

GARMIN G1000 INTEGRATED AVIONICS SYSTEM - DESCRIPTION AND OPERATION**1. General**

- A. The Garmin G1000 integrated avionics system is the primary component of the navigation system on the Model 208 airplane. The Garmin G1000 core system line replaceable units (LRU)'s includes three Garmin Display Units (GDU's), and two Garmin GIA 63W/64W Integrated Avionics Units (IAU's). It is an integrated system that sends data from avionics system LRU's that is displayed on the pilot's and copilot's primary flight displays (PFD's), and the Multi Function Display (MFD). This section gives a description and operation of the G1000 software configurations, PFD, the MFD, and the Garmin GIA 63W/64W Integrated Avionics Units.

- B. The G1000 Integrated Avionics System has five principle software configurations, depending on your Aircraft Serial Number and/or Service Bulletins installed on your Aircraft. Make sure to read each section carefully for your serial number. Each software configuration uses some variants of Garmin LRU's which are NOT interchangeable with Garmin Next Generation Software (NXi) LRU software version configurations. Refer to Figure 1 Sheet 1, Figure 1 Sheet 2, Figure 1 Sheet 3, and Figure 1 Sheet 4 for LRU compatibility based on software configurations. The procedures in this Chapter are typical for the G1000 v.767.XX Family and the G1000 NXi System Software (v.2499.03, v.2499.08 or v.2499.10) configuration unless otherwise noted in this document.

NOTE: Any notation of G1000 Integrated Avionics System NXi Software Configuration (v.2499.XX) denotes cross functionality between software versions.

NOTE: Specific system software version numbers are added when there is NO compatibility across multiple versions. Read each section carefully identify the correct procedure.

NOTE: For additional information refer to the Introduction, Supplier Publication List, Caravan Line Maintenance Manual for Software Family 767.XX and Caravan Line Maintenance Manual for NXi.

- (1) G1000 Integrated Avionics System Phase 12 Software Configuration (v.767.13).
 - Cessna Model 208, Airplanes -000416, 000500 thru -000541 Incorporating CAB-34-02.
 - Cessna Model 208 Airplanes -000542 thru -000564.
 - Cessna Model 208B Airplanes -001190, -001216, -002000 thru -002261, -002263 thru -002323, -002325, 002326, 002328 thru -002357 Incorporating CAB-34-02.
 - Cessna Model 208B Airplanes -002262, -002324, -002327, -002358 thru -004999.
- (2) G1000 Integrated Avionics System Phase 13 Software Configuration (v.767.15).
 - Cessna Model 208 Airplanes -000565 thru -000581.
 - Cessna Model 208B Airplanes -005000 thru -005271.
- (3) G1000 Integrated Avionics System Phase 14 Software Configuration (v.767.23):

NOTE: This software configuration introduces the Garmin GWX 70 Weather Radar and ADS-B Out Capability with the Garmin GTX 33ES transponder.

 - Cessna Model 208, Airplanes -000416, -000500 thru -000581 Incorporating CAB-34-03 and (CAB-34-04 for ADS-B Out Capability).
 - Cessna Model 208, Airplanes -000582 thru -000600.
 - Cessna Model 208B, Airplanes -001190, -001216, 002198 thru -005271 Incorporating CAB-34-03 and (CAB-34-04 for ADS-B Out Capability).
 - Cessna Model 208B, Airplanes -002197 and -005272 thru -005400
- (4) G1000 Integrated Avionics System NXi Software Configuration (v.2499.03):
 - Cessna Model 208, Airplanes -000601 thru -000650.
 - Cessna Model 208B, Airplanes -005401 thru -005500.
- (5) G1000 Integrated Avionics System NXi Software Configuration (v.2499.08):
 - Cessna Model 208, Airplanes -000651 thru -000677.
 - Cessna Model 208B, Airplanes -005501 thru -005641.
- (6) G1000 Integrated Avionics System NXi Software Configuration (v.2499.10):
 - Cessna Model 208, Airplanes -000678 and On.
 - Cessna Model 208B, Airplanes -005642 and On.

- C. The G1000 NXi Software configuration includes the use of Garmin's Intelligent LRU replacement, optional ADS-B In

capability with the GTX-345R transponder, transaction log and card copy features. When an LRU is changed the system displays the "LRU Replacement" Alert message on the PFD/MFD. This message will persist until the LRU replacement software procedure or full configuration/baseline software upload procedure has been done. With the Configuration Manager page open, the system will display which LRU's are synchronized and which LRU's are not synchronized. Refer to Garmin G1000 Integrated Avionics System - Adjustment/Test, refer to 34-60-00, Figure 512, LRU Replacement. When the technician has completed an LRU change, the technician can return to the Configuration page to make sure the LRU is synchronized.

NOTE: Intelligent LRU replacement will only work with one LRU at a time. Replacing multiple LRU's at once will result in baseline configuration software load procedures.

NOTE: The "LRU replacement detected" message may not display if there are existing Manifest error or Configuration error messages.

- (1) The Intelligent LRU replacement is designed to reduce the amount of time required to change a Garmin NXi LRU.
 - (2) The Transaction Log is designed to log maintenance actions when loading configuration files, software and entering commands. This stores LRU location and configuration upon initial loading/installation.
 - (3) The Card Copy allows the system to store entire contents of a loader card to the GDU's internal memory. This is the content that is used to automate the Intelligent LRU software and configuration during the replacement process.
 - (4) G1000 Integrated Avionics System NXi Software Configuration (v.2499.08) upgrades utilize two GIA 63W/64W integrated avionics units, two GMA 1347/1360D audio panels and two GEA 71/71B Enhanced airframe engine interface adapters.
 - (5) G1000 Integrated Avionics System NXi Software Configuration (v.2499.08) also has an option for Garmin Flight Stream 510 (FS 510) Infotainment System.
 - (6) G1000 Integrated Avionics System NXi System Software Configuration (v.2499.10) installs a redesigned weather radar (GWX-75) and magnetometer units (GMU44B). The GWX-75 and GMU44B's are NOT backwards compatible for previous software versions.
- D. Two of the displays are configured as PFD's and one as a MFD. Each of the displays has a color Active Matrix Liquid Crystal Displays (AMLCD). The displays incorporate multiple flight instrument functions and annunciations. Additionally, the system shows the engine indicating system (EIS), the crew alerting system (CAS), and environmental control system diagnostics functions on the displays.
- E. The two GIA 63W/64W integrated avionics units function as the main communications hub, linking all the line replaceable units (LRU) with each of the two PFD's.
- F. The G1000 system and non-Garmin LRU's communicate with each other through different data bus connections. The data buses used include high-speed data bus (HSDB), RS-232, RS-485/422, ARINC-429, and Ethernet connections. The Garmin integrated avionics system also communicates with non-Garmin system LRU for display and some control functions. For a general overview of the typical G1000 system and system interconnect (Refer to Figure 1 Sheet 1, Figure 1 Sheet 2, Figure 1 Sheet 3, and Figure 1 Sheet 4).

