| <b>Engine/Airframe Sensors</b>                                   |                                                                                                                                                                                                                                                                                        |                    |              |
| MAP Sensor (DA40 ONLY)                                           | <p>Removal &amp; Replacement:</p> <p><u>For DA 40 Aircraft:</u></p> <p>Refer to the G1000/DA40 Installation Drawing, 005-00304-00 for drawings (Ref STC #SA01254WI-D).</p> <p><u>For DA 40 F Aircraft:</u></p> <p>Refer to the Diamond Airplane Maintenance Manual and OAM 40-222.</p> | N/A                | On Condition |
| Oil Pressure Sensor                                              |                                                                                                                                                                                                                                                                                        |                    |              |
| Oil Temperature Sensor                                           |                                                                                                                                                                                                                                                                                        |                    |              |
| Fuel Pressure Sensor (DA40 ONLY)                                 |                                                                                                                                                                                                                                                                                        |                    |              |
| Tach Sensor                                                      |                                                                                                                                                                                                                                                                                        |                    |              |
| Fuel Flow Sensor                                                 |                                                                                                                                                                                                                                                                                        |                    |              |
| CHT Probes (Qty 4)                                               |                                                                                                                                                                                                                                                                                        |                    |              |
| EGT Probes (Qty 4)                                               |                                                                                                                                                                                                                                                                                        |                    |              |
| Alternator Current Sensor                                        | Should one or both fuel quantity transducers fail, replace according to instructions in Diamond DA 40 Aircraft Maintenance Manual. <b>The new replacement fuel quantity probe(s) must be re-calibrated.</b>                                                                            | 4.6                |              |
| Fuel Tank Quantity Sending Units – G1000 Fuel Tank Recalibration |                                                                                                                                                                                                                                                                                        |                    |              |

## 4.4 Visual Inspection

Perform a visual inspection every aircraft annual. 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. Visual 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.<br>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, GMA 1347, and Backup Attitude Indicator Voltage Suppressors (4)                                                          | a) Inspect both voltage suppressors and associated wiring for cracks, chaffing, or other defects.<br>b) Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that the fuse is in good condition.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |
| GDU Fans                                                                                                                                      | a) Inspect both GDU fans for accumulation of dirt and other damage. Remove excess dirt as required.<br>b) Ensure that both fans are operational.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| GDU 1040 PFD & GDU 1042 MFD                                                                                                                   | a) Remove the MFD and PFD as described in Section 6.<br>b) Inspect the mounting surface, copper bonding fingers and connector for corrosion, heavy oxidation, or other damage.<br>c) Reinstall the MFD and PFD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |
| To gain access for the following Inspections:                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |
| 1. Remove rear baggage compartment floor.<br>2. Detach seat belts.<br>3. Remove baggage compartment shell.<br>4. Remove Rear Passenger Seats. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |
| Refer to the DA 40 Aircraft Maintenance Manual for removal instructions.                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |          |
| GFC 700 Equipment                                                                                                                             | a) Inspect the servos, servo mounts, connectors, support structures, and control cables to ensure that no corrosion, chaffing, cracks, or other defects exist.<br>b) Have an assistant manually move the ailerons (for roll servo), elevators (for pitch servo) and elevator trim wheel (for pitch trim servo) from stop to stop and visually observe the servo, servo mount, and control cabling/chain. Ensure there is no binding in the control cabling or chain, and that the capstan/sprocket rotates freely.<br>c) Check the servo control cables to ensure no fraying, corrosion, or other damage exists. If the condition of the cable is questionable, replace it with a new one.<br>d) Check the tension of the pitch and roll control cables and the pitch trim chain. Refer to the following servo installation drawings for cable and chain tension specifications:<br>a) <u>005-00336-18: Roll Servo Install Drawing</u><br>b) <u>005-00336-17: Pitch Servo Install Drawing</u><br>c) <u>005-00336-19: Pitch Trim Servo Install Drawing</u><br>e) Ensure that each cable is correctly attached to the clamps, and that the chain is |          |

|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                 | <p>secure on the sprockets.</p> <p>f) Follow Diamond's recommended checks for checking main control rods, following the instructions in Chapter 27, Flight Controls, of the Diamond Airplane Maintenance Manual.</p> <p>g) Inspect the servo wiring and ensure no chaffing, wear, or other damage exists.</p> <p>h) Reinstall the access panels if no other maintenance is to be performed.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| GRS 77                                          | <p>a) Inspect the GRS 77 unit, rack, and connector for corrosion or other defects.</p> <p>b) Inspect both braided ground straps to the GRS rack and ensure they are in good condition.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |  |
| Remote Avionics Enclosure                       | <p>a) Inspect the outer area around the enclosure for damage.</p> <p>b) Inspect the antenna connection junction.</p> <p>c) Inspect the aluminum ground strap.</p> <p>d) Inspect the GIA/AHRS voltage suppressors, resistors, and fuses mounted to the front of the enclosure (refer to 005-00304-00 for drawings):</p> <ol style="list-style-type: none"> <li>Inspect each voltage suppressor and associated wiring for cracks, chaffing, or other defects.</li> <li>Remove each voltage suppressor fuse and inspect the fuse filament. Ensure that each fuse is in good condition.</li> <li>Inspect each lightning protection resistor and associated wiring for cracks, chaffing, or other defects.</li> </ol> <p>e) Loosen the screws securing the top half of the avionics enclosure.</p> <p>f) Remove the top half of the enclosure and inspect the bottom mounting tray and all connectors.</p> <p>g) Reinstall the top avionics enclosure.</p> <p>h) <u>For WAAS aircraft:</u> Inspect resistor bracket assembly and wiring harness for cracks, chaffing, or other defects. Remove resistor bracket assembly if necessary, to inspect wiring, shields, resistors, and cable ties.</p> |  |
| GIA Avionics Fan                                | <p>a) Inspect remote avionics fan for dirt accumulation and other damage. Remove excess dirt as required.</p> <p>b) Ensure that the fan is operational.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |  |
| The GMU 44 is mounted below the starboard wing. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| GMU 44                                          | <p>a) Remove the three Phillips screws holding the GMU access plate to the wing. Be sure to use a non-magnetic screwdriver to avoid harming the GMU.</p> <p>b) Carefully lower the assembly and inspect the GMU 44 and rack.</p> <p>c) Inspect the mounting hardware and GMU 44 for corrosion or other damage.</p> <p>d) Reinstall the GMU 44 beneath the wing.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |

### 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.

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## 4.5 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.

### 4.5.1 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.

### 4.5.2 Test Equipment

A milli-ohm meter and Kelvin probes are recommended for this test. However, a standard voltmeter, power supply with adjustable current limit, 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.

### 4.5.3 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  $\pm$ 100 milli-amp at each point)
3. Set the voltmeter to measure milli-volts and null the reading. Measure the voltage from the engine grounding bracket (step 1) to each of the following points and record the voltage. (Perform Step 2 at each point to ensure that 1 amp  $\pm$ 100 milli-amp is present before measuring)
  - a) Top metal case of PFD: \_\_\_\_\_ milli-volts
  - b) Top metal case of MFD: \_\_\_\_\_ milli-volts
  - c) Top metal case of GMA 1347: \_\_\_\_\_ milli-volts
  - d) GEA 71 Body: \_\_\_\_\_ milli-volts
  - e) GDC 74A Body: \_\_\_\_\_ milli-volts
  - f) OAT Probe Base Nut (inside fuselage): \_\_\_\_\_ milli-volts
  - g) GIA 1 Top: \_\_\_\_\_ milli-volts
  - h) GIA 2 Top: \_\_\_\_\_ milli-volts
  - i) GTX 33 Top: \_\_\_\_\_ milli-volts
  - j) GRS 77 metal base: \_\_\_\_\_ milli-volts
  - k) Resistor Bracket Top (WAAS only): \_\_\_\_\_ milli-volts

Ensure that at each test point, no more than 2.5 mV ( $\approx$ 2.5 m $\Omega$ ) are present. In this case, voltage is approximately equivalent to resistance ( $\Omega$ ), given that precisely 1 amp reference current is present.

TIP: If 1 amp reference current cannot be maintained, note the difference between the attainable current and 1 amp reference current. Calculate the percentage difference and apply this to the voltage reading to obtain the equivalent resistance. Example: If the measured current is 1.2 amps, (20% high from the target 1 amp current), then the allowable voltage measurement would be 20% high, 2.5 mV would now be 3.0 mV.

---

## 4.6 Fuel Tank Probe Re-Calibration

The G1000 in the DA40 uses digital fuel probes to provide fuel quantities. The fuel probes interface to the GEA 71 where the data is received and sent to the displays for additional processing. In the PFD and MFD, the raw fuel probe data is processed against a set of calibration offset points, in order to display an accurate fuel indication. Due to the design of the fuel probes, the precise measurement of fuel quantity varies from probe to probe. It is therefore necessary to have specific calibration points for the specific probes installed in the aircraft.

The G1000 in DA40 is set up at the factory to use 3 calibration points:

EMPTY (0.00 Gallons)

5 Gallons

FULL (15 Gallons for STD Range Tanks, 21 Gallons for Long Range Tanks)

### NOTE:

Although the total fuel quantity for long range tanks is 24 gallons usable fuel, the method of fuel quantity processing in the DA40's G1000 system only has a raw calibration total of 21 gallons when both probes are at their ceilings. However, this does not affect the actual display to the pilot, which correctly shows 24 gallons on the MFD.

These calibration points allow precise display of fuel quantities at the low-to-empty end of the probes. The EMPTY and 5 GAL points may be recalibrated as necessary by following this procedure, should the fuel probe ever drift over time, or require replacement. It is **MANDATORY** to recalibrate a replacement fuel probe. Generally, the FULL calibration point does not ever need to be calibrated.

### CAUTION:

The CAL configuration file contains default calibration probe points which will overwrite the fuel-probe specific points. Should the CAL file be inadvertently loaded, this fuel calibration procedure must be performed.

---

### 4.6.1 Calibration Setup

These instructions are given in the event a fuel quantity probe is replaced or is in need of adjustment. These procedures apply to both standard and long-range fuel tank.

1. Level the aircraft, following instructions in the DA40 Airplane Maintenance Manual.
2. Drain all fuel from the tanks, and set the fuel selector switch to the 'OFF' position.

**NOTE:**

To achieve the required fuel quantity precision, it is recommended that the fuel quantities be weighed with a calibrated scale. Fuel density of 6.00 lbs/gallon is acceptable for purposes of this procedure.

3. Fill the fuel tank with 0.5 gallons (3 ±0.05 pounds) fuel (unusable fuel, refer to DA 40 AFM).

**CAUTION:**

Use proper precautions when handling fuel. Ensure that the aircraft is grounded correctly and that there is adequate ventilation.

4. Start the G1000 in normal mode. With the tanks filled only with useable fuel, verify the presence of the amber L FUEL LOW and R FUEL LOW annunciations on the PFD.
5. Restart the PFD and MFD in configuration mode by pulling, then resetting, the PFD and MFD circuit breakers.
6. On the PFD, at the System Upload page, activate the cursor and use the small FMS knob to highlight the CALIBRATION option in the AIRFRAME field.
7. Press the ENT key.
8. Once the CALIBRATION file is selected the cursor moves to the FILE window. Rotate the small FMS knob to active the drop-down menu. Move the cursor to highlight the appropriate fuel tank calibration (standard or extended range) and press ENT.

**IMPORTANT!**

It is at this step where the choice is given to load standard range or extended range fuel tank default calibration parameters. Be sure to select the correct option.

9. The CAL file is shown in the PRODUCT window. Verify it is 'checked' then press the LOAD softkey.

SYSTEM UPLOAD

AIRFRAME  
Calibration

FILE  
DA40/DA40F Standard Range Fuel Tank Calibration

PRODUCT

| LRU VERS | CARD VERS | CARD PART NUM | SOFTWARE | CONFIGURATION                       |
|----------|-----------|---------------|----------|-------------------------------------|
|          |           |               | N/A      | <input checked="" type="checkbox"/> |

SUMMARY

CHK ALL   CHK SW   CHK CFG   CLR ALL   LOAD   SHUT OFF   SHUT ON   UPDT CFG

10. Verify the file loads successfully and press the ENT key to acknowledge the confirmation prompt.
11. Restart the MFD in normal mode by pulling and then resetting the MFD circuit breaker.
12. On the MFD, press the ENGINE softkey to display the full page engine instrumentation.
13. Go to the CAL Page Group on the PFD. The FUEL TANK CALIBRATION page should be displayed as shown:

FUEL TANK CALIBRATION

| FUEL FLOW   |         | FUEL CALIBRATION POINTS |           | FUEL UNITS                               |                  |
|-------------|---------|-------------------------|-----------|------------------------------------------|------------------|
| ENG 1 SCALE | 1.00000 | CURRENT TANK            | ◀ RIGHT ▶ | GALLONS(GL, GL/HR)                       |                  |
| ENG 2 SCALE | 0.00000 | SENSOR LIMITS           |           | SENSOR INPUTS                            |                  |
|             |         | RIGHT 1 FLOOR           | 0.00000   | RIGHT 1                                  | 57.42622         |
|             |         | RIGHT 1 CEILING         | 58.80592  | RIGHT 2                                  | 11.05903         |
|             |         | RIGHT 2 FLOOR           | 0.00000   | RIGHT 3                                  | -----            |
|             |         | RIGHT 2 CEILING         | 21.33109  | RIGHT 4                                  | -----            |
|             |         | RIGHT 3 FLOOR           | 0.00000   | RIGHT 5                                  | -----            |
|             |         | RIGHT 3 CEILING         | 0.00000   | ACTUAL FUEL QUANTITY   CALIBRATION VALUE |                  |
|             |         | RIGHT 4 FLOOR           | 0.00000   | -----GL                                  | 68.48725         |
|             |         | RIGHT 4 CEILING         | 0.00000   | CALIBRATE?                               |                  |
|             |         | RIGHT 5 FLOOR           | 0.00000   | CALIBRATION TABLE                        |                  |
|             |         | RIGHT 5 CEILING         | 0.00000   | ACTUAL QUANTITY                          | CALIBRATED VALUE |

FUL FLW   TNK SEL   LIMITS   EMPTY   FULL   FUEL QTY   CAL TBL   DELETE   EDIT

14. 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

- 
15. Press the TNK SEL softkey to activate the cursor in the CURRENT TANK field. Rotate the FMS knob as necessary throughout this procedure to select the RIGHT or LEFT tanks as desired.

#### **4.6.2 Empty Calibration**

1. On the PFD, select the desired fuel tank (LEFT or RIGHT). Note that for extended range tanks, there are two fuel probes each for the LEFT and RIGHT tanks. The fuel quantity from both probes is summed and displayed as a single tank quantity to the pilot. However, the raw data can be seen from both probes independently on the PFD at the FUEL TANK CALIBRATION page.
2. Verify that unusable fuel has been added to the selected tank. Allow the fuel probe(s) to stabilize for at least 2 minutes.
3. Press the EMPTY softkey. The cursor will automatically activate and select the CALIBRATE? option. The calibrated value setting will default to 00.00.
4. Press the ENT key. A prompt appears requesting overwrite acknowledgement. Select YES and press the ENT key. The G1000 system will 'zero' the actual fuel quantity value to be displayed.
5. Observe the CALIBRATED TOTAL indication for the selected tank. Verify that it remains at 0.00.
6. On the MFD, verify the fuel quantity indicator correctly point to '0' for the affected tank.
7. Repeat these steps for the opposite tank, if both sides require recalibration.

#### **4.6.3 5 Gallon Calibration**

1. Fill the affected fuel tank with  $5 \pm 0.1$  gallons ( $30.0 \pm 0.05$  pounds) usable fuel.
2. Allow the fuel probe(s) to stabilize at least 2 minutes before continuing.
3. With the desired tank selected, highlight the ACTUAL FUEL QUANTITY field and enter 5.00 Gallons.
4. Press the ENT key. The cursor automatically selects the CALIBRATE? option.
5. Press the ENT key again to calibrate the 5 gallon point.
6. Verify the 5.00 gallon point appears in the CALIBRATION TABLE.
7. Verify that the CALIBRATED TOTAL value indicates 5.00.
8. On the MFD, verify the fuel quantity indicator correctly points to '5'.
9. Repeat these steps for the opposite tank, if both sides require recalibration.
10. In the CALIBRATION TABLE, verify that each tank side has a 0.00 GL point, a 5.00 GL point, and a full point (15.0 GL for standard range tanks, 21.00 GL for long range tanks).
11. Fill the tanks to capacity, or at least to greater than 3 gallons.
12. Restart the PFD in normal mode. Verify that the L FUEL LOW and R FUEL LOW annunciations are not present.
13. Fuel tank probe recalibration is complete.

---

## 4.7 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: 2010, 2015, and every five years thereafter, as 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 5.13). Garmin and/or Diamond will distribute update instructions when updates are available. As of this writing, Garmin Service Bulletin #0533 addresses the most recent update to the 2005 database. Service Bulletins may be obtained from [www.garmin.com](http://www.garmin.com) at the ‘Dealers Only’ portion of the web site.

## 4.8 GSA 81 Greasing Procedure

Re-grease each servo output gear following this procedure.

1. Remove each servo (see Section 6.11).
2. Remove excess grease build-up from the single servo output gear using a lint-free cloth.

### IMPORTANT

It is not necessary to remove all of the grease from the output gear, only the excess grease. DO NOT USE SOLVENTS TO CLEAN THE OUTPUT GEAR!

3. Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 17 or equivalent (Synthetic Diester, Low Temp; Must meet MIL-G-21164D).
4. Re-install the servos.
5. Move control surfaces through their range of motion.

## 4.9 Flap Position Discrete Input Check

To perform this check, all G1000 and GFC 700 equipment must be installed and operational. Start the G1000 system in Configuration Mode and go to the GIA Page Group and select the GIA I/O Configuration Page using the FMS knob. Perform the following checks:

The screenshot shows the 'GIA I/O CONFIGURATION' page. At the top, there are two dropdown menus: 'SELECT GIA UNIT' (set to GIA1) and 'SELECT INPUT/OUTPUT' (set to DISCRETE IN). Below these is a 'CONFIGURATION' table with columns for CHANNEL, DATA, DATA TYPE, INVERTED, and timing values (ACTV DEBNC (ms) and INACTV DEBNC (ms)). The table lists 26 channels (IN\* 1 to IN\* 6A) with various data types like OFF, AFCS GO AROUND, PLT CTRL WHL, PLT PIT TRM ARM, FLAP EXTEND, FLAP RETRACT, and PLT PIT TRM UP/DWN. The INVERTED column shows FALSE for all entries. The timing columns show 0 for all entries. At the bottom, there is a 'SET>ACTV/ACTV>SET' button.

| CHANNEL | DATA            | DATA TYPE       | INVERTED | ACTV DEBNC (ms) | INACTV DEBNC (ms) |
|---------|-----------------|-----------------|----------|-----------------|-------------------|
| IN* 1   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 2   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 3   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 4   | AFCS GO AROUND  | AFCS GO AROUND  | FALSE    | 0               | 0                 |
| IN* 5   | PLT CTRL WHL    | PLT CTRL WHL    | FALSE    | 0               | 0                 |
| IN* 6   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 7   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 8   | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 9   | PLT PIT TRM ARM | PLT PIT TRM ARM | FALSE    | 0               | 0                 |
| IN* 10  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 11  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 12  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 13  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 14  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 15  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 16  | FLAP EXTEND     | FLAP EXTEND     | FALSE    | 0               | 0                 |
| IN* 17  | FLAP RETRACT    | FLAP RETRACT    | FALSE    | 0               | 0                 |
| IN* 1A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 2A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 3A  | PLT PIT TRM UP  | PLT PIT TRM UP  | FALSE    | 0               | 0                 |
| IN* 4A  | PLT PIT TRM DWN | PLT PIT TRM DWN | FALSE    | 0               | 0                 |
| IN* 5A  | OFF             | OFF             | FALSE    | 0               | 0                 |
| IN* 6A  | OFF             | OFF             | FALSE    | 0               | 0                 |

Figure 4-2. GIA I/O Page

1. Extend the flaps down. While the flaps are traveling down, check that the discrete input labeled 'FLAP EXTEND' lights up green.
2. Retract the flaps up. While the flaps are traveling up, check that the discrete input labeled 'FLAP RETRACT' lights up green.
3. Restart the G1000 system in normal mode. Wait until the AHRS and ADC systems come online and for the AFCS Pre-flight Test to complete.
4. Press the FD key on the MFD to engage the Flight Director. Press the AP key to engage the Autopilot. Press the CWS button for a few seconds and release; verifying there is no residual force on the control wheel for the pitch axis.
5. Extend the flaps to approach position. The trim wheel should immediately run in the DOWN direction. Now retract the flaps. The trim should immediately run in the UP direction.
6. Disengage the autopilot system.
7. The flap discrete input check is complete.

---

#### **4.10 Slip Clutch Torque Check Procedure**

Remove each servo (see Section 6.11), then remove each GSM 85 Servo Mount (See Section 6.12).

The slip clutch torque values must be checked, and adjusted if necessary, to the limits prescribed on each servo mount installation drawing. The procedure for adjusting the clutch is also given on each servo mount installation drawing.

This adjustment requires the use of the Garmin servo adjustment fixture, P/N 011-01085-01.

