GARMIN

G1000 NXi Integrated Avionics System
Line Maintenance Manual

Kodiak 100
System Software Version 2633.00 or later
2634.00 or later

190-02102-00 August 2021 Revision 4

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This manual supports line maintenance of G1000 NXi systems installed and configured with System Software Versions 2633 and 2634.03 or later for the Kodiak 100.

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Definition of Warnings, Cautions, and Notes

WARNING
A WARNING INDICATES INJURY OR DEATH IS POSSIBLE IF THE INSTRUCTIONS ARE NOT FOLLOWED.

CAUTION
A caution indicates damage to the equipment is possible.

NOTE
A note provides additional information.

WARNING
TURN OFF THE SYSTEM POWER BEFORE ENABLING OR DISABLING ELECTRICAL CONNECTIONS. REGARD ANY EXPOSED CONNECTOR, TERMINAL BOARD, OR CIRCUIT BOARD AS A POSSIBLE SHOCK HAZARD. COMPONENTS THAT RETAIN A CHARGE SHOULD ONLY BE DISCHARGED WHEN SUCH GROUNDING DOES NOT RESULT IN EQUIPMENT DAMAGE. IF A TEST CONNECTION TO ENERGIZED EQUIPMENT IS REQUIRED, MAKE THE TEST EQUIPMENT GROUND CONNECTION BEFORE PROBING THE VOLTAGE OR SIGNAL TO BE TESTED.

WARNING
DO NOT, UNDER ANY CIRCUMSTANCES, REACH INTO OR ENTER ANY ENCLOSED SPACES FOR THE PURPOSE OF SERVICING OR ADJUSTING THE EQUIPMENT WITHOUT IMMEDIATE PRESENCE OR ASSISTANCE OF ANOTHER PERSON CAPABLE OF RENDERING AID.

WARNING
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CAUTION
The GDU lens is coated with a special anti-reflective coating which is very sensitive to skin oils, waxes and abrasive cleaners. Cleaners containing ammonia will harm the anti-reflective coating. It is very important to clean the lens using a clean, lint-free cloth and a premium off the shelf LCD screen cleaner that is anti-static, alcohol and sodium lauryl sulfate free and safe for AR coatings.

CAUTION

The GIA contains a lithium battery that must be recycled or disposed by professional services according to applicable governing laws.

NOTE

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NOTE

A single event upset (SEU) is an uncommanded change in state of the memory inside of an LRU. SEUs are normally caused by physical interactions between cosmic rays (high energy particles originating from outside of our atmosphere) and device memory. SEU occurrences are more common at high altitudes due to the proximity to where the cosmic rays originate. The change in memory state observed during an SEU can impact software program flow and/or it can change parameter values being processed.

NOTE

To protect against any SEUs, many Garmin LRUs incorporate hardware with Error Checking and Correcting (ECC) functionality. This hardware can detect an SEU and repair the changed memory state caused by the SEU. When SEUs are corrected in this manner, their occurrence does not interfere with operation of the equipment and typically goes unnoticed by the crew. In some rare cases however, an SEU might cause more errors than can be corrected by the ECC functionality. In this case, the LRU must be restarted to correct the error and a temporary disruption in LRU functionality might be seen. This restart will be performed automatically by the LRU. There is no maintenance action required as a result of such an SEU-driven restart, and the LRU is capable of resuming normal operation after the corrective restart.

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Record of Revisions

Revision	Date	Pages	Description
1	10/06/2017	All	Initial Release
2	04/23/2019	All	Comprehensive Revision to support latest software
3	04/13/2021	All	Comprehensive Revision for support of GDU 20.94
4	08/06/2021	All	Added notes to Section 3.

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1 INTRODUCTION

This manual contains line maintenance information for the Garmin G1000 NXi Integrated Avionics System installed in the Kodiak 100 aircraft.

NOTE

All screenshots shown in this manual are included for visual reference only and might not reflect the information displayed during actual G1000 NXi system operation.

1.1 Line Maintenance

Performing line maintenance on the G1000 NXi system consists of the following tasks:

- Loading and Configuring System Software
- Troubleshooting
- LRU Replacement
- Reloading Software and Configuration
- LRU Testing and Calibration
- LRU Periodic Maintenance

Line maintenance involves identification and replacement of a faulty LRU. The LRU is sent to Garmin for further diagnosis and repair. Component level LRU repair is beyond the scope of maintenance described in this manual.

1.2 Support Equipment

Standard avionics support equipment is used to perform line maintenance.

1.3 Special Tools

No special tools are required to perform line maintenance.

1.4 Required Software

The G1000 NXi system is functional only after airframe-specific software and configuration have been loaded. The correct loader card with the correct software version is required. The system includes optional features that require the correct software enablement card for activation. Refer to *Section 3*.

1.5 Materials

No materials are needed.

1.6 Consumables

No consumable items are required.

1.7 Expendables

No expendable items are required.

1.8 Supplemental Documents

The following documents supplement the information contained in this manual:

- Kodiak 100 Pilot's Guides, Garmin part numbers 190-02100-00 and 190-02534-01
- SN21-01 Kodiak 100 G1000 Software Configurations and Updates.
- Kodiak 100 Aircraft Maintenance Manual
- Kodiak 100 Airplane Wiring Diagrams
- Garmin LRU Installation Manuals listed in *Section 5*

1.9 Garmin Technical Support

Contact Garmin at the following for technical support:

Garmin Aviation Support:

- Hours: 7 am to 7 pm (CT), Monday - Friday
- Phone: 1-866-739-5687
- Fax: 1-913-397-8282
- Email: avionics@garmin.com

For Asia/Australia (APAC):

Dealer Sales and Support:

- Phone: 1800 244 143
- Fax: 02 9679 3450
- Email: au.order@garmin.com

For EMEA:

Aviation - Garmin Europe:

- Phone: +44 (0)37 0850 1243
- Hours: 8:30 am to 4:30 pm, Western European Time (GMT/UTC), Monday - Friday
- Fax: +44 (0)23 8052 4004
- Email: avionics.europe@garmin.com

NOTE

'Aviation Warranty Policies and Procedures', Garmin document number M02-60069-00, contains information regarding warranties, field repairs, factory repairs/exchanges and service bulletins. The document is available in the Dealer Resource Center at dealers.garmin.com.

1.10 Manual Distribution

The latest revision of this manual can be accessed in the Dealer Resource Center at dealers.garmin.com.

1.11 Activation of Garmin Connext Satellite Services

Activation of a GSR 56 or GDL 69A SXM unit for Garmin Connext Satellite Services can be done at flyGarmin.com.

NOTE

In addition to Garmin Connext Satellite Services activation, refer to 'GDL69 Series SiriusXM Satellite Radio Activation Instruction' (190-00355-04).

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2 SYSTEM DESCRIPTION AND OPERATION

Basic knowledge about system operation is needed to perform line maintenance. Refer to the G1000 NXi Pilot's Guide for the Kodiak 100 to locate complete operating information not covered in this section.

2.1 G1000 NXi Integrated Avionics System Description

This section provides an overview of the G1000 NXi Integrated Avionics System as installed in the Kodiak 100. The G1000 NXi system is an integrated flight control system that presents flight instrumentation, position, navigation, communication, and identification information to the pilot through large-format displays. The Kodiak 100 G1000 NXi systems consists of the Line Replaceable Units (LRUs) listed in *Table 2-1*. System level block diagrams are shown in *Figure 2-1* and *Figure 2-2*.

Table 2-1. Kodiak 100 G1000 NXi System LRUs

Part Number	LRU	Type	Qty
011-03470-00	GDU 1050 Display Unit	Standard	3
011-03595-00	Flight Stream 510 Wireless Transceiver	Standard	1
011-00809-00	GMA 1347 Audio Panel	Standard	2
011-03568-20	GMA 1360D Audio Panel	Standard	2
011-01020-10	GMC 710 AFCS Controller	Standard	1
011-01105-20	GIA 63W Integrated Avionics Unit	Standard	2
011-03711-00	GIA 64W Integrated Avionics Unit	Standard	2
011-03711-01	GIA 64W Integrated Avionics Unit	Standard	2
011-00831-00	GEA 71 Engine and Airframe Interface Unit	Standard	1
011-03682-00	GEA 71B Engine and Airframe Interface Unit	Standard	1
011-03303-00	GTX 345R Transponder	Standard	1
011-03303-01	GTX 345R Transponder	Standard	1
011-03732-00	GRS 79 Altitude and Heading Reference System	Standard	2
011-03734-00	GDC 72 Air Data Computer	Standard	2
011-00870-10	GMU 44 Magnetometer	Standard	2
011-04201-00	GMU 44B Magnetometer	Standard	2
011-00978-00	GTP 59 Outside Air Temperature Probe	Standard	2
011-01356-00	GTS 800 TAS/TCAS Traffic System	Optional	1

Table 2-1. Kodiak 100 G1000 NXi System LRUs

Part Number	LRU	Type	Qty
011-01768-20	GWX 70R Airborne Weather Radar	Optional	1
011-03997-00	GWX 75 Airborne Weather Radar	Optional	1
011-03177-10	GDL 69A SXM Satellite Radio Receiver	Optional	1
011-03177-15	GDL 69A SXM Satellite Radio Receiver	Optional	1
011-00877-20	GSA 80 Servo Actuator - Roll, Yaw	Standard	2
011-00878-20	GSA 81 Servo Actuator - Pitch, Pitch Trim	Standard	2
011-01904-00	GSM 86 Servo Mount - Pitch, Roll, Yaw, Pitch Trim	Standard	4

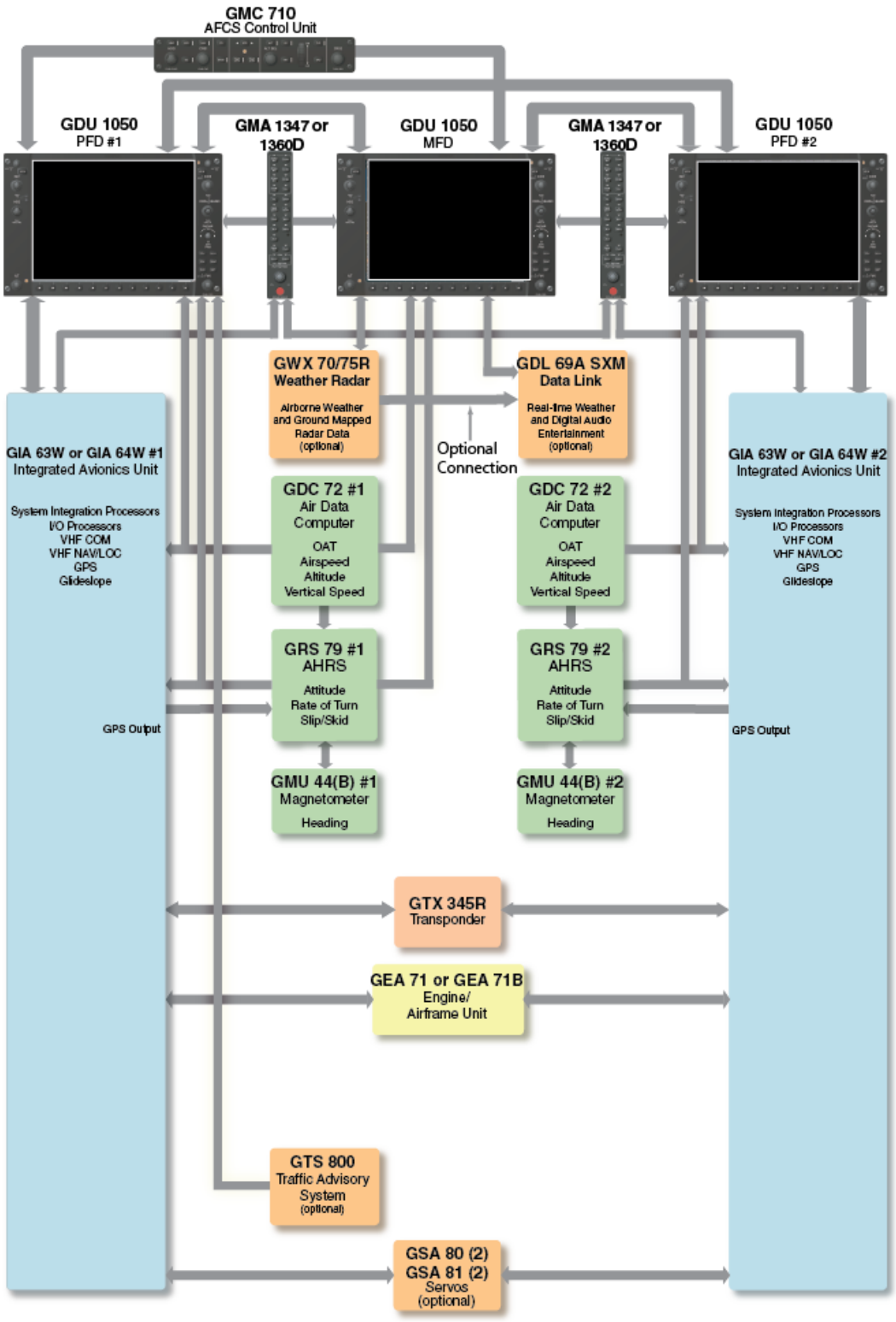

Figure 2-1. Kodiak 100 Block Diagram-1

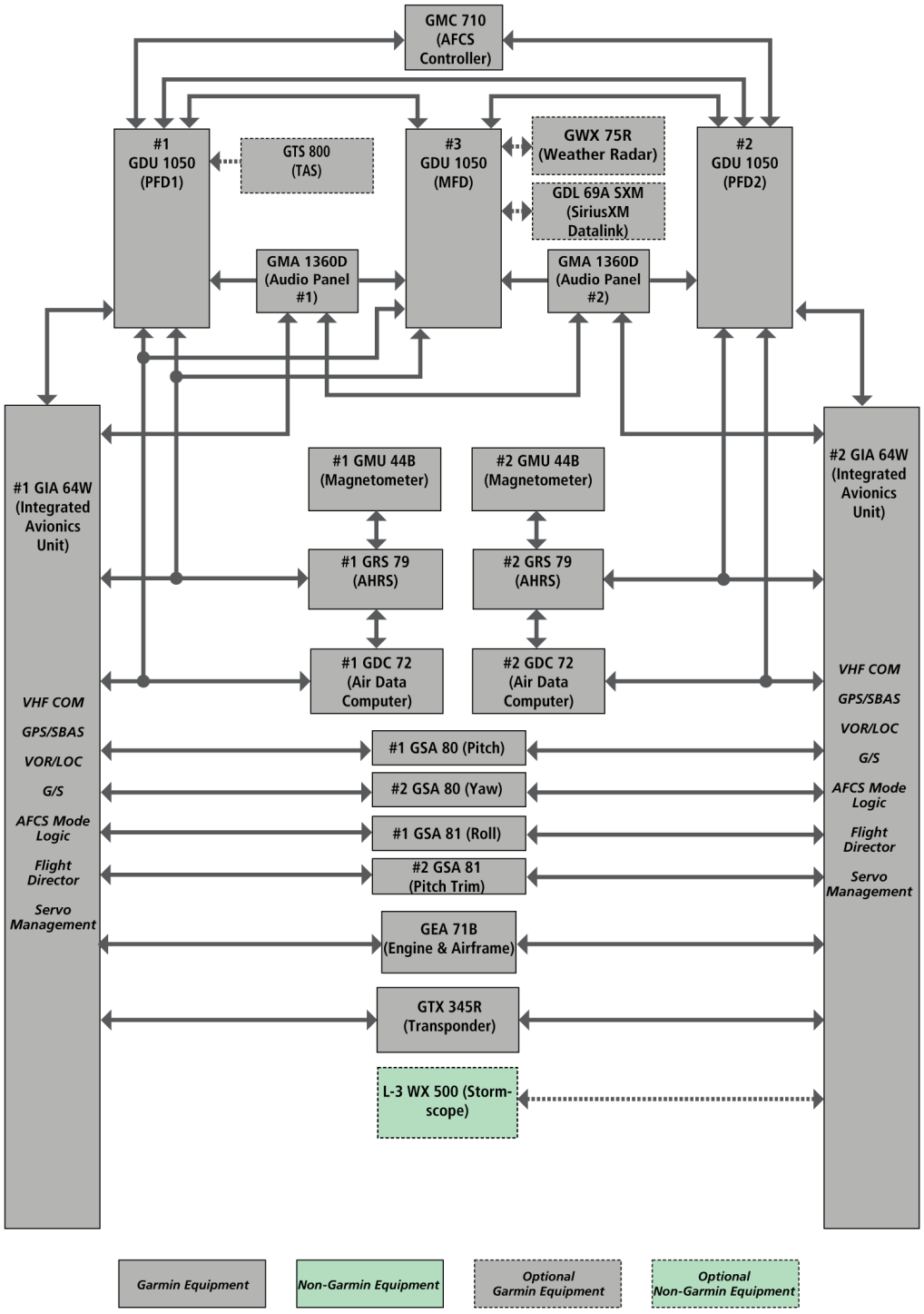

Figure 2-2. Kodiak 100 Block Diagram-2

2.2 LRU Descriptions

2.2.1 GDU 1050 Display Unit

The three GDU (Garmin Display Unit) 1050s are LCD screens with 1024 x 786 resolution. The GDU 1050 displays are installed in the Kodiak instrument panel. Two units are configured as PFD 1 and PFD 2, the third is configured as an MFD. All displays provide control and display of nearly all functions of the system. The PFD displays are located on either side of the MFD, with the stand-by instruments located to the left of PFD1. The two GMA 1360D Audio Panels are located inboard of each PFD. Additionally, a GMC 710 AFCS Controller is on the center instrument panel.

The GDL 69A SXM datalink and the GWX weather radars are connected to the MFD through a high-speed data bus (HSDB) Ethernet connection. The displays communicate with each other and the GIA units through a HSDB Ethernet connection as well. PFD1 communicates with the GTS 800 through a HSDB. The Garmin GTX 345R transponder communicates with the GIA through an RS-232 interface.

2.2.2 Flight Stream 510 Wireless Transceiver

The Flight Stream 510 is a Wi-Fi and Bluetooth capable multimedia card installed in the bottom SD card slot of an MFD. It sends position, velocity, time, attitude, heading, FIS-B, TIS-B traffic, Sirius XM audio control, Sirius XM weather data, and flight plan transfer to mobile devices by Bluetooth. The Flight Stream 510 can also interface with a mobile device using Wi-Fi pairing for the purpose of updating databases used by the GDUs. Bluetooth and Wi-Fi are mutually exclusive, with only one interface functional at a time. Connecting through Wi-Fi requires a pilot-configurable Wi-Fi Protected Access WPA2 security password. By updating databases wirelessly, new databases can be transferred to the G1000 NXi system without taking the data card out of the aircraft.

2.2.3 GMA 1347 Audio Panel

The GMA 1347 is a vertically oriented panel mounted audio control and marker beacon system. The system delivers reliability and versatility for all audio controlling functions. LED-illuminated push buttons and logical panel layout allow audio selection of NAV, COM, DME, ADF, MKR, TEL, AUX, and automatic warning audio in voice or tone annunciation. LED brightness is adjusted to a level appropriate for ambient cockpit light conditions automatically by the GDU or manually with radio lighting controls, depending upon installation connections. A failsafe circuit connects the pilot's headset and microphone directly to COM 1 in case power is interrupted or the unit is turned off.

2.2.4 GMA 1360D Audio Panel

The GMA 1360D is a vertically oriented panel-mounted audio controller and marker beacon system that collects, processes, and distributes audio signals between avionics, crew, and passengers. LED illuminated push buttons allow for the selection of active radios, as well as entertainment audio. LED brightness is adjusted to a level appropriate for ambient cockpit light conditions automatically by the GDU. The GMA 1360D is a high fidelity digital audio panel with improved circuitry that makes audio signals less prone to noise (e.g. whining sound of an alternator or blip sound from a radar). At the core of the GMA 1360D is a digital signal processor (DSP) that cleans up audio using advanced filtering techniques and provides VOX control for mic inputs. The GMA 1360D outputs feature high quality digital-to-analog converters and headset amplifier circuits that are used to minimize noise and distortion. The GMA 1360D provides a speaker output that may be used as a cockpit speaker or for a PA system to address passengers.

The GMA 1360D digitally records audio and plays the recordings back. The GMA 1360D provides an intercom communication system (ICS) which controls communication paths between pilot, copilot, and passengers. The ICS also allows independent volume adjustments for the pilot, copilot, and passengers. Additionally, there is a volume adjustment for the MKR, AUX, MUSIC, and TEL sources.

A failsafe circuit connects the pilot headset and microphone directly to the on-side COM when power is removed from the unit. This circuit will also connect Pilot PTT to the on-side MIC KEY and pilot headset to a failsafe warning audio input. The GMA 1360D is available as a dual audio panel installation. A GMA 1360D installation can provide redundancy and additional support for COMs, radios, or headset positions, as required by an installation. The GMA 1360D includes Bluetooth® technology, used to wirelessly connect smartphones and tablets to stream audio and make phone calls. The GMA 1360D also connects wirelessly to a VIRB XE, eliminating the need to install a headset audio cable.

2.2.5 GMC 710 AFCS Controller

The GMC 710 Autopilot Mode Controller provides pitch and roll commands and displays them on the PFDs. The mode logic and flight director calculations are performed by the Garmin GIA 64W Integrated Avionics Unit (IAU) and are displayed on the pilot's and copilot's GDU 1050 primary flight displays.

The AFCS function of the IAU supplies flight director steering commands and annunciations in relation to the active pitch and roll flight director modes. The AFCS system continuously monitors the flight director and autopilot functions for correct sensor data. If the flight director modes cannot be calculated, the flight director and autopilot will automatically disengage. If sensor data for the autopilot or yaw damper are not correct, these modes automatically disengage.

2.2.6 GIA 63W/GIA 64W Integrated Avionics Unit

The Integrated Avionics Unit (GIA) functions as the main communication hub, linking all LRUs with the on-side PFD. Each GIA contains a GPS SBAS receiver, VHF COM/NAV/GS receivers, a Flight Director (FD) and system integration microprocessors. The GIAs are not paired together and do not communicate with each other directly. An optional configuration is possible which will also interface with older equipment with analog, synchro, and other unique interfaces.

2.2.7 GEA 71 and GEA 71B Engine and Airframe Interface

The GEA71(B) Engine Airframe Unit is a microprocessor based input/output Line Replaceable Unit (LRU) which monitors sensor inputs and drive annunciator outputs for aircraft airframe and engine systems.

The GEA 71(B) interfaces with various sensors on the aircraft and communicates airframe and engine information through an RS-485 digital interface to the GIA. The GIAs then interface with the PFDs and the MFD. The MFD displays engine instrumentation and the PFDs display airframe alerts provided by the GEA 71(B).

Engine/airframe instrumentation is also displayed on the PFDs and/or MFD when the system is in reversionary mode.

The displays serve as the GEA 71(B) user interface. All configuration settings are controlled by software settings accessed by the MFD and PFDs.

The GEA 71(B) uses a configuration module temperature sensor and a thermocouple sensor housed in a backshell assembly to monitor backshell junction temperatures.

The GEA 71(B) has Analog Inputs (18), Engine Temperature Analog Inputs, Transducer Excitation Outputs, RS-485 interfaces, Discrete Inputs, Digital Inputs, and Aircraft Power Inputs. The GEA 71(B) has 9 Annunciator Outputs and 2 Differential Counter Inputs and 2 Extended Common Mode Analog Inputs. The GEA 71(B) operates with 28 V DC nominal aircraft power.

2.2.8 GTX 345R Transponder

The GTX 345R Transponder operates on radar frequencies, receiving ground radar or TCAS interrogations. The transponder transmits a coded response of pulses to ground based radar on a frequency of 1090 MHz. The transponder has IDENT capability and replies to ATCRBS Mode A, Mode C and Mode S All-Call interrogation. It also includes ADS-B In which provides TISB and FIS-B data via UAT and 1090 MHz.

The transponder offers an optional Garmin altitude encoder to meet the required barometric pressure altitude source and an optional internal GPS/SBAS source to meet the required GNSS position source integrity for ADS-B Out.

NOTE

ADS-B technology improves situational awareness and flight safety. A Garmin transponder with ADS-B capabilities will automatically transmit position, velocity, and heading information to other aircraft and ground stations. The current air traffic control system depends on a transponder request for pertinent aircraft information, whereas ADS-B provides automatic transmission of aircraft information without a request.

2.2.9 GRS 79 Altitude and Heading Reference System

The Attitude and Heading Reference System (AHRS) provides aircraft attitude and heading information to both displays and both GIAs. The AHRS contains advanced sensors (including accelerometers and rate sensors) that interface with the Magnetometer to obtain magnetic field information, with the ADC to obtain air data, and with both GIAs to obtain GPS information.

2.2.10 GDC 72 Air Data Computer

The Air Data Computer (ADC) processes data from the pitot/static system as well as the OAT probe. This unit provides pressure altitude, airspeed, vertical speed and OAT information to the system, and it communicates with both GIAs, the PFDs, the MFD, and the AHRS. It also interfaces directly with the OAT probe.

2.2.11 GMU 44/GMU 44B Magnetometer

The GMU 44(B) magnetometer measures the magnitude of the local magnetic field in three axes. It also measures its own internal temperature and its two-axis tilt angles. The GMU 44(B) relays all this information to the GRS 79 AHRS unit. The GMU 44(B) uses magneto-resistive sensors, an inclinometer, and a temperature sensor to perform its measurements. The sensor readings are converted from their original analog voltage format into digital format. The GMU 44(B) has a single RS-232 input for code upload and testing. This input is not active in normal operation.

The GMU 44(B) is a sensitive instrument that requires careful mounting. Specific guidelines regarding vibration, mounting rigidity, accuracy of orientation (relative to aircraft structure), and placement position (relative to aircraft structure), and magnetic disturbances must be observed. Refer to the GRS 79 AHRS Installation Manual, Garmin P/N 190-01852-00, for details.

2.2.12 GTP 59 Outside Air Temperature Probe

Each of the GTP 59 OAT probes provides outside air temperature data for use by the associated GDC 72 Air Data Computer.

2.2.13 GTS 800 Traffic System

The GTS 800 is a microprocessor-based Line Replaceable Unit (LRU) that uses active interrogations of Mode C transponders to provide Traffic Advisories to the pilot. When installed with a 1090 MHz ADS-B transmit class of equipment, the GTS 800 also utilizes passive surveillance. Traffic is displayed on the MFD via ARINC 429 and/or Ethernet High Speed Data Bus (HSDB).

An aural alert is also provided to inform the crew a traffic advisory (TA) will be displayed. A top mounted directional antenna is used to derive bearing of the intruder aircraft, which is displayed with relative altitude to own aircraft. Top antenna transmitted interrogations are directional, reducing the number of transponders that receive the interrogation, thus reducing potential garble on the 1090 MHz band.

Optional bottom antenna transmit interrogations are directional antenna (recommended for retractable gear installations). A bottom directional antenna installation gives the benefit of intruder bearing visibility for targets that are shaded from the top directional antenna.

2.2.14 GWX 75 Airborne Weather Radar Processor

The Airborne Weather Radar is an all-digital, high definition radar that automatically performs multiple scan/sweep angles to help give the actual size, shape and hazardous storm cell activity. It has zero blind range for close-in returns and ground clutter suppression. It provides data to the PFDs and to the MFD.

2.2.15 GWX 70R Weather Radar

The GWX 70R is a solid-state weather radar providing airborne weather and ground mapped radar data to the PFDs and to the MFD. The displays communicate with the GWX 70R weather radar through a high-speed data bus (HSDB) Ethernet connection.

NOTE

R stands for Reduced Scan. It has a 45-degree scan as opposed to ±60 degrees with hard mechanical stops.

2.2.16 GDL 69A SXM Satellite Radio Receiver

The GLD 69A SXM is a satellite radio receiver that provides data link weather information to the MFD (and, indirectly, to the inset map of the PFD) as well as digital audio entertainment. The GDL 69A SXM communicates with the MFD via a HSDB connection. Subscriptions to the SiriusXM Weather or SiriusXM Satellite Radio services are required to enable the GDL 69A SXM capability.

2.2.17 GSA 80/81 Servo Actuator

The GSA 80/81 Servo Actuators are electromechanical units that provide automatic control of a single flight axis (pitch, roll, or yaw) and/or their associated trims. The units contain a motor-control and monitor circuit board, as well as a solenoid and a brushless DC motor, all enclosed in an extruded aluminum housing.

The units receive serial RS-485 data packets from two GIA integrated avionics units, which contain data from the flight director, the GRS 79 AHRS. The motor control board processes this incoming data and drives the brushless motor as necessary to obtain the desired aircraft response. The monitor board independently monitors the servo speed, monitors the output torque, and controls the engagement of the drive-clutch solenoid.

2.2.18 GSM 86 Servo Mount

The GSM 86 Servo Gear Box is mounted to the aircraft structure via a custom mounting bracket, and is responsible for transferring the output torque of the GSA 80/81 servo actuator to the mechanical flight control surface linkage. The GSM 86 houses its internal components within a cast aluminum housing. The slip clutch is available in a variety of slip torque settings, and in three different lengths, depending on the setting (short, medium, and long). The clutch cannot be set once manufactured; therefore, it is obtained with the proper setting.

2.3 System Operation

2.3.1 G1000 NXi System Controls

Control and operation of G1000 NXi equipment as normally used in flight occurs through the PFD and MFD bezel controls, the GMA 1360D Audio Panel faceplate buttons, and the GMC 710 AFCS Controller.

2.3.1.1 PFD/MFD Controls

Figure 2-3 and *Table 2-2* identify controls available on the GDU bezels.

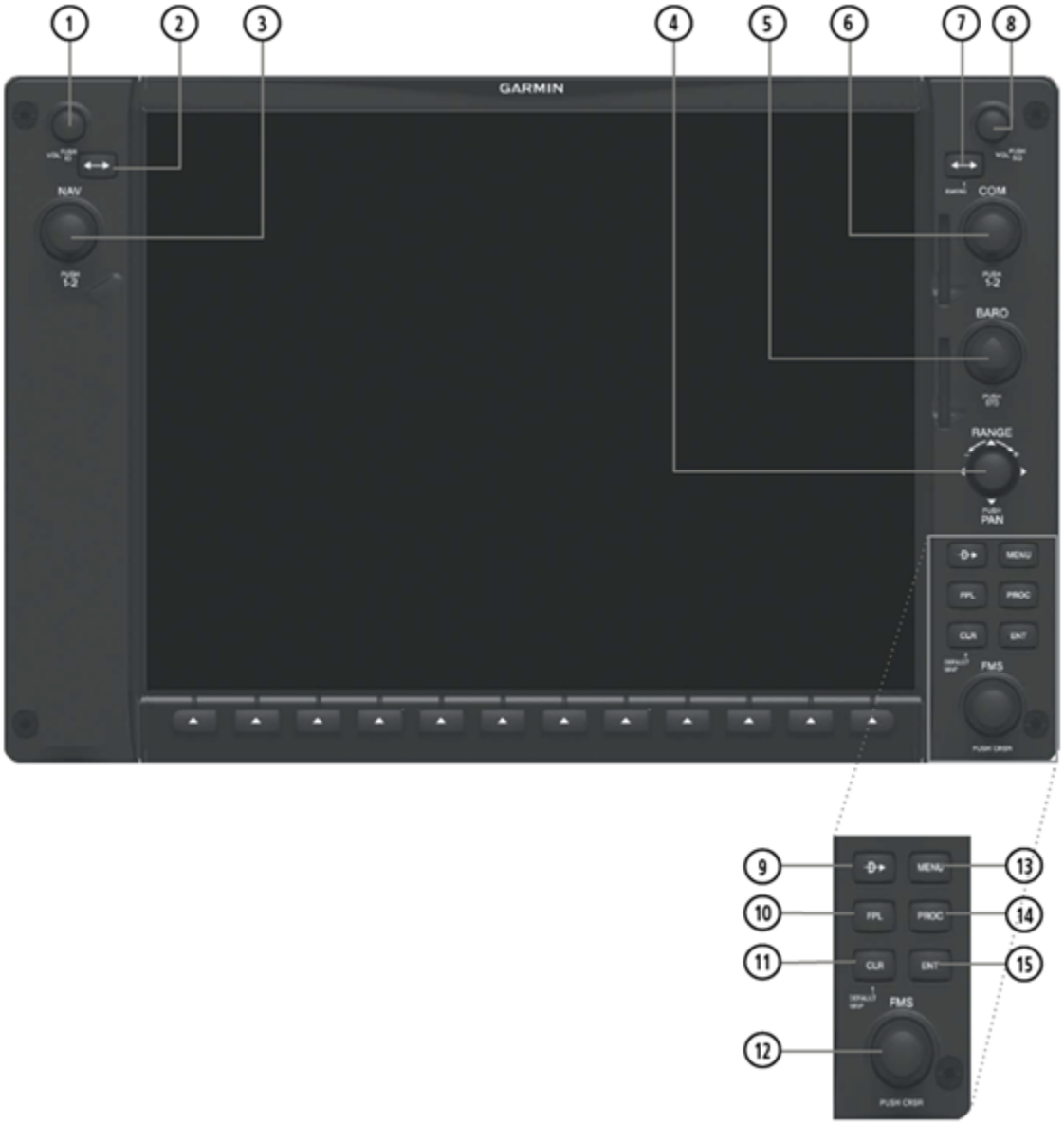

Figure 2-3. GDU Controls

Table 2-2. GDU Control Functions

1	NAV VOL/ID Knob	• Controls NAV audio volume level. • Press to toggle the Morse code identifier audio ON and OFF.
2	NAV Frequency Transfer Key	• Toggles the standby and active NAV frequencies.
3	Dual NAV Knob	• Tunes the standby frequencies for the NAV receiver (large knob for MHz; small knob for kHz). • Press to switch the tuning box (cyan box) between NAV1 and NAV2.
4	Joystick	• Turn to change the map range. • Press to activate Map Pointer and move in the desired direction to pan map.
5	BARO Knob	• Sets the altimeter barometric pressure. • Press to enter standard pressure (29.92).
6	Dual COM Knob	• Turn to tune COM transceiver standby frequencies (large knob for MHz, small knob for kHz). • Press to toggle cyan tuning box between COM1 and COM2. • The selected COM (green) is controlled with the COM MIC key (Audio Panel).
7	COM Frequency Transfer Key	• Transfers the standby and active COM frequencies. • Press and hold two seconds to tune the emergency frequency (121.5 MHz) automatically into the active frequency field.
8	COM VOL/SQ Knob	• Turn to control COM audio volume level. (shown as a percentage in the COM Frequency Box) • Press to turn the COM automatic squelch On/Off.
9	Direct-To Key	• Activates the Direct-To function and allows the user to enter a destination waypoint and establish a direct course to the selected destination. (designated by identifier, chosen from the active route, or taken from the map pointer position.)
10	FPL Key	• Displays the active Flight Plan Page for creating and editing the active flight plan.
11	CLR Key	• Erases information, cancels entries, or removes menus • Press and hold to display MAP - NAVIGATION Page (MFD only).

Table 2-2. GDU Control Functions (Continued)

12	Dual FMS Knob	• Press to turn the selection cursor On/Off. • Data Entry: With cursor on, turn to enter data in the highlighted field (large knob moves cursor location, small knob selects character for highlighted cursor location). • Scrolling: When a list of information is too long for the window or box, a scroll bar appears, indicating more items to view. With cursor on turn large knob to scroll through list. • Page Selection: Turn knob on MFD to select the page to view (large knob selects a page group, small knob selects a specific page from the group).
13	MENU Key	• Displays a context-sensitive list of options for accessing additional features or making setting changes that relate to particular pages.
14	PROC Key	• Gives access to IFR departure procedures (DPs), arrival procedures (STARs) and approach procedures (IAPs) for a flight plan. If a flight plan is used, available procedures for the departure and/or arrival airport are automatically suggested. These procedures can then be loaded into the active flight plan. If a flight plan is not used, both desired airport and desired procedure may be selected.
15	ENT Key	• Validates or confirms a menu selection or data entry.

2.3.1.2 GDU Softkey Functions

Selection softkeys are located along the bottom of the display. The softkeys shown depend on the softkey level previously selected. The bezel keys below the softkey labels can be used to press the appropriate softkey.

There are three types of softkeys. The first type of softkey selects a simple On/Off state, indicated by an annunciator on the softkey label displayed as green (On) or gray (Off). The second type of softkey selects among several options, indicated by the softkey label changing to reflect the name of the chosen option. When pressed, the third type of softkey displays another set of softkeys available for the selected function. These softkeys also revert to the previous level after 45 seconds of inactivity. When a softkey function is disabled, the softkey label is subdued.

Figure 2-4. GDU Softkeys

2.3.1.3 GMA 1347 Audio Panel Controls

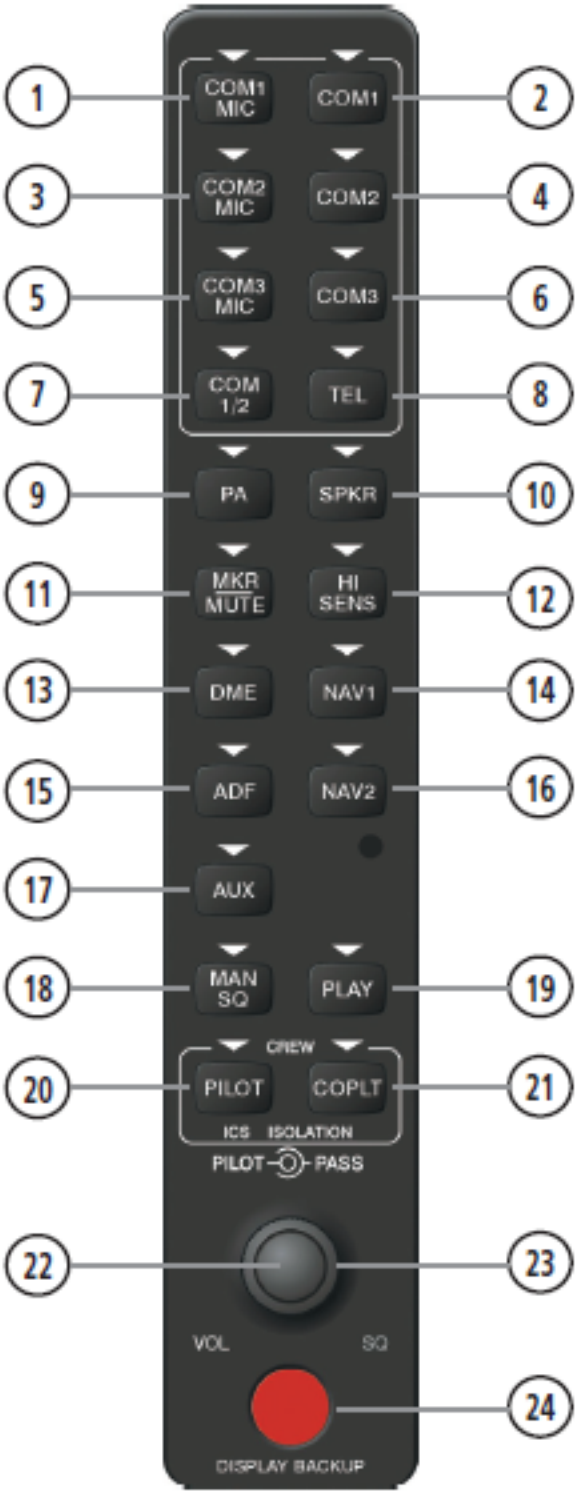

Figure 2-5. GMA 1347 Controls

Table 2-3. GMA 1347 Control Functions

1	COM1 MIC	Selects the #1 COM for transmitting. The COM1 receiver is simultaneously selected when this key is pressed, allowing received audio from the COM1 receiver to be heard. COM2 receiver audio can be added by pressing the COM2 Key.
2	COM1	When selected, the #1 COM receiver audio can be heard.
3	COM2 MIC	Selects the #2 COM for transmitting. The COM2 receiver is simultaneously selected when this key is pressed, allowing received audio from the COM2 receiver to be heard. COM2 can be deselected by pressing the COM2 Key, or COM1 can be added by pressing the COM1 Key.
4	COM2	When selected, the #2 COM receiver audio can be heard.
5	COM 3 MIC	Not used.
6	COM 3	Not used.
7	COM 1/2	Not used.
8	TEL	Not used.
9	PA	Selects the passenger address system. The selected COM transmitter is deselected when the PA Key is pressed.
10	SPKR	Selects and deselects the cabin speaker. COM and NAV receiver audio can be heard on the speaker.
11	MKR/MUTE	Mutes the currently received marker beacon receiver audio. Unmutes when new marker beacon audio is received. Also, stops play of the clearance recorder.
12	HI SENS	Press to increase marker beacon receiver sensitivity. Press again to return to normal.
13	DME	Not used.
14	NAV 1	When selected, audio from the #1 NAV receiver can be heard.
15	ADF	Not used.
16	NAV 2	When selected, audio from the #2 NAV receiver can be heard.
17	AUX	Not used.
18	MAN SQ	Press to enable manual squelch for the intercom. When active, press the PILOT Knob to illuminate 'SQ'. Turn the PILOT/PASS Knobs to adjust squelch.

Table 2-3. GMA 1347 Control Functions (Continued)

19	PLAY	Press once to play the last recorded audio. Pressing the PLAY Key during play begins playing the previously recorded memory block. Each subsequent press of the PLAY Key begins playing the next previously recorded block. Press the MKR/MUTE Key to stop play.
20	PILOT	Pressing selects the pilot intercom isolation. Press again to deselect pilot isolation.
21	COPLT	Pressing selects the copilot intercom isolation. Press again to deselect copilot isolation.
22	PILOT Knob	Press to switch between volume and squelch control as indicated by the 'VOL' or 'SQ' being illuminated. Turn to adjust intercom volume or squelch. The MAN SQ Key must be selected to allow squelch adjustment.
23	PASS Knob	Turn to adjust Copilot/Passenger intercom volume or squelch. The MAN SQ Key must be selected to allow squelch adjustment.
24	Reversionary Mode Button	Pressing manually selects Reversionary Mode.

2.3.1.4 GMA 1360D Audio Panel Controls

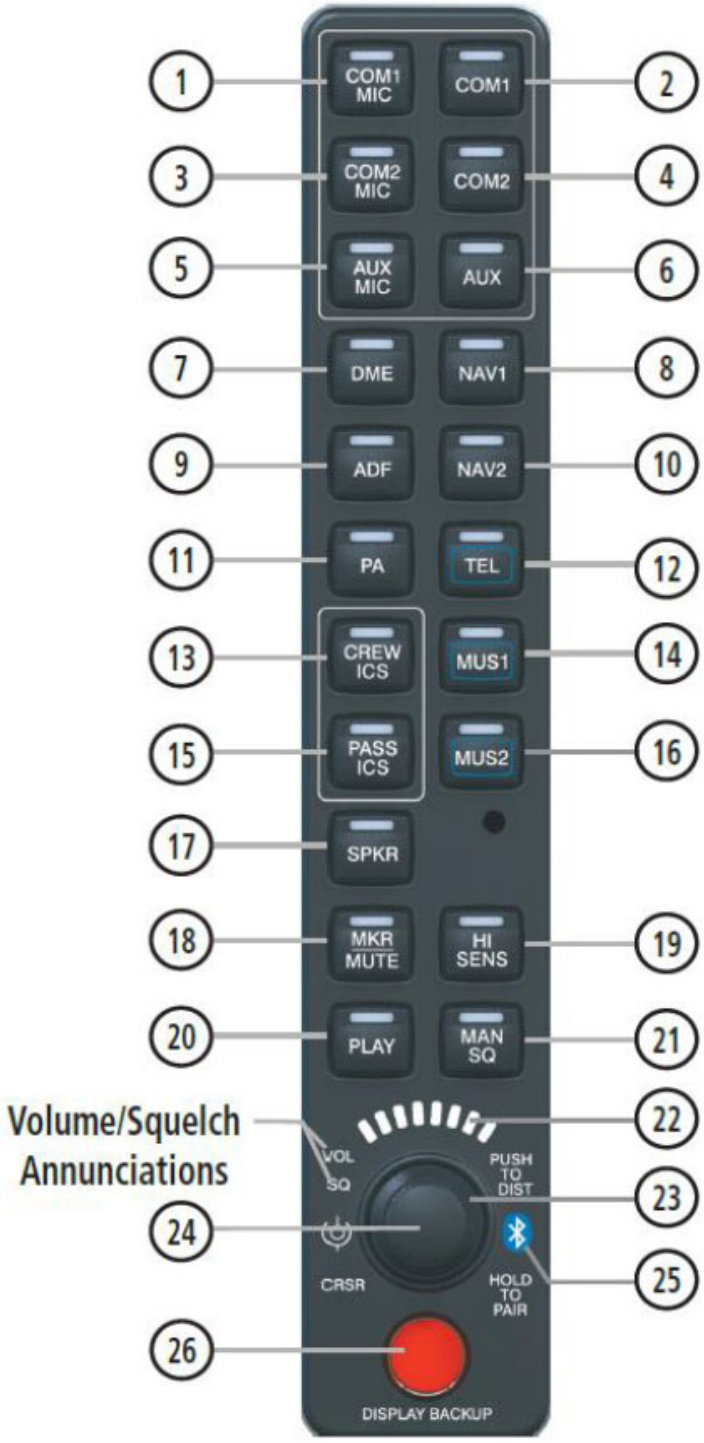

Figure 2-6. Audio Panel Controls

Table 2-4. GMA 1360D Control Functions

1	COM1 MIC	Selects the #1 COM for transmitting. The COM1 receiver is simultaneously selected when this key is pressed, allowing received audio from the COM1 receiver to be heard. COM2 receiver audio can be added by pressing the COM2 Key. When the PTT is active the annunciation will be flashing.
2	COM1	When selected, the #1 COM receiver audio can be heard.
3	COM2 MIC	Selects the #2 COM for transmitting. The COM2 receiver is simultaneously selected when this key is pressed, allowing received audio from the COM2 receiver to be heard. COM2 can be deselected by pressing the COM2 Key, or COM1 can be added by pressing the COM1 Key. When the PTT is active the annunciation will be flashing.
4	COM2	When selected, the #2 COM receiver audio can be heard.
5	AUXMIC	Reserved for optional audio.
6	AUX	Reserved for optional audio.
7	DME	Turns optional DME audio On or Off.
8	NAV1	When selected, the #1 NAV receiver audio can be heard.
9	ADF	Turns optional the ADF receiver audio On or Off.
10	NAV2	When selected, the #2 NAV receiver audio can be heard.
11	PA	Selects the passenger address system. The selected COM transmitter is deselected when the PA Key is pressed. A solid annunciation indicates PA mode is active, while a flashing annunciation indicates PTT has been keyed.
12	TEL	Selects/deselects the TEL audio source and assigns the Bluetooth device to the TEL audio. Press the TEL button until the annunciator turns blue. The annunciator will cycle from OFF to WHITE to BLUE. WHITE selects the wired audio source and BLUE selects the Bluetooth audio source. The Bluetooth audio source can only be assigned to one source at a time. Once the Bluetooth audio is assigned to an audio source, the remaining entertainment audio sources will only cycle between OFF and WHITE.
13	CREW ICS	Controls the crew intercom system. Press and hold to enable/disable the onside Bluetooth recording mode.

Table 2-4. GMA 1360D Control Functions (Continued)

14	MUS1	Selects/deselects the MUS1 audio source and assigns the Bluetooth device to the MUS1 audio. Press the MUS1 button until the annunciator turns blue. The annunciator will cycle from OFF to WHITE to BLUE. WHITE selects the wired audio source and BLUE selects the Bluetooth audio source. The Bluetooth audio source can only be assigned to one source at a time. Once the Bluetooth audio is assigned to an audio source, the remaining entertainment audio sources will only cycle between OFF and WHITE.
15	PASS ICS	Controls the crew intercom system.
16	MUS2	Selects/deselects the MUS2 audio source and assigns the Bluetooth device to the MUS2 audio. Press the MUS1 button until the annunciator turns blue. The annunciator will cycle from OFF to WHITE to BLUE. WHITE selects the wired audio source and BLUE selects the Bluetooth audio source. The Bluetooth audio source can only be assigned to one source at a time. Once the Bluetooth audio is assigned to an audio source, the remaining entertainment audio sources will only cycle between OFF and WHITE.
17	SPKR	Selects and deselects the on-side flight deck speaker. COM, NAV, AUX, PA, and MKR receiver audio can be heard on the speaker.
18	MRK/MUTE	Selects Marker Beacon receiver audio. Mutes the currently received Marker Beacon receiver audio. Unmutes automatically when new Marker Beacon audio is received. Also, stops play of recorded COM audio.
19	HI SENS	Press to increase Marker Beacon receiver sensitivity. Press again to return to low sensitivity.
20	PLAY	Press once to play the last recorded COM audio. Press again while audio is playing and the previous block of recorded audio will be played. Each subsequent press plays each previously recorded block. Pressing the MKR/MUTE key during play of a memory block stops play.
21	MAN SQ	Enables manual squelch for the intercom. When the intercom is active, press the VOL/SQ Control Knob to illuminate the squelch annunciation. Turn the PILOT/PASS knobs to adjust squelch.
22	Volume/Squelch Indicator	Indicates volume/squelch setting relative to full scale.

Table 2-4. GMA 1360D Control Functions (Continued)

23	Cursor (CRSR) Control Knob	Turn to move the cursor (flashing white or blue annunciator) to the desired source.
24	Volume/Squelch (VOL/SQ) Control Knob	Turn the smaller knob to control volume or squelch of the selected source (indicated by the flashing white or blue annunciator). When the volume control cursor is not active press to switch to Blue-Select mode. If the volume control cursor is active, press twice (once to cancel the cursor, twice to activate Blue-Select mode). Press and hold for five seconds to enable the audio panel as discoverable for pairing. The Bluetooth Annunciator will flash to indicate the unit is discoverable. The unit will remain discoverable for 90 seconds or until a successful pair is established.
25	Bluetooth Connection Annunciator	The indicator is white. It flashes when discoverable. It is solid when connected and not illuminated when not connected.
26	DISPLAY BACKUP Button	Manually selects PFD/MFD Reversionary Mode.

2.3.1.5 GMC 710 AFCS Controller

Figure 2-7 shows the GMC 710 faceplate controls. The Garmin AFCS is mainly controlled through the GMC 710 AFCS Control Unit. The AFCS Control Unit consists controls listed below.

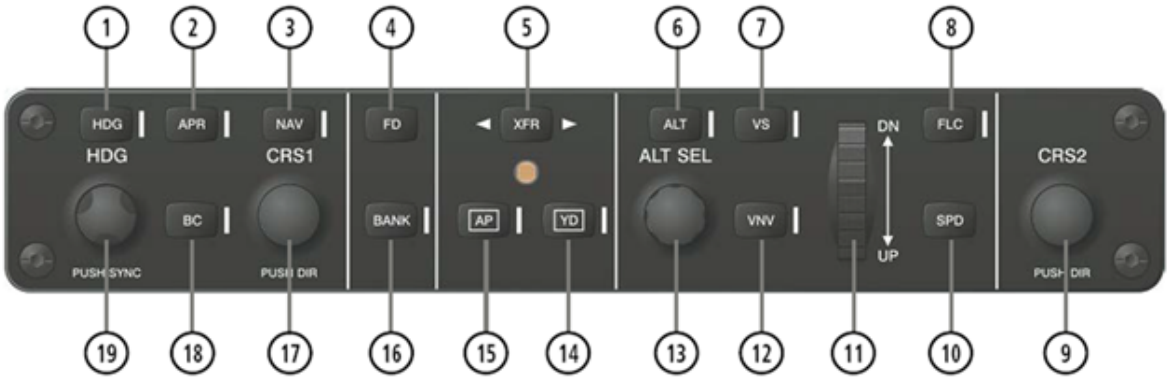

Figure 2-7. GMC 710 Controls

NOTE

Except for the FD and SPD Keys, if a key is selected, its respective annunciator is illuminated

Table 2-5. AFCS Control Unit (GMC 710)

1	HDG Key	Selects/deselects Heading Select Mode.
2	APR Key	Selects/deselects Approach Mode.
3	NAV Key	Selects/deselects Navigation Mode.
4	FD Key	Activates/deactivates the flight director in the default pitch and roll modes. If the autopilot is engaged, the FD Key is disabled.
5	XFR Key	Switches the autopilot between the pilot-side and the copilot side flight directors. This selection also selects which air data computer is communicating with the active transponder. Upon start, the pilot-side FD is selected.
6	ALT Key	Selects/deselects Altitude Hold Mode.
7	VS Key	Turns optional DME audio On or Off.
8	FLC Key	When selected, the #1 NAV receiver audio can be heard.

Table 2-5. AFCS Control Unit (GMC 710)

9	CRS2 Knob	Sets the copilot-selected course on the HSI of PFD2 when the VOR1, VOR2, or OBS/SUSP mode is selected. Pressing this knob centers the CDI on the currently selected VOR. The copilot-selected course provides course reference to the copilot-side flight director when operating in Navigation and Approach modes.
10	SPD Key	Switches the Flight Level Change mode reference speed between IAS and MACH number
11	NOSE UP/DN Wheel	Controls the active mode reference for the Pitch, Vertical Speed, and Flight Level Change modes.
12	VNV Key	Selects/deselects Vertical Navigation mode.
13	ALT SEL Knob	Sets the selected altitude in the Selected Altitude Box. In addition to providing the standard altitude alerter function, selected altitude provides an altitude setting for the Altitude Capture/ Hold mode of the AFCS.
14	YD Key	Engages/disengages the yaw damper.
15	AP Key	Engages/disengages the autopilot.
16	BANK Key	Selects/deselects Low Bank Mode.
17	CRS1 Knob	Sets the pilot-selected course on the HSI of PFD1 when VOR1, VOR2, or OBS/SUSP mode is selected. Pressing this knob centers the CDI on the currently selected VOR. The pilot-selected course provides course reference to the pilot-side flight director when operating in Navigation and Approach modes.
18	BC Key	Selects/deselects Back Course Mode.
19	HDG Knob	Sets the selected heading on the HSI. When operating in Heading Select mode, this knob provides the heading reference to the flight director.