2. Description

- A. Garmin GDU Primary Flight Display (Refer to Figure 2).
- (1) There are two PFD's installed in the airplane, one for the pilot (PFD 1) and one for the copilot (PFD 2). The PFD's are a central display and user interface for the Garmin G1000 integrated cockpit system. The PFD's are configured as an open architecture system that uses typical ARINC 429, RS-232, and Ethernet High-Speed Data Bus (HSDB) communications interfaces. The important flight data that follows is displayed on the pilot's and copilot's PFD's. The PFD's and MFD are interchangeable to each position.
 - Display of attitude (pitch and roll), rate of turn, slip/skid, heading, airspeed, altitude, and vertical speed data
 - Display of engine and airframe instrumentation (reversionary modes only)
 - Display of the Auto Flight Control System (AFCS) flight director command bars and modes
 - Display of position and ground speed for use by the pilot
 - Display of stored navigation and map databases for use by the pilot.
 - (2) The PFD's also do the functions that follow.
 - Control and display of the course deviation indicator (CDI), radio magnetic indicator (RMI), and selected heading
 - Area navigation functions that use the position, velocity and stored navigation data

- Interfaces with the Garmin GIA 63W/64W Integrated Avionics Unit and the opposite PFD
- Control and display the dual communications transceivers
- Control and display the dual VOR/ILS receivers
- Control and display the Garmin GTX-33 Mode S (G1000 v.767.XX) and GTX-33ES (Optional, G1000 v.767.23 only) or the GTX-335R and GTX-345R (Optional) for G1000 NXi System Software (v.2499.XX).

B. Garmin GDU Multi Function Display (Refer to Figure 2).

- (1) There is one GDU installed between the pilot's and copilot's PFD's, that is configured as a MFD. The MFD gives a central display and user interface for the G1000 integrated cockpit system. The MFD is configured as an open architecture system that uses typical ARINC 429, RS-232, and HSDB communications interfaces.
 - Display of moving map, weather radar data, Stormscope, Garmin GDL 69A data link weather data, and terrain proximity.
 - Display of the engine indication and crew alerting system (EICAS)
 - Display of the attitude (pitch and roll), rate of turn, slip/skid, heading, airspeed, altitude, and vertical speed data (reversionary mode only)
 - Display of the AFCS flight director command bars and modes (reversionary mode only)
 - Display of position and ground speed for use by the pilot (reversionary mode only)
 - Display of stored navigation and map databases for use by the pilot (reversionary mode only)
 - XM radio channel selection
 - Flight and trip planning
 - Control and display of the CDI, RMI, and selected heading (reversionary mode only).

C. Garmin GIA 63W/64W Integrated Avionics Unit (Refer to Figure 3).

- (1) Two Garmin GIA-63W/64W Integrated Avionics Units are installed in the cockpit, one forward of the pilot's PFD and one forward the copilot's PFD. The integrated avionics units are installed on the G1000 system racks, forward of the instrument panels. The GIA-63W/64W is a microprocessor-based input/output LRU used in the Garmin G1000 integrated cockpit system.
- (2) The GIA 63W/64W communicates with the GDU's thru an Ethernet high-speed data bus (HSDB) and with other LRUs using RS-232, RS-485/422, and ARINC 429. All configuration of this unit is performed through the GDU. This LRU gives the functions that follow:
 - Main processor that interfaces with all LRU's in the G1000 system
 - WAAS parallel GPS receiver that simultaneously tracks and uses up to 12 satellites
 - VHF COM transceiver that provides digital tuning in the range 118.000 to 136.990 MHz
 - VOR/ILS localizer receiver that provides digital tuning in the range 108.000 to 117.950 MHz.
 - ILS glideslope receiver that provides tuning from 328.6 to 335.4 MHz, paired with the frequency tuned on the VOR/ILS localizer receiver
 - Flight Director Processor with interfaces with the GFC 700 Automated Flight Control System (AFCS).

3. Operation

A. Garmin GDU Primary Flight Display (Refer to Figure 2 and Figure 3).

- (1) During system initialization, test annunciations are displayed. All system annunciations will go off, typically within one minute of start. When the system is started, key annunciator lights also momentarily come on the audio panels, the control units, and the display bezels.
- (2) On the PFD, the AHRS will start to initialize and display the AHRS ALIGN: Keep Wings Level message. The AHRS will display valid altitude and heading, typically in one minute of start. The AHRS can align itself during taxi and during level flight.
- (3) The pilot's and copilot's PFD's are operated with the buttons and knobs shown in Table 1. Also, the PFD's have keys that have many operations that change with the software and pages shown on the PFD. Because these keys operation change with the software, they are called softkeys.