Refer to the following servo mount installation drawings for removal and re-installation:

005-00336-18: Roll Servo Installation Drawing

005-00336-17: Pitch Servo Installation Drawing

005-00336-19: Pitch Trim Servo Installation Drawing

## 4.11 PFD/MFD Power Interrupt Function Check

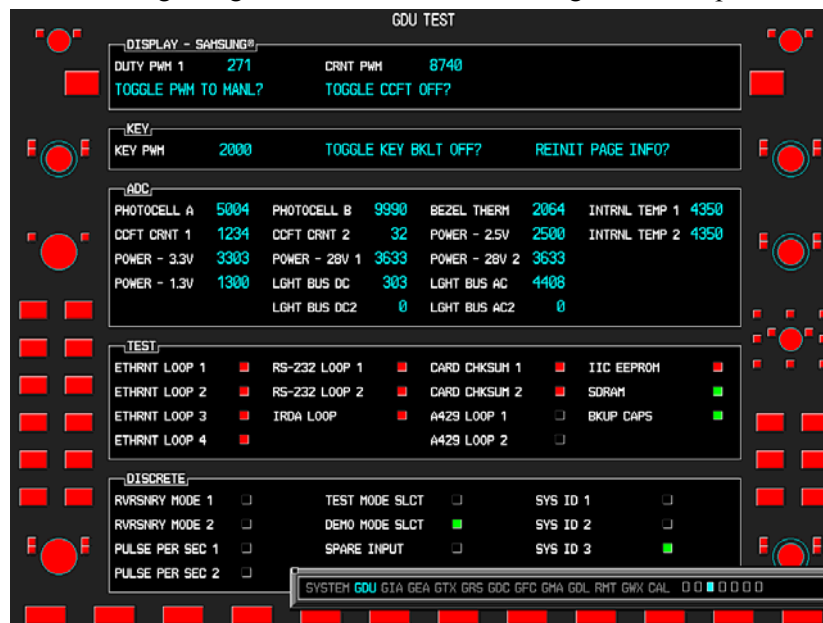
The MFD and PFD power interrupt backup capacitors must be checked every aircraft annual.

1. Remove the MFD and PFD displays following the instructions shown in Section 6.1.
2. Review the TSO label on each display. Check the MOD Status block against Table 4-3:

**Table 4-3. Power Interrupt Category A (200mS) Mod Status**

| Unit     | Unit Part Number | Long Term Power Interrupt Category A (200 mS)* Mod Status |
|----------|------------------|-----------------------------------------------------------|
| GDU 1040 | 011-00972-00     | 2                                                         |
|          | 011-00972-03     | 1                                                         |
| GDU 1042 | 011-01080-00     | 1                                                         |
| GDU 1044 | 011-01078-01     | 1                                                         |

- a) If display meets or exceeds the minimum MOD status required as specified in Table 4-3, then no further action is required. Reinstall the display according to Section 6.1.
  - b) If one or both displays do not meet the specified MOD status, then the following procedure must be performed.
3. Verify the ambient air temperature is at least 70° Fahrenheit. Apply power to both displays and leave them on for a minimum of 11 minutes.
  4. Remove power from both displays. Place both displays in Configuration mode by holding the ENT key while applying power.
  5. Using the FMS knob go to the GDU TEST page (Figure 4-3) on the MFD and PFD (part of the GDU Page Group).
  6. Verify the BKUP CAPS light is green. If the BKUP CAPS light is red, replace the GDU.



**Figure 4-3. GDU TEST Page**

## 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.

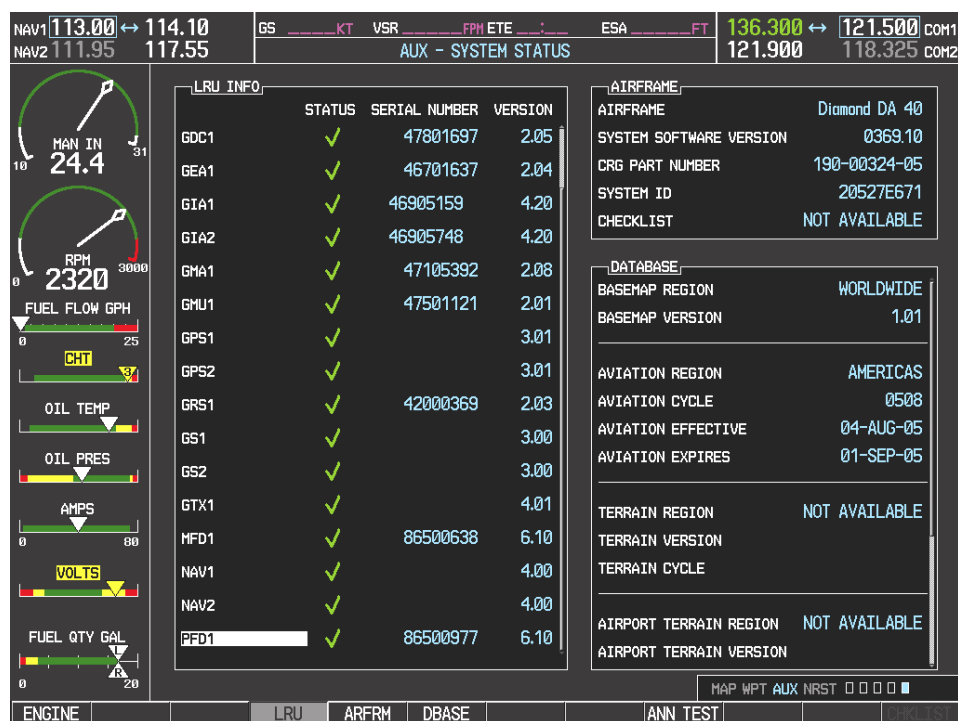


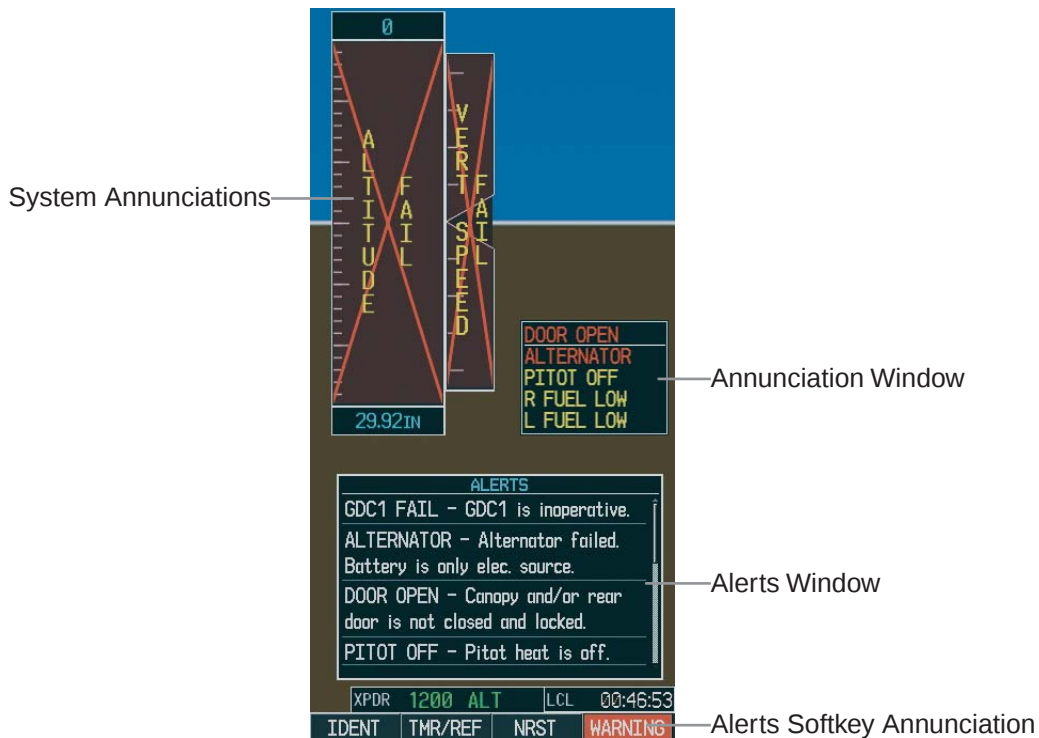
Figure 5-1. AUX – System Status Page

The AUX – System Status page is the 5<sup>th</sup> page in the AUX Page Group and displays the following information for each LRU and sub-function:

- Status: A green check is displayed for properly operating LRUs. A red 'x' appears when a LRU fault is detected, or if the LRU is unavailable.
- Serial Number: Each LRU serial number is displayed (functions such as GPS and GS are contained within an LRU; therefore, serial numbers are not shown for these).
- Current SW Version Loaded.

When troubleshooting, first check to ensure that each LRU status is 'green' and that the correct software is loaded in each unit. Additional airframe and database information is also displayed on this 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 Annunciation:

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 Figure 5-3, along with a continuous 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 softkey 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**

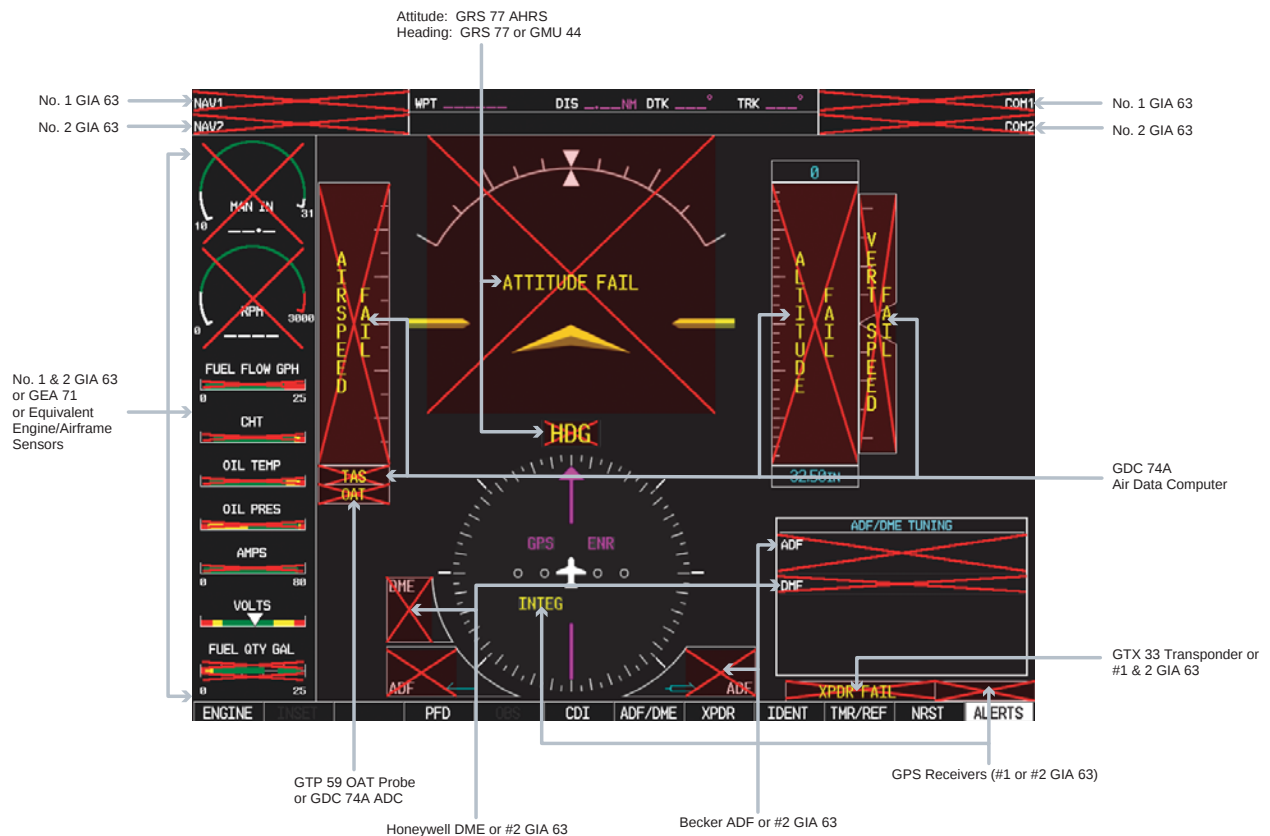
### 5.1.1 Aural & Audio Alerts

The G1000 system is capable of issuing audio and aural (voice) alerts for various situations. The following alerts are utilized by the G1000:

| Alert Name                                                                                                        | Purpose                                                                                           |
|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| 350, 1000, & 2500 Hz Tone                                                                                         | Various System Alerts                                                                             |
| Beep Beep                                                                                                         |                                                                                                   |
| Alert Ping                                                                                                        | G1000 Alert Issued                                                                                |
| Traffic (male & female)                                                                                           | TIS Traffic Advisory                                                                              |
| No Traffic (male & female)                                                                                        | TIS Traffic Unavailable                                                                           |
| Alt Alert                                                                                                         | Altitude Alerting Function                                                                        |
| "Caution Terrain, Caution Terrain" (voice) <i>and</i><br>"Terrain Ahead, Terrain Ahead" (voice)                   | TAWS <b>Caution</b> alert: Reduced required terrain clearance<br>Or Imminent impact with terrain. |
| "Terrain Terrain, Pull Up Pull Up" (voice) <i>and</i><br>"Terrain Ahead Pull Up, Terrain Ahead Pull Up"           | TAWS <b>Warning</b> alert: Reduced required terrain clearance<br>Or Imminent impact with terrain. |
| "Too Low Terrain" (voice)                                                                                         | TAWS <b>Caution</b> alert: Premature descent alert (PDA)                                          |
| "Sink Rate" (voice)                                                                                               | TAWS <b>Caution</b> alert: Ground Proximity envelope 1, 2, or 3, Excessive Descent Rate           |
| "Pull Up" (voice)                                                                                                 | TAWS <b>Warning</b> alert: Ground Proximity envelope 1, 2, or 3, Excessive Descent Rate           |
| "Don't Sink" (voice) <i>and</i><br>"Too Low Terrain"                                                              | TAWS <b>Caution</b> alert: Ground Proximity altitude loss after takeoff                           |
| "Five Hundred" (voice)                                                                                            | TAWS <b>Caution</b> alert: Ground proximity voice callout                                         |
| "Caution Obstacle, Caution Obstacle" (voice)                                                                      | TAWS <b>Caution</b> alert: Obstacle awareness caution.                                            |
| "Obstacle Obstacle Pull Up Pull Up" (voice) <i>or</i><br>"Obstacle Ahead Pull Up, Obstacle Ahead Pull Up" (voice) | TAWS <b>Warning</b> alert: Obstacle awareness warning.                                            |
| "TAWS System Failure" (voice)                                                                                     | TAWS status alert: Terrain failure                                                                |
| "TAWS Not Available" (voice)                                                                                      | TAWS status alert: Terrain not available                                                          |
| "TAWS System Test, OK" (voice)(If passed) <i>or</i><br>"TAWS System Failure" (voice) (If test failed)             | TAWS status alert: Terrain self-test                                                              |
| "TAWS Available" (voice)                                                                                          | TAWS status alert: Terrain available                                                              |

## 5.2 System Annunciations

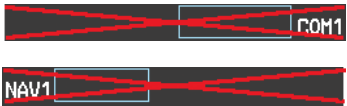
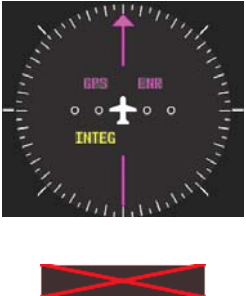
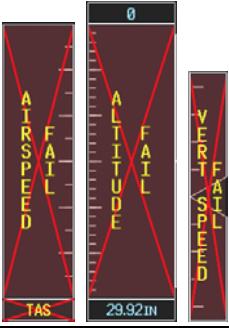
If data fields become invalid due to an LRU failure, the PFD/MFD typically annunciates the failure with a large red X, as shown in Figure 5-6.



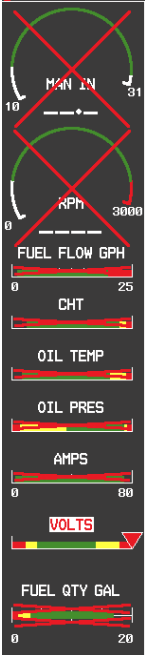
**Figure 5-6. System Annunciations**

## 5.2.1 System Failure Troubleshooting

The following table provides basic troubleshooting guidance for LRU failures:

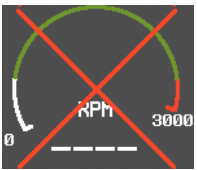
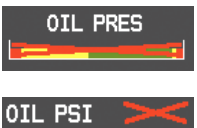
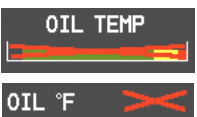
| Invalid Data Field                                                                                                                                   | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| NAV1 & COM1<br>                                                     | GIA1              | Check configuration settings for GIA1 and the PFD.<br>Check Ethernet interconnect from GIA1 to the PFD.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> <li>✓ If problem persists, replace defective PFD.</li> </ul>                                                                                                                                                                            |
| NAV2 & COM2<br>                                                     | GIA2              | Check configuration settings for GIA2 and the MFD.<br>Check Ethernet interconnect from GIA2 to the MFD.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> <li>✓ If problem persists, replace defective MFD.</li> </ul>                                                                                                                                                                            |
| GPS INTEG & Time<br>                                               | GIA1 or GIA2      | Check GPS1 and GPS2 signal strength on the 3rd AUX page.<br>Check corresponding GPS antenna and cable.<br>Check Ethernet interconnect from PFD to GIA1 or MFD to GIA2.<br>Switch GIA1 and GIA2, to verify location of problem: <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective unit.</li> <li>✓ If problem persists, replace defective MFD or PFD.</li> </ul>                                                                                                      |
| XPDR FAIL<br>                                                     | GTX 33            | Check GTX RS-232 configuration settings for GIA1, GIA2, and GTX 33.<br>Reload GTX Config File and verify a Registration Number is present, see Sections 3.6 and 7.5.<br>Replace defective GTX 33.                                                                                                                                                                                                                                                                                                      |
| TAS FAIL<br>AIRSPEED FAIL<br>ALTITUDE FAIL<br>VERT SPEED FAIL<br> | GDC 74A           | Inspect GDC 74A pitot/static plumbing integrity.<br>Inspect pitot/static ports and associated equipment.<br>For TAS failure, also check GTP 59 OAT probe as stated below.<br>Check GDC ARINC 429 configuration settings for the PFD, MFD, GIA1, and GIA2. <ul style="list-style-type: none"> <li>✓ If PFD, MFD, and GIA configuration settings are correct, replace defective GDC configuration module according to Section 6.8.</li> <li>✓ If problem persists, replace defective GDC 74A.</li> </ul> |
| OAT<br>                                                           | GTP 59            | See above guidance for GDC 74A troubleshooting.<br>Replace GTP 59 probe: <ul style="list-style-type: none"> <li>✓ If problem persists replace defective GDC 74A.</li> </ul>                                                                                                                                                                                                                                                                                                                            |

| Invalid Data Fields                                                                                    | Associated LRU(s) | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>ATTITUDE FAIL</p>  | GRS 77            | <p>Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0.</p> <p>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.</p> <p>Cycle power to restart initialization.</p> <p>Load configuration files to the PFD, MFD, GIA1, and GIA2</p> <p>Ensure GRS connector is secure and proper strain relief is provided.</p> <p>Calibrate the GRS 77 (Pitch/Roll Offset and Magnetometer Calibration):</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GRS 77 and GRS 77 configuration module.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <p>HDG FAIL</p>      | GRS 77 & GMU 44   | <p>Ensure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer and aircraft is not in hangar or near buildings.</p> <p>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.</p> <p>Cycle power, after moving aircraft away from metal objects, to determine if metal objects were the source of the problem.</p> <p>Ensure GRS 77 and GMU 44 connectors are secure.</p> <p>Check the wiring and any inline connectors between the GRS and GMU for faults.</p> <p>Perform a Magnetometer Interference Test to check for interference from onboard electrical system components (e.g. NAV lights). Pay particular attention to any new electrical devices that have been installed since the aircraft was new. Correct any discrepancies that do not allow this test to pass before continuing.</p> <p>Recalibrate the GMU 44</p> <p>Load configuration files to the PFD, MFD, GIA1, and GIA2:</p> <p>If problem persists replace the GRS 77 with a known good unit:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GMU 44.</li> </ul> |
|                     | GRS 77 & GMU 44   | <p>This message is normal for approximately one minute after initial powerup.</p> <p>Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.</p> <p>Ensure GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0.</p> <p>If this message persists, see section 5.13.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

|                                                                                                                                     |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Engine/Airframe Sensors<br/>(All Invalid)</p>  | <p>GEA 71</p> | <p>If software was loaded to a new GDU display, be sure that the user settings for the replaced display were cleared. Clear user settings by pressing the CLR key on the replaced display while applying power to it. Acknowledge the on-screen prompt by pressing the ENT key or the right-most softkey.</p> <p>Ensure the GEA is online (green checkmark on the AUX – SYSTEM STATUS page) .</p> <ul style="list-style-type: none"> <li>✓ If GEA is not online verify unit is receiving power.</li> <li>✓ If problem persists, check GIA/GEA interconnects.</li> <li>✓ If problem persists, load configuration files to both GIA's and both GEA's.</li> <li>✓ If problem persists, replace the GEA 71</li> </ul> <p>Check corresponding engine/airframe sensors and wiring</p> <p>Check for GEA related alert messages on the PFD.</p> <p>Verify GEA internal power supply, configuration, and calibration status in configuration mode.</p> <ul style="list-style-type: none"> <li>✓ Configuration and calibration boxes should be green. If they are red, replace the GEA 71.</li> <li>✓ With GDU software version 4.00 or higher, the INT PWR SUPPLY box should be green. If red check for shorts on power sensor input and check corresponding engine/airframe sensors and wiring. Systems with GDU software versions less than 4.00 will display a red box, indicating proper operation.</li> </ul> <p>Verify internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes are not dashed out (does not include Aircraft Power 1 and 2).</p> <ul style="list-style-type: none"> <li>✓ If any voltages are dashed out, replace GEA 71.</li> </ul> <p>Load configuration files to both GIA's and the GEA.</p> <p>Replace GEA configuration module and backshell thermocouple (only for red X'd engine temperatures):</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace defective GEA 71</li> </ul> |
|-------------------------------------------------------------------------------------------------------------------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## 5.2.2 Engine/Airframe Instrument Failures

