

GFC 600

Automatic Flight Control System

Part 23 AML STC Maintenance Manual

Includes Instructions for Continued Airworthiness
for STC SA01844WI

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1. Introduction

1.1 Content, Scope, Purpose

This document provides maintenance instructions and Instructions for Continued Airworthiness (ICA) for the GFC 600 Automatic Flight Control System (AFCS) as installed under STC SA01844WI. This document satisfies the requirements for continued airworthiness as defined by 14 CFR Part 23.1529 and 14 CFR Part 23 Appendix G.

1.2 Applicability

This document applies to all Part 23 aircraft equipped with the GFC 600 installed under AML STC SA01844WI.

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

1.3 Organization

The following outline briefly describes the organization of this manual:

Section 2: System Description

Provides a complete description of the type design change associated with installing the GFC 600 AFCS. Also provides an interface summary, power requirements, and instructions on electrical bonding.

Section 3: Control and Operation

Provides brief instructions on controls and operation.

Section 4: Instructions for Continued Airworthiness

Provides maintenance instructions for continued airworthiness of the GFC 600 AFCS.

Section 5: Troubleshooting

Provides troubleshooting information to aid in diagnosing and resolving potential problems with the GFC 600 AFCS.

Section 6: Equipment Removal & Replacement

Gives instructions for the removal and replacement of GFC 600 AFCS equipment.

Section 7: Garmin GFC 600 LRU Replacement/Configuration & Testing

Gives instructions for loading software, configuring, and testing of GFC 600 AFCS equipment.

Section 8: Software Load and Configuration Procedures

Gives instructions for loading software and configuring the GFC 600 AFCS.

Section 9: GFC 600 Return to Service Procedure

Specifies return-to-service procedures to be performed upon completion of maintenance of the GFC 600 AFCS.

1.4 Definitions/Abbreviations

AFCS:	Automatic Flight Control System
AFM:	Airplane Flight Manual
AFMS:	Airplane Flight Manual Supplement
AHRS:	Attitude and Heading Reference System
AML:	Approved Model List
CDI:	Course Deviation Indicator
CFR:	Code of Federal Regulations
CWS:	Control Wheel Steering
DDM:	Difference in Depth of Modulation
DTK:	Desired Track
ESD:	Electro-Static Discharge
ESL:	Electronic Speed Limiting
ESP:	Electronic Stability Protection
FAA:	Federal Aviation Administration
HSDB:	High Speed Data Bus
HSI:	Horizontal Situation Indicator
ICA:	Instructions for Continued Airworthiness
LRU:	Line Replaceable Unit
OBS:	Omni-Bearing Selector
PFD:	Primary Flight Display
PFT:	Pre-Flight Test
POH:	Pilot's Operating Handbook
STC:	Supplemental Type Certificate
TSO:	Technical Standard Order
USB:	Universal Serial Bus
WAAS:	Wide Area Augmentation System

1.5 Reference Publications

All of the documents listed in Table 1-1 and Table 1-2 are available for download through the Dealer Resource Center section of the Garmin web site. Refer to Section 1.6 for details.

The documents listed in Table 1-1 are required by this maintenance manual to perform maintenance on the GFC 600 AFCS. It is the responsibility of the owner/operator to ensure that the latest versions of these documents are used during operation, servicing or maintenance of the airplane. Note: There is a model-specific installation manual addendum for each model covered. Each has a different dash number. Refer to the Master Drawing List 005-01009-01 for applicability.

Table 1-1 – Required Documents

Document Number	Title
005-01009-01	Master Drawing List GFC 600 Automatic Flight Control System Part 23 AML STC
005-01009-05	Equipment List GFC 600 Automatic Flight Control System Installation Part 23 AML STC
190-01937-00	GFC 600 AFCS Part 23 AML STC Installation Manual
190-01937-XX	GFC 600 AFCS Part 23 AML STC Model-Specific Installation Manual Addendum
190-01488-00	GFC 600 Pilot's Guide

The documents listed in Table 1-2 are recommended to be available during the performance of maintenance activities.