Table 1. Garmin GDU Primary Flight Display Controls

| Button or Knob | Location on PFD | Available Operations | Use |
|----------------|-----------------|----------------------|-----|
|----------------|-----------------|----------------------|-----|

| | | | |
|-----------------------------|-------|--------------------------|---|
| VOL Knob | Left | PUSH ID | Controls the NAV audio volume level. Push to set the Morse code identifier audio ON and OFF. Volume level is shown in the NAV frequency display as a percentage. |
| VOL Knob | Right | PUSH SQ | Controls COM audio volume level. Push to set the COM automatic squelch ON and OFF. Volume level is shown in the COM frequency display as a percentage. |
| NAV Knob | Left | PUSH 1 - 2 | Sets the standby and active NAV frequencies. |
| Dual NAV Knob/Button | Left | | Tunes the standby frequencies for the NAV receiver (large knob for MHz, small knob for kHz). Push to select the tuning box (cyan box) between NAV1 and NAV2. |
| COM Knob/Button | Right | PUSH 1 - 2, EMERG | Sets the standby and active COM frequencies. Push and hold this key for two seconds to tune the emergency frequency (121.5 MHz) automatically into the active frequency display. |
| Dual COM Knob/Button | Right | | Tunes the standby frequencies for the COM receiver (large knob for MHz, small knob for kHz). Push to select the tuning box (cyan box) between COM1 and COM2. |
| BARO Knob | Right | PUSH STD | Sets the altimeter barometric pressure. Push this key to set the barometric pressure to standard (29.92 inches). |
| RANGE (Joystick) | Right | | Changes the map range when turned. Activates the map pointer when pushed. |
| Direct-to Button | Right | | Lets the user enter a destination way-point and establish a direct course to the selected destination. The destination is specified by the identifier, chosen from the active route, or taken from the map pointer position. |
| MENU Button | Right | | Displays a context-sensitive list of options. This list lets the user get access to more features or make setting changes that relate to specific pages. |
| FPL Button | Right | | Displays the active Flight Plan page to make and edit the active flight plan. |
| PROC Button | Right | | Gives access to IFR departure procedures (DP's), arrival procedures (STAR's), and approach procedures (IAP's) 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, the correct airport and the correct procedure can be selected. |
| CLR Button | Right | | Removes data, cancels entries, or removes page menus. |
| ENT (Dual) Button | Right | | Validates or confirms a menu selection or data entry. |
| FMS Knob/Button | Right | PUSH CRSR | Flight Management System knob. Push the FMS knob to set the selection cursor ON and OFF. When the cursor is ON, data can be entered in the applicable window with a turn of the small and large knobs. The large knob moves the cursor on the page. The small knob selects individual characters for the highlighted cursor location. |

- (4) The pilot's PFD receives power through the PFD 1 circuit breaker on the Avionics circuit breaker panel in the cockpit. The copilot's PFD receives power through the PFD 2 circuit breaker found on the Avionics circuit breaker panel in the

cockpit.

- B. Garmin GDU Multi Function Display (Refer to Figure 4 Sheet 1 for G1000 v.767XX Family and Figure 4 Sheet 2 for G1000 NXi (v.2499.XX).
- (1) The Garmin GDU MFD has softkeys that change with the page that is displayed. In normal mode, the right part of the MFD displays a full color moving map with navigation data. The left part of the MFD will show the EICAS display. During the start of the MFD, the power up page (splash screen) shows the data that follows:
 - System version
 - Copyright
 - Land database name and version
 - Obstacle database name and version
 - Terrain database name and version
 - Aviation database name, version, and effective dates
 - Chartview database data
 - Safe Taxi database data.
 - IFR/VFR Chart database (G1000 NXi System Software, v.2499.XX)

NOTE: **G1000 NXi supports dual chart type. Chartview and Flitecharts can be loaded at the same time and used with the system.**
 - (2) When the user makes sure that the data is correct, a prompt will come on the display to continue.
 - (3) The MFD receives power through the MFD circuit breaker found on the Avionics circuit breaker panel in the cockpit.
- C. Reversionary Mode (Refer to Figure 5).
- (1) In the event of PFD1 or MFD failure, reversionary (or backup) mode is automatically engaged by the other GDU displays. Reversionary mode is a mode of operation in which all important flight information is presented on at least one of the displays that is operational. In reversionary mode flight parameters are presented in the same format as in normal mode. When you push the GMA series audio panel DISPLAY BACKUP button you activate or deactivate reversionary mode for both the PFD1 (pilot's) and the MFD.
- D. Garmin GIA 63W/64W Integrated Avionics Unit (Refer to Figure 3).
- (1) The integrated avionics unit communicates with the Garmin GDU PFD's through an Ethernet HSDB, and with other LRU's through RS-232, RS-485/422, and ARINC 429 links. All system integrated avionics unit configurations are done with the use of the PFD. The GIA 63W/64W uses the subassemblies that follow:
 - A main processor that interfaces with all LRU's in the Garmin G1000 system
 - Wide Area Augmentation System (WAAS) 12-channel parallel global positioning system (GPS) receiver that monitors and uses up to 12 satellites
 - VHF COM receiver that gives tuning from 118.00 to 136.990 MHz in 25 kHz or 8.33 kHz spacing for the related 760 or 3040 channel configuration
 - VOR/ILS localizer receiver that gives tuning from 108.00 to 117.95 MHz in 50 kHz increments
 - ILS glideslope receiver that gives tuning from 328.6 to 335.4 MHz as configured with the frequency tuned on the VOR/ILS localizer receiver
 - Flight director processor that interfaces with the Garmin GFC-700 AFCS.
 - (2) The pilot's GIA 63W/64W Integrated Avionics Unit No. 1 receives power through the NAV1 and COM1 circuit breakers found on the Avionics circuit breaker panel in the cockpit. The copilot's GIA 63W/64W Integrated Avionics Unit No.2 receives power through through the NAV 2 and COM 2 circuit breakers found on the Avionics circuit breaker panel in the cockpit.
- E. The GIA 63W/64W generates Digital Warnings and Tones that are processed by the GMA 1347/1360D Audio Panel.