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 7.4.1 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.<br>Replace tachometer sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                                   |
|    | MAP Sensor<br>(DA 40 Only) | Check MAP sensor – GEA wiring.<br>Replace MAP sensor. Refer to G1000/DA40 Install Drawing 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                                           |
|    | Fuel Pressure              | Check fuel pressure sensor – GEA wiring.<br>Troubleshoot/replace fuel pressure sensor. Refer to the G1000/DA40 Install Drawing, 005-00304-00 for DA 40, and OAM 40-222 for DA 40 F.                                                                                                                                                                                                                      |
|   | Fuel Flow                  | Check fuel flow sensor – GEA wiring.<br>Replace fuel flow sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                              |
|  | CHT Probes<br>(4)          | <u>For one CHT indicator that is flagged, check the following:</u><br>Check CHT probe – GEA wiring.<br>Replace CHT probe. Refer to G1000/DA40 Install 005-00304-00 or OAM 40-222 for DA 40 F.<br><u>If all 4 CHT indicators are flagged, check the following:</u><br>Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.13 & 6.14.<br>Replace defective GEA 71. |
|  | EGT Probes<br>(4)          | <u>For one EGT indicator that is flagged, check the following:</u><br>Check EGT probe – GEA wiring.<br>Replace EGT probe. Refer to G1000/DA40 Install 005-00304-00 or OAM 40-222 for DA 40 F.<br><u>If all 4 EGT indicators are flagged, try the following:</u><br>Replace backshell thermocouple and/or configuration module in GEA connector. See Sections 6.13 & 6.14.<br>Replace defective GEA 71.   |
|  | Oil Pressure Sensor        | Check oil pressure sensor – GEA wiring.<br>Replace oil pressure sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                        |
|  | Oil Temperature Sensor     | Check oil temperature sensor – GEA wiring.<br>Replace oil temperature sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.<br>Replace defective GEA 71.                                                                                                                                                                                                                  |

|                                                                                   |                           |                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Alternator Current Sensor | <p>Check current sensor sensor – GEA wiring.</p> <p>Replace current sensor. Refer to G1000/DA40 Install Drawing, 005-00304-00 or OAM 40-222 for DA 40 F.</p> <p>Replace defective GEA 71.</p> |
|  | Fuel Quantity Sensors (2) | <p>Check fuel quantity sensor – GEA wiring.</p> <p>Replace fuel quantity sensor. Refer to the DA40 AMM.</p> <p>Replace defective GEA 71.</p>                                                  |

### 5.2.3 ADF/DME Failure

Effective System Software Version 0369.08 or later, an ADF and DME interface were added as an option. The PFD functions as a control head for the remote-mounted Becker ADF and Honeywell DME. A DME or ADF failure is represented by the following red X's.

|                                                                                                                                                                                                                                                              |                              |                                                                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <br><br> | Becker ADF and Honeywell DME | <p>Ensure that GIA 63 #2 is properly functioning.</p> <p>Reload the ADF or DME option configurations.</p> <p>Check for proper operation of the ADF or DME receivers. Ensure that each is receiving power.</p> <p>Check ADF – GIA2 and DME – GIA2 interconnect. Refer to Diamond wiring diagram for details.</p> <p>Replace ADF or DME unit(s).</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 5.3 DA 40/DA 40 F Specific Alerts

The following alerts are configured specifically for the DA 40 and DA 40 F:

#### WARNING Alerts:

| Annunciation Window | Alert Message                                               | Solution                                                                                                                                                                                                            |
|---------------------|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ALTERNATOR</b>   | Alternator failed. Battery is only elec. source.            | Check alternator current sensor for proper operation.<br>If current sensor is OK, troubleshoot alternator & aircraft electrical system according to DA 40 Airplane Maintenance Manual instructions.                 |
| <b>OIL PRES LO</b>  | Oil pressure is below 25 psi.                               | Check aircraft oil level.<br>Troubleshoot oil pressure sensor for proper operation.<br>If oil pressure sensor is OK, troubleshoot engine oiling system according to DA 40 Airplane Maintenance Manual instructions. |
| <b>FUEL PRES LO</b> | <u>For DA 40:</u><br>Fuel pressure is below 14 psi.         | Troubleshoot fuel pressure sensor for proper operation.<br>If fuel pressure sensor is OK, troubleshoot fuel pump and associated fuel systems per DA 40 Airplane Maintenance Manual instructions.                    |
| <b>FUEL PRES HI</b> | <u>For DA 40 F:</u><br>Fuel Pressure is below 1 psi.        |                                                                                                                                                                                                                     |
|                     | <u>For DA 40:</u><br>Fuel pressure is greater than 35 psi.  | If fuel pressure sensor is OK, troubleshoot fuel pump and associated fuel systems per DA 40 Airplane Maintenance Manual instructions.                                                                               |
|                     | <u>For DA 40 F:</u><br>Fuel pressure is greater than 8 psi. |                                                                                                                                                                                                                     |
| <b>STARTER ENGD</b> | Starter clutch is engaged while engine is running.          | Troubleshoot starting system per DA 40 Airplane Maintenance Manual.<br>Check wiring from starter to the GEA 71 (Analog IN 6 Hi & Lo, Pins 62 and 63, respectively).                                                 |
| <b>DOOR OPEN</b>    | Canopy and/or rear door is not closed and locked.           | Close canopy and/or rear door.<br>If alert does not disappear, check canopy/door discrete sensor for proper operation.                                                                                              |
| <b>TRIM FAIL*</b>   | Autopilot automatic trim has failed.                        | Troubleshoot autopilot per DA 40 Airplane Maintenance Manual instructions.                                                                                                                                          |

\*KAP140 aircraft only

#### CAUTION Alerts

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

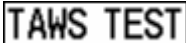
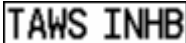
### MESSAGE ADVISORY Alerts

| 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.<br>Check cooling fan wiring.<br>Replace cooling fan Refer to 005-00304-00 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 message advisory alerts presented are common to all G1000 systems and are not specific to the DA 40. Messages are grouped according to LRU.

## **5.4 TAWS Troubleshooting**

| Annunciation                                                                        | Cause                                               | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | A TAWS system failure has occurred.                 | If message occurred on the first power up after unlocking TAWS, cycle power to initialize TAWS.<br>Ensure each GDU contains the correct database data card<br>Ensure the G1000 is configured for TAWS: <ul style="list-style-type: none"><li>✓ If the system is not configured for TAWS, reconfigure per Section 3.6.6.</li></ul> Verify GIA #1 is online.<br>Ensure a database or GDU SW mismatch has not occurred. <ul style="list-style-type: none"><li>✓ If a mismatch has occurred, load correct database/software files or replace the terrain card.</li></ul> |
|  | TAWS system is currently being tested.              | N/A – Test will be conducted up to two minutes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | TAWS system alerting is disabled                    | Enable TAWS system alerting by pressing the INHIBIT softkey on the MAP – TAWS page.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|  | GPS system integrity not high enough to enable TAWS | Ensure valid GPS position is received from the AUX – GPS STATUS page.<br>Check GPS antenna & associated coaxial cabling.<br>Troubleshoot GIAs.                                                                                                                                                                                                                                                                                                                                                                                                                       |

## 5.5 GFC 700 AFCS Troubleshooting

The GFC 700 is a digital Automatic Flight Control System (AFCS) which is integrated into various components of the G1000. This section touches upon key items to note while troubleshooting the GFC 700.

Should a problem be encountered during the operation of the GFC 700, the pilot and technician should first evaluate the overall status and condition of the G1000 system at the AUX – System Status page (on MFD). Any alert messages, annunciations, or other abnormal behaviors should be noted in an effort to pinpoint the fault. The object is to locate the fault within a LRU or LRUs in efforts to replace the defective equipment.

The GFC 700 AFCS Annunciation field is located above the airspeed tape on the PFD as shown:



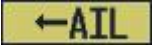
Figure 5-7. AFCS Annunciation Field

## 5.5.1 General Troubleshooting

The following annunciations may appear in the AFCS Annunciation field:

**Table 5-1. AFCS Annunciation Troubleshooting**

| Annunciation                                                                        | Condition               | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | AFCS System Failure     | <p>Ensure that the G1000 system is in proper working order. Check specifically for proper operation of the:</p> <ul style="list-style-type: none"> <li>• GIA 63 Integrated Avionics Unit</li> <li>• GRS 77 AHRS</li> <li>• GDC 74A Air Data Computer</li> <li>• All GSA 81 Servos (Check AFCS Breaker IN)</li> </ul> <p>Check that no red X's are present on the MFD and PFD.</p> <p>Check that no related alert messages are present on the PFD (press the ALERTS softkey).</p> <p>Go to the AUX SYSTEM STATUS page on the MFD and verify that all LRUs have a 'green' check.</p> <p>In Configuration mode, review the GFC 700 equipment status, software, and certification gains.</p> <p>Reload software, configuration, and certification gains to the GIAs and GSA 81 servos.</p> <p>Check the GFC Status page for additional GFC 700 system information.</p> <p>Review the fault and assert logs for the GIAs and servos (see Section 5.5.3)</p> <p>Isolate the fault to an LRU, airframe switch or wiring using the information from the fault log. Contact Garmin Aviation Product Support for assistance if needed..</p> |
|  | Pitch Axis Failure      | Check the AUX – SYSTEM STATUS page to see if the servo is online (green check).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | Pitch Trim Axis Failure | Check that the affected servo is receiving power.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|  | Roll Axis Failure       | Ensure the MET switches are not stuck.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|  | AHRS Monitor Failure    | Check the servo wiring and connector.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|  | Elevator Mis-Trim Down  | If failure condition still exists, remove and replace the affected servo.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|  | Elevator Mis-Trim Up    | <p>If the AHRS inputs have been determined to be “unreasonable” while the AP is engaged, in air, this message will be displayed until AHRS inputs are determined reasonable for 5 seconds.</p> <p>If elevator mistrim annunciations persist, check the pitch and pitch trim servos for proper operation. Verify that the servo is online at the AUX – SYSTEM STATUS page.</p> <p>Check the servo wiring and connectors. Ensure the servo is receiving power.</p> <p>Check the aircraft control adjustments.</p> <p>If mistrim condition still exists, remove and replace the affected servo.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

|                                                                                   |                       |                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Aileron Mistrim Right | Check for possible fuel imbalance.<br>Check aileron control adjustments.                                                                                                                          |
|  | Aileron Mistrim Left  | If mistrim condition still exists remove and replace the roll servo.                                                                                                                              |
|  | Pre-Flight Test Fails | Allow the system to complete pre-flight tests.                                                                                                                                                    |
|  |                       | The preflight test should finish within 2 minutes. If it does not pass, the red 'PFT' annunciation is shown. In case of PFT failure, see Sections 5.5.3 and 5.5.4 for additional PFT diagnostics. |

**Table 5-2. AFCS General Troubleshooting**

| Condition                                                  | Resolution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Poor AP Performance<br>(Limited AP Authority)              | Check each servo mount slip clutch per Section 4.10. Verify the clutches are not excessively loose and are within torque limits.<br><br>Check aircraft controls for proper balancing and adjustment per the DA40 AMM.                                                                                                                                                                                                                                                                                       |
| AP DISC Problems                                           | For intermittent nuisance disconnects with no AFCS or PFT alert, check A/P disconnect switch and wiring for intermittent faults.<br><br>If an AFCS or PFT alert is displayed at the time of the disconnect, troubleshoot per Table 5-1.<br><br>Check the GIA AFCS Fault Logs according to Section 5.5.3. If a <b>Mon Prmtr Invalid</b> message is received, check for valid true airspeed. A faulty GTP 59 OAT probe may cause TAS to become invalid, which will flag the <b>Mon Prmtr Invalid</b> message. |
| Manual Electric Trim Failure                               | Check pitch trim servo status.<br><br>Check MET switch discrete inputs to both GIAs by going to the GIA I/O Configuration page and selecting DISCRETE IN inputs.                                                                                                                                                                                                                                                                                                                                            |
| AutoTrim Failure (Trim does not run while flaps in motion) | Check flap-in-motion discrete inputs to both GIAs for proper operation by going to the GIA I/O Configuration page and selected DISCRETE IN inputs. See Section 4.9.<br><br>If continually 'open' troubleshoot flap motor & discrete input wiring (refer to DA40 AMM).                                                                                                                                                                                                                                       |

## 5.5.2 GFC Status Page

The GFC Status page is presented in configuration mode and gives status information regarding the GFC 700.

The screenshot displays the GFC STATUS page with the following sections:

- SELECT GIA UNIT:** GIA 1
- SELECT SERVO AXIS:** PITCH SERVO
- GIA STATUS:** AP DISCONNECT (Green indicator)
- MONITOR BOARD STATUS:**
  - SERVO PROGRAM 1 (Green indicator)
  - SERVO PROGRAM 2 (Black indicator)
  - SERVO PROGRAM 3 (Black indicator)
  - AP DISCONNECT (Green indicator)
  - PFT (PASSED)
  - HIGH RES LOAD CELL CAL (Green indicator)
  - HIGH RNG LOAD CELL CAL (Green indicator)
- CONTROL BOARD STATUS:**
  - SERVO PROGRAM 1 (Green indicator)
  - SERVO PROGRAM 2 (Black indicator)
  - SERVO PROGRAM 3 (Black indicator)
  - AP DISCONNECT (Green indicator)
  - PFT (PASSED)
- DRIVE SERVO:** RPM 0.00rpm
- SERVO DATA:**
  - VOLTAGE 0.00V
  - CURRENT 0.00A
  - SPEED 0.00rpm
  - TORQUE 0.0in-lb
  - CLUTCH ENGAGE STATUS (Black indicator)
- SLIP CLUTCH TEST RESULTS:**
  - NOSE UP: MIN \_\_\_\_in-lb, MAX \_\_\_\_in-lb
  - NOSE DOWN: \_\_\_\_in-lb, \_\_\_\_in-lb

At the bottom, there are four buttons: TEST SV0, TEST ALL, ENG CLCH/DRV SRVO, and RST GAIN.

### GIA STATUS

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

### MONITOR/CONTROL BOARD STATUS

Shows the condition of various monitor board components.

**SERVO PROGRAM (1-3):** Servo program discreets are used to determine the HW strapping for each GSA to define the servo type. This information can be cross-referenced against the system interconnects to verify proper servo grounding.

**AP DISCONNECT:** Same as GIA Status.

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

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

### DRIVE SERVO

Allows the technician to enter a desired RPM at which to electronically drive the selected servo. Direction of rotation is controlled by the polarity of the RPM (+ or -). After the speed is entered, the technician may use the ENG CLCH and DRV SRVO softkeys to drive the servo.

### **NOTE:**

Be certain that the flight controls are clear and safe to operate before electronically driving the servo.

---

## **SERVO DATA**

Shows real-time reported data including servo voltage, speed, motor current, load cell torque, and clutch solenoid status. A green box indicates the servo clutch is engaged.

## **SLIP CLUTCH TEST RESULTS**

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

### **IMPORTANT!**

**This automated clutch check method is NOT approved as an acceptable means of compliance with the annual slip clutch maintenance requirements in Section 4.10. The servo mounts MUST be removed from the aircraft to satisfy this requirement.**

## **5.5.3 GIA Fault Log Descriptions**

The section is meant to help determine why the GFC 700 has failed the pre-flight test. A failed pre-flight test is indicated by a  indication in the AFCS Annunciation field. There are 16 steps to the GFC 700 pre-flight test.

### **NOTE:**

A thorough understanding of the G1000 system in Configuration mode is recommended before you start this procedure.

1. Start the G1000 in Configuration mode.
2. Use the FMS knob on the PFD to go to the Diagnostics Terminal page in the System group. This page allows the installer to allow the technician to view maintenance logs associated with the GFC 700.
3. Using the FMS knob choose GIA 1 or GIA 2 in the LRU window.
4. Using the FMS knob choose VIEW MAINTENANCE LOG in the COMMAND window.
5. Press the ENT key.
6. Scroll through the OUTPUT list by pressing the OUTPUT softkey.

The GIA will log any of the following faults:

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

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

*Reload the gain files to correct.*

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

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

*Reload the gain files to correct.*

---

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

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

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

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

**PFT FAIL: <STEP>**

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

**AHRS MON invalid: <STATE>**

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

- a. **Mon Prmtr Invalid:** The ARINC 429 data used by one of the monitors has not been received.
- b. **Attitude Prmtr Invalid:** The ARINC 429 pitch or roll angle has not been received.
- c. **Exceeded Attitude Limits:** The pitch or roll angle has exceeded the engagement limits.
- d. **Cross Hdg Accel Fail:** Cross heading acceleration monitor failed.
- e. **Vert Accel Fail:** Vertical acceleration monitor failed.
- f. **Filtrd Cross Hdg Accel Fail:** Filtered cross heading acceleration monitor failed.
- g. **Filtrd Vert Accel Fail:** Filtered vertical acceleration monitor failed.
- h. **Roll Accel Fail:** Roll acceleration monitor has failed.
- i. **Normal Accel Fail:** Normal acceleration has failed.

*Troubleshoot the GRS 77 for the cause of the failure.*

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

A MET switch in the specified axis is stuck.

*Check the MET (trim) switches for proper operation.*

---

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

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

- a. **AD TDM Comm Valid:** The specified mode has been disengaged because communication with the servos, via the Time Division Multiplexer protocol, has been lost.
- b. **AP Pitch MET not stuck:** The specified mode has been disengaged due to a stuck pitch MET switch.

*Check the MET (trim) switches for proper identification.*

## **5.5.4 GIA Pre-Flight Test Steps**

### **Step 0: System initializing, verify GFC powered**

This step checks to ensure the GFC is powered up.

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

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

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

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

*Load GIA audio files to correct.*

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

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

*Reload the gain files to correct.*

### **Step 3: System initializing, verify selected side**

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

*Ensure the PFD is turned on.*

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

### **Step 4: System initializing, verify AHRS monitor**

This step checks to ensure the AHRS monitor is valid and not reporting an AHRS failure. NOTE: AHRS monitor will be assumed valid if on the ground.

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

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

---

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

*Ensure MET switch is not stuck.*

*Cycle power on all servos.*

#### **Step 6: System initializing, verify cross GIA valid**

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

*Ensure both GIAs are online and communicating with all servos.*

#### **Step 7: Verify cross GIA initialized**

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

*Cycle power on all servos and GIAs.*

*Ensure the PFD and MFD are turned on.*

#### **Step 8: Verify servo type**

This step checks to ensure the servos are correct type.

*Verify servos are correct type.*

#### **Step 9: Verify servo first certification data**

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

*Reload the certification gains to all GIAs and servos.*

#### **Step 10: Verify servo second certification data**

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

*Reload the certification gains to all GIAs and servos.*

#### **Step 11: Updating servo RTC**

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

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

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

#### **Step 13: Verify AP disconnect enabled**

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

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

---

*Ensure the autopilot disconnect switch is not pressed.*

**Step 14: Verify servo validity**

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

*Ensure all servos are turned on and communicating.*

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

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

*Cycle power on all servos and GIAs.*

*Ensure the PFD and MFD are turned on.*

**Step 16: PFT completed**

The pre-flight test is successfully completed.

**Step 17: PFT failed**

The pre-flight test has failed.

---

## 5.6 Backup Communications Path Checks

### 5.6.1 Overview

The G1000 system architecture is designed with redundant communication ports for several LRUs so that critical information can continue to be displayed in the event of an equipment or wiring failure. Of most importance is flight attitude, heading, and air data information. The GRS 77 and GDC 74A each have four separate ARINC 429 data lines which are all capable of sending data to the displays. The GEA 71, GTX 33, and GMA 1347 each have two redundant serial communication paths for the same purpose. See Figure 2-4 for a basic G1000 block diagram depicting this architecture. Several other diagrams are shown later in this section for illustrative purposes. When doing troubleshooting always use the Diamond wiring diagrams for reference (Refer to Table 1-2 for wiring diagram drawing numbers).

#### NOTE:

Refer to Section 8.2.4 for procedures on checking the status of each configured G1000 / GFC 700 backup data path.