2.3.2 Apply System Power

The system is integrated with the aircraft electrical system and receives power directly from electrical busses. The PFDs, MFD and supporting sub-systems include both power on and continuous built-in test features that exercise the processor, system memory, external inputs and outputs to provide safe operation.

During system initialization, test annunciations appear on both PFDs. All system annunciations should disappear typically within one minute of system start. Upon start, key annunciator lights also become momentarily illuminated on the audio panels, the control units and the display bezels.

On the PFDs, the AHRS initializes and displays 'AHRS ALIGN: Keep Wings Level'. The AHRS should display valid attitude and heading fields typically within one minute of system start. The AHRS can align itself both while taxiing and during level flight.

When the MFD starts, the MFD Start Page shows the following information:

- System version
- Checklist File
- Land database name and version
- Safe Taxi database and expiration date
- Terrain database name and version
- Airport Terrain database name and version
- Obstacle database name and expiration date
- Navigation database name and expiration date
- Airport Directory name and expiration date
- FliteCharts/ChartView name and expiration date

Current database information includes the valid operating dates, cycle number and database type.

When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue. Pressing the ENT Key acknowledges this information and displays the Navigation Map (MAP) Page. When the system has acquired enough satellites to calculate a position, the aircraft's current position is shown on the Navigation Map Page.

Figure 2-8. PFD Initialization (both PFDs)

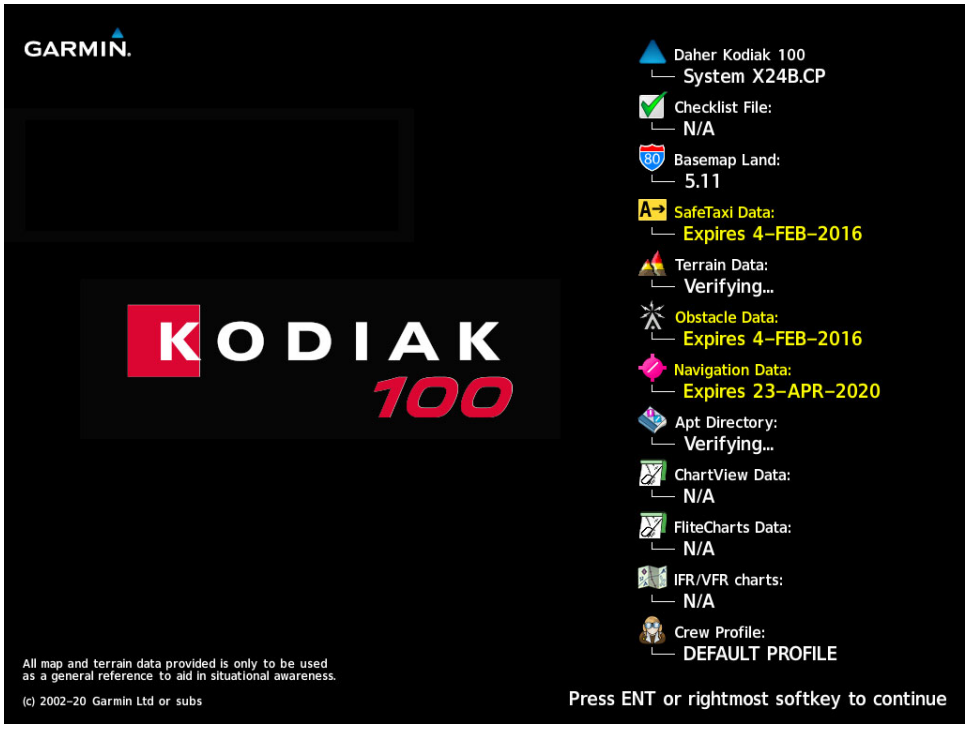

Figure 2-9. MFD Start Page

2.3.3 Normal Operation

In normal operating mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude, vertical speed), replacing the traditional flight instrument cluster. The MFD displays a full-color moving map with navigation information, while the left portion of the MFD is dedicated to the Engine Indication System (see *Figure 2-10*). Both displays offer control for COM and NAV frequency selection.

Figure 2-10. Normal Mode

2.3.4 Reversionary Mode

Reversionary mode is a mode of operation in which all important flight information is presented identically on the displays closest to the red DISPLAY BACKUP button. The left hand audio panel forces PFD1 and the MFD to display the same data and the right hand audio panel forces PFD2 and the MFD to display the same data. Transition to reversionary mode should be straightforward for the pilot, for flight parameters are presented in the same format as in normal mode. Reversionary mode can be activated manually by pressing the dedicated DISPLAY BACKUP Button at the bottom of the audio panel.

Pressing this button again deactivates reversionary mode.

In the event of a display failure, the system automatically switches to Reversionary (backup) mode. In Reversionary mode, all important flight information is presented on the remaining display in the same format as in normal mode (see *Figure 2-11*).

Figure 2-11. Reversionary Mode (Failed PFD)

If a display fails, the appropriate interface between that display and the associated GIA is cut off. Thus, the GIA can no longer communicate with the remaining display. The NAV and COM functions provided to the failed display by the GIA are flagged as invalid on the remaining display. The system reverts to backup paths for the AHRS, ADC, Engine/ Airframe Unit, and Transponder, as required. The change to backup paths is completely automated for all LRUs and no pilot action is required.

If the system fails to detect a display problem, Reversionary mode can be manually activated by pressing the red DISPLAY BACKUP button on the audio panel. Pressing this button again deactivates Reversionary Mode.

2.3.5 Configuration Mode

Configuration mode enables configuring, checking, and calibrating the various G1000 NXi subsystems. Troubleshooting and diagnostics information can also be derived from the configuration pages when the system is in this mode.

To enter configuration mode:

1. Press and hold the ENT key on the PFD while applying power.
2. Release the ENT key after INITIALIZING SYSTEM is displayed in the upper left corner of the PFD.
3. Supply electrical power to the MFD and PFD2 in the same manner. It is best to have all displays in the same mode.
4. The system is now in configuration mode. The System Upload page is displayed (see *Figure 2-12* and *Figure 2-13*).

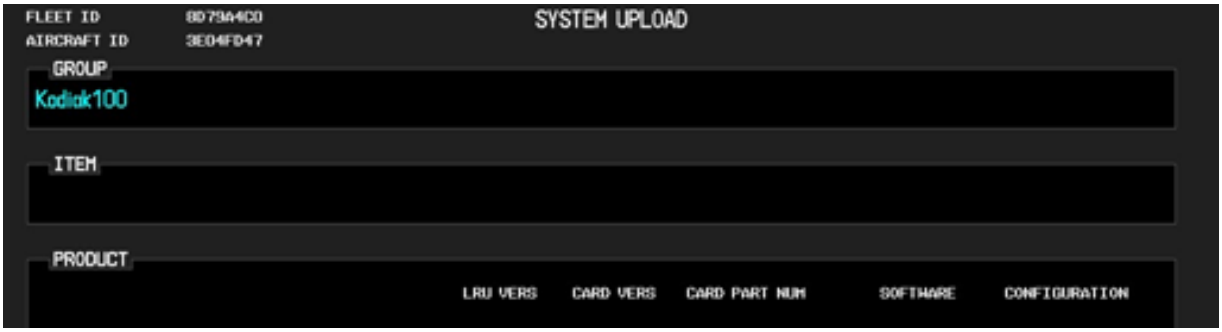

Figure 2-12. System Upload Page

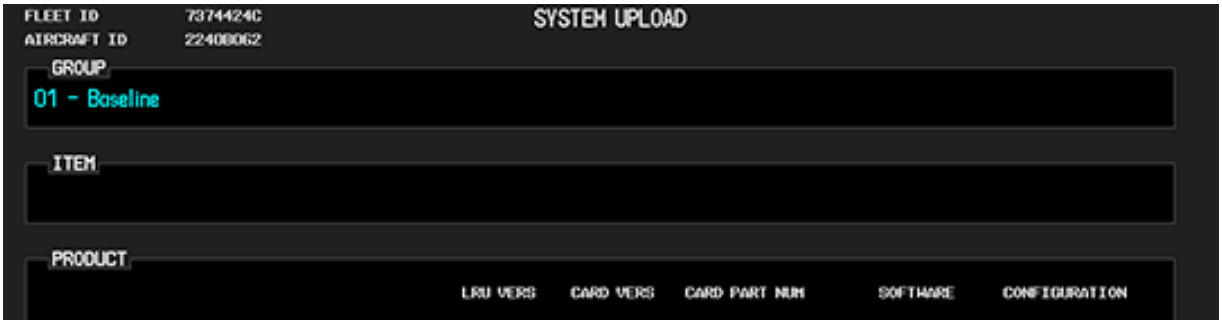

Figure 2-13. System Upload Page

The FMS knob is the primary control for the G1000 NXi system when in configuration mode. It is located near the lower right corner of each display.

FMS Control Functions:

- To change page groups, turn the large FMS knob.
- To change pages in a group, turn the small FMS knob.
- To activate the cursor for a page, press the small FMS knob.
- To cycle the cursor through data fields, turn the large FMS knob.
- To change the contents of a highlighted data field, turn the small FMS knob. This action either brings up an options menu for the 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. Pressing the small FMS knob again turns the cursor off. The CLR key can also be used to cancel a selection or to turn off the cursor.

2.3.6 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.
- A 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).

NOTE

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 2-14* 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.

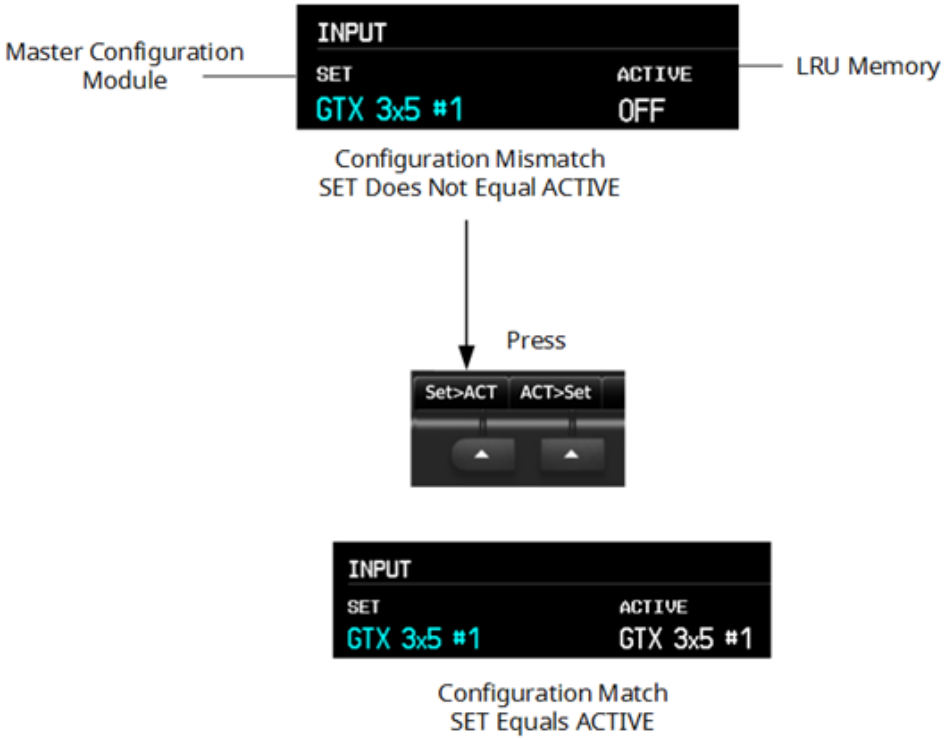

Figure 2-14. SET>ACTIVE Diagram

Technicians can look for inequalities between SET and ACTIVE columns when troubleshooting. Certain problems can be resolved 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. *Section 5* describes this process for each LRU).

2.3.7 Data Transmission

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.

Table 2-6. Data Transmission Indicators

	The LRU is online and reports the item located next to the indicator box is communicating.
	The LRU is online, and reports the item located next to the indicator box is not communicating.
	The LRU is not reporting a status for the item located next to the indicator box. This may be because the data is not available, not applicable, or not expected.
	The LRU is not reporting status for the item located next to the indicator box. This may be because the data is not available or is not expected.
	'True' condition; i.e., necessary conditions have been met in order to activate the item.
	'False' condition; i.e., necessary conditions have not been met in order to activate the item.
	'High' condition; i.e., the system expects a high voltage or a high resistance input to trigger the item (fan operation, etc.).
	'Low' condition; i.e., the system expects a low voltage or a low resistance input to trigger the item (fan operation, etc.).

2.4 CONFIGURATION MODE NAVIGATION

The user can navigate through different pages and page groups in Configuration Mode using the FMS knob

2.5 SOFTWARE FILES

Software files are defined by part number and version number in SN21-01 Kodiak 100 G1000 Software Configurations and Updates. Each system 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 PFD System Upload page in configuration mode.

2.6 CONFIGURATION FILE DESCRIPTIONS

There are configuration files for baseline settings and various options. Configuration files contain preset selections for input/output channels, aircraft-specific settings, and LRU specific settings.

CAUTION

Certain software and configuration files are REQUIRED to be reloaded during maintenance that involves removal and replacement of system equipment. Refer to Section 6 for reconfiguration requirements for each individual LRU. Pay special attention to the selection of option files for the units to assure a complete load.

2.7 CONFIGURATION FILE STORAGE

The G1000 NXi is designed to store all configuration settings in various places so the configuration of the system is retained in the aircraft during maintenance. *Figure 2-15* and *Figure 2-16* show a block diagram of how a typical G1000 NXi stores configuration settings.

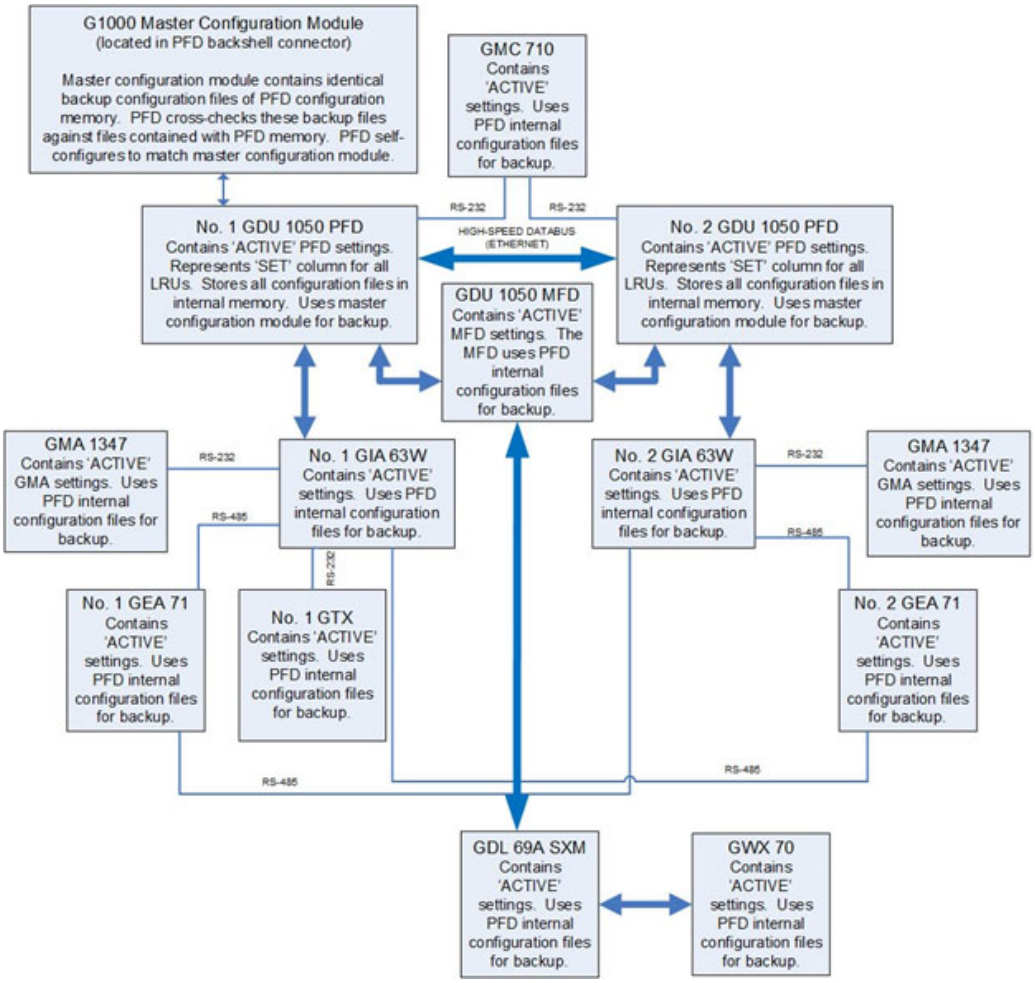

Figure 2-15. G1000 NXi LRU Configuration File Storage

NOTE

GMA 1347 includes the GMA 1360D, GIA 63W includes the GIA 64W, and the GEA 71 includes the GEA 71B in Figure 2-15.

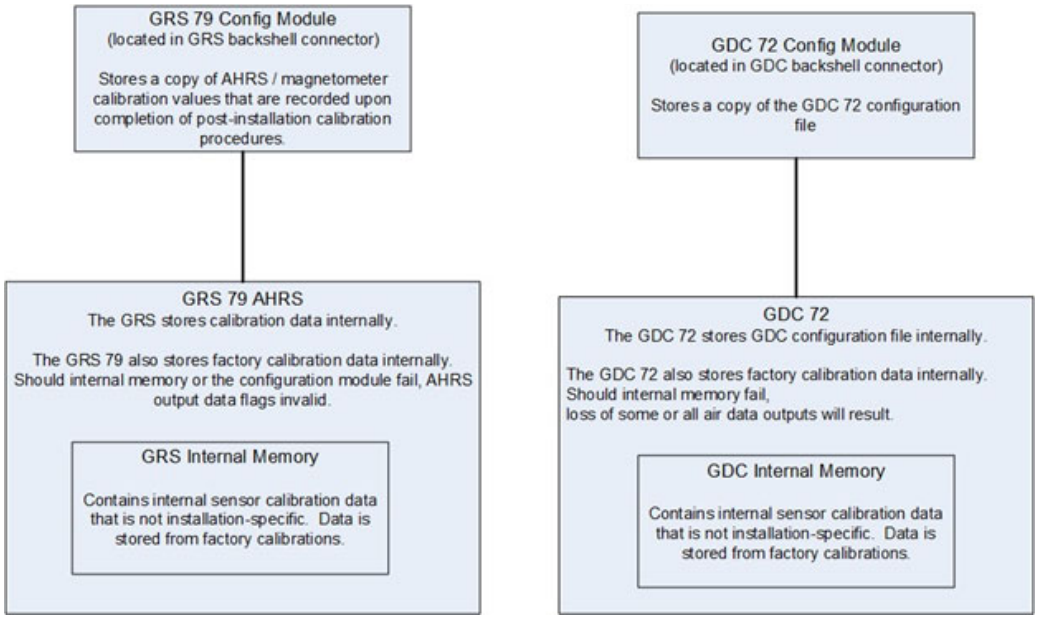

Figure 2-16. GRS/GDC Configuration Settings Storage

2.8 LOADER CARDS

NOTE

The system requires the use of SanDisk SD™ cards for loading software and configuration.

A Secure Data (SD) Card is used to load and configure software. It is very important to use the correct loader card part number. Each loader card's part number defines all files found on the card for a specific installation. Approved loader card part numbers are found in SN21-01 Kodiak 100 G1000 Software Configurations and Updates.

The display data card slots are located on the right side of the display bezels (*Figure 2-17*). Each display bezel is equipped with two card slots.

CAUTION

Be cautious when using software loader cards during maintenance. Always make sure the correct part number of the loader card that is going to be used before inserting it into a display. The system immediately initializes the card upon start. On-screen prompts must be given careful attention to avoid possible loss of data.

Figure 2-17. GDU SD Card Slots

NOTE

The SD card label should be on the left side when inserted into the display. Do not force the card into the slot.

To install an SD card:

Insert the SD card in the SD card slot, pushing the card in until the spring latch engages. The front of the card should remain flush with the face of the display bezel.

To remove an SD card:

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

NOTE

When first inserted, Enablement Cards, Supplemental Data Cards, and Software Loader Cards store a unique system ID code and after that can only be used to re-enable a feature on the same system. If a customer purchases one of these cards, and a qualified Garmin dealer uses it to enable a feature according to approved documentation, the card must be returned to the customer and (preferably) stored in the aircraft for future maintenance activity.

2.8.1 SD Card Replacement

In the event a card(s) is lost or damaged, and requires replacement contact Garmin Aviation Support to order the replacement card(s). The authorized OEM service center or installing technician is required to give proof of the successful initial installation to the OEM and/or Garmin Aviation Support.

For factory-installed features in a new aircraft, the aircraft manufacturer (OEM) keeps a record of the installation verification for all special feature enablement cards. OEM records shall show when an aircraft was installed with special feature unlock card(s) from their facility.

2.8.2 Spare Supplemental Data Cards

To ensure availability of data cards that are both compatible and authorized, Garmin offers blank replacement cards. These blank cards do not contain any preloaded aviation databases and are intended for operators who have already purchased databases from the flyGarmin website. Databases for Garmin avionics can be purchased directly from www.flyGarmin.com. Blank replacement cards are available through authorized Garmin Aviation Dealers and Service Centers. Refer to Garmin Service Advisory 1506 for detailed information.

3 LOADING SYSTEM SOFTWARE AND CONFIGURATION

The G1000 NXi system does not contain the correct software or configuration settings for the Kodiak 100 when it is shipped from the factory. Those must be loaded when the system is initially installed.

NOTE

There might be a situation in which the only solution to a problem is to reload system software and configuration according to the procedures in this section. Perform the troubleshooting steps in Section 4 first. If troubleshooting does not resolve the issue; before reloading, contact Garmin Aviation Support to find another solution to the fault if one exists.

3.1 Loader Cards

NOTE

The system requires the use of SanDisk SD™ cards for loading software and configuration.

A Secure Digital (SD) Card is used for loading software and configuration. It is very important to use the correct loader card part number. Each loader card part number defines all files found on the card for a specific installation. Approved loader card part numbers can be found in the Kodiak 100 Aircraft Maintenance Manual (AMM).

The GDU data card slots are located in the upper right portion of the display bezels (see *Figure 3-1*). Each display bezel is equipped with two card slots. SD cards are used for aviation databases, system software, recording flight data, and storing electronic documents.

Figure 3-1. GDU SD Card Slots

1. To Install an SD Card:
   a) Insert the SD card into the SD card slot.
   b) Push the card in until the spring latch engages.
   c) The front of the card should remain flush with the face of the display bezel.
2. To Remove an SD Card:
   a) Gently press on the SD card.
   b) The spring latch should release and eject the card.

3.2 ReadyBoost

SD cards used in Garmin displays can potentially be harmed by the Windows operating system ReadyBoost feature available in Windows. ReadyBoost is a disc caching feature allowing an external flash memory device such as a USB flash drive or SD card to be used to speed up system operation by writing frequently used PC Data to the external flash memory device for faster access.

ReadyBoost can potentially overwrite required data on any Garmin SD card installed in a computer with ReadyBoost enabled and render the card unusable. Garmin advises using the following procedure to disable ReadyBoost:

1. Plug a flash drive or other removable media device (non-Garmin SD card) into the computer.
2. In the AutoPlay dialog box under General Options, click ‘Speed up my system’.
3. In the properties dialog box for the removable media device, click the ReadyBoost tab, and then click ‘Do not use this device’ to disable ReadyBoost.
4. Click OK.

3.2.1 Display Digital Signature Check

If loader card 006-B2634-0(X) is going to be installed, first determine if the G1000 NXi has had loader card 006-B2633-0(X) previously installed by checking the PFD1 MANIFEST config page or the MFD start-up page in the upper right corner. Alternately, check PFD1, MFD, and PFD2 displays if any were replaced if they have unit software versions 20.00 through 20.12 installed using configuration mode and the SYSTEM STATUS config page.

If display software version 20.00 through 20.12 is present in any display, and loader card 006B2634-0(X) is going to be installed, a display digital signature update card P/N 006-B3071-01 needs to be installed first. Do NOT install the digital signature update card if the displays will use loader cards 006-B2633-0(X).

Follow these steps to load the digital signature update before loading a 006-B2634-0(X) loader card when required per the conditions above.

1. Download the digital signature update executable program Garmin P/N 006-B3071-01 from the Garmin Dealer Resource center. Run the program to make an SD card for use in the aircraft.
2. Open the PFD1, MFD, and PFD2 circuit breakers.
3. Place the digital signature update card in the top slot of the display that requires the update.
4. Hold the ENT key on the display and restore power by closing the circuit breaker.
5. When the words INITIALIZING SYSTEM appear in the upper left corner of the display, release the ENT key.
6. Follow the on-screen prompts to update system files and boot block software.
7. When the load is complete, open the display circuit breaker and remove the card from the top slot.
8. Repeat steps 3 - 7 for all displays that require the update.

3.3 PFD/MFD Software Loading

NOTE

All screenshots in this manual are included for visual reference only and might not reflect the information displayed during actual G1000 NXi system operation.

NOTE

All CMC maintenance logs should be downloaded before loading new software, otherwise they will be lost. Refer to Section 4.9 for CMC Log exporting.

NOTE

The Weight and Balance configuration, crew profiles, flight plans, and user waypoints will be cleared when loading baseline configuration. For instructions on how to export and import crew profiles and flight plans please refer to the relevant Kodiak 100 Pilot's Guide for the software that is being loaded. All user page settings will also revert to their default values.

Software is loaded to the displays first. To load the display software:

1. Pull the PFD and MFD circuit breakers.
2. Insert the correct G1000 NXi Daher Kodiak 100 Loader Card into the card slot of the display requiring the update. See Required Equipment List for correct Loader Card part number.
3. Hold the ENT keys on the display to be updated and restore power by closing the applicable circuit breaker (power only the replaced unit).
4. When the words INITIALIZING SYSTEM appear in the upper left corner of the display, release the ENT and CLR keys.
5. Press the ENT key to acknowledge the following prompt:

Figure 3-2. Clear User Settings Prompt

6. Press the ENT key to acknowledge the following prompt:

Figure 3-3. Update System Files Prompt

7. The following screen is displayed.

Figure 3-4. File Update Verification

8. Software is loaded to the display. When complete, the display starts in configuration mode.

9. Repeat steps 1-8 for all displays that require the update.

10. Continue to the System Upload procedure.

3.4 System Upload for Software Versions 2633.00+ and 2634.00 to 2634.04

CAUTION

If the aircraft being modified has incorporated any modifications beyond factory configuration that effect engine or airspeed limitations, your configuration may not be supported at this time. It is the responsibility of the installer to ensure compatibility with existing modifications.

CAUTION

Do not allow power to be removed from the system when loading software. Remove power only when instructed by the following procedures. As a general rule, all displays should be in the same mode (configuration or normal) unless instructed otherwise.

CAUTION

For the rest of the software/configuration procedure, do not operate the MFD or PFD2 while loading software or configuration unless specifically instructed to do so. A failed or canceled load may result.

The first step is to load software to the MFD and PFDs. They do not come from the factory with software installed. A file exists on the applicable SD card that contains GDU software.

1. Insert the loader card into the top slot of PFD2.

2. Hold the ENT key on PFD2 and restore power by closing the PFD2 circuit breaker.

3. When the words INITIALIZING SYSTEM appear in the upper left corner of PFD2, release the ENT key.

4. Press the YES softkey to acknowledge the “DO YOU WANT TO UPDATE SYSTEM FILES” prompt.

5. An UPDATED xx FILES SUCCESSFULLY! screen is displayed. New software is loaded to PFD2.
6. When complete, PFD2 starts in configuration mode.
7. Remove power to PFD2 by pulling the PFD2 circuit breaker.
8. Remove the Software/Configuration card loader from PFD2 and insert it into the top card slot on the MFD. Repeat Steps 2 through 5 for the MFD, using the MFD to hold Softkey #12 (far right) down.
9. When MFD update is complete, it starts in the configuration mode.
10. Remove power to the MFD by pulling the MFD circuit breaker.
11. Remove the Software/Configuration card loader from the MFD and insert it into the top card slot on PFD1. Repeat Steps 2 through 5 for PFD1.
12. While holding down Softkey 12 on the MFD, restore power to the MFD by closing the MFD circuit breaker.
13. While holding down Softkey 12 on PFD2, restore power to PFD2 by closing PFD2 circuit breaker.

3.4.1 Baseline Software and Configuration Loading

CAUTION
If an incorrect configuration file is loaded at any time during this procedure, STOP and start the configuration load over with Baseline or Kodiak 100.

1. Ensure all avionics circuit breakers are closed and the G1000NXi system is fully powered.
2. On PFD1, go to the SYSTEM UPLOAD page using the small FMS knob.
3. Push in the PFD1 FMS knob to activate the cursor in the Group field. Turn the small FMS knob to activate the drop-down menu. Turn the small FMS knob to highlight Baseline or Kodiak 100 in the drop-down menu and press the ENT key to select it.

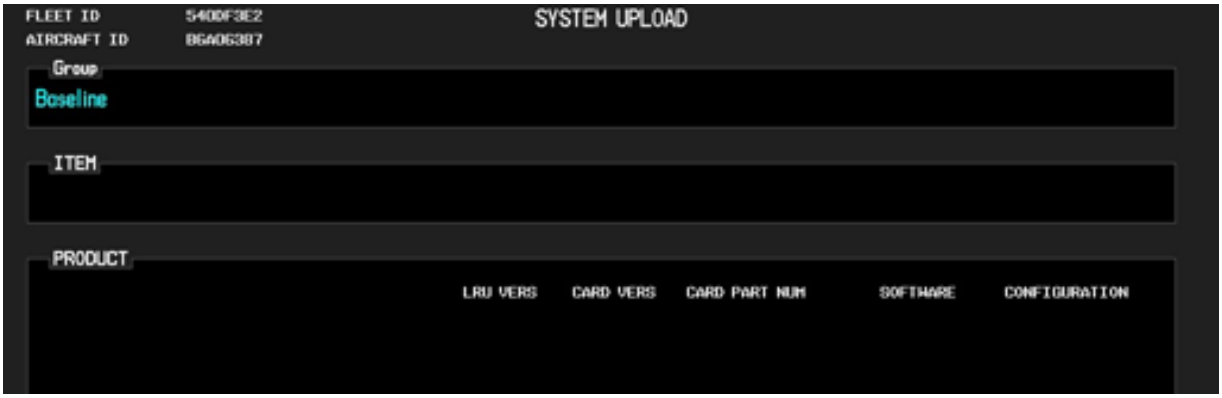

Figure 3-5. 006-B2633-0(X) Loader Card Example

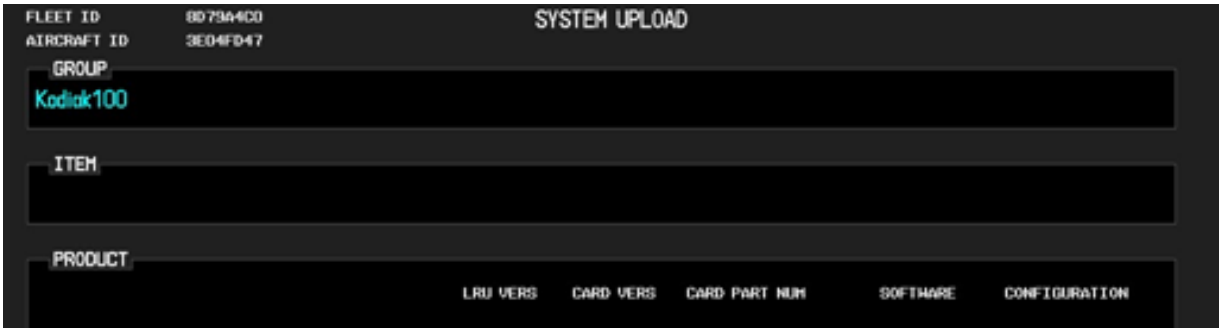

Figure 3-6. 006-B2634-0(X) Loader Card Example

4. Once the Group choice is selected, the cursor moves to the ITEM window. Turn the small FMS knob to activate the drop-down menu. Highlight the appropriate baseline configuration, then press the ENT key to select it. The PRODUCT field will then populate.

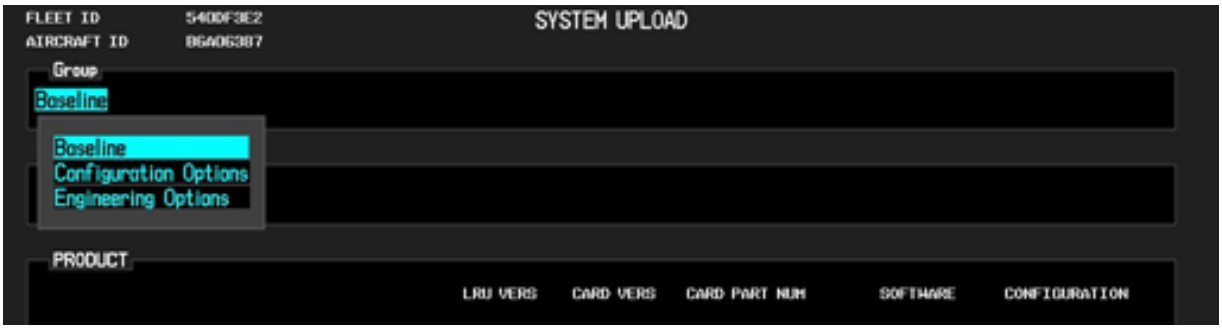

Figure 3-7. 006-B2633-0(X) Loader Card Example

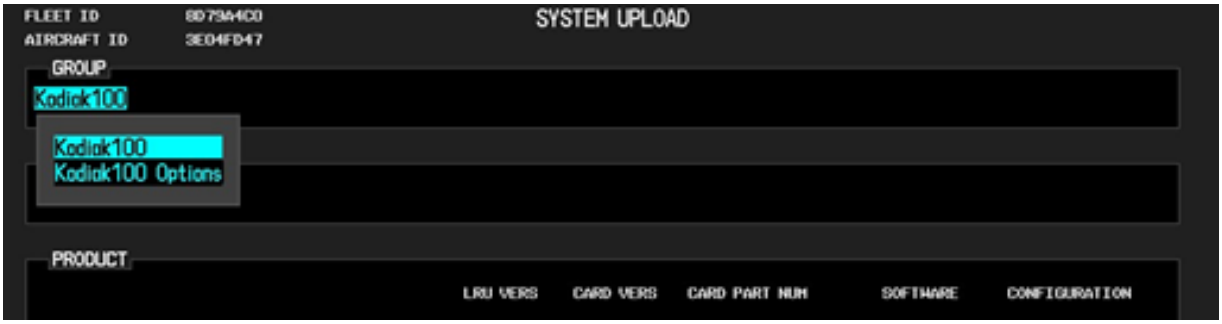

Figure 3-8. 006-B2634-0(X) Loader Card Example

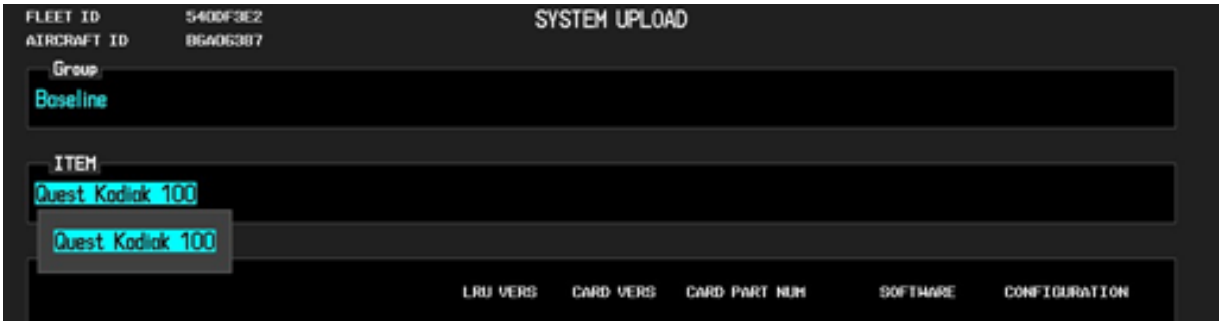

Figure 3-9. 006-B2634-0(X) Loader Card Example

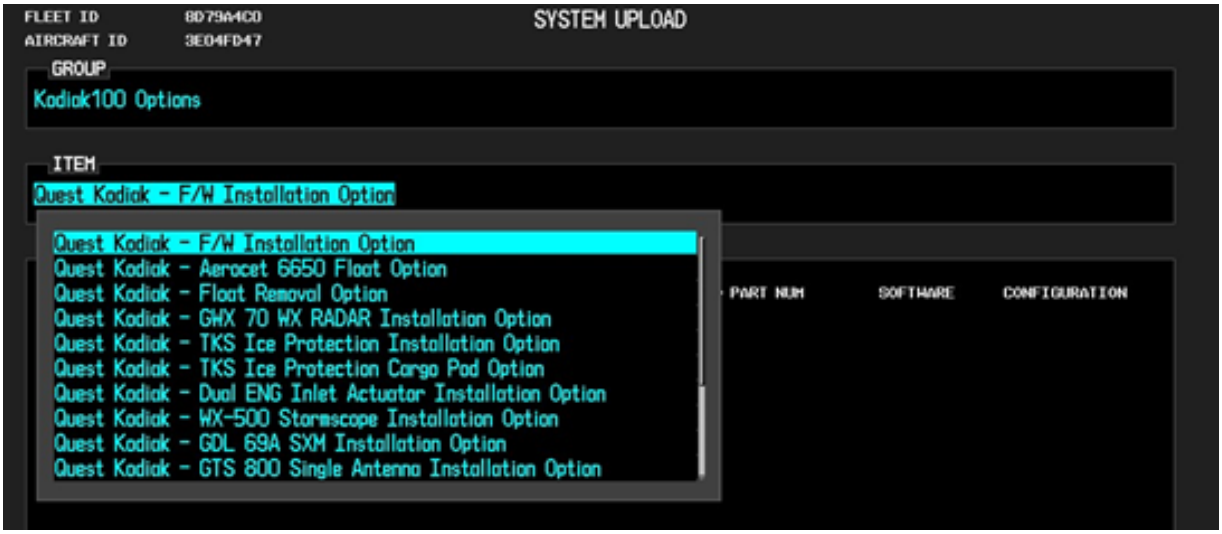

Figure 3-10. Options Selection

5. Press the CHK All softkey.

6. For aircraft that do not have Garmin GMA 1347/1360 audio panels installed, manually uncheck the GMA 1347/1360 software and configuration files by using the small FMS knob to scroll down and highlight the software or configuration.

box, then press the ENT key to uncheck the selection. Do this for all GMA 1347/ 1360 files.

7. If a CARD COPY item is present, manually uncheck the configuration box by using the small FMS knob to scroll down and highlight the configuration box, then press the ENT key to uncheck the selection. This file was installed as part of the baseline load. This is to save time in the load process. These instructions are also used to install software for the first time. If this is done this way on the first load, there wont be a copy.
8. Press the LOAD softkey.
9. Monitor the loading progress and make sure the software load completes without errors as indicated by the following:

   a) Green PASS or White N/A in all Configuration and Software columns.

   b) Upload Complete. COMPLETE is in the summary box.
10. Press Delete if the Detected new LOG config window appears.
11. Press the ENT key to acknowledge the UPLOAD COMPLETE box.
12. Repeat steps 4 through 10 for each option file required. Use the large FMS knob to move the cursor back to the ITEM window for Step 4.
13. After all option files are loaded, press the UPDT CFG softkey.
14. An “Update Configuration Module?” window appears. Press the ENT key to select Yes.

Figure 3-11. Update Confirmation

15. After the update is complete, press the ENT key to select OK in the Update config complete window.

Figure 3-12. Update Complete

16. After all option files are loaded, go to the Optional Features Enablement section next.

Table 3-1. Version 2633+ Options

Configuration Options	Action
Quest Kodiak - F/W Installation Option	Load this option only for Fish and Wildlife aircraft.
Quest Kodiak - Wipline 7000 Amphibian	Load this option only if Wipline 7000 floats are installed.
Quest Kodiak - Aerocet 6650 Float Option	Load this option only if Aerocet 6650 floats are installed.
Quest Kodiak - Float Removal Option	Load this option only if Wipline or Aerocet floats are removed from the aircraft.
Quest Kodiak - GWX 70 WX Radar Installation Option	Load this option only if GWX 70R Weather Radar has been installed.
Quest Kodiak - TKS Ice Protection Installation Option	Load this option only if FIKI system with console tank is installed on the aircraft.
Quest Kodiak - TKS Ice Protection Cargo Pod Option	Load this option only if FIKI system with tank in cargo pod is installed on the aircraft.
Quest Kodiak - Dual ENG Inlet Actuator Installation Option	Load this option only if Dual Engine Inlet Actuators are installed on the aircraft.

Table 3-1. Version 2633+ Options (Continued)

Configuration Options	Action
Quest Kodiak - WX-500 Stormscope Installation Option	Load this option only if WX-500 Stormscope system is installed on the aircraft.
Quest Kodiak - GDL 69A SXM Installation Option	Load this option only if GDL 69A SXM Radio/Weather Datalink system is installed on the aircraft.
Quest Kodiak - GTS 800 Single Antenna Installation Option	Load this option only if GTS 800 Dual Antenna Traffic Awareness System has been installed.
Quest Kodiak - GTS 800 Dual Antenna Installation Option	Load this option only if GTS 800 Dual Antenna Traffic Awareness System has been installed.
Quest Kodiak - Air Conditioning Installation Option	Load this option only if the Air Conditioning System has been installed.
Quest Kodiak - Fuel Calibration Reset	Load this option only if the fuel calibration needs to be reset for aircraft with fuel quantity capacitance probes installed.
Quest Kodiak - AFCS Option	Load this option only if Garmin GFC 700 Autopilot System is installed on the aircraft.
Quest Kodiak - FS 510 Installation Option	Load this option only if a Flight Stream 510 is going being used.
Quest Kodiak - Fuel Level Indication	Load this option only if the float-type fuel quantity sensors are installed.
Quest Kodiak - ELT 1000 Option	Load this option only if aircraft is equipped with Artex ELT 1000.

Table 3-2. Version 2634.00 to 2634.04 Options

Configuration Options	Action
Quest Kodiak - F/W Installation Option	Load this option only for Fish and Wildlife aircraft.
Quest Kodiak - Aerocet 6650 Float Option	Load this option only if Aerocet 6650 floats are installed.
Quest Kodiak - Float Removal Option	Load this option only if Wipline or Aerocet floats are removed from the aircraft.
Quest Kodiak - GWX 70 WX Radar Installation Option	Load this option only if GWX 70R Weather Radar has been installed.
Quest Kodiak - TKS Ice Protection Installation Option	Load this option only if FIKI system with console tank is installed on the aircraft.
Quest Kodiak - TKS Ice Protection Cargo Pod Option	Load this option only if FIKI system with tank in cargo pod is installed on the aircraft.
Quest Kodiak - Dual ENG Inlet Actuator Installation Option	Load this option only if Dual Engine Inlet Actuators are installed on the aircraft.
Quest Kodiak - WX-500 Stormscope Installation Option	Load this option only if WX-500 Stormscope system is installed on the aircraft.
Quest Kodiak - GDL 69A SXM Installation Option	Load this option only if GDL 69A SXM Radio/Weather Datalink system is installed on the aircraft.
Quest Kodiak - GTS 800 Single Antenna Installation Option	Load this option only if GTS 800 Dual Antenna Traffic Awareness System has been installed.
Quest Kodiak - GTS 800 Dual Antenna Installation Option	Load this option only if GTS 800 Dual Antenna Traffic Awareness System has been installed.
Quest Kodiak - Air Conditioning Installation Option	Load this option only if the Air Conditioning System has been installed.

Table 3-2. Version 2634.00 to 2634.04 Options (Continued)

Configuration Options	Action
Quest Kodiak - Fuel Calibration Reset	Load this option only if the fuel calibration needs to be reset for aircraft with fuel quantity capacitance probes installed.
Quest Kodiak - AFCS Option	Load this option only if Garmin GFC 700 Autopilot System is installed on the aircraft.
Quest Kodiak - FS 510 Installation Option	Load this option only if a Flight Stream 510 is going being used.
Quest Kodiak - Fuel Level Indication	Load this option only if the float-type fuel quantity sensors are installed.
Quest Kodiak - ELT 1000 Option	Load this option only if aircraft is equipped with Artex ELT 1000.
Activate Garmin FliteCharts Only (Disables Dual Charts and ChartView)	Load this option if dual charts feature or ChartView only was installed and the operator wants to use Garmin FliteCharts only. This removes ChartView database messages from appearing.
Quest Kodiak - COM 3 Enablement Option	Load this option for COM 3 enablement.

3.5 System Upload for Software Version 2634.05 and Later

CAUTION

If the aircraft being modified has incorporated any modifications beyond factory configuration that effect engine or airspeed limitations, your configuration may not be supported at this time. It is the responsibility of the installer to ensure compatibility with existing modifications

CAUTION

Do not allow power to be removed from the system when loading software. Remove system power only when instructed by the following procedures. As a general rule, all displays should be in the same mode (configuration or normal) unless instructed otherwise.

CAUTION

For the rest of the software/configuration procedure, do not operate the MFD or PFD2 while loading software or configuration unless specifically instructed to do so. A failed or canceled load may result.

The first step is to do an inventory of the hardware installed on the aircraft so a successful software load can be completed. A review of the Kodiak aircraft equipment list or maintenance records should provide the actual equipment installed. If the current Garmin system functions, a review of the Aux System Status Page or Transaction Log will indicate what hardware that is actually or was installed on the aircraft.

An example of options might include: GLD69A SXM, GWX70, TKS ECC Option, GTS 800 Single Antenna, WX-500, Air conditioning (VCS), GFC 700 AFCS (autopilot), ELT 1000, FS510, Dual IPS).

1. Insert the loader card into the top slot of PFD2.
2. Hold the ENT key on PFD2 and restore power by closing the PFD2 circuit breaker.
3. When the words INITIALIZING SYSTEM appear in the upper left corner of PFD2, release the ENT key.
4. Press the YES softkey to acknowledge the “DO YOU WANT TO UPDATE SYSTEM FILES” prompt.
5. An UPDATED xx FILES SUCCESSFULLY! screen is displayed. New software is loaded to PFD2.
6. When complete, PFD2 starts in configuration mode.
7. Remove power to PFD2 by pulling the PFD2 circuit breaker.

8. Remove the Software/Configuration card loader from PFD2 and insert it into the top card slot on the MFD. Repeat Steps 2 through 5 for the MFD, using the MFD to hold Softkey #12 (far right) down.
9. When MFD update is complete, it starts in the configuration mode.
10. Remove power to the MFD by pulling the MFD circuit breaker.
11. Remove the Software/Configuration card loader from the MFD and insert it into the top card slot on PFD1. Repeat Steps 2 through 5 for PFD1.
12. While holding down Softkey 12 on the MFD, restore power to the MFD by closing the MFD circuit breaker.
13. While holding down Softkey 12 on PFD2, restore power to PFD2 by closing PFD2 circuit breaker.

NOTE

The following procedures are for 2634.05 loader cards.

3.5.1 01 - Baseline Software and Configuration Loading

Load software version 2634.05 and later in a sequential order. Load the software starting in group 01, followed by 02, and on until all applicable items are completed based on hardware configuration. The procedure for loading software is as follows:

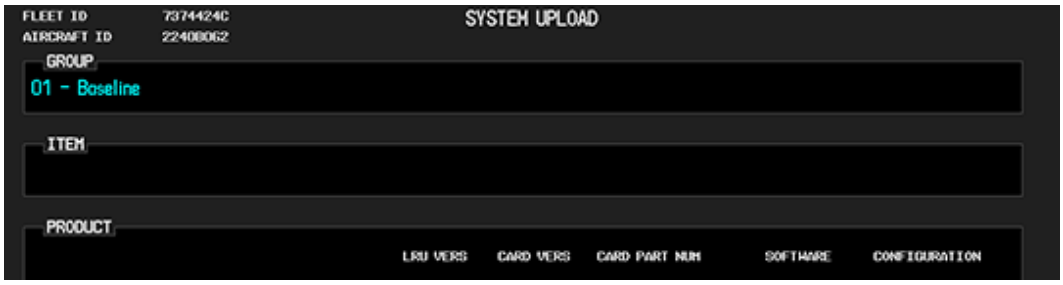

Figure 3-13. System Upload

CAUTION

If an incorrect configuration file is loaded at any time during this procedure, STOP and start the configuration load over with 01- BASELINE.

1. Ensure all avionics circuit breakers are closed and the G1000NXi system is fully powered.
2. On PFD1, go to the SYSTEM UPLOAD page using the small FMS knob.
3. Push in the PFD1 FMS knob to activate the cursor in the Group field. Turn the small FMS knob to activate the drop-down menu. Turn the small FMS knob to highlight 01 Baseline in the drop-down menu and press the ENT key to select it.

4. Once 01 Baseline is selected, the cursor moves to the ITEM window. Turn the small FMS knob to activate the drop-down menu. Highlight the appropriate baseline configuration, then press the ENT key to select it. The PRODUCT field will then populate.
5. Press the CHK All softkey.
6. Press the LOAD softkey.
7. Monitor the loading progress and make sure the software load completes without errors as indicated by the following:
   a) Green PASS or White N/A in all Configuration and Software columns.
   b) Upload Complete. COMPLETE is in the summary box.
8. Select Delete if the Detected new LOG window appears.
9. Press the ENT key to acknowledge the UPLOAD COMPLETE box.
10. After completing the 01 Baseline Group and applicable options, continue onto Group 02, then select the applicable option and load it using this same procedure.

Table 3-3. Loader Card Folder Structure Kodiak Series - SW2634.05 and Later

Group	Item	Details
01 - Baseline	Kodiak 100	Loads GDU 1050 screen software and base configurations for the Kodiak 100 aircraft.
02 - GIA	GIA 64W	Load when equipped with the GIA 64W.
03 - AHRS	• GRS79 - GMU44 • GRS79 - GMU44B	• Load when equipped with the GRS79 AHRS and GMU 44 Magnetometers. • Load when equipped with the GRS79 AHRS and GMU 44B Magnetometers.
04 - Autopilot	GFC 700	Load when equipped with the GFC700 Autopilot System.
05 - GEA	GEA 71B	Load when equipped with the GEA 71B Garmin Engine Airframe.

Table 3-3. Loader Card Folder Structure Kodiak Series - SW2634.05 and Later

Group	Item	Details
06 - Transponder	• GTX 345R-00 • GTX 345R-01	• Load when equipped with the GTX345R PN 011-03303-00 transponder. • Load when equipped with the GTX345R PN 011-03303-01 transponder.
07 - Audio Panel	• COM 3 Enable • 2X GMA 1360D	• Load when equipment is installed that requires COM 3 to be enabled (HF radio or other Auxiliary equipment) • Load when equipped with dual GMA1360D Audio Panels.
08 - GDL	GDL69A SXM	Load when equipped with GDL 69A SXM part number 011-03177-10, or -15.
09 - WX Radar	• GWX 70 • GWX Processor (75/80)	• Load when equipped with the GWX70 Weather Radar. • Load when equipped with the GWX Processor (GWX75 or GWX80).
10 - Airborne Traffic	• GTS 800 Dual Antenna • GTS 800 Single Antenna	• Load when equipped with the GTS800 and 2 antennas are installed (one on the top of the aircraft and one on the bottom). • Load when equipped with the GTS800 and a single antenna is installed on the top of the aircraft.
011 - TKS Protection	• K100 - Console Tank • K100 - ECC Tank	• Load when equipped with the TKS Anti ice system and the fluid tank is located in the cabin between the two pilot seats. • Load when equipped with the TKS Anti ice system and the fluid tank is located in the ECC (External Cargo Compartment).
012 - Amphibious Floats	• K100 – Aerocet 665 • Float Removal	• Load when equipped with Aerocet Floats model 6650. • Load when removing Aerocet Floats.

Table 3-3. Loader Card Folder Structure Kodiak Series - SW2634.05 and Later

Group	Item	Details
013 - ELT	GPS Position - RS232	• Load when equipped with the ELT 1000. This option configures GIA 1 RS-232 Channel 2 to output GPS position data.
014 - MISC OPTIONS	• WX-500	• Load when equipped with the WX500 Stormscope system.
	• GPS GIA 232 4 OUT	• This option configures RS-232 Channel 4 on both GIAs to output GPS data. This option used to be titled Fish and Wildlife and may be used by STC installations as needed.
	• DUEL ENG INLET	• Load if not equipped with TKS Protection and the aircraft has the DIPS, or Dual Inlet Particle Separator System Installed.
	• KODI-100 AIR CONDITIONING	• Load when equipped with the Vapor Cycle System (VCS)/Air Conditioning System (AC).
	• FS 510	• Load when Flight Stream 510 is installed in the lower slot of MFD1.
	• FUEL CAL RESET (This option is only on cards v2634.07 and later.)	• Load this option only if the fuel calibration needs to be reset.

3.6 Loading Optional Equipment Software and Configuration

After baseline software and configuration have been loaded per *Section 3.5*, the software and configuration for optional equipment installed in the system can be loaded. To load optional equipment software and configuration:

NOTE

If the configuration for an optional system is inadvertently loaded for a system that is not installed, the basic Kodiak 100 Baseline Loads must be reloaded. Following this, the configuration for the optional systems must be repeated.

1. Insert the correct G1000 NXi Kodiak 100 Loader Card into the PFD1 top card slot, if it is not already in the PFD.
2. Start both the PFDs and the MFD in configuration mode.
3. On PFD1, go to the System Upload page using the FMS knob.
4. Activate the cursor and use the small FMS knob to highlight Kodiak 100 Baseline Loads in the GROUP field. Press the ENT key.
5. Once any of the Kodiak Options are selected and the cursor moves to the ITEM field, turn the small FMS knob to generate a pick list. Move the cursor to highlight any desired Option. Press ENT.
6. In the PRODUCT window, make sure that LRU VERS and CARD VERS are listed. Make sure the Configuration box is checked.
7. Press the LOAD softkey.
8. If another option is to be loaded, use the large FMS knob to move the cursor back up to the ITEM field. Turn the small FMS knob to again generate the pick list, then move the cursor to highlight the next desired option available in the pick list. Press ENT, then press the LOAD softkey.
9. Make sure the SUMMARY field lists the configuration upload as complete and PASS is displayed next to the configuration check box.
10. Repeat Step 8 through steps 8 and 9 until all desired available options have been loaded.