Figure 1 : Sheet 1 : Garmin G1000 Software Interface

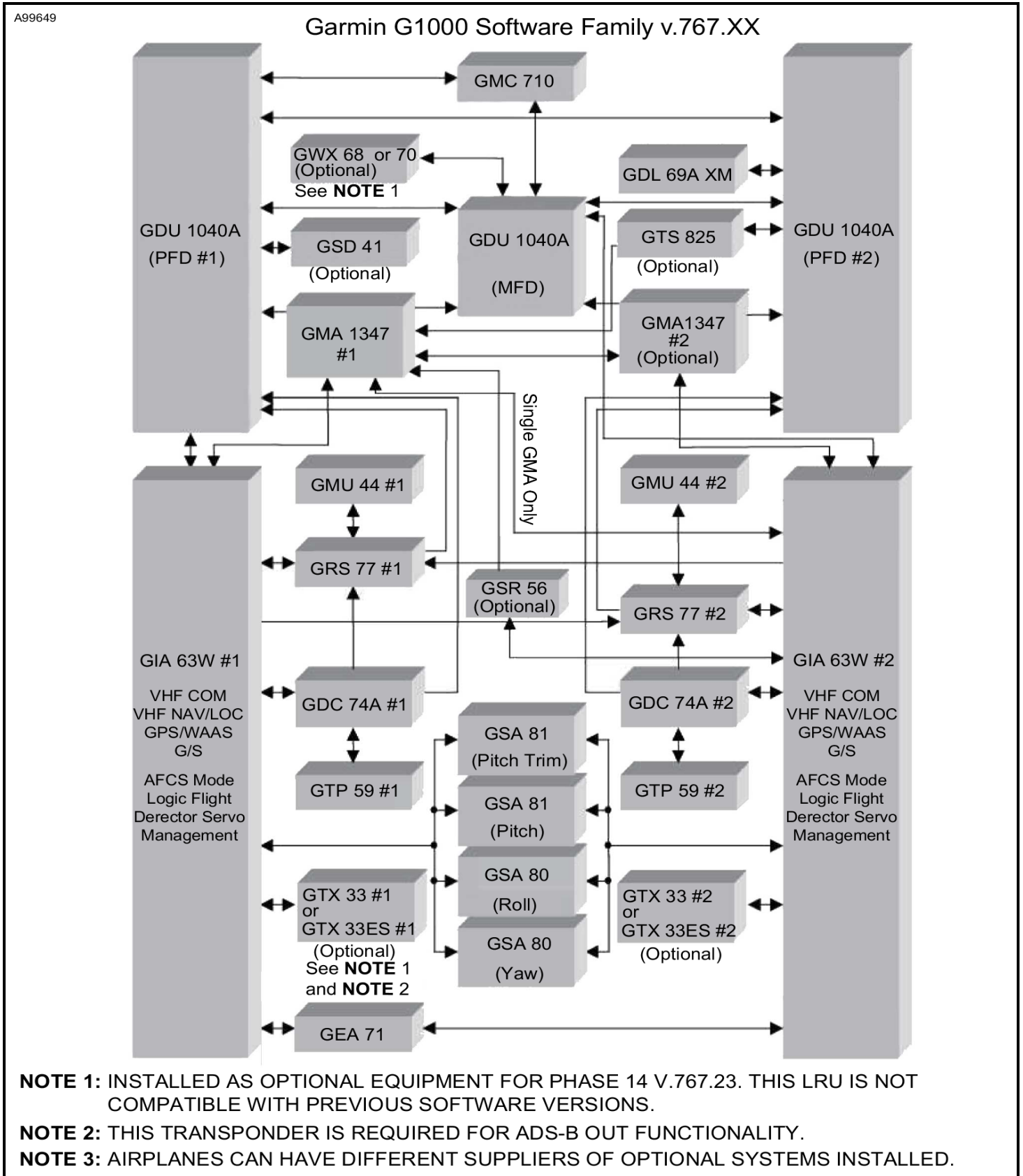


Figure 1 : Sheet 2 : Garmin G1000 Software Interface

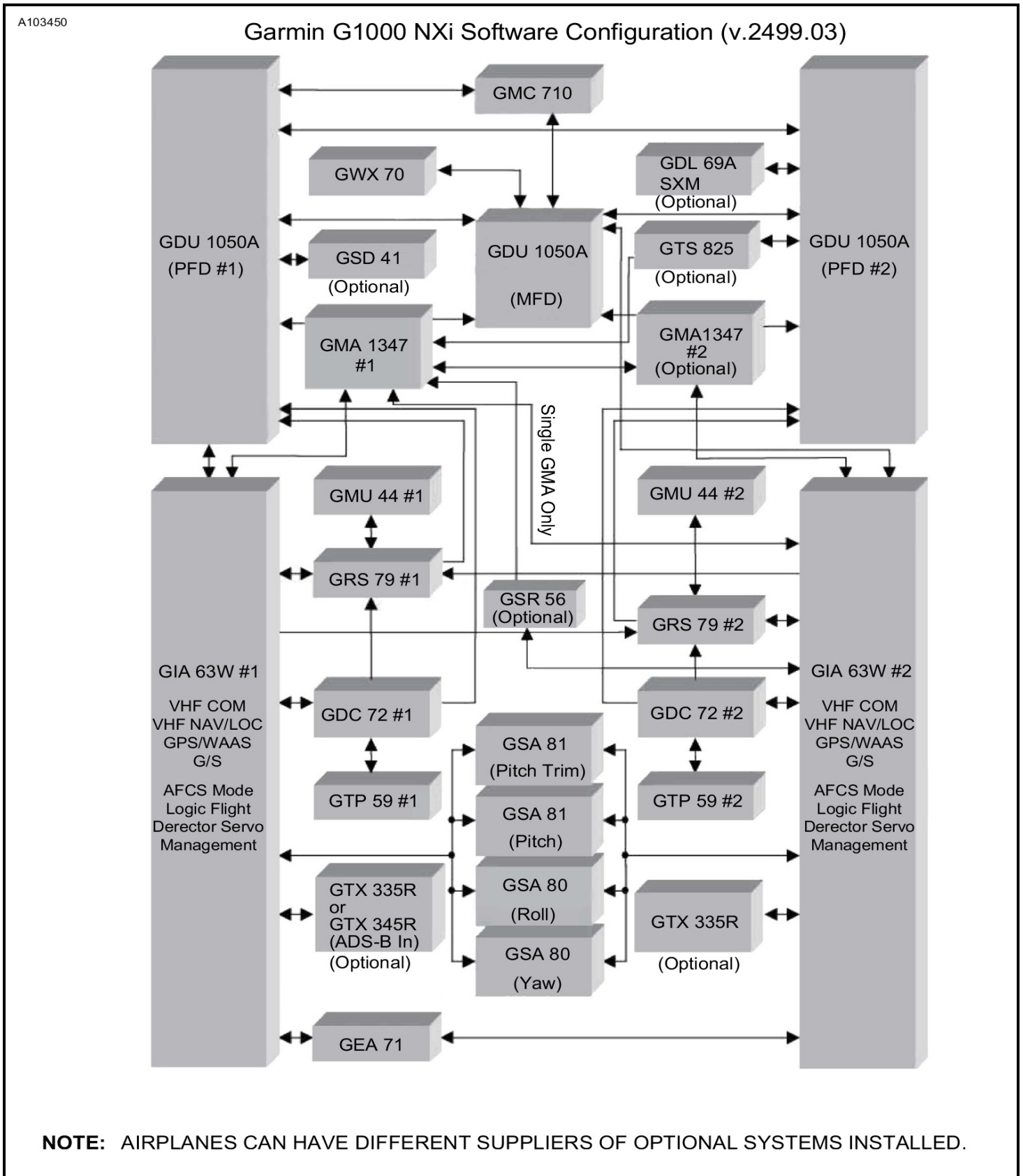