### 5.6.2 Data Path Failures

| Failure Message                       | Cause                                                                 | Solutions                                                                                                                                                |
|---------------------------------------|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| FAILED PATH – A data path has failed. | A communications data path status is not being received by the G1000. | Determine which data path has failed:<br>See Section 8.2.4.<br><br>Check wiring continuity for the failed path.<br><br>Swap or replace the affected LRU. |

### 5.6.3 GMA Backup Path

The GMA 1347 utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GMA1 through GIA1 to the PFD. The secondary backup path is through GIA2 into the MFD. Audio panel data is cross-filled to the appropriate display over the HSDB.

| Failure Message                                   | Cause                                            | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACKUP PATH – Audio panel using backup data path. | The GMA 1347 is using a backup RS-232 data path. | <p>Check GIA RS-232 configuration settings:</p> <ul style="list-style-type: none"><li>✓ If configuration is not correct, reconfigure GIAs as described in Section 3.6.</li></ul> <p>Check wiring.</p> <p>Replace GMA 1347 with a known good unit, to verify location of problem:</p> <ul style="list-style-type: none"><li>✓ If problem persists, replaced GIA1.</li><li>✓ If problem does not persist, replace GMA 1347.</li></ul> |

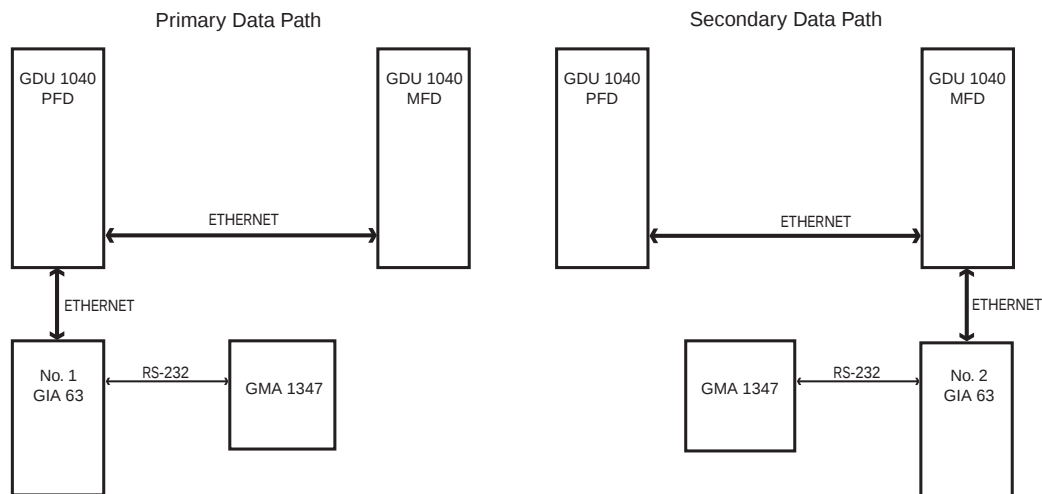
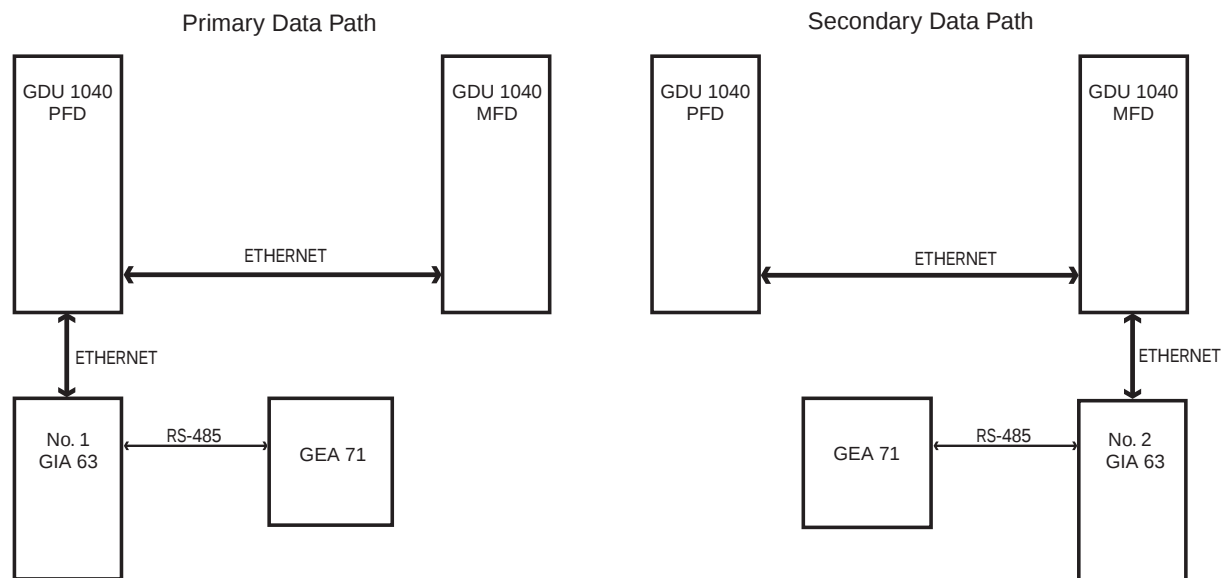


Figure 5-8. GMA 1347 Data Paths

## 5.6.4 GEA Redundant Paths

The GEA 71 Engine/Airframe Unit utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GEA through GIA1 to the PFD, where it is then cross-filled to the MFD. The secondary backup path is through GIA2 into the MFD.

| Failure Message                           | Cause                                          | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACKUP PATH – EIS using backup data path. | The GEA 71 is using a backup RS-485 data path. | <p>Check RS-485 configuration settings at the GIA page group:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure GIA as described in Section 3.6.</li> </ul> <p>Check wiring.</p> <p>Replace GIA1 with a known good unit, to verify location of problem:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GEA 71.</li> <li>✓ If problem does not persist, replace GIA1.</li> </ul> |



**Figure 5-9. GEA 71 Data Paths**

## 5.6.5 GTX Backup Paths

The GTX 33 transponder utilizes two backup paths to preserve communications with the G1000. The primary data path is from the GTX 33 through GIA1 to the PFD. The secondary backup path is through GIA2 into the MFD. Transponder data is cross-filled to the appropriate display over the HSDB.

| Failure Message                                   | Cause                                          | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACKUP PATH – Transponder using backup data path. | The GTX 33 is using a backup RS-232 data path. | <p>Check RS-232 configuration settings at GIA and GTX page groups:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure GIA or GTX as described in Section 3.6.</li> </ul> <p>Check wiring.</p> <p>Replace GIA1 with a known good unit, to verify location of problem:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GTX 33.</li> <li>✓ If problem does not persist, replaced GIA1.</li> </ul> |

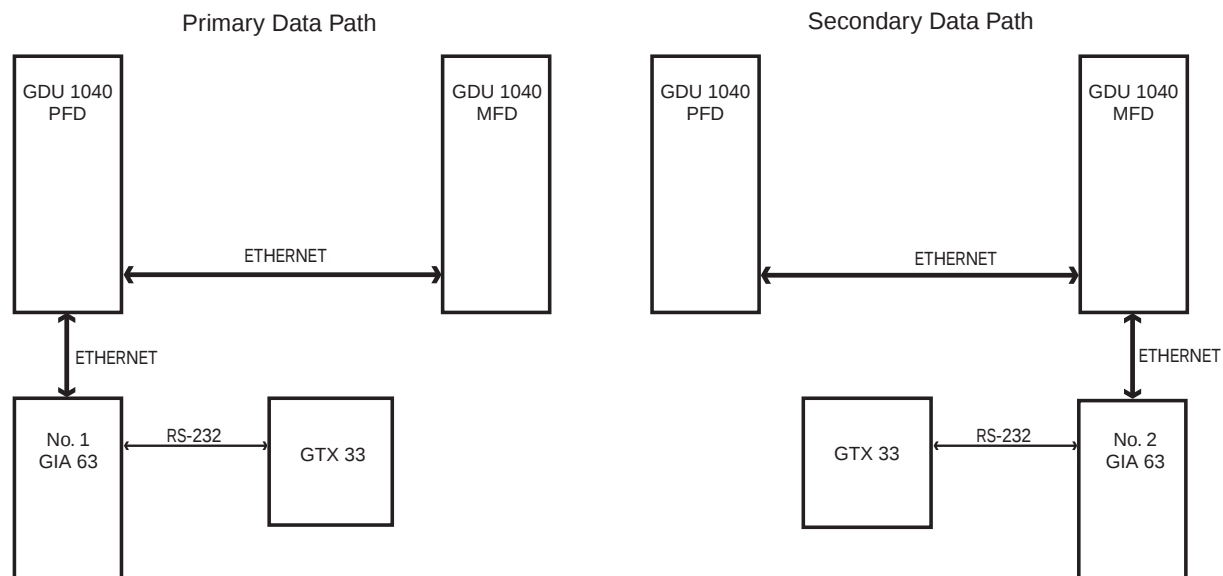


Figure 5-10. GTX 33 Data Paths

## 5.6.6 GDC 74A Backup Paths

The GDC 74A Air Data Computer has 4 redundant communication paths which are capable of supplying ARINC 429 air data information to the PFD and MFD. The primary path is the ARINC 429 bus between the GDC 74A and the PFD. The secondary backup path is the ARINC 429 bus input to the MFD. The tertiary backup path inputs ARINC data to GIA1, where it is then sent over HSDB to the PFD. The last backup path inputs ARINC data to GIA2, where it is then sent over HSDB to the MFD. The air data is then cross-filled to the appropriate display.

| Failure Message                               | Cause                                              | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACKUP PATH – Airdata using backup data path. | The GDC 74A is using a backup ARINC 429 data path. | <p>Check ARINC 429 configuration settings at GDU and GIA page groups:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure GIA or GDU as described in Section 3.6.</li> </ul> <p>Check wiring.</p> <p>Replace PFD1 with a known good unit, to verify location of problem:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GDC 74A.</li> <li>✓ If problem does not persist, replace PFD1.</li> </ul> |

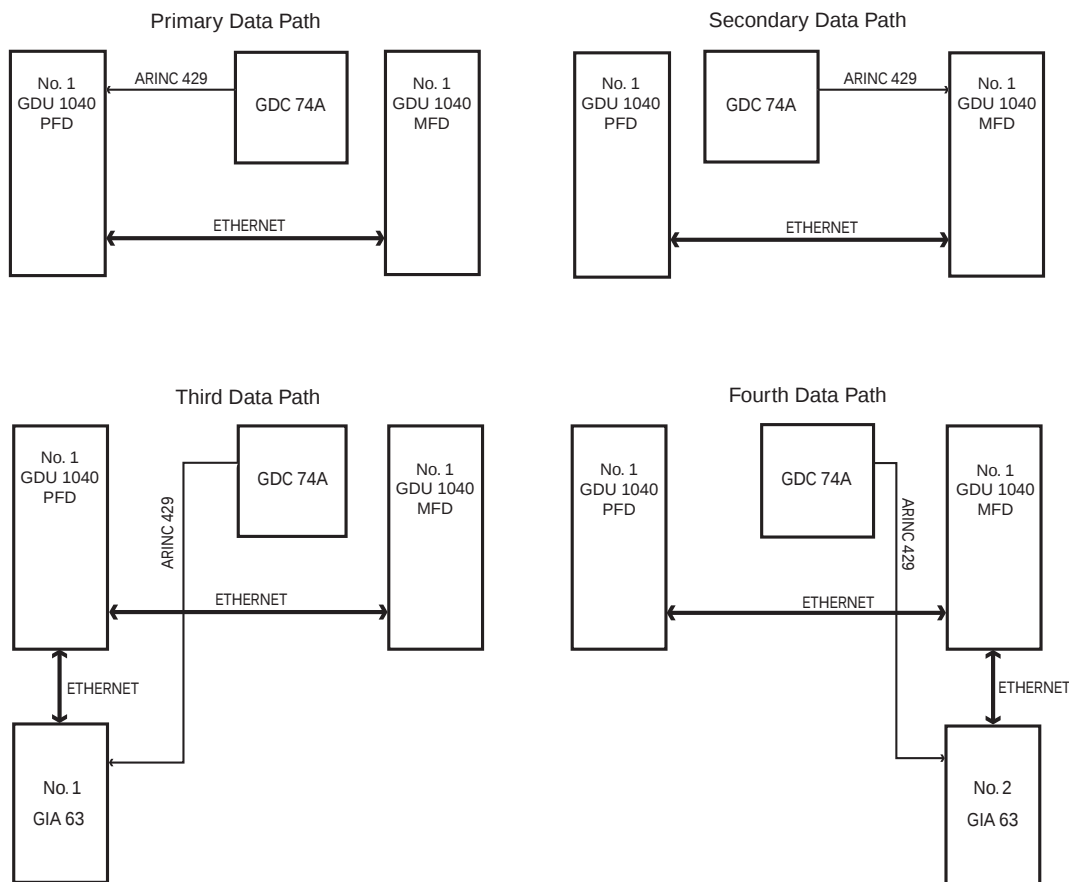


Figure 5-11. GDC 74A Data Paths

### 5.6.7 GRS 77 Backup Paths

The GRS 77 AHRS has 4 redundant communication paths which are capable of supplying ARINC 429 attitude and heading information to the PFD and MFD. The primary path is the ARINC 429 bus between the GRS 77 and the PFD. The secondary backup path is the ARINC 429 bus input to the MFD. The tertiary backup path inputs ARINC data to GIA1, where it is then sent over HSDB to the PFD. The last backup path inputs ARINC data to GIA2, where it is then sent over HSDB to the MFD. AHRS data is then cross-filled to the appropriate display.

| Failure Message                            | Cause                                             | Solutions                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BACKUP PATH – AHRS using backup data path. | The GRS 77 is using a backup ARINC 429 data path. | <p>Check ARINC 429 configuration settings at the GDU and GIA page groups:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure GDU or GIA as described in Section 3.6.</li> </ul> <p>Check wiring.</p> <p>Replace PFD1 with a known good unit, to verify location of problem:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GRS 77.</li> <li>✓ If problem does not persist, replace PFD1.</li> </ul> |

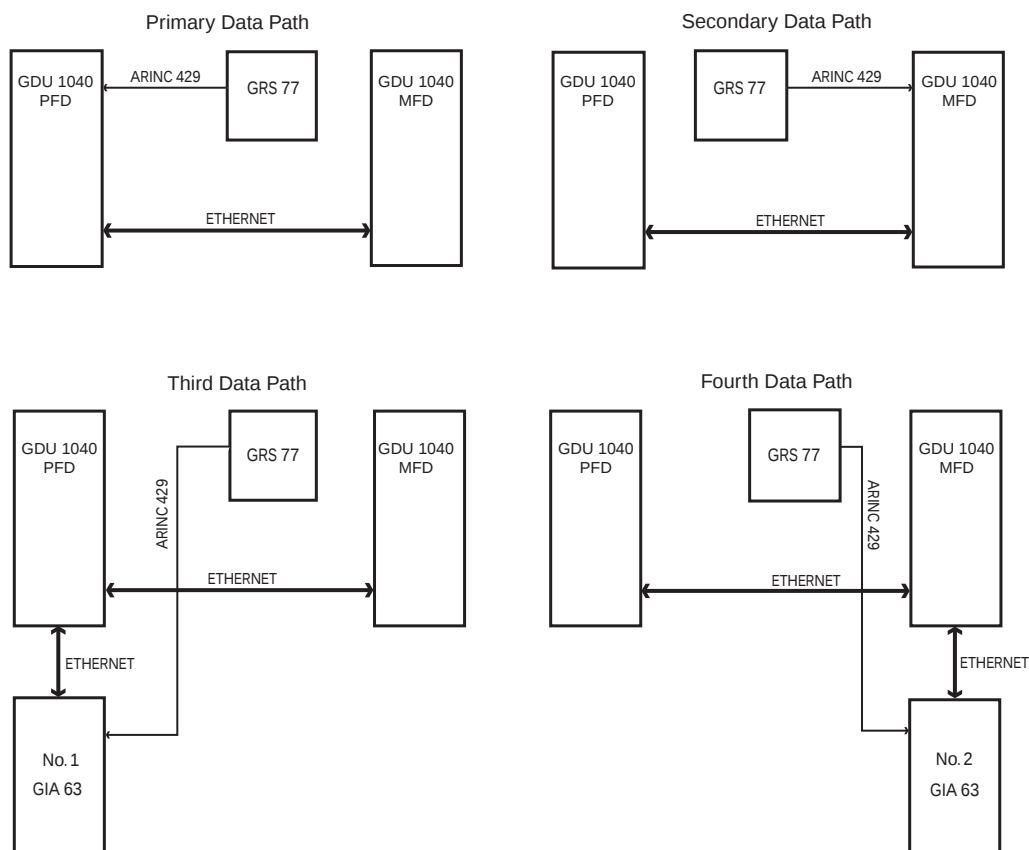


Figure 5-12. GRS 77 Data Paths

## 5.7 GDU 104X Troubleshooting

### 5.7.1 GDU 104X Common Problems

| Symptom                                                     | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display is blank                                            | <p>Cycle power</p> <ul style="list-style-type: none"> <li>✓ If GDU recovers, observe display for yellow text containing error information at the top of the screen. If message indicates software need to be re-loaded, then re-load software. Otherwise, replace the GDU.</li> </ul> <p>Ensure GDU is receiving power. If a circuit breaker is tripped, determine source of short before resetting breaker.</p>                                                                                                                                                                                                                                                                                                                                              |
| Display resets                                              | <p>Ensure circuit breakers have not failed and power wire connections are secure.</p> <p>Use a bright light to verify LCD is active.</p> <ul style="list-style-type: none"> <li>✓ Manually turn up backlight and load configuration files to the PFD and MFD.</li> </ul> <p>Ensure slide lock is fully engaged with the locking tabs on the back of the unit.</p> <ul style="list-style-type: none"> <li>✓ If slide lock is not fully engaged, remove connector and verify the locking tabs on the GDU are perpendicular to the connector. If necessary, straighten them before reseating connector.</li> </ul>                                                                                                                                               |
| Display flickers                                            | <p>Reinstall GDU</p> <p>Switch MFD and PFD</p> <ul style="list-style-type: none"> <li>✓ If problem follows unit, replace defective display. Please note the position it failed in (PFD or MFD).</li> <li>✓ If problem does not follow unit, troubleshoot aircraft wiring for fault.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| SD card is stuck in GDU                                     | <p>DO NOT insert the screwdriver any length into the card slot.</p> <p>DO NOT pry against the overlay.</p> <p>DO NOT force the SD Card out.</p> <p>Insert a small screwdriver in the groove on the side of the exposed end of the card to pull out the card.</p> <p>Push the card in further to release the card locking mechanism.</p> <p>Check SD Card for having more than one label. Two or more labels on the card will cause sticking.</p> <ul style="list-style-type: none"> <li>✓ Remove all but one label.</li> </ul> <p>Ensure the SD card is from Toshiba or SanDisk. Use of other SD Cards is not recommended.</p> <p>If card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair</p> |
| Engine instruments are missing on the MFD                   | <p>Clear user settings on each GDU by pressing and holding the CLR key while powering up both the MFD and PFD.</p> <ul style="list-style-type: none"> <li>✓ If problem persist, replace GDU.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Cannot navigate through pages on the MFD using the FMS knob |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| A button/knob/joystick does not appear to function          | <p>Go to the GDU TEST page in configuration mode and verify button, knob, or joystick is stuck.</p> <ul style="list-style-type: none"> <li>✓ If problem is verified, replace GDU.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Terrain/TOPO Data does not display                          | <p>Ensure supplemental data cards are inserted correctly in the lower slots of both GDU's.</p> <p>Allow the system to verify the data on the cards for approximately five minutes after power-up.</p> <ul style="list-style-type: none"> <li>✓ If the databases do not activate, reload the Terrain and Obstacle databases onto the SD Card or replace the card.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                   |

|                                    |                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Display will not track photocell   | Go to the GDU TEST page in configuration mode. Cover and uncover the photocell and verify the PHOTOCELL A or PHOTOCELL B value changes.<br>✓ If problem persists, replace defective display.                                                                                                                                     |
| Keyboard will not track photocell  |                                                                                                                                                                                                                                                                                                                                  |
| Display will not track dimmer bus  | Check display lighting settings on the Main Lighting page (system group page 3)<br>Check presence or integrity of pin 59 (J10001)<br>Check dimmer bus to verify voltage (refer to the airframe specific maintenance manual for troubleshooting).<br>Switch MFD and PFD:<br>✓ If problem follows unit, replace defective display. |
| Keyboard will not track dimmer bus |                                                                                                                                                                                                                                                                                                                                  |
| Display delaminating               | Replace GDU, reference Garmin Service Bulletin 0527.                                                                                                                                                                                                                                                                             |

## 5.8 GDU 104X Alerts

### 5.8.1 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 3.6 for the software loading procedure.                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| MANIFEST – PFD1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in the PFD.                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| MANIFEST – MFD1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in MFD.                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| CNFG MODULE – PFD1 configuration module is inoperative.       | The PFD master configuration module has failed.                                                | Check master configuration module connector and wiring for damage inside the GDU connector backshell.<br>Replace master configuration module, refer to Section 6.13: <ul style="list-style-type: none"><li>✓ If problem persists, replace master configuration module wiring and/or pins</li></ul>                                                                                                                                                                                                                                          |
| MFD1 CONFIG – MFD1 configuration error. Config service req'd. | A configuration mismatch has occurred between the display and the Master Configuration Module. | Cycle power 2-3 times.<br>Ensure the MFD/PFD connector is fully seated and locked<br>Reload system configuration files. See Section 3.6.<br>Press the UPDT CFG softkey on the System Upload page to load configuration files into the configuration module. <ul style="list-style-type: none"><li>✓ If message persists, check configuration module wiring and pins for damage.</li><li>✓ If no wire or pin damage is found, replace master configuration module. See Section 6.13.</li></ul> If the problem persists, replace the MFD/PFD. |
| PFD1 CONFIG – PFD1 configuration error. Config service req'd. |                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |

## 5.8.2 Database Alerts

| Failure Message                                                 | Cause                                                                                                                                                       | Solution                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 DB ERR – MFD1 aviation database error exists.              | The MFD or PFD has encountered an error in the Jeppesen aviation database.                                                                                  | Attempt to update the aviation database to both displays.<br>If the error persists, replace the MFD or PFD.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| PFD1 DB ERR – PFD1 aviation database error exists.              |                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| MFD1 DB ERR – MFD1 basemap database error exists.               | The MFD or PFD has encountered an error in the basemap database.                                                                                            | Basemaps are stored on internal ROM within the GDU displays. However, basemaps are now included on the 010-00330-42 database cards. For GDU software 7.00 and greater, the G1000 will use the basemap on the card in lieu of the internal when the -42 card is installed.<br><br>If this message is received, and the -42 card is NOT present, try installing a -42 card in the problematic display and see if the issue goes away.<br><br>If this message is received and the -42 card IS present, removed the card and verify that the message goes away. If so, then replace the -42 card.<br><br>If the error persists, Garmin Aviation Technical Support for assistance. |
| PFD1 DB ERR – PFD1 basemap database error exists.               |                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| MFD1 DB ERR – MFD1 terrain database error exists.               | The MFD has encountered an error in the terrain database.                                                                                                   | Confirm database cards are inserted properly.<br><br>Verify that the card is either of the Toshiba or SanDisk brand. Use of other brand SD cards is not recommended.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PFD1 DB ERR – PFD1 terrain database error exists.               | The PFD has encountered an error in the terrain database.                                                                                                   | Update the database cards and reinstall.<br><br>If the error persists, replace terrain datacard.<br><br>If the error persists, replace the MFD or 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 aviation database versions to both displays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| DB MISMATCH – Aviation database type mismatch. Xtalk is off.    | The system has found the Jeppesen aviation database types in the PFD and MFD do not match (i.e., different regions: Americas, International, Atlantic, etc) | Load same type aviation database to both displays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| DB MISMATCH – Basemap database version mismatch. Xtalk is off.  | The PFD and MFD have different basemap versions installed.                                                                                                  | Replace or update both terrain database cards to install matching databases.<br><br>If the error persists, replace terrain datacard.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| DB MISMATCH – Airport Terrain database version mismatch.        | The PFD and MFD have different Airport Terrain database versions installed.                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| DB MISMATCH – Terrain database version mismatch.                | The PFD and MFD have different terrain database versions installed.                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |

|                                                   |                                                                                                                                    |  |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|--|
| DB MISMATCH – Obstacle database version mismatch. | The PFD and MFD have different obstacle database versions installed.                                                               |  |
| DB MISMATCH – Terrain database type mismatch.     | The PFD and MFD have different terrain database types installed (i.e., different regions: Americas, International, Atlantic, etc). |  |