Table 1-2 – Garmin Reference Documents

Document Number	Title
190-01488-01	GMC 605 Installation Manual
190-01903-00	GSA 87 Installation Manual
190-00303-98	GI 285 Installation Manual
190-00067-22	GPS 155XL/GNC 300XL Installation Manual
190-00140-02	400 Series Installation Manual
190-00149-01	GMA 340 Audio Panel Installation Manual
190-00181-02	500 Series Installation Manual
190-00303-15	GDC 74(X) Air Data Computer Installation Manual
190-00325-01	GMA 347 Audio Panel Installation Manual
190-00356-08	GNS 400W Series Installation Manual
190-00357-08	GNS 500W Series Installation Manual
190-00601-04	GDU 620 Installation Manual
190-00858-11	GMA 35/35c Installation Manual
190-01004-02	GTN 625/635/650 TSO Installation Manual
190-01007-02	GTN 725/750 TSO Installation Manual
190-01134-11	GMA 350/350c/350H350Hc Installation Manual
190-01499-02	GTX 3X5 Transponder TSO Installation Manual
190-01639-00	GSU 75 ADAHRS Installation Manual
190-01717-00	G500/G600 TXi TSO Installation Manual
190-01855-00	GDC 72 Air Data Computer Installation Manual

560-0979-00	Apollo Model SL15 Audio Selector Panel Installation Manual
560-0982-01	GNS 480 (CNX80) Color GPS/NAV/COM Installation Manual

Table 1-3 – Other Reference Documents

Document Number	Title
AC 43.13-1B	FAA Advisory Circular, Acceptable Methods, Techniques, and Practices – Aircraft Inspection and Repair
AC 43.13-2B	FAA Advisory Circular, Acceptable Methods, Techniques, and Practices – Aircraft Alterations
SAE ARP1870	Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety
SAE AS4461	Assembly and Soldering Criteria for High Quality/High Reliability Soldered Wire and Cable Termination in Aerospace Vehicles
SAE AS50881	Wiring, Aerospace Vehicle
ASTM F 2490-05	Standard Guide for Aircraft Electrical Load and Power Source Capacity Analysis

1.6 Revision and Distribution

This document is required for maintaining the continued airworthiness of the GFC 600 AFCS. When this document is revised, every page will be revised to indicate current revision level.

Garmin Dealers may obtain the latest revision of this document on the Garmin Dealer Resource Center website.

Owner/operators may obtain the latest revision of this document from the <https://fly.garmin.com/Support> page, or by contacting a Garmin dealer, contacting Garmin Product Support at 913-397-8200, toll free 866-739-5687, or using around the world contact information on <https://fly.garmin.com/>.

A Garmin Service Bulletin describing the revision to this document will be sent to Garmin dealers if the revision is determined to be significant.

1.7 Garmin Technical Support

For technical support contact, Garmin Aviation Product Support at 913-397-8200 (toll free 866-739-5687) or by using the around the world contact information on www.flygarmin.com.

2. System Description

2.1 Equipment Descriptions

2.1.1 GMC 605 AFCS Mode Controller

The GMC 605 Automatic Flight Control System (AFCS) mode controller is shown in Figure 2 1. The front panel of the GMC 605 includes a monochrome display that provides AFCS status indications, autopilot and flight director mode indications, and other system indications. The GMC 605 performs flight director computations. It contains an internal attitude board which is used to provide the attitude reference input to the AFCS computations. The internal attitude board requires air data aiding to provide a valid attitude solution and will also use GPS/WAAS aiding to provide additional accuracy of the attitude solution.

The GMC 605 provides the AFCS commands directly to the GSA 87 servos. Refer to the GFC 600 Pilot's Guide, 190-01488-00 for operational characteristics of the system.



Figure 2-1 – GMC 605

2.1.2 GSA 87 Servo

The GSA 87 servo uses a dual processor providing for a fail passive design. It uses a brushless DC motor that requires software commutation. The GSA 87 runs application software appropriate to the axis it is installed in, as programmed by the four installation straps on the servo connector. The possible strap selections include pitch, roll, yaw damper, and pitch trim. The GSA 87 uses a position-based motor-control loop. Output torque is computed based on sensed motor current. The GSA 87 uses electronic speed limiting (ESL) to control the maximum speed of the servo to prevent rapid changes in flight control surface movement.