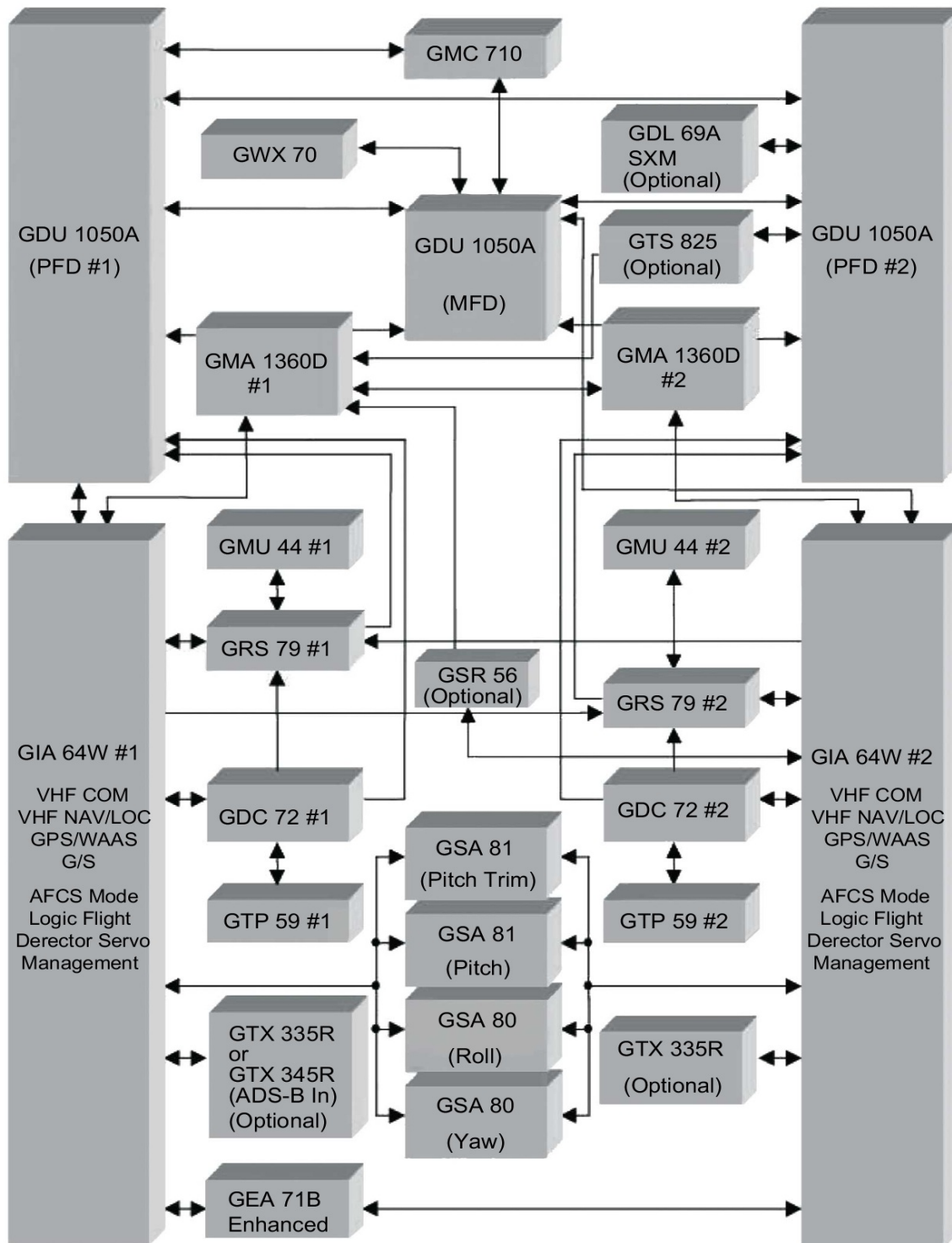


Figure 1 : Sheet 3 : Garmin G1000 Software Interface

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Garmin G1000 NXi Software Configuration (v.2499.08)