### 5.8.3 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.<br>Replace the MFD.<br>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.<br>Replace the PFD.<br>If problem persists contact Garmin. |

### 5.8.4 Datacard Alerts

| Message                           | Cause                            | Solutions                                                                                                                                                                                                                                                                     |
|-----------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 CARD – data card has failed. | MFD1 can not read a datacard     | Remove and reinsert datacard multiple times to clean card contacts<br>Replace with known good card to verify failed card<br><ul style="list-style-type: none"> <li>✓ If problem does not persists replace the datacard.</li> <li>✓ If problem persist replace MFD.</li> </ul> |
| PFD1 CARD – data card has failed. | The PFD can not read a datacard. | Remove and reinsert datacard multiple times to clean card contacts<br>Replace with known good card to verify failed card<br><ul style="list-style-type: none"> <li>✓ If problem does not persists replace the datacard.</li> <li>✓ If problem persist replace PFD.</li> </ul> |

### 5.8.5 Key Alerts

| Failure Message                   | Cause                                                           | Solution                                                                                                                                                                                                         |
|-----------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 "key" KEYSTK – key is stuck. | The system has determined a key is stuck on the listed display. | Go to the GDU TEST page in configuration mode for the appropriate display and verify key is stuck (if key is stuck the corresponding indicator will be green)                                                    |
| PFD1 "key" KEYSTK – key is stuck. |                                                                 | Exercise suspected stuck key and reset GDU TEST page to see if indicator remains green without pressing the key.<br><ul style="list-style-type: none"> <li>✓ If problem persists replace the display.</li> </ul> |

### 5.8.6 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. | <p>Ensure a database error has not occurred</p> <ul style="list-style-type: none"> <li>✓ If a database error has occurred, correct error before proceeding.</li> </ul> <p>Verify that both PFD and MFD are receiving power.</p> <p>In Configuration Mode, check the System Configuration page:</p> <ul style="list-style-type: none"> <li>✓ Ensure that MFD1 and PFD1 are green.</li> <li>✓ If configuration is not correct, reconfigure the PFD and MFD per Section 3.6.</li> </ul> <p>Check Ethernet interconnect.</p> <p>Replace PFD with a known good unit to verify location of problem:</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace MFD.</li> <li>✓ If problem does not persist, replace PFD.</li> </ul> |
| DATA LOST – Pilot stored data lost. Recheck settings.         | Pilot stored data has been lost.                            | <p>If the CLR key was held during a power cycle, disregard message.</p> <p>Cycle power to PFD1:</p> <ul style="list-style-type: none"> <li>✓ Ensure CLR key is not stuck on the GDU TEST page.</li> <li>✓ If problem persist, replace PFD1.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                                                            |                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD1 SERVICE – needs service.<br>Return unit for repair.   | The G1000 has determined MFD1 needs service.    | <p>Ensure the display connector is fully seated and locked.</p> <p>If the unit was started in a very dark environment the photocells may not have enough light to initially raise the CCFT level.</p> <p>Go to the GDU STATUS page in configuration mode, ensure CCFT CRNT 1 &amp; 2 levels are above 50.</p> <ul style="list-style-type: none"> <li>✓ If the CCFT levels are not above 50, apply light to the photocell and observe if the CCFT level rises.</li> <li>✓ If the CCFT level rises, disregard the message.</li> <li>✓ If the CCFT level does not rise, replace the display.</li> </ul> |
| PFD1 SERVICE – needs service.<br>Return unit for repair.   | The G1000 has determined the PFD needs service. | <p>Replace the display.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| PFD1 VOLTAGE – PFD1 has low voltage. Reducing power usage. | The PFD supply voltage is low.                  | <p>Verify aircraft power is at proper voltage level and that the alternator or battery have not failed. Refer to the Diamond AMM for electrical troubleshooting information.</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| MFD1 VOLTAGE – MDF1 has low voltage. Reducing power usage. | The MFD supply voltage is low.                  | <p>Ensure the GDU rear connector is properly connected.</p> <p>Check wiring.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

### 5.8.7 GMA Common Problems

| Symptom        | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Noise in Audio | <p>Remove unit and check for MOD 1 marking.</p> <ul style="list-style-type: none"><li>✓ If MOD 1 is not marked, replace GMA.</li></ul> <p>Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise:</p> <p>Try a different pair of headsets. Noise cancelling headsets may pick up and/or generate more noise than standard headsets from their own circuitry.</p> <p>Check for noise with engine turned off.</p> <ul style="list-style-type: none"><li>✓ If the noise is present only when the engine is running, check the alternator and/or ignition system as possible sources of noise (see applicable airframe specific maintenance manual).</li></ul> <p>Check for noise as all electrical equipment is turned on and off (strobes, other radios, etc.)</p> <ul style="list-style-type: none"><li>✓ If the noise is identified from one electrical system or component refer to the applicable airframe specific maintenance manual</li></ul> <p>Ensure the NAV/COM squelch is not open</p> <p>Ensure the ADF and DME audio is not active</p> <p>Ensure the marker beacon audio is not active</p> <p>Ensure the ICS squelch is not open</p> <ul style="list-style-type: none"><li>✓ Master squelch level can be adjusted on the GMA CONFIGURATION page for higher noise environments</li></ul> <p>Replace unit only after all possible external sources of noise are eliminated</p> |

### 5.8.8 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.                        | <p>Ensure GMA1 is receiving power</p> <p>Ensure both GIAs are receiving power</p> <p>Ensure all GDUs are receiving power</p> <p>Ensure the GMA/GIA RS-232 data lines are working properly</p> <p>Ensure the GIA/GDU Ethernet data lines are working properly:</p> <ul style="list-style-type: none"><li>✓ Replace GMA</li></ul> |
| MANIFEST – GMA1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in GMA 1347. | See Section 3.6 for the software loading procedure.                                                                                                                                                                                                                                                                             |
| GMA1 CONFIG – GMA1 configuration error. Config service req'd. | The system has detected a GMA 1347 configuration mismatch.                | See Section 3.6 for the configuration loading procedure.                                                                                                                                                                                                                                                                        |

## 5.9 GIA 63 Troubleshooting

### 5.9.1 COM

| Symptom                 | Recommended Action                                                                                                                                                                                                                                                                     |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak COM transmit power | Check COM antenna and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):<br>✓ If problem follows unit, replace defective unit per Section 6.3.                              |
| Weak COM receiver       | Check COM antenna and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):<br>✓ 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 3.6):<br>✓ If problem follows GIA, replace defective GIA per Section 6.3.<br>✓ If problem persists, replace defective GMA per Section 6.3. |

### 5.9.2 NAV

| Symptom           | Recommended Action                                                                                                                                                                                                                                                  |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak NAV receiver | Check NAV antenna, coupler, and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):<br>✓ If problem follows unit, replace defective unit per Section 6.3. |

### 5.9.3 G/S

| Symptom           | Recommended Action                                                                                                                                                                                                                                                 |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Weak G/S receiver | Check G/S antenna, coupler, and cabling.<br>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):<br>✓ If problem follows unit, replace defective unit per Section 6.3 |

### 5.9.4 GPS

| Symptom                     | Recommended Action                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Will Not Acquire Satellites | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Check GPS antenna and cabling<br>Check date and time on Date/Time Setup Page<br>✓ If date and time is incorrect, correct date and time.<br>Switch GIA1 and GIA2, to verify location of problem:<br>✓ If problem follows unit, replace defective unit. |

## 5.10 GIA Alert Messages

### 5.10.1 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. | <p>Press the push-to-talk switch(s) again to cycle its operation.</p> <p>Check push-to-talk switch(s) and wiring.</p> <p>Check GIA1/GMA 1347 interconnect.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped; see Section 3.6):</p> <ul style="list-style-type: none"><li>✓ If problem follows the unit, replace GIA1.</li><li>✓ If problem persists replace defective GMA 1347.</li></ul> |
| 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. | <p>Press the push-to-talk switch(s) again to cycle its operation.</p> <p>Check push-to-talk switch(s) and wiring.</p> <p>Check GIA2/GMA 1347 interconnect.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):</p> <ul style="list-style-type: none"><li>✓ If problem follows the unit, replace GIA2.</li><li>✓ If problem persists replace defective GMA 1347.</li></ul> |

| 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.                          | <p>Press the COM1 external remote transfer switch again to cycle its operation.</p> <p>Check COM1 external remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6)</p> <ul style="list-style-type: none"> <li>✓ If problem follows the unit, replace GIA1.</li> <li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li> </ul>  |
| COM2 RMT XFR – COM2 remote transfer key is stuck.       | The COM2 external remote transfer switch is stuck in the enabled (or “pressed”) state.                          | <p>Press the COM2 external remote transfer switch again to cycle its operation.</p> <p>Check COM2 external remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):</p> <ul style="list-style-type: none"> <li>✓ If problem follows the unit, replace GIA2.</li> <li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li> </ul> |
| COM1 TEMP – COM1 over temp. Reducing transmitter power. | The COM transceiver is reporting a high temperature condition and is reducing transmit power to prevent damage. | <p>Check avionics cooling fans for proper operation. Verify that cooling air can flow freely into and out of the remote avionics box.</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace overheating GIA.</li> </ul>                                                                                                                                                                                                                                                             |
| COM2 TEMP – COM2 over temp. Reducing transmitter power. |                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 5.10.2 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. | <p>Press the NAV1 external remote transfer switch again to cycle its operation.</p> <p>Check NAV1 remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):</p> <ul style="list-style-type: none"><li>✓ If problem follows unit, replace GIA1.</li><li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li></ul> |
| NAV2 RMT XFR – NAV2 remote transfer key is stuck.          | The NAV2 external remote transfer switch is stuck in the enabled (or “pressed”) state. | <p>Press the NAV2 external remote transfer switch again to cycle its operation.</p> <p>Check NAV2 remote transfer switch and wiring.</p> <p>Switch GIA1 and GIA2, to identify whether the unit or connectors/wiring is at fault (Both GIAs must be configured when swapped, see Section 3.6):</p> <ul style="list-style-type: none"><li>✓ If problem follows unit, replace GIA1.</li><li>✓ If problem persists, continue to troubleshoot remote transfer switch &amp; wiring.</li></ul> |

### 5.10.3 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 glideslope antenna and cabling<br>Switch GIA1 and GIA2, to verify location of problem.<br>✓ If problem follows the unit, replace the bad GIA. |
| G/S2 FAIL – G/S2 is inoperative.                           | The system has detected a failure in G/S2 receiver. |                                                                                                                                                     |

### 5.10.4 GPS Alerts

#### NOTE:

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

| Failure Message                                                 | Cause                                                                                               | Solution                                                                                                                                                                                                                   |
|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GPS1 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GIA1.                               | Load correct software.<br>See Section 3.6 for the Software Loading procedure.                                                                                                                                              |
| MANIFEST – GPS2 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GIA1.                               |                                                                                                                                                                                                                            |
| GPS1 SERVICE – GPS1 needs service. Return unit for repair.      | The system has detected a failure in GPS1 receiver.                                                 | Replace appropriate GIA. Note that for WAAS units, this message may be triggered by a low or defective internal battery (GPS may still be usable).                                                                         |
| GPS2 SERVICE – GPS2 needs service. Return unit for repair.      | The system has detected a failure in GPS2 receiver.                                                 |                                                                                                                                                                                                                            |
| GPS1 FAIL – GPS1 is inoperative.                                | The system has detected a failure in GPS1 receiver.                                                 | Check GPS antenna and cabling for improper wear or signal loss.<br><br>Verify that the correct GIA 63s are installed.<br><br>Check the GIA reporting status in configuration mode.<br><br>Replace GIA if problem persists. |
| GPS2 FAIL – GPS2 is inoperative.                                | The system has detected a failure in GPS2 receiver.                                                 |                                                                                                                                                                                                                            |
| LOI – GPS integrity lost. Crosscheck with other NAVS.           | If the primary receiver is a WAAS sensor, the alert indicates that GPS position data has timed out. |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. Insufficient satellites. | There is no GPS position fix available or the system is in dead reckoning mode.                     |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. Position error.          | The G1000 has detected an internal position warning has occurred.                                   |                                                                                                                                                                                                                            |
| GPS NAV LOST – Loss of GPS navigation. GPS fail.                | The G1000 has detected a GPS engine failure.                                                        |                                                                                                                                                                                                                            |
|                                                                 |                                                                                                     |                                                                                                                                                                                                                            |

### 5.10.5 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.<br>Replace GIA1.<br>If problem persists contact Garmin. |
| GIA2 COOLING – GIA2 over temperature.    | GIA2 has exceeded its operating temperature range. | Check Avionics Fan for proper operation.<br>Replace GIA2.<br>If problem persists contact Garmin. |

### 5.10.6 GIA Configuration Alerts

| Failure Message                                                        | Cause                                                                                                                                         | Solution                                                                                                                                                                        |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GIA1 software mismatch. Communication Halted.               | The system has detected an incorrect software version loaded in GIA1.                                                                         | Load correct software. See Section 3.6 for the software loading procedure.                                                                                                      |
| MANIFEST – GIA2 software mismatch. Communication Halted.               | The system has detected an incorrect software version loaded in GIA2.                                                                         |                                                                                                                                                                                 |
| GIA1 CONFIG – GIA1 audio config error. Config service req'd.           | The GIA's audio configuration files are incorrect or missing.                                                                                 | Reload audio configuration files.<br>If problem persists, replace master configuration module.                                                                                  |
| GIA2 CONFIG – GIA2 audio config error. Config service req'd.           |                                                                                                                                               |                                                                                                                                                                                 |
| 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 3.6 for the configuration loading procedure.<br>If problem persists, replace master configuration module.                                                           |
| GIA2 CONFIG – GIA2 configuration error. Config service req'd.          |                                                                                                                                               |                                                                                                                                                                                 |
| HW MISMATCH – GIA hardware mismatch, GIA1 (or 2) communication halted. | A GIA 63 and a GIA 63W are installed on the same aircraft.                                                                                    | Remove the incorrectly installed GIA. Install the correct P/N GIA and verify correct software is loaded.<br>Refer to the appropriate General Arrangement drawings in Table 1-2. |

## 5.11 GEA Troubleshooting

### 5.11.1 GEA Common Problems

| Symptom                                                                     | Recommended Action                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CHT, EGT, and TIT are red X'd (no other field is red X'd)                   | Ensure the GEA configuration module and thermocouple wiring and pins are not damaged.<br>Replace the GEA configuration module and thermocouple.                                                                                                                                      |
| One or more CHT, EGT, or TIT temperatures drop as electrical load increases | Check temperature probe(s) for opens (usually where bayonet is cramped)<br>Replace defective temperature probe(s)                                                                                                                                                                    |
| One or more CHT, EGT, or TIT temperatures drift up and flag                 |                                                                                                                                                                                                                                                                                      |
| Fuel quantity flags intermittently                                          | Check for an open in the wiring and connectors between the GEA, signal conditioner, and the sender (hi, low, or signal ground lines)<br>Check for 5 volt excitation shorted to ground between the GEA, signal conditioner, and sender.<br>Check fuel sender for an open or dead spot |
| Engine instruments are missing on the MFD                                   | Clear user data on each GDU by holding down the CLR button while powering on each GDU.                                                                                                                                                                                               |

### 5.11.2 GEA Alerts

| Failure Message                                               | Cause                                                                   | Solution                                                                                                                                   |
|---------------------------------------------------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GEA1 software mismatch. Communication Halted.      | The system has detected an incorrect software version loaded in GEA 71. | Load correct software version. See Section 3.6 for the software load procedure.                                                            |
| GEA1 CONFIG – GEA1 configuration error. Config service req'd. | The system has detected a GEA 71 configuration mismatch.                | Load GEA configuration file. See Section 3.6 for the configuration procedure.<br>If problem persists, replace master configuration module. |

---

## 5.12 GTX Troubleshooting

### 5.12.1 GTX Alerts

| Failure Message                                                 | Cause                                                                   | Solutions                                                                                                                                                                                                              |
|-----------------------------------------------------------------|-------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GTX1 software mismatch. Communication Halted.        | The system has detected an incorrect software version loaded in GTX 33. | Load correct software version. See Section 3.6 for the software load procedure.                                                                                                                                        |
| XPDR1 CONFIG – XPDR1 configuration error. Config service req'd. | The system has detected a GTX 33 configuration mismatch.                | Load GTX1 configuration file. See Section 3.6 for the configuration procedure.<br>Verify correct aircraft registration is present in the GTX config page.<br>If problem persists, replace master configuration module. |

## 5.13 GRS 77/GMU 44 Troubleshooting

### 5.13.1 AHRS Common Problems

#### NOTE:

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

| Symptom                               | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AHRS does not complete initialization | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Calibrate the GRS 77<br>Check GRS configuration module wiring for damage<br>Check GRS connector for bent pins <ul style="list-style-type: none"><li>✓ If no damage can be found, replace GRS configuration module</li><li>✓ If problem persists, replace the GRS 77</li></ul>                                                  |
| Attitude appears unstable             | Ensure the four GRS mounting screws are tight. Finger tight is not sufficient, a screwdriver must be used to verify.<br>Ensure mounting rack and airframe shelf are secure and all hardware and brackets are present.<br>Ensure aircraft battery is mounted securely<br>Ensure GRS connector is securely fastened and proper strain relief is provided<br>Remove GRS connector and verify there are no bent pins<br>Contact Garmin for further troubleshooting |

### 5.13.2 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 and/or manifest using correct approved loader card. See Section 3.6 for the Software Load Procedure.                                                                                                                                          |
| AHRS1 SRVC – AHRS1 magnetic-field model needs update.        | The AHRS magnetic field model should be updated. Appears on ground only.                                        | Load updated magnetic field model. See Section 4.7.                                                                                                                                                                                                           |
| GEO LIMITS – AHRS1 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.                                                                                                                                                                             |
| AHRS1 TAS – AHRS1 not receiving airspeed.                    | The GRS 77 is not receiving airspeed from the GDC 74A.                                                          | Check GRS/GDC interconnect<br>Replace the GDC 74A with a known good unit: <ul style="list-style-type: none"><li>✓ If problem does not persist, replace the GRS 77.</li></ul>                                                                                  |
| AHRS1 GPS – AHRS1 not receiving backup GPS information.      | The GRS 77 is not receiving backup GPS information from either GIA 63.                                          | Ensure that a cell phone or a device using cell phone technology is not turned on (even in a monitoring state) in the cabin.<br>Check GPS status for GIA 1 and 2 on AUX page 3: <ul style="list-style-type: none"><li>✓ If GPS status is poor check</li></ul> |
| AHRS1 GPS – AHRS1 operating exclusively in no-GPS mode.      | The GRS 77 is operating in the absence of GPS.                                                                  |                                                                                                                                                                                                                                                               |
| AHRS1 GPS – AHRS1 not receiving any GPS information.         | The GRS 77 is not receiving GPS data from the GPS receivers.                                                    |                                                                                                                                                                                                                                                               |

|                                                                   |                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| AHRS1 GPS – AHRS1 using backup GPS source.                        | The GRS 77 is using the backup GPS data path.        | <p>GPS antenna and cabling.</p> <ul style="list-style-type: none"> <li>✓ If problem persists replace associated GIA.</li> </ul> <p>Check RS-232 configuration settings for the GIA 63/GIA 63Ws:</p> <ul style="list-style-type: none"> <li>✓ If configuration is not correct, reconfigure.</li> </ul> <p>Check GRS/GIA interconnect.</p> <ul style="list-style-type: none"> <li>✓ Replace the GRS 77</li> </ul> |
| MAG VAR WARN – Large magnetic variance. Verify all course angles. | Magnetic variance value from GMU 44 is not accurate. | If problem persists, run magnetic interference check in Section 5.13.4 to check for localized magnetic interference.                                                                                                                                                                                                                                                                                            |

### 5.13.3 GMU Alerts

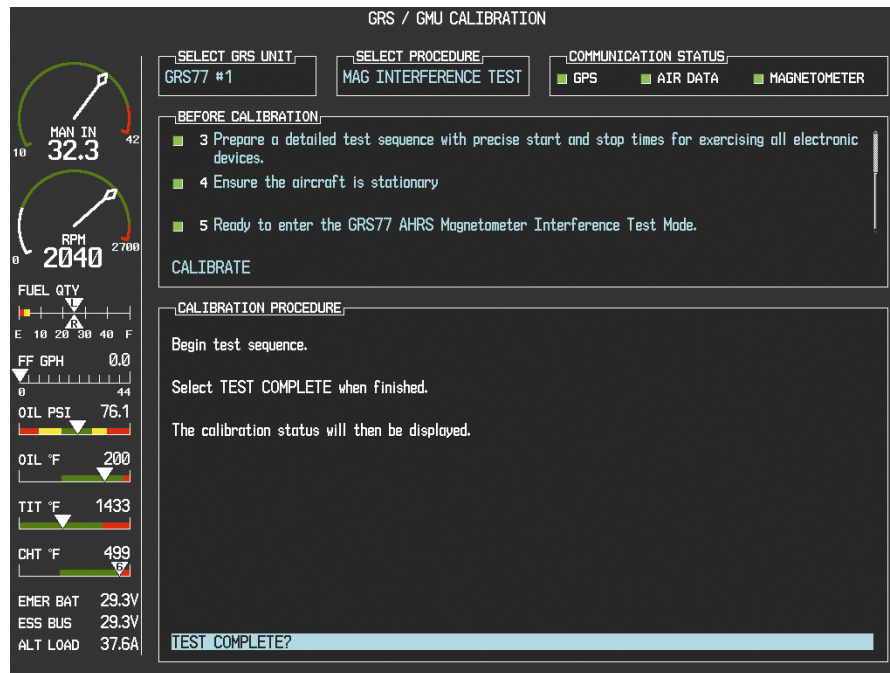
| Failure Message                                          | Cause                                                                      | Solutions                                                                                                                                                        |
|----------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GMU1 software mismatch. Communication Halted. | The system has detected an incorrect software version loaded in GMU 44.    | Load correct software version. See Section 3.6 for the software load procedure.                                                                                  |
| HDG FAULT – AHRS1 magnetometer fault has occurred.       | A fault has occurred in the magnetometer; heading will be flagged invalid. | <p>Check GMU 44/GRS 77 interconnect.</p> <p>Replace the GMU 44.</p> <ul style="list-style-type: none"> <li>✓ If problem persists, replace the GRS 77.</li> </ul> |

### 5.13.4 Calibration Procedure E: Magnetometer Interference Test (Optional)

A magnetometer interference test is available for troubleshooting and/or verifying a magnetically ‘clean’ installation of the GMU 44. This test exercises various devices on the aircraft that could potentially affect the magnetic field as measured by the GMU 44 (examples include navigation lights, control servos, landing gear motors, etc).