3.7 Loading Optional Features That Use Enablement Cards

The G1000 NXi system includes optional features that require use of enablement cards for activation. Follow the procedure in this section to enable any of these features:

- Part Number 010-00330-5A, Enhanced AFCS
- Part Number 010-00330-50, Chartview Only
- Part Number 010-00330-51, TAWS-B

- Part Number 010-00330-55, SVS
- Part Number 010-00330-58, Aux Video
- Part Number 010-00330-59, Enhanced SAR
- Part Number 010-00330-D1, GWX 70R TD and GCS
- Part Number 010-00330-DD, GMA Delete
- Part Number 010-00330-DK, CMC
- Part Number 010-00330-J9, GWX 75 TD and GCS
- Part Number 010-00330-KA, SurfaceWatch
- Part Number 010-00330-HH, CVDR

1. Remove power from the PFDs and the MFD by opening the PFD1, PFD2 and MFD circuit breakers.
2. A special enablement card is required to enable some optional G1000 NXi features. This example refers to TAWS enablement.

NOTE

An enablement card can only enable the applicable feature on one system (one aircraft). A new enablement card must be used for each feature on each aircraft.

3. Insert the TAWS enablement card in the upper slot of the PFD1.
4. While holding the ENT key on the PFD1, restore power by closing the PFD1 circuit breaker.
5. When the words INITIALIZING SYSTEM appear in the upper left corner of the PFD, release the ENT key.
6. Repeat steps 4 and 5 for the MFD and PFD2.
7. On PFD1, go to the System Upload page (default startup page) using the FMS knobs.
8. Activate the cursor and use the small FMS knob to highlight Configuration Files in the GROUP field. Press the ENT key.
9. Activate the cursor and use the small FMS knob to highlight Enable TAWS in the ITEM field. Press the ENT key.
10. Make sure there is a check mark in the box in the configuration column for each item to be loaded.
11. Press the LOAD softkey.
12. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:

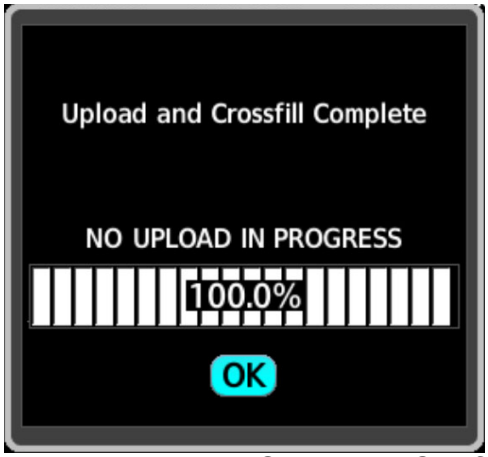

Figure 3-14. Upload Complete Confirmation

13. View the SUMMARY field and ensure the loaded items are COMPLETED.
14. Repeat Step 1 through Step 13 to load any other desired options requiring an enable card.
15. De-activate the cursor.
16. Power down the system and remove the enablement card from PFD1.

3.8 Crossfill Monitoring System

After a configuration file upload to an MFD or PFD is complete, it has only been verified on PFD1, and not on any other device. If the technician powers down the devices before the configuration has been sent to the other devices on the crossfill network, it is possible the other devices may not have received the entire configuration. When these devices are powered on with missing or invalid configuration, they may revert to a default, safe configuration, and then that new configuration will be cross filled to the other devices (including the original device that has the correct configuration), erasing the uploaded configuration. The Crossfill Monitoring System prevents that from happening by waiting until crossfill has completed to declare the upload complete, at which point it is safe to power down the devices.

While the Crossfill Monitor is waiting for crossfill to complete, a progress bar displays the percentage of the 10-minute timeout that has elapsed. This bar does not display the crossfill progress. When crossfill is complete, the bar will be set to 100%, the Crossfill Monitor will display a message to the technician indicating the upload is complete, and the OK button will appear, concluding the upload process.

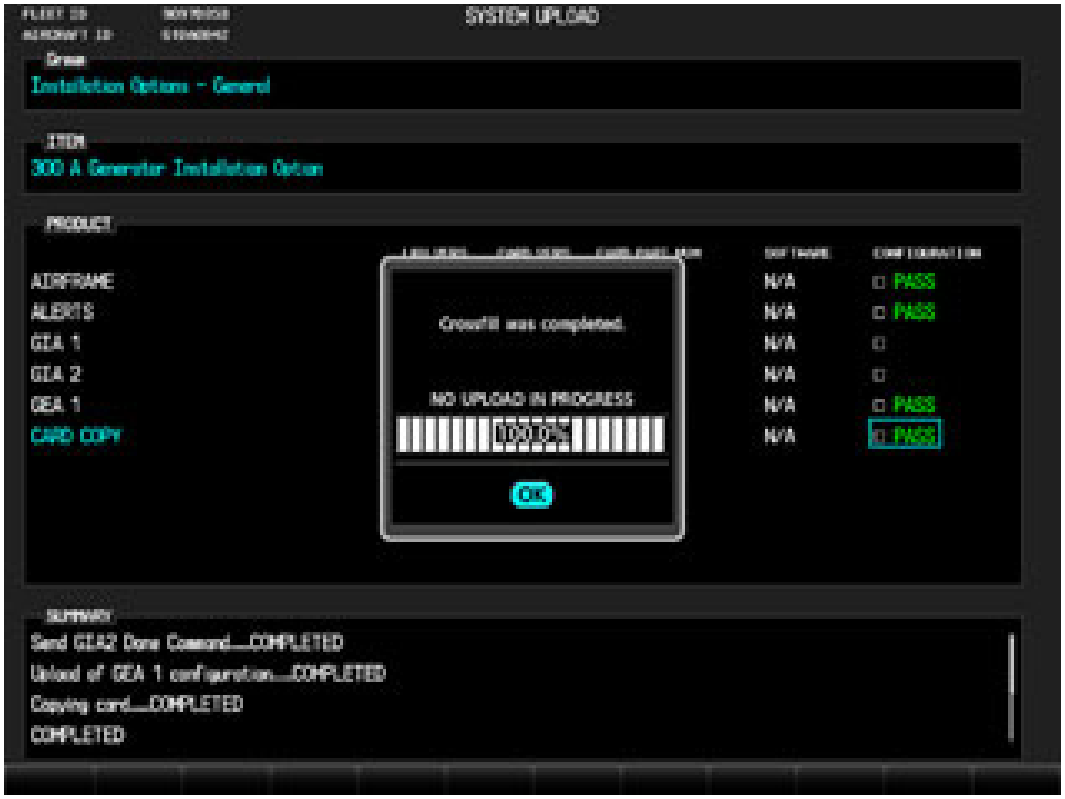

Figure 3-15. Crossfill Monitor

The Crossfill Monitor immediately fails if it detects that a configured LRU (PFD, MFD) is not online. This is because an offline device could cause the problem the monitoring system was meant to prevent if it did not receive the configuration, or if it received only partial configuration.

Figure 3-16. Upload and Crossfill Complete

The Crossfill Monitor immediately fails if it detects that a configured LRU (PFD, MFD) is not online. This is because an offline device could cause the problem the monitoring system was meant to prevent if it did not receive the configuration, or if it received only partial configuration.

Figure 3-17. Crossfill Failed

In this case, the summary window displays the configured LRU or LRUs it detects as being offline.

Figure 3-18. Crossfill Summary

The Crossfill Monitor waits indefinitely for crossfill to complete, but after 10 minutes it displays a message advising the technician that something may be wrong.

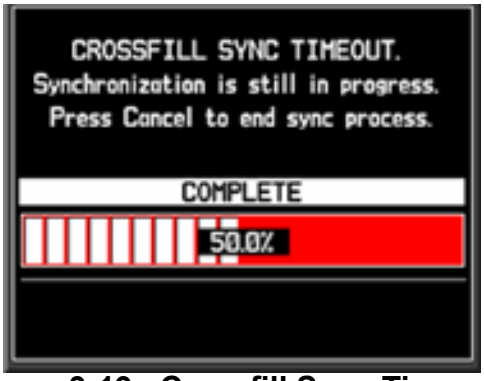

Figure 3-19. Crossfill Sync Timeout

The Summary window on the System upload page will report what LRUs it still detected as unsynced at the time the user canceled. Normally PFD1 would not detect as unsynced, because the device which is uploading is always considered to be synced with itself.

Figure 3-20. Unsynced Summary

The listed LRUs would be the ones to check for the problems mentioned in the troubleshooting section. The crossfill will still be ongoing even after the user cancels, though it will no longer be monitored.

Figure 3-21. No Longer Waiting for Crossfill

Even though 'timeout' has occurred, crossfill still proceeds normally, and if the Crossfill Monitor detects the network has synced all of the 'config' tags, it will still show a completion message, even after timeout. This message will only be displayed if the user has not yet canceled. Crossfill will still be ongoing even after the user cancels, though it will no longer be monitored.

Figure 3-22. Crossfill completes after Timeout

NOTE

If the timeout has elapsed, an error has occurred and crossfill is not going to finish. The technician should cancel, view the unsynced LRUs, and proceed with troubleshooting, unless the decision is made to let it run as part of troubleshooting.

3.8.1 Crossfill Troubleshooting

1. Possible causes of a failure for this include the following:
   a) An LRU is not online or is not connected to the uploading LRU.
   b) An LRU is configured and should not be.
2. Possible Corrections for a failure are:
   a) Turn on the offline device.
   b) Check the LRUs configured and see if one is configured and should not be so.
3. Possible causes for a timeout include the following:
   a) A connected device is not in config mode (either because it was never in config mode, or because it did not restart in config mode after a software upload).
   b) Something else is preventing registry tags from appropriately cross-filling to at least 1 other device
   c) Not all LRUs have the same software version
4. Possible corrections for a timeout include the following:
   a) Ensure that all configured LRUs are on, and in config mode.
   b) Ensure that all online LRUs can be seen by the uploading device on the network (The System Status page on the uploading device should show which ones it detects on the network.)
   c) Ensure that all LRUs have the same software version.
5. If timeout problems persist:
   a) Pay special attention to the LRUs listed as being unsynced when the user cancels the monitoring process (see ‘User cancels after timeout’ above).
   b) If after several attempts, the same LRU or LRUs are listed as being unsynced, it is likely there is something preventing those devices from cross-filling. Double check that they are in config mode, and have the same software version as the other LRUs.
   c) If after several attempts, different/random LRUs are listed as being unsynced, it is likely that there is a registry tag that is changing too fast to ever be detected as 'synced'. For the technician, this means it is likely that crossfill has truly completed, and there is just one or a small number of tags that are changing quickly.

d) The Crossfill Monitoring system is advisory (it doesn't perform cross-filling, it monitors) and cross-filling proceeds normally, so waiting 10 minutes (which is the crossfill timeout time) still applies.

3.9 Software and Configuration Load Troubleshooting

Table 3-4. Software/Config Troubleshooting

Problem	Solution
GDU 1050 MFD or PFD display does not come on.	• Ensure power is present at display connector. • Replace display.
Software file load fails. 	• Ensure that LRU is reporting data on System Status page (LRU is online). Check data path wiring as needed. • Retry software file load or try using a different card. • Ensure the MFD is not touched during the loading process, unless specifically instructed to do so. • Ensure that LRU part number is compatible with software version and Loader Card. • Replace LRU.
Configuration file load fails. 	• Ensure that LRU is reporting data on System Status page (LRU is online). Check data path wiring as needed. • Retry software file load or try using a different card. • Ensure the MFD is not touched during the loading process, unless specifically instructed to do so. • Ensure that LRU part number is compatible with software version and Loader Card. • Replace LRU.
GIA1 and/or GIA2 to LRU data path not working.	• Ensure GIA1 and GIA2 are configured correctly. • Check wiring, connectors, and pins as needed.
Software File Mismatch Alert appears in lower right corner of PFD when started in normal mode. 	• Ensure that proper software fie part number and version were loaded to LRU. • Check and ensure that correct Loader Card was used during loading process. • Reload software to LRU. • Reload MANIFEST configuration file to PFD.

3.9.1 System Communication Hierarchy

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

Table 3-5. System COM Hierarchy

Desired Operation	Criteria for Success
Load Software to GDU 1050 MFD or PFD Displays.	• G1000 NXi Kodiak 100 Loader Card must be inserted in top slot for each display to be loaded. • CLR and ENT keys must be held when system power is applied to display. • Power only one display on at a time during software loading.
Load Software/Configuration files to GIA 63/64Ws.	• G1000 NXi system must be powered on. • PFD and MFD must have correct software. • PFD and MFD must be successfully configured with configuration files.
Load Software/Configuration files to: • GMA 1347/1360D • GDC 72 • GEA 71/71B • GRS 79 • GMU 44/44B • GTX 345R • GDL 69A SXM	• G1000 NXi must be powered on. • G1000 NXi Kodiak 100 Loader Card must be inserted into PFD top slot. • PFD and MFD must have correct software and configuration settings. • GIA 63/64Ws must have correct software. • GIA 63/64Ws must be successfully configured with GIA1 and GIA2 configuration files. • Serial data path from GIA1 to each LRU must be operational.

3.10 Maintenance Records

After conducting a functional test in accordance with the Kodiak 100 Aircraft Maintenance Manual, the aircraft may be returned to service. Record the following information in appropriate aircraft maintenance logs:

- Part number of the G1000 NXi Kodiak 100 Loader Card used to perform software loading or software updates.
- Part numbers and versions of LRU software files reported after maintenance is complete (found at the System Status page in configuration mode).

3.11 Aviation Database Loading

1. With the system OFF, remove an SD Card from the top SD card slot of the MFD.
2. Download and install the databases on an SD card.
3. Put the SD Card in the top SD card slot of the MFD.
4. Turn the system ON.
5. Press the ENT Key or the right-most softkey on MFD display to acknowledge the startup screen.
6. Turn the large FMS Knob and select Aux.
7. Turn the small FMS Knob and select Databases.
8. Monitor the Sync Status on the 'Aux-Databases' Page. Wait for all databases to complete syncing, indicated by 'Sync Complete' being displayed. A cyan double arrow will appear between the Standby and Active columns to show which Standby databases will be transferred to Active at the next power cycle.

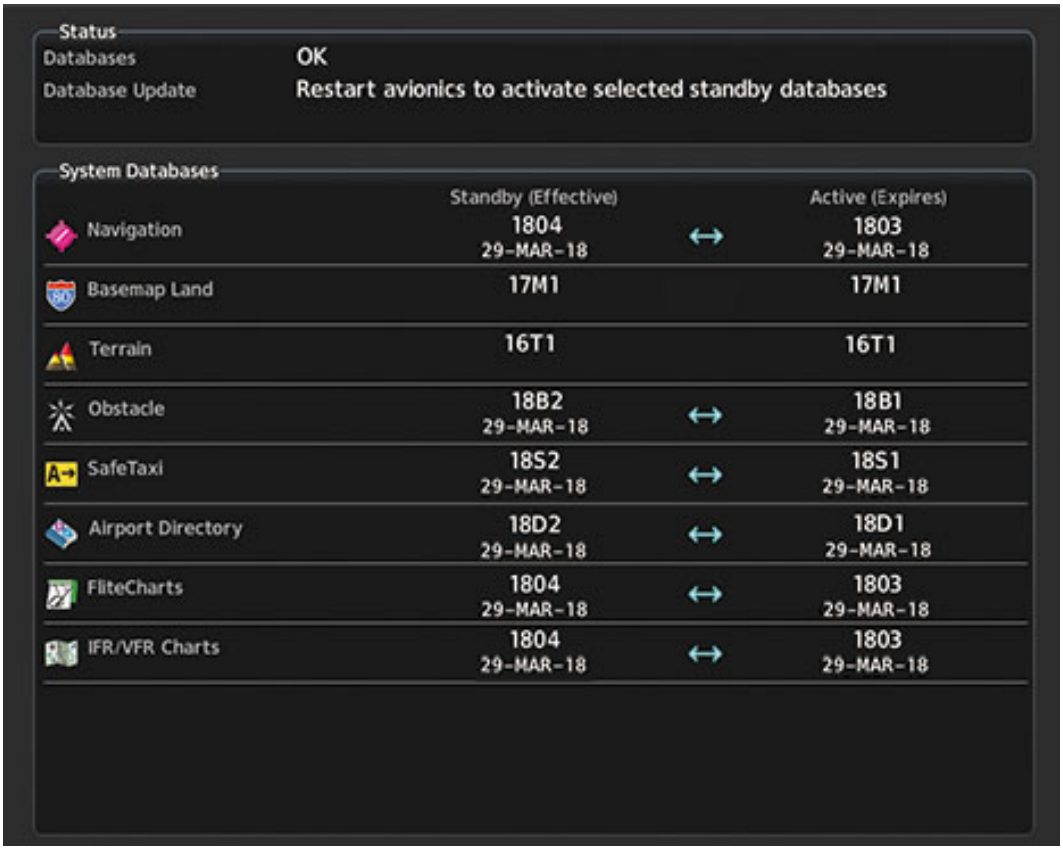

Figure 3-23. Aux - Databases' Page before Activation of Standby Databases

9. Make sure the correct database cycle information is shown in the Standby column.

10. Remove the SD card from the bottom slot of the MFD if desired.
11. Remove and reapply power to the system.
12. Press the ENT Key or the right-most softkey on MFD display to acknowledge the startup screen.
13. Turn the large FMS Knob and select Aux.
14. Turn the small FMS Knob and select the Databases.
15. Make sure the standby databases transferred and are now in the Active column.

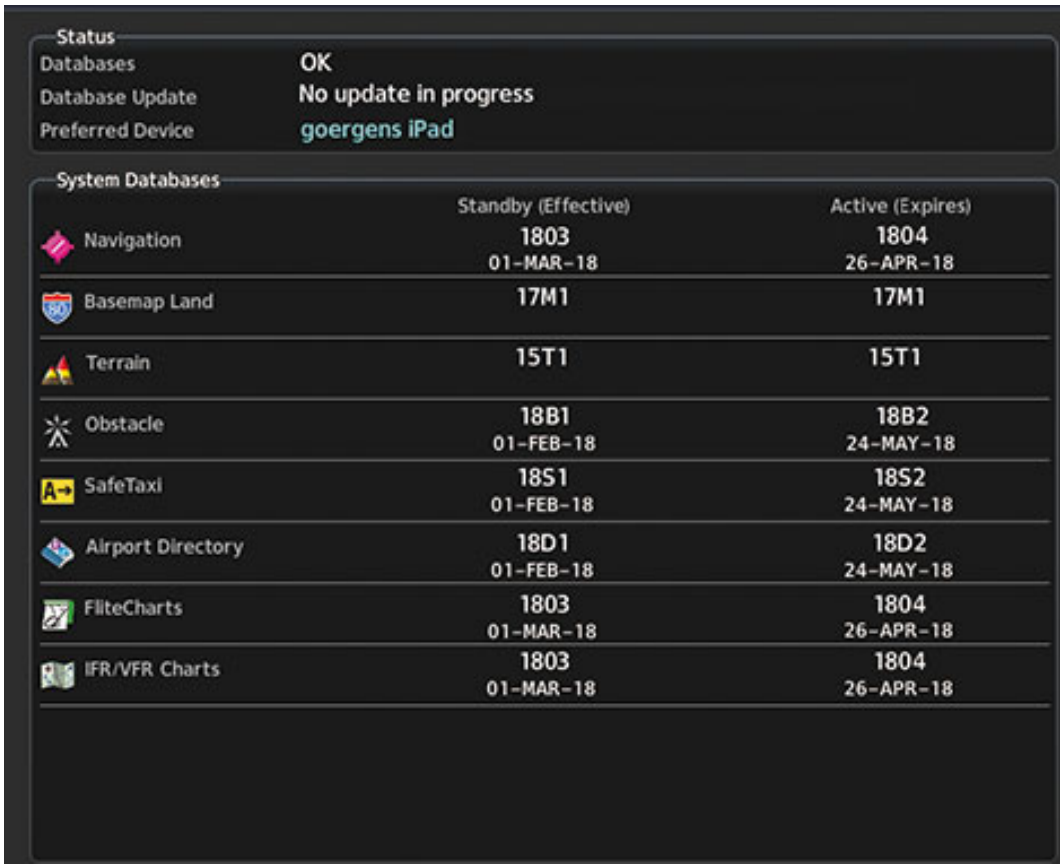

Figure 3-24. Aux - Databases' Page - Updated Databases

16. To manually activate any databases that did not transfer to the active column:
    a) Push the FMS Knob. The first database title on the screen will be selected.
    b) Turn the small FMS Knob as necessary to select the database title.
    c) Press the ENT Key. A cyan double-sided arrow will appear indicating the standby database will become active.
    d) Remove and reapply power to the system.

e) Press the ENT Key or the right-most softkey on MFD display to acknowledge the startup screen.

f) Turn the large FMS Knob and select Aux.

g) Turn the small FMS Knob and select Databases.

h) Make sure the standby databases transferred and are now in the Active column.

17. For additional information on each database, press and then turn the FMS Knob to select the database, and then press the Details Softkey. Press the ENT Key or the FMS Knob to exit.

18. To view database information for an individual display:

a) Turn the large FMS Knob and select Aux.

b) Turn the small FMS Knob and select System Status.

c) Press the Display Database Selection Softkey (MFD1 DB, PFD1 DB) to show database information for each display. Use the small FMS Knob to scroll through the database information. Press the ENT Key or the FMS Knob to exit.

3.12 Final Configuration Items

3.12.1 Aircraft Registration Number Entry

1. On PFD1, go to the AIRCRAFT CONFIGURATION page

2. Activate the cursor to select the AIRCRAFT REGISTRATION field and enter the aircraft's tail number.

3. Turn the large FMS knob to select the ICAO ADDRESS and enter the aircrafts 24-bit ICAO address if the system does not automatically fill in this field based on an N-number registration.

4. If applicable, turn the large FMS knob to select the ICAO REGION field and select the ICAO region. Otherwise, leave at NONE.

5. If applicable, turn the large FMS knob to select the DOMAIN IDENTIFIER field and enter the number (not common). Otherwise, leave blank.

6. 6.Turn the large FMS knob to select the VFR CODE field and enter the desired code that will become active when the VFR key on a PFD is pressed.

7. Press the Set GTX1 softkey (if present) and acknowledge the PFD1 prompt by pressing the ENT key.

8. Press the Set GTS softkey (if present) and acknowledge the PFD1 prompt by pressing the ENT key
9. Deactivate the cursor.
10. Turn large FMS knob to select GTX 3X5 configuration page group.
11. Turn the small FMS knob to select Transponder Airframe Config page.
12. Make sure the GTX 3x5 - #1 box at the top of the page is checked green and the tail number, ICAO address, and VFR code that were entered previously are correct.

3.12.2 Fuel Flow Configuration

Shadin Transducer

1. Locate the number stamped on the transducer data tag (the number will between 34 and 46).
2. Multiply the number by 1000 (XX multiplied by 1000 = XX000).

Electronics International Transducer

1. Locate the number engraved on the transducer.
2. Multiply the number by 1000 (XX.XXX multiplied by 1000 = XXXXX).

Configure K Factor

1. Select the FUEL TANK CALIBRATION Page in the CAL Page Group.
2. Using the softkeys along the bottom of the screen, enter the following pass code: 12, 11, 10, 9. The cursor should now appear on the screen.

NOTE
Softkeys are numbered 1 to 12, left to right.

3. Turn the outer FMS knob counterclockwise to move the cursor and highlight ENG 1 K Factor in the Fuel Flow window.
4. Enter the five-digit K Factor (calculated in the above section) as follows:
   a) Turn the inner FMS knob to select the first digit.
   b) Turn the outer FMS knob to move the cursor to the right one digit.
   c) Turn the inner FMS knob to enter the desired number.
   d) Repeat steps B and C until all five K Factor digits have been entered.
5. Press the ENT key.
6. Press the FMS knob to turn off the cursor.

3.12.3 Engine Serial Number

Make sure the engine serial number is correct:

1. Select the AIRFRAME CONFIGURATION Page.
2. Press the FMS knob. Turn the large FMS knob until the ENGINE S/N field is highlighted.
3. Use the large and small FMS knob to enter the engine serial number in the following format: RBXXXX, where XXXX is a four-digit number.
4. Press the ENT key.

3.12.4 Date and Time Setting (Optional)

NOTE

This setting may allow the GPS to acquire satellites more rapidly.

1. Select the System Setup Page.
2. Press the FMS knob.
3. Use the large and small FMS knob to enter the current UTC date and time.
4. Press the ENT key.

3.12.5 Sidetone Setting (For aircraft with GIA 63W units installed only)

1. Select the GIA COM SETUP PAGE in the GIA Page Group.
2. Press the FMS knob. The SELECT GIA UNIT field is highlighted.
3. Select GIA1.
4. Use the large and small FMS knob to change the FREQUENCY to 118.00.
5. Use the large and small FMS knob to change the SIDETONE to 63.
6. Press the ENT key twice.
7. Repeat for the frequencies 127.00 and 136.975.
8. Repeat the procedure for GIA2.

3.12.6 Calibration Procedures

After the fthe final configuration procedures have been completed, refer to *Section 7.12*.

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4 TROUBLESHOOTING

This section describes troubleshooting methods that can be used to help identify and resolve G1000 NXi system hardware and software faults. The test procedures in *Section 7* can also be used as an aid in troubleshooting.

NOTE

All screenshots in this manual are included for visual reference only and might not reflect the information displayed during actual G1000 NXi system operation.

4.1 Supporting Documents

The following documents supplement the information contained in this troubleshooting section:

- G1000 NXi Pilot's Guide for the Kodiak 100
- G1000 NXi Cockpit Reference Guide for the Kodiak 100
- Kodiak 100 Wiring Diagrams
- Kodiak 100 Aircraft Maintenance Manual
- Garmin LRU Installation Manuals referenced in *Section 5*

4.2 System Fault Reporting and Built-In Testing

In addition to the troubleshooting information presented in this section, it should be noted that Garmin LRUs carry out Built-In Test (BIT) and performance checks on a full time basis. They do not require a special request to run the BIT cycle. All LRUs report health and diagnostic information to the display in real time. The display acts as a central location to track LRU health status. Some examples of parameters being monitored by an LRU are:

- Voltage Values
- Operating Temperature
- Memory Status
- Software, Configuration, Calibration Status
- Databus Status

An abnormal event reported by an LRU is displayed using System Messages. A critical failure can also be configured to displayed as a Crew Alerting System (CAS) message. The information related to a fault event is logged in the system for future reference.

This line maintenance manual describes system messages and recommended actions for resolving the problem. The G1000 NXi system LRU data pages provide information about relevant LRU parameters. These pages can be accessed in configuration mode and can be used to verify parameters for troubleshooting.

4.3 System Annunciations

NOTE

Operating the G1000 NXi in the vicinity of metal buildings, metal structures, or electromagnetic fields can cause sensor differences that may result in nuisance annunciations during start up, shut down, or while taxiing. If one or both sensed values are unavailable, it will be annunciated as a NO COMP (no compare).

When an LRU or an LRU function fails, a red X is displayed on items associated with the unsuccessful data. The following section describes common system annunciations. Causes may include (but are not limited to):

- Unavailable Data
- Unreliable Data
- Failed Data due to aircraft/LRU connector wiring issue
- Failed Data due to power removal to the LRU
- Failed Data due to LRU hardware failure
- Dashes or underscores indicate uninitialized data. Upon applying system power, certain display fields remain invalid as equipment begins to initialize.

NOTE

Everything should be operational within one minute of applying power. If any display field remains flagged, begin troubleshooting the most likely cause.

If data fields become invalid due to LRU failure, the PFD/MFD typically annunciates the failure with a large red X, as shown in *Figure 4-1* and *Figure 4-2*.

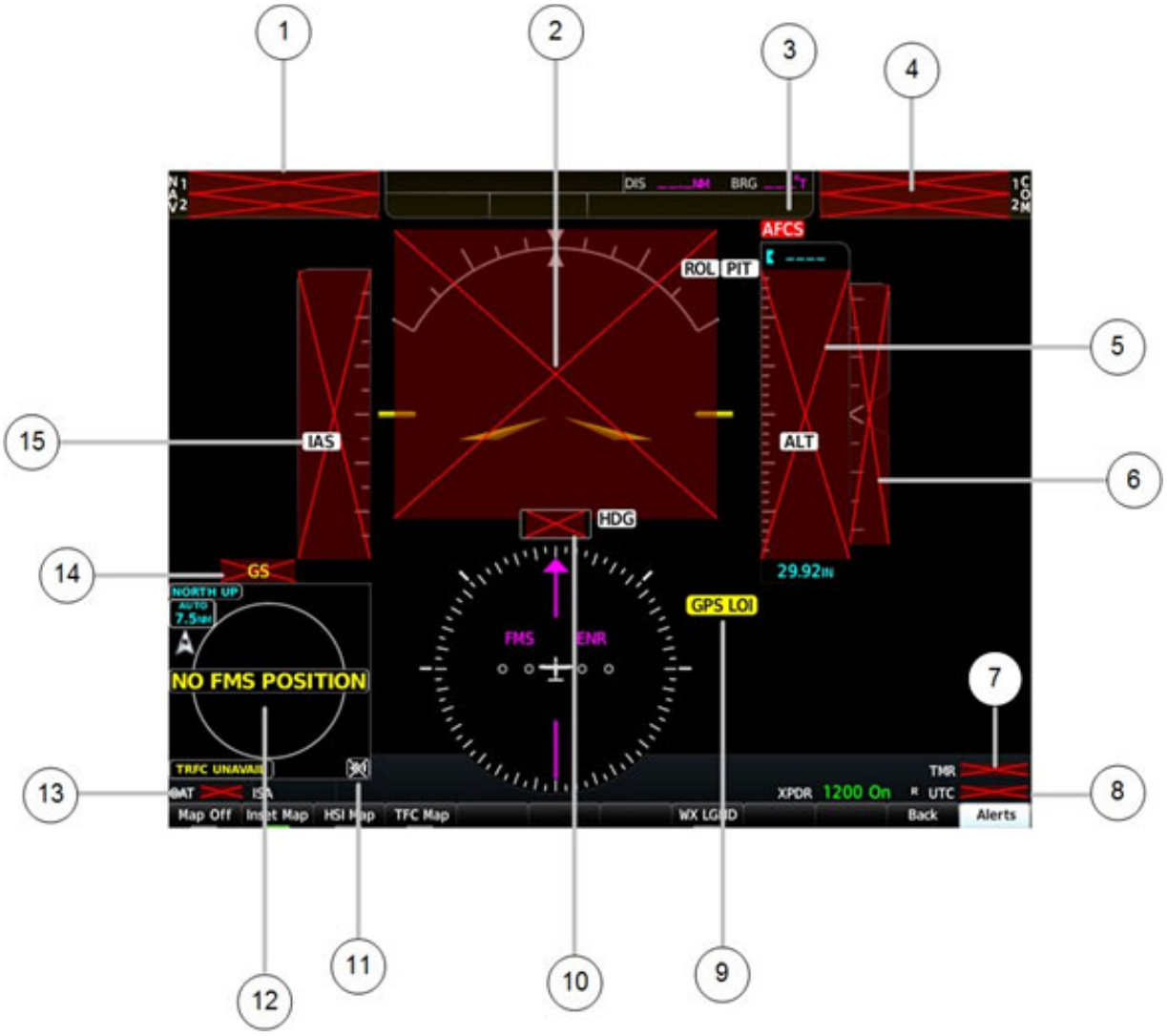


Figure 4-1. Failure Annunciations (PFD)

4.3.1 NAV1 or COM1 (Numbers 1 & 4)

1. Check for GIA1 configuration, software, or failed data path error messages. Correct any errors before proceeding.
2. Switch GIA1 and GIA2 to verify the location of the problem. If the problem follows GIA1, replace GIA1.
3. Check the configuration settings for GIA1 and PFD1.
4. Check the Ethernet interconnect from GIA1 to PFD1 and unit connector pins for faults. If the problem persists, replace PFD1.

4.3.2 NAV2 or COM2 (Numbers 1 & 4)

1. Check for GIA2 configuration, software, or failed data path error messages. Correct any errors before proceeding.
2. Switch GIA2 and GIA1 to verify the location of the problem. If the problem follows GIA2, replace GIA2.
3. Check the configuration settings for GIA2 and PFD2.
4. Check the Ethernet interconnect from GIA2 to PFD2 and unit connector pins for faults. If the problem persists, replace PFD2.

4.3.3 Attitude (Number 2)

1. Make sure all personal electronic devices are turned off in the cabin at the time the attitude fails.
2. Check the Alert Window for PFD, MFD or GRS configuration, software, or failed data path error messages. Correct any errors before proceeding.
3. For an attitude failure while parked, check the following:

   - Is the aircraft stationary if GPS is not available? Aircraft movement (rocking the wings or moving the tail) may cause the attitude and heading to fail if it believes the aircraft is in motion without GPS input.
   - Check if the GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0.
   - Check for metal objects (tool boxes, power carts, nearby large steel structures, etc.) around the aircraft that could be interfering with the magnetometer. Cycle GRS 79 power to restart initialization. Check the GRS 79 connector for security and that proper wire harness strain relief is provided. Check the GRS 79 is fastened down tightly in its mounting rack and the mounting rack is not loose (CAUTION - do not loosen the mounting rack hardware to the airframe shelf or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed). Perform an Engine Run-Up Test to check if engine vibration is causing the GRS 79 to go off-line.
   - Replace the GRS 79.
   - If the problem persists, replace the GRS 79 configuration module.

4.3.4 AFCS (Number 3)

1. Check specifically for proper operation of the:

   - GIA 64W
   - GRS 79 AHRS, GDC 72 Air Data Computer, and GSA 80 and 81 Servo Actuators.

2. Check that no red X's are present on the MFD or PFDs.

3. Check that no related alert messages are present on PFD1 (press the ALERTS softkey).
4. Isolate the fault to an LRU. Replace this LRU and confirm the resolution of the annunciation.
5. Isolate the fault to an LRU. Replace this LRU and confirm the resolution of the annunciation.
6. Check the AFCS wiring.
7. Also, see the information later in this section for GRS 79 troubleshooting information

4.3.5 Altitude (Number 5)

1. Inspect the integrity of the GDC 72 pitot/static plumbing.
2. Inspect the pitot/static ports and associated equipment for faults.
3. Check the GTP 59 probe if there is a TAS failure.
4. Check the GDC 72 configuration settings for the PFDs, MFD, GIA1, and GIA2.
5. If the PFDs, MFD, and GIA configuration settings are correct, replace the GDC 72 configuration module.
6. Replace the GDC 72 if the problem persists.

4.3.6 Vertical Speed (Number 6)

Same as 4.3.5.

4.3.7 TMR (Number 7)

Same as 4.3.1 and 4.3.2.

4.3.8 UTC (Number 8)

Same as 4.3.1 and 4.3.2.

4.3.9 GPS LOI (Loss of Integrity) (Number 9)

1. Check for GIA1/2 configuration, software or failed data path error messages. Correct any errors before proceeding.
2. Make sure the aircraft is located where the GPS antennas have a clear view of the sky.
3. Check for possible external interference to the GPS receivers.

4. Make sure a cell phone or Wi-Fi/Bluetooth technology is not turned on in the cabin (even in a monitoring state).

5. Check the GPS strength bars on both GPS receivers on the GPS 1 or GPS 2 Status Display on the MFD. If the signal strength levels are erratic, disappear and reappear rapidly, or switch between a solid and hollow bar frequently there is an external device interfering with the GPS receivers. Turn off any devices that radiate a signal in the local area or move the aircraft to another location to remove the interference.

6. Make sure the aircraft is not parked near a hanger equipped with a GPS repeater with its doors open.

7. Make sure the GIAs are online. If a GIA is not online, check for power input faults.

4.3.10 HDG (Number 10)

1. Check for GMU or GRS configuration, software or failed data path error messages. Correct any errors before proceeding.

2. Make sure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer. Make sure the aircraft is not in a hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that may contain steel reinforcements.

3. Make sure that a cell phone or a device using cell phone technology is not turned on in the cabin (even in a monitoring state).

4. Cycle power after moving the aircraft away from metal objects to find whether or not metal objects were the source of the interference. Allow up to five minutes for the heading to reinitialize.

5. Perform a Magnetometer Interference Test to check for interference from on-board electrical system components (e.g. NAV lights). Pay 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.

6. Make sure the GRS 79 and GMU 44/44B connectors are secure.

7. Check the wiring and any in-line connectors between the GRS and GMU.

8. Recalibrate the GMU 44/44B.

9. Replace the GMU 44/44B.

10. Replace the GRS 79 if the problem persists

4.3.11 No Traffic Data (Number 11)

NOTE

The GTS 800 may be at fault. Take the following steps to resolve the problem:

1. Perform a SET>ACTV configuration reset on the GTS configuration page.
2. If an error is still present, reload the GTS 800 configuration files.
3. If a problem persists, replace the master configuration module and check the configuration module harness for faults. Replace if necessary.

NOTE

Option and enablement cards will need to be replaced if the master configuration module is changed. The G1000 NXi System ID number will change to a new number when installing a new master config module.

4. Load the correct GTS 800 software.
5. Replace the GTS 800.

4.3.12 No FMS Position (Number 12)

1. Check PFD1 for GIA1/2 configuration, software or failed data path error messages. Correct any errors before proceeding.
2. Make sure the airplane is located where its GPS antennas have a clear view of the sky.
3. Check for possible external interference to the GPS receivers.
4. Ensure that a cell phone or a device using Wi-Fi/Bluetooth technology is not turned on (even in a monitoring state) in the cabin.
5. Check the GPS strength bars on both GPS receivers on the GPS 1 or GPS 2 STATUS Display on the MFD. If the signal strength levels are erratic, disappear and reappear rapidly, or switch between a solid and hollow bar frequently there is an external device interfering with the GPS receivers. Turn off any devices that radiate a signal in the local area or move the aircraft to another location to remove the interference.
6. Make sure the airplane is not parked near a hanger with the doors open and equipped with a GPS repeater.
7. Make sure the GIAs are online by checking for a green check mark on the MFD System Status Page. If a GIA is not online (a red X will be present instead of a green check mark), check for power input faults.

4.3.13 OAT (Number 13)

1. Check the GTP 59 wiring and connectors for faults or damage.
2. Check the GDC 72 config module wiring for damage and replace if any is found.
3. Replace the GDC 72 config module.
4. Replace the GDC 72 with a known good unit.
5. If the problem persists, replace the GTP 59.

4.3.14 GS (Number 14)

Same as 4.3.1 and 4.3.2.

4.3.15 IAS (Number 15)

1. Check the PFD for PFD1/2, MFD or GDC1/2 configuration, software or failed data path error messages. Correct any errors before proceeding.
2. Verify the GDCs are on-line by checking for a green check mark next to the GDC on the MFD System Status Page.
3. If the GDC is not on-line (a red X will be present instead of a green check mark), check for wiring/power faults and GDC connector security.
4. Inspect the GDC 72 pitot/static ports and plumbing for blockage.
5. If the PFDs, MFD, and GIA configuration settings are correct, replace the GDC 72 configuration module.
6. Replace the GDC 72.

Figure 4-2. Failure Annunciations (MFD)

4.3.16 FLAPS (Number 16)

1. Check the flap position - GEA 71/GEA 71B wiring.
2. Replace the GEA 71/GEA 71B.

4.3.17 ELEV (Number 17)

1. Check the elevator trim - GEA 71/GEA 71B wiring.
2. Replace the GEA 71/GEA 71B.

4.3.18 RUD (Number 18)

1. Check the GEA 71/GEA 71B wiring.
2. Replace the GEA 71/GEA 71B.

4.3.19 AIL (Number 19)

1. Check the GEA 71/GEA 71B wiring.
2. Replace the GEA 71/GEA 71B.

4.3.20 Assorted Engine/Airframe Sensors (Number 20)

1. 1.Check the PFD Alert Window for GIA1/2 or GEA configuration, software or failed data path error messages. Correct any errors before proceeding.
2. On PFD1 in Configuration Mode, Select the GEA STATUS page and verify the GEA internal power supply, configuration, and calibration status boxes are checked green.
3. If the internal power supply box displays a red X, check for shorted engine/airframe sensors that receive 5V, 10V or 12V power from the GEA are:
   - 12V-TKS Flow Sensor, TKS QTY Sensor, Fuel Sensors, Fuel Flow Sensor, Aileron Trim Servo.
   - 10V- Pitot and Stall Heat Current Sensors.
   - Fuel OFF Indication.
4. The configuration and calibration boxes should be checked green. If the calibration status boxes are red X, replace the GEA 71/GEA 71B.
5. Verify the internal, external, and reference voltages listed in the Main Analog and I/O A Analog boxes do not display dashes (does not include Aircraft Power 1 and 2). If any voltages display dashes, replace the GEA 71/GEA 71B.
6. Check the MFD AUX - SYSTEM STATUS page if the GEA is online (green check on the AUX - SYSTEM STATUS page is present). If GEA is not online (red X is present), verify the unit is receiving power at the GEA rack connector.
7. If the problem persists, check the GIA/GEA interconnect wiring and unit connector pins for faults. Replace the GEA configuration module and thermocouple located in the back shell of the GEA connector.
8. If the problem persists, replace the GEA 71/GEA 71B.

4.4 System Messages

NOTE

New Terrain/Obstacle cards, Jeppesen Aviation Database and other optional features (i.e. TAWS unlock card) will need to be replaced if the master configuration module is changed. The System ID number will change to a new number when installing a new master configuration module. The old Terrain and other cards will no longer work as they will remain locked to the old System ID number.

Table 4-1 lists maintenance related system messages, possible causes, and recommended actions.

Table 4-1. Troubleshooting System Messages

System Message	Description	Possibly Faulty LRU / Subsystem
ADC1 ALT EC	ADC1 altitude error correction is unavailable.	• GDC 72
ADC1 AS EC	ADC1 airspeed error correction is unavailable.	• GDC 72
ADC1 SERVICE	A failure has been detected in ADC1.	• GDC 72
AHRS MAG DB	The AHRS1 magnetic model database versions do not match.	• GRS 79
AHRS1 CAL	AHRS1 calibration error.	• GRS 79
AHRS1 CONFIG	AHRS1 configuration error.	• GRS 79 • Master Config Module
AHRS1 GPS	AHRS1 is using the backup GPS data path.	• GRS 79 • GIA 64W
AHRS1 GPS	AHRS1 is not receiving any GPS information.	• GRS 79 • GIA 64W
AHRS1 GPS	AHRS1 is not receiving backup GPS information.	• GRS 79 • GIA 64W
AHRS1 GPS	AHRS1 is operating exclusively in no-GPS mode.	• GRS 79 • GIA 64W
AHRS1 SERVICE	A failure has been detected in AHRS1.	• GRS 79

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
AHRS1 SRVC	The AHRS1 magnetic-field model is out of date.	• GRS 79
AHRS1 TAS	AHRS1 is not receiving valid true airspeed.	• GRS 79
CNFG MODULE	The PFD (master) configuration module is inoperative.	• GDU 1050 • Master Config Module
COM1 INOP - CAL	The COM Calibration needs to be checked.	• GIA 64W
COM1 CONFIG	A COM1 configuration error.	• GIA 64W • Master Config Module
COM1 INOP - CRNT	GIA COM current.	• Aircraft supply voltage to the GIA 64W • Wiring
COM1 INOP - INTRL	A GIA internal fault.	• GIA 64W
COM1 MANIFEST	COM1 software mismatch.	• GIA 64W
COM1 PTT	The COM1 push-to-talk (PTT) key line is stuck in the enabled state.	• GIA 64W • GMA 1360D
COM1 REDUCED TX POWER	Reduced COM transmit power.	• GIA 64W
COM1 RMT XFR	The COM1 remote transfer key line is stuck in the enabled state.	• GIA 64W
COM1 SERVICE	A fault has been detected in the COM subsystem of GIA1.	• GIA 64W
COM1 INOP - SERL	A COM Serial Communication fault.	• GIA 64W
COM1 INOP - SYNTH	A COM Synthesizer Lock Fault.	• GIA 64W
COM1 TEMP	COM1 has exceeded its operating temperature range.	• GIA 64W
COM2 INOP - CAL	The COM Calibration needs to be checked.	• GIA 64W

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
COM2 CONFIG	COM2 configuration error.	• GIA 64W • Master Config Module
COM2 INOP - CRNT	GIA COM current.	• Aircraft supply voltage to the GIA 64W • Wiring
COM2 INOP - INTRL	A GIA internal fault.	• GIA 64W
COM2 MANIFEST	COM2 software mismatch.	• GIA 64W
COM2 PTT	The COM2 push-to-talk (PTT) key line is stuck in the enabled state.	• GIA 64W • GMA 1360D
COM2 REDUCED TX POWER	Reduced COM transmit power.	• GIA 64W
COM2 RMT XFR	The COM2 remote transfer key line is stuck in the enabled state.	• GIA 64W
COM2 SERVICE	A fault has been detected in the COM subsystem of GIA2.	• GIA 64W
COM2 INOP - SERL	A COM Serial Communication fault.	• GIA 64W
COM2 INOP - SYNTH	A COM Synthesizer Lock Fault.	• GIA 64W
COM2 TEMP	COM2 has exceeded its operating temperature range.	• GIA 64W
DATA LOST	The pilot profile data was lost.	• GDU 1050
DB MISMATCH	Navigation database mismatch. Crosstalk is off.	• GDU 1050
DB MISMATCH	Obstacle database mismatch.	• GDU 1050
DATABASES MISMATCHED	Databases mismatch.	• GDU 1050
DB MISMATCH	Terrain database mismatch.	• GDU 1050
FAILED PATH	A data path connected to a GDU and/or GIA has failed.	• GDU 1050 • GIA 64W

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
G/S1 FAIL	A failure has been detected in the Glideslope subsystem of GIA1.	• GIA 64W
G/S1 SERVICE	A failure has been detected in the Glideslope subsystem of GIA1. The receiver may still be available.	• GIA 64W
G/S2 FAIL	A failure has been detected in the Glideslope subsystem of GIA2.	• GIA 64W
G/S2 SERVICE	A failure has been detected in the Glideslope subsystem of GIA2. The receiver may still be available.	• GIA 64W
GDC1 MANIFEST	GDC1 software mismatch. Communication halted.	• GDC 72
GEA1 CM INOP-COMM	GEA1 Configuration Module connection.	• GEA 71B • Master Config Module
GEA1 CONFIG	GEA1 configuration error.	• GEA 71B • Master Config Module
GEA1 INOP-CAL	GEA1 rigging.	• GEA 71B
GEA1 INOP-CNFG	GEA1 software and configuration.	• GEA 71B
GEA1 INOP-INTRL	GEA1 internal fault.	• GEA 71B
GEA1 INOP-SENS	GEA1 configuration.	• GEA 71B
GEA1 CM INOP-TEMP	GEA1 cooling.	• Cooling • GEA 71B
GEA1 MANIFEST	GEA1 software mismatch.	• GEA 71B
GIA1 CONFIG	GIA1 configuration error.	• GIA 64W
GIA1 CONFIG	GIA1 audio configuration error.	• GIA 64W
GIA1 COOLING	The GIA1 operating temperature is too low to operate properly.	• GIA 64W
GIA1 COOLING	GIA1 has exceeded its operating temperature range.	• GIA 64W

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
GIA 1 INOP - CRNT	Check GIA1 Current.	• Aircraft supply voltage to the GIA 64W • Wiring
GIA 1 INOP - SERL (COM)	Internal GIA Serial Communication Fault (COM Transceiver).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 1 INOP - SERL (GPS)	Internal GIA Serial Communication Fault (GPS Receiver).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 1 INOP - SERL (NAV)	Internal GIA Serial Communication Fault (VOR/ILS Receivers).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 1 INOP - VOLT	Check GIA voltage.	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA1 MANIFEST	GIA1 software mismatch.	• GIA 64W
GIA1 SERVICE	A fault has been detected in GIA1.	• GIA 64W
GIA2 CONFIG	GIA2 configuration error.	• GIA 64W
GIA2 CONFIG	GIA2 audio configuration error.	• GIA 64W
GIA2 COOLING	The GIA2 operating temperature is too low to operate properly.	• GIA 64W
GIA2 COOLING	GIA2 has exceeded its operating temperature range.	• GIA 64W
GIA 2 INOP - CRNT	Check GIA2 Current.	• Aircraft supply voltage to the GIA 64W • Wiring

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
GIA 2 INOP - SERL (COM)	Internal GIA Serial Communication Fault (COM Transceiver).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 2 INOP - SERL (GPS)	Internal GIA Serial Communication Fault (GPS Receiver).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 2 INOP - SERL (NAV)	Internal GIA Serial Communication Fault (VOR/ILS Receivers).	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA 2 INOP - VOLT	Check GIA voltage.	• Aircraft supply voltage to the GIA 64W • GIA 64W
GIA2 MANIFEST	GIA2 software mismatch.	• GIA 64W
GIA2 SERVICE	A fault has been detected in GIA2.	• GIA 64W
GMA 1 CONFIG	GMA1 configuration error.	• GMC 1360D • Master Config Module
GMA1 FAIL	GMA1 is inoperative.	• GMA 1360D
GMA1 MANIFEST	GMA1 software mismatch.	• GMA 1360D
GMA 1 INOP: COMM	GMA Communication Fault.	• Software • GMA 1360D
GMA 1 INOP: INTRL	GMA Communication Fault.	• Software • GMA 1360D
GMA 1 INOP: SOFTWARE	GMA CRC Fault.	• Software • GMA 1360D
GMA 1 INOP: VOLTAGE	Voltage outside standard range.	• Cooling • Aircraft supply voltage
GMA1 PANEL STUCK KEY	Front Panel Key is Stuck.	• GMA 1360D

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
PILOT PTT STUCK	GMA 1 Pilot Push-to-Talk is Stuck.	• Pilot Push-to-Talk Switch • GMA 1360D
COPILOT PTT STUCK	GMA 1 Copilot Push-to-Talk is Stuck.	• Copilot Push-to-Talk Switch • GMA 136D
GMA1 SERVICE	A fault has been detected in GMA1.	• GMA 1360D
GMU1 MANIFEST	GMU1 software mismatch.	• GMU 44B
GPS1 INOP - CAL	Calibration fault.	• GIA 64W
GPS1 INSPECT RQRD - BATT	Check GPS battery.	• GIA 64W
GPS1 BATT LOW:	GPS1 Batt Check Recommended.	• GIA 64W
GPS NAV LOST	A loss of GPS navigation has been detected due to position error.	• GIA 64W
GPS NAV LOST	A loss of GPS navigation has been detected due to GPS failure.	• GIA 64W
GPS NAV LOST	A loss of GPS navigation has been detected due to GPS sensors not being enabled.	• GIA 64W
GPS1 FAIL	The GPS subsystem of GIA1 is inoperative.	• GIA 64W
GPS1 SERVICE	A fault has been detected in the GPS1 receiver.	• GIA 64W
GPS2 FAIL	The GPS subsystem of GIA2 is inoperative.	• GIA 64W
GPS2 SERVICE.	A fault has been detected in the GPS2 receiver.	• GIA 64W
GRS1 MANIFEST	GRS1 software mismatch. Communication halted.	• GRS 79
GTX1 MANIFEST	GTX1 software mismatch. Communication.	• GTX 335R

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
HDG FAULT	AHRS1 magnetometer fault has occurred.	• GMU 44/44B
HW MISMATCH	GIA HW mismatch. Only one GIA is SBAS capable.	• GIA 64W
LOI	GPS information loss of integrity has been detected.	• GIA 64W
MFD1 BKLT CAL INV	MFD1 backlight calibration lost.	• GDU 1050
MFD1 CONFIG	MFD1 configuration error.	• GDU 1050 • Master Config Module
MFD1 COOLING	MFD1 has poor cooling. Reducing power usage.	• GDU 1050
MFD1 KEYSTK	A key is stuck on the MFD1 bezel.	• GDU 1050
MFD1 MANIFEST	MFD1 software mismatch.	• GDU 1050
MFD1 SERVICE	A fault has been detected in MFD1.	• GDU 1050
MFD1 VOLTAGE	MFD1 has low voltage.	• GDU 1050
NAV 1 INOP - CAL	Check NAV Calibration.	• GIA 64W
NAV 1 INOP - CONFIG	A NAV software or configuration fault.	• GIA 64W
NAV 1 INOP - INTRL	A NAV internal fault.	• GIA 64W
NAV 1 INOP - SERL	A NAV serial communication fault.	• GIA 64W
NAV 1 INOP - SYNTH	NAV synthesizer lock fault.	• GIA 64W
NAV1 MANIFEST	NAV1 software mismatch.	• GIA 64W
NAV1 RMT XFR	The NAV1 remote transfer key line is stuck in the enabled state.	• GIA 64W
NAV1 SERVICE	A fault has been detected in the NAV subsystem of GIA1.	• GIA 64W
NAV 2 INOP - CAL	Check NAV Calibration.	• GIA 64W

Table 4-1. Troubleshooting System Messages (Continued)

System Message	Description	Possibly Faulty LRU / Subsystem
NAV 2 INOP - CONFIG	A NAV software or configuration fault.	• GIA 64W
NAV 2 INOP - INTRL	A NAV internal fault.	• GIA 64W
NAV 2 INOP - SERL	A NAV serial communication fault.	• GIA 64W
NAV 2 INOP - SYNTH	NAV synthesizer lock fault.	• GIA 64W
NAV2 MANIFEST	NAV2 software mismatch.	• GIA 64W
NAV2 RMT XFR	The NAV2 remote transfer key line is stuck in the enabled state.	• GIA 64W
NAV2 SERVICE	A fault has been detected in the NAV subsystem of GIA2.	• GIA 64W
PFD1 BACKLIGHT CAL	PFD1 backlight calibration lost.	• GDU 1050
PFD1 CONFIG	PFD1 configuration error.	• GDU 1050 • Master Config Module
PFD1 COOLING	PFD1 has poor cooling. Reducing power usage.	• GDU 1050
PFD1 KEYSTK	A key is stuck on the PFD1 bezel.	• GDU 1050
PFD1 MANIFEST	PFD1 software mismatch.	• GDU 1050
PFD1 SERVICE	A fault has been detected in PFD1.	• GDU 1050
PFD1 VOLTAGE	PFD1 has low voltage.	• GDU 1050
XPDR1 FAIL	XPDR1 is inoperative.	• GTX 345R
XPDR1 SERVICE	A fault has been detected in XPDR1.	• GTX 345R
XTALK ERROR	A flight display crosstalk error has occurred. A PFD and an MFD are not communicating with each other.	• GDU1050

4.5 System Status Page

The System Status Page on the MFD provides LRU health status by means of a green check mark or red X indication (see *Figure 4-3*). Software versions are listed for installed LRUs, along with other database versions and dates. If a red X is shown for an LRU, refer to the associated troubleshooting information in *Section 4.7*.