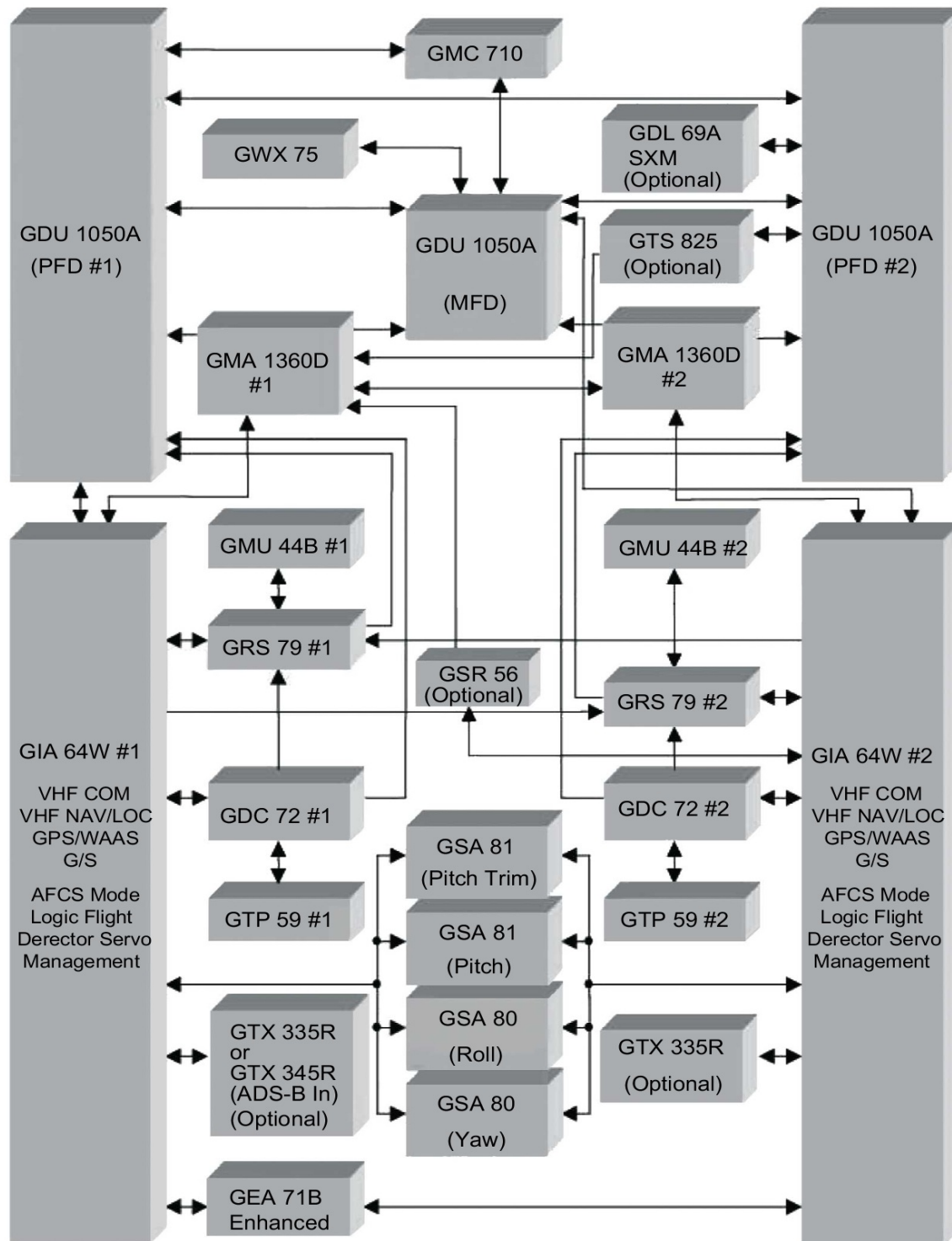


NOTE: AIRPLANES CAN HAVE DIFFERENT SUPPLIERS OF OPTIONAL SYSTEMS INSTALLED.

Figure 1 : Sheet 4 : Garmin G1000 Software Interface

A111600

Garmin G1000 NXi Software Configuration (v.2499.10 and On)



NOTE: AIRPLANES CAN HAVE DIFFERENT SUPPLIERS OF OPTIONAL SYSTEMS INSTALLED.