#### NOTE:

This test is optional and is used to validate that no electronic device interferes with the operation of the GMU 44 magnetometer. It is highly recommended that this test be performed after installation or maintenance of electrical components on the aircraft and/or for troubleshooting the GMU 44.



**Figure 5-13. Magnetometer Interference Test**

1. Initiate the AHRS magnetometer interference test procedure by performing the following steps:
2. Enter Configuration Mode and go to GRS/GMU Calibration page as shown in Figure 5-13.
3. This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:
  - i) softkey 9
  - ii) softkey 10
  - iii) softkey 11
  - iv) softkey 12
4. Select MAG INTERFERENCE TEST and press the ENT key.
5. Follow the checklist items displayed on the PFD, and press the ENT key as each one is completed or confirmed.

---

**NOTE:**

The 3<sup>rd</sup> item on the checklist instructs the operator to “prepare a detailed test sequence with precise start and stop times for exercising all electronic devices”. Only the electronic devices that are likely to affect the operation of the GMU 44 magnetometer need be included in the test sequence. The list of relevant electronic devices will vary from aircraft to aircraft. An example of an appropriate test sequence is given Table 5-3.

**Table 5-3. Magnetometer Interference Test Sequence (Example)**

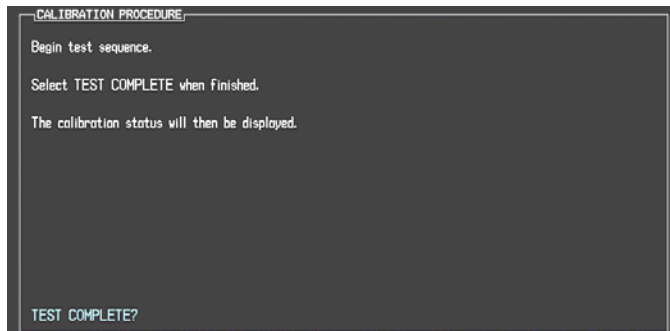
| Elapsed Time<br>Since Start of Test<br>(min:secs) | Action                                                                                                                     |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|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

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

---

**NOTE:**

It is important that the “time equals zero” moment corresponds with the moment the PFD first displays the blinking TEST COMPLETE? message.



7. The operator should carry out the actions called for in the prepared test sequence.

**NOTE:**

It is important that all actions are carried out in the order and at the precise elapsed time as specified in the prepared test sequence.

8. When the operator has completed the actions specified in the test sequence, press the ENTER button to indicate that the process is complete. When this is done, the TEST COMPLETE field stops blinking.
9. The PFD informs the operator if the installation has passed or failed the magnetometer interference test. If the test passes, no further action is required for this test.

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

**NOTE:**

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

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

---

## 5.14 GDC 74A Troubleshooting

### 5.14.1 Air Data Common Problems

| Symptom                                      | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Altitude is different than standby altimeter | <p>Perform a pitot/static check per Section 7.6 of this manual. Allow the GDC to warm up for fifteen minutes before checking accuracy, per Garmin Service Advisory 0606.</p> <p>Determine which instrument is outside limits and replace. The GDC is not field adjustable. Note: Both units may individually be in spec but show a difference in altitude. Do not return the GDC to Garmin for service if not outside limits.</p> |

### 5.14.2 GDC Alerts

| Failure Message                                          | Cause                                                                    | Solutions                                                                       |
|----------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| MANIFEST – GDC1 software mismatch. Communication Halted. | The system has detected an incorrect software version loaded in GDC 74A. | Load correct software version. See Section 3.6 for the software load procedure. |

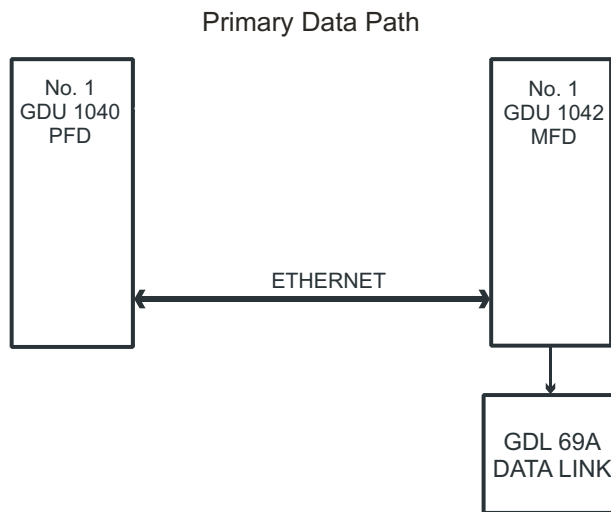
## 5.15 GDL 69A Troubleshooting

### 5.15.1 GDL 69A Common Problems

| Symptom                                | Recommended Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| No XM audio is heard                   | Ensure the following items are not preventing the audio panel from distributing XM audio (reference applicable G1000 Pilot's Guide): <ul style="list-style-type: none"><li>✓ Verify the XM volume is not muted on the AUX – XM RADIO page on the MFD.</li><li>✓ Verify no music sources are plugged into the AUX music input jack.</li><li>✓ Verify the COM squelch is not open.</li><li>✓ Verify the ICS squelch is not open.</li><li>✓ Verify the marker beacon tones are not being received.</li><li>✓ Verify the headphone (if equipped) volume is turned up.</li></ul>                                                                                                                                                                                                                                                                                  |
| No XM weather information is displayed | Go to the AUX – SYSTEM STATUS page on the MFD and ensure unit is online <ul style="list-style-type: none"><li>✓ If a red X is present, verify the unit is receiving power</li><li>✓ Load GDL configuration files</li><li>✓ If problem persists, replace the GDL 69/69A</li></ul> Ensure there are no GDL alerts in the alert window<br>Restart the PFD and MFD in configuration mode and go to the GDL page <ul style="list-style-type: none"><li>✓ Verify unit is active</li><li>✓ If unit is not active, contact XM with the Audio Radio ID (or Data Radio ID number for XM weather) number.</li><li>✓ Verify the Signal number is "2" or "3". If it is "0" or "1" check the GDL 69/69A antenna and cabling.</li><li>✓ Reseat the GDL 69/69A to verify the coax connector is fully seated.</li><li>✓ If problem persists, replace the GDL 69/69A</li></ul> |

### 5.15.2 GDL 69A Alerts

| Failure Message                                           | Cause                                                                    | Solutions                                                                                                              |
|-----------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| MANIFEST – GDL software mismatch. Communication Halted.   | The system has detected an incorrect software version loaded in GDL 69A. | Load correct software version. See Section 3.6 for the software load procedure.                                        |
| GDL69 CONFIG - GDL 69 config error. Config service req'd. | The system has detected a GDL 69A configuration mismatch.                | Reload configuration. See Section 3.6 for the configuration procedure.                                                 |
| GDL69 FAIL - GDL 69 has failed.                           | The system has detected a failure in the GDL 69A.                        | Ensure GDL 69 is receiving power.<br><br>Check wiring from GDL 69A to MFD.<br><br>Replace GDL 69A if problem persists. |



**Figure 5-14. GDL 69A 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 performing maintenance, **it is required** that the technician verify the LRU software part number and version number matches the software configuration listed in the appropriate General Arrangement drawing.

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

1. Start the G1000 system in configuration mode as described in Section 3.4.

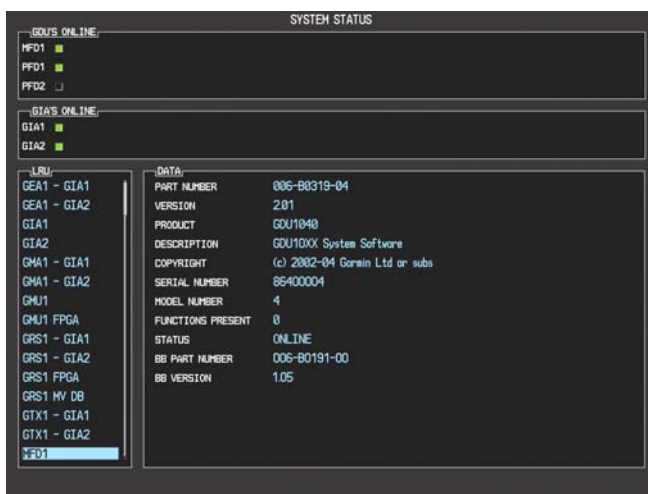


Figure 6-1. System Status Page (Configuration Mode)

2. The System Status page shows a list of LRUs in the LRU window. Activate the cursor and use the FMS knob to scroll through the list in the window and select the following items:

| <u>LRU</u> | <u>SW VER OK</u> | <u>LRU</u>         | <u>SW VER OK</u> |
|------------|------------------|--------------------|------------------|
| PFD1       | _____            | GMA1               | _____            |
| PFD1 FPGA  | _____            | GMU1               | _____            |
| MFD1       | _____            | GMU1 FPGA          | _____            |
| MFD1 FPGA  | _____            | GDL69              | _____            |
| GIA1       | _____            | GFC CERT R M*      | _____            |
| GIA2       | _____            | GFC CERT R C*      | _____            |
| GPS1       | _____            | GFC CERT PT M*     | _____            |
| GPS2       | _____            | GFC CERT PT C*     | _____            |
| GRS1       | _____            | GFC CERT P M*      | _____            |
| GRS1 FPGA  | _____            | GFC CERT P C*      | _____            |
| GIA1 AUDIO | _____            | GSA PTCH C – GIA1* | _____            |
| GIA2 AUDIO | _____            | GSA PTCH M – GIA1* | _____            |

---

|                |       |                        |       |
|----------------|-------|------------------------|-------|
| GFC CERT GIA1* | _____ | GSA PTCH TRM C – GIA1* | _____ |
| GFC CERT GIA2* | _____ | GSA PTCH TRM M – GIA1* | _____ |
| GTX1           | _____ | GSA ROLL C – GIA1*     | _____ |
| GEA1           | _____ | GSA ROLL M – GIA1*     | _____ |
| GDC1           | _____ |                        |       |
| GDC1 FPGA      | _____ |                        |       |

\*GFC 700-equipped aircraft only.

3. The software part number and version is displayed in the DATA window. Compare this to the software configuration in the appropriate General Arrangement drawing (see Table 1-2).

**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 the General Arrangement drawing. The Software Manifest page may also be used to check part numbers and versions.

## **6.1 GDU 104X MFD & PFD**

### Removal:

1. Using a 3/32<sup>nd</sup> 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 3/32<sup>nd</sup> 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 (W) 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 handle 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 GDL 69A

### Removal:

1. Remove the baggage compartment floor and compartment to gain access to the remote avionics enclosure.
2. Unlock the GDL 69A handle by loosening the Phillips screw on the handle.
3. Pull the handle upward to unlock the GDL 69A. 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 GDL 69A into its rack. The handle should engage the dogleg track.
3. Press down on the GDL 69A hand to lock the unit into the rack.
4. Lock the handle to the GDL 69A body using the Philips screw.
5. Configure and test the GDL 69A according to Section 7.8.

---

## 6.11 GSA 81 Servos

### Removal:

1. Gain access to the desired servos by following instructions provided in the Diamond Airplane Maintenance Manual, and by referring to the General Arrangement Drawing.
2. Disconnect the harness connector for each servo.
3. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
4. Carefully remove the servo and place a protective cover on the output gear.

### Replacement:

1. Inspect the output gear for abnormal wear or the absence of grease. If grease is required, refer to Section 4.8 and grease the gear.
2. Carefully place the servo into the servo mount, ensuring proper orientation and alignment.
3. Fasten the servo to the servo mount using the existing hardware.
4. Inspect the harness connectors and check that no pins are bent or otherwise damaged. Connect the harness and secure it appropriately.
5. If no further maintenance is required, replace the servo access panels and continue to Section 8.3.

## 6.12 GSM 85 Servo Mounts

### Removal:

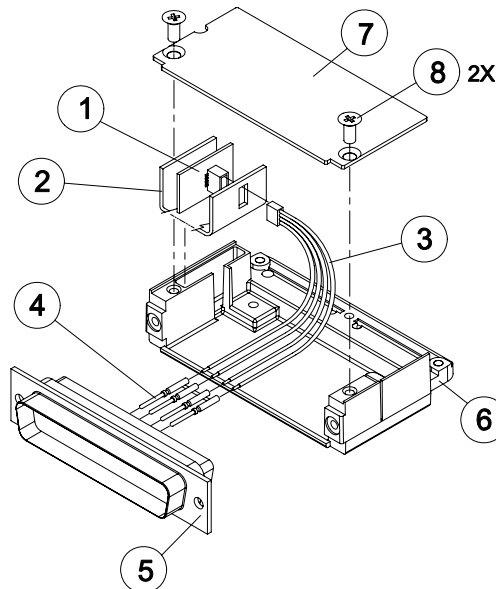
1. Remove the desired servo(s) per Section 6.11.
2. De-rig the flight control cabling or chain (Table 1-2 lists the servo installation drawings; refer to these for removal details).
3. Use a socket or open-wrench to loosen and remove the servo attachment bolts.
4. Carefully remove the servo mount.

### Replacement:

1. Follow the installation instructions provided in the respective servo installation drawings listed in Table 1-2.
2. If no other maintenance is to be performed, reinstall the servo(s) per Section 6.11.

## 6.13 Configuration Module Removal & Replacement

Configuration modules (Item 1 shown below) are located in the following LRU harness connector backshells (Item 6): GDU 1040 PFD, GRS 77 AHRS, GDC 74A Air Data Computer, and the GEA 71 Engine/Airframe Unit. Refer to the G1000/DA40 Install Drawing, 005-00304-00, for installation locations.



**Figure 6-2. Configuration Module Installation**

**Table 6-1. Configuration Module Kit – 011-00979-00**

| Item | Description                                                    | Qty Needed | Garmin Part Number |
|------|----------------------------------------------------------------|------------|--------------------|
| 1    | Configuration Module PCB Board Assembly w/EEPROM & Temp Sensor | 1          | 012-00605-00       |
| 2    | Spacer, Config Module                                          | 1          | 213-00043-00       |
| 3    | Cable, 4-Conductor Harness                                     | 1          | 325-00122-00       |
| 4    | Pins, #22 AWG (HD)                                             | 5          | 336-00021-00       |

### 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.
5. Continue to Section 6.11.1.

---

### **6.13.1 Configuration Module Checkout**

#### **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 GEA 71 Configuration Module is replaced:**

Proceed to Section 7.4.1 and check the EGT / CHT indications for accurate readings.

#### **If only the Master Configuration Module is replaced:**

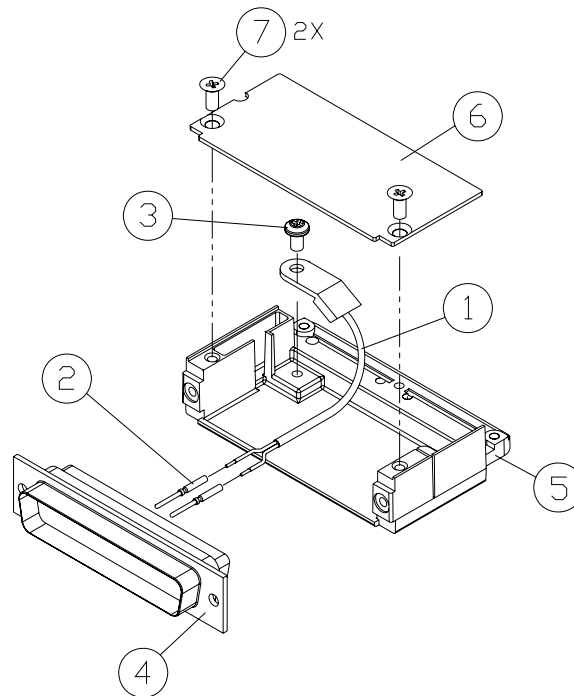
1. Start the G1000 system in configuration mode.
2. Go to the Configuration Upload Page on the PFD.
3. Press the UPDT CFG softkey and press ENT.

#### **If both the PFD and Master Configuration Module are replaced:**

1. The entire G1000 system must be re-configured. Insert the correct G1000 software loader card into the PFD.
2. Start the G1000 in configuration mode. Go to the System Upload Page on the PFD.
3. See Section 3.6 for instructions on how to use the System Upload page. Check all configuration files and reload them.
4. After reloading configuration files, examine the G1000 installation for any installed configuration options. Options are listed in Section 3.5.3.1. Load optional files as necessary.
5. Continue to Section 8 and conduct the return to service checkout.

## 6.14 GEA 71 Backshell Thermocouple Removal & Replacement

The GEA 71 has a K-Type thermocouple (Item 1 shown below) installed in its backshell, in addition to the configuration module. The thermocouple is used in conjunction with the configuration module temperature sensor to compensate for EGT/CHT temperature probe errors resulting from the dissimilar metals at the pin contacts.



**Figure 6-3. GEA Backshell Thermocouple**

**Table 6-2. 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.
6. Continue to Section 7.4.1 and verify that the EGT and CHT indications are valid on the MFD.

## **6.15 GA35 GPS/WAAS Antennas**

Remove and install the GA35 GPS/WAAS antennas following the drawing details shown on the General Arrangement drawings 005-00500-10 and 005-00400-15.

For procedural instructions on accessing the GPS antennas, refer to the DA40 Aircraft Maintenance Manual, Chapter 34-58-00, Section 5.

## 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 104X 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. For GFC 700 aircraft, the displays cannot remain in the swapped positions. The GDU 1042 or 1044 must be installed in the MFD position.

#### 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. See Section 3.6. If TAWS, ChartView, or any other options were previously installed, these must be reactivated. See Sections 3.6.6, 3.6.7, and 3.6.3 respectively.

#### 7.1.1 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 BACKUP 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 DISPLAY BACKUP button again.
5. If TAWS was activated, select the TAWS page (4th page in the MAP group) on the MFD.



- a. Verify that the title at the top of the page reads “MAP – TAWS”. If TAWS has not been enabled, the title will read “MAP – TERRAIN PROXIMITY” or “MAP – TERRAIN”.
  - b. Press the MENU button and select “Test TAWS” from the pop-up menu.
  - c. After the TAWS test has completed, verify that “TAWS System Test Okay” is heard over the cockpit speaker.
6. 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. See Section 3.6.

#### 7.2.1 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:

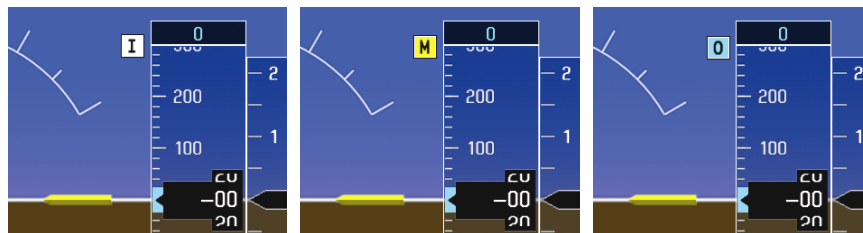
Perform a ramp test radio check by exercising the installed transceivers, microphone, microphone key and audio over the headphones and speaker. Verify that communications are clear and PTT operation is correct for each pilot position.

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. See Section 3.6.

#### *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. See Section 3.6.

### 7.3.1 GIA 63 Test

#### GPS Signal Acquisition:



**Figure 7-4. AUX – GPS STATUS Page (MFD)**

The GIA 63(W) units should normally acquire a GPS navigation solution within 5 to 10 minutes of startup, provided the aircraft is outside (or indoors with a GPS repeater). Select the GPS STATUS page on the MFD (3<sup>rd</sup> page in AUX group). Two softkeys on the bottom of the display allow the user to toggle between GPS 1 and GPS 2.

#### For non-WAAS G1000 installations:

Verify that both receivers show 3D NAV on the MFD. Verify that the active GPS sensor is GPS1.

#### For G1000 installations using WAAS:

Verify that both receivers show 3D DIFF NAV on the MFD. Verify that the active GPS sensor is GPS1.