Figure 4-3. System Status Page

4.6 Visual Inspection

Conduct a general visual check of all LRUs and associated wiring harnesses to ensure continued installation integrity. Inspect all LRUs for security of attachment, including visual inspection of mounting rack and other supporting structure attaching the rack to aircraft structure. For installations using countersunk fasteners, verify the fastener heads are in full contact with unit mounting rack holes.

Re-torque mounting fasteners to aircraft specifications if required. Inspect for signs of corrosion. Inspect condition of wiring, shield terminations, routing, and attachment/ clamping. Inspect any bonding straps for corrosion, loose connections, or signs of lightning damage. Rework as needed. Ensure the appropriate circuit breakers are closed.

Perform a visual inspection of avionics fan operation. Check fan wiring. Visually inspect integrity of the system antennas, antenna fasteners, and antenna sealant for damage. If required, check and re-torque antenna fasteners 20 to 25 in-lbs, and remove and replace antenna sealant. Perform any Periodic Maintenance visual inspections listed in *Section 8*.

4.6.1 LRU Visual Inspections

NOTE

Refer to AM902.0 Kodiak 100 Airplane Maintenance Manual for LRU access instructions.

4.6.1.1 Shield Block Grounds

G1000 NXi connectors may employ a Shield Block grounding system to provide necessary ground reference to shielding and/or transducers. The shield block termination method allows multiple grounds to be terminated directly to a block mounted to the backshell assembly.

4.6.1.2 GDC 72 Air Data Computer

Visually inspect the GDC 72, mount, and connector for corrosion or other defects. Ensure that pitot/static plumbing is secure and in good condition.

4.6.1.3 GEA 71/GEA 71B Engine/Airframe Unit

Inspect the GEA unit, rack, and connectors for corrosion or other defects. Check the integrity of the SHIELD BLOCK ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment.

4.6.1.4 GMA 1347/GMA 1360D Audio Panel

Inspect the GMA unit, rack, and connectors for corrosion or other defects. Check the integrity of the SHIELD BLOCK ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment.

4.6.1.5 GDU Fans

Inspect avionics fans hoses for accumulation of dirt and other damage. Remove excess dirt as required. Ensure that both fans are operational.

4.6.1.6 GIA 63W/GIA 64W Fans

Inspect avionics cooling fans hoses for accumulation of dirt and other damage. Remove excess dirt as required. Ensure that each GIA fan is operational.

4.6.1.7 Displays

Remove the displays. Inspect the mounting surface, copper bonding fingers and connector for corrosion, heavy oxidation, or other damage. Check the integrity of the SHIELD BLOCK ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment.

4.6.1.8 GRS 79

Inspect the GRS 79 unit, rack, and connector for corrosion or other defects. Check the integrity of the SHIELD BLOCK ground attachments to the harness connector assembly as well as the integrity of the individual shields and their attachment. Inspect wiring harness for chaffing.

4.6.1.9 GSA 80 Pitch and Yaw Servo and GSM 86 Servo Gearbox

Inspect the servo, servo mount, connector, and support structures to ensure that no corrosion, chaffing, cracks, or other defects exist. Check the servo control cable to ensure no fraying, corrosion, or other damage exists. If the condition of the cable is questionable, replace it with a new one.

Ensure the cable is correctly attached to the pulley and check the tension of the servo control cable. Have an assistant manually move the elevator from stop to stop and visually monitor the servo, servo mount, and control surface cabling. Ensure there is no binding in the control cabling, and the capstan pulley rotates freely.

Inspect the servo wiring and ensure no chaffing, wear, or other damage exists.

4.6.1.10 GSA 81 Pitch Trim Servo and GSM 86 Servo Gearbox

Inspect the servo, servo mount, connector, and support structures to ensure that no corrosion, chaffing, cracks, or other defects exist. Check the servo control chain to ensure no link deformation, corrosion, or other damage exists. If the condition of the chain is questionable, replace it with a new one.

Ensure the chain is correctly engaged to the sprockets. Check the rigging of the servo control chain. Have an assistant manually move the elevator trim wheel from stop to stop and visually monitor the servo, servo mount, and control chain movement. Ensure there is no binding in the control chain and the capstan sprockets turn freely.

Inspect the servo wiring and ensure no chaffing, wear, or other damage exists. Replace the access panels if no other maintenance is to be performed.

4.6.1.11 GSA 81 Roll Servo

Gain access to the roll servo gearbox and move the control wheel full travel (left and right) while observing the gearbox capstan and roll servo cables using an inspection mirror (or equivalent) and adequate lighting.

Verify the roll servo cables are properly routed, are not touching any of the capstan retaining pins, and are not interfering with any other structure. Check for any signs of fraying or damage to the roll servo cables.

Listen for indication of roll servo cables contacting any retaining pins or other structure. If either roll servo cable is found to contact any capstan retaining pin or other structure, or if either roll servo cable shows any signs of fraying or damage, the roll servo cable(s) must be replaced before further flight.

Contact Garmin Aviation support before disassembly or removal of roll servo cable(s).

4.6.1.12 GMU 44/44B

Visually inspect the GMU 44/44B and rack. Inspect the mounting hardware and GMU 44/44B for corrosion or other damage. Inspect the mounting hardware and GMU 44/44B for corrosion or other damage.

4.6.1.13 GTP 59

Inspect the GTP 59 for dirt accumulation, corrosion, and other damage. Clean or replace as required.

4.6.1.14 GA 58 Traffic System Antenna

Conduct a visual inspect on the GA 58 antenna(s) for proper sealing and attachment. In the event attachment is not secure, re-attach antenna and complete the Electrical Bonding Test and investigate any cause of bonding test failure. Correct any discrepancies and re-seal the antenna.

In the event antenna seal shows signs of damage or decomposition, complete the Electrical Bonding Test and re-seal the antenna.

In the event of a suspected or actual lightning strike to the aircraft, the GA 58 Antenna(s) and its associated installation shall be inspected. If the GA 58 Antenna was struck by lightning, then the antenna and the surrounding installation shall be inspected to ensure that there is no structural damage around the areas where lightning may have attached. At the antenna end ensure there is no damage to the connectors on the antenna and on the coaxial cable. Ensure the coaxial cable connectors are securely attached to the antenna connectors. An electrical bonding test must be performed on the GA 58 Antenna.

For a top-mounted GA 58 Antenna, disconnect all four coaxial cable antenna connectors (GA 58 antenna, connectors (P1-P4). Measure the resistance between the body of the connector on the antenna base and a nearby exposed portion of aircraft structure (example: exposed rivet on fuselage stringer). Verify the resistance is equal to or less than 10 milliohms.

Reconnect all four antenna connectors ensuring each connector is secured. Repeat for optional bottom-mounted GA 58 Antenna. In the event of bonding test failure, remove antenna, clean and re-attach using unit replacement procedures in the section of this manual that covers GA 58 replacement. The fresh attachment should yield resistance less than or equal to 2.5 milliohms.

4.7 LRU Troubleshooting

This section contains troubleshooting information and procedures for the various components of the G1000 NXi system. Check the servo control cable to ensure no fraying, corrosion, or other damage exists. If the condition of the cable is questionable, replace it with a new one.

4.7.1 GDU 1050 Display Unit Troubleshooting

4.7.1.1 GDU 1050 System Messages

Table 4-2 lists GDU 1050 related system messages, possible causes, and recommended actions.

Table 4-2. GDU 1050 System Messages

System Message	Cause	Recommended Actions
CNFG MODULE	The PFD1 (master) configuration module is inoperative.	• Check the master configuration module connector and wiring for damage inside the GDU connector back plate. • Replace the master configuration module wiring and pins. • If the message persists, replace the master configuration module.
DATA LOST	Pilot stored data has been lost. Recheck settings.	• If the CLR key was held during a power cycle, disregard the message. • Cycle power to the PFD. • On the GDU TEST page, verify the CLR key is not stuck. • If the fault persists, replace the GDU.
DB MISMATCH	Navigation database mismatch.	• Load the correct database type and version in both displays.
DB MISMATCH	Obstacle database mismatch.	• Load the correct database type and version in all displays.

Table 4-2. GDU 1050 System Messages (Continued)

System Message	Cause	Recommended Actions
DB MISMATCH	Terrain database mismatch.	• Load the correct database type and version in both displays.
FAILED PATH	A data path connected to a GDU and/or GIA has failed.	• Determine which data path has failed and check wiring continuity for the failed path. • If the problem persists, replace the affected LRU.
MFD1 BACKLIGHT CAL	MFD1 backlight calibration lost.	• Replace the GDU.
MFD1 CONFIG	MFD1 configuration error.	• Reload configuration to the GDU. • If the fault persists, check the master configuration module harness for faults and replace if necessary.
MFD1 COOLING	MFD1 has poor cooling. Reducing power usage.	• Check the avionics environment for proper cooling and make any necessary corrections. • If the fault persists, replace the GDU.
MFD1 KEYSTK	A key is stuck on the MFD1 bezel.	• Select the GDU Test page and verify the key is stuck (corresponding indicator will be green). • Exercise the suspected stuck key and reset the GDU Test page to see if the indicator remains green without pressing the key. • If the fault persists, replace the GDU.
MFD1 MANIFEST	MFD1 software mismatch.	• Load the correct software.
MFD1 SERVICE	A fault has been detected in MFD1.	• Replace the GDU.

Table 4-2. GDU 1050 System Messages (Continued)

System Message	Cause	Recommended Actions
MFD1 VOLTAGE	MFD1 has low voltage.	• Check input voltage to the GDU. • If the input voltage is correct, replace the GDU.
PFD1 BACKLIGHT CAL	PFD1 backlight calibration lost.	• Replace the GDU.
PFD1 CONFIG	PFD1 configuration error.	• Reload configuration to the GDU. • If the fault persists, check the master configuration module harness for faults and replace if necessary.
PFD1 COOLING	PFD1 has poor cooling. Reducing power usage.	• Check the avionics environment for proper cooling and make any necessary corrections. • If the fault persists, replace the GDU.
PFD1 KEYSTK	A key is stuck on the PFD1 bezel.	• Select the GDU Test page and verify the key is stuck (corresponding indicator will be green). • Exercise the suspected stuck key and reset the GDU Test page to see if the indicator remains green without pressing the key. • If the fault persists, replace the GDU.
PFD1 MANIFEST	PFD1 software mismatch.	• Load the correct software.
PFD1 SERVICE	A fault has been detected in PFD1.	• Replace the GDU.
PFD1 VOLTAGE	PFD1 has low voltage.	• Check input voltage to the GDU. • If the input voltage is correct, replace the GDU.

Table 4-2. GDU 1050 System Messages (Continued)

System Message	Cause	Recommended Actions
XTALK ERROR	A flight display crosstalk error has occurred. A PFD and an MFD are not communicating with each other.	• Check the PFD Alerts window for database errors and correct all faults before proceeding. • Check the display Ethernet interconnect wiring. • Switch the PFD with a known good unit. If the problem follows the unit, replace the GDU. • If the fault persists, switch the MFD with a known good unit If the problem follows the unit, replace the GDU.

4.7.1.2 Display Troubleshooting

4.7.1.2.1 Display and/or Keyboard Will Not Track Photocell

1. Reload the PFD and MFD configuration files.
2. Select the GDU TEST page. Cover and uncover the photocells and verify the PHOTOCELL A or PHOTOCELL B value changes. If the values do not change, replace the display.

4.7.1.2.2 Display/Keyboard Will Not Track Dimmer Bus

1. Using the GDU Test Page, ensure the lighting bus voltage is changing as the dimmer bus is rotated (LIGHTBUS DC and LIGHTBUS DC2).
2. If it is suspected the settings have been manually changed by an operator, reload the display configuration.
3. If the display is the PFD, switch it with a known good unit to see if the problem remains with the display. Replace the display if the condition remains with the same unit.
4. If the fault remains in the original position after switching displays, check the display dimmer input to verify the presence of voltage (disconnect the unit and check pin 59 in the wire harness connector for a voltage).
5. If the display is the MFD, check the dimmer input to verify the presence of a voltage. If it is, replace the GDU.

4.7.1.2.3 Display is Blank, Resets, or Flickers

1. Cycle power. If the GDU recovers, look for yellow text containing error information at the top of the screen. If the message indicates that software needs to be reloaded, reload the software. Otherwise, replace the GDU.
2. Shut off all cabin light and hangar lights so the environment is dark, to verify the display is just very dim.
3. Adjust the avionics dimmer control fully clockwise.
4. Manually turn up the backlight on the PFD and load configuration files to the GDU.
5. Ensure the slide lock is fully engaged with the locking tabs on the back of the unit. If the slide lock is not fully engaged, remove the connector and see if the locking tabs on the GDU are perpendicular to the connector. If not, straighten them before reseating the connector.
6. Ensure the GDU is receiving power and ground. If a circuit breaker is tripped, find the source of short before resetting the breaker.
7. Verify the circuit breakers have not failed and the power wire connections are secure. Troubleshoot the aircraft wiring for faults.

4.7.1.2.4 SD Card is Stuck in the GDU

1. Do not insert a screwdriver of any length into the card slot.
2. No not pry against the overlay.
3. Do not force the SD card out.
4. Use a small screwdriver in the groove on the side of the exposed end of the card to help pull out the card.
5. It might be necessary to push the card in further to release the card locking mechanism.
6. If the card can be removed, check for more than one label. Two or more labels on the card can cause sticking.
7. Remove all but one label.
8. Ensure the SD card is from SanDisk. Use of other SD cards is not approved.
9. If the card was inserted with the label facing to the right, do not attempt to remove. Return the unit to Garmin for repair.

4.7.1.2.5 Button/Knob/Joystick Does Not Appear to Function

1. Select the GDU TEST page and confirm that buttons, knobs, or joystick all operate correctly by observing a change in color from red to green in the button/knob/joystick icon when the button/knob/joystick is pressed. If a button is stuck, the button icon will be green without pressing the button as soon as the GDU TEST page is selected.

2. If the problem is verified, replace the GDU.

4.7.1.3 Garmin SVT™ (Synthetic Vision Technology) Troubleshooting

The optional Synthetic Vision Technology (SVT) is a visual enhancement to the G1000 NXi. SVT depicts a forward-looking attitude display of the topography immediately in front of the aircraft. The field of view is 30 degrees to the left and 35 degrees to the right. SVT information is shown on the Primary Flight Display (PFD), or on the Multifunction Display (MFD) in Reversionary Mode.

The depicted imagery is derived from the aircraft attitude, heading, GPS three dimensional position, and a 4.9 arc-second database of terrain, obstacles, and other relevant features. The terrain data resolution of 4.9 arc-seconds, meaning the terrain elevation contours are stored in squares measuring 4.9 arc-seconds on each side, is required for the operation of SVT.

Figure 4-4. SVT View on the PFD

SVT is intended to be used with traditional attitude, heading, obstacle, terrain, and traffic inputs. SVT is disabled when valid attitude or heading data is not available for the display. In case of invalid SVT data, the PFD display reverts to the standard blue-over-brown attitude display.

Since SVT becomes disabled without the following data resources all the following become candidates for troubleshooting:

- Attitude data
- Heading data
- GPS position data
- 4.9 Arc-second Terrain data
- Obstacle data
- TAWS function is not available, in test mode, or failed
- The position of the aircraft exceeds the range of the terrain database

4.7.1.3.1 SVT System Messages

Table 4-3. SVT System Messages

System Message	Cause	Recommended Actions
SVT - SVT DISABLED: Out of available terrain region	SVT is disabled because the aircraft exceeded the boundaries of the loaded terrain database.	• Ensure that operations are within the required geographic area.
SVT - SVT DISABLED: Terrain DB resolution too low	The Copilot push-to-talk (PTT) switch is stuck in the enabled state.	• Ensure the correct terrain cards are installed in the lower slot of each display. • If terrain data has been recently updated, ensure the correct 4.9 arc-second databases were used.

4.7.2 GMA 1360D Audio Panel Troubleshooting

4.7.2.1 GMA 1360D System Messages

Table 4-4 lists GMA 1360D related system messages, possible causes, and recommended actions.

Table 4-4. GMA 1360D System Messages

System Message	Cause	Recommended Actions
PILOT PTT STUCK GMA 1: Pilot Push to Talk is Stuck	The Pilot push-to-talk (PTT) key line is stuck in the enabled state.	• Cycle power to the unit. • Press the PTT switch to cycle its operation. • Check the PTT switch and wiring. • Check the GIA to GMA interconnect. • If the fault persists, replace the GMA.
COPILOT PTT STUCK GMA 1: Copilot Push to Talk is Stuck	The Copilot push-to-talk (PTT) switch is stuck in the enabled state.	• Cycle power to the unit. • Press the PTT switch to cycle its operation. • Check the PTT switch and wiring. • Check the GIA to GMA interconnect. • If the fault persists, replace the GMA.
PTC1 STUCK GMA 1 Push-to-Command key 1 is Stuck	The Push-to-command 1 key for the GMA is stuck.	• Cycle power to the unit. • Press the push-to-command switch again to cycle operation. • Check push-to-command switch(es) and wiring. • If problem persists, remove and replace the GIA.

Table 4-4. GMA 1360D System Messages (Continued)

System Message	Cause	Recommended Actions
GMA 1 PANEL STUCK KEY Front Panel Key is Stuck	The Front Panel key for the GMA is stuck.	• Cycle power to the unit. • Press the Front Panel Key again to cycle operation. • Check Front Panel Key. • Reload the software. • If the problem persists, remove and replace the GMA.
GMA 1 INOP: INTRL GMA Internal Fault	The GMA is inoperative due to an internal fault.	• Cycle power to the unit. • Re-load software, FPGA image, audio database, and unit configuration. • Retrieve log from CMC Diagnostic Folder. • If problem persists, remove and replace the GMA.
GMA 1 INOP: VOLTAGE Voltage outside standard range	The GMA is inoperative due to a voltage fault.	• Cycle power to the unit. • Verify GMA cooling. • Check aircraft supply voltage and proper ground. • Retrieve log from CMC Diagnostic Folder. • If the problem persists, remove and replace the GMA.
GMA 1 INOP: SOFTWARE GMA CRC Fault	The GMA is inoperative due to a CRC fault.	• Cycle power to the unit. • Reload the software. • Retrieve log from CMC Diagnostic Folder. • If problem persists, remove and replace the GMA.
GMA 1 INOP: COMM GMA Communication Fault	The GMA is inoperative due to a communications fault.	• Cycle power to the unit. • Reload software / FPGA image. • Retrieve log from CMC Diagnostic Folder. • Analyze fault logs for GIA faults. • If problem persists, remove and replace the GMA.

Table 4-4. GMA 1360D System Messages (Continued)

System Message	Cause	Recommended Actions
GMA 1 CONFIG	The audio panel configuration settings do not match backup configuration memory.	• Reload configuration to the GMA. • If the problem persists, replace the GMA. • If the problem persists, check the configuration module wiring for faults and replace if necessary. • If the problem persists, replace the configuration module.
GMA1 INSPECTION REQUIRED	GMA1 backup power source is not connected.	• Cycle power to the unit. • Check aircraft supply voltage and proper ground. • If problem persists, remove and replace the GMA.
GMA1 FAIL	The audio panel self-test has detected a failure. The audio panel is unavailable.	• Cycle power to the unit. • If problem persists, remove and replace the GMA.
DIG GMA MANIFEST	GMA1 software mismatch. Communication halted.	• Load the correct software.
GMA1 MANIFEST	GMA1 software mismatch.	• Load the correct software.
GMA1 SERVICE	A fault has been detected in GMA1.	• Replace the GMA.

4.7.2.2 Noise Present in the Audio

Most often the cause of the noise is external to the GMA. Try the following to locate the source of the noise before replacing the GMA:

1. Try a different headset. Noise canceling headsets might pick up or generate more noise from their own circuitry than standard headsets.
2. Check for noise with the aircraft engine turned off.
3. If the noise is present only when the aircraft engine is running, check the generator and ignition system as possible sources of noise. Refer to the OEM approved Aircraft Maintenance Manual.

4. Turn all electrical equipment On and Off (strobes, other radios, etc.) and check for noise.
5. If the noise is identified as coming from one electrical system or component, refer to the OEM approved Aircraft Maintenance Manual for information about eliminating the noise source.
6. Make sure the NAV/COM squelch is not open.
7. Make sure the ADF and DME audio are not active.
8. Make sure the Marker Beacon audio is not active.
9. Make sure the ICS squelch is not open. The master squelch level can be adjusted on the GMA configuration page for higher noise environments.
10. Replace the unit only after all possible external sources of noise have been eliminated.

4.7.2.3 Speaker Cuts Out

Reduce the volume level of the item that causes the speaker to cut out. A speaker protection circuit disables the speaker output if the volume is set too high. If the volume is not sufficient, replace the aircraft cabin speaker. Refer to the OEM approved Aircraft Maintenance Manual.

4.7.2.4 COM Bleed Over

Verify on the GMA CONFIGURATION page that Disable Split COM has a green box. Due to the closeness of the COM antennas and high power of the COM transceivers, Split COM operation is not approved. If the box is black (indicating COM 1/2 button is active), highlight Disable Split COM with the cursor and press the ENT key to turn the box green which will deactivate Split COM mode.

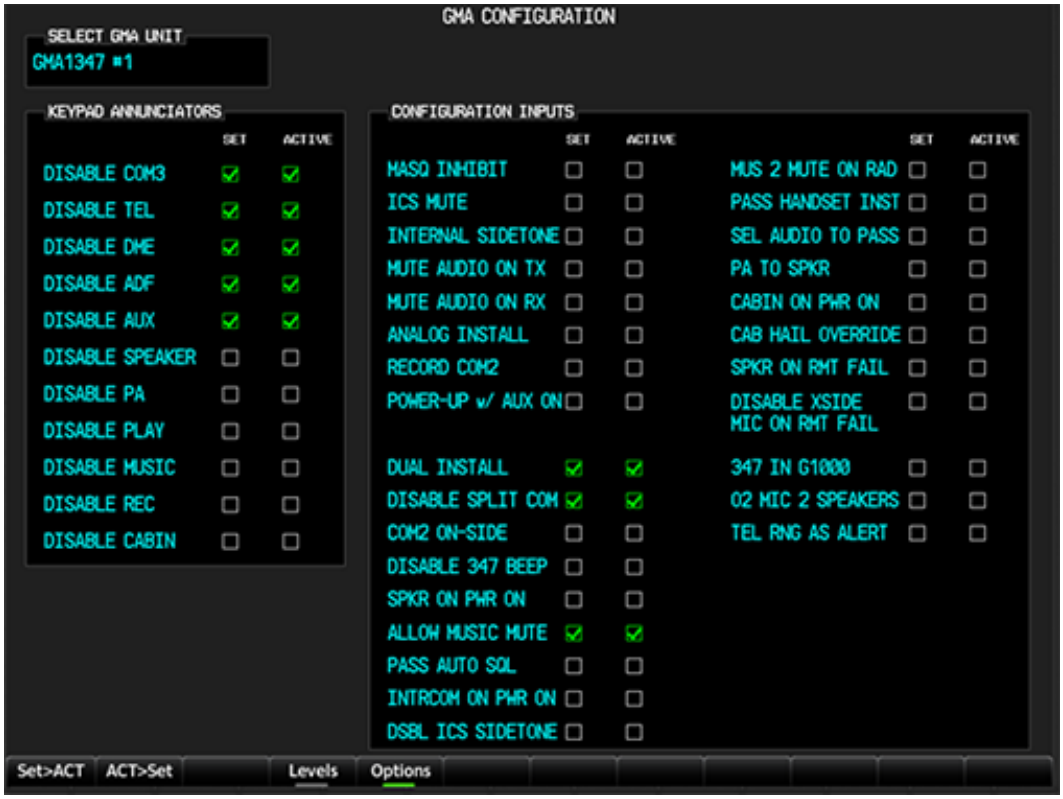


Figure 4-5. GMA Configuration Page/Disable Split Com

4.7.3 GIA 64W Integrated Avionics Unit Troubleshooting

4.7.3.1 GIA 64W System Messages

Table 4-5 lists GIA 64W related system messages, possible causes, and recommended actions.

NOTE

If necessary, retrieve log from CMC Diagnostic Folder and provide it to the OEM or Garmin for assistance with further troubleshooting

Table 4-5. GIA 64W System Messages

System Message	Cause	Recommended Actions
AHRS1 GPS	AHRS1 using the backup GPS path. The primary GPS path has failed.	• Troubleshoot the primary GPS data bus. • Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the GPS Status page. • If one or both of the GPS receivers cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GIA. • If the fault persists, replace the GSU.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS1 GPS	AHRS1 not receiving any GPS information.	• Check AFMS limitations. • Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the GPS Status page. • If the message persists, replace the GIA with no GPS reporting. • If the message persists, replace the GSU.
AHRS1 GPS	AHRS1 is not receiving backup GPS information.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • Check GIA/GSU interconnect. • If the fault persists, replace the GSU.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS1 GPS	AHRS1 is operating exclusively in no-GPS mode.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • Check GIA/GSU interconnect. • If the fault persists, replace the GRS.
COM1 CONFIG	COM1 configuration error	• Reload configuration to the GIA. • If the fault persists, check the configuration module wiring for faults and replace if necessary. • If the fault persists, replace the master configuration module. • If the fault persists, replace the GIA.
COM1 INOP - CAL	The COM subsystem of GIA1 is inoperative due to loss of factory calibration.	• Load the correct software. • Cycle power to the GIA. • If the problem persists, replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
COM1 INOP - CRNT	The COM subsystem of GIA1 is inoperative due to a current fault.	• Check the aircraft supply voltage. • Check input voltage to the GIA. • Check for loose connections, bent pins, or shorts. • Cycle power to the GIA. • Retrieve log from CMC fault Folder. • If the fault persists, replace the GIA.
COM1 INOP - INTRL	The COM subsystem of GIA1 is inoperative due to an internal fault.	• Cycle power to the GIA. • Retrieve the log from CMC fault folder. • If the fault persists, replace the GIA.
COM1 MANIFEST	COM1 has incorrect software installed and communication is halted.	• Load the correct software.
COM1 PTT	The COM1 push-to-talk (PTT) key line is stuck in the enabled state.	• Press the PTT switch to cycle its operation. • Check the PTT switch and wiring. • Check the GIA to GMA interconnect. • If the fault persists, replace the GIA. • If the fault persists, replace the GMA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
COM1 REDUCED TX POWER	The COM sub-system of the GIA is operating in a reduced power transmit mode due to a voltage fault or it has exceeded its operating temperature range.	• Check input voltage to the GIA while transmitting. • Check for loose connections, bent pins, or shorts. • Check the fan, wiring, and air tubing for proper ventilation (if applicable) • Replace fan or cooling system if not sure it is operating correctly. • If the fault continues, replace the GIA.
COM1 RMT XFR	The COM1 remote transfer key line is stuck in the enabled state.	• Press the remote transfer switch to cycle operation. • Check the remote transfer switch and wiring. • If the fault continues, replace the GIA.
COM1 SERVICE	A fault has been detected in the COM subsystem of GIA1. COM1 may still be usable.	• Cycle power to the GIA. • Replace the GIA.
COM1 INOP - SERL	There is COM serial communication fault.	• Cycle power to the GIA. • Check status of the other LRU. • Check data bus wiring. • Retrieve log from CMC Fault Folder. • If the problem persists, replace the GIA.
COM1 INOP - SYNTH	There is COM synthesizer lock fault.	• Cycle power to the GIA. • Perform a radio check. • Check data bus wiring. • Retrieve log from CMC Fault Folder. • If the problem persists, replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
COM1 TEMP	The system has detected an over temperature condition in COM1. The transmitter is operating at reduced power.	• Check the fan, wiring, and air tubing for proper ventilation (if applicable). • Replace the cooling fan if not able to find if it is operating properly. • If the problem persists, replace the GIA.
COM2 CONFIG	COM2 configuration error.	• Reload configuration to the GIA. • If the fault persists, check the configuration module wiring for faults and replace if necessary. • If the fault persists, replace the master configuration module. • If the fault persists, replace the GIA.
COM2 INOP - CAL	The COM subsystem of GIA1 is inoperative due to loss of factory calibration.	• Load the correct software. • Cycle power to the GIA. • If the problem persists, replace the GIA.
COM2 INOP - CRNT	The COM subsystem of GIA1 is inoperative due to a current fault.	• Check the aircraft supply voltage. • Check input voltage to the GIA. • Check for loose connections, bent pins, or shorts. • Cycle power to the GIA. • Retrieve log from CMC fault Folder. • If the fault persists, replace the GIA.
COM 2 INOP - INTRL	The COM subsystem of GIA1 is inoperative due to an internal fault.	• Cycle power to the GIA. • Retrieve the log from CMC fault folder. • If the fault persists, replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
COM2 MANIFEST	COM2 has incorrect software installed and communication has halted.	• Load the correct software.
COM2 PTT	The COM2 push-to-talk (PTT) key line is stuck in the enabled state.	• Press the PTT switch to cycle its operation. • Check the PTT switch and wiring. • Check the GIA to GMA interconnect. • If the fault persists, replace the GIA. • If the fault persists, replace the GMA.
COM2 RMT XFR	The COM2 remote transfer key line is stuck in the enabled state.	• Press the remote transfer switch to cycle operation. • Check the remote transfer switch and wiring. • If the fault continues, replace the GIA.
COM2 SERVICE	A fault has been detected in the COM subsystem of GIA2. COM2 may still be usable.	• Cycle power to the GIA. • Replace the GIA.
COM2 TEMP	The system has detected an over temperature condition in COM2. The transmitter is operating at reduced power.	• Check the fan, wiring, and air tubing for proper ventilation (if applicable). • Replace the cooling fan if not able to find it is operating properly. • If the problem persists, replace the GIA.
FAILED PATH	A data path connected to a GDU and/or GIA has failed.	• Determine which data path has failed and check wiring continuity for the failed path. • If the problem persists, replace the affected LRU.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
G/S1 FAIL	A failure has been detected in Glideslope subsystem of GIA1.	• Replace the GIA.
G/S1 SERVICE	A failure has been detected in the Glideslope subsystem of GIA1. The receiver may still be available.	• Cycle power to the GIA. • Replace the GIA.
G/S2 FAIL	A failure has been detected in the Glideslope subsystem of GIA2.	• Cycle power to the GIA. • Replace the GIA.
G/S2 SERVICE	A failure has been detected in the Glideslope subsystem of GIA2. The receiver may still be available.	• Cycle power to the GIA. • Replace the GIA.
GIA1 CONFIG	The GIA1 configuration settings do not match the backup configuration memory.	• Reload configuration to the GIA. • If the problem persists, check the configuration module harness for faults, and replace if necessary.
GIA1 CONFIG	GIA1 has an error in the audio configuration.	• Reload configuration to the GIA. • If the problem persists, check the configuration module harness for faults, and replace if necessary.
GIA1 COOLING	GIA1 operating temperature is too low to operate properly.	• Allow the unit to warm up to normal operating temperature.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
GIA1 COOLING	GIA1 has exceeded its operating temperature range.	• Check the fan, wiring, and air tubing (if applicable). • Replace the cooling fan if not sure it is operating properly. • If the problem persists, replace the GIA. • If the problem persists, contact Garmin Aviation Support for assistance.
GIA 1 INOP - CRNT	Check GIA1 Current.	• Aircraft supply voltage to the GIA 64W. • Wiring.
GIA 1 INOP - SERL (COM)	Internal GIA Serial Communication Fault (COM Transceiver).	• Cycle power to the GIA. • Check aircraft supply voltage to the GIA. • Check supply voltage(s) at GIA Main power supply inputs. The minimum operational voltage is 9 VDC. • Replace the GIA 64.
GIA 1 INOP - SERL (GPS)	Internal GIA Serial Communication Fault (GPS Receiver).	• Cycle power to the GIA. • Check aircraft supply voltage to the GIA. • Check supply voltage(s) at GIA Main power supply inputs. The minimum operational voltage is 9 VDC. • Replace the GIA 64.
GIA 1 INOP - SERL (NAV)	Internal GIA Serial Communication Fault (VOR/ILS Receivers).	• Cycle power to the GIA. • Check aircraft supply voltage to the GIA. • Check supply voltage(s) at GIA Main power supply inputs. The minimum operational voltage is 9 VDC. • Replace the GIA 64.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
GIA 1 INOP - VOLT	Check GIA voltage.	• Cycle power to the GIA. • Wait 5 minutes before restoring power to the GIA. • Check aircraft supply voltage to the GIA. • Check for loose connections, bent connector pins, or shorts. • Replace the GIA 64.
GIA1 MANIFEST	GIA1 software mismatch.	• Load correct software.
GIA1 SERVICE	The GIA1 self-test has detected a problem in the unit.	• Cycle power to the GIA. • Replace the GIA.
GIA2 CONFIG	The GIA2 configuration settings do not match the backup configuration memory.	• Reload configuration to the GIA. • If the problem persists, check the configuration module harness for faults, and replace if necessary.
GIA2 CONFIG	GIA2 has an error in the audio configuration.	• Reload configuration to the GIA. • If the problem persists, check the configuration module harness for faults, and replace if necessary.
GIA2 COOLING	GIA2 operating temperature is too low to operate properly.	• Allow the unit to warm up to normal operating temperature.
GIA2 COOLING	GIA2 has exceeded its operating temperature range.	• Check the fan, wiring, and air tubing (if applicable). • Replace the cooling fan if not sure it is operating properly. • If the problem persists, replace the GIA. • If the problem persists, contact Garmin Aviation Support for assistance.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
GIA2 MANIFEST	GIA2 software mismatch.	• Load correct software.
GIA2 SERVICE	The GIA1 self-test has detected a problem in the unit.	• Cycle power to the GIA. • Replace the GIA.
GPS1 INOP - CAL	The GPS sub-system of the GIA is inoperative due a loss of factory calibration.	• Replace the GIA.
GPS1 INSPECT RQRD - BATT	Battery needs replacement.	• Replace the GIA 64.
GPS1 BATT LOW:	GPS1 Batt Check Recommended.	• GIA 64W.
GPS NAV LOST	A loss of GPS navigation has been detected due to position error.	• Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAM may be issued for periods of outage, or the US Coast Guard website will have notices posted. • Using the MFD GPS Status Page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check the GPS antenna and cabling for faults. • If the message persists, replace the GIA.
GPS NAV LOST	A loss of GPS navigation has been detected due to GPS failure.	
GPS NAV LOST	A loss of GPS navigation has been detected due to GPS sensors not being enabled.	
GPS1 FAIL	The GPS subsystem of GIA1 is inoperative.	• Replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
GPS1 SERVICE	A fault has been detected in the GPS1 receiver. The receiver may still be available.	• If the message persists through a normal power cycle, replace the GIA.
GPS2 FAIL	The GPS subsystem of GIA2 is inoperative.	• Replace the GIA.
GPS2 SERVICE	A fault has been detected in the GPS2 receiver.	• If the message persists through a normal power cycle, replace the GIA.
HW MISMATCH	GIA HW mismatch. Only one GIA is SBAS capable.	• Replace the GIA with a WAAS capable unit.
LOI	GPS information loss of integrity has been detected.	• Verify the area the aircraft was traveling through did not have loss of GPS coverage. FAA NOTAM may be issued for periods of outage, or the US Coast Guard website will have notices posted. • Using the MFD GPS Status Page, verify the signal strength bars are not erratic. If so, this indicates outside interference is affecting the GPS receivers. Find and remove the source of interference (i.e. cell phones, FBO datalink antennas, etc.). • Check the GPS antenna and cabling.
NAV1 INOP - CAL	Factory NAV calibration lost or corrupted.	• Replace the GIA.
NAV1 INOP - CONFIG	NAV internal fault.	• Cycle power to the GIA. • Retrieve log from CMC fault folder. • Replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
NAV1 INOP - INTRL	NAV internal fault.	• Cycle power to the GIA. • Replace the GIA.
NAV1 INOP - SERL	An internal NAV serial communication fault.	• Check data bus wiring. • Check status of the other LRU. • Retrieve log from CMC fault folder. • Replace the GIA.
NAV1 INOP - SYNTH	NAV synthesizer lock fault.	• Cycle power to the unit. • Perform a radio check. • Retrieve log from CMC fault folder. • Replace the GIA.
NAV1 MANIFEST	NAV1 software mismatch.	• Load the correct software.
NAV1 RMT XFR	The NAV1 remote transfer key line is stuck in the enabled state.	• Press the NAV1 remote transfer switch to cycle its operation. • Check the NAV1 remote transfer switch and wiring. • If the fault continues, replace the GIA.
NAV1 SERVICE	A fault has been detected in the NAV subsystem of GIA1.	• Replace the GIA.
NAV2 INOP - CAL	Factory NAV calibration lost or corrupted.	• Replace the GIA.
NAV2 INOP - CONFIG	NAV internal fault.	• Cycle power to the GIA. • Retrieve log from CMC fault folder. • Replace the GIA.
NAV2 INOP - INTRL	NAV internal fault.	• Cycle power to the GIA. • Replace the GIA.

Table 4-5. GIA 64W System Messages (Continued)

System Message	Cause	Recommended Actions
NAV2 INOP - SERL	An internal NAV serial communication fault.	• Check data bus wiring. • Check status of the other LRU. • Retrieve log from CMC fault folder. • Replace the GIA.
NAV2 INOP - SYNTH	NAV synthesizer lock fault.	• Cycle power to the unit. • Perform a radio check. • Retrieve log from CMC fault folder. • Replace the GIA.
NAV2 MANIFEST	NAV2 software mismatch.	• Load the correct software.
NAV2 RMT XFR	The NAV2 remote transfer key line is stuck in the enabled state.	• Press the NAV2 remote transfer switch to cycle its operation. • Check NAV2 remote transfer switch and wiring. • If the fault continues, replace the GIA.
NAV2 SERVICE	A fault has been detected in the NAV subsystem of GIA2.	• Replace the GIA.

4.7.3.2 Weak COM Transmit Power

At Least 16 Watts when Vin = 28 VDC

At Least 10 Watts when Vin = 14 VDC (011-01105-2x and 011-01105-3x only)

1. Switch GIA1 and GIA2, and reconfigure both GIAs at their new locations, to verify if the unit or the aircraft wiring is the problem.
2. If the problem follows the unit, replace the GIA.
3. If the problem does not follow the unit, check the COM antenna and cabling for faults.

4.7.3.3 VHF COM / GPS Interference

In some installations VHF COM transceivers, Emergency Locator Transmitter (ELT) antennas, and Direction Finder (DF) receiver antennas can re-radiate through the GPS antenna. The GIA COM does not interfere with its own GPS section. However, placement of the GA 56 antenna (or other comparable antenna) relative to a COM transceiver and COM antenna (including the GIA COM antenna), ELT antenna, and DF receiver antenna is critical.

Use the following guidelines in addition to others in the GIA Installation Manual when locating the GIA and its antennas:

- GPS Antenna - Locate as far as possible from all COM antennas and all COM transceivers (including the GIA COM), ELT antennas, and DF antennas. The GPS antenna is less susceptible to harmonic interference if a 1.57542 GHz notch filter is installed on the COM transceiver antenna output.
- Locate the GIA as far as possible from all COM antennas.
- If a COM antenna is found to be the problem, a 1.57542 GHz notch filter (Garmin P/N 330-00067-00) can be installed in the VHF COM coax, as close to the COM as possible. This filter is not required for the GIA transmitter.

If a COM is found to be radiating, the following can be done:

1. Replace or clean the VHF COM rack connector to ensure good coax ground.
2. Place grounding straps between the GIA unit VHF COM and a good ground.
3. Shield the VHF COM wiring harness.

4.7.3.4 Weak COM Receiver

1. Switch GIA1 and GIA2, and reconfigure both GIAs at their new locations, to verify if the unit or the aircraft wiring is the problem.
2. If the problem follows the unit, replace the GIA.
3. If the problem does not follow the unit, check the COM antenna and cabling for faults.

4.7.3.5 No COM Sidetone

1. Select the COM SETUP page.
2. Activate any of the following frequencies:
   - 118.00 MHz
   - 127.00 MHz
   - 136.975 MHz

3. A window showing the SIDETONE setting is displayed (see *Figure 4-6*).
4. Check the sidetone setting and adjust as necessary. The range is -100 to +100.

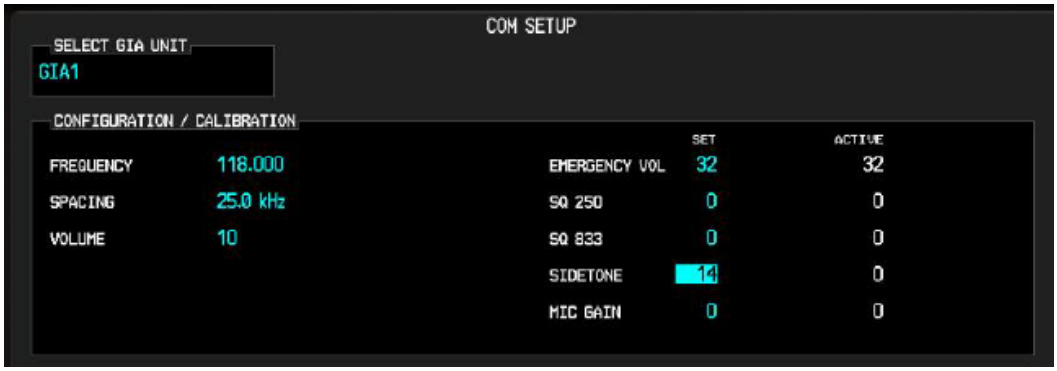


Figure 4-6. COM Setup Page Sidetone Adjustment

5. If the problem continues; switch GIA1 and GIA2, and reconfigure both GIAs at their new locations, to verify if the unit or the aircraft wiring is the problem.
6. If the problem follows the unit, replace the GIA.
7. If the problem continues, replace the GMA.

4.7.3.6 COM Squelch Threshold Adjustment

The COM squelch threshold adjustment is not a required procedure and is not generally performed during installation or maintenance. It can be used to adjust COM receiver 25.0 kHz / 8.33 kHz squelch settings if needed.

If the COM squelch opens after performing the procedure, the aircraft electrical system might be noisy causing it to open. Find the source of electrical system noise and correct it. Electrical motors are a common source of interference). Desensitizing the COM squelch to prevent it from opening due to electrical system noise might reduce the receiving range of the COM.

To set the COM Squelch threshold:

1. Connect a ground power unit to the aircraft.
2. Disconnect the GIA COM antenna connector at the back of the GIA rack and connect an RF generator.
   a) For 25.0 kHz frequency spacing, set the RF generator to 5.0µV hard, modulated 30% at 1000 Hz.
   b) For 8.33 kHz frequency spacing, set the RF generator to 3.0µV hard, modulated 30% at 1000 Hz.
3. Turn on the system and allow it to initialize in normal mode.

4. Turn off the PFD and MFD by pulling the associated circuit breakers. Restart the PFD and MFD in configuration mode.

5. Select the COM SETUP page on the PFD.

6. Select GIA1 or GIA2 in the COM Setup window. This forces an update of the calibration data values and must be accomplished before making any changes. Failure to do so might allow COM calibration values to be inadvertently stored into incorrect memory locations, requiring GIA replacement.

7. Activate the cursor and select the desired tuning frequency. Only the frequencies 118.00 MHz, 127.00 MHz, and 136.975 MHz can be used to set squelch levels.

8. For 25.0 kHz operation, adjust the SQ 250 value. It can be set to any value between -100 and +100. The higher the number, the less signal is required to break squelch (see *Figure 4-7*).

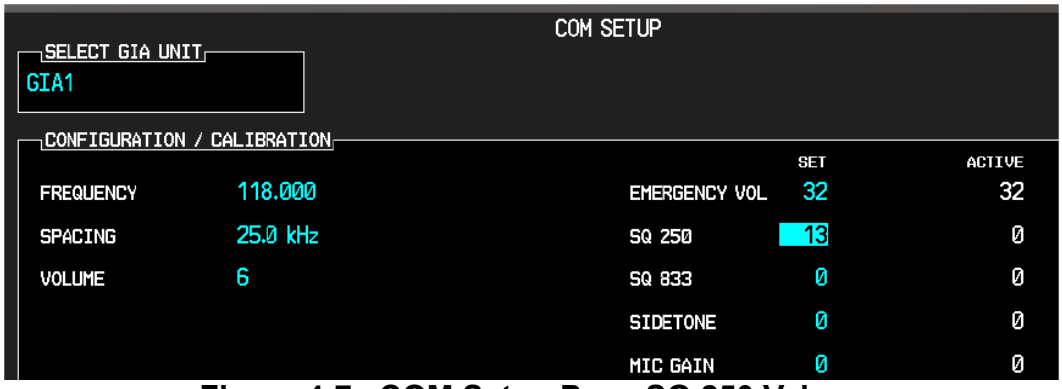


Figure 4-7. COM Setup Page SQ 250 Value

9. For 8.33 kHz operation, adjust the SQ 833 value. It can be set to any value between -100 and +100. The higher the number, the more signal is required to break squelch (see *Figure 4-8*).

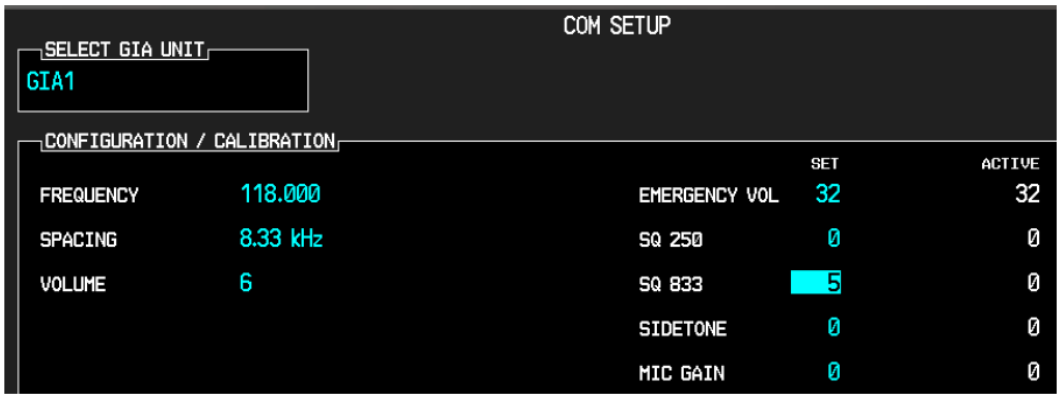


Figure 4-8. COM Setup Page SQ 833 Value

10. After the squelch value is adjusted to the desired number, touch ENT to save the value to the GIA.

4.7.3.7 GPS Troubleshooting

4.7.3.7.1 GPS Receiver Operation

Each GIA contains a GPS receiver. Information collected by the specified receiver (GPS1 for GIA1 or GPS2 for GIA2) can be viewed on the GPS1 or GPS2 Status pane (see *Figure 4-9*).

Figure 4-9. GPS Receiver Information

These GPS sensor annunciations are most often seen after system start when one GPS receiver has acquired satellites before the other, or one of the GPS receivers has not yet acquired an SBAS (Satellite Based Augmentation System) signal. While the aircraft is on the ground, the SBAS signal might be blocked by obstructions causing one GPS receiver to have difficulty acquiring a good signal. Also, while airborne, turning the aircraft might result in one of the GPS receivers temporarily losing the SBAS signal. If the sensor annunciation persists, check for a system failure message by touching the MSG Button on Touchscreen Controller. If no failure message exists, check the GPS Status Screen and compare the information for GPS1 and GPS2. Discrepancies might indicate a problem.

Selecting the GPS receiver:

1. From the MFD Home screen, touch Utilities > GPS Status.

2. Touch the GPS1 button to select the GIA1 GPS receiver. The button annunciator is green when enabled and subdued when disabled. The system displays the GPS1 STATUS pane.

3. Touch the GPS2 button to select the GIA2 GPS receiver. The button annunciator will be green when selected. The system displays the GPS2 STATUS pane.

4.7.3.7.2 Satellite Constellation Diagram

Satellites currently in view are shown at their respective positions on a sky view diagram. The sky view is always in a north-up orientation, with the outer circle representing the horizon, the inner circle representing 45° above the horizon, and the center point showing the position directly overhead.

Each satellite is represented by an oval containing the Pseudo-random noise (PRN) number (i.e., satellite identification number). Satellites whose signals are currently being used are represented by solid ovals.

4.7.3.7.3 Satellite Signal Status

Accuracy of the aircraft GPS fix is calculated using Estimated Position Uncertainty (EPU), Dilution of Precision (DOP), and horizontal and vertical figures of merit (HFOM and VFOM). EPU is the radius of a circle centered on an estimated horizontal position in which actual position has 95% probability of laying. EPU is a statistical error indication and not an actual error measurement.

DOP measures satellite geometry quality (i.e., number of satellites received and where they are relative to each other) on a range from 0.0 to 9.9, with lower numbers denoting better accuracy. HFOM and VFOM, measures of horizontal and vertical position uncertainty, are the current 95% confidence horizontal and vertical accuracy values reported by the GPS receiver.

The current calculated GPS position, time, altitude, ground speed, and track for the aircraft are displayed below the satellite signal accuracy measurements.

4.7.3.7.4 GPS Receiver Status

The GPS solution type (ACQUIRING, 2D NAV, 2D DIFF NAV, 3D NAV, 3D DIFF NAV) for the active GPS receiver (GPS1 or GPS2) is shown in the lower right of the GPS1 and GPS2 Status Pane. When the receiver is in the process of acquiring enough satellite signals for navigation, the receiver uses satellite orbital data (collected continuously from the satellites) and last known position to find the satellites that should be in view. ACQUIRING is indicated as the solution until a sufficient number of satellites have been acquired for computing a solution.

When the receiver is in the process of acquiring a 3D navigational GPS solution, 3D NAV is indicated as the solution until the 3D differential fix has finished acquisition. SBAS (Satellite-Based Augmentation System) indicates INACTIVE. When acquisition is complete, the solution status indicates 3D DIFF NAV and SBAS indicates ACTIVE.

4.7.3.7.5 GPS Satellite Signal Strengths

The GPS1 and GPS2 Status Panes can be helpful in troubleshooting weak (or missing) signal levels due to poor satellite coverage or installation problems. As the GPS receiver locks onto satellites, a signal strength bar is displayed for each satellite in view, with the appropriate satellite PRN number (01-32 or 120-138 for WAAS) below each bar. The progress of satellite acquisition is shown in three stages, as indicated by signal bar appearance:

- No Bar - The receiver is looking for the indicated satellite.
- Hollow Bar - The receiver has found the satellite and is collecting data.
- Cyan Bar - The receiver has collected the necessary data and the satellite signal can be used.
- Green Bar - The Satellite is being used for the GPS solution.
- Checkered Bar - The receiver has excluded the satellite (Fault Detection and Exclusion)
- 'D' Indication - Denotes the satellite is being used as part of the differential computations.

Each satellite has a 30-second data transmission that must be collected (signal strength bar is hollow) before the satellite can be used for navigation (signal strength bar becomes solid).

4.7.3.7.6 Poor Satellite Signal Strength

Possible Solutions:

1. Make sure that no cell phone or device using cell phone technology is turned on in the cable, even in a monitoring state.

2. Check for possible external interference to the GPS receivers by selecting the GPS status page on the Touchscreen Controller and check the GPS strength bars on both GPS receivers. If the signal strength level is erratic, or if they disappear and reappear rapidly, or if they switch between a solid and hollow bar frequently, there is possibly an external device interfering with the GPS receivers. Turn off any devices that radiate a signal in the local area or move the aircraft to another location to see if the interference is removed.

3. Check the date and time shown on the Date/Time Setup page and enter the correct values, if necessary (see *Figure 4-10*).

Figure 4-10. Date / Time Setup Page

4. Switch GIA1 and GIA2 to verify the location of the problem. If the problem follows the unit, clear the GPS almanac by performing the following steps.

   a) Select the GIA Serial (RS-232 / ARINC 429) Configuration Page (see *Figure 4-11*). At the top of the screen, select the GIA that cannot acquire satellites (GIA1 or GIA2) and touch Enter.

   b) Select CLR NV at the bottom of the screen using the Softkey Select control on the GTC and touch Select.

   c) Touch Select on the GTC. The 'Clear GIA nonvolatile memory?' pop-up window is displayed with OK highlighted. Touch Select a window showing the progress of clearing the GIA nonvolatile memory is displayed. Touch Enter when the progress is finished.

   d) Reload the GIA audio and configuration files. Also reload the configuration files for any optional equipment which is installed on the aircraft that require the GIA configuration to be updated.

   e) Cycle power to the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac.