Figure 2 : Sheet 1 : Garmin GDU PFD and MFD

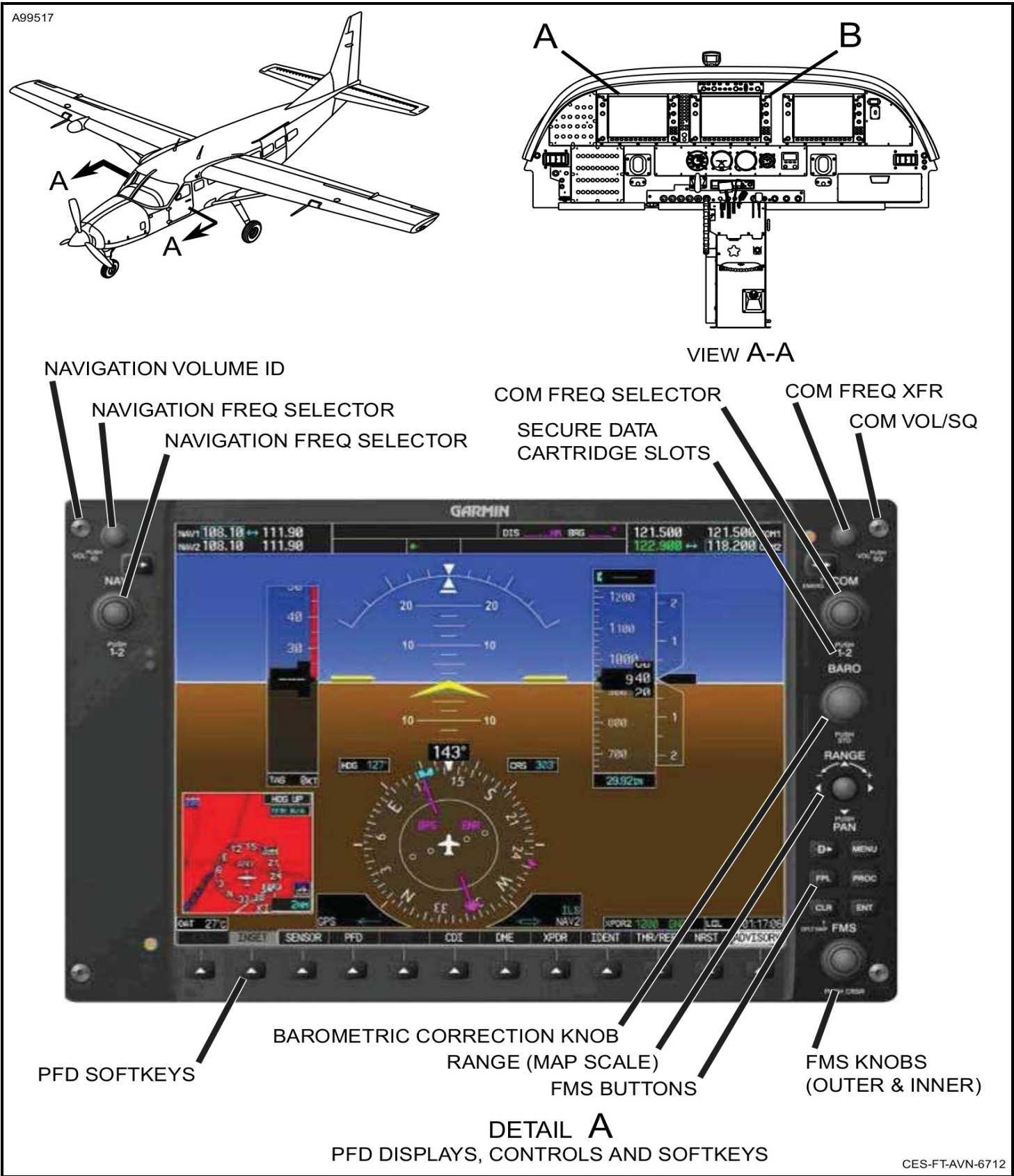


Figure 2 : Sheet 2 : Garmin GDU PFD and MFD

A99518



ENGINE INDICATION
SYSTEM STRIP

PFD SOFTKEYS

DETAIL B
MFD DISPLAYS, CONTROLS AND SOFTKEYS

CES-FT-AVN-6712

Figure 3 : Sheet 1 : Integrated Avionics Unit

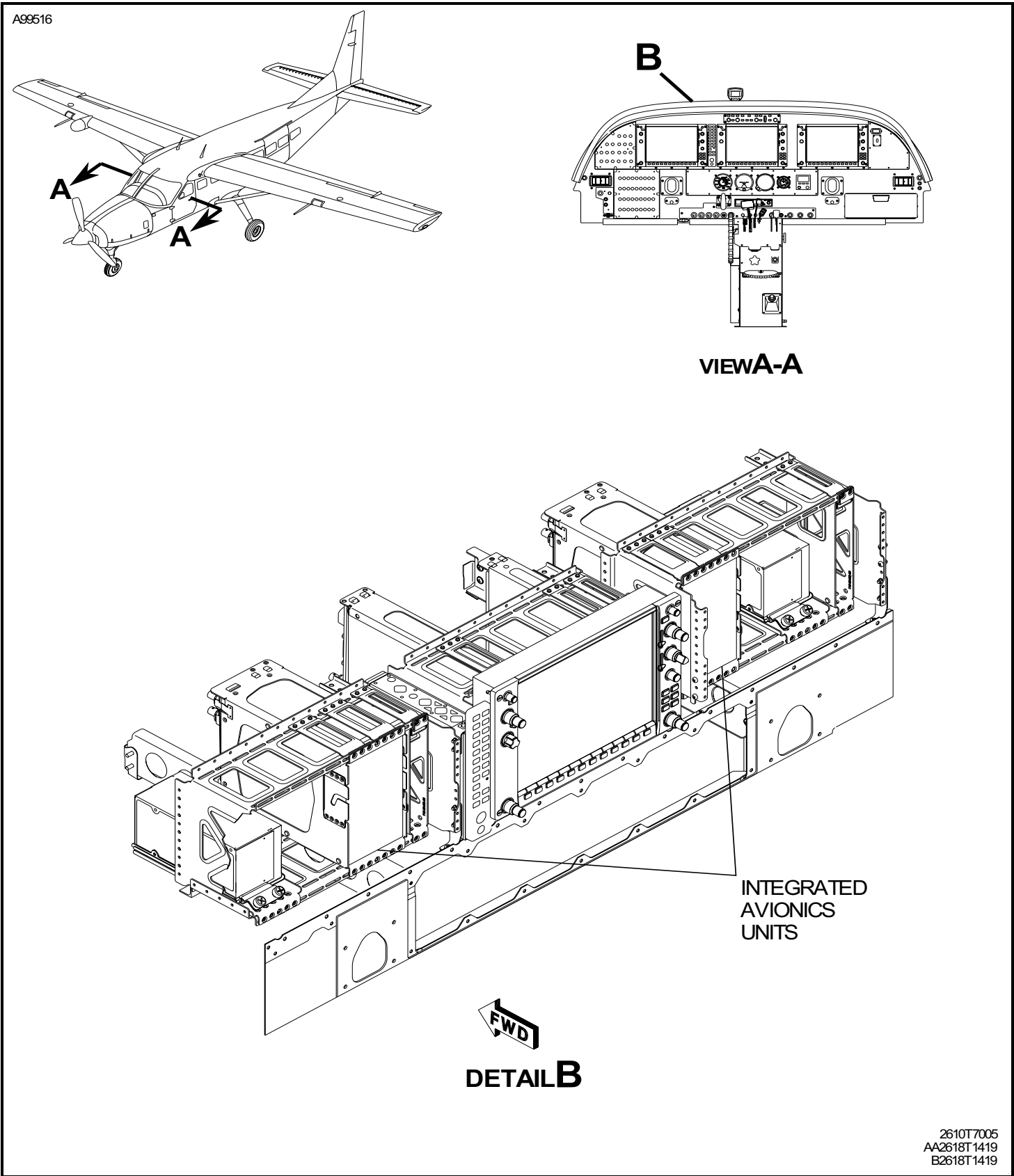


Figure 4 : Sheet 1 : MFD Splash Screen

A99519



MFD POWER UP PAGE
G1000 V.767.XX FAMILY

Figure 4 : Sheet 2 : MFD Splash Screen

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G1000 NXi

Figure 5 : Sheet 1 : Reversionary Mode Screen

A99569



Figure 512 : Sheet 3 : G1000 NXi LRU Replacement Reference Screens

A103448

LRU DROPDOWN ALLOWS SELECTION OF ANY LRU INSTALLED ON THE G1000 NXI CONFIGURATION

INDICATES THE LRU IS FUNCTIONING CORRECTLY

LRU

PFD2

LRU INFO

PFD2

PFD2 FPGA

LRU REPLACEMENT

LRU DATA

PART NUMBER

VERSION

PRODUCT

DESCRIPTION

COPYRIGHT

SERIAL NUMBER

MODEL NUMBER

FUNCTIONS PRESENT

STATUS

006-B1177-54

20.05

GDU1XXX 200

GDU1XXX System Software

(c) 2002-16 Garmin Ltd or subs

494100005

2

134225984

OK

PRODUCT

INFORMATION

006-B2499-01

Caravan Baseline Loads

Cessna 208 PT6A-114A - Baseline Configuration

PFD 2

CONFIG

FINALIZE REPLACEMENT

LRU VERS

CARD VERS

CARD PART NUM

SOFTWARE

CONFIGURATION

20.05

20.05

✓

N/A

N/A

N/A

✓

✓

CHK All

CHK SW

CHK CFG

CLR All

Load

Manage

LRU VERSION SHOULD MATCH THE CARD VERSION THAT WAS UPLOADED TO THE GDU

SOFTWARE CARD NUMBER CURRENTLY STORED IN THE "CARD COPY MANAGEMENT" INTERNAL MEMORY OF THE GDU

NOTE:

CHANGING MORE THAN ONE NXI LRU WILL RESULT IN THE NXI BASELINE SOFTWARE LOAD PROCEDURES IN THIS CHAPTER.