Press the SBAS softkey. Verify that WAAS is checked. When the GIA 63W begins to receive the WAAS correction signals, each of the satellite strength bars should have a 'D' inside of it, indicating that differential corrections are available for that specific satellite.

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 AUX – GPS STATUS 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 AUX – SYSTEM SETUP page.
11. Under the COM CONFIG field, change the COM channel spacing from 25 kHz to 8.33 kHz.
12. Go back to the AUX – GPS STATUS 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 AUX – SYSTEM SETUP 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 receivers. Repeat using a Localizer signal (tune NAV 1 and NAV2 receivers to appropriate frequency). Exercise the Glideslope deviation indicator with up and down deviation indications.

### GFC 700 VOR/LOC/GS Test

#### **NOTE:**

Perform this test only if the aircraft is equipped with a GFC 700.

1. Simulate a VOR signal on radial 360° with a course-width of 20°. Tune the NAV1 and NAV2 receivers to this specific frequency.
2. Set the HSI on the PFD to NAV1 by pressing the CDI soft key until NAV1 is selected. Adjust the HSI course as necessary using the CRS knob.
3. Verify full scale deflection of the CDI while applying a 10° deviation signal. Exercise the CDI with both right and left deviations for both NAV1 and NAV2.
4. Engage the Autopilot in altitude hold mode and press the NAV key on the MFD. Apply a right signal deviation to the CDI. Verify that the Flight Director and aircraft controls respond and follow the CDI. Apply a left signal deviation and verify the Flight Director and aircraft controls follow the CDI.
5. Press the CDI soft key to select the NAV 2 receiver. Verify that the NAV annunciation flashes yellow, then returns to default PIT mode.
6. Repeat Step 4 while the NAV 2 source is selected on the HSI.
7. Simulate a Localizer/Glideslope signal. Tune this signal on NAV 1 receiver. Set the HSI to LOC1. Use the test equipment to center the deviation bars (localizer and glideslope) on the PFD.
8. Press the APR key on the MFD. Verify that the LOC and GS annunciations are green on the PFD. Apply right/left and up/down localizer/glideslope signals using the test equipment. Verify that the Flight Director and flight controls respond appropriately.
9. Repeat Steps 7 and 8 for the NAV 2 receiver.

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.

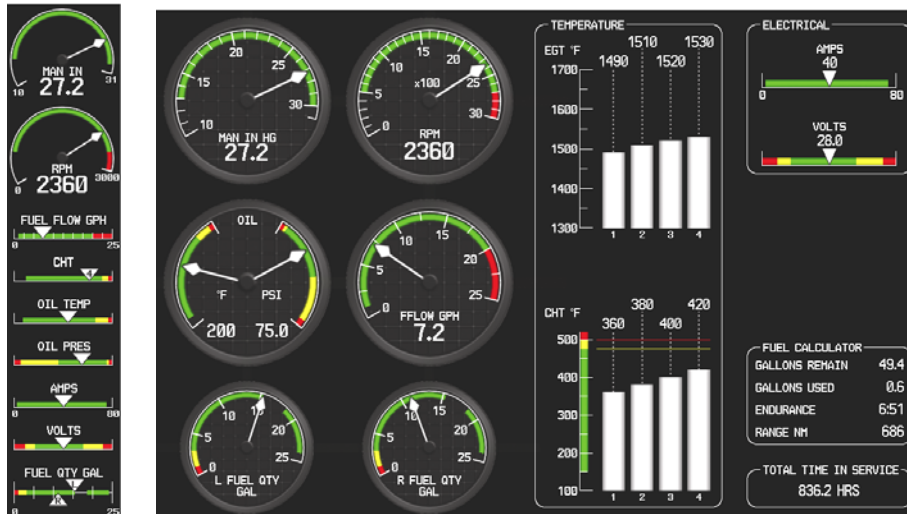
### 7.4.1 GEA 71 Test

On the MFD, check the indication for each of the sensor or monitor inputs with the aircraft engine off.

In general, verify all engine and system instruments show valid and reasonably true data, with no red Xs or erratic indications.

#### Full Page Engine Instrument Check:

1. Observe the EIS strip on the MFD and check each display gauge value against.
2. Press the ENGINE softkey and observe the full-page EIS display. Check each display gauge value against Table 7-1.



3. Press the RED reversionary mode button on the GMA 1347 audio panel.

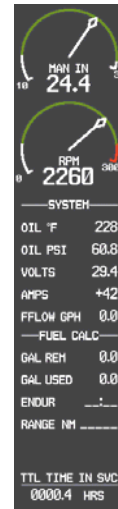
4. Press the ENGINE softkey, and then press the LEAN softkey and verify that the display gauges change to show EGT and CHT bar indicators as shown below. Verify information agrees with the conditions of Table 7-1.
5. Press the SYSTEM softkey and verify that the display changes to show the digital equivalent of the normal EIS page (oil temp, oil pressure, etc), as shown below. Verify the information presented agrees with the conditions of Table 7-1.



ENGINE



LEAN



SYSTEM

6. Deactivate reversionary mode.

**Table 7-1: Engine/Airframe Instrument Checks**

| Engine/Airframe Indicator          | Desired Reading                                                   |
|------------------------------------|-------------------------------------------------------------------|
| Manifold Air Pressure (DA 40 Only) | Atmosphere Pressure                                               |
| Tachometer                         | 0                                                                 |
| Fuel Flow                          | 0                                                                 |
| CHT                                | Ambient*                                                          |
| EGT                                | Ambient*                                                          |
| Oil Temperature                    | Ambient*                                                          |
| Oil Pressure                       | Approximately 0                                                   |
| Amps                               | Approximately 0                                                   |
| Volts                              | Battery or GPU Voltage, Approximately 28 Vdc                      |
| Fuel Tanks                         | FULL w/ full tanks, (including extended range tanks, if equipped) |
| Total Time in Service              | Total Airborne Time                                               |

\*Unless engine is hot, in which case higher temps to be expected.

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

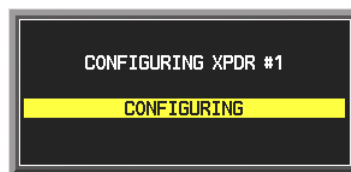
If a new GTX 33 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. See Section 3.6.

#### 7.5.1 Transponder Configuration

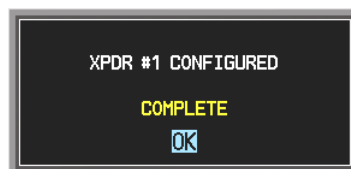
Select the GTX page group, then select the Transponder Configuration page on the PFD:

|                 | SET          | ACTIVE       |
|-----------------|--------------|--------------|
| ADDRESS TYPE    | US TAIL      | US TAIL      |
| ADDRESS         | N58GA        | N58GA        |
| FLIGHT ID TYPE  | SAME AS TAIL | SAME AS TAIL |
| FLIGHT ID       | N58GA        | N58GA        |
| AIRCRAFT WEIGHT | < 15,500 LBS | < 15,500 LBS |
| MAX AIRSPEED    | <= 150 KTS   | <= 150 KTS   |
| VFR CODE        | 1200         | 1200         |

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



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



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

---

### 7.5.2 GTX 33 Test

Operation of the GTX 33 Mode-S transponder is accomplished using the G1000 PFD. Refer to Garmin part number 190-00324-01, G1000 Cockpit Reference Guide for Diamond DA40, 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, **every 24 calendar months**, or any time the transponder is removed. 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.

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## 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 Test

#### IMPORTANT

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

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, **every 24 calendar months**. 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. Remove power to the PFD by pulling the circuit breaker labeled PFD.
2. Press and hold the ENT key on the PFD while applying power using the PFD circuit breaker.
3. Release the ENT key after 'INITIALIZING SYSTEM' appears in the upper left corner of the PFD.
4. Rotate the FMS knob to until the display shows the GRS page group. Within the Air Data 1 sub window is the field "B ALT" which is Barometric Altitude. B ALT is equivalent to the altitude that will be displayed to the pilot on the altitude display when the PFD is in normal mode. B ALT will be used for all CFR Part 43 Appendix E tests for G1000 altitude.
5. Push the red "display backup" button on the audio panel. This will activate Reversionary Mode for the MFD. 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 pushing the red "display backup" button. Return the PFD to normal mode by pulling the PFD circuit breaker and then resetting.

## NOTE

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

### 7.6.2 Airspeed Test

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

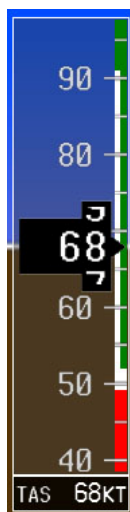
| Calibrated air speed, knots | Allowed tolerance, $\pm$ knots |
|-----------------------------|--------------------------------|
| 50                          | 5.0                            |
| 80                          | 3.5                            |
| 100                         | 2.0                            |
| 120                         | 2.0                            |
| 150                         | 2.0                            |

For EASA Registered Aircraft Only—EASA Airspeed Tape configuration must be completed prior to performing this procedure.

4. Command air data test set (ADTS) to simulate 68 KIAS on the Airspeed Indicator.
5. Verify that the color bands on the airspeed tape match those specified in the table below:

| Color Bands on Airspeed Indicator | Indicated airspeed range |
|-----------------------------------|--------------------------|
| Red                               | Up to 49 KIAS            |
| White                             | 49 – 52 KIAS             |
| White/Green                       | 52 – 91 KIAS             |

6. There should be no Yellow band between the Red and the White/Green bands (Reference image below).



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### 7.6.3 Static Port Vertical Speed (Rate of Climb) Test

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

| Vertical Speed, feet/minute | Allowed tolerance, $\pm$ feet/minute |
|-----------------------------|--------------------------------------|
| 2000                        | 100                                  |
| 1000                        | 50                                   |
| 500                         | 45                                   |
| 200                         | 45                                   |
| 0                           | 45                                   |
| -200                        | 45                                   |
| -500                        | 45                                   |
| -1000                       | 50                                   |
| -2000                       | 100                                  |

### 7.6.4 OAT Probe Check

Check the outside air temperature (OAT) measurement shown on the PFD to ensure it reads ambient temperature, within  $\pm 2.0$  degrees (reference a second thermometer for ambient temperature comparison).

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

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## 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 and the unit must be calibrated. 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/GMU Calibration Procedures

### GRS/GMU Recalibration Criteria

There are six calibration procedures available for the GRS 77 and GMU 44:

- Pitch/Roll Offset: (Procedure A1, PROVIDED IN SECTION 7.7.2)
- Pitch/Roll Offset, Manual Entry: (Procedure A2, NOT PROVIDED)
- Magnetometer Calibration: (Procedure B, PROVIDED IN SECTION 7.7.4)
- Heading Offset Compensation: (Procedure C, NOT PROVIDED)
- Engine Run-Up Vibration Test: (Procedure D, PROVIDED IN SECTION 7.7.5)
- Magnetometer Interference Test: (Procedure E, PROVIDED IN SECTION 5.13.4)

### **NOTE:**

Procedures A2 and C are not required and should not be performed on DA 40 aircraft.

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

| Condition                                                                                                                 | Calibrations Required                               |                                                    |                                                    |
|---------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|----------------------------------------------------|
|                                                                                                                           | Procedure A1:<br>GRS 77<br>Pitch/Roll<br>Offset     | Procedure B:<br>GRS/GMU<br>Magnetic<br>Calibration | Procedure D:<br>Engine Run-up<br>Vibration<br>Test |
| GMU 44 was removed and reinstalled. (no change in serial number)                                                          | None Required.<br>Continue to GRS/GMU Test section. |                                                    |                                                    |
| GMU 44 was replaced with new unit.<br>(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.<br>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                                                  |

## 7.7.2 Procedure A1: GRS 77 Pitch/Roll Offset Calibration

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

1. Level the aircraft to within  $\pm 0.25^\circ$  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.

---

The Magnetometer Calibration Procedure (Calibration Procedure B) must be carried out at a site that is determined to be free of magnetic disturbances. If it is unsure whether the site is ‘clean’ the technician should verify that the site is ‘clean’ by following the guidance provided in Section 7.7.3. The technician may skip Section 7.7.3 if the site condition is acceptable.

### **7.7.3 Compass Rose Evaluation of Magnetic Disturbances for Magnetometer Calibration Procedure (Optional)**

#### **NOTE:**

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

A G1000-equipped DA 40 airplane can be used to evaluate a candidate site for magnetic disturbances and determine whether it is a suitable location to perform the magnetometer calibration procedure. The magnetometer calibration procedure itself contains the logic to simultaneously survey the location for magnetic cleanliness while it is computing the magnetometer calibration parameters.

The G1000-equipped DA 40 used to evaluate the site must have already completed the pitch/roll offset compensation procedure (Procedure A-1). However, prior completion of the Magnetometer Calibration Procedure (Procedure B) is not required.

In order to evaluate a candidate site, the Magnetometer Calibration Procedure must be performed twice: once turning clockwise around the site, and once turning counter-clockwise. Both times, the procedure should be conducted as described in Section 7.7.4 of this document, with the exception of the direction of turns around the site.

#### **NOTE**

Although Section 7.7.4 indicates that the Magnetometer Calibration Procedure should be performed by making a series of clockwise turns around the site, the procedure can also be performed by making counter-clockwise turns for the purpose of evaluating the site for magnetic disturbances.

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

If, upon completion of the Magnetometer Calibration Procedure in either of the two directions, the PFD displays either the “MAG FIELD AT SITE NOT UNIFORM”, or “MAG FIELD AT SITE DIFFERS FROM IGRF MODEL” message, then the site contains magnetic disturbances that are too large.

### 7.7.4 Procedure B: GRS 77/GMU 44 Magnetic Calibration

Procedure A-1 must first be successfully accomplished before performing Procedure B, only for situations where the GRS 77 was replaced with a new unit.

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. If the compass rose condition is not known, it is recommended that the technician follow the guidance in Section 7.7.4.

1. Start the aircraft engine following the procedures referenced in the G1000/DA40 AFMS.
2. After aircraft engine startup, taxi the aircraft to a properly calibrated compass rose.
3. At the compass rose, align the aircraft to a heading of magnetic north ( $\pm 5^\circ$ ).

#### 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.

4. Restart the PFD and MFD in configuration mode.
5. Go to the GRS Page Group on the PFD.



6. Select the GRS/GMU Calibration page and enter the following softkey password:
  - a) 9
  - b) 10
  - c) 11
  - d) 12 (Far Right softkey)

Note that engine instruments may be monitored at this page.

- 
7. Activate the cursor and highlight the SELECT PROCEDURE window and select MAGNETOMETER.
  8. Press the ENT button.
  9. Use the cursor to highlight the BEFORE CALIBRATION window.
  10. 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.
  11. The PFD display advises the operator when to turn the aircraft, when to stop, and when to turn again.
  12. Upon instruction to turn, taxi the aircraft in a right turn. After approximately 25° to 30° of turn from the last heading, the PFD display advises the operator to stop the aircraft.

**NOTE**

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

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

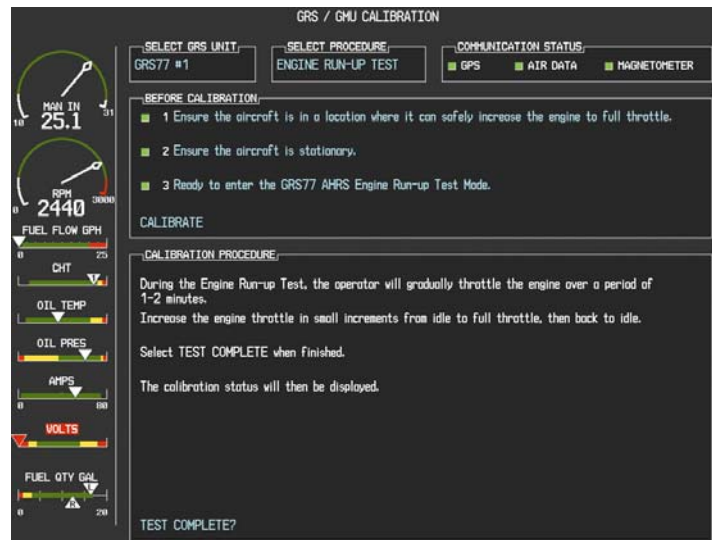
**NOTE**

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 30 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.”

14. 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.
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.

### 7.7.5 Procedure D: Engine Run-Up Vibration Procedure

Calibration Procedure D must be performed in order to guarantee that the AHRS mounting is sufficiently rigid and insensitive to vibration.



1. 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 one is completed or confirmed. When the CALIBRATE field is blinking, press the ENT key to begin the procedure.
2. The PFD display instructs the operator to gradually increase power from idle to full throttle and back to idle over a period of 2-4 minutes.
3. 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.
4. 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 associated numeric values are displayed on the PFD.

#### NOTE

Should a failure occur, the technician may perform the Engine Run-up test up to 3 times successively before corrective action must be taken. 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.
5. Press the ENT key on the PFD to conclude this procedure and proceed to Section 7.7.6.

## 7.7.6 GRS/GMU Test

The aircraft can now be taxied back and the engine can be shut down for final testing. Restart both displays in normal mode to conduct final system checks. When the PFD powers up in normal mode, the AHRS attitude and heading information displayed should become valid within 1 minute of power-up, as shown in Figure 7-5 (provided both GPS receivers have a valid position; if GPS is unavailable, AHRS initialization may take as long as 2 minutes).



Figure 7-5. Normal Mode AHRS Check

Test the AHRS reversionary paths by pressing the red reversionary mode button on the audio panel. Ensure that both displays have valid AHRS information, as shown in Figure 7-6.



Figure 7-6. Reversionary Mode AHRS Information

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

---

## **7.8 GDL 69 XM Data Link**

### **Original GDL 69 is Reinstalled**

No software or configuration loading is required if the removed GDL 69 is re-installed. Continue to the GDL 69 Test procedure.

### **New GDL 69 is Installed**

If a new GDL 69 (new serial number) is installed, the correct software and configuration files must be loaded to the unit, then the XM Satellite Radio subscription must be reactivated. See Section 3.6.3 and the XM Activation Instructions listed in Table 1-2.

#### **7.8.1 GDL 69 Test**

If an XM Satellite Radio subscription has already been activated for the GDL 69, then power up the G1000 and go to the AUX – XM INFORMATION page and verify that the GDL 69 is working properly. Refer to the Cockpit Reference Guide for details on XM Radio weather and music operation.

If the GDL 69 is replaced (new unit), the owner must re-activate the subscription, using the new GDL 69's Radio ID number(s). Refer to the GDL 69/69A XM Satellite Radio Activation Instructions, Garmin document 190-00355-04 for details on the activation process.

As a final operations check, make sure there are no MANIFEST errors shown on the PDF for the GDL 69.

---

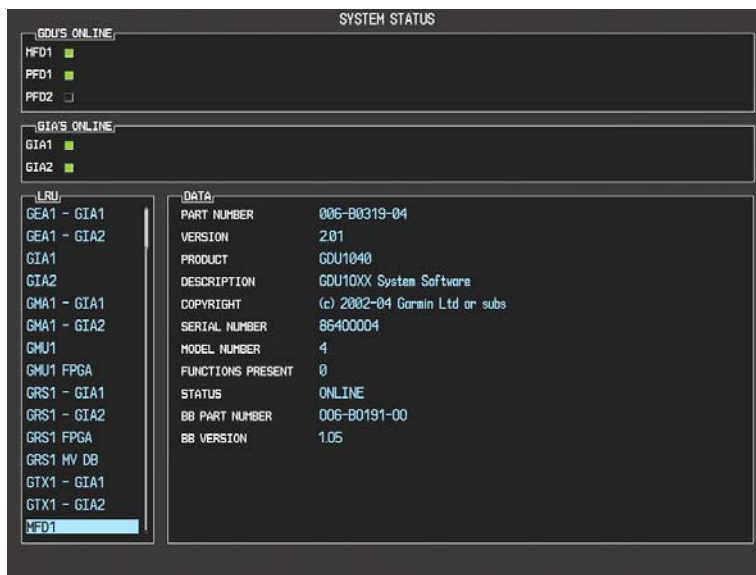
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## 8 System Return to Service Procedure

### 8.1 Software Verification

After reinstalling any G1000 LRU, verify the correct LRU software part numbers and versions against the numbers listed on the appropriate General Arrangement drawing (see Table 1-2).

1. Start the G1000 system in configuration mode.



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

2. The PFD's System Status page shows a list of LRUs in the LRU window. Activate the cursor and highlight the LRU window. Use the FMS knob to scroll through the list in the window and select the following LRUs.

| <u>LRU</u>     | <u>SW VER OK</u> | <u>LRU</u>             | <u>SW VER OK</u> |
|----------------|------------------|------------------------|------------------|
| PFD1           | _____            | GMA1                   | _____            |
| PFD1 FPGA      | _____            | GMU1                   | _____            |
| MFD1           | _____            | GMU1 FPGA              | _____            |
| MFD1 FPGA      | _____            | GDL69                  | _____            |
| GIA1           | _____            | GFC CERT R M*          | _____            |
| GIA2           | _____            | GFC CERT R C*          | _____            |
| GPS1           | _____            | GFC CERT PT M*         | _____            |
| GPS2           | _____            | GFC CERT PT C*         | _____            |
| GRS1           | _____            | GFC CERT P M*          | _____            |
| GRS1 FPGA      | _____            | GFC CERT P C*          | _____            |
| GIA1 AUDIO     | _____            | GSA PTCH C – GIA1*     | _____            |
| GIA2 AUDIO     | _____            | GSA PTCH M – GIA1*     | _____            |
| GFC CERT GIA1* | _____            | GSA PTCH TRM C – GIA1* | _____            |
| GFC CERT GIA2* | _____            | GSA PTCH TRM M – GIA1* | _____            |

---

|           |       |                    |       |
|-----------|-------|--------------------|-------|
| GTX1      | _____ | GSA ROLL C – GIA1* | _____ |
| GEA1      | _____ | GSA ROLL M – GIA1* | _____ |
| GDC1      | _____ |                    |       |
| GDC1 FPGA | _____ |                    |       |

\*GFC 700 Aircraft only

3. The software part number and version is displayed in the DATA window. Compare this to the software configuration shown in the appropriate General Arrangement drawing (see Table 1-2).