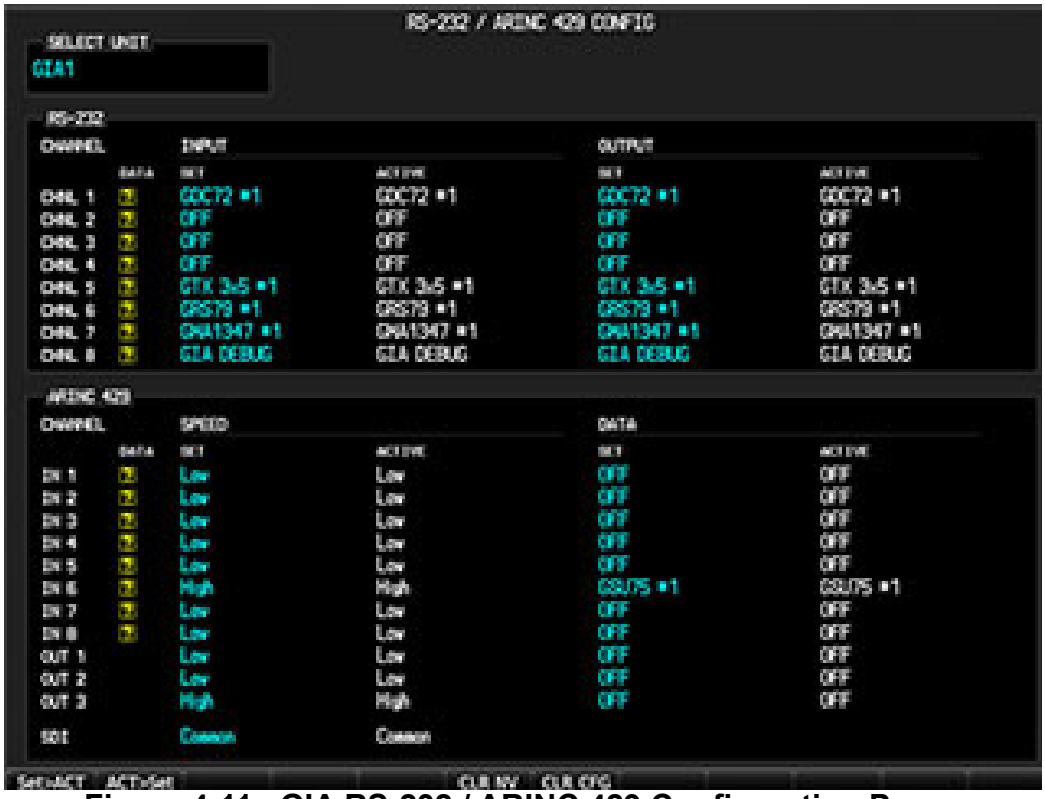


Figure 4-11. GIA RS-232 / ARINC 429 Configuration Page

5. If clearing nonvolatile memory is unsuccessful and the GPS still cannot acquire a position, Reload the GIA audio and configuration files. Also, reload the configuration files for any optional equipment which is installed on the aircraft that require the GIA configuration to be updated.

6. Cycle power to the system and allow it to restart in normal mode. Place the aircraft outside and allow 15-30 minutes for the GPS to acquire a position and download a new almanac.

7. If clearing nonvolatile memory is unsuccessful and the GPS still cannot acquire a position, replace the GIA.

8. Check GPS antenna and cabling.

4.7.3.7.7 Dual GPS Antenna Troubleshooting

In some dual GPS installations, a single failed antenna can cause both GPS systems to drop satellites. In this case, failure of one antenna interferes with, but does not cause damage to the working antenna. The following steps might be helpful in troubleshooting to identify the failed antenna in dual GPS installations.

NOTE
Some antennas might fail intermittently depending on temperature or altitude.

Test the antenna as follows:

1. For dual installations, turn on and monitor the GPS status of both installed units on the GPS Status Pane.
2. If GPS1 signal strength bars are erratic/weak, open the GIA2 and COM2 circuit breakers. If the problem is resolved, the GPS2 antenna has failed. If the GPS2 signal strength bars are erratic/weak, open the GIA1 and COM2 circuit breakers. If problem is resolved, the GPS1 antenna has failed.
3. Contact Garmin Aviation Product Support for a replacement antenna. Return the failed antenna to Garmin for engineering evaluation.

4.7.3.8 NAV Troubleshooting

4.7.3.8.1 Weak NAV Receiver

1. Set up a NAV/COM ramp test set to radiate a test signal.
2. Switch GIA1 and GIA2 to verify the location of the problem.
3. If the problem follows the unit, replace the GIA.
4. If the problem does not follow the unit; check the NAV antenna, coupler, and cabling for faults.

4.7.3.8.2 Weak Glideslope Receiver

1. Set up a NAV/COM ramp test set to radiate a test signal.
2. Switch GIA1 and GIA2 to verify the location of the problem.
3. If the problem follows the unit, replace the GIA.
4. If the problem does not follow the unit; check the NAV antenna, coupler, and cabling for faults.

4.7.4 GEA 71B Engine and Airframe Unit Interface Troubleshooting

4.7.4.1 GEA 71B System Messages

Table 4-6 lists GEA 71 related system messages, possible causes, and recommended actions.

NOTE

If necessary, retrieve log from CMC Diagnostic Folder and provide it to the OEM or Garmin for assistance with further troubleshooting

Table 4-6. GEA 71B System Messages

System Message	Cause	Recommended Actions
GEA1 CONFIG	GEA1 configuration error.	• Reload configuration to the GEA.
GEA1 MANIFEST	GEA1 software mismatch.	• Load the correct software.
GEA 1 INOP POWER - Check GEA power.	AIRCRAFT POWER 1 is high or low.	• Cycle power to the unit. • Check the input voltage to the GEA. • Check for loose connections, bent pins or shorts at the GEA and connected sensors. • If problem persists, remove and replace the GEA.
GEA 1 INOP VOLT - Check GEA voltages.	The GEA is inoperative due to a voltage fault.	• Cycle power to the unit. • Check the input voltage to the GEA. • Check for loose connections, bent pins or shorts at the GEA and connected sensors. • If problem persists, remove and replace the GEA.

Table 4-6. GEA 71B System Messages (Continued)

System Message	Cause	Recommended Actions
GEA 1 INOP EXCIT - Check GEA Transducer Power Outputs	The GEA is inoperative due to an excitation voltage fault.	• Cycle power to the unit. • Check the input voltage to the GEA. • Check for loose connections, bent pins or shorts between the GEA and the excitation power output. • Check the voltage of the excitation power output. • If problem persists, remove and replace the GEA.
GEA 1 INOP - TEMP: Check GEA cooling arrangement.	The GEA has exceeded its operating temperature range.	• Check fan or cooling system for proper operation (if applicable). • Shutdown the LRU for 15 minutes. Cycle the power. • If the fault persists, remove and replace the GEA.
GEA 1 INOP - SENS CNFG: Check GEA software and configuration.	The GEA is inoperative due to invalid configuration.	• Reload the software and configuration file. • Cycle the power to the unit. • If the fault persists, remove and replace the GEA.
GEA 1 INOP - CNFG: Check GEA software and configuration.	The GEA is inoperative due to invalid configuration.	• Reload the software and configuration file. • Cycle the power to the unit. • If the fault persists, remove and replace the GEA.
GEA 1 INOP - INTRL: GEA internal fault.	The GEA is inoperative due to an internal fault.	• Cycle the power to the unit. • Check aircraft supply voltage and connections. • If the fault persists, remove and replace the GEA.

Table 4-6. GEA 71B System Messages (Continued)

System Message	Cause	Recommended Actions
GEA 1 CM INOP - COMM: Check GEA Config Module connection.	The GEA Config Module is inoperative due to loss of communication with configuration module.	• Cycle the power to the unit. • Check the connection to the configuration module • If the fault persists, remove and replace the configuration module. • If the fault persists, remove and replace the GEA.

4.7.4.2 GEA 71B General Troubleshooting

Follow the steps listed in this section if there are no specific system messages present but the GEA is suspected of being faulty.

1. Make sure the correct software is loaded to the GEA.
2. Reload configuration to the GEA.
3. Check the configuration module connector and wiring for damage inside the connector backshell of the GEA.
4. Replace the configuration module wiring and pins of the GEA.
5. If the fault persists, replace the configuration module of the GEA.
6. Replace the Master Configuration Module.
7. Check the Master Configuration Module harness for faults and replace if necessary.
8. Replace the thermocouple of the GEA.
9. Allow the GEA to warm up if the operating temperature is thought to be too high.
10. If it is thought the internal temperature of the GEA has exceeded the upper limit of its operating range on the ground, check the cooling fans and wiring for proper operation. Replace the cooling fan if not sure it is operating correctly. If the fault persists, replace the GEA. If this condition occurs in flight, replace the GEA.

4.7.5 GTX 345R Transponder Troubleshooting

4.7.5.1 GTX 345R System Messages

Table 4-7 lists GTX 345R related system messages, possible causes, and recommended actions.

Table 4-7. GTX 345R System Messages

System Message	Cause	Recommended Actions
GTX1 MANIFEST	GTX1 software mismatch.	• Load the correct software.
XPDR1 FAIL	XPDR1 is inoperative.	• Check communication paths. • Replace the GTX. • Reload GTX configuration and verify aircraft data is set on the GTX.
XPDR1 SERVICE	A fault has been detected in XPDR1.	• Replace the GTX.

4.7.5.2 GTX General Troubleshooting

This section provides information to assist troubleshooting if problems occur to the transponder after completing maintenance. Refer to the GTX System Configuration Log retained in the aircraft permanent records for a list of the interfaced equipment and system configuration data. When troubleshooting the GTX, refer to the wire routing drawings and interconnect wiring diagrams that are retained in the aircraft permanent records.

Figure 4-12 provides a general troubleshooting flowchart. Refer to the Garmin GTX 33x and GTX 3x5 ADS-B Maintenance Manual (190-00734-11) for further troubleshooting information and additional flowcharts.

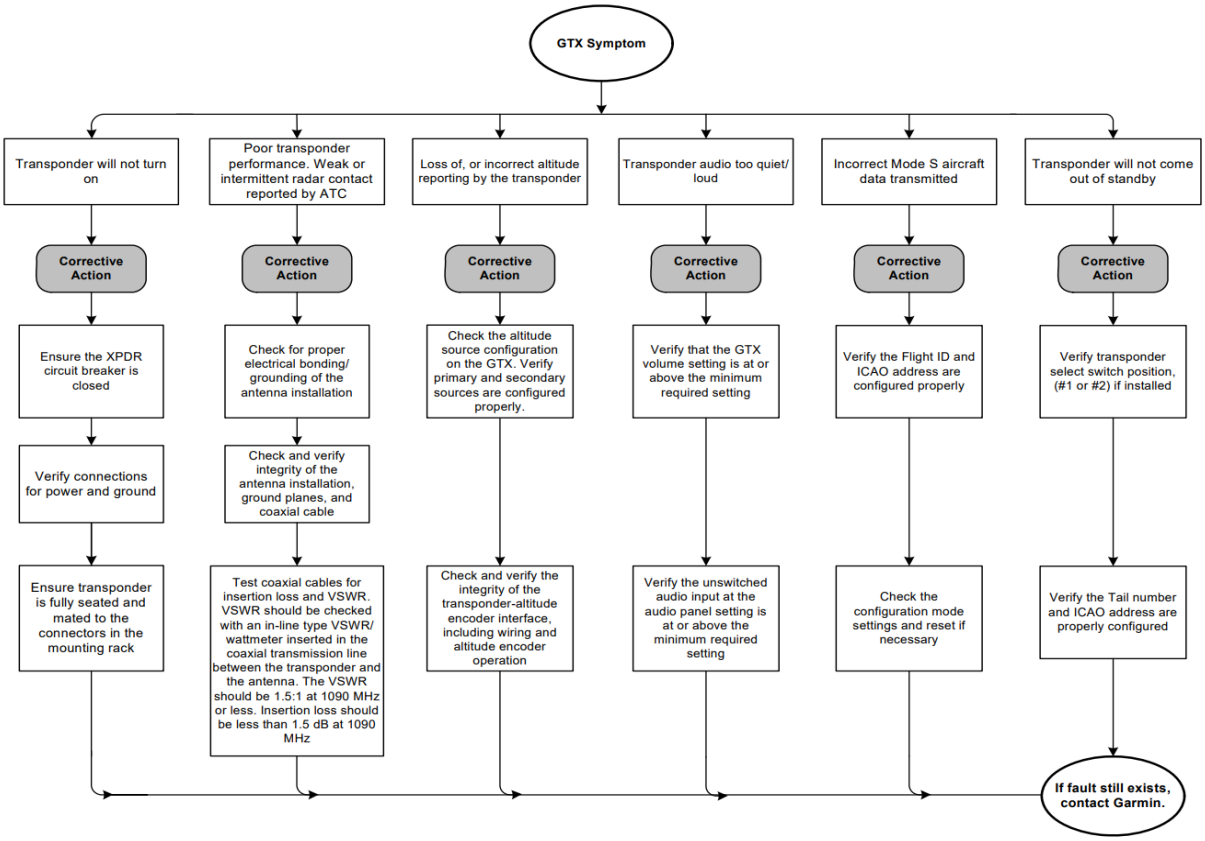


Figure 4-12. GTX 3x5R General Troubleshooting Flowchart

4.7.6 GTS Troubleshooting

NOTE

Consult GTS-IM4 (190-00993-03) for additional trouble information using the GTS 8XX Install Tool.

Table 4-8. GTS Troubleshooting

Problem	Cause	Solution
Unit does not come on Data failed message	Improper wiring; circuit breaker open. Improper configuration.	• Ensure power is properly wired to the GTS and the circuit breaker is closed. • Ensure the remote power discretes (P8003-18,36). • Verify using the USB tool the GTC Processor is configured correctly for the desired display .
GTS Install Tool won't display any pages	Improper wiring; circuit breaker open.	• Ensure USB is properly wired to the GTS and the circuit breaker is closed.
Traffic Display erroneously indicates TA at aircraft position	Suppression bus I/O fault.	• Check the mutual suppression line to ensure it is connected to the correct pins at the GTS as well as the installed transponder. Ensure there are no fractures in the wire, and the suppression line is functioning properly.
No Audio alerts	Improper wiring; Volume not set correctly.	• Ensure the audio is properly wired from the GTS and volume is not set too low.
Calibration Fault	Factory calibration invalid.	• If the unit fails to go into operate mode then return to Garmin for service.

Table 4-8. GTS Troubleshooting (Continued)

Problem	Cause	Solution
Configuration Fault	Both internal and external configuration checks failed	• Verify the configuration through the GTS Install Tool. • Verify wiring to the configuration module and replace if necessary.
FPGA Fault ROM Fault Execution Fault Electrical Fault Whisper Shout Fault	• . Internal Fault	• Replace the unit.
Transmit Power Fault	• . Internal voltages are out of tolerance	• Check power connections to the GPA 65 to verify that they are not connected to ground or each other. Ensure that power and ground connections to the GPA 65 are connected in their proper place. Verify input voltage and if it continues return to Garmin for service.
1030 MHz Fault 1090 MHz Fault	• Internal Fault.	• Replace the unit.
PA/LNA Fault Receiver Fault Transmitter Fault	• Antenna connections or internal fault.	• Ensure all antenna connections are correct otherwise replace the unit.
Baro Altitude Fault	• Baro Altimeter is not powered on or improper wiring. • Improper configuration settings.	• Verify the baro altimeter has power and is properly wired. • Verify the configuration is set correctly using the GTS Install Tool.
Temperature Fault	• Fan is not operating, Poor ventilation at the mounting location.	• Verify the fan is running and the unit is getting adequate ventilation.

Table 4-8. GTS Troubleshooting (Continued)

Problem	Cause	Solution
TCAS Equipage Fault	Broken wire, improper configuration.	• Verify configuration settings on the transponder and the GTS. Ensure proper wiring between the transponder and the GTS.
Radio Altitude Fault	• Radio Altimeter is not powered on or improper wiring. • Improper configuration settings.	• Verify the radio altimeter has power and is properly wired. • Verify the configuration is set correctly using the GTS Install Tool.
Red 'X' on a data port on the configuration page	• Improper wiring; wrong port or speed selected.	• Ensure the port is properly wired to the GTS and the correct settings are selected on the configuration page.

4.7.7 GWX Processor Troubleshooting

Figure 4-13.

WARNING

SAFE DISTANCE DETERMINATION - THE FOLLOWING INFORMATION ESTABLISHES A MINIMUM SAFE DISTANCE FROM THE ANTENNA FOR PERSONNEL NEAR AN OPERATING AIRBORNE WEATHER RADAR. THE MINIMUM SAFE DISTANCE IS BASED UPON THE FCC EXPOSURE LIMIT AT 9.3 TO 9.5 GHZ FOR GENERAL POPULATION/ UNCONTROLLED ENVIRONMENTS WHICH IS 10 MW/CM2. SEE ADVISORY CIRCULAR 20-68B FOR MORE INFORMATION ON SAFE DISTANCE DETERMINATION. THE GWX PROCESSOR SAFE DISTANCE DETERMINATION GIVEN IN Table 4-9 IS BASED ON LOWER EXPOSURE LIMITS OF 1 MW/CM2 THAN WHAT IS SPECIFIED IN AC 20-68B.

Table 4-9. Safe Distance Determination

Antenna Size	Safe Distance
10”	7.4 ft
12”	9.6 ft
18”	14 ft

WARNING

MAXIMUM PERMISSIBLE EXPOSURE LEVEL (MPEL)- THE ZONE IN WHICH THE RADIATION LEVEL EXCEEDS THE 1 MW/CM2, IS THE SEMI-CIRCULAR AREA WITHIN A RADIUS OF 7.4 FT FROM THE 10" ANTENNA, 9.6 FT FROM THE 12" ANTENNA, AND 14 FT FROM THE 18" ANTENNA AS INDICATED IN THE ILLUSTRATION BELOW. ALL PERSONNEL MUST REMAIN OUTSIDE OF THIS ZONE. THE DISTANCE TO THE MPEL BOUNDARY IS CALCULATED UPON THE BASIS OF EACH ANTENNA AVAILABLE WITH THE GWX 80 NOMINAL AVERAGE OUTPUT POWER OF THE TRANSMITTER, AND IN THE NON-ROTATING OR BORE SIGHT POSITION OF THE ANTENNA (SEE EXAMPLE CALCULATIONS ABOVE). WITH A SCANNING OR ROTATING BEAM, THE AVERAGED POWER DENSITY AT THE MPEL BOUNDARY IS SIGNIFICANTLY REDUCED.

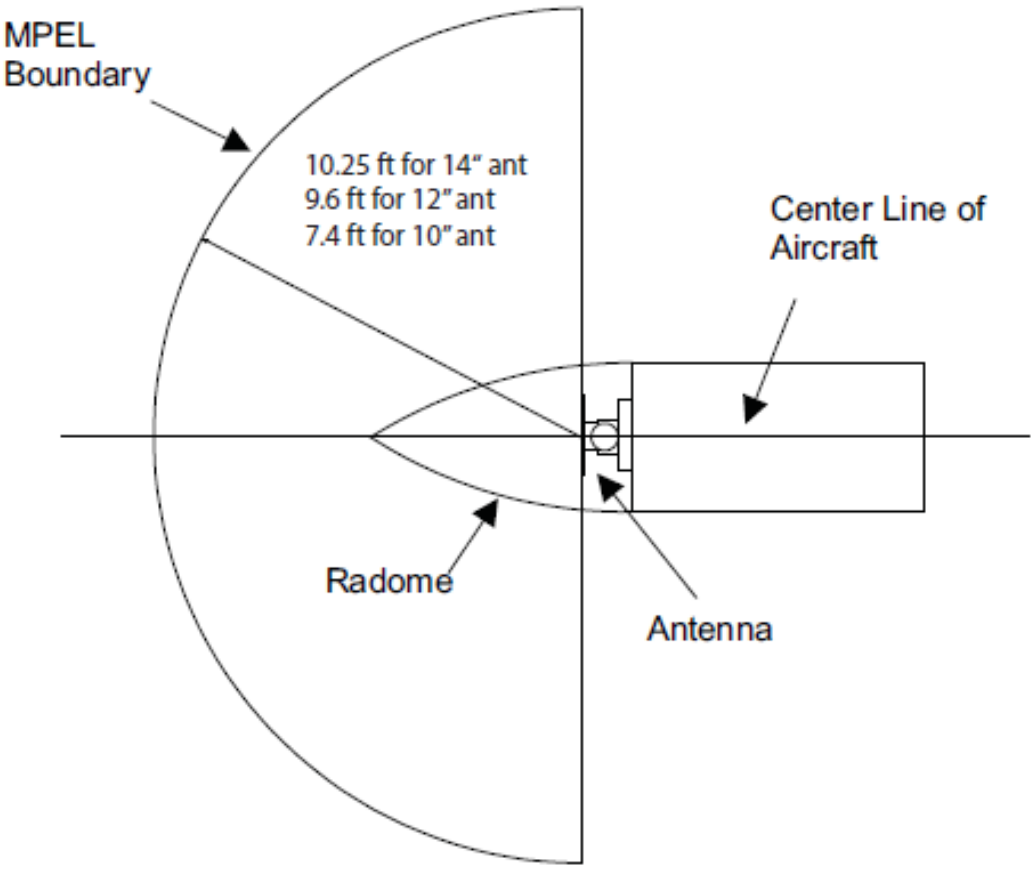


Figure 4-14. MPEL Boundary

WARNING

AIRBORNE WEATHER RADAR SHOULD BE OPERATED ON THE GROUND ONLY BY QUALIFIED PERSONNEL. INSTALLED AIRBORNE RADAR SHOULD NOT BE OPERATED WHILE THE AIRCRAFT IS IN A HANGER OR OTHER ENCLOSURE UNLESS THE RADAR TRANSMITTER IS NOT OPERATING, OR THE ENERGY IS DIRECTED TOWARD AN ABSORPTION SHIELD WHICH DISSIPATES THE RADIO FREQUENCY ENERGY. OTHERWISE, RADIATION WITHIN THE ENCLOSURE CAN BE REFLECTED THROUGHOUT THE AREA.

WARNING

TAKE THE FOLLOWING PRECAUTIONS TO PREVENT HUMAN BODY DAMAGE.

WARNING

NEVER STAND NEARBY OR IN FRONT OF A RADAR ANTENNA WHICH IS TRANSMITTING. THE DANGER INCREASES WHEN THE ANTENNA IS NOT SCANNING.

WARNING

FOLLOW THE RECOMMENDED SAFE DISTANCE. THE DISTANCE FROM ANY PERSON TO THE RADAR SHOULD BE GREATER THAN THE RECOMMENDED SAFE DISTANCE.

WARNING

AVOID THE END OF AN OPEN WAVEGUIDE UNLESS THE RADAR IS TURNED OFF.

WARNING

AVOID LOOKING INTO A WAVEGUIDE, OR INTO THE OPEN END OF A COAXIAL CONNECTOR OR LINE CONNECTOR TO A RADAR TRANSMITTER OUTPUT, AS SEVERE EYE DAMAGE MAY RESULT.

WARNING

X-RAYS MAY BE EMITTED WHEN HIGH POWER RADAR TRANSMITTERS ARE OPERATED OUT OF THEIR PROTECTIVE CASES. STRAY X-RAYS CAN EMANATE FROM THE GLASS ENVELOPE TYPE PULSER, OSCILLATOR, CLIPPER, OR RECTIFIER TUBES, AS WELL AS MAGNETRONS.

4.7.7.1 GWX 75 Troubleshooting Table

Table 4-10 lists the various GWX Processor fault indication descriptions and corrective actions.

NOTE

The fault indications are reset if PFD1 is transitioned from normal mode to configuration mode. It will return if the fault is persistent. It may not return if the fault is intermittent. The fault indications also reset with a power cycle to the unit. Note: transitioning the MFD to configuration mode will not reset the fault indications.

NOTE

'Viewable in config mode' in Table 4-10 means the fault (if persistent) can display itself while in configuration mode. All other faults require the radar to be actively used and are not retained upon reset.

Table 4-10. GWX Processor Troubleshooting

Fault Indication	Cause	Solution
Electrical Status Indicator 	• Voltages within the unit are out of range.	• Cycle unit twice to confirm problem. • Replace the GWX if condition remains. • Viewable in config mode.
400Hz Status Indicator 	• 400Hz Attitude Analog Reference Signal is below minimums. • A valid 400Hz attitude signal must be received then lost to set this box to red in the current power cycle.	• Verify the attitude reference signal is valid and properly connected the GWX. • This fault should not be shown if analog attitude is not used. • Viewable in config mode.
High Volt Status Indicator 	• Transmit Power Supply is below the minimum threshold of 12.0V when transmitting.	• Command the unit back to Weather mode again. If the problem persists, cycle power on unit and command the unit back to Weather mode again. • Replace the GWX if condition remains. • Not viewable in config mode.

Table 4-10. GWX Processor Troubleshooting (Continued)

Fault Indication	Cause	Solution
AFC Status Indicator 	• Radar receiver signal strength below minimum threshold.	• Replace the GWX if condition remains. • Not viewable in config mode.
Temp Status Indicator 	• Unit temperature is >95°C or <-60°C.	• If condition occurred during flight, replace the GWX. • If condition occurs on the ground due to excessive heat inside the radome, turn unit off and allow it to cool before further use. • If the condition occurs on the ground and the temperature is normal in the radome, replace the GWX • Not viewable in config mode.
RX TX Status Indicator 	• Receiver/Transmitter fault.	• Ensure the software, including FPGA, is up to date. • Replace the GWX if condition remains. • Not viewable in config mode.
CAL Status Indicator 	• Bad factory calibration data.	• Replace the GWX if condition remains. • Viewable in config mode.
CONFIG Status Indicator 	• GWX and GDU configuration do not match.	• Reconfigure the GWX. • Viewable in config mode.
EEPROM Status Indicator 	• Internal EEPROM failure.	• Replace the GWX. • Viewable in config mode.

Table 4-10. GWX Processor Troubleshooting (Continued)

Fault Indication	Cause	Solution
RAM Status Indicator 	• Internal SW execution failure or RAM component failure.	• Ensure the software, including FPGA, is up to date. • Replace the GWX 80. • Possibly viewable in config mode.
FPGA Status Indicator 	• Internal FPGA component failed.	• Replace the GWX. • Viewable in config mode.
Attitude Status Indicator 	• Valid attitude information is not being received on neither HSDB, ARINC, nor analog.	• Verify the unit is properly connected to the systems AHRS databus (HSDB or ARINC) or Analog Gyro (if applicable). • Viewable in config mode.
Antenna Status Indicator 	• Antenna Clearance test failure.	• Ensure nothing is blocking the unit but running the antenna clearance test by putting the radar into standby mode. This should be done with and without the radome. • Replace the GWX. • Viewable in config mode.

4.7.7.2 Miscellaneous Radar Faults

Table 4-11. Possible Radar Faults

Symptom	Possible Cause	Recommended Action
Radar audibly noisy during ground operation.	Excessive gear train noise or radome interference.	• Remove radome. • Inspect interior surfaces of the radome for contact with the radar dish. Correct interference by adjusting or replacing radome. • If no radome interference is found, perform the following: 1. Turn on the system. 2. Select the radar page on the MFD. 3. Press the following softkeys in the following order: 7, 9, 9, 7. 4. Press the MODE softkey 5. Press the TEST softkey. The radar dish will begin scanning, but it will not be transmitting. • Test the horizontal and vertical modes to exercise the gear train and evaluate for noise. • If excessively noisy, replace the GWX.

Table 4-11. Possible Radar Faults (Continued)

Symptom	Possible Cause	Recommended Action
Radar fails to make a full vertical or horizontal sweep on the screen.	Radome Interference or GWX 80 failure	• Remove the radome and inspect interior surfaces for contact with the radar dish. Correct interference by adjusting or replacing the radome. • If problem persists, replace the GWX.

4.7.7.3 Weather Radar Page Annunciations

NOTE
Refer to the Kodiak 100 Pilot's Guide for complete weather radar page display annunciations.

The Weather Radar Page may display a STAB INOP annunciation in upper right corner of the MFD indicating a radar stabilization problem. The likely cause is a faulty AHRS. There may also be RDR FAULT and RADAR FAIL indications on the MFD radar page in normal mode. RDR FAULT message is on radar page.

- The system has detected the GWX is present but it is reporting an issue.
- Refer to the GWX system messages for troubleshooting steps.
- If the problem persists, replace the GWX.

RADAR FAIL message is on radar page.

- The system does not detect the presence of the GWX .
- Make sure the GWX is receiving power and ground.
- Check the GWX connector for security.
- If the GWX communication path passes through other units to the display, check those units for proper operation.
- Check the Ethernet connections between the GWX and the displays for faults.
- If the problem persists, replace the GWX.

STAB INOP message on radar page.

- Stabilization function is not available due to lack of attitude data.
- Caused by 'attitude fault' on the GWX config page.
- Refer to the GWX system messages for troubleshooting steps.
- If problem persists, replace the GWX.

4.7.8 GRS 79 / GMU 44B (AHRS) Troubleshooting

4.7.8.1 AHRS Description

In addition to using internal sensors, the GRS 79 AHRS uses GPS information, magnetic field data and air data to assist in attitude/heading calculations. In normal mode, the AHRS relies upon GPS and magnetic field measurements. If either of these external measurements is unavailable or invalid, the AHRS uses air data information to assist in attitude determination. Four AHRS modes of operation are available and depend upon the combination of available sensor inputs (see *Figure 4-15*). Loss of air data, GPS, or magnetometer sensor inputs is communicated to the pilot by message advisory alerts.

The AHRS (GRS 79) corrects for shifts and variations in the Earth's magnetic field by applying the Magnetic Field Variation Database. The Magnetic Field Variation Database is derived from the International Geomagnetic Reference Field (IGRF). The IGRF is a mathematical model that describes the Earth's main magnetic field and its annual rate of change. The database is updated approximately every five years. The system will prompt the pilot on startup when an update is available. Failure to update this database could lead to erroneous heading information being displayed to the pilot.

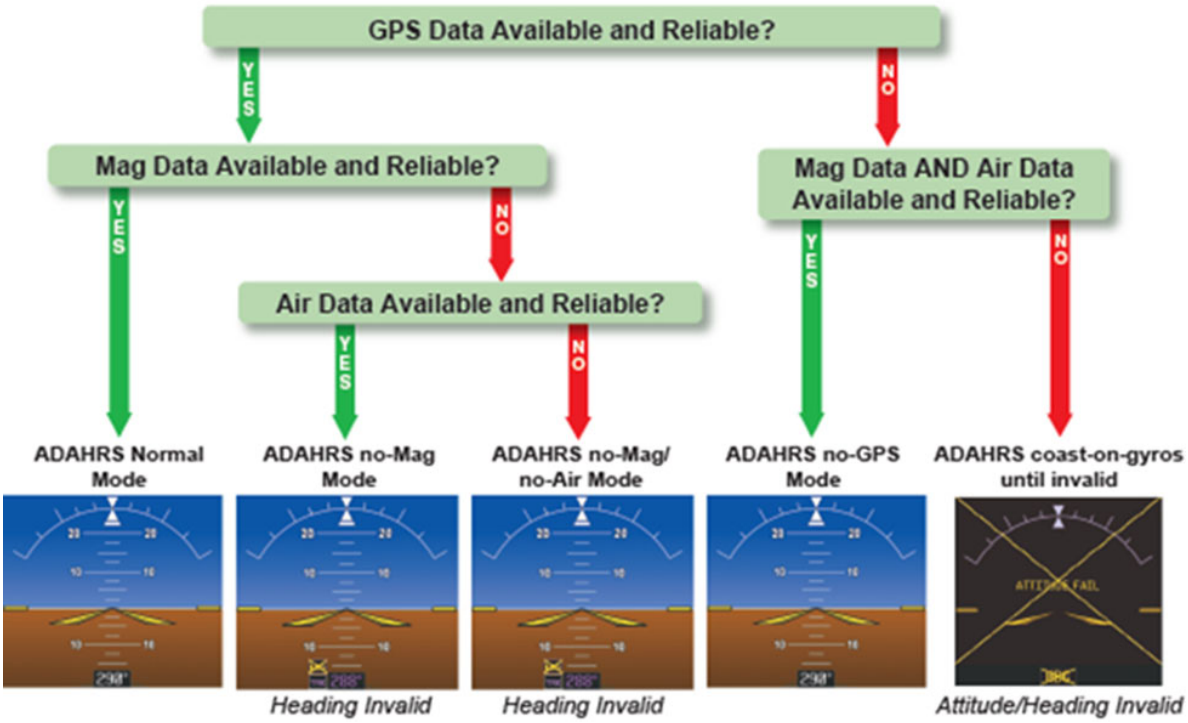


Figure 4-15. AHRS Basic Operation

4.7.8.2 GRS 79 System Messages

Table 4-12 lists GRS 79 related system messages, possible causes, and recommended actions.

NOTE

If necessary, retrieve log from CMC Diagnostic Folder and provide it to the OEM or Garmin for assistance with further troubleshooting.

Table 4-12. GRS 79 System Messages

System Message	Cause	Recommended Actions
AHRS MAG DB	AHRS magnetic model database version mismatch.	• Update the magnetic field model.
AHRS1 CAL	AHRS1 calibration error.	• Calibrate the AHRS per *Section 7.6*.
AHRS1 CONFIG	AHRS1 configuration error.	• Reload configuration to the AHRS. • If the fault persists, check the configuration module wires for faults and replace if necessary. • If the fault persists, replace the master configuration module. • If the message persists, replace the GRS.
AHRS1 GPS	AHRS1 using the backup GPS path. The primary GPS path has failed.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GIA. • If the fault persists, replace the GRS.

Table 4-12. GRS 79 System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS1 GPS	AHRS1 not receiving any, or any useful, GPS information.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If the message persists, replace the GIA with no GPS reporting. • If the message persists, replace the GRS.
AHRS1 GPS	AHRS1 is not receiving backup GPS information.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GRS.
AHRS1 GPS	AHRS1 is operating exclusively in no-GPS mode.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GRS.

Table 4-12. GRS 79 System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS1 SERVICE	A failure has been detected in ADHARS1.	• Replace the GRS.
AHRS1 SRVC	The ADHARS1 magnetic-field model is out of date.	• Update the magnetic-field model.
AHRS1 TAS	The GRS 79 is not computing valid airspeed.	• Check the pneumatic plumbing. • If the problem persists, replace the GSU.
AHRS2 CAL	AHRS2 calibration error.	• Calibrate the AHRS per *Section 7.6*.
AHRS2 CONFIG	AHRS2 configuration error.	• Reload configuration to the AHRS. • If the fault persists, check the configuration module wires for faults and replace if necessary. • If the fault persists, replace the master configuration module. • If the message persists, replace the GRS.
AHRS2 GPS	AHRS2 using the backup GPS path. The primary GPS path has failed.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GIA. • If the fault persists, replace the GRS.

Table 4-12. GRS 79 System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS2 GPS	AHRS2 not receiving any, or any useful, GPS information.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If the message persists, replace the GIA with no GPS reporting. • If the message persists, replace the GRS.
AHRS2 GPS	AHRS2 is not receiving backup GPS information.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GRS.
AHRS2 GPS	AHRS2 is operating exclusively in no-GPS mode.	• Ensure no device using cell phone, Wi-Fi, or Bluetooth technology is turned on (even in a monitoring state) in the aircraft cabin. • Check the GPS status for GIA1 and GIA2 on the MFD GPS Status page. • If a GPS receiver cannot acquire a position lock, troubleshoot the GPS. • If the fault persists, replace the GRS.

Table 4-12. GRS 79 System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS2 SERVICE	A failure has been detected in AHRS2.	• Replace the GRS.
AHRS2 SRVC	The AHRS2 magnetic-field model is out of date.	• Update the magnetic-field model.
AHRS2 TAS	The GRS 79 is not computing valid airspeed.	• Check the pneumatic plumbing. • If the problem persists, replace the GRS.

4.7.8.3 GMU 44 System Messages

Table 4-13 lists GMU 44 related system messages, possible causes, and recommended actions.

Table 4-13. GMU 44 System Messages

System Message	Cause	Recommended Actions
GMU1 MANIFEST	GMU1 software mismatch.	• Load the correct software.
HDG FAULT	AHRS1 magnetometer fault has occurred.	• Check the GMU/GRS interconnect for faults. • Ensure there are no sources of magnetic interference near the GMU. Refer to the document AHRS/Magnetometer Installation Considerations (190-01051-00). • If the fault persists, replace the GMU. • If the fault persists, replace the GRS.

4.7.8.4 GPS Input Failure

Two GPS inputs are provided to the AHRS. If GPS information from one of the inputs fails, the AHRS uses the operating GPS input and a System Message is issued to inform the flight crew. If both GPS inputs fail, the AHRS can continue to provide attitude and heading information to the PFD as long as magnetometer and airspeed data are available and valid.

4.7.8.5 Magnetometer Failure

If the magnetometer input fails, the AHRS transitions to one of the reversionary No-Magnetometer modes and continues to output valid attitude information. However, if the aircraft is airborne, the heading output on the PFD does become invalid (as indicated by an amber X).

4.7.8.6 Air Data Input Failure

Failure of the air data input has no affect on the AHRS output while AHRS is receiving valid GPS information. Invalid/unavailable airspeed data in addition to GPS failure results in loss of all attitude and heading information on the PFD.

4.7.8.7 AHRS Troubleshooting

Troubleshoot the AHRS according to the symptoms and recommended actions shown in *Table 4-14*.

Table 4-14. AHRS Troubleshooting

Symptom	Recommended Action
The AHRS does not complete initialization.	• Make sure no cell phone or device using cell phone technology is turned on in the cabin, even in a monitoring state. • Make sure the GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important if this issue appears during ground operation only. if the message Calibrate AHRS/Mag is present, perform a GRS/GMU Calibration. • Check the GRS 79 configuration module wiring for damage. Check the GRS 79 connector for bent pins. If no damage can be found, replace the configuration module. • Replace the GRS 79 if the problem continues.

Table 4-14. AHRS Troubleshooting

Symptom	Recommended Action
The attitude appears to be unstable.	• Make sure no cell phone or device using cell phone technology is turned on in the cabin, even in a monitoring state. • Make sure the four GRS 79 mounting screws are tight. Finger tight is not sufficient. A screwdriver must be used to verify. • Make sure the mounting rack and airframe shelf are secure, and that all hardware and mounting brackets are present. Do not loosen the hardware attaching the mounting rack to the airframe shelf, or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed. • Make sure the GRS 79 connector is securely fastened and that proper strain relief is provided. • Remove the GRS 79 connector and verify there are no bent pins. • Replace the GRS 79.

4.7.8.8 GRS 79 Operational Modes

To compute valid pitch and roll outputs, the GRS 79 requires valid GPS information or valid inputs from both the magnetometer and air data computer. To compute valid heading outputs, the GRS 79 requires valid input from the magnetometer. Insufficient inputs will prevent the AHRS from initializing.

Table 4-15 lists attitude and heading outputs the GRS can provide based on the available data inputs.

Table 4-15. GRS 79 Inputs and Outputs

	GRS 79 Input			GRS 79 Output		
GRS 79 Mode	GPS Data	GMU 44B Data	CPS Data	Heading	Pitch	Roll
Primary	Good	Good	Doesn't Matter	Valid	Valid	Valid
Reversion No-GPS	Bad	Good	Good	Valid	Valid	Valid
Reversion No-Mag	Good	Bad or Anomaly	Good	Invalid	Valid	Valid
Reversion No-Mag No-Air	Good	Bad or Anomaly	Bad	Invalid	Valid	Valid
Coast on Gyros	Bad	Either or Both Bad		Invalid	Invalid	Invalid
Output Unreliable	Bad	Either or Both Bad		Invalid	Invalid	Invalid

For reports of difficulty associated with AHRS realignment in flight, ensure the pitch and roll limits listed in *Table 4-15* are not being violated. *Table 4-16* lists pitch and roll limits the pilot must maintain for the AHRS to realign itself. Performing maneuvers outside these limits can indefinitely delay the reinitialization of the GRS.

Table 4-16. GRS 79 Pitch/Bank Limits

Mode of Operation Entered Following Initialization	Sensor Inputs Available and Valid				Limits (degrees)	
	All Inertials	GPS	MMAG	Air Data	Bank	Pitch
Primary	Yes	Yes	Yes	Yes	±20.0	±5.0
Reversion - No GPS	Yes	No	Yes	Yes	±10.0	±5.0
Reversion - No GMU 44	Yes	Yes	No	Yes	±10.0	±5.0
Reversion - No GMU 44 and No Air Data	Yes	Yes	No	No	±10.0	±5.0

4.7.8.9 GRS 79 Troubleshooting Questions

If possible, ask the operator the following questions to help gather the information to accurately troubleshoot the GRS 79:

1. What specifically was the nature of the failure? Was it a red X of only heading, only pitch/roll, or both?
2. If there was a red X of pitch or roll information, did the PFD display the AHRS Align: Keep Wings Level message (which is indicative of an AHRS reset), or the Attitude Fail message (which is indicative of either AHRS invalidating its output, or a communication path failure)?
3. What exactly was the aircraft doing in the two minutes preceding the failure (taxing on the ground, flying straight-and-level flight, turning, climbing, etc.)? If the fault occurred on the ground, was in within 100 feet of a hanger using GPS repeaters?
4. How long did the failure last? Was it brief or sustained? Was it repetitive in nature? If it was repetitive, about how many times did it happen? Did it happen on more than one day?
5. Was the fault correlated with a specific maneuver or a specific geographic area?
6. Can the fault be repeated reliably?
7. Were any of the following message advisory alerts observed within an hour of the occurrence of the fault?

    - AHRS not receiving airspeed
    - AHRS using backup GPS source
    - AHRS not receiving any GPS information
    - AHRS not receiving backup GPS information
    - AHRS magnetic-field model out of data
    - AHRS extended operation in No-GPS mode

8. Did the onset of the fault occur shortly after a software upload to one or more system LRU, or shortly after a repeat of the magnetometer calibration procedure?
9. Was a cell phone on in the aircraft at the time?
10. Were there any GPS Alert messages or loss of position lock?

4.7.8.10 GRS Troubleshooting on the Aircraft

1. Review the aircraft maintenance logbook. See if any system, other avionics, or electrical maintenance has been performed recently.
2. Check the power wire connections at the circuit breakers. Loose wire terminals can cause intermittent power. Also check for intermittent circuit breakers.

3. Apply ground power to the aircraft. Energize the system and record the system software level. This will be needed if assistance from Garmin Aviation Support is required.

4. After the system has initialized (about one minute from applying power), note any red X or system messages.

5. Try to verify the issue still exists before proceeding to the physical inspection procedure below:

   a) Turn off the system and gain access to the GRS.

   b) Verify the GRS connector is tight and the locking slider is engaged to the locking tabs on each side of the connector.

   c) Ensure the wiring harness is not loose and able to move around during flight. This condition could cause wires to pull on or vibrate the connector, causing intermittent connections.

   d) Ensure the GRS is mounted tight to the rack. If any doubt exists, use a screwdriver to check the tightness of the mounting screws.

   e) Check the area of the GRS for any heavy objects that might not be fastened tight to the structure, which could induce GRS vibration.

   f) Look for evidence of water or fluid contamination in the area around the GRS.

   g) Unplug the GRS connector and check for bent pins.

   h) Inspect the wiring harness clamp on the rear of the connector to verify it is not too tight and damaging wires. Also check for some sort of protective wire wrap between the wires and the clamp. If the wire clamp is installed upside down, it has sharp edges that can cut into the wires.

   i) Make sure the locking slider spring is strong enough to keep the slider in the locked position by cycling the slider.

6. Ensure that no device is turned on in the aircraft cabin using cell phone or Wi-Fi technology, even in a monitoring state.

7. Make sure metal objects (tool boxes, power carts, etc.) are not interfering with the magnetometer; and the aircraft is not in a hangar, near other buildings, parked over metal drainage culverts or on hard surfaces that might contain steel reinforcements.

8. Check for software or failed data path error messages. Correct any errors before proceeding.

9. Make sure the GRS unit connector is secure and proper wiring harness strain relief is provided.

10. Ensure the GRS is fastened down tightly in its mounting rack and the mounting rack is not loose. Do not loosen the hardware attaching the mounting rack to the airframe shelf, or the aircraft will need to be re-leveled and the PITCH/ROLL OFFSET procedure performed.
11. Cycle GRS power to restart initialization.
12. Ensure the GPS has acquired at least four satellites, has a 3D navigation solution, and a DOP of less than 5.0. This is particularly important for an ATTITUDE FAIL that appears during ground operation only.
13. Perform an Engine Run-Up Test to find whether or not engine vibration is causing the GRS to invalidate outputs or reset.
14. Perform a Magnetic Interference Test to find whether or not there is significant magnetic interference from some device on the aircraft.
15. Replace the GRS.
16. If the problem persists, replace the GRS configuration module.
17. Contact Garmin Aviation Support for additional assistance if the condition is not resolved.

4.7.8.11 Heading Red X

For heading issues, a heading red X (steady or intermittent) is the typical fault indication. Normally there will also be a green check mark displayed on the System Status page for the GMU, indicating the GRS 79 and the GMU 44/44B are operating.

In addition to the troubleshooting information provided in the beginning of this section, maintenance personnel should be aware of the following AHRS system characteristics during ground operation that could cause the red X.

This is important if the operator finds the red X only occurring during ground operations. GRS 79 ground operation is heavily dependent on GPS data inputs. Correct any GPS performance problems (i.e. interference caused by some types of cell phones, Wi-Fi, GPS repeaters, or any other device that transmits in the area; before troubleshooting the GRS 79 or GMU 44B. For GPS data to be considered valid, the receiver must be tracking at least four satellites and have a 3D GPS Solution.

When taxiing without reliable GPS information, heading performance is susceptible to the presence of magnetic anomalies (metal buildings, underground steel culverts, steel grates in the ramp). Localized sources of interference on the ground might consistently red X the heading in the same spot while taxiing, this is not caused by a failure of the GMU 44 or its calibration. If no observable steel structures are present, the red X is most likely caused by an unseen underground disturbance. To confirm this, the heading will repeatedly red X in the same area during multiple taxi runs. The GRS 79 might invalidate (red X) the heading if the following are present: it does not have GPS information, it senses a magnetic anomaly and senses aircraft movement. Remove those influences to find if one of them caused the red X.

When the aircraft is on the ground and stationary, the aircraft yaw rate must be less than 1.5 degrees/second to use GPS track information to calculate heading. This logic is applied regardless of magnetic anomaly detection. This could cause a heading red X if the aircraft is moving due to wind, operators entering/exiting the aircraft or any other disturbance that moves the wings and tail.

4.7.8.12 GMU Communications

The GMU status on the System Status page indicates the health of the GRS 79 to GMU 44 RS-232 data path. If a red X is present for the GMU, check the RS-232 data path for faults before replacing any unit.

4.7.8.13 GRS 79 Calibration Message

The external installation configuration parameters are not considered calibrated. These parameters are categorized into 2 sets: AHRS installation, and magnetic installation parameters. If either of the two is NOT CALIBRATED, the GRS 79 heading, pitch, and roll might all be flagged as invalid, or a message displayed (see *Figure 4-16*).

Figure 4-16. GRS Calibration Message

Perform the required post-installation calibration procedures. If the calibration is unsuccessful, the GRS configuration module might require replacement since it stores the calibration information.

4.7.9 GDC 72 Air Data Computer Troubleshooting

4.7.9.1 GDC 72 System Messages

Table 4-17 lists GDC 72 related system messages, possible causes, and recommended actions.

NOTE

If necessary, retrieve log from CMC Diagnostic Folder and provide it to the OEM or Garmin for assistance with further troubleshooting.

Table 4-17. GDC 72 System Messages

System Message	Cause	Recommended Actions
ADC1 ALT EC	ADC1 altitude error correction is unavailable.	• Incorrect software might have been loaded to the GDC. • Load the correct software.
ADC1 AS EC	ADC1 airspeed error correction is unavailable.	• Incorrect software might have been loaded to the GDC. • Load the correct software.
ADC1 SERVICE	A failure has been detected in ADC1.	• Replace the GDC.
AHRS1 TAS	The GRS 79 is not receiving valid airspeed from the GDC 72.	• Check the GRS to GDC wiring. • If the problem persists, replace the GRS.
GDC1 MANIFEST	GDC1 software mismatch.	• Load the correct software.
ADC2 ALT EC	ADC2 altitude error correction is unavailable.	• Incorrect software might have been loaded to the GDC. • Load the correct software.
ADC2 AS EC	ADC2 airspeed error correction is unavailable.	• Incorrect software might have been loaded to the GDC. • Load the correct software.
ADC2 SERVICE	A failure has been detected in ADC2.	• Replace the GDC.

Table 4-17. GDC 72 System Messages (Continued)

System Message	Cause	Recommended Actions
AHRS2 TAS	The GRS 79 is not receiving valid airspeed from the GDC 72.	• Check the GRS to GDC wiring. • If the problem persists, replace the GRS.
GDC2 MANIFEST	GDC2 software mismatch.	• Load the correct software.

4.7.9.2 GDC 72 General Troubleshooting

If the altitude is different than the standby altimeter reading:

1. Perform a pitot/static check (refer to the Kodiak 100 AMM for the procedure). Allow the GDC to warm up for fifteen minutes before checking for accuracy.
2. Determine which instrument is outside limits and recalibrate or replace. Both units might individually meet specifications but show a difference in altitude. Do not return a unit to Garmin for service if it meets specifications.
3. Recalibrate the unit if it does not meet the specifications.
4. Replace the GDC 72 configuration module if the unit configuration file does not load.
5. Replace the GDC 72 configuration module wiring harness if problem continues.

4.7.10 GTP 59 Outside Air Temperature Probe Troubleshooting

Inspect the GTP 59 for dirt accumulation, corrosion, and other damage. Clean or replace as required. Check the GTP 59 wiring and connectors for faults or damage. The GTP 59 has no icing protection. If ice accumulates on the GTP 59, air temperature measurements might be incorrect. Furthermore, computations dependent upon air temperature measurements might be affected (e.g. true airspeed and delta-ISA). Verify the GDC is supplying power to the GTP 59. If fault persists, replace the GTP 59. Also note the following information:

1. The white (power) and blue (sense) wires are connected internally.
2. Between the blue (sense) and orange (low) wires is a 500 ohm RTD sensor.
3. Typical resistance between the blue and orange wires will be as follows:
   - -25 degrees C = 451 ohms
   - 0 degrees C = 500 ohms
   - +25 degrees C = 549 ohms
   - +50 degrees C = 597 ohms

4.7.11 GDL 69A SXM Satellite Radio Receiver Troubleshooting

4.7.11.1 GDL 69A SXM System Messages

Table 4-18 lists GDL 69A SXM related system messages, possible causes, and recommended actions.

Table 4-18. GDL 69A SXM System Messages

System Message	Cause	Recommended Actions
GDL69 CONFIG	GDL 69 configuration error.	• Reload configuration to the GDL. • If the fault persists, check the configuration module wiring for faults and replace if necessary. • If the fault persists, replace the master configuration module. • If the fault persists, replace the GDL.
GDL69 FAIL	A failure has been detected in the GDL 69 is unavailable.	• Replace the GDL.
GDL69 MANIFEST	GDL 69 software mismatch.	• Load the correct software.

4.7.11.2 Activating SiriusXM Services

Before SiriusXM Weather and SiriusXM Satellite Radio can be used, the services must be activated by providing SiriusXM customer service the coded IDs unique to the installed GDL 69A SXM.

SiriusXM Satellite Radio (audio) and SiriusXM Weather (data) services each have coded IDs. The Data and Audio Radio IDs must be provided to activate the weather and entertainment subscriptions, respectively. These IDs are in the following locations:

- The SiriusXM Info Screen on Touchscreen Controllers
- The XM Satellite Radio Activation Instructions included with the unit
- the label on the back of the GDL 69A SXM Datalink Receiver

Contact Garmin Aviation Support if the Audio and Data Radio IDs cannot be located. SiriusXM uses the coded IDs to send an activation signal to enable the system to receive weather data and/or audio entertainment programming.

NOTE

Complete instructions for activating the SiriusXM satellite radio can be found in document 190-00355-04 'GDL 69 Series SiriusXM® Satellite Radio Activation Instructions'.

4.7.11.3 GDL 69A SXM General Troubleshooting

Table 4-19. GDL 69A Troubleshooting Guide

Problem	Probable Cause	Corrective Action
No communication with GDL 69A	• Improper Wiring. • Circuit breaker open.	• Ensure the GDL 69A wiring is correct and the circuit breaker is closed. • Ensure the Remote Power On discrete (P691, pin 77) is not pulled above 3 volts.
	• Improper configuration.	• Ensure the control display device communication port is configured correctly.
No or low quality SiriusXM signal	• The GDL 69A is not receiving SiriusXM signal.	• Ensure the XM antenna has an unobstructed view of satellite constellation. • Ensure the GDL 69A configuration settings are properly set (e.g., antenna cable loss). • Check the antenna cable and connectors. • Ensure antenna ground plane is adequate.
Incorrect or no SiriusXM subscribed services displayed	• Inactive or incorrect subscription.	• Check subscription with SiriusXM Satellite Radio. • Refresh inactive subscription. Refer to *Section 4.7.11.2*.

Table 4-19. GDL 69A Troubleshooting Guide (Continued)

Problem	Probable Cause	Corrective Action
No audio output	• No audio output from GDL 69A. • Improper wiring.	• Check wiring of audio suppression input. Check that wiring is going to correct active high or active low input sense. • Check the wiring from GDL 69A to audio panel. • Verify that mute is not on. • Increase volume by pressing Volume Up. • If there is audio output only on channel 1, verify that audio SiriusXM service has been activated. Refer to *Section 4.7.11.2* for more details.
SiriusXM audio entertainment does not mute when audio suppression interfaced inputs (stall, gear) are activated.	• Improper wiring	• Check wiring of audio suppression inputs. • Check alarm activation state of warning. • Verify that audio is not connected to Line Output.

4.7.12 AFCS Troubleshooting

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

Should a problem be encountered during the operation of the AFCS, the pilot and maintenance personnel should first evaluate the overall status and condition of the G1000 NXi System. Monitor any messages, annunciations, or other abnormal behaviors in an effort to pinpoint the fault.

4.7.12.1 AFCS Annunciations

The AFCS Annunciation field is located above the altimeter tape on the PFD as shown in *Figure 4-17*.