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Page 16 of 18
Print Date: Tue May 14 08:15:21 CDT 2024

Figure 512 : Sheet 1 : G1000 NXi LRU Replacement Reference Screens

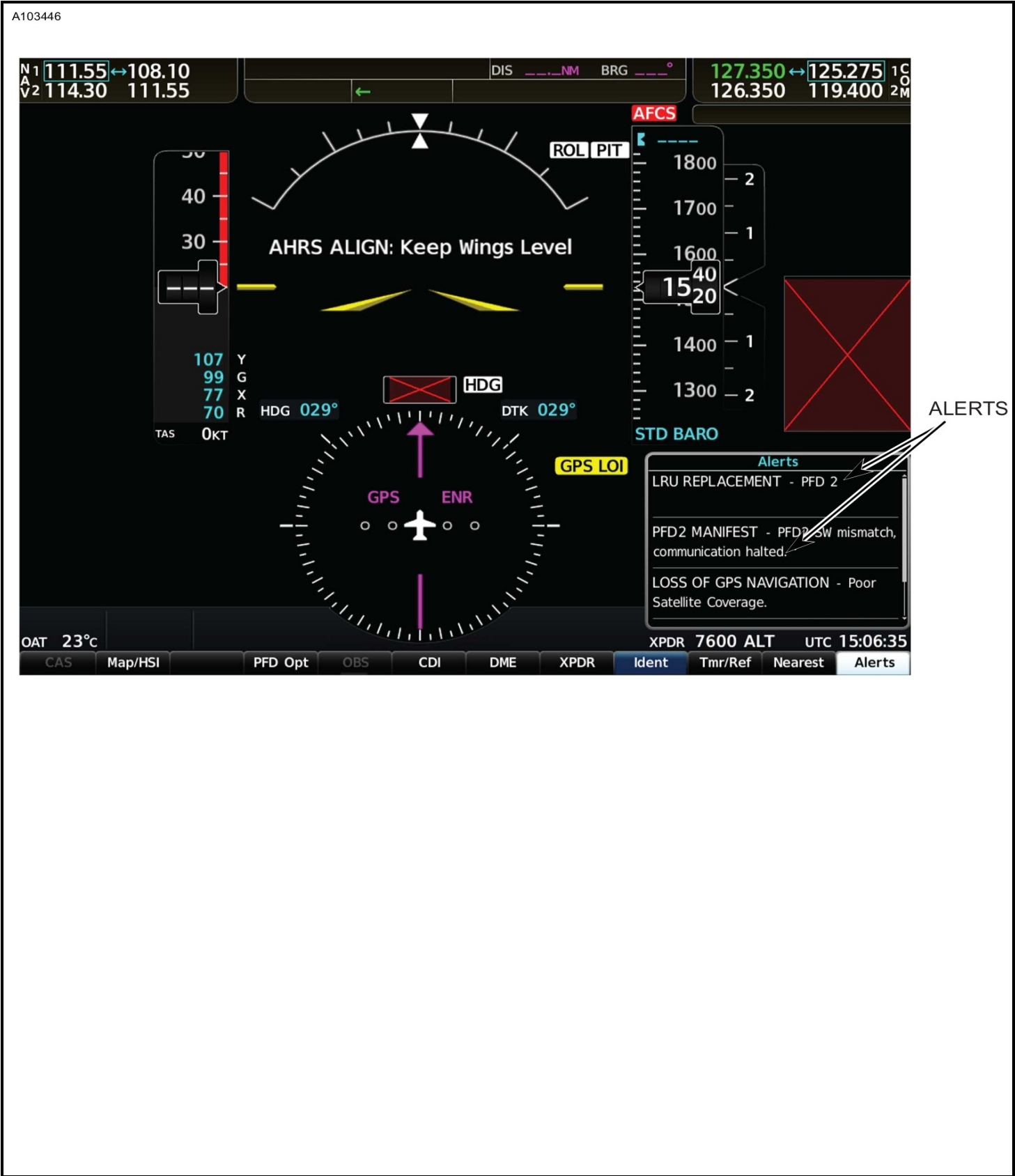


Figure 512 : Sheet 2 : G1000 NXi LRU Replacement Reference Screens

A103447

| CONFIGURATION MANAGER | | |
|------------------------------|---------------------------------------|-------------------------------------|
| CONFIGURATION IDENTIFICATION | | |
| FLEET | EXPECTED CONFIGURATION ID 76650A58 | ACTUAL CONFIGURATION ID 76650A58 |
| AIRCRAFT | 538697FF | 538697FF |
| CONFIGURATION ITEMS | | |
| | FLEET ID | AIRCRAFT ID |
| +COM2 | Synchronized | Synchronized |
| +GDC1 | Synchronized | Synchronized |
| +GDC2 | Synchronized | Synchronized |
| +GEA1 | Synchronized | Synchronized |
| +GIA1 | Synchronized | Synchronized |
| +GIA2 | Synchronized | Synchronized |
| +GMA1 | Synchronized | Synchronized |
| +GMC 1 | Synchronized | Synchronized |
| +GRS1 | Synchronized | Synchronized |
| +GRS2 | Synchronized | Synchronized |
| +GSD1 | Synchronized | Synchronized |
| +GTx1 | Synchronized | Synchronized |
| +MFD1 | Synchronized | Synchronized |
| +PFD1 | Synchronized | Synchronized |
| +PFD2 | Not Synchronized | Synchronized |
| CNFM CFG | | |