### **IMPORTANT**

It is essential that the software versions be checked and matched against the listed versions in the appropriate General Arrangement drawing. Software Configuration is a critical part of the G1000 operation and must be verified before returning an aircraft to service.

## 8.2 Backup Path System Testing

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.

- Start the G1000 in normal mode.
- Before starting, create a simple Direct-To flight plan to an airport or other waypoint that is greater than 31 NM from the present aircraft position. Verify that the phase of flight displayed on the GPS CDI is ENR.
- Verify that no 'Backup Path failure' alerts are present. If they are, troubleshoot per Section 5.6 before continuing. All backup paths must be operational before returning the aircraft to service.

### 8.2.1 GPS Failure Test

This test verifies that the system responds appropriately to GPS position losses.

| Step                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Single GPS Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Place a shroud over the GPS antenna for GIA1 to prevent signal reception. Verify loss of signal on MFD AUX page 3.</li><li>2. Check for desired results.</li><li>3. Remove shroud from the GIA1 GPS antenna.</li><li>4. Place a shroud over the GPS antenna for GIA2 to prevent signal reception. Verify loss of signal on MFD AUX page 3.</li><li>5. Check for desired results.</li><li>6. Remove shroud from the GIA2 GPS antenna.</li></ol> | <p>GPS Failure – For each of the specified GPS failure conditions, the following shall remain valid on the PFD throughout the procedure:</p> <ul style="list-style-type: none"><li>✓ Attitude and Heading from AHRS.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT from Air Data Computer.</li><li>✓ GPS Course Deviation Indicator remains valid on PFD.</li><li>✓ Press the ALERTS softkey and verify that the "AHRS1 GPS – AHRS using backup GPS source" alert is given. (GPS1 failure only)</li></ul>                                                                                                                                                                                                                                                                                                                                                                           |
| <p>Dual GPS Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Cover both GPS antennas. Verify loss of signal on MFD AUX page 3.</li><li>2. Check for desired results.</li><li>3. Remove shrouds from GPS antennas.</li><li>4. Allow both receivers to re-acquire satellite signals before continuing.</li></ol>                                                                                                                                                                                                | <p>Dual GPS Failure – For a dual GPS failure, the following shall occur:</p> <ul style="list-style-type: none"><li>✓ GPS CDI is removed</li><li>✓ HSI flags DR on PFD, all GPS data AMBER.</li><li>✓ Attitude and Heading remain valid from AHRS.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid from Air Data Computer.</li><li>✓ GPS NAV LOST alert given (press ALERTS softkey)</li><li>✓ TAWS N/A aural alert &amp; annunciation given.*</li></ul> <p>When a GPS satellites are re-acquired, verify that the INTEG OK annunciation is given on the HSI in white for a brief period of time then disappears.</p> <p>After ~10 seconds of stable GPS position reacquisition, verify the TAWS AVAILABLE aural alert is given.</p> <p>Verify that the system returns to normal navigation mode (GPS CDI restored, DR annunciation removed, &amp; GPS data magenta).</p> |

\*If equipped.

## 8.2.2 GIA Failure Test

This test verifies redundant systems operate as intended.

| Step                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Single GIA Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Remove power from GIA1 by pulling NAV/GPS1 and COM1 breakers.</li><li>2. Check for desired results.</li><li>3. Restore power to GIA1. Allow GPS1 to re-acquire satellites.</li><li>4. Remove power from GIA2 by pulling NAV/GPS2 and COM2 breakers.</li><li>5. Check for desired results.</li><li>6. Restore power to GIA2. Allow GPS2 to re-acquire satellites.</li></ol> | <p>GIA1 Failure – For a GIA1 failure, <i>only</i> the following shall flag invalid:</p> <ul style="list-style-type: none"><li>✓ COM1/NAV1 field (PFD &amp; MFD).</li><li>✓ NAV1 CDI loses deviation bar (PFD only).</li><li>✓ Red AFCS status annunciation given.*</li><li>✓ “AHRS1 using backup GPS” alert given.</li></ul> <p>GIA2 Power Failure – For a GIA2 failure, <i>only</i> the following shall flag invalid:</p> <ul style="list-style-type: none"><li>✓ COM2/NAV 2 field (PFD &amp; MFD).</li><li>✓ NAV2 CDI loses deviation bar (PFD only).</li><li>✓ Red AFCS status annunciation given.*</li><li>✓ “AHRS not receiving backup GPS information” alert is given.</li><li>✓ ADF/DME windows flag invalid.*</li></ul>               |
| <p>Dual GIA Failure Conditions:</p> <ol style="list-style-type: none"><li>1. Remove power from both GIA units.</li><li>2. Check for desired results.</li><li>3. Restore power to both GIA units.</li></ol>                                                                                                                                                                                                                                                | <p>Dual GIA Failure – For a dual GIA failure, the following shall occur:</p> <ul style="list-style-type: none"><li>✓ COM1/NAV1 &amp; COM2/NAV2 fields flag invalid.</li><li>✓ GPS CDI flags DR on PFD, all GPS data AMBER</li><li>✓ Verify that “DR” appears in amber superimposed over the ownship icon on the MFD map and PFD inset map.</li><li>✓ NAV1 &amp; NAV2 CDI loses deviation bar.</li><li>✓ XPDR field flags invalid on PFD.</li><li>✓ Engine Instrument field flags invalid on MFD.</li><li>✓ All AHRS &amp; ADC fields remain valid.</li><li>✓ “AHRS1 using backup GPS” alert given.</li><li>✓ Red AFCS status annunciation given.*</li><li>✓ TAWS FAIL annunciation given.*</li><li>✓ ADF/DME windows flag invalid.*</li></ul> |

\*If equipped.

### 8.2.3 Display Failure Test

This test verifies redundant systems operate as intended, including automatic transition to reversionary mode.

| Step                                                                                                                      | Desired Result                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MFD Display Failure Conditions:<br>1. Remove power from MFD.<br>2. Check for desired results.<br>3. Restore power to MFD. | The following shall occur when power is removed from the MFD:<br><ul style="list-style-type: none"><li>✓ PFD switches to reversion mode.</li><li>✓ AFCS disconnects.*</li><li>✓ Attitude and Heading remain valid on PFD.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid on PFD.</li><li>✓ Valid Engine Instrumentation appears on PFD.</li><li>✓ XPDR field remains valid on PFD.</li><li>✓ COM2/NAV2 fields flag invalid.</li><li>✓ NAV2 CDI deviation bar is removed.</li><li>✓ ADF/DME windows flag invalid.*</li><li>✓ "GDL 69 Fail" alert is given.*</li><li>✓ XTALK ERROR alert is given.</li></ul> |
| PFD Display Failure Conditions:<br>1. Remove power from PFD.<br>2. Check for desired results.<br>3. Replace power to PFD. | The following shall occur when power is removed from the PFD:<br><ul style="list-style-type: none"><li>✓ MFD switches to reversion mode.</li><li>✓ AFCS disconnects.*</li><li>✓ Attitude and Heading remain valid on the MFD.</li><li>✓ Airspeed, Altitude, Vertical Speed, and OAT remain valid on the MFD.</li><li>✓ MFD retains engine instrumentation.</li><li>✓ Valid XPDR field appears on MFD.</li><li>✓ COM1/NAV 1 fields flag invalid.</li><li>✓ NAV1 CDI deviation bar is removed.</li><li>✓ XTALK ERROR alert is given.</li></ul>                                                                                   |

\*If Equipped.

## 8.2.4 G1000 Backup Path Tests

Before performing these tests, remove power from both displays by pulling the PFD and MFD circuit breakers. Reboot the PFD and MFD while holding the ENT key on each display until the words INITIALIZING SYSTEM appear.

1. In configuration mode, go to the GDU Page Group on the PFD.
2. On the PFD, activate the cursor and select PFD1 in the SELECT UNIT field and press ENT.
3. Observe the GRS 77 and GDC 74 DATA indicators in the ARINC 429 window.
4. Verify both indicators are GREEN, indicating the channels are receiving data as shown below:

RS-232 / ARINC 429 CONFIG

SELECT UNIT  
PFD1

RS-232

| CHANNEL | INPUT                               | OUTPUT                         |
|---------|-------------------------------------|--------------------------------|
| CHNL 1  | DATA SET OFF ACTIVE OFF             | SET OFF ACTIVE OFF             |
| CHNL 2  | DATA SET GDU DEBUG ACTIVE GDU DEBUG | SET GDU DEBUG ACTIVE GDU DEBUG |

ARINC 429

| CHANNEL | SPEED                     | DATA                         |
|---------|---------------------------|------------------------------|
| IN 1    | DATA SET High ACTIVE High | SET GRS77 #1 ACTIVE GRS77 #1 |
| IN 2    | DATA SET Low ACTIVE Low   | SET GDC74 #1 ACTIVE GDC74 #1 |

SDI Common Common

5. On the PFD, activate the cursor and select MFD1 in the SELECT UNIT field and press the ENT key.
6. Repeat Steps 3 and 4.

7. On the PFD, go to the GIA Page Group. Go to the RS-232 / ARINC 429 CONFIG page.
8. Verify that GIA1 is selected in the SELECT UNIT field.
9. Observe the data indicators for all configured RS-232 and ARINC 429 channels (except GIA DEBUG), including the GRS 77 and GDC 74 ARINC 429 channels.
10. Verify all DATA indicators for configured channels are GREEN, indicating the channels are receiving data as shown below:

RS-232 / ARINC 429 CONFIG

SELECT UNIT  
GIA1

RS-232

| CHANNEL | DATA                                 | INPUT            | ACTIVE           | OUTPUT           | ACTIVE           |
|---------|--------------------------------------|------------------|------------------|------------------|------------------|
| CHNL 1  | <span style="color: green;">■</span> | GDC74 #1         | GDC74 #1         | GDC74 #1         | GDC74 #1         |
| CHNL 2  | <input type="checkbox"/>             | GIA DEBUG        | GIA DEBUG        | GIA DEBUG        | GIA DEBUG        |
| CHNL 3  | <input type="checkbox"/>             | OFF              | OFF              | OFF              | OFF              |
| CHNL 4  | <input type="checkbox"/>             | OFF              | OFF              | OFF              | OFF              |
| CHNL 5  | <span style="color: green;">■</span> | GTX 33 #1 w/ TIS | GTX 33 #1 w/ TIS | GTX 33 #1 w/ TIS | GTX 33 #1 w/ TIS |
| CHNL 6  | <span style="color: green;">■</span> | GRS77 #1         | GRS77 #1         | GRS77 #1         | GRS77 #1         |
| CHNL 7  | <span style="color: green;">■</span> | GMA1347 #1       | GMA1347 #1       | GMA1347 #1       | GMA1347 #1       |
| CHNL 8  | <input type="checkbox"/>             | OFF              | OFF              | OFF              | OFF              |

ARINC 429

| CHANNEL | DATA                                 | SPEED  | ACTIVE | DATA     | ACTIVE   |
|---------|--------------------------------------|--------|--------|----------|----------|
| IN 1    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| IN 2    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| IN 3    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| IN 4    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| IN 5    | <span style="color: green;">■</span> | Low    | Low    | GDC74 #1 | GDC74 #1 |
| IN 6    | <span style="color: green;">■</span> | High   | High   | GRS77 #1 | GRS77 #1 |
| IN 7    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| IN 8    | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| OUT 1   | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| OUT 2   | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| OUT 3   | <input type="checkbox"/>             | Low    | Low    | OFF      | OFF      |
| SDI     | <input type="checkbox"/>             | Common | Common |          |          |

SET>ACTV
ACTV>SET
CLR NV

11. Activate the cursor and select GIA2 in the SELECT UNIT field, then press the ENT key.
12. Repeat Steps 9 and 10.

13. On the PFD, go to the CAN / RS-485 CONFIGURATION page in the GIA Page Group.
14. Verify that GIA1 is selected in the SELECT UNIT field.
15. Observe the data indicators for all configured RS-485 channels.
16. Verify all DATA indicators for configured channels are GREEN, indicating the channels are receiving data as shown:

CAN / RS-485 CONFIGURATION

SELECT GIA UNIT  
GIA1

CAN

| CHANNEL | INPUT DATA               |     | ACTIVE | OUTPUT DATA |        | SPEED |        |
|---------|--------------------------|-----|--------|-------------|--------|-------|--------|
|         | DATA                     | SET |        | SET         | ACTIVE | SET   | ACTIVE |
| CHNL 1  | <input type="checkbox"/> | OFF | OFF    | OFF         | OFF    | 0     | 0      |
| CHNL 2  | <input type="checkbox"/> | OFF | OFF    | OFF         | OFF    | 0     | 0      |

RS-485

| CHANNEL | INPUT DATA                          |        | ACTIVE | OUTPUT DATA |        |
|---------|-------------------------------------|--------|--------|-------------|--------|
|         | DATA                                | SET    |        | SET         | ACTIVE |
| CHNL 1  | <input checked="" type="checkbox"/> | GEA 1  | GEA 1  | GEA 1       |        |
| CHNL 2  | <input type="checkbox"/>            | OFF    | OFF    | OFF         |        |
| CHNL 3  | <input type="checkbox"/>            | OFF    | OFF    | OFF         |        |
| CHNL 4  | <input checked="" type="checkbox"/> | GFC700 | GFC700 | GFC700      |        |
| CHNL 5  | <input type="checkbox"/>            | OFF    | OFF    | OFF         |        |

CLOCKED DATA INTERFACE

| CHANNEL | INPUT/OUTPUT DATA |        |
|---------|-------------------|--------|
|         | SET               | ACTIVE |
| CHNL 1  | OFF               | OFF    |

SET>ACTV/ACTV>SET

17. Activate the cursor and select GIA2 in the SELECT UNIT field, then press the ENT key.
18. Repeat Steps 15 and 16.
19. Backup path testing is complete.

## 8.3 GFC 700 Ground Checkout

The following procedures verify the proper operation of the GFC 700 AFCS, after maintenance has been performed. The technician performing these checks should be thoroughly familiar with the G1000 and GFC 700 by studying the following references:

- G1000/DA40 Cockpit Reference Guide, Garmin P/N 190-00324-07
- G1000/GFC700 in DA40 Airplane Flight Manual Supplement, Garmin P/N 190-00492-10

### 8.3.1 Pre-Flight Test

1. Power down the G1000 system using the Avionics Master, then the BAT-side aircraft master switch. If a ground power unit is being used, it too must be powered off. Wait 30 seconds then restore power to the system. The GFC 700 will begin an automatic pre-flight test after AHRS and ADC parameters become valid.
2. Verify that a white 'PFT' annunciation is displayed on the PFD, as shown in Figure 8-2.



Figure 8-2. Pre-Flight Test

#### NOTE:

A red AFCS ( AFCS ) annunciation may be displayed momentarily before PFT starts. This indicates that the Autopilot and Manual Electric Trim are not available (due to AHRS initialization, GFC 700 system failure, power loss, or because PFT has not been performed)

3. Upon successful completion of the test, an aural alert will sound and the annunciation will clear. For even-interval system power-up, the aural alert is generated by GIA 63 #1, whereas odd-interval system power-ups are generated GIA 63 #2.
4. Repeat Step 1 to test the PFT aural alert for the opposite GIA 63.
5. Continue to Section 8.3.2. (If the 'PFT' annunciation turns red, the test has failed).
6. If the aural alert is not heard, but pre-flight testing passed, engage the Autopilot by pressing the AP key and disengage the Autopilot by pressing the AP key again. Visual and aural disconnect alerting should occur. If no alert is heard, the audio interface between the GIA and audio panel should be checked.

---

### 8.3.2 AFCS Switch Checks

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

1. Actuate both halves of the autopilot trim (AP TRIM) switch. The trim clutch should engage and the trim wheel should drive in the requested direction. Check operation in both directions.
2. Press the AP DISC button and hold while actuating the AP TRIM switch. Trim should not run and the trim wheel should rotate freely when moved manually. Release the AP DISC button.
3. Engage the Autopilot by pressing the AP key on the MFD. Press and hold the left half of the AP TRIM switch. The Autopilot should disengage and the trim wheel should not move and rotate freely when moved manually.
4. Engage the Autopilot again by pressing the AP key on the MFD. The pitch and roll clutches should engage, resisting movement of the control stick. Press and hold the CWS switch. The control wheel should now move freely when moved manually.
5. Release the CWS switch and press the AP DISC switch. The Autopilot should disengage with a flashing amber 'AP' annunciation on the PFD, accompanied by an aural alert. Verify that the control stick is free in pitch and roll axes.
6. Engage the Autopilot again by pressing the 'AP' key on the MFD. Pull the AFCS circuit breaker. The Autopilot should disengage, with abnormal disconnect alerting, consisting of a continuous disconnect tone and a flashing red/white 'AP' annunciation. No AFCS annunciations (e.g. AFCS, PFT, Mistrim) should remain on the PFD. Press the A/P DISC switch to cancel the abnormal alert. Reset the AFCS breaker and watch the pre-flight test sequence again.
7. Press the GA button, on the throttle lever. 'GA' should be annunciated on the PFD for both pitch and roll modes and the command bars should indicate a wings-level climb to 7 degrees.
8. Press the FD key on the MFD to deactivate the Go Around mode, and reset the Flight Director. Press the AP key to engage the Autopilot. Press the CWS button for a few seconds and release; verifying there is no residual force on the control stick for the pitch axis. Extend the flaps to approach position. The trim wheel should immediately run in the **DOWN** direction. Now retract the flaps. The trim should immediately run in the **UP** direction.
9. Disengage the Autopilot by pressing the AP DISC switch. Now engage VS mode by pressing the VS key on the MFD. Verify the PFD display 'VS' in green and indicates a pitch reference of '0 FPM'.
10. Press the FLC key on the MFD and verify that 'FLC' is annunciated on the PFD in green with a reference of 70 KTS (NOTE: This is the minimum speed reference for the GFC 700).
11. Press the ALT key on the MFD and verify that the 'ALT' annunciation is displayed in green on the PFD with an altitude reference equal to the aircraft altitude (within the nearest 20 feet).
12. Press the FD key and verify that the mode annunciations and command bars are removed from the display.

---

### 8.3.3 Autopilot Clutch Overpower Check

#### NOTE:

The GFC 700 uses electronic torque limiting as well as mechanical slip clutches to limit the maximum servo effort. When the system is on the ground, the electronic torque limiting is removed, allowing manual checks of the slip-clutch settings.

1. Engage the Autopilot by pressing the AP key on the MFD.
2. Apply force to the control stick to determine if the Autopilot clutches can be overpowered in pitch and roll. If the Autopilot clutches cannot be overpowered, check the servo clutch torque settings.
3. Actuate the AP TRIM switch (this causes an Autopilot disconnect). While the trim is running, grasp the aircraft pitch trim wheel and verify that the trim clutch can be overpowered. If it cannot be overpowered, check the trim servo clutch torque setting. Verify also that the trim wheel moves smoothly in both directions throughout the entire trim range during AP TRIM operation. If the trim wheel hesitates, this may indicate that the pitch trim clutch is slipping. First verify proper clutch setting and cable tension. If both clutch setting and cable tension are within tolerance, check the aircraft pitch trim system for excessive friction.

### 8.3.4 Manual Electric Trim Speed Check

1. Run AP TRIM in one direction until it runs against the stop.
2. Using a stop watch or equivalent device, time the trim speed from one end of travel to the opposite stop. The elapsed time should measure  $17 \pm 3$  seconds for each direction.

### 8.3.5 Autopilot Operation Checks

1. Engage the Autopilot by pressing the AP key on the MFD. Push the HDG knob in to synchronize the heading bug to the present aircraft heading on the HSI. Select Heading mode by pressing the HDG key on the MFD. The command bars should be level and the control wheel should be stationary (very slow movement acceptable, due to the aircraft not being perfectly level).
2. Turn the HDG knob to the left and right and check that the command bars move in the correct direction and the control wheel follows the command bars.
3. Push the CWS button and pull the control stick to the middle of the pitch control range. Release the CWS button. The Autopilot clutches should re-engage and hold the wheel stationary.
4. Holding the control stick lightly, press the NOSE UP key on the MFD twice, to increase the pitch reference. The command bars should move up 1 degree and the control wheel should begin moving aft. In some aircraft, the down spring may require manual assistance to get aft control stick movement.
5. Hold the control stick and press the CWS button, re-synchronizing the pitch reference and re-centering the control stick. Release the CWS button and check that servo clutches re-engage before releasing the control stick.
6. Press the NOSE DN key on the MFD twice. The command bars should command down and the control stick should begin moving forward. Hold the controls and press CWS to re-center the command bars and stop control stick movement.
7. With the Autopilot still engaged and the CWS button pressed, move the control stick to its aft limit. Release the CWS button and apply continuous forward pressure, slowly moving the control stick. After 1 or 2 seconds, the trim wheel should begin moving in a trim up direction.

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8. Grip the control stick and press the CWS button. Trim motion should stop. Move the control stick to the forward limit and release the CWS button. Now slowly pull back on the control stick. After a similar delay, the trim wheel should begin to trim down. Relief pressure on the wheel and the trim motion should stop. Check that the trim wheel is free to turn. Hold the control stick and press the AP DISC switch to disconnect the Autopilot.

## **8.4 Maintenance Records**

After conducting required return-to-service procedures 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 software loader card used to perform software loading or software updates.
- Record part and serial numbers of any LRU which was replaced.
- Record any database updates which were performed during maintenance.
- Any other applicable information related to the maintenance work performed on the aircraft.