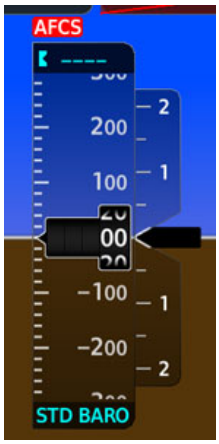


Figure 4-17. AFCS Annunciation Field

Table 4-20 lists annunciations that might appear in the AFCS Annunciation field, associated conditions, and recommended actions.

Table 4-20. AFCS Annunciations

Annunciation	Condition	Recommended Actions
AFCS	System Failure - AP and MEPT are unavailable. Stick pusher is unavailable. FD and YD may still be available.	• Ensure the system is in proper working order. Check specifically for proper operation of the following: - GIA 64W Integrated Avionics Unit - GRS 79 AHRS - GDC 72 Air Data Computer - All Servos • Verify no red X is displayed. • Verify no related messages are displayed. • Verify that all LRUs have a green check mark indicated on the Avionics Status page. • Review the AFCS equipment status, software, and certification gains on the GFC configuration pages. • Reload software, configuration, and certification gains to the GIAs and the servos. • Check the GFC Status page for additional AFCS system information. • Review the fault and assert logs for the GIAs and servos. • Isolate the fault to an LRU, airframe switch, or wiring using the information in the fault log. Contact Garmin Aviation Support for assistance, if needed.

Table 4-20. AFCS Annunciations (Continued)

Annunciation	Condition	Recommended Actions
PTCH	Pitch Failure - Pitch axis control failure. AP is inoperative.	• Check the Avionics Status page to see if the servo is online (green check mark). • Ensure the affected servo is receiving power. • Check the servo wiring and connector. • If the failure condition still exists, remove and replace the affected servo. • If the AP is engaged, take control of the aircraft and disengage the AP. • If the AP is disengaged, move the MEPT switches separately to unstick.
PTRM	Pitch Trim Failure (or stuck MEPT Switch).	
ROLL	Roll Failure - Roll axis control failure. AP is inoperative.	
YAW	Yaw Damper Failure - YD control failure.	• Check the Avionics Status page to verify the servo is online (green check mark). • Ensure the affected servo is receiving power. • Check the servo wiring and connector. • If the failure condition still exists, remove and replace the affected servo. • If the AP is engaged, take control of the aircraft and disengage the AP. • If the AP is disengaged, move the MEPT switches separately to unstick.
EDM	Emergency Descent Mode.	• The Emergency Descent Mode (EDM) is activated by the Hypoxia Recognition System. • A continuous repeating chime will be heard as long as Emergency Descent Mode is active. • After the descent begins, Emergency Descent Mode can only be canceled by disconnecting the autopilot.
↓ELE	Elevator Mistrim Down.	• Pitch servo providing sustained force in the indicated direction. May indicate a failure of the pitch trim servo or trim system. • Ensure the servo is online. • Check the servo wiring and connectors. • Ensure the servo is receiving power. • Check the aircraft control adjustments. • If the mistrim condition still exists, remove and replace the affected servo.
↑ELE	Elevator Mistrim Up.	

Table 4-20. AFCS Annunciations (Continued)

Annunciation	Condition	Recommended Actions
AIL→	Aileron Mistrim Right.	• Roll servo providing sustained force in the indicated direction. • Check for possible fuel imbalance. • Check the aileron control adjustments. • If the mistrim condition still exists, remove and replace the roll servo.
←AIL	Aileron Mistrim Left.	
PFT	Performing preflight system test. Aural alert sounds at completion.	• Allow the system to complete preflight tests.
PFT	Preflight system test failed. Aural alert sounds at failure.	• The preflight test should complete within 2 minutes. If it does not pass, the red PFT annunciation is displayed. • In case of PFT failure, refer to *Section 4.7.12.2* and *Section 4.7.12.4* for additional PFT diagnosis.

NOTE

Loss of the GIA that is the active FD will result in FD down mode to PIT/ROL but AP will stay engaged.

4.7.12.2 AFCS Preflight Test Sequence and Troubleshooting

This section can help determine why the AFCS has failed the Preflight Test indicated by the red PFT annunciation. It also defines the PFT sequence for the servos and the AFCS, and provides troubleshooting information to help resolve failures.

The PFT is performed by both GIAs at startup, and must pass for both GIAs before the autopilot can be engaged.

The PFT starts only if the GIAs and servos are configured, and the certification gains are valid. If the PFT has not completed after one minute from when the initialization started, the PFT will fail. After the system PFT has passed, it will be performed again if a servo resets, if the autopilot servo breaker is reset, or the cross side GIA restarts it.

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

NOTE

A thorough understanding of the system operation in configuration mode is needed before performing this procedure. The GFC Status page can be used to check the status of the servos, which can be engaged to aid in troubleshooting.

To access the GIA and GSA Maintenance Logs, perform the following steps:

1. Start the G1000 NXi system in configuration mode.
2. Use the FMS knob on the PFD to go to the Diagnosis Terminal page in the PFD configuration pages System group. This page enables viewing of maintenance logs associated with the AFCS.
3. Select either GIA1 or GIA2 in the LRU window.
4. In the SERVO window, choose NONE to view the GIA Maintenance Log, or choose a servo to view their logs.
5. Using the FMS knob, choose VIEW MAINTENANCE LOG in the COMMAND window.
6. Press the ENT key.
7. When the Maintenance Log data starts to display in the OUTPUT window, you might see 'More...press any key to continue...' at the bottom of the OUTPUT window. This informs you there is more data to display and the system has paused allowing you to view the data before continuing. To see more of the data, reselect the VIEW MAINTENANCE LOG in the COMMAND window and press the ENT key. The 'press any key to continue' function is not active at this time.
8. Scroll through the OUTPUT list by pressing the Output softkey.

Table 4-21 lists faults recorded by the GIA Maintenance Log.

Table 4-21. GIA Maintenance Log Faults

Fault	Description
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.

Table 4-21. (Continued)GIA Maintenance Log Faults

Fault	Description
PFT FAIL: Timeout, <STEP>	Preflight test has failed because the specified step has not passed in the allotted time. See the GIA preflight steps for a description of the possible values for <STEP> on the failed GIA and corrective actions.
PFT FAIL: Cross GIA Failed, State: <STEP>	Preflight 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>	Preflight has failed because the step specified has failed. See the GIA preflight 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 the AHRS data is invalid. The possible values for <STATE> are: • Mon Prmtr Invalid: The ARINC 429 data used by one of the monitors has not been received. • Attitude Prmtr Invalid: The ARINC 429 pitch or roll angle has not been received • Exceeded Attitude Limits: The pitch or roll angle has exceeded the engagement limits. • Cross Hdg Accel Fail: Cross heading acceleration monitor failed. • Vert Accel Fail: Vertical acceleration monitor failed. • Fltrd Cross Hdg Accel Fail: Filtered cross heading acceleration monitor failed. • Fltrd Vert Accel Fail: Filtered vertical acceleration monitor failed. • Roll Accel Fail: Roll acceleration monitor has failed. • Normal Accel Fail: Normal acceleration has failed. • Troubleshoot the GRS 79 for the cause of the failure.
Stuck switch invalid parameter: <AXIS>	An MET switch in the specified axis is stuck. Check the MET (trim) switches for proper operation.

Table 4-21. (Continued)GIA Maintenance Log Faults

Fault	Description
PRMTR: <PARAMETER> MODE: <MODE> Parameter lost	• The mode specified by <MODE> has been disengaged because the parameter specified by <PARAMETER> has become invalid. The following is a list of some of the possible values for <PARAMETER>: • AD TDM Comm Valid: The specified mode has become disengaged because communication with the servos, through the Time Division Multiplexer protocol, has been lost. • 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.
GIA Preflight Test Steps	(refer to *Section 4.7.12.3*)

4.7.12.3 GIA Preflight Test

4.7.12.3.1 PFT Step 0: System Initializing, Verifying GFC Powered

This step checks to ensure the GFC is powered up.

- On the GFC Configuration page, verify the GIA is connected to the autopilot disconnect.
- On the System Status page, verify that all configured servos are communication.

4.7.12.3.2 PFT Step 1: System Initializing, Verify GIA Audio is Valid

This step checks to verify the GIA audio region has been loaded and configured. Load GIA audio files to correct.

4.7.12.3.3 PFT Step 2: System Initializing, Verify Required Servos are Configured

This step checks to verify the current servo configuration matches the servo configuration specified in the certification gain file. Reload the gain files to correct.

4.7.12.3.4 PFT Step 3: System Initializing, Verify Selected Side.

This step checks to verify 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.

4.7.12.3.5 PFT Step 4: System Initializing, Verify AHRS Monitor

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

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

- Ensure the GRS 79 and the GDC 72 are turned on and sending valid data.

4.7.12.3.6 PFT Step 5: System Initializing, Verify Configured Servos are Valid

This step checks to verify that none of the servos are reporting any type of failure.

NOTE
Trim servos will report a failure on stuck MET switches.

- Ensure MET switch is not stuck.
- Cycle power on all servos.

4.7.12.3.7 PFT Step 6: System Initializing, Verify Cross GIA Valid

This step checks to verify 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.

4.7.12.3.8 PFT Step 7: Verify Cross GIA Initialized.

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

- Cycle power on all servos and GIAs.
- Ensure the PFD and MFD are turned on.

4.7.12.3.9 PFT Step 8: Verify Servo Type

This step checks to verify all servos are the correct type.

4.7.12.3.10 PFT Step 9: Verify Servo First Certification Data

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

- Reload the certification gains to all GIAs and servos.

4.7.12.3.11 PFT Step 10: Verify Servo Second Certification Data

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

- Reload the certification gains to all GIAs and servos.

4.7.12.3.12 PFT Step 11: Updating Servo RTC

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

4.7.12.3.13 PFT Step 12: Verify Servo PFT Status

This test checks to verify all servos have passed their own preflight test.

4.7.12.3.14 PFT Step 13: Verify AP Disconnect Enabled

This steps checks to verify GIA1, GIA2, 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.

4.7.12.3.15 PFT Step 14: Verify Servo Validity

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

- Ensure all servos are turned on and communicating.

4.7.12.3.16 PFT Step 15: Verify Cross GIA PFT is Completed.

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

- Cycle power on all GIAs and servos.
- Ensure the PFD and MFD are turned on.

4.7.12.3.17 PFT Step 16: PFT Completed

The preflight test has successfully completed.

4.7.12.3.18 PFT Step 17: PFT Failed

The preflight test has failed.

4.7.12.4 Servo Faults and Troubleshooting

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

Table 4-22 and *Table 4-23* list possible faults that could be reported in a GSA fault log. Each servo has two processors, a monitor board processor and a control board processor. For each servo position (pitch, roll, yaw, and pitch trim), the two processors are uniquely numbered. Faults can occur in either of the two, both of which are contained in the GSA unit.

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

2 – Pitch Servo

4 – Roll Servo

6 - Yaw

8 – Pitch Trim Servo

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

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

Table 4-22. PFT Faults

Monitor PFT Step	Notes
INTERNAL COMM FAIL	This can sometimes be the result of a failure on the other internal servo board. Check faults on the other processor.
UNSW POWER INV	Check unit power.
MON SOL PWR ON FAIL	Check unit power and AP Disconnect power.
CTL SOL PWR ON FAIL	GSA only. Check unit power and AP Disconnect power.
SOL PWR FAIL	Check unit power and AP Disconnect power.
CERT DATA UNINSTALLED	Upload the certification gain file to the Monitor Board.
STRAP MODE MISMATCH	Check the connector strap inputs to the unit.

Table 4-23. Normal Mode Faults

Monitor Fault	Notes
GIA DIS FAULT	Check the AP Disconnect power to the unit.
HOST DATA DIF	Check the AHRS wiring to the system.
HOST DATA INV	Check the AHRS wiring to the system.
SVO PWER INV	Check unit power and AP Disconnect power.
STRP CODE CHNG	Check the connector strap inputs to the unit.
MET STUCK SWTCH	Check the MET switch inputs into the system.
MET STATUS DIF	Check the MET switch inputs into the system.

The control processor contains the following logs:

3 – Pitch Servo

5 – Roll Servo

7 - Yaw

9 – Pitch Trim Servo

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

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

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

Table 4-24. PFT Faults

Monitor PFT Step	Notes
INTERNAL COMM TESTFAIL	This can sometimes be the result of a failure on the other board. Check faults on the other processor.
CTL MOT PWR ON FAIL	Check unit power and AP Disconnect power.
MON SOL PWR ON FAIL	Check unit power and AP Disconnect power.
HALL 1 FAIL	Check unit power and AP Disconnect power.
HALL 2 FAIL	Check unit power and AP Disconnect power.
HALL 3 FAIL	Check unit power and AP Disconnect power.
HALL 4 FAIL	Check unit power and AP Disconnect power.
HALL 5 FAIL	Check unit power and AP Disconnect power.
HALL 6 FAIL	Check unit power and AP Disconnect power.
CURR OFFSET FAIL	Check unit power and AP Disconnect power.
SVO TYPE FAIL	Check unit power and AP Disconnect power.
CERT DATA UNINSTALLED	Upload the certification gain file to the Monitor Board.
STRAP MODE MISMATCH	Check the connector strap inputs to the unit.

Table 4-25. Normal Mode Faults

Monitor Fault	Notes
GIA DIS FAULT	Check the AP Disconnect power to the unit.
HOST DATA DIF	Check the AHRS wiring to the system.
HOST DATA INV	Check the AHRS wiring to the system.
SVO PWER INV	Check unit power and AP Disconnect power.
STRP CODE CHNG	Check the connector strap inputs to the unit.
MET STUCK SWTCH	Check the MET switch inputs into the system.
MET STATUS DIF	Check the MET switch inputs into the system.

4.7.13 Downloading GIA and GSA Maintenance Logs

1. Insert a FAT 32 formatted SD card into the top slot of the PFD1 before turning on the displays

2. Apply system power to PFD1/2 and MFD in the configuration mode.

3. On the PFD1 in the System page group, use the small FMS knob to scroll to the Diagnostics Terminal page.

4. Press the LG2CRD softkey at the bottom of the PFD1. Verify the softkey text grays out. This indicates the recording function is active and all text that is displayed in the OUTPUT window will be saved to the card.

5. Enable the cursor by pressing the FMS knob, select GIA1 in the LRU drop down menu and then press the ENT key to select it.

6. Skip the SERVO box and move the cursor to the COMMAND box and select View Maintenance Log in the drop down menu then press the ENT key. The error log data will be displayed in the OUTPUT box. If you see the ‘more... press any key to continue’ text at the bottom of the screen, you may need to reselect View Maintenance Log for GIA data to allow it to continue scrolling down the screen (pressing any key will not continue, disregard the text instruction you to do so). Continue to scroll through all the OUTPUT data until you see the text End of Fault Log.

7. Move the cursor back to the LRU box, select GIA2 in the LRU drop down menu and then press the ENT key to select it.

8. Skip the SERVO box and move the cursor to the COMMAND box and select View Maintenance Log in the drop down menu then press the ENT key. The error log data will be displayed in the OUTPUT box. If you see the ‘more... press any key to continue’ text at the bottom of the screen, you may need to reselect View Maintenance Log for GIA data to allow it to continue scrolling down the screen (pressing any key will not continue, disregard the text instruction you to do so). Continue to scroll through all the OUTPUT data until you see the text End of Fault Log.

9. If you need to download Servo fault logs (usually done at the request of Garmin Product Support), perform the following steps. Otherwise, skip to step 10.

   a) In the LRU box, you may select either GIA1 or GIA2.

   b) In the SERVO box, choose a servo using the FMS knobs. Each servo contains two logs, one in the Monitor (MON) processor and one in the Control (CTL) processor. You must download both for each servo separately.

   c) In the COMMAND box, select View Maintenance Log and press the ENT key.

d) The log will appear in the OUTPUT box. It will scroll to the end automatically. When it is complete, repeat steps a-c for the other servos in the aircraft. Be sure to note the order the servos were downloaded in including the Monitor or Control logs to email to Garmin Product Support. Without knowing the order in which the logs were downloaded, Garmin will be unable to process them and will ask for another full download.

10. Press the LG2CRD softkey to turn off the recording function.
11. Wait 1 minute for the system to save the data from the download to the SD card.
12. Power down the system and remove the SD card.
13. Insert the SD card in the card reader of a laptop or desktop computer and open the diag_buf_log.txt file from the SD card using the WordPad program. Verify that all of the fault logs were downloaded by checking for the End of Fault Log message at the end of the GIA data, and the last servo log entry has the current date.
14. Insert the fault log as an attachment to an email and include the LRU order how the data was downloaded and send to Garmin Aviation Product Support at avionics@Garmin.com.

4.7.14 Downloading Assert (Diagnostic) Logs

If additional assistance is needed in troubleshooting LRU faults, assert logs for selected LRUs can be downloaded to an SD card as encrypted files and emailed to Garmin Aviation Product Support for evaluation. Contact Garmin Aviation Product Support before sending a log to prevent any delay in response.

NOTE

The following procedure requires the aircraft to be on the ground.

1. Place an SD card into the top slot of PFD1.
2. Start the system in configuration mode.

Figure 4-18. System Status Page (Configuration Mode)

3. Enable the cursor by pressing the FMS knob, select the desired in the LRU, and press the ENT key.
4. Press the 'DNLD LOG' softkey *Figure 4-20*.
5. Monitor the Assert Log Download Box.
6. Press the ENT key when the box shows 100%.
7. Repeat steps 4-7 for any additional LRUs which require data.
8. Power down the system and remove the SD card.
9. Insert the assert log as an attachment to an email and include the LRU download order. Send to Garmin Aviation Product Support at avionics@Garmin.com.

Figure 4-19. Selected LRU

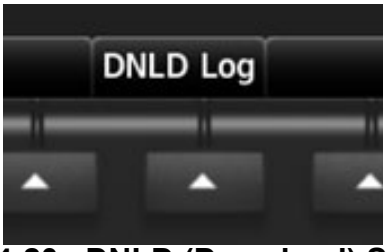


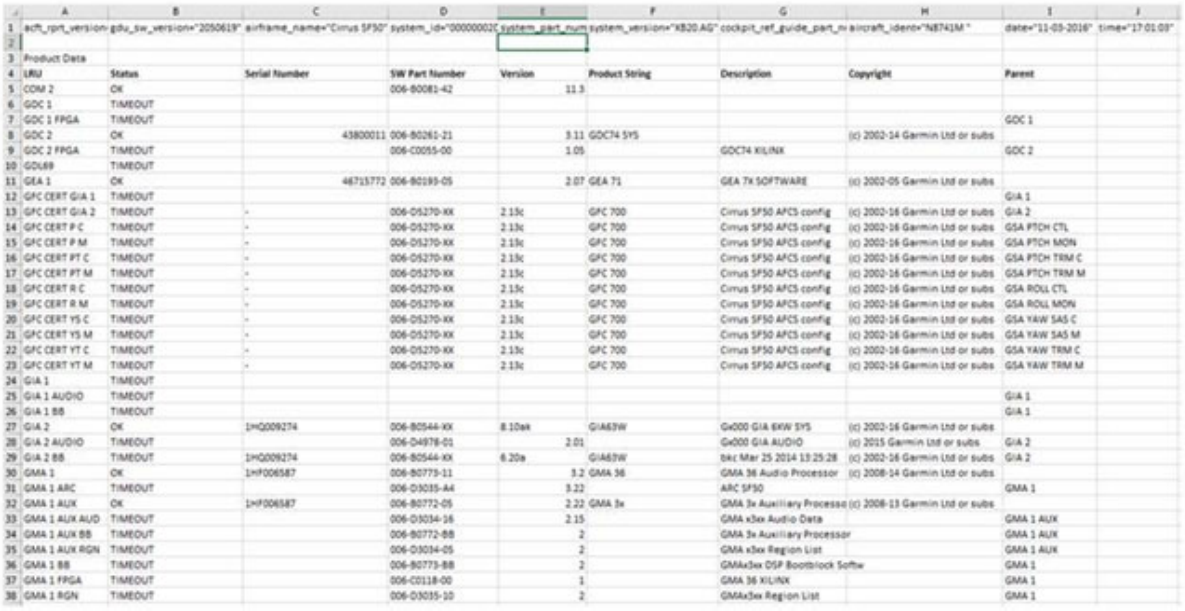
Figure 4-20. DNLD (Download) Softkey

4.8 Additional Troubleshooting

This section contains additional information that can aid in the troubleshooting process.

4.8.1 Aircraft Report

An Aircraft Report is a human readable report generated by the G1000 NXi system to publish pertinent information about the system (see *Figure 4-21*). This report can be used to assist with engineering squawk investigations, fleet management, Product Support issues, among others. Typically an Aircraft Report will include items like system ID, LRU software versions, database versions, loader cards utilized, and even options loaded to an aircraft. The primary goal of an Aircraft Report is to provide a fast and accurate method to generate a report that identifies key pieces of equipment installed on an aircraft.



	A	B	C	D	E	F	G	H	I	J
1	acft_rprt_version	gdu_sw_version="2050619"	airframe_name="Cirrus SF50"	system_id="00000002(	system_part_num	system_version="KB20.AG"	cockpit_ref_guide_part_n	aircraft_ident="N8741M "	date="11-03-2016"	time="17:01:09"
2										
3	Product Data									
4	LRU	Status	Serial Number	SW Part Number	Version	Product String	Description	Copyright	Parent	
5	COM 2	OK		006-B0081-42	11.3					
6	GDC 1	TIMEOUT								
7	GDC 1 FPGA	TIMEOUT							GDC 1	
8	GDC 2	OK	43800011	006-B0261-21	3.11	GDC74 SYS		(c) 2002-14 Garmin Ltd or subs		
9	GDC 2 FPGA	TIMEOUT		006-C0055-00	1.05		GDC74 XILINX		GDC 2	
10	GDU69	TIMEOUT								
11	GEA 1	OK	46715772	006-B0193-05	2.07	GEA 71	GEA 7X SOFTWARE	(c) 2002-05 Garmin Ltd or subs		
12	GFC CERT GIA 1	TIMEOUT							GIA 1	
13	GFC CERT GIA 2	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GIA 2	
14	GFC CERT P C	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA PTCH CTL	
15	GFC CERT P M	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA PTCH MON	
16	GFC CERT PT C	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA PTCH TRM C	
17	GFC CERT PT M	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA PTCH TRM M	
18	GFC CERT R C	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA ROLL CTL	
19	GFC CERT R M	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA ROLL MON	
20	GFC CERT YS C	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA YAW SAS C	
21	GFC CERT YS M	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA YAW SAS M	
22	GFC CERT YT C	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA YAW TRM C	
23	GFC CERT YT M	TIMEOUT	-	006-05270-KK	2.13c	GFC 700	Cirrus SF50 AFCS config	(c) 2002-16 Garmin Ltd or subs	GSA YAW TRM M	
24	GIA 1	TIMEOUT								
25	GIA 1 AUDIO	TIMEOUT							GIA 1	
26	GIA 1 BB	TIMEOUT							GIA 1	
27	GIA 2	OK	1HQ009274	006-B0544-XX	8.10ak	GIA63W	Gx000 GIA 6XW SYS	(c) 2002-16 Garmin Ltd or subs		
28	GIA 2 AUDIO	TIMEOUT		006-04978-01	2.01		Gx000 GIA AUDIO	(c) 2015 Garmin Ltd or subs	GIA 2	
29	GIA 2 BB	TIMEOUT	1HQ009274	006-B0544-XX	6.20a	GIA63W	bkc Mar 25 2014 13:25:28	(c) 2002-16 Garmin Ltd or subs	GIA 2	
30	GMA 1	OK	1HF006587	006-B0779-11	3.2	GMA 36	GMA 36 Audio Processor	(c) 2008-14 Garmin Ltd or subs		
31	GMA 1 ARC	TIMEOUT		006-D3035-A4	3.22		ARC SF50		GMA 1	
32	GMA 1 AUX	OK	1HF006587	006-B0772-05	2.22	GMA 3x	GMA 3x Auxiliary Processo	(c) 2008-13 Garmin Ltd or subs		
33	GMA 1 AUX AUD	TIMEOUT		006-D3034-16	2.15		GMA x3xx Audio Data		GMA 1 AUX	
34	GMA 1 AUX BB	TIMEOUT		006-B0772-BB	2		GMA 3x Auxiliary Processor		GMA 1 AUX	
35	GMA 1 AUX RGN	TIMEOUT		006-D3034-05	2		GMA x3xx Region List		GMA 1 AUX	
36	GMA 1 BB	TIMEOUT		006-B0773-BB	2		GMAx3xx DSP Bootblock Softw		GMA 1	
37	GMA 1 FPGA	TIMEOUT		006-C0118-00	1		GMA 36 XILINX		GMA 1	
38	GMA 1 RGN	TIMEOUT		006-D3035-10	2		GMAx3xx Region List		GMA 1	

Figure 4-21. Aircraft Report Example

The Aircraft Report captures information about the system when the system transitions to In Air condition. The header logs Flight Time for the system based on default logic. This logic can be customized through CAS if required. The report will also capture Power ON time and Power Cycle count for individual LRUs if it is reported by the unit. The report file is available for export after the system transitions to on ground status. There are three ways to retrieve an aircraft report file.

4.8.1.1 Copy to Card

Automatic: The aircraft report file is automatically generated on the top slot of all PFD/MFD units. This file is available in a human readable csv format. An equivalent file in encrypted zip format is also generated. This is a tamper proof means of manually sending the file to Garmin. (through email/web portal upload).

Manual: The report file can also be generated manually, using the configuration mode System Status page on the GDU. To generate an Aircraft Report from an aircraft/bench, cycle a GDU into config mode (it is desirable to have the entire system powered during this procedure). From the GDU System Status page, press the ACFT RPT softkey. This will generate an Aircraft Report csv file on the top slot of the installed SD card of the GDU in which the softkey was pressed on. The Aircraft Report is built off of live data reported from connected LRUs. If the units are not powered on when the ACFT RPT softkey is pressed, their data will not be present in the report.

4.8.1.2 Auto Export Through Garmin GFDS Server Using GSAF Protocol

The G1000 NXi system is capable of being set up to auto transmit the aircraft report file upon landing. This uses the Garmin Send Any File (GSAF) format for export through Iridium (RUDICS) or Wi-Fi. Before export, the exporter checks if the system has Aircraft Report delivery registered for RUDICS and Wi-Fi. The file is sent over RUDICS if the link is good. Otherwise, the file is designated for transmission over Wi-Fi link. If the system shuts down before export, the file is flagged for transmission in the next power cycle. Note that this file might get replaced if a new Aircraft Report file is generated before getting access to Wi-Fi or RUDICS link.

4.8.1.3 Auto Export to Flight Stream

A G1000 NXi system equipped with a Flight Stream 510 card in the MFD top slot can also use this link for Aircraft Report export. This export is in addition to the export mechanism using GFDS link through RUDICS and Wi-Fi. Upon landing, the file generated in Flight Stream card will automatically get streamed to PED based Garmin Pilot App. A file that has not been exported will be flagged for export on the next power cycle. The export is triggered if there is a valid connection available for the PED based App. Note that a newly generated Aircraft Report file will overwrite an older file flagged for export.

4.8.2 Aircraft Copy / Fleet Copy

The Aircraft Copy/Fleet Copy feature is a means to quickly and reliably load software/configuration/option baselines to a G1000 NXi system setup with the same system ID. It is an easy to use system recovery feature. This feature can also be used to recreate software/configuration/option baseline from one system to another identically equipped G1000 NXi system with a different system ID. In order to do this, the software/configuration/option available on the source system is exported to an SD card. This exported data can then be loaded to identically equipped system setup with the same or different system ID.

The OEM can carry out following action without requiring Garmin assistance:

- Reload a previously loaded software/configuration/option baseline to the same bench/aircraft (same system ID). Maintain a set of recovery cards.

The following actions involving copy to a system with different system ID requires Garmin assistance:

- Copy from a Test Bench to Another Identically Equipped Test Bench.
- Copy from a Test Bench to an Identically Equipped Aircraft.
- Copy from an Aircraft to an Identically Equipped Test Bench.
- Copy from one Aircraft to Another Identically Equipped Aircraft.
- Copy from one Aircraft/Bench to Multiple Identical Aircraft.

4.8.2.1 Usage

The Aircraft Copy/Fleet Copy operation is carried out as a two-step process; system export and system import. There are two cases to be considered for system import.

Import into the same system: When the source and target G1000 NXi system has the same system ID, system import is supported without requiring special permissions or an enablement card. This helps to reload the bench/airframe with multiple software/ configuration/option baselines or can function as a system recovery card. The OEM engineering team can carry out this operation on its own.

Import to a different system/systems: System copy from one G1000 NXi system to a different (but identically equipped) G1000 NXi system has to be carried out by a Garmin representative. Garmin can assist in this activity for exceptional cases that require issue recreation or troubleshooting on a G1000 NXi system with different system ID.

4.8.2.2 System Export

The software/configuration/option for any source setup can be easily copied to a Garmin approved blank SD card using configuration mode interface. Please get in touch with the Garmin sales person to order the Garmin approved SD cards. The actions required for export process are as follows:

1. Insert a blank Garmin approved SD card into the PFD top slot.
2. Apply system power the G1000 NXi system in configuration mode. Verify all Garmin LRUs are online.
3. From the PFD, navigate to System Status page.
4. Press the SYS Export softkey and wait until a completion notification is displayed. G1000 NXi system displays will export this in 1-2 min.

The system will export two files to the SD card: sys_export.zip and export_info.gca. These files are password protected by the system. It is not required to open these files for the System Copy feature. The files generated using the system export mechanism can be optionally archived in order to create a System Recovery source.

4.8.2.3 System Import

The card generated using the system export mechanism can be used to load the setup on a target system. The procedure for system import operation is as follows:

NOTE

Import into the same G1000 NXi system (same system ID) is supported without any restriction. However, import into a different G1000 NXi system (different system ID) will require assistance from Garmin.

NOTE

Use of the copy feature should be limited to developmental and trouble-shooting activity only. An exported baseline should not be used to load software/configuration/option in a production environment.

1. Insert the exported SD card into the PFD top slot.
2. Start the target system in configuration mode. Verify all Garmin LRUs are online.
3. Review the displayed aircraft model and loader card version to confirm the system being imported is as desired.
4. Select Yes when prompted to import the system.
5. The PFD should restart in configuration mode on the System Import page.
6. Confirm the import loader card is as desired.
7. Press the LOAD key.
8. Restart the system in normal mode after the upload is completed.

NOTE

If the import side G1000 NXi system has an additional or missing LRU, the software/configuration/option associated with that unit will not get automatically imported. These items can get loaded using manual selection using the System Upload page.

4.9 CMC Maintenance Log Exporting

This is the procedure for exporting maintenance logs to an SD card.

1. Insert an SD card into the top slot of the MFD.
2. On the MFD, navigate to the Aux->Maintenance Logs page.

Figure 4-22. MFD Aux-Maintenance Logs page

3. Select the folder for export.

Figure 4-23. File Selected for Export

4. Press the Export Button, and then press OK.

Figure 4-24. Selected File Exporting

5. Once the Status indicates 'Exported', the file will be on the SD card in a folder with the same name as the log folder (in this case, FOLDER_0).

Figure 4-25. Folder Exported

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5 LRU REPLACEMENT

This section contains Garmin LRU installation and removal instructions. Garmin installation manual part numbers are listed at the beginning of each of the sub-sections for technician reference. The procedures contained in this section are for reference only and do not supersede the installation and removal procedures in the Kodiak 100 AMM.

5.1 Accessing LRUs

Refer to the Kodiak 100 AMM for information about gaining access to LRUs.

NOTE

Certain LRU connectors include Garmin backshell assemblies. Garmin backshells gives the installer the ability to easily terminate shield grounds at the backshell housing. Refer to the Jackscrew Backshell Installation Instructions (Garmin P/N 190-00313-11) for backshell assembly instructions.

5.2 Replacement Procedures

Always make sure that aircraft power is off when removing or installing an LRU. Disconnect any auxiliary power supplies when performing LRU replacement.

NOTE

This section lists reference documents which contain additional information for installing Garmin LRUs. The technician should read all of this relevant reference material before removing and reinstalling an LRU.

NOTE

Software and configuration must be loaded to an LRU after it has been replaced. Testing is also required.

5.2.1 GDU 1050 Display Unit Replacement

Unit Part Number: 011-03470-10

Garmin Reference Documents:

- Captive Screw Hardware Replacement Instructions: 190-00313-65.
- SPIDER Installation Instructions: 190-00313-03.
- Shield Block Installation Instructions: 190-00313-09.
- Installation Manual: 190-00303-92.

The GDU 1050 is installed by holding the unit flush with the instrument panel. The locking studs should be oriented with the alignment marks in the vertical position for installation.

1. To Remove:
   a) Using a 3/32” hex drive tool, turn all four 1/4-turn fasteners counterclockwise until they reach their stops.
   b) Carefully remove the display from the panel.
   c) While supporting the display, disconnect the connector.
2. To Reinstall:
   a) While supporting the display, attach the connector to the rear of the unit.
   b) Carefully insert the display in the panel cutout, ensuring all four 1/4-turn fasteners align with the corresponding holes.
   c) Seat the display in the panel cutout. Do not use excessive force.
   d) Once seated, turn all four 1/4-turn fasteners clockwise to lock the display to the panel.

5.2.2 GMA1360D/GMA1347 Audio Panel Replacement

Unit Part Number: 011-03568-20 or 011-00809-00

Installation Manual Part Number: 190-03813-00 or 190-00303-20

CAUTION
Switch off No. 2 GMA when No. 2 GIA is being replaced. If No. 2 GMA was not switched off, then reload the config for No. 2 GMA.

1. To Remove:

   a) Using a 3/32” hex drive tool, turn the hex nut counterclockwise until the GMA 1347 is unlocked from its location.

   b) Carefully remove the GMA 1360D/1347 from its rack.

2. To Reinstall:

   a) Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.

   b) Insert a 3/32” hex drive tool into the access hole and turn the mechanism 90°counterclockwise to insure the correct position before placing the unit in the rack.

   c) Gently push the unit into the rack and engage the connectors.

   d) Insert a 3/32” hex drive tool into the access hole and turn the mechanism clockwise until the unit is firmly seated in the rack, avoiding excessive tightening.

5.2.3 GIA 64W/63W Integrated Avionics Unit Replacement

Installation Manual Part Number: 190-01912-00 or 190-00303-05

Unit Part Number: 011-03711-00 or 011-01105-20

Garmin Reference Documents

- 190-00848-00 GA 35, GA 36, and GA 37 Antenna Installation Instructions
- 190-00355-02 GDL 69/69A Installation Manual
- 190-00522-01 GA 55A, GA 56A, GA 57 Installation Instructions
- 190-00483-01 GA 56W Antenna Installation Instructions
- 004-00287-00 Antenna Minimum Performance Specification for the Garmin GPS/WAAS Receiver System

1. To Remove:

   a) Loosen the Phillips screw (or pull on the D-Ring and twist counter-clockwise 90°, for units with a D-Ring).

   b) Unlock the handle and remove the unit from the rack.

NOTE
The install screw is designed with a ratcheting socket that resists turning counterclockwise, unless pushed in. This ensures the engagement screw cannot loosen under vibration.

2. To Reinstall:

   a) Carefully slide the GIA into the rack. Ensure the orientation of the unit allows for engagement of the locking stud in the channel on the rack. The unit can only be installed in one direction.

   b) Push the GIA lever down towards the bottom of the unit. This engages the locking stud with the dogleg slot and locks unit into the rack. If there is excessive resistance, do not force the unit.

   c) Lock the handle into the GIA body and tighten the Phillips screw (or push in the D-Ring and twist clockwise 90°, for units with a D-Ring).

5.2.4 GMC 710 AFCS Control Unit

Unit Part Number: 011-01020-10

Garmin Installation Manual: 190-00303-70

1. To Remove:
   a) Use a 3/32" hex drive tool to turn each of the four locking sockets ¼ turn counterclockwise until they reach their stops.
   b) Disconnect backshell assembly from unit.
2. To Reinstall:
   a) Inspect connector(s) for damaged pins.
   b) Connect backshell assembly to unit.
   c) Hold unit flush with the instrument panel, ensuring locking stud alignment marks are in the vertical position.
   d) Use a 3/32" hex drive tool to turn each of the four locking sockets ¼ turn clockwise. This may require applying a small amount of forward pressure to engage the ¼ turn sockets.

5.2.5 GRS 79 Attitude and Heading Reference System Replacement

Unit Part Number: 011-03732-00

Installation Manual Part Number: 190-01852-00

NOTE
When mounting the GRS 79 rack to the airframe, and the unit to the rack, it is important to ensure that lockdown mechanisms are tight for proper unit operation.

1. To Remove:
   a) Turn each retention screw counterclockwise until they disconnect from the remote rack.
   b) Slide the GRS 79 forward to remove it from the remote rack.
2. To Reinstall:
   a) Place the GRS 79 on the remote rack.
   b) Slide the GRS 79 back until the feet are fully engaged with the remote rack.
   c) Push down and simultaneously turn each retention screw clockwise. Torque each retention screw to 15-20 in-lbs.

5.2.6 GMU 44/44B Magnetometer Replacement

Unit Part Number: 011-00870-10 or 011-04201-00

Installation Manual Part Number: 190-00303-10

1. To Remove:

   a) Unscrew the three Phillips head screws attaching the GMU to its mounting rack.

   b) Carefully lift the GMU from the rack.

   c) Disconnect the wiring harness.

NOTE
The GMU must be mounted such that pitch offset relative to the GRS mounting is less than 6.0 degrees. Likewise, the roll offset of the GMU mounting relative to the GRS mounting should also be less than 6.0 degrees. Failure to meet these specifications may result in a failed magnetometer calibration. The mounting screws must be brass.

2. To Reinstall:

   a) Connect the wiring harness to the GMU.

   b) Lower the GMU 44/44B into the rack and secure the plate with the three screws.

NOTE
If the GMU 44/44B is removed, the anti-rotation properties of the mounting screws must be restored. This may be done by replacing the screws with new Garmin P/N 211-60037-08. If original screws must be re-used, coat screw threads with Loctite 242 (blue) thread-locking compound, Garmin P/N 291-00023-02, or equivalent.

5.2.7 GDC 72 Air Data Computer

The unit Part Number is 011-03734-00 and the Installation Manual is 190-01855-00

NOTE
When mounting the GDC 72 rack to the airframe, and the unit to the rack, it is important to make sure that lockdown mechanisms are tight for proper unit operation.

1. To Remove:

   a) Turn the retention screw counterclockwise to disconnect from the remote rack.

b) Slide the GDC 72 forward to remove from the remote rack.

2. To Reinstall:

a) Place the GDC 72 (with endplate mount assembly installed) on the remote rack.

b) Slide the GDC 72 back (with endplate mount assembly facing forward) until the feet are fully engaged with the remote rack.

c) Push down and simultaneously turn the retention screw clockwise.

d) Torque the retention screw to 20 ± 2 in-lbs.

5.2.8 GEA 71/71B Engine and Airframe Interface Unit Replacement

Installation Manual Part Number: 190-01807-00

Captive Screw Hardware Replacement Instructions: 190-00313-65

1. To Remove:

   a) Loosen the Phillips screw to unlock unit handle (for units with a D ring unlock the handle by twisting the D-Ring counterclockwise 90°).

   b) Pull the unit lever up towards the top of the unit. This disengages the locking stud with the dogleg slot.

2. To Reinstall:

   a) Inspect the connectors for damaged pins.

   b) Gently push the unit into the rack to engage the connectors.

   c) Push the unit lever down towards the bottom of the unit avoiding the use of excessive force.

   d) If the lever fails to go down, adjust the backplate while engaging the unit.

   e) Lock the GEA 71/71B in place using the lever-locking handle.

   f) Tighten the Phillips screw (or push in the D-Ring and twist clockwise 90° for units with a D-Ring).

CAUTION

The application of torque exceeding 14 in-lbs. to the screw may result in damage to the LRU case and/or retaining hardware. If the retaining hardware is damaged during installation, a replacement hardware kit, Garmin part number K00-00652-00, is available. Reference Garmin part number 190-00313-65 for instructions on replacing the retaining hardware.

   g) Torque the captive screw to 10-14 in-lbs.

5.2.9 GDL 69A SXM Satellite Radio Receiver Replacement

Installation Manual: 190-00355-07

GDL 69 Series SiriusXM Activation Instructions: 190-00355-04

CAUTION

Carefully start the handle screw into the hole to avoid cross-threading. Damage to the LRU case and/or hardware will occur if a torque value of 14 in-lbs. is exceeded.

CAUTION

Do not use excessive force when inserting the unit into the rack. This may cause damage to occur to the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, remove the unit and identify the source of resistance. The unit is designed with a key, and the back plate is designed to float in the unit rack. Check to ensure the rear plate is not bound by the connector harness.

NOTE

When inserting the unit into the remote mounting rack, it may be possible for the pivot pin to fit between the unit and the mount rack without going into the slot of the locking plate. If the cam head does not seat in the slot of the locking plate, the unit will not firmly engage with the mount rack and the unit can loosen from the rack.

1. To Remove:

   a) Loosen the Phillips screw. Unlock the unit handle.

   b) Pull the unit lever up towards the top of the unit. This disengages the locking stud and the dogleg slot.

2. To Reinstall:

   a) Loosen and remove the locking lever handle securing screw.

   b) Lift up on the end of the locking lever handle.

   c) Slide the unit into the mounting rack, carefully fitting the locking lever handle cam head into the slot of the locking plate of the rack.

   d) After fully inserting the unit into the mounting rack, visually note the cam head remains seated in the slot of the locking plate.

   e) With unit firmly engaged with the mount rack, lower the locking lever handle.

   f) Insert and tighten the locking lever handle securing screw to mechanically secure the unit to the mount rack.

5.2.10 GTS Traffic System

Unit Part Number: 011-01356-00

GTS 8XX Installation Manual: 190-00587-00

GTS 8XX Maintenance Manual: 190-00587-01

1. To remove:

   a) If a cooling hose is attached to the unit, remove it from the air fitting and set aside.

   b) Turn the harness connector jackscrews counterclockwise to disengage them from the unit.

   c) Pull the harness connectors away from the unit.

   d) Disengage the QMA coax connectors by pulling back firmly on the outer sleeve of the QMA plug away from the jack connector. This will disengage the locking mechanism that secures the plug connector to the jack connector. Pulling on or disengaging the QMA connectors in any other way is not recommended and may cause damage to both the connectors and coaxial cable.

   e) Loosen the unit hold down clamp by turning it counterclockwise until it disengages the unit hold down tab.

   f) Pull the unit up slightly at an angle and pull the unit out of the rack from the connector end of the unit.

2. To reinstall:

   a) Hold the unit at a slight angle with the connector end up and slide the back of the unit into the rack engaging the curled-up lip at the back of the rack.

   b) Fully seat the unit the rest of the way into the rack.

   c) Pull the locking clamp up and turn it clockwise to engage the unit hold down tab tightly.

   d) Attach the QMA coax connectors by holding the outer sleeve of the QMA plug to align the connectors and insert the plug onto the jack until it snaps into place. There will be an audible ‘snap’ when the connectors are fully engaged. No tools are required for the insertion of a QMA plug onto a QMA jack.

   e) Install the harness connectors and tighten the connector jackscrews to secure the connectors.

   f) If a cooling hose was attached to the unit, reinstall the cooling hose to the air fitting.

5.2.11 GTX 345R Transponder Replacement

Unit Part Number: GTX 345R 011-03303-01

Installation Manual Part Number: 190-01499-02

WARNING
TURN OFF AIRCRAFT POWER BEFORE REMOVAL OR REINSTALLATION OF THE TRANSPONDER. UNPLUG ANY AUXILIARY POWER SUPPLY

1. To Remove:
   a) Insert a 3/32” hex drive tool into the access hole in the front of the unit.
   b) Turn the hex drive tool counterclockwise until it stops.
   c) Pull the unit from the rack, using the spring loaded tab on the front of the unit.
2. To Reinstall:
   a) Visually inspect the connectors on the back of the rack to make sure there are no bent or damaged pins. Repair any damage found.
   b) Insert a 3/32” hex drive tool into the access hole in the front of the unit.
   c) Turn the hex drive tool counterclockwise until it stops.
   d) Slide the unit into the rack until it stops. The unit will appear to stick out of the rack approximately 3/8”.
   e) Insert a 3/32” hex drive tool into the access hole in the front of the unit.
   f) Push on the left side of the unit and turn the hex drive tool clockwise until it stops. Do not apply more than 8 in-lbs of torque on the hex tool to seat the unit.

5.2.12 GTP 59 Outside Air Temperature Probe Replacement

Unit Part Number: 011-00978-00

Installation Manual Part Number: 190-00313-00

1. To Remove:
   a) Using a deep well socket to hold the probe in place on the outside of the aircraft, along with a 9/16” open end wrench, loosen the GTP 59 mounting nut.
   b) Remove the mounting nut, sealing washer, and the GTP 59.

2. To Reinstall:

   a) Place the ring terminal over the end of the sensor.

   b) Insert the sensor and ring terminal into the hole in the aircraft skin.

   c) Slide the washer onto the sensor.

   d) Thread the washer onto the sensor.

   e) Tighten the nut to 100 ±20 in-lbs using the deep well socket and open end wrench.

5.2.13 GWX 70R/75 Weather Radar

Unit Part Number: 011-03997-00 or 011-01768-20

Garmin Installation Manual: 190-02009-00

NOTE

Take care to avoid any contact between tools that can become magnetized and the magnetron. Even momentary contact of a potentially magnetic object with the magnetron case will cause serious weakening of the magnetic field. Use of non-magnetic tools (typically beryllium copper or titanium) is recommended when installing or servicing the GWX 70R/75.

1. To Remove:

   a) Remove the radome to get access to the weather radar by unscrewing the screws from the dome; break the sealant with a flat, sharp-edged tool before removing screws. Keep the screws to reinstall the radome.

CAUTION

Carefully hold the weather radar while loosening attachment nuts. Be sure to support the radar unit as the fasteners are removed.

   b) Remove the weather radar from the bulkhead assembly by removing the socket head cap screws.

   c) Remove the connector from the unit by pushing on the slide lock tab on the side of the connector which releases it and pull the connector away from the unit.

2. To Reinstall:

   a) Put the weather radar in position on the bulkhead assembly.

   b) Attach the connector to the unit by first pressing the slide lock tab on the side of the connector, then align and mate the unit and wire harness connectors together, and then release the slide lock tab. The locking tabs must be engaged on both ends of the connector.

   c) Install the socket head cap screws that hold the weather radar on the bulkhead assembly. Ensure the connector wire is secure and not chafing. Add strain relief or wire ties if necessary.

   d) Make sure the wiring harness has been routed and secured in such a way it cannot be struck by or interfere with unit movement throughout the full range of sweep and tilt.

   e) Install the radome according to Kodiak 100 AMM instructions.

5.2.14 GSA 80/81 Servo Actuators

Unit Part Numbers: GSA 80: 011-00877-20, GSA 81: 011-00878-20

Installation Manuals: 190-00303-72 and 190-00303-83

NOTE

The technician should be familiar with information contained in the GSA 8X/GSM 85(A) and the GSM 86 Servo Gear Box Installation Manuals (part numbers 190-00303-72 and 190-00303-83 respectively) before performing maintenance on the autopilot servo equipment.

1. To remove:
   a) Gain access to the desired servo(s).
   b) Disconnect the servo harness connector.
   c) Use a socket or open-wrench to loosen and remove the servo attachment bolts. The Pitch-Trim servo bracket will need to be removed to access all the Pitch-Trim servo attachment bolts.
   d) Carefully remove the servo and place a protective cover on the output gear.
   e) Place a protective cover over the GSM 86 Servo Gearbox.
2. To Reinstall:
   a) Inspect the servo output gear for abnormal wear.
   b) Using a lint-free cloth, remove excess grease build-up from the servo output gear.

CAUTION

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.

   c) Using a brush or other applicator, apply a thin coat of Aeroshell 33MS (Lithium-complex based) grease to the servo output gear.
   d) Carefully place the servo into the servo gearbox, ensuring proper orientation and alignment.
   e) Fasten the servo to the servo gearbox using the existing hardware. Follow the installation instructions provided in the respective servo installation manuals.
   f) Inspect the harness connectors and check that no pins are bent or otherwise damaged. Connect the harness and secure it appropriately.

5.2.15 GSM 86 Servo Gearbox

Unit Part Numbers: 011-01904-04 (pitch, roll, yaw and pitch trim)

Installation Manual: 190-00303-83

NOTE

Keep Part the protective covers (part numbers 145-00807-00 and 145-00808-00) installed for as long as practical and use care while handling before and during installation of the autopilot servo actuator and servo mount to avoid foreign object/debris contamination. If foreign object/debris contamination of either the servo actuator or servo mount is suspected, immediately return the contaminated unit(s) to Garmin for repair.

CAUTION

Do not disassemble the servo actuator or servo mount. There is no requirement or provision for routine maintenance, lubrication, or field repair of the servo actuator or servo mount. Servo actuators and servo mounts in need of repair may be returned to Garmin for service.

CAUTION

Do not insert any foreign object into the openings located in the mating surfaces of either the autopilot servo actuator or servo mount.

1. To Remove:
   a) Remove the desired servo(s).
   b) De-rig the flight control cabling or chain (refer to the servo installation drawings for removal details).
   c) Use a socket or open-wrench to loosen and remove the servo attachment bolts.
   d) Carefully remove the servo mount.
2. To Reinstall:
   a) Follow the installation instructions provided in the respective servo installation drawings.
   b) If no other maintenance is to be performed, reinstall the servo(s).

5.2.16 Configuration Module Replacement

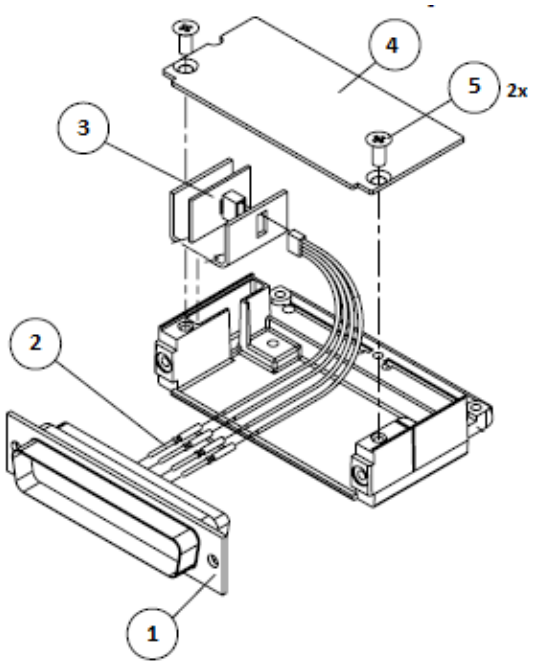

Figure 5-1. Configuration Module Installation

Item	Description	Qty Needed	Garmin Part Number
1	Sub-Assy,Potted,Config Mdl,w/EEPROM,Jackscrew	1	011-02179-00
2	Cable, 4-Conductor Harness	1	325-00122-00
3	Pins, #22 AWG (HD)	5	336-00021-00

Figure 5-2. Configuration Module Kit - 011-00979-03

1. To Remove:
   a) Disconnect the connector (1) from the LRU.
   b) Remove the two screws (5) from the cover (4) and remove the cover.
   c) Unplug the connector from the configuration module (3).
   d) Remove the configuration module.

2. To Reinstall:

   a) Inspect the connector for damaged pins (3).

   b) Place the configuration module (1) in position and insert the connector.

   c) Insert the connector into the configuration module (1).

   d) Assembly of the connector is the reverse of disassembly.

3. Post-Installation Instructions:

   a) If the GRS 79 AHRS Configuration Module is replaced, all three GRS.GMU calibration procedures must be performed. Refer to *Section 7.6*.

   b) If the GDC 72 Configuration Module is replaced, configuration settings must be reloaded to the GDC 72. Refer to *Section 7.7*.

   c) If the Master Configuration Module is replaced:

      i) Start the G1000 NXi system in configuration mode.

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

      iii) Press the UPDT CFG softkey.

4. If both the PFD and the Master Configuration Module are replaced, configuration must be reloaded to all LRUs in the G1000 NXi system except the GRS 79, GMU 44B, and GDC 72. Refer to *Section 3*.

5.2.17 GEA 71B Backshell Thermocouple Removal and Replacement

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

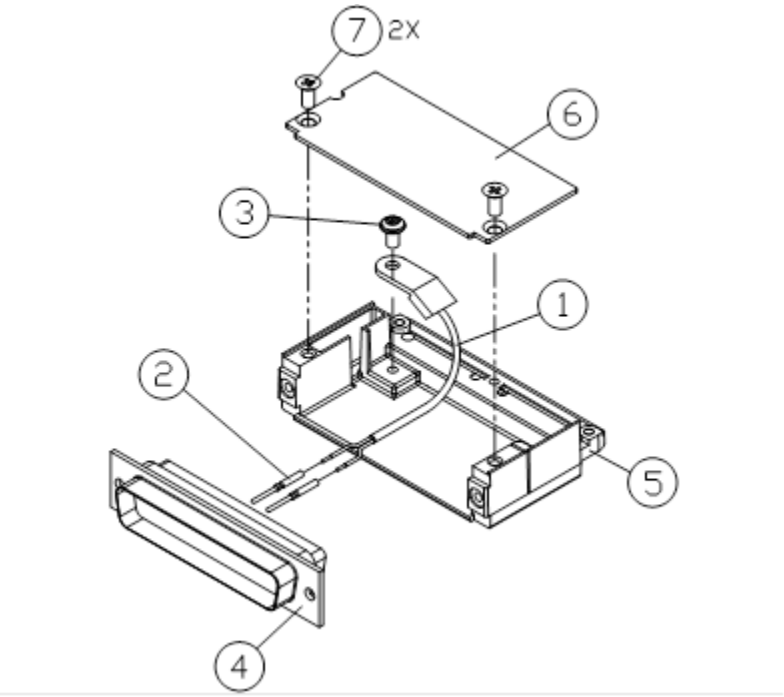

Figure 5-3. GEA Backshell Thermocouple

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

Figure 5-4. Thermocouple Kit (011-00981-00)

1. To Remove:

   a) Remove the GEA 71B.

   b) Remove the GEA 71B connector backplate.

   c) Remove connector assembly J711 from the backplate.

   d) Remove screws, item 7, and cover, item 6, from the backshell, item 5.

   e) Unscrew thermocouple from boss on backshell. Extract the thermocouple pins from the connector.

2. To Replace:

   a) Crimp pins, item 2, onto each of the thermocouple wires, item 1. Ensure that pre-stripped wire length is 1/8" before crimping.

   b) Insert newly crimped pins and wires into the appropriate connector housing location, item 4, as specified by the Kodiak Wiring Diagram.

   c) Place thermocouple body, item 1, onto the backshell boss, item 5. Place the thermocouple as shown in *Figure 5-3* so the wires exit towards the bottom of the backshell.

   d) Place thermocouple body, item 1, onto the backshell boss, item 5. Place the thermocouple as shown in *Figure 5-3*so the wires exit towards the bottom of the backshell.

   e) Fasten cover, item 6, to backshell using screws, item 7.

   f) Make sure the ITT indications are valid on the MFD.

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6 RELOADING SOFTWARE AND CONFIGURATION

This section provides procedures to be followed after equipment is replaced. 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.

NOTE

If the technician skips reloading of a replaced LRU, an 'LRU replacement detected' message is shown on the GDU in normal mode. This message persists until the LRU software reloading procedure is performed. The 'LRU replacement detected' message may not be displayed if there are existing Manifest error or Configuration error messages.

The procedures in this section can be used to correct problems relating to MANIFEST errors, CONFIG (configuration errors), and LRU REPLACEMENT messages that show up after the replacement of an LRU.

Baseline system software and configuration must already be loaded and functioning correctly before reloading software and configuration to an LRU that has been replaced. In the event of an upload failure, cycle power to the system and attempt the procedure again. In the event of continued failures stop performing the procedures in this section and perform the procedure described in *Section 3*, Loading System Software And Configuration, using the Transaction Log (on the Transaction Log Page) as a guide for what options were previously installed on the system.

Testing and/or calibration is required to confirm proper operation of the LRU after software and configuration is loaded (*Section 7*). The procedures in this section only support software and configuration reloading. Refer to the Kodiak 100 Pilot's Guide for instructions on loading databases and subscription related items.

The procedure in this section cannot be used to replace PFD1. Use the full procedure as outlined in *Section 3*.

6.1 Applicability and Limitations

The system keeps track of features that have been activated using baseline, options, and enablement cards. When an LRU is replaced, the system will ensure the associated feature set remains available.

Reloading described in this section only supports replacement of LRUs with the same model number. For example, a GIA 64W-20 should only be replaced with GIA 64W-20 model in order to utilize the procedures. Reference *Section 3* for procedures on how to perform a full software/configuration load in the event of a LRU model number change.

The procedures in this section cannot be used if a software update is being carried out on the system. Reference *Section 3* for procedures on how to perform a full software/configuration load in the event of a software upgrade.

The procedures in this section can be used to reload any item that has been setup with a loader or enablement card. This includes LRU software, LRU configuration, equipment options and feature unlock settings described in *Section 3*.

NOTE

Garmin recommends the use of SanDisk brand SD cards to reload software and configuration. If another brand of card is used, and software loading problems occur, replace the card with a SanDisk brand card and reattempt loading.

CAUTION

Connect a ground power unit to the aircraft before reloading software. DO NOT RELY ON THE AIRCRAFT BATTERY. DO NOT USE A BATTERY CHARGER AS AN EXTERNAL POWER SOURCE DUE TO ELECTRICAL NOISE IT MAY INJECT IN THE SYSTEM. DO NOT ALLOW POWER TO BE REMOVED FROM THE SYSTEM. Remove power only when told to do so in the procedures. Power loss during software loading can corrupt an LRU requiring replacement. Both displays should be in the same mode (configuration or normal), unless instructed differently.

6.2 Transaction Log Page

In order for the system to correctly reload software and configuration to an LRU, it must first know what was originally loaded to that LRU. To facilitate this, the system records all updates performed using the loading process as described in *Section 3*.

Once this record is stored the system has the ability to replace those updates back to the LRU at any time. This stored record of all software and configuration updates is known as the Transaction Log on the Transaction Log Page (7th page in the System Group).

The most recent update is on the top of the list and the oldest upload is on the bottom of the list. Any subdued text represents configuration items that were loaded before the last Clear Command. These configurations are no longer applicable to the current state of the aircraft but are listed in the log for informational and historical purposes. Updates performed using the process described in this section does not affect the Transaction Log.

6.3 Reloading Procedures

NOTE

If the technician skips the reloading of a replaced LRU, an 'LRU replacement detected' message is shown on the GDU in normal mode. This message persists until the LRU software reloading procedure is performed. The 'LRU replacement detected' message may not be displayed if there are existing Manifest error or Configuration error messages.

1. *Replace the faulty LRU hardware according to the procedures in Section 5.*
2. *Start the system in configuration mode.*
3. *Select the LRU Replacement Page.*
4. *Press the FMS knob. The LRU window is highlighted.*
5. *Turn the small FMS. A drop down list is displayed showing all of the LRUs installed in the system.*
6. *Turn the small FMS knob to select the LRU which was replaced and press ENT.*
7. *The Product Window fills with all of the necessary software and configuration for the replaced LRU.*
8. *Press the Load softkey. Software and configuration begins loading, including any required options.*
9. *Press ENT to acknowledge the loading was complete. PASS indicates loading was successful.*
10. *Deactivate the cursor.*

6.3.1 LRUs with Unique Loading Procedures

When LRUs contain multiple subassemblies (i.e., GIA contains the following subassemblies: GIA, COM, NAV, and GPS), each subassembly must go through the replacement process. It is not sufficient just to load the LRU only.

1. Replaced LRU GIA 64W 1 or 2
    a) GIA 1 or 2
    b) COM 1 or 2
    c) NAV 1 or 2
    d) GPS 1 or 2
2. GSA 8X
    a) GSA axis CTL
    b) GSA axis MON

Press the Load softkey. The loading begins.

1. Press ENT to acknowledge the loading was complete. PASS indicates loading was successful.
2. Deactivate the cursor.

6.3.2 Reloading Verification

Once an LRU software reloading procedure has been performed, the technician can confirm the system has been successfully returned to its previously approved state by using the Configuration Manager Page.

The Configuration Manager page supports two functions as follows.

- The display of expected and actual system fleet and aircraft identification numbers.
- The display of the synchronization status between each LRU and the GDU currently being utilized. This status compares the GDUs expected configuration to what each LRU is reporting as its actual configuration. The synchronization status may be reported in the following values.

1. Green Valid - This indicates the GDU and LRU are synchronized, and GDUs configuration expectations match what the LRU is reporting.
2. Red Invalid - This indicates the GDU and LRU are not synchronized, and GDUs configuration expectations do not match what the LRU is reporting.

3. Blank - This indicates the GDU to LRU synchronization status information is not available for that LRU. Any configuration mismatches will be reported elsewhere on the system.

4. Gray Not Supported - This indicates the GDU to LRU synchronization status information is not supported for that LRU. Any configuration mismatches will be reported elsewhere on the system.

NOTE

During the time between when the LRU hardware has been replaced, and before the LRU Replacement procedure being performed, the technician should expect to see an Invalid status. Once the LRU loading procedure is performed, the status will return to Valid, providing confirmation the load was successful.

The display of Invalid messages after a reloading procedure may indicate that a system restart is required. If the restart does not resolve the items responsible for these error messages; it may be required to reload the system as described in *Section 3*.

6.3.3 Card Copy Management

The system provides a Card Copy operation. This operation copies the loader card to GDU internal memory. The internally saved loader cards are used by LRU Software and Configuration loading procedure. The Card Copy operation uploads the loader card into the PFD internal memory. A newly uploaded loader card is automatically synchronized with other MFDs and PFDs by transferring it in the background during normal and configuration mode. This transfer takes approximately four minutes.

The GDUs can hold copies of 32 cards. An interface is provided to delete cards that are no longer applicable. This can be accessed by using the MANAGE key on LRU Replacement page.

NOTE

The card copy management feature does not track enable cards that were certified before NXi. It does not track, Enhanced SAR, SVT, HTAWS-B, and ChartView. It does track TD, GCS, SurfaceWatch, and Kodiak 100 Software Loader Cards. Also, a warning message will appear if 32 cards has been exceeded.

6.4 Swapping LRUs

The procedures in this section are designed to support the replacement of a single LRU at one time. Swapping positions of two like units for trouble shooting purposes is also supported using this same procedure. For instructions on how to physically swap the unit hardware, refer to *Section 5*. For instructions on how to ensure configuration is properly loaded after the swap refer to *Section 7*. The only additional instructions beyond what is outlined in *Section 4* for unit swapping is to ensure the replacement procedure is performed on the pilot side (#1) LRU first.

6.5 Alternate Loading Procedures

In the case of any unresolved faults encountered during the reloading of LRU software and configuration described in *Section 6.3*, perform the reloading of software and configuration according to the following:

1. Load Baseline software and configuration per *Section 3*.
2. Load applicable options. If help is needed identifying options, reference the Transaction Log page.

6.6 GDU 1050A Display Unit

If the removed display(s) are reinstalled in their original positions, no software or configuration loading is required. If the PFD and MFD are installed in opposite positions, no software or configuration loading is required.

If a new GDU 1050 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Refer to *Section 3*.

6.7 GMA 1360D Audio Panel

No software/configuration loading is required if the removed GMA 1347/1360D is reinstalled.

If a new GMA (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Refer to *Section 3*.

6.8 GEA 71/71B Engine and Airframe Interface Unit

No software or configuration loading is required if the removed GEA 71/71B is reinstalled.

If a new GEA 71B (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Follow the instructions in *Section 3* to load the GEA software and configuration files.

6.9 GTX 345R Transponder

No software or configuration loading is required if the removed GTX 345R is reinstalled.

If a new GTX 345R (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Follow the instructions in *Section 3* to load the GTX software and configuration files.

6.10 GRS 79 AHRS / GMU 44(B) Magnetometer

If the original GRS 79 was reinstalled, no software loading is required. Continue to the GRS/GMU calibration in *Section 7.6*.

If the GRS 79 was replaced with a new unit (new serial number), software must be loaded. Follow the instructions in *Section 3* to load the GRS software and configuration files.

If the original GMU 44(B) Magnetometer was reinstalled, no software loading is required.

If the GMU was replaced with a new unit (new serial number), software must be loaded. Follow the instructions in *Section 3* to load the GMU software file.

6.11 GDC 72 Air Data Computer

No software or configuration loading is required if the removed GDC 72 is reinstalled.

If a new GDC 72 (new serial number) is installed, the correct software and configuration files must be loaded to the unit. Follow the instructions in *Section 3* to load the GDC software and configuration files.

6.12 GDL 69A SXM SiriusXM Datalink Receiver

No software or configuration loading is required if the removed GDL 69A SXM is reinstalled.

If a new GDL 69A (new serial number) is installed, the correct software and configuration files must be loaded to the unit. The GDL 69A will also have to be activated. Follow the instructions in *Section 3* to load the GDL software and configuration files. Activation of the GDL 69A unit for Garmin Connext Satellite Services can be done at flygarmin.com.

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7 LRU TESTING AND CALIBRATION

This section contains LRU testing and calibration procedures to ensure proper operation of the G1000 NXi system after maintenance has been performed and software has been reloaded to the affected unit(s). Throughout this section, reference is made to softkey numbers. Refer to *Figure 7-1* for softkey numbering.

Figure 7-1. Softkey Numbering

7.1 Display Testing

1. Start the displays in normal mode and allow them to initialize for approximately one minute. The AHRS requires longer initialization periods than the other LRUs. This causes the attitude, airspeed, and altitude fields to be invalid during the first approximately 40-60 seconds of applying system power.
2. Check the displays for the following:
   a) Check that all NAV/COM display fields are valid (located in the top corners of the PFD).
   b) Check that attitude, heading, altitude, airspeed, vertical speed and OAT fields are valid on both PFDs within 2 minutes of applying system power.
   c) Check to see that attitude and heading are valid (unless AHRS calibration is required).
   d) Test data from the Air Data Computers as follows:
      i) Press the PFD Opt softkey.
      ii) Press the Sensors softkey.
      iii) Switch between ADC1 and ADC2.
      iv) Make sure the data from both GDC data computers is valid on both displays
   e) Press the Sensor softkey on each PFD and switch between AHRS1 and AHRS2. Verify that data from both GRS 79s is valid on both displays.
   f) Verify that engine instrument fields are valid on the MFD.

NOTE

The following steps are for two GMA1360D's installed; if one GMA is installed, push the red display reversion button on the GMA 1360D. Verify both displays enter reversionary mode (both should have valid altitude, airspeed, vertical speed, and engine instruments). Deactivate reversionary mode by pushing the red reversion button.

g) Push the red DISPLAY BACKUP button on the pilot-side GMA 1360D. Make sure the pilot-side PFD and MFD displays enter reversion mode. MFD should have valid altitude, airspeed, vertical speed, COM1, COM2, NAV1, NAV2 and engine instruments.

h) De-activate the pilot-side reversion mode by pushing the DISPLAY BACKUP button. Make sure PFD1 and MFD return to normal display modes.

i) Repeat Step 1 using GMA2. Ensure that PFD 2 and MFD enter reversion mode and MFD displays valid altitude, airspeed, vertical speed, COM1, COM2, NAV1, NAV2 and engine instruments.

j) De-activate the co-pilot's side reversion mode by pushing the DISPLAY BACKUP button. Make sure PFD2 and MFD return to normal display modes.

k) Select the Map-TERRAIN-SVT page on the MFD. Note: that will be the page title with TAWS not enabled and SVT enabled. If neither TAWS or SVT are not enabled, the page title is Map-Terrain Proximity.

l) Make sure the page title reads Map - TAWS-B.

m) Press the MENU button and select Test TAWS from the pop-up menu.

7.2 GIA 64W/63W Testing

7.2.1 GPS Signal Acquisition

Figure 7-2. Aux - GPS Status Page (MFD)

The GIA 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 Aux - GPS Status page on the MFD. Two softkeys on the bottom of the display allow the user to toggle between GPS 1 and GPS 2. Make sure both receivers show 3D DIFF NAV on the MFD.

NOTE

It may be necessary to temporarily disable or move away from GPS repeaters while testing, since repeaters may adversely affect GPS receiver performance.

7.2.2 VHF COM Interference Test

NOTE

Conduct this test outside. A GPS repeater operating inside a hangar may result in a failed test. This procedure assumes the system is currently set to 25 kHz COM channel spacing.

1. Monitor GPS signal strength bars on the Aux-GPS Status page (see *Figure 7-2*).
2. On the PFD, ensure the CDI is set to GPS. It it is not, press the CDI softkey until GPS ENR is displayed.
3. Make sure the GPS INTEG flag is out of view.
4. Select 121.150 MHz on the COM1 transceiver.
5. Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
6. During the transmit period, make sure the GPS INTEG flag does not come into view on the PFD and that GPS1 does not lose a 3-D navigation solution on the MFD.
7. Repeat Step 5 and Step 6, and re-transmit while monitoring GPS2 signal levels on the MFD.
8. Repeat Step 4 through Step 7 for each of the following frequencies:
   - 121.175 MHz
   - 121.200 MHz
   - 131.250 MHz
   - 131.275 MHz
   - 131.300 MHz
9. Repeat Step 4 through Step 8 for the COM2 transceiver.
10. On the MFD, select the Aux-System Setup page.
11. Under the COM CONFIG field, change the COM channel spacing from 25.0 kHz to 8.33 kHz.
12. Go back to the AUX-GPS Status page.
13. Select 121.185 MHz on the COM1 transceiver.
14. Transmit for a period of 35 seconds while monitoring GPS1 signal strength levels.
15. During the transmit period, make sure the GPS INTEG flag does not come into view on the PFD and make sure that GPS1 does not lose a 3-D navigation solution on the MFD.

16. Repeat Step 14 and Step 15, and re-transmit while monitoring GPS2 signal levels on the MFD.

17. Repeat Step 14 through 16 for each of the following frequencies:

    - 121.190 MHz
    - 130.285 MHz
    - 131.290 MHz

18. Repeat Step 14 through Step 17 for the COM2 transceiver.

19. On the MFD, select the Aux-System Setup page and change the COM channel spacing back to 25.0 kHz.

7.2.3 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. The PFD CDI will not show a course deviation bar unless a valid VHF Nav frequency is tuned. Simulate a VOR signal on radial 000° with a course-width of 20°. Make sure full-scale deflection of the CDI while applying a 10° deviation signal. Exercise the CDI with both right and left deviations for both NAV 1 and 2. Exercise the Glideslope indicator with up and down deviation indications.

7.3 GMA 1347/1360D Audio Panel

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

7.3.1 Intercom System (ICS) Check

1. Make sure the MAN SQ key is off (no light).

2. Adjust the ICS volume to a comfortable level.

3. Plug in a headset at each Cockpit ICS position. One at a time, plug a headset into each left and right CABIN ICS jack location (if installed) (one headset on right, one headset on left).

4. Check the following:

    - Two-way communication between each CABIN ICS jack position.
    - CABIN ICS position cannot hear the pilot and copilot.
    - CABIN ICS positions cannot be heard by the pilot or copilot.

5. Select COM1 MIC and AUDIO on the GMA 1347/1360D.

6. Make sure INTR COM is deselected. Check for an active (green) COM1 frequency is displayed on the PFD.

7. Select PA and verify the PA select annunciator is illuminated. Make sure the COM1 active frequency is displayed white.
8. Initiate passenger address using pilot's headset boom mic by keying the pilot's PTT. Check the following:
   - Clear PA audio can be heard over cabin speaker and CABIN ICS headsets.
   - PA selected annunciator on the GMA flashes ~ once per second during PA address.
9. Repeat Step 8 using pilot hand mic.
10. Initiate passenger address using copilot's headset boom mic by keying the copilot's PTT. Check the following:
    - Clear PA audio can be heard over cabin speaker and CABIN ICS headsets.
    - PA selected annunciator on the GMA flashes ~ once per second during PA address.
11. Repeat Step 10 using copilot hand mic.

7.3.2 Transceiver Operational Check

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

NOTE
Adjust pilot or co-pilot mic gains in the Fast Volume Configuration page in the event that COM sidetone is lower than desired.

1. Select the audio source corresponding to each installed avionics unit (i.e. NAV1, NAV2, COM1, COM2, ADF and DME) and check for audio over the headsets.
2. Press the SPKR button and make sure the selected audio is heard over the speaker.

7.3.3 Failsafe Operation Check

1. Remove power to the GMA 1347/1360D. This directs all COM1 phone audio, MIC audio and MIC key to the pilot position.
2. Check the failsafe operation by exercising the COM1 microphone, microphone key and audio over the headphones. All volume control for the COM audio should be through the PFD/MFD volume control. Check for proper operation of COM1 using the failsafe operation.
3. Restore power to the GMA 1347/1360D to continue testing.

7.3.4 Marker Beacon Test

1. Using a ramp tester, simulate the outer marker, middle marker and inner marker signals by following the test equipment manufacturer instructions. Make sure that each marker audio signal is present over the headphones and speaker.
2. Make sure 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. Operate the MKR MUTE key on the GMA 1347/1360D and ensure the audio signal is muted.

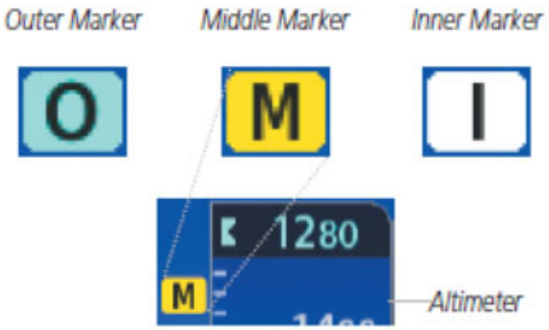

Figure 7-3. Marker Beacon Annunciations

7.3.5 SiriusXM Audio Suppression Check

Refer to the Kodiak 100 AMM for instructions on SiriusXM Audio Suppression Check. This procedure is applicable only to aircraft that have Sirius XM radio subscriptions.

7.4 GEA 71/71B Engine and Airframe Interface Unit

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

1. The system Engine Indication System (EIS) displays critical engine, electrical, fuel, and other system parameters on the left side of the Multi Function Display (MFD) during normal operations.

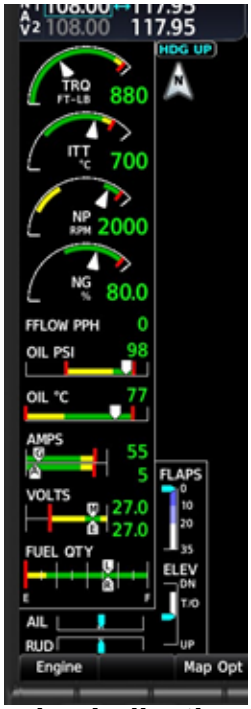

Figure 7-4. Engine Indication System-MFD

2. The Kodiak 100 EIS instrument types include vertical slider gauges, horizontal bar indicators, digital displays, and slide bars. Green bands and displays indicate normal ranges of operation; amber and red bands and displays indicate caution and warning, respectively. When unsafe operating conditions occur, displays, pointers, and labels may change color and flash corresponding to the level of the condition. If sensor data to an instrument becomes invalid or unavailable, a red X is shown across the instrument.

3. Values/gages red X outside of display range. EIS information is presented in two displays, accessed using the ENGINE Softkey on the MFD:

   - Engine Display - Default display; shows all critical engine, fuel, and electrical indicators.
   - System Display - Shows numeric displays of critical engine, oil, ice protection, and electrical indicators.
   - Fuel Display - Shows numeric displays of oil, fuel indicators and calculations.

4. To test the GEA 71/71B, start the system in normal mode. The Engine Indicator System gauges should become valid within two minutes of system power being supplied.

7.5 GTX 345R Transponder

The transponder system must be verified in accordance with Title 14 of the Code of Federal Regulations (14 CFR) §§ 91.411 and 91.413, every 24 calendar months, or any time a transponder is removed.

This test requires use of a Mode S ramp generator. Specific instructions for operating the ramp tester are contained in the applicable operators manual. Refer to 14 CFR Part 43 Appendixes E and F for testing criteria.

7.5.1 Transponder Ground Test

1. Make sure no GTX errors are displayed and the GTX controls are responding.
2. Place the MFD and PFD 2 into NORMAL MODE.
3. Place PFD1 into CONFIG MODE.
4. Go to the System Aircraft Configuration page (has the GND TST Softkey).
5. Press the GND TST softkey.
6. Leave the MFD and PFD 2 in Normal mode.
7. Cycle power only on PFD1 to place PFD1 into Normal mode.
8. Once PFD1 comes on the GTX should still be in the ground test mode the GTX should be reporting an airborne state. The GIA should be sending GPS position information to the GTX.
9. Perform the procedures to test the transponder according to FAR 91.413 and 14 CFR Part 43, Appendix F.
10. Cycle power on the system to take it out of 'Test Mode'.

NOTE

In addition to the Ground Test test above, the GTX 345R must be tested and shown to comply with Title 14 CFR Part 91.411, 91.413, and Part 43 Appendix E and F. Refer to Title 14 CFR Part 91.411, 91.413, and Part 43 Appendix E and F for interval requirements

7.5.2 ADS-B Out Test

The ADS-B Out test procedure requires the use of a Mode S transponder ramp tester, such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

To perform the test, do the following:

1. Make sure the aircraft is in a location where a GPS signal is receivable (e.g., outdoors with a clear view of the sky).
2. Power on the aircraft/avionics.
3. Make sure the GPS source(s) have acquired a position.
4. Ensure the GTX transponder is in ADS-B TX mode.
5. Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted:
   a) Aircraft emitter category is Light Airplane < 15,500 lbs (on the TR-220 this is indicated as “A1”).
   b) Aircraft length documented in the aircraft checkout log.
   c) Aircraft width documented in aircraft checkout log.
   d) 1090 ADS-B In capability matches the configuration setting documented in the aircraft checkout log.
   e) UAT (978) ADS-B In capability matches the configuration setting documented in the aircraft checkout log.
6. Place the GTX transponder into airborne state (refer to Section 8.1.1).
7. If dual GPS sources are connected to the GTX, disable the GPS source not being checked by covering the GPS antenna or removing power from that navigator.
8. Make sure the GPS source not being checked is no longer receiving satellite data.
9. Ensure the GPS source being checked has acquired position.
10. Select ALT mode on the GTX.

11. Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted:

    a) NACv ≥1

    b) SDA ≥ 2

    c) SIL ≥3

    d) NACp ≥8

    e) NIC ≥7

12. If dual GPS sources are connected to the GTX, repeat steps 6 through 10 for the other GPS source.

7.5.3 GDC 72 Testing

Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) (Barometric Scale Error) are not applicable because the digital outputs of the GDC 72 are not susceptible to these types of errors.

7.5.4 GTP 59 OAT Probe Check

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

7.5.5 GRS/GMU Calibration Procedure

After mechanical and electrical installation of the GRS 79 AHRS and GMU 44 magnetometer have been completed and before operation, a set of post-installation calibration procedures must be carried out. Refer to the Calibration Procedures.

7.6 GRS 79 and GMU 44(B) AHRS Testing

After replacement of a GRS 79 and/or GMU 44(B) has been completed, before operation, a set of calibration procedures must be performed. *Table 7-1* describes the necessary calibration procedures.

NOTE

During calibration, the message 'Calibration Error' may appear even though the Mag Interference test passed. Troubleshooting shows no magnetism issues, swapping the GMU does not correct the problem, and there are no wiring issues. Perform the following:

1. Check the relative orientation between the GRS and the GMU.

2. Change the location where the Mag Cal is being conducted.

Table 7-1. Post-Installation Calibration Procedure Summary

Calibration Procedure	Procedure Name	Procedure Description	Installations Requiring Procedure
A-1	Pitch/Roll Offset Compensation	Level Aircraft	Either procedure A-1 or A-2 is required for all installations. Procedure A-1 is recommended.
A-2	Zero Pitch/Roll Offsets by Manual Entry	Manually enter zeros for Pitch/Roll Offsets (passcode required)	This procedure should be used only if leveling the aircraft is not feasible and the AHRS is mounted to within 0.25° of aircraft reference.
B	Magnetometer Calibration	Compass Rose Taxi Maneuver	All installations. This procedure should be repeated following removal or replacement of the GMU 44 unit or degaussing of the area near the GMU 44.
C	Heading Offset Compensation	Compass Rose Alignment with Magnetic North	Strongly recommended for installations in which GMU 44 alignment is not within 0.5° of aircraft forward longitudinal direction.
D	Engine Run-Up Vibration Test	Validate Vibration Characteristics of Installation	All installations.

Table 7-1. Post-Installation Calibration Procedure Summary (Continued)

Calibration Procedure	Procedure Name	Procedure Description	Installations Requiring Procedure
E	Magnetometer Interference Test	Validate to Magnetic Interference with GMU 44	Required for initial installation certification. This test should also be repeated to ensure all subsequent electrical changes associated with devices within 10.0 feet of the GMU 44 Magnetometer. Such changes include, but are not limited to, wiring, shielding, or grounding changes to any light, strobe, beacon, or any other electrical device located near the GMU 44 unit. Likewise, this test should also be repeated to ensure all subsequent changes to materials within 10.0 feet of the GMU 44. Such changes include, but are not limited to, addition, removal, or modification of ferrous or electrically conductive materials located near the GMU 44 unit. Garmin recommends this test be performed at least once every 12 months by all aircraft manufacturers on a minimum of one production aircraft for every airframe type or model equipped with the G1000 NXi system.

If removal and replacement of a GRS 79 or GMU 44(B) unit is required after post-installation calibration has been completed, the unit mounting racks must not be moved. If the mounting bolts that secure the GRS 79 mounting racks are loosened for any reason, a new post-installation calibration procedure A-1 (or A-2, if applicable), B and D (plus C if recommended initially) must be carried out before the aircraft can be returned to service.

Any GMU 44(B) removal or replacement requires repeating the magnetometer calibration procedure (Procedure B), and if recommended initially, the heading offset compensation procedure (Procedure C).

Any degaussing of the area near the GMU 44(B) mounting location requires repeating the magnetometer calibration procedure (Procedure B), and if recommended initially, the heading offset compensation procedure (Procedure C).

A repeat of the pitch/roll offset procedure (either Procedure A-1 or A-2) requires a repeat of the magnetometer calibration procedure (Procedure B), and also (if previously recommended) a repeat of the heading offset compensation procedure (Procedure C).

The addition, removal or modification of components that are ferrous, or otherwise magnetic, within 10.0 feet of the GMU 44IB) Magnetometer location after the magnetometer interference test or magnetometer calibration procedure were completed requires a repeat of both procedures.

Furthermore, electrical changes to the installation that affect components within 10.0 feet of the GMU 44(B) magnetometer after the magnetometer calibration and magnetometer interference procedures were completed will require a repeat of the magnetometer interference test. If new magnetic interference is detected, it must be resolved and the magnetometer calibration procedure must be repeated. Wiring or grounding changes associated with a device located in the same wing as the GMU 44(B) is a good example of such a change.

7.6.1 Calibration Procedure A-1: Pitch

NOTE

Either procedure A-1 or procedure A-2 is required for all installations. Procedure A-1 is preferred.

1. Level the aircraft to within ±0.25° of zero pitch and zero roll.
2. Enter configuration mode (refer to *Section 2.3.5* as needed).
3. Select the GRS/GMU Calibration page on the PFD. The GRS/GMU Calibration page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence: 9, 10, 11, 12.
4. Press the FMS small knob to highlight GRS1. Press the ENTER key. The SELECT PROCEDURE field is flashing. The FMS small knob can now be used to select which calibration/validation procedure to run.
5. Select PITCH/ROLL OFFSET, then press the ENTER key. If the PITCH/ROLL OFFSET selection is still flashing, press the ENTER key again.
6. Follow the checklist items displayed on the PFD and press the ENTER key as each one is completed or confirmed. When the CALIBRATE field is flashing, press the ENTER key to begin the procedure.
7. After several seconds, a new checklist appears in the lower half of the PFD. Press the ENTER key as each item is confirmed. When the CONFIRM AIRCRAFT IS LEVEL field is flashing, press the ENTER key to continue.

8. 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.

9. Press the ENTER key on the PFD to conclude this procedure.

7.6.2 Calibration Procedure A-2: Zero Pitch/Roll Offsets by Manual Entry

NOTE
Procedure A-2 requires a unique passcode that is not listed here. Contact Garmin for the passcode.

1. Enter configuration mode (refer to *Section 2.3.5* as needed).

2. Select the GRS/GMU Calibration page on the PFD. The GRS/GMU Calibration page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence: 9, 10, 11, 12.

3. Press the FMS small knob to highlight GRS1. Press the ENTER key. The SELECT PROCEDURE field is flashing. The FMS small knob can now be used to select which calibration/validation procedure to run.

4. Select PITCH/ROLL OFFSET, then press the ENTER key. If the PITCH/ROLL OFFSET selection is still flashing, press the ENTER key again. Contact Garmin for the passcode.

5. Follow the checklist items displayed on the PFD and press the ENTER key as each one is completed or confirmed.

6. When the PASSCODE field is flashing, enter the appropriate pass-code by using the FMS small knob to change the value of the first digit and the FMS large knob to move to the next digit of the pass-code. Press the ENTER key when finished entering the pass-code.

7. When the CALIBRATE field is flashing, press the ENTER key to begin the procedure.

8. After several seconds, additional instructions appear in the lower half of the PFD and the PITCH OFFSET FIELD will be flashing.

9. Enter a pitch offset value of exactly 0.00 using the FMS small and large knobs as described above.

10. Press the ENTER key when finished with the pitch offset. The ROLL OFFSET field is now flashing.

11. Enter a roll offset value of exactly 0.00 using the FMS small and large knobs as described above.

12. Press the ENTER key when finished with the roll offset.

13. When the RECORD OFFSETS field is flashing, press the ENTER key to complete data entry.

14. 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 then returns to normal operation.

15. Press the ENTER key on the PFD to conclude this procedure.

7.6.3 Calibration Procedure B: Magnetometer Calibration

NOTE

With a dual GRS installation, it is preferable to calibrate the #1 & #2 GMUs at the same time by selecting GRS #1 on the PFD & GRS #2 on the MFD. Calibrating both GMUs at the same time and at the same location reduces the possibility of having HDG splits between the #1 & #2 systems.

NOTE

Calibration Procedure A-1 or A-2 must be successfully completed before Calibration Procedure B. If either Calibration Procedure A-1 or A-2 is repeated, then Procedure B must also be repeated.

NOTE

Calibration Procedure B must be carried out at a location that is determined to be free of magnetic disturbances, such as a compass rose. Attempting to carry out this maneuver on a typical ramp area will not yield a successful calibration. The accuracy of the AHRS cannot be guaranteed if this calibration is not performed at a magnetically clean location. A method for evaluating the magnetic disturbances at a candidate site is described in Section 7.6.7.

Taxi the aircraft to a site that has been determined to be free of magnetic disturbances. Ensure there are no nearby magnetic materials on or near the perimeter of the site. If unavoidable, maneuver the aircraft to keep the magnetometer from passing within twenty feet (6.1 meters) of such objects. Additionally, ensure vehicles or other aircraft are an adequate distance [forty feet (12.2 meters)] away from the aircraft under test.

At the site, align the aircraft to a heading of magnetic north (±5°). The aircraft should be positioned to enable clockwise turning around the compass rose. For fixed-wing aircraft, it is best to offset the aircraft position to the left (west) of the North/South axis (see *Figure 7-5*).

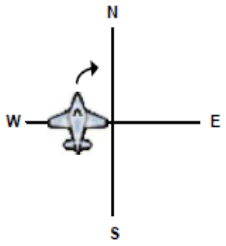

Figure 7-5. Fixed Wing Aircraft Position Example

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

1. Enter configuration mode (refer to *Section 2.3.5* as needed).
2. Select the GRS/GMU Calibration page on the PFD. The GRS/GMU Calibration page is protected and requires a keystroke password to perform the calibration. Press the following softkeys in sequence: 9, 10, 11, 12.
3. Press the FMS inner knob to highlight GRS1 and press the ENT key.
4. After selecting GRS1, the SELECT PROCEDURE field will begin flashing.
5. Using the FMS small knob, select MAGNETOMETER and press the ENTER key. If the MAGNETOMETER selection continues to flash, press the ENTER key again.
6. Follow the checklist items displayed on the PFD and press the ENTER key as each one is completed or confirmed. When the CALIBRATE field is flashing, press the ENTER key to begin the procedure.
7. The PFD advises the operator when to turn the aircraft, when to stop, and when to turn again.
8. 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 might 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 degress). 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 if stations are skipped, at least a minimum of 2 stations per quadrant are completed. Thus, it might 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.

9. Repeat the turn-and-stop process until the PFD instructs the operator a successful calibration is complete.

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

NOTE

A magnetometer calibration failure is indicated by a Calibration Error message. In the event of a failure, make sure the installation passes the Magnetometer Interference Test, check the relative orientation of the GRS 77 relative to the GMU 44, and (if needed) move the aircraft to a different location and attempt the magnetic calibration again.

7.6.4 Calibration Procedure C: Heading Offset Compensation

Calibration Procedures A and B must have been successfully completed before Calibration Procedure C can be performed. For calibration accuracy, maneuver the aircraft with assistance from outside the cockpit to precisely align the aircraft to cardinal compass heading reference lines on the compass rose.

NOTE

In order to accomplish the necessary degree of accuracy in heading alignment, it is generally required the aircraft be physically towed by hand. Towing tugs should not be used as they distort the magnetic field in their vicinity.

1. If the PFD is not displaying the GRS/GMU CALIBRATION configuration page, follow steps from calibration procedure A-1 listed previously.

2. The FMS small knob can now be used to select which calibration/validation procedure to run. Select HEADING OFFSET, then press the ENTER key. If the HEADING OFFSET selection is still flashing, press the ENTER key again.

3. Follow the checklist items displayed on the PFD and press the ENTER key as each one is completed or confirmed. When the CALIBRATE field is flashing press the ENTER key to begin the procedure.

4. The PFD display advises the operator when to turn the aircraft to a cardinal heading, when to stop, and when to turn to another heading. During the procedure, the operator turns to magnetic headings of 360, 090, 180, and 270 degrees, within a tolerance of ±0.25°.

NOTE

A tolerance of ±0.5° can be used if ±0.25° is not achievable.

5. Maneuver the aircraft with the longitudinal axis aligned with the desired heading line of the compass rose.

6. The operator must confirm each aircraft heading. Press the ENTER key to confirm. The CONFIRM HEADING field stops flashing.

7. The PFD informs the operator of the calibration results. Press the ENTER key on the PFD to conclude this procedure.

7.6.5 Calibration Procedure D: Engine Run-Up Vibration Test

Calibration Procedure D is required for all installations to validate the vibration characteristics of the installation. Calibration Procedures A-1 through C are not required before this procedure.

1. If the PFD is not displaying the GRS/GMU CALIBRATION configuration page, follow steps from calibration procedure A-1 listed previously.

2. The FMS small knob can now be used to select which calibration/validation procedure to run. Select ENGINE RUN-UP TEST and press the ENTER key. If the ENGINE RUN-UP TEST selection is still flashing, press the ENTER key again.

3. Follow the checklist items displayed on the PFD and press the ENTER key as each one is completed or confirmed. When the CALIBRATE field is flashing, press the ENTER key to begin the procedure.

4. The PFD display instructs the operator to gradually increase power from idle to full throttle and back to idle over the course of a couple of minutes.

5. When the operator has completed the engine run-up and the engine is back to an idle setting, press the ENTER key to indicate the process is complete. When this is done, the TEST COMPLETE field stops flashing.

6. The PFD informs the operator if the installation has passed or failed the vibration test. If the test fails, the specific measurements causing the failure are identified

and numeric values are displayed on the PFD. Use the FMS small knob to scroll through and view the entire list of failed measurements.

7. If failures are indicated, the engine run-up test can be repeated up to three times. If the test does not pass after three attempts, the installation should be considered unreliable until the source of the vibration problem is identified and remedied.

8. When the engine run-up test fails repeatedly, record the values that are reported to be out of range for future reference.

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

   - Excessive flexibility of GRS 79 and/or GMU 44(B) mechanical mounting with respect to the airframe.
   - Vibrational motion of GRS 79 and/or GMU 44(B) caused by neighboring equipment and/or supports.
   - Mounting of GRS 79 at a location that is subject to severe vibrations (example; close to an engine mount).
   - Mounting screws and other hardware for GRS 79 and/or GMU 44(B) not firmly attached.
   - Absence of mounting supports recommended by the aircraft manufacturer
   - GRS 79 connector not firmly attached to unit.
   - Cabling leading to GRS 79 or GMU 44(B) not firmly secured to supporting structure.
   - An engine/propeller combination significantly out of balance.
   - In some aircraft, attempting the engine run-up test on a day with very strong and/or gusty winds might cause the test to occasionally fail. However, windy conditions should not be taken as evidence the test would pass in calm conditions; an actual pass is required before the installation can be considered adequate.
   - Press the ENTER key on the PFD to conclude this procedure.

7.6.6 Calibration Procedure E: Magnetometer Interference Test

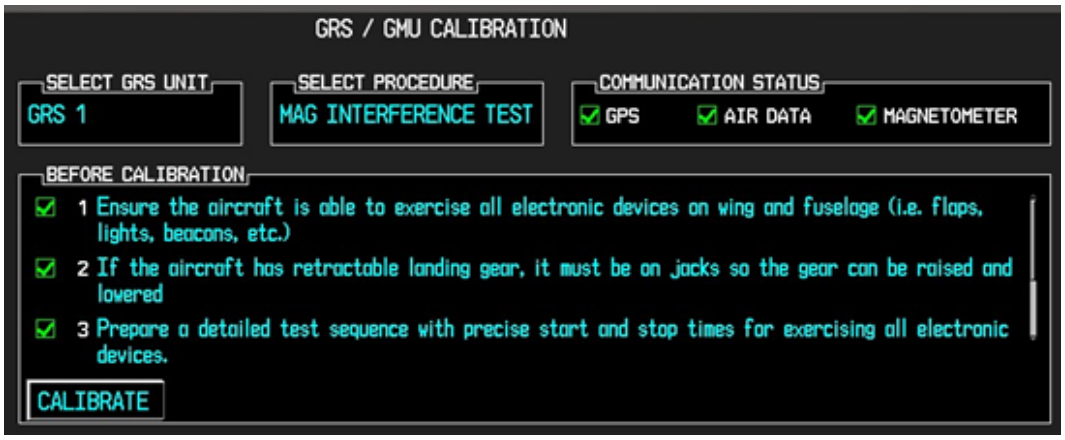

Figure 7-6. GRS / GMU Calibration Page

This procedure provides instructions for calibrating both GRS AHRS separately. It is acceptable to calibrate both GRS AHRS simultaneously by putting both PFD 1 and PFD 2 in configuration mode and following the procedure below, using PFD 1 to calibrate GRS #1 and PFD 2 to calibrate GRS #2.

NOTE

Calibration Procedure E is required for initial installation verification and should be included as part of the certification data. Furthermore, Calibration Procedure E should be performed once every 12 months on at least one production aircraft for every airframe type or model equipped with the G1000 system. This procedure validates that no electronic device is interfering with the operation of the GMU 44 magnetometer which directly impacts the determination of attitude and heading by the GRS 79 AHRS. Calibration Procedures A-1 through D are not required before the execution of this procedure.

1. Initiate the AHRS magnetometer interference test procedure by performing the following steps:

   a) Enter Configuration Mode and go to GRS/GMU Calibration page as shown in *Figure 7-6*.

   b) This page is protected and requires a keystroke password to perform this test. Press the following softkeys in sequence:

   - Softkey 9.
   - Softkey 10.
   - Softkey 11.
   - Softkey 12.

   c) Select GRS unit and press the ENT key.

d) Select MAG INTERFERENCE TEST and press the ENT key.

e) Follow the checklist items displayed on the PFD and press the ENT key as each one is completed or confirmed.

NOTE

The third item on the checklist instructs the operator to prepare a detailed test sequence list 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 44/44B magnetometer need be included in the test sequence. The list of relevant electronic devices varies from aircraft to aircraft. An example of an appropriate test sequence is given in Table 7-2.

Table 7-2. Magnetometer Interference Test Sequence Example

Elapsed Time Since Start of Test (min:sec)	Action
0:00	Test Begins
10	Aileron Full Right
20	Aileron Full Left
30	Aileron Level
40	Flaps Down
50	Flaps Up
60	Roll Trim Left
70	Roll Trim Right
80	Beacon On
90	Beacon Off
100	Strobes On
110	Strobes Off
120	Navigation Lights On
130	Navigation Lights Off
140	Landing Lights On
150	Landing Lights Off
160	Taxi Lights On
170	Taxi Lights Off

Table 7-2. Magnetometer Interference Test Sequence Example (Continued)

Elapsed Time Since Start of Test (min:sec)	Action
180	Pulse Lights On
190	Pulse Lights Off
200	Landing + Taxi Lights On
210	Landing + Taxi Lights Off
220	Turn on all wing-tip lights simultaneously (Strobe and Nav)
230	Turn off all wing-tip lights simultaneously
240	Pitot Heat On, Left and Right
250	Pitot Heat Off
260	End of Test

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

NOTE
It is important the 'time equals zero' moment corresponds with the moment the PFD first displays the flashing TEST COMPLETE message.

2. 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.

3. When the operator has completed the actions specified in the test sequence, press the ENTER key to indicate the process is complete. When this is done, the TEST COMPLETE field stops flashing.

4. 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.

5. 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 near the GMU 44 magnetometer (i.e. HID light ballasts), and 2) an existing or new electronic device has become grounded through the aircraft structure instead of using the proper ground wire in a twisted shielded pair (i.e. NAV lights).

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

7.6.7 Site Evaluation of Magnetic Disturbances for Magnetometer Calibration

As mentioned earlier in this section, the Magnetometer Calibration Procedure (Calibration Procedure B) must be carried out at a site that is determined to be free of magnetic disturbances.

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 find out 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 NXi system equipped 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 NXi system equipped airplane installation 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 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 counterclockwise. Both times, the procedure should be conducted, with the exception of the direction of turns around the site.

NOTE

Although Section 7.6.3 indicates 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 both the clockwise and counter- clockwise directions, the PFD displays the CALIBRATION SUCCESSFUL / SITE IS CLEAN message, the candidate site is sufficiently free of magnetic disturbances and is acceptable for performing the Magnetometer Calibration Procedure. It is important to perform the procedure in both the clockwise and counter-clockwise directions to ensure 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, the site contains magnetic disturbances that are too large.

NOTE

The Magnetometer Calibration Procedure must consistently report CALIBRATION SUCCESSFUL / SITE IS CLEAN in both the clockwise and counter-clockwise directions for the site to be considered acceptable. More than one failure out of ten attempts in a given direction would be sufficient reason to conclude the site is not acceptable.

A site that is used repeatedly to perform the Magnetometer Calibration Procedure should be re-evaluated every 12 months, and after any significant construction or placement of magnetic objects (above or below ground) within 50 meters of the location.

After calibration, 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 PFDs start in normal mode, the AHRS attitude and heading information displayed should become valid within one minute of system start (provided both GPS receivers have a valid position; if GPS is unavailable, AHRS initialization may take as long as 2 minutes). Test the AHRS reversionary paths by pressing the red reversionary mode button on the audio panel. Ensure that both PFDs display valid AHRS information.

7.6.8 GEA 71 High-Side Current Monitor Calibration Procedure (GEA 71 only)

1. In the aircraft

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

2. On the MFD

   a) Power on the MFD in configuration mode, select the HSCM CALIBRATION page (third page in the CAL page group).

   b) Unlock the page using the softkey sequence 2, 3, 4, 5.

   c) Select the appropriate GEA from the HSCM ENABLED GEA selection box (see *Figure 7-7*).

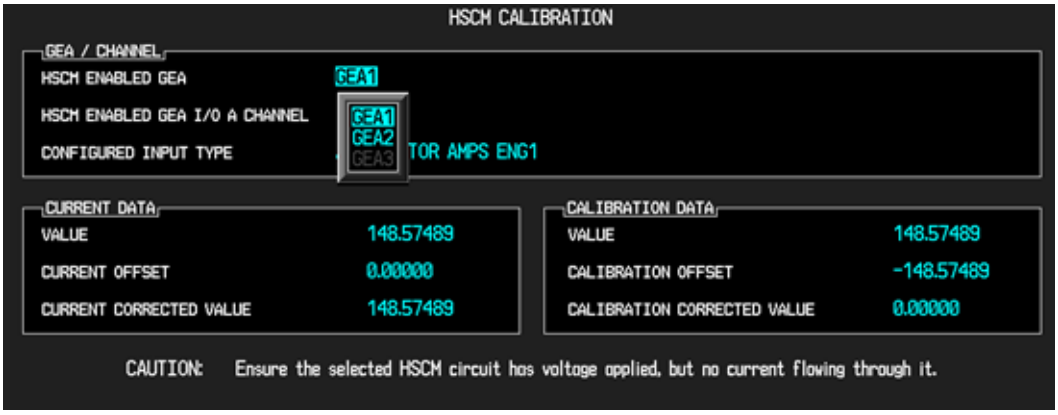

Figure 7-7. HSCM Enabled GEA Selection Box

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

   e) Check that all displayed Current and Calibration data is appropriate.

3. CURRENT DATA:

   a) VALUE -the instantaneous reading from the GEA if the current offset were zero (any calibration offset has been taken out).

   b) CURRENT OFFSET -the calibration offset that is presently loaded on the channel (this will be zero if the channel has never been calibrated).

   c) CURRENT CORRECTED VALUE - the current output of the GEA channel with the above current offset applied (essentially what would be displayed on the EIS display if the GDU was in normal mode). If the channel is calibrated

and the calibration setup is correct, this parameter should be near zero, and fluctuation should be minimal, take note of the range of fluctuation.

4. CALIBRATION DATA:

   a) VALUE -the instantaneous current reading from the GEA if the current offset were zero (any calibration has been taken out).

   b) CALIBRATION OFFSET -the instantaneous calculation of what the offset should be to properly calibrate the channel (assuming the shunt is properly set up for calibration, see Step 0).

   c) CALIBRATION CORRECTED VALUE - the output of the GEA channel if the above offset were applied (should always be zero).

   d) Press the STORE softkey, a confirmation box will be displayed.

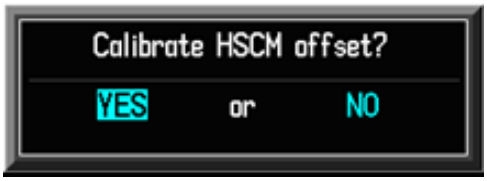

Figure 7-8. Calibrate Confirmation Box

   e) Press the ENT Key to accept the CALIBRATION OFFSET value, the instantaneous CALIBRATION OFFSET value will be stored as the CURRENT OFFSET.

   f) The G1000 NXi will now recheck the GEA configuration (this may take several minutes). During this time the box shown in *Figure 7-9* will be displayed. Do not perform any actions until this is complete.

Figure 7-9. Configuration Verification Processing

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

Figure 7-10. Configured Confirmation Box

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

7.7 GDC 72 Air Data Computer

After software and configuration have been loaded to a replacement GDC, test per the procedures in the OEM approved Aircraft Maintenance Manual.

NOTE
The GDC will not provide valid outputs until the aircraft post installation calibration procedures are completed.

7.8 GDL 69A SXM Testing

NOTE
The use of an external power cart is optional in order to prevent the aircraft battery from discharging to a critically low level.

1. Move the aircraft outside and ensure there is an unobstructed view of the southern sky.
2. Attach a ground power cart to the external power connector on the aircraft and apply power.
3. Power on all systems and allow two to four minutes for initialization.
4. Make sure the displays and the audio processor are connected and operating properly.
5. Make sure the circuit breaker for the GDL 69A SXM is closed.

6. If an XM Satellite Radio subscription has already been activated for the GDL 69A SXM, then start the system and select the XM Information Display and make sure the GDL 69A SXM is working properly. Especially check for the presence of weather products and radio signal strengths.

7. After ensuring all GDL 69A SXM interfaces to external equipment are working correctly, a brief EMI/RMI check must be conducted. This check will verify the GDL 69A SXM does not produce unacceptable interference in other avionics systems.

   a) Open the circuit breaker for the GDL 69A SXM.

   b) Start the aircraft engine(s) and switch to aircraft power.

   c) Turn on all avionics except the GDL 69A SXM.

   d) With the GDL 69A SXM circuit breaker open, make sure all existing avionics systems are functioning properly.

   e) Close the GDL 69A SXM circuit breaker.

   f) Make sure all existing avionics systems continue to function properly.

7.8.1 Audio Entertainment Testing

Entertainment audio muting occurs when aircraft radio or marker beacon activity is heard. Audio is always soft muted when an interruption occurs from these sources. Soft muting is the gradual return of audio to its original volume level. The time required for the volume to return to normal is between one-half and four seconds.

Pressing and holding the MKR/MUTE Key for three seconds switches muting of crew entertainment audio on and off. When switching, either one or two beeps are heard; one beep indicates that audio muting is enabled, two beeps indicate audio muting is disabled.

Entertainment audio muting is independent for each audio panel. Pressing the MKR/MUTE Key on one audio panel does not enable or disable entertainment audio muting on the opposite side. Entertainment audio muting is reset (enabled) when started. Passenger entertainment audio is never muted.

NOTE

This section verifies correct installation in the aircraft. It does not activate the GDL 69 XM data link radio. If the XM Radio is activated, the channel list will contain more channels than the three that are shown for a radio that has not been activated. Complete instructions for activating the XM data link can be found in Garmin document 190-00355-04 or by calling XM at 1-800-985-9200. XM service is currently only available in the U.S. and select Canadian areas. See www.siriusxm.com for coverage areas.

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

Figure 7-11. XM Radio Page

7.8.2 SIRIUS XM Weather

Make sure weather data is being displayed on the Navigation Map Page. If not, begin troubleshooting.

7.8.2.1 Displaying SiriusXM Weather on the Navigation Map Page

1. Press the MAP Softkey.
2. Press the NEXRAD or XM LTNG Softkey to display the desired weather.
3. Press the applicable softkey again to remove weather data from the Navigation Map Page. Ensure Weather Data is being displayed on the Weather Data Link Page. If not, begin troubleshooting.

7.8.2.2 Displaying Weather on the Weather Data Link Page

1. Turn the large FMS Knob to select the Map Page Group.
2. Turn the small FMS Knob to select the Weather Data Link Page.
3. Select the available softkeys to select the desired SiriusXM Weather product.
4. Press the LEGEND Softkey to view the legends for the selected products. If necessary, turn either FMS Knob to scroll through the list.
5. Press the small FMS Knob or the ENT Key to return to the map.

7.9 GTS Testing

Figure 7-12. GTS Test Softkey

7.9.1 TAS Test on the MFD Traffic Page

1. Turn ADS-B softkey off (this will allow the Test softkey to become active).
2. Press the test softkey.
3. Make sure TAS targets are shown on the traffic map and ‘TAS system test passed’ is heard over the audio speakers and crew headsets.

NOTE

Following the TAS test, the ADS-B traffic system test is performed. Depending on the GPS status, the ‘Traffic system Passed/failed?’ will be heard. Refer to ADS-B traffic system testing.

7.9.2 GTS Ground Test Procedure

Use a ramp tester such as a TIC TR220 or equivalent to make the following setup and measurements.

1. The Ground Test mode can be set by starting PFD1 in configuration mode, and the MFD and PFD2 in normal mode. Navigate to the AIRCRAFT CONFIGURATION page in the SYSTEM folder group on PFD1. Press the GND Test Softkey. Pull the PFD1 circuit breaker, wait a few seconds for it to power down completely, and push back in to put PFD1 in normal mode. Once the system is back up, ensure the transponder is now in Altitude mode (the text '1200 ALT' is displayed in green text.

2. Disable ADS-B traffic (the GTX transponder is the traffic boss and will not show TAS traffic if it is not in air mode. TAS traffic will be shown if the ADS-B traffic is failed). There are two methods to disable ADS-B traffic, either can be used

3. Disable ADS-B traffic by covering the GPS antennas to lose the GPS signal. This is the recommended method. Another is to install an air data test set, with an altitude of 10,000 and 150 Kts of airspeed.

4. Press the Test softkey.

5. Use a ramp tester such as a TIC TR220 or equivalent to make the following setup and measurements.

6. Position the test set directional antenna with a clear line of sight to the GTS Processor antenna at 90 degrees.

7. With the GTS powered up and in TAS STBY mode (TAS STBY softkey is displayed in green), press the TAS OPER softkey (green indication).

8. Select the following scenario:

   - Intruder Type-ATCRBS Intruder Start Distance-10 NM.
   - Intruder Start Altitude-10,000 ft Vertical Speed-0 fpm.
   - Velocity-150 Kts.

9. Initiate the intruder scenario and make sure the following occurs:

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

NOTE

The air/on-ground mode logic mutes the aural TA while GSL altitude is below 400 ft.

7.9.3 GTS 800 Antenna Functional Check

NOTE

The GTS 800 must be in Ground Test mode to perform antenna verification testing.

NOTE

If an IFR 6000 ramp tester is used with a GTS 800, the IFR 6000 can be configured for a distance that is 4 times the actual distance. For example, if the ramp tester is located 10 ft away from an aircraft, the IFR 6000 should be configured as if it were 40 ft. away from the aircraft. This will adjust the MTL setting of the IFR 6000 so it will see the GTS 800 low power interrogations and reply to the interrogations.

1. The first step in antenna verification is to make sure auto-calibration operates without indicating a fault.
2. With the GTS powered up and the TAS STBY softkey indicated green on the MFD, press the TAS OPER softkey. Each time the GTS Processor transitions between these modes, a self-test of the antenna circuit is initialized. If the antenna connection is not correct the MFD will display ‘Failure’ indicating it will be necessary to recheck the antenna coaxial connections. If the MFD displays Operate without indicating a fault, proceed to the next step of antenna verification.
3. Using a ramp tester, such as a TIC TR220 or equivalent, make the following set up and measurements to ensure the antenna is properly connected and the GTS is operational.
4. Position the test set directional antenna with a clear line of sight to the GTS antenna.
5. Ensure the transmitter or receiver (RX/TX) under test is significantly closer to the ramp tester than another operating RX/TX, or erroneous and inaccurate results may occur. All four quadrants (forward, starboard, aft, and port) will be similarly tested to check bearing of simulated intruder supplied by the ramp tester are correctly displayed on the MFD.
6. Using the ramp tester, select the proper antenna gain and distance to aircraft.
7. Position ramp test set at 0 degrees.
8. Turn on the test set.

9. Connect the directional antenna to the ramp test set.
10. Set the multifunction test set to perform TCAS testing. Press the TAS OPER softkey on the MFD.
11. Program a static intruder per the following scenario:

NOTE

Refer to the ramp test set operators manual to set the following parameters:

- Intruder Start Distance-2 NM Intruder Start Altitude-50,000.
- Vertical Speed-0 fpm Velocity-0 Kts.

12. Set the intruder type as ATCRBS.
13. Ensure a target is annunciated on the MFD at the correct bearing of approximately 0 degree azimuth at 2 NM and co-altitude (read as 00 above a filled diamond indicating proximate traffic).
14. Toggle intruder traffic to standby or off.
15. Reposition ramp test set and directional antenna to a starboard position of 90 degrees.
16. Reengage the same intruder scenario as above.
17. Verify a target is annunciated at the correct bearing of approximately 90 degree azimuth at 2 NM and co latitude.
18. Toggle intruder traffic to standby or off.
19. Reposition ramp test set and directional antenna to an aft position of 180 degrees.
20. Reengage the same intruder scenario as above.
21. Verify a target is annunciated on the MFD at the correct bearing of approximately 180 degree azimuth at 2 NM and co-altitude.
22. Toggle intruder traffic to standby or off.
23. Reposition ramp test set and directional antenna to a port position of 270 degrees.
24. Reengage the same intruder scenario as above.
25. Verify a target is annunciated on the MFD at the correct bearing of approximately 270 degree azimuth at 2 NM and co-altitude.
26. Toggle intruder traffic to standby or off.

27. If the bearing is not as anticipated, recheck the antenna coaxial connections by verifying the following:

    - QMA connectors are 'snapped' firmly in place.
    - Connections are made to the proper channels and color-coded heat shrink is the same color on both ends of cable QMA connectors are correctly installed on cables.
    - Correct antenna type is selected in the configuration.

NOTE

If multiple targets are displayed during the antenna tests, recheck the antenna coaxial connections.

7.10 GWX Processor Testing

Perform an operational check by pressing each softkey on the Map-Weather Radar Screen (MFD-normal mode) for the proper operation of each function (see *Figure 7-13*). Ensure no abnormal or non-working annunciations or messages are displayed on the MFD Weather Radar Screen when testing each softkey. Refer to the Kodiak Pilot's Guide for a complete description of the GWX features and operation using the softkeys.

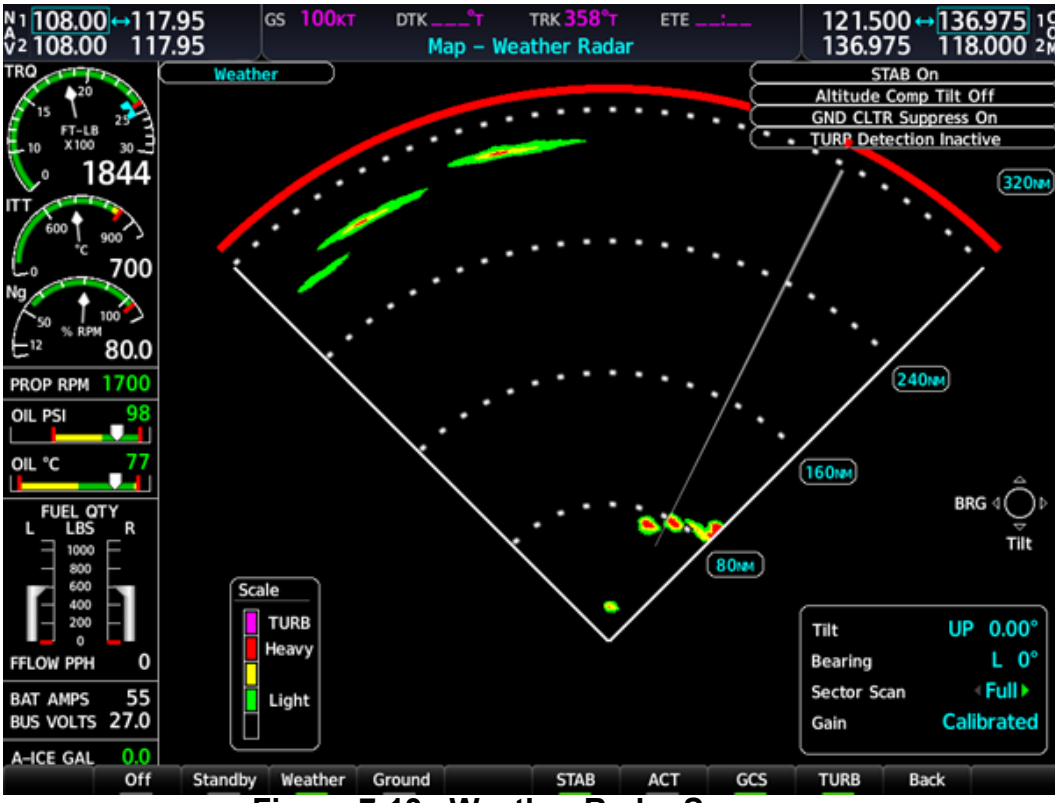

Figure 7-13. Weather Radar Screen

7.10.1 GWX Processor Pitch and Roll Trim Adjustments

NOTE

Whenever any configuration is changed in this manual, confirm the configuration so the system does not display configuration error messages.

The following procedure assumes the correct configuration files have been loaded to the GWX.

1. Select the GWX configuration page.

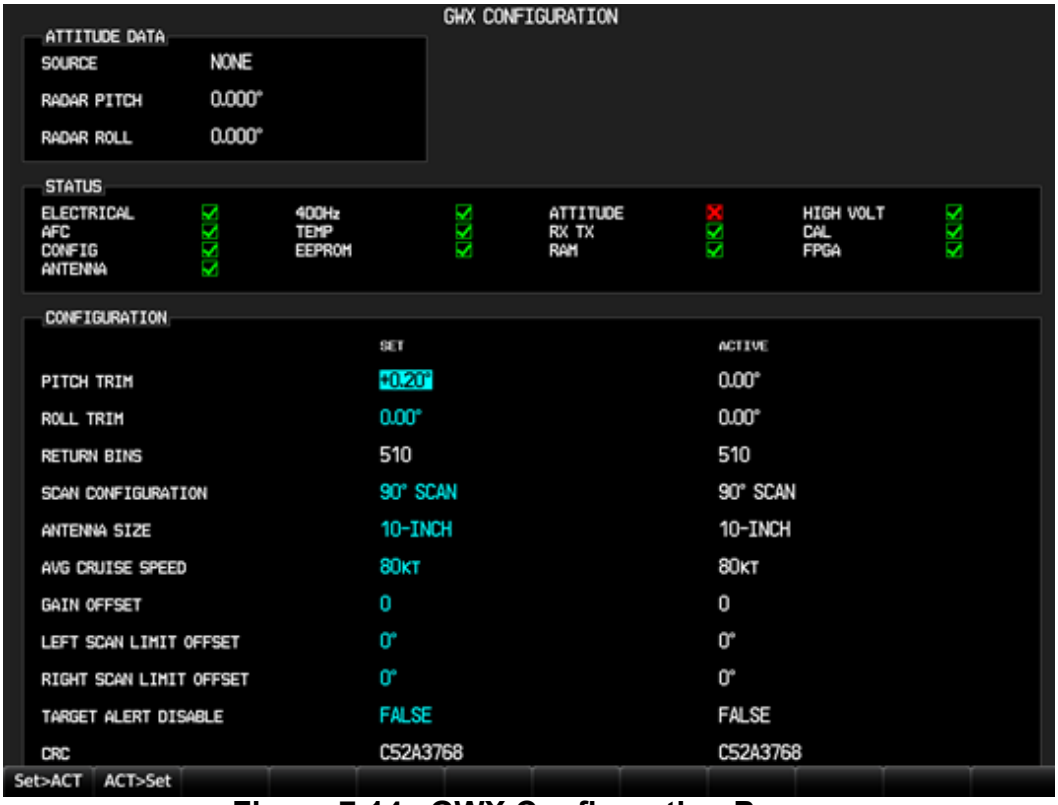

Figure 7-14. GWX Configuration Page

2. Press the FMS knob. The Pitch Trim field is highlighted.
3. Turn the small FMS knob and select the desired Pitch Trim value. The value must be between minus 4.00 and plus 4.00.
4. Press ENT. The GWX is configured to the new settings.

Figure 7-15. GWX Configuration Complete Prompt

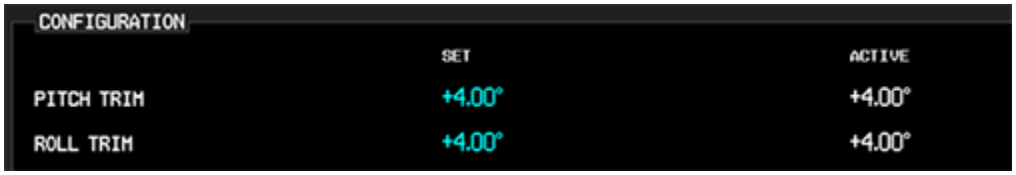

Figure 7-16. GWX Configuration Complete (Set = Active)

7.11 GFC 700 TESTING

The following procedure will make sure the proper operation of the GFC 700 AFCS. The technician performing these checks must be thoroughly familiar with the GFC 700, refer to the Garmin G1000 Kodiak 100 Pilot's Guide.

7.11.1 Preflight Test

1. If selected ON, select the MASTER and AVIONICS MASTER PWR switches to OFF. After 30 seconds select the MASTER and AVIONICS MASTER PWR switches to ON. Ensure the GFC 700 begins an automatic pre-flight test after AHRS and ADC parameters become valid.
2. Make sure a white 'PFT' annunciation is displayed on PFD1 and PFD2.

NOTE

A momentarily red AFCS annunciation displayed before PFT starts is acceptable

3. Upon successful completion of the test, an aural alert will sound, and the annunciation will clear. The aural alert is generated by either GIA1 or GIA2, alternately, with each system start. Thus, the PFT sequence must be run twice to verify both GIA units are providing the correct aural alert.

4. Repeat steps 1-3 to test the second GIA.

NOTE

If the 'PFT' annunciation turns red, the test has failed. Refer to the System Maintenance Manual for troubleshooting.

7.11.2 AFCS Switch Checks

Verify the AFCS system buttons and switches are operating correctly by performing the following:

1. Actuate both sections of the PITCH TRIM (NOSE UP/NOSE DN) switch to activate Manual Electric Pitch Trim (MEPT). Verify the trim clutch engages and the trim wheel drives in the requested direction. Check operation in both the up and down direction.

2. While actuating both sections of the manual electric pitch trim switch, press and hold the AP DISC TRIM INTRPT switch. Verify the trim stops and the trim wheel turns freely when moved manually. Release the AP/YD DISC TRIM INTRPT button and PITCH TRIM switch.

3. Engage the autopilot by pressing the AP key on AFCS mode controller. Press and hold the left section of the manual electric pitch trim switch. Verify the Autopilot disengages normally with an aural alert and the trim wheel turns freely when moved manually.

4. Engage the autopilot again by pressing the AP key on the AFCS mode controller. Verify the pitch and roll clutches engage and resist movement of the control yoke. Press and hold the CWS switch and verify the control yoke moves freely when moved manually. Verify the green AP at the top of PFD1 and PFD2 is replaced by a white CWS.

5. Release the CWS switch and press the 'XFR' key on the AFCS mode controller. Verify the clutches are engaged and resist movement of the control wheel. Press and hold the CWS switch and verify the control yoke moves freely when moved manually. Verify the green AP at the top of PFD1 and PFD2 is replaced by a white CWS.

6. Release the CWS switch and press the AP/YD DISC TRIM INTRPT switch on the pilots control wheel. Verify the autopilot disengages with a flashing amber 'AP' and YD annunciation on PFD1 and PFD2, accompanied by an aural alert. Verify the control wheel is free in pitch and roll and the rudder pedals also move freely.

7. Engage the autopilot again by pressing the AP key on the AFCS mode controller. Open AUTO PILOT circuit breaker. Verify the autopilot disconnects and the abnormal disconnect is provided, consisting of a continuous aural alert and a flashing red/white AP annunciation. Verify no AFCS annunciations (e.g. AFCS, PFT, Mistrim) remain on PFD1 or PFD2. Close the AUTO PILOT circuit breaker to restore power to the system and then press the AP/YD DISC TRIM INTRPT switch to cancel the abnormal alert. Wait for completion of the pre-flight test sequence.

8. Engage the autopilot again by pressing the AP key on the AFCS mode controller. Ensure the autopilot is coupled to GIA1 by verifying the arrowhead next to the XFR key on the AFCS mode controller is pointing to the pilot's side. If the arrowhead points to the copilot's side, press the XFR key. Open NO 1 GPS NAV circuit breaker. Verify the autopilot disconnects with a continuous aural alert and a flashing red/white AP annunciation. Press the AP/YD DISC TRIM INTRPT switch to cancel the alert and annunciation. Close the NO 1 GPS NAV circuit breakers and wait for completion of the pre-flight test sequence. Repeat this test with the NO 2 GPS NAV circuit breaker.

9. Press the XFR key on the AFCS mode controller and engage the autopilot by pressing the AP key on the AFCS Mode Controller. Press the AP/YD DISC TRIM INTRPT switch on the pilot side to disconnect the autopilot; verify the flashing amber AP and YD alerts are displayed on PFD1 & 2.

10. Press the GO AROUND button on the left throttle. Verify 'TO' is annunciated on PFD1 and PFD2 for both PITCH and ROLL modes and the FD command bars show 9 ±1° degrees nose up and wings-level.

11. Press the Flight Director (FD) key on the AFCS mode controller to deactivate the GA mode. Press the AP key to engage the autopilot. Press the CWS button for a minimum of 5 seconds and release; verifying there is no residual force on the control wheel.

12. Disengage the autopilot by pressing the AP/YD DISC TRIM INTRPT switch. Engage VS mode by pressing the VS key on the AFCS mode controller. Verify PFD1 and PFD2 display 'VS' in green and indicates a vertical speed reference of '0 FPM'.

13. Press the ALT key on the AFCS mode controller and verify the ALT annunciation is displayed in green on PFD1 and PFD2 with an altitude reference equal to the aircraft altitude (within the nearest 20 feet).

14. Press the FD key and verify the mode annunciations and command bars are removed from both PFDs.

7.11.3 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 AFCS mode controller.
2. Manually overpower the autopilot clutches in pitch, roll and yaw. If the Autopilot clutches cannot be overpowered, check the GSM 86 clutch cartridges. Refer to the servo installation drawing as applicable.
3. Actuate and hold PITCH TRIM switch in either the NOSE UP or NOSE DOWN direction to disconnect the autopilot. While the trim is running, restrain the aircraft pitch trim wheel and verify the trim clutch can be overpowered. If it cannot be overpowered, check the GSM 86 clutch cartridge. Refer to the pitch trim servo installation drawing.
4. Engage the autopilot by pressing the AP key on the AFCS mode controller. Actuate and hold the manual electric trim switch in either the up or down direction to disconnect the autopilot. Verify the trim wheel moves smoothly in both directions throughout the entire trim range during manual electric trim operation. If the trim wheel hesitates, this may indicate the pitch trim clutch is slipping, and proper clutch cartridge and cable tension should be verified. Refer to the System Maintenance Manual. If both clutch cartridge and cable tension are within tolerance, check the aircraft pitch trim system for excessive friction.

7.11.4 Manual Electric Trim Speed Check, Pitch Trim

1. Run MANUAL ELECTRIC PITCH TRIM in one direction until it runs against the mechanical stop.
2. Run the trim in the opposite direction, and using a stop watch or equivalent device, time the trim speed to the opposite mechanical stop. Verify the elapsed time for full travel measures 26 ±3 seconds.

7.11.5 HDG, CWS and NOSE UP/DN Wheel Check

1. Engage the Autopilot by pressing the AP key on the AFCS mode controller. Push the HDG knob to synchronize the heading bug to the current aircraft heading. Select HDG mode by pressing the HDG key on the AFCS mode controller. Verify the command bars are level and the control wheel are stationary. (There may be some roll motion in the yoke if the aircraft is not perfectly level).

2. Turn the HDG knob to the left and right and verify command bars move in the correct direction and the control wheel follows the command bars.

3. Push and hold the CWS button and pull the control wheel to the center of the pitch control range. Release the CWS button. Verify the autopilot clutches re-engage and hold the wheel stationary.

4. Holding the control yoke lightly, turn the NOSE UP/DN wheel on the AFCS mode controller two clicks UP to increase the pitch reference. Verify the command bars move up 1 degree and the control wheel begins moving aft.

5. While holding the control wheel firmly, press and hold the CWS button to re-synchronize the pitch reference. Re-center the control wheel to wings level and mid-range elevator travel. Release the CWS button and check that servo clutches re-engage before releasing the control wheel.

6. Turn the NOSE UP/DN wheel on the AFCS mode controller two clicks DOWN to decrease the pitch reference. Verify the command bars move down 1 degree and the control wheel begins moving forward. Hold the controls and press CWS to re-center the command bars and stop control wheel movement.

7. With the Autopilot still engaged and the CWS button pressed, move the control wheel to its aft limit. Release the CWS button and apply continuous forward pressure, slowly moving the control wheel. After a brief delay, verify the trim wheel begins moving in a trim up direction.

8. Grip the control wheel and press the CWS button. Verify trim motion stops. Move the control wheel to the forward limit and release the CWS button. Slowly move the control wheel aft. After a brief delay, verify the trim wheel begins to trim down. Relieve pressure on the wheel and verify the trim motion stops. Verify the trim wheel is free to turn. Hold the control wheel and press the AP DISC TRIM INTRPT switch to disconnect the autopilot.

7.11.6 ESP Functional Check

1. Apply power to the aircraft and avionics systems by placing the aircraft MASTER and AVIONICS MASTER switches to ON. Ensure the G1000 NXi and components are powered and operating normally.
2. Verify the DISPLAY BACKUP buttons on the audio panels are pushed in so the GDUs will not operate in reversionary mode.
3. Verify no AHRS, ADC, Autopilot, PFD, AFCS Mode Controller, GCU alert messages or monitor flags (HDG MISCOMP etc.) are present on PFD1 or PFD2.
4. On the GMC 710 couple the Flight Director to the left side by pressing the XFR button. The arrow that is illuminated indicates which side is coupled. No flight director modes should be active at this time.
5. On the MFD, turn the inner FMS knob to activate the AUX - SYSTEM SETUP page on the MFD.
6. On the MFD AUX - SYSTEM SETUP page press the SETUP 2 softkey.
7. Make sure that on the MFD SETUP 2 page there is a window for Stability & Protection and the status is ENABLED.
8. Verify on PFD 1 and PFD 2 that there are no ESP FAIL, ESP OFF, or ESP DEGRADE alert messages.
9. After system start and GPS satellite acquisition, make sure on PFD1 and PFD2 the ESP Roll Indexes are displayed at 45° on the roll indicator on the Attitude Display.

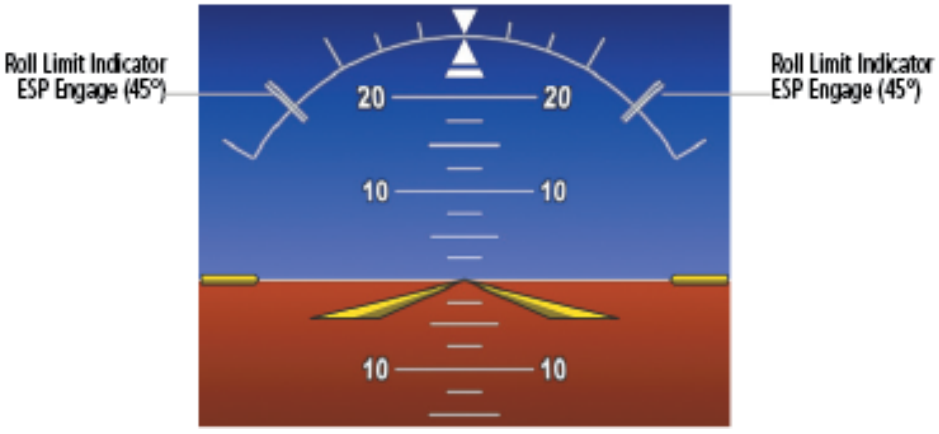

Figure 7-17. ESP Roll Engagement Indication

10. On the MFD, press the inner FMS knob to activate the cursor then turn the outer FMS knob to select the Stability & Protection window on the MFD.
11. Turn the inner FMS knob to change the status to DISABLED.

12. Make sure the status on the MFD SETUP 2 page Stability & Protection window is DISABLED.

13. Make sure on PFD 1 and PFD 2 the ESP Roll Indexes are not displayed at 45° on the roll indicator on the Attitude Display.

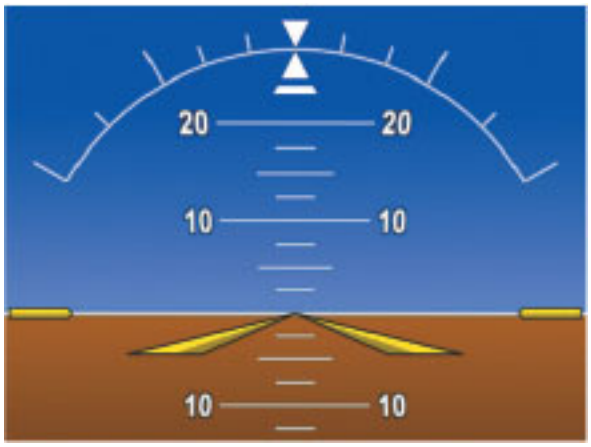

Figure 7-18. No ESP Roll Engagement Indication

14. Make sure on PFD 1 and PFD 2 that there is an ESP OFF alert message (Press Softkey 12).

15. On the MFD, turn the inner FMS knob to activate the AUX - SYSTEM SETUP page.

16. On the MFD AUX - SYSTEM SETUP page press the SETUP 2 softkey.

17. Verify that on the MFD SETUP 2 page there is a window for Stability & Protection and the status is ENABLED. Verify on PFD 1 and PFD 2 that there are no ESP FAIL, ESP OFF, or ESP DEGRADE alert messages.

18. Once AFCS PFT is complete and GPS has acquired satellites, verify on PFD1 and PFD2 the ESP Roll Indexes are not displayed at 45° on the roll indicator on the Attitude Display.

19. On the GMC 710, couple the Flight Director to the right side by pressing the XFR button. The arrow that is illuminated indicates which side is coupled. No flight director modes should be active at this time.

NOTE

On system start the coupled side will default to the left side. Each time power is reapplied couple back to the right side and continue test steps.

20. Repeat step 1 thru 19 while coupled to right side.
21. Remove power to the aircraft and avionics systems by placing the aircraft MASTER and AVIONICS MASTER switches to OFF.
22. Wait ~ 1 minute before re-applying power for further testing as required.

7.12 Calibration Procedures

7.12.1 Trim Calibration

If the entire trim calibration procedure cannot be performed during a single power cycle, perform the last two steps in this procedure before the aircraft master power switch is turned off.

The four subsets should be indented, and the last step 7 & 8 should be 3 & 4 as follow-on to 1 & 2:

1. Select the FLAPS and TRIM CALIBRATION Page in the CAL Page Group.
2. On PDF#1, unlock the page using the softkey sequence 1, 2, 3, 4.
   a) Elevator Trim
      i) Press RESET (softkey 6). Press ENT.
      ii) Move the trim nose down all the way until it hits the stop.
      iii) Press the right-most DN softkey.
      iv) Move the trim nose up all the way until it hits the stop.
      v) Press the right-most UP softkey.
   b) Rudder Trim
      i) Press RESET (softkey 9). Press ENT.
      ii) Run trim all the way left until it hits the stop.
      iii) Press the left-most LEFT softkey.
      iv) Run trim all the way right until it hits the stop.
      v) Press the left-most RIGHT softkey.

c) Aileron Trim

i) Press RESET (softkey 12). Press ENT.

ii) Move trim all the way left until it hits the stop.

iii) Press the right-most LEFT softkey.

iv) Move trim all the way right until it hits the stop.

v) Press the right-most RIGHT softkey.

d) Flap Trim

i) Press RESET (softkey 3). Press ENT.

ii) Move the trim nose down all the way until it hits the stop.

iii) Press the left-most DN softkey.

iv) Move the trim nose up all the way until it hits the stop.

v) Press the left-most UP softkey.

vi) Select the SYSTEM UPLOAD Page in the SYSTEM Page Group.

vii) Press the UPDT CFG softkey.

viii) Press ENT.

7.12.2 Fuel Level Indication System Calibration

Both Empty Calibration and Full Calibration must be performed on every aircraft. For the following instructions, refer to *Figure 7-19* for details on the G1000NXi Fuel Calibration page.

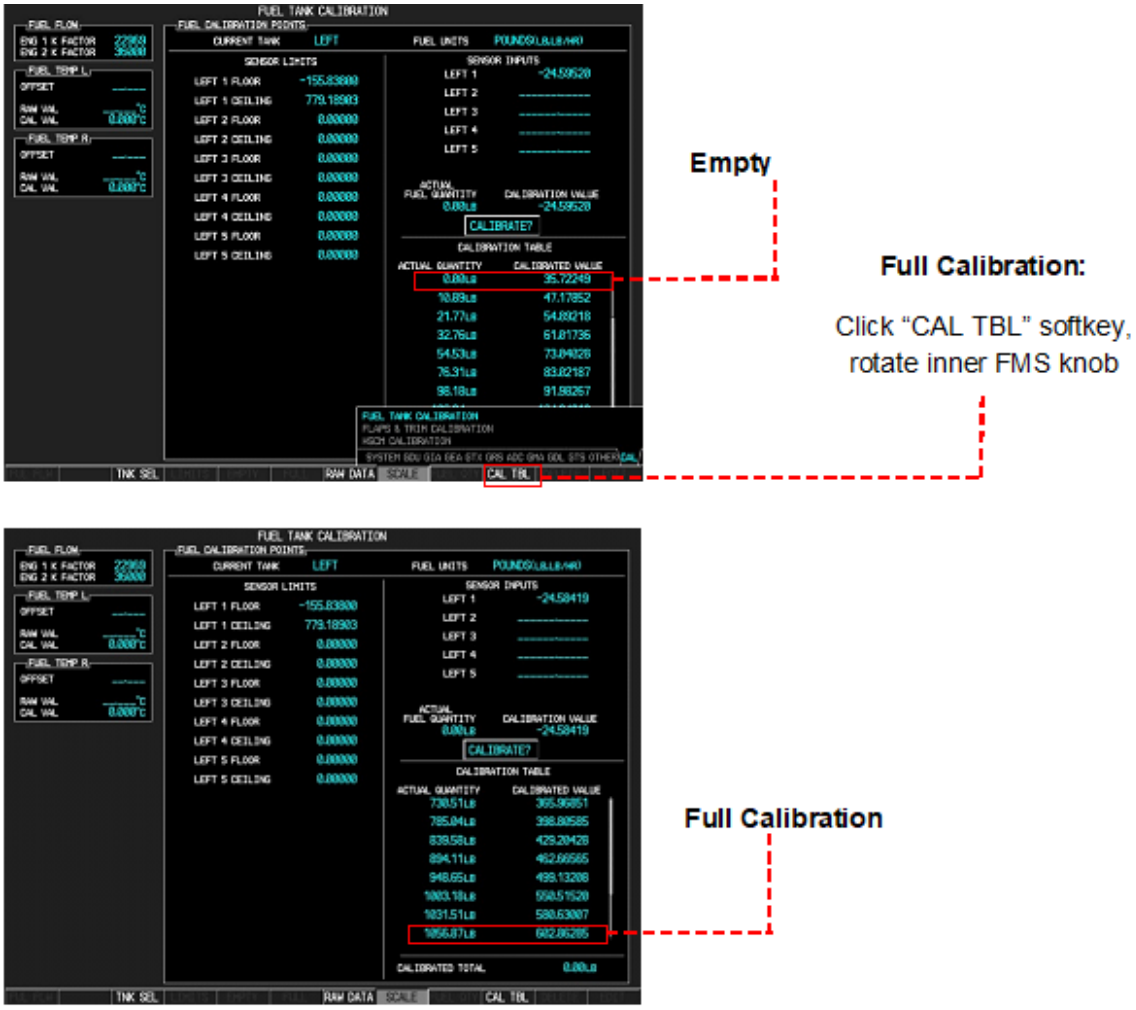

Figure 7-19. G1000NXi Fuel Calibration

7.12.2.1 Fuel Temperature Configuration

The fuel temperature sensor is integrated into the Right-Wing fuel sensor. The Fuel Temp L Offset must be set for the fuel quantity to display on the EICAS. Although the fuel temperature sensor is in the right wing the left fuel temp offset must be set to zero.

1. On PFD 1, go to the CAL page group and select the FUEL TANK CALIBRATION page.
2. Set the FUEL TEMP L OFFSET to 0.

7.12.2.2 Empty Calibration

1. Place the aircraft in a 1.0° ± 0.25° nose up and 0° ± 0.1° roll attitude, to simulate an average level cruise flight attitude.
2. Drain all fuel from each fuel tank. Turn both overhead fuel selector valves to the OFF position. Fill each wing tank with 3.25 gallons (21.8 lb.) of Jet A fuel.

NOTE
If the G1000 NXi is shut down during fuel handling, the system should be allowed to stabilize for AT LEAST three minutes before proceeding.

CAUTION
If the aircraft is on jacks assure that there is no greater than 50 gallons (345.0 lbs.) of fuel imbalance between the left and right fuel tanks at any point during this procedure.

NOTE
A continuous audible tone will sound signaling that both overhead fuel selector valves are in the OFF position. The NO. 1 and NO. 2 Audio circuit breakers may be pulled to deactivate the tone. Ensure both circuit breakers are re-activated after this procedure is completed.

3. Turn all three displays on in Configuration mode by pushing and holding the ENT key on each display, while applying display power. Release the ENT key after “INITIALIZING SYSTEM” appears in the upper left corner of the display.
4. On PFD #1, go to the CAL page group, FUEL TANK CALIBRATION page.
5. On PFD #1, enter pass code: softkeys 12, 11, 10, 9 by pressing each softkey sequentially.
6. Additional softkey labels will appear at the bottom of the display. The system will default to the LEFT tank.
7. Press the EMPTY softkey. The cursor will highlight the CALIBRATE? option.
8. Press ENT. If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgment. If prompted, select YES and press ENT. An ACTUAL QUANTITY of 0.00 lb. and a CALIBRATED VALUE will appear in the CALIBRATION TABLE.
9. Check the CALIBRATED TOTAL indication in the lower right-hand corner. Make sure it remains at 0.00 lb. ±1.0 lb.
10. Press the TNK SEL softkey and turn the inner FMS knob to select RIGHT. Press ENT.
11. Press the EMPTY softkey. The cursor will highlight the CALIBRATE? option.

12. Press ENT. If a previous CALIBRATION VALUE exists, a prompt will appear requesting overwrite acknowledgment. If prompted, select YES and press ENT. An ACTUAL QUANTITY of 0.00 lb. and a CALIBRATED VALUE will appear in the CALIBRATION TABLE.

13. Monitor the CALIBRATED TOTAL indication in the lower right-hand corner. Make sure it remains at 0.00 lb. ±1.0 lb.

14. Turn off the cursor by pressing the FMS knob, and turn the outer FMS knob to select SYSTEM page group.

15. Turn the inner knob to select SYSTEM UPLOAD page. Press the UPDT CFG softkey. A prompt appears asking to UPDATE CONFIG MODULE. Select YES and press ENT.

16. After UPDATE CONFIG COMPLETE appears, press the ENT key to select OK.

7.12.2.3 Full Calibration

1. Place the aircraft in a 2.7° ± 0.2° nose up and 0.0° ± 0.1° roll attitude, to simulate an reflect normal ground attitude.

2. Fill the fuel tanks to the bottom of the outboard filler cap with Jet A or Jet A1 fuel, ensuring the aircraft remains in a 2.7° ± 0.2° nose up and 0.0° ± 0.1° roll attitude. A full tank is defined as just enough fuel to cover the anti-siphon flapper valve with a thin (1/16" - 1/8") film of fuel.

3. Allow the system to stabilize for a minimum of three minutes.

4. If not already performed, turn all three displays on in Configuration mode by pushing and holding the ENT key on each display, while applying display power. Release the ENT key after INITIALIZING SYSTEM appears in the upper left corner of the display.

5. On PFD #1, go to the CAL page group, FUEL TANK CALIBRATION page.

6. If not already performed, on PFD #1, enter pass code: softkeys 12, 11, 10, 9 by pressing each softkey sequentially.

7. With the LEFT selected as the CURRENT TANK, press the FULL softkey. The cursor will automatically activate and select the CALIBRATE? option.

8. Press ENT. If a previous CALIBRATION VALUE exists, a prompt appears requesting overwrite acknowledgment. If prompted, select YES and press ENT. An ACTUAL QUANTITY of 1056.87 lb. and a CALIBRATED VALUE will appear in the CALIBRATION TABLE.

9. Check the CALIBRATED TOTAL indication in the lower right-hand corner. Make sure it remains at 1056.87 lb. ±1.0 lb.

10. Press the TNK SEL softkey and turn the inner FMS knob to select RIGHT. Press ENT.

11. Press the FULL softkey. The cursor will highlight the CALIBRATE? option.

12. Press ENT. If a previous CALIBRATION VALUE exists, a prompt appears requesting overwrite acknowledgment. If prompted, select YES and press ENT. An ACTUAL QUANTITY of 1056.87 lb. and a CALIBRATED VALUE will appear in the CALIBRATION TABLE.

13. Check the CALIBRATED TOTAL indication in the lower right-hand corner. Make sure it remains at 1056.87 lb. ±1.0 lb.

14. Turn off the cursor by pressing the FMS knob, and turn the outer FMS knob to select SYSTEM page group. Turn the inner knob to select SYSTEM UPLOAD page. Press the UPDT CFG softkey. A prompt appears asking to UPDATE CONFIG MODULE. Select YES and press ENT.

15. After UPDATE CONFIG COMPLETE appears, press the ENT key to select OK.

16. Reset any circuit breakers pulled during the procedure.

17. Turn the master switch to the OFF position.

18. Proceed to the Verification procedure.

7.12.2.4 Verification

1. Turn all three displays on in Configuration mode by pushing and holding the ENT key on each display while applying power. Release the ENT key after INITIALIZING SYSTEM appears in the upper left corner of the display.

2. On PFD #1, go to the CAL page group, FUEL TANK CALIBRATION page.

3. Ensure the CURRENT TANK is LEFT.

4. Ensure the FUEL UNITS to are set to POUNDS (LB, LB/HR).

5. Check the CALIBRATION TABLE in the lower right screen. Ensure the CALIBRATED VALUE at the top of the table is not -1.72000 (this is the default value). Ensure the CALIBRATED VALUE at the bottom of the table is not 602.90997. If these default values are present, the fuel system must be recalibrated.

6. Press the TNK SEL softkey and turn the inner FMS knob to select RIGHT. Press ENT.

7. Check the CALIBRATION TABLE in the lower right screen. Ensure the CALIBRATED VALUE at the top of the table is not -1.72000. Ensure the CALIBRATED VALUE at the bottom of the table is not 602.90997.

8. Turn the master switch to the OFF position.

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8 PERIODIC MAINTENANCE

This section contains basic scheduled maintenance procedures for the G1000 NXi system. Refer to the Kodiak 100 approved AMM or manual supplements for actual aircraft maintenance requirements.

8.1 Electrical Bonding Tests

Refer to the Kodiak 100 AMM for bonding tests. Bonding tests should be performed every 2000 flight hours or ten (10) years, whichever comes first.

NOTE

These bonding test tests should be performed for all of the following LRUs except for the Flight Stream 510.

8.2 GWX 70R/GWX 75 Weather Radar

Maintenance of the GWX 70R/GWX 75 is on-condition only.

8.3 GTS 800 TAS

Maintenance of the GTS 800 is on-condition only.

8.4 GDC 72 Air Data Computer Periodic Maintenance

Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) (Barometric Scale Error) are not applicable because the digital outputs of the GDC 72 are not susceptible to these types of errors. Other than periodic testing as required by 14CFR91.411 maintenance of the GDC 72 is on condition only.

8.5 GEA 71/71B Engine and Airframe Interface Unit Periodic Maintenance

Maintenance of the GEA 71/71B is on-condition only.

8.6 GMA 1347/1360D Audio Panel Periodic Maintenance

Maintenance of the GMA 1347/1360D is on-condition only.

8.7 GIA 63/64W Integrated Avionics Unit

Maintenance of the GIA 63/64W is on-condition only.

8.8 GTP 59 Outside Air Temperature Probe

Maintenance of the GTP 59 is on-condition only.

8.9 GMC 710 AFCS Mode Controller Periodic Maintenance

Maintenance of the GMC 710 is on-condition only.

8.10 GRS 79 Altitude and Heading Reference System Periodic Maintenance

Per Part 43 Appendix E, paragraph (b)(2), Garmin specifies a test procedure equivalent to Part 43 Appendix E, paragraph (b)(1) with two exceptions. The tests of sub-paragraphs (iv) (Friction) and (vi) (Barometric Scale Error) are not applicable because the digital outputs of the GRS 79 are not susceptible to these types of errors. Other than periodic testing as required by 14CFR91.411 maintenance of the GRS 79 is on condition only.

8.11 GTX 345R Transponder Periodic Maintenance

Maintenance of the GTX 345R is on-condition only.

8.12 GDL 69A SXM Periodic Maintenance

Removal and replacement of the GDL 69A SXM is on-condition only.

8.12.1 Equipment Removal and Replacement

Removal and replacement of the GDL 69A SXM is on-condition only.

8.12.2 Audio Suppression Verification

Verify each audio suppression input for proper operation. Verify the GDL 69A SXM audio to the crew headphones is muted when each connected warning alarm system is activated. When possible, activate all warning alarms at the system source. For example, the stall warning may be activated by raising the stall vane on the leading edge of the wing. The gear warning horn may be simulated by providing power or ground, as appropriate, directly to the horn; provided the horn has been tested for proper operation when a gear retraction test was performed. Check every 12 calendar months.

8.13 GDU 1050A Display Unit Periodic Maintenance

Maintenance of the GDU 1050A is on-condition only.

8.14 GSA 80/81 Servo Actuator Periodic Maintenance

There is no periodic maintenance requirement for the GSA 80 and GSA 81 Servo Actuators. Remove and replace when failed.

8.14.1 GSA 80/81 Greasing Procedure

NOTE

Grease is required if the servo has been removed for periodic inspection or maintenance. Grease is required any time the servo and servo gearbox are separated. If both servo and servo gearbox are new, grease is not required, as sufficient grease is applied to the servo gearbox during its manufacture.

NOTE

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

1. Remove each servo.
2. Remove excess grease build-up from the single servo output gear using a lint free cloth.
3. Using a brush or other applicator, apply a thin coat of grease to the servo output gear. Use Aeroshell 33MS.
4. Re-install the servos.
5. Turn control surfaces through their range of motion.

8.15 GSM 86 Servo Gearbox

8.15.1 GSM 86 Servo Gearbox

NOTE

There are two O-ring seals pressed into grooves in the back plate of GSM 86 units (except for GSM 86 part numbers 011-01904-03 and 011-01904-04, in which there are no O-ring seals in the back plate). If it is found during installation, removal, or reinstallation of a GSM 86 that either of the O-rings has become detached from the rear plate, carefully inspect the O-ring and ensure there are no cuts or any other damage. If no damage is found, reinstall the O-ring(s) in the rear plate, being careful not to stretch or compress it along its length while installing into the groove in the rear plate. If either O-ring is missing or damaged, replace with Garmin part number 251-20031-00.

8.15.2 Slip Clutch Torque Check Procedure and Servo Current Display Check

NOTE

To perform the Automatic Slip Clutch Test Procedure that follows, all G1000 NXi and GFC 700 equipment must be installed and operational.

Start the G1000 NXi in Configuration Mode and select the GFC STATUS Configuration Page. Perform the following checks:

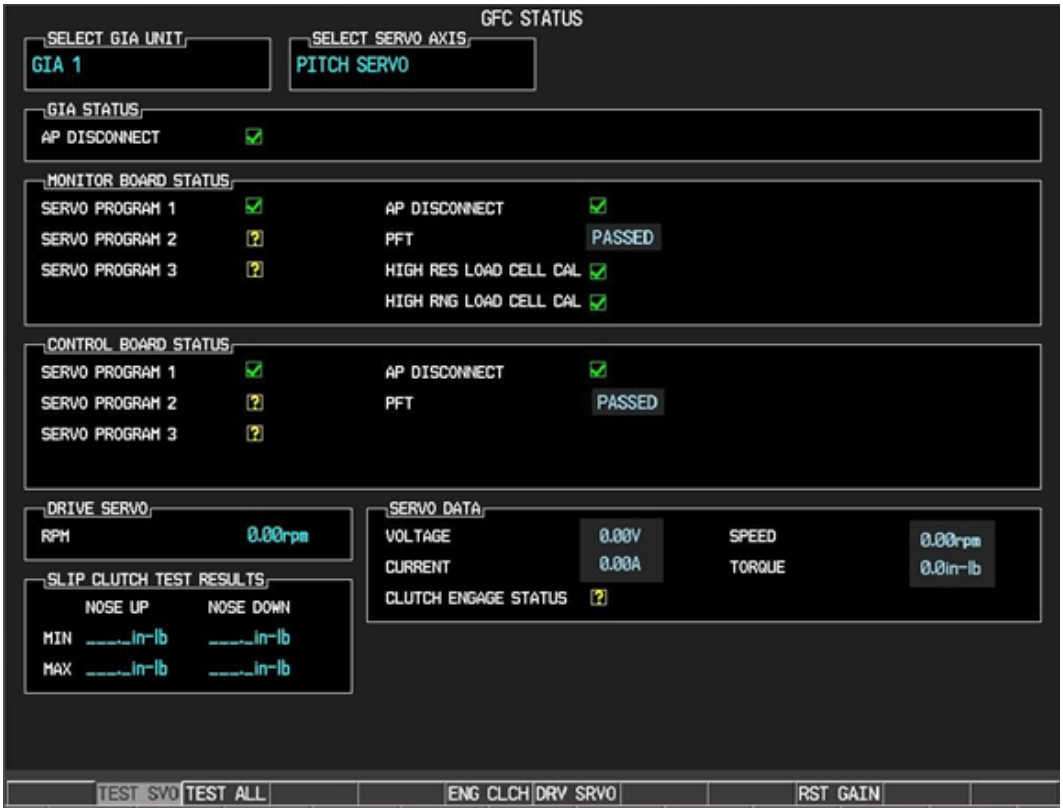

Figure 8-1. GFC Status Page

NOTE

The displayed test results on the PFD are not stored in G1000NXi memory. If power is cycled, these values will be lost. However, these test values are not lost by changing configuration mode pages.

NOTE

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

1. Use the FMS knob to select the desired servo.
2. Verify the PFT status field shows PASSED.
3. Verify the aircraft control surface to be checked is free to travel throughout its range of motion.
4. Press the ENG CLCH softkey on the PFD.
5. With the clutch engaged, take hold of the aircraft controls and manually overcome the clutch. Move the control surface to be tested from stop to stop a minimum of two times each direction.

6. Position the control surface in the neutral position (full aft position if the PITCH SERVO is selected). Press the DIS CLCH softkey

7. Press the TEST SVO softkey. Highlight YES and press the ENT key.

NOTE

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

8. The test begins, and the selected servo drives the control surface to either the NOSE UP stop (Pitch & Pitch Trim), or the LEFT stop (Roll and Yaw). If the PITCH SERVO is selected, firmly hold the control yoke in the full aft position until the NOSE UP portion of the test is completed

9. Upon reaching the control stop, the test initializes and begins a 50 second data collection period, where the servo is commanded to drive at ~2.5 rpm while the servo load cell measures clutch torque.

10. Monitor the CURRENT field and verify the current displayed is greater than zero.

11. After the data is collected and processed, the test displays the results of the first direction on the PFD. The servo immediately begins to drive in the opposite direction toward the opposite control stop. If the PITCH SERVO is selected, let the control yoke move to the full forward position

12. Upon reaching the stop, the test repeats the data collection process and displays the results on the PFD.

13. Firmly grasp the aircraft control under test and press the red AP DISC button to relieve any control tension. Press the ENT key to acknowledge the COMPLETE prompt on the PFD.

14. Record the clutch measurement values in the appropriate aircraft maintenance records.

15. Repeat this procedure for each servo axis.

16. Verify the minimum and maximum torque values measured are within the Minimum and Maximum torque values allowed, for the given axis, listed below. The minimum and maximum allowable torque values are based on nominal slip clutch settings for part number 011-02147-11 (roll and pitch trim) of 61 in-lbs. and 011-02147-13 (pitch and yaw) of 103 in-lbs. These values should be verified for equipment installed on aircraft.

NOTE

If the measured values exceed these limits, the servo must be replaced. GSM 86 settings are set at the factory and cannot be adjusted in the field.

a) Up pitch minimum allowed torque is 97.026 in-lbs and maximum is 115.360 in-lbs.

b) Down pitch minimum allowed torque is 97.026 in-lbs and maximum is 115.630 in-lbs.

c) Roll left minimum allowed torque is 57.462 in-lbs and maximum is 68.320 in-lbs.

d) Roll right minimum allowed torque is 57.462 in-lbs and maximum is 68.320 in-lbs.

e) Yaw left minimum allowed torque is 97.026 in-lbs and maximum is 115.630 in-lbs.

f) Yaw right minimum allowed torque is 97.026 in-lbs and maximum is 115.630 in-lbs.

g) Up pitch trim minimum allowed torque is 57.462 in-lbs and maximum is 68.320 in-lbs.

h) Down pitch trim minimum allowed torque is 57.462 in-lbs and maximum is 68.320 in-lbs.

17. The following prompts may be displayed indicating an abnormality during the test. Use the following guidelines to troubleshoot.

Table 8-1. Troubleshooting Table

Message Prompt	Probable Cause	Action
STOP NOT REACHED	The servo did not detect a torque value which exceeded 70% of the established mechanical torque limit within 1 minute of starting the test. A low slip clutch setting is the likely cause.	• Repeat the test. • If the same result is received, remove the servo gearbox and check/ set the clutch on the stand.

Table 8-1. (Continued)Troubleshooting Table

Message Prompt	Probable Cause	Action
SERVO TORQUE TOO HIGH	The servo detected an average torque value which exceeded 130% of the established mechanical torque limit. Likely causes include a high slip clutch setting, or excess friction encountered during the control surface travel.	• Engage the autopilot for the axis which reported torque to high. Manually operate the controls and verify the clutch can be overridden. If the clutch can slip, repeat the test again. Otherwise, remove the servo gearbox and reset the clutch. • Check control friction against aircraft maintenance specifications. • If the same result is received on retest, remove servo gearbox and check/set clutch on stand.
SERVO TORQUE TOO LOW	The servo detected an average torque value which fell below 70% of the established mechanical torque limit after detecting the stop was reached. Likely causes include a low slip clutch setting or a disturbance in the controls before reaching the stop.	• Repeat test again. If the same result is received, remove servo gearbox and check/set clutch on stand.
INVALID SERVO SPEED	The servo is unable to maintain the required ~2.5 RPM during the test (Speed drops below 2 RPM or exceeds 3 RPM).	• Repeat test again. • If the same result is received, remove servo gearbox and check/set clutch on stand.

Table 8-1. (Continued)Troubleshooting Table

Message Prompt	Probable Cause	Action
TEST SPEED FAIL	Servo has not responded to the test initialization command.	• Repeat test again. • If message does not clear, troubleshoot the servo and it's wiring for the source of the failure. • If message does not clear, troubleshoot the servo and it's wiring for the source of the failure.
SERVO TEST TIMED OUT	Servo not responding for over 60 seconds during testing.	• Repeat test again.
SERVO DATA TIMED OUT	The servo has failed to transmit load cell sensor status.	• Repeat test again. • If message does not clear, troubleshoot the servo and it's wiring for the source of the failure. • If message does not clear, troubleshoot the servo and it's wiring for the source of the failure.
LOAD CELL INVALID	A special test monitor has detected an inequality between motor torque and load cell torque greater than the specified threshold. An out-of-calibration load cell may be the cause.	• Replace servo motor and repeat test.
AIRBORNE STATUS	The G1000 NXi has detected airborne status, (determined by true airspeed) and has canceled the test.	• Verify the ADC is online. • Check pitot/static system is free of obstructions and plumbing kink. • Repeat test.

8.15.3 GSM Slip Clutch Checking and Adjustment Procedure

NOTE

Conduct a visual inspection and check slip clutches every 500 hours or 1 year.

Refer to the Daher Kodiak 100 Maintenance Manual for rigging and de-rigging instructions. For instructions on checking and adjusting the slip clutch refer to Section 3.4 of the GSA 8X/GSM 85(A) Installation Manual (P/N 190-00303-72). Refer to Section 3.3 of the GSM 86, Installation Manual (P/N 190-00303-83). The settings for the GSM 86 are listed below. The GSM 86 settings are set at the factory and cannot be adjusted in the field.

1. Part Number 011-01908-00, Roll Servo
   a) GSM 86 with 61 in-lb clutch, 1/16" spiral capstan
   b) Tolerance of ±15%
2. Part Number 011-01908-01, Pitch and Yaw Servos
   a) GSM 86 with 103 in-lb clutch, 3/32" spiral capstan
   b) Tolerance of ±15%
3. Part Number 011-01908-03, Pitch Trim Servo
   a) GSM 86 with 61 in-lb clutch, .25" pitch sprocket
   b) Tolerance of ±15%

8.15.4 Slip Clutch Override

Manually override the slip clutch as follows:

1. On the ground, with the autopilot off, check for freedom of control movement in the roll, yaw, pitch and pitch trim control axes.
2. Apply system power and start the G1000 NXi in configuration mode. Turn on AP power.
3. Select the GFC Status Page on PFD 1.
4. Engage the selected servo actuator by pressing the ENG CLCH softkey
5. Enter zero speed in the DRIVE SERVO box.
6. Press the DRV SRVO softkey. This ensures the servo actuator will hold zero speed through this check.

NOTE

This procedure will only work correctly if both are selected. False readings may be given otherwise. During the next two steps, the softkeys DIS CLCH and STP SRVO should be showing - do not select them yet.

7. Override the servo actuator slip clutch for the engaged axis by moving the control yoke through its range of motion. The controls should move, with some resistance, through their range of motion.

NOTE

It is not necessary to move each trim control through its full range of motion; it should be moved sufficiently both directions to find the slip clutch of the servo actuator is being overridden.

8. While moving the control yoke, be sure the servo motor does not turn by viewing the SPEED (speed of motor) in the SERVO DATA box as you override the slip clutch.

NOTE

The motor of the servo actuator should remain stationary as the slip clutch slips.

9. Disengage the servo actuator by selecting DIS CLCH and STP SRVO and check for freedom of movement of controls. The resistance to movement from the autopilot actuator slip clutch should not be present

10. Repeat for each control axis (roll, yaw, pitch and pitch trim).

8.16 GFC 700 Visual Inspection Procedure

Refer to the Kodiak 100 AMM.

8.17 Flight Stream 510 Wireless Transceiver Periodic Maintenance

There are no periodic maintenance requirements.

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