2.1.3 GI 285 Mode Annunciator Panel

The GI 285 mode annunciator panel (if installed) interfaces directly with the GMC 605 to provide AFCS mode annunciations to the pilot (see Figure 2 2).



Figure 2-2 – GI 285

2.1.4 Audio Output

The GMC 605 has an analog audio output to an audio panel, plus an active low output to drive an external aural alert device (e.g. sonalert). The analog audio can be interfaced to any audio panel that has an unswitched and unmuted analog audio input. If the analog audio is interfaced to an audio panel other than a GMA 35 or GMA 350, which has a fail-safe audio path, the installation must also include a sonalert.

2.1.5 Garmin Air Data Module (ADM)

The ADM (if installed) provides pitot and static pressure input to the GMC 605 via connection to the existing aircraft pitot and static systems. The ADM contains an internal configuration module, and when installed replaces the GMC 605 configuration module. The ADM uses the same I2C interface to the GMC 605 that the configuration module would use with the exception that the ADM wiring harness includes an additional wire for unit power.

2.2 GFC 600 Interface Summary

The following Figures provide a high-level summary of the interfaces for the GFC 600. Refer to the installation-specific information in the aircraft records to determine which interfaces are applicable.

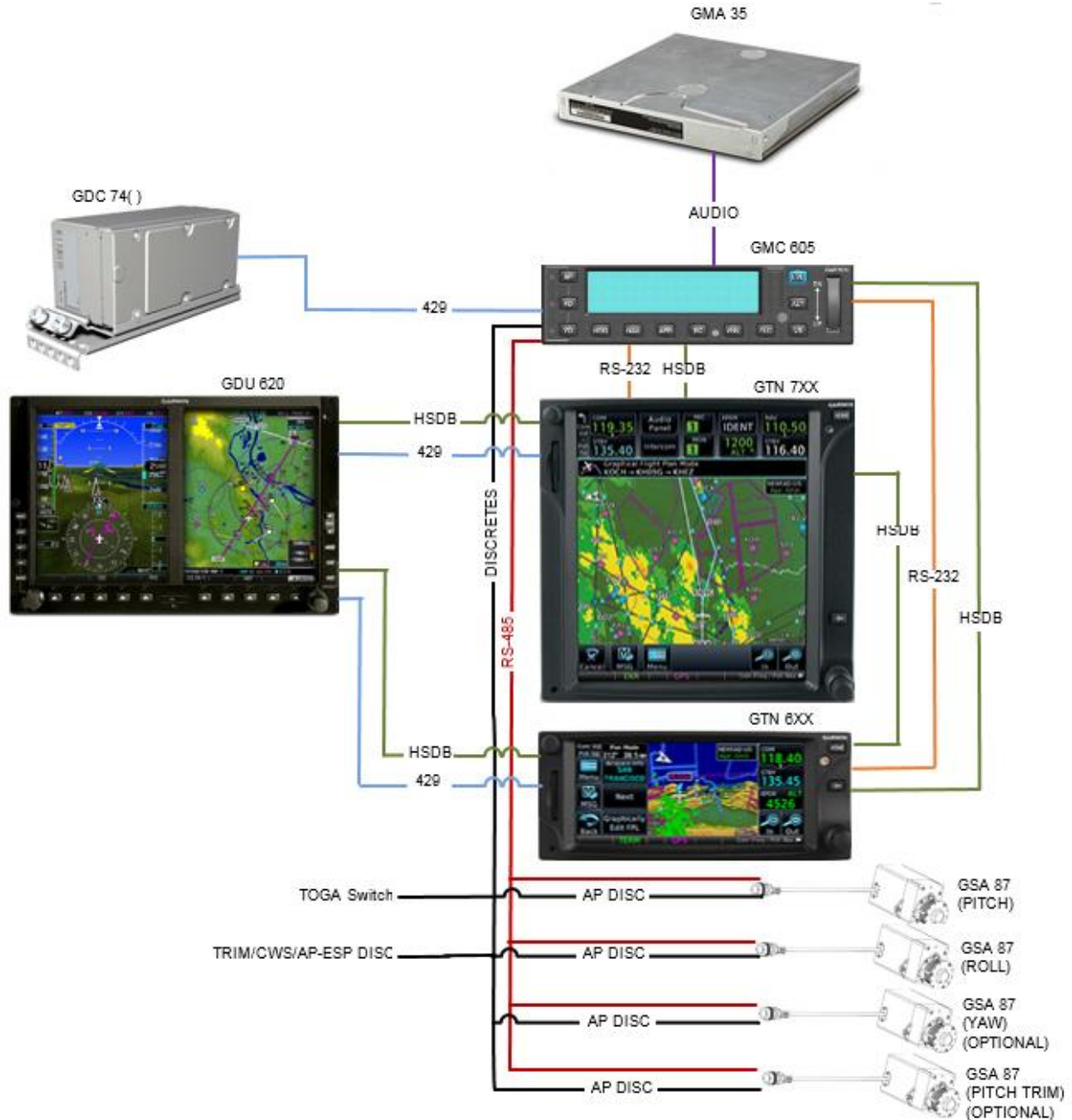


Figure 2-3 – Fully Optioned GFC 600 AFCS Interfaced with Garmin LRUs

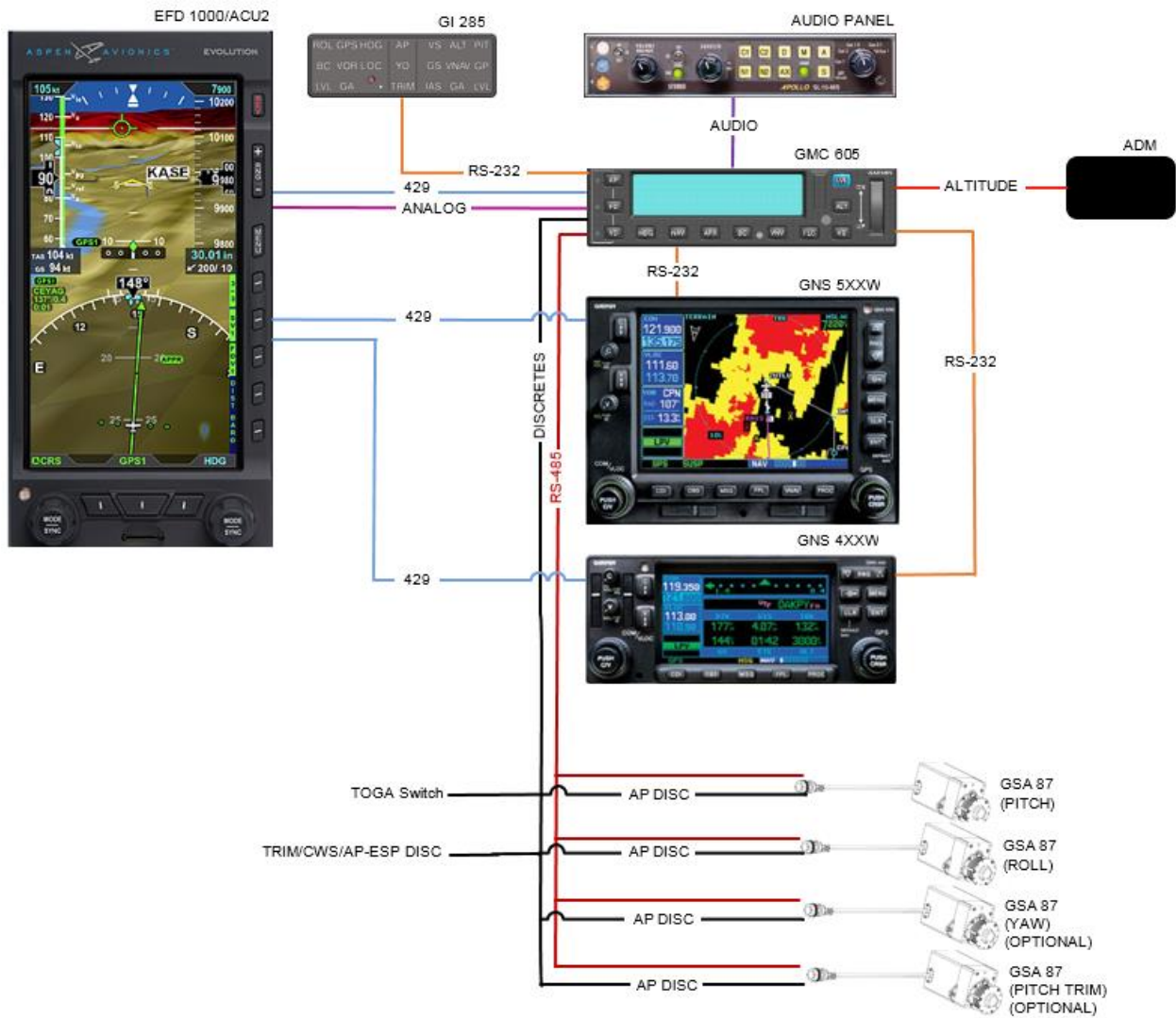


Figure 2-4 – GFC 600 AFCS Interfaced Aspen EFD 1000 and GI 285

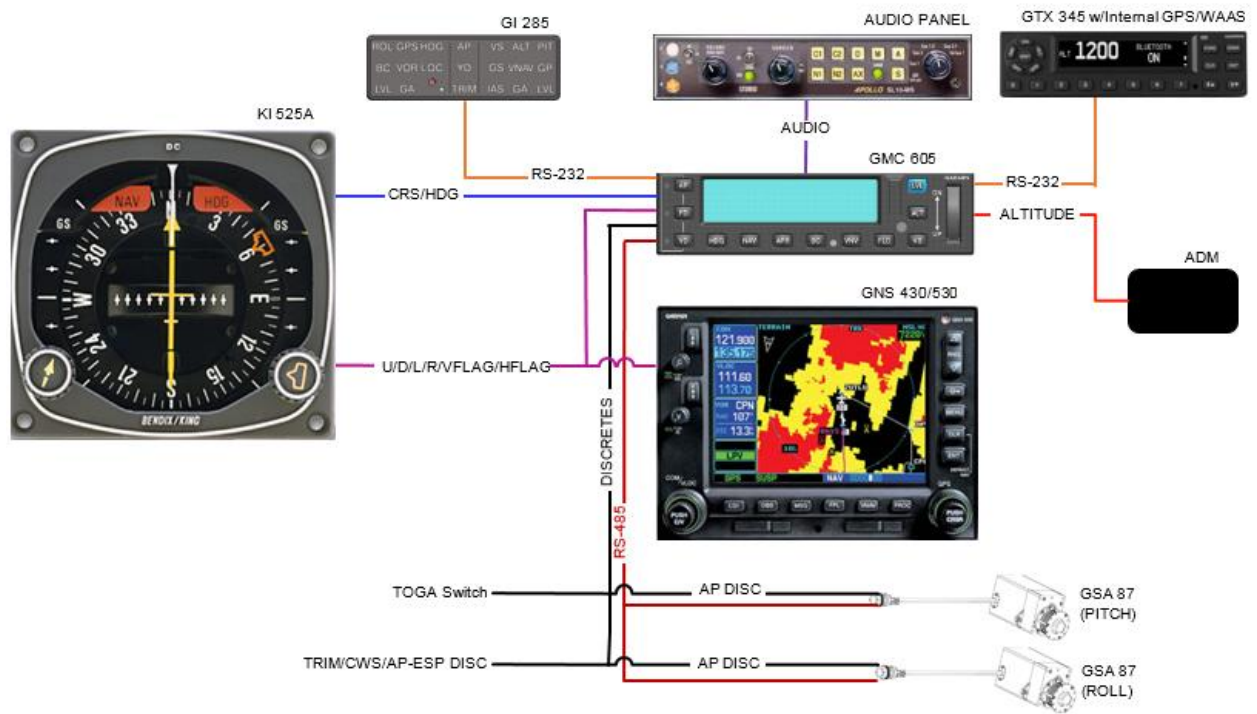


Figure 2-5 – Basic 2 Axis GFC 600 AFCS Interface

2.3 Power Requirements

Table 2-1 below summarizes the power requirements for the GFC 600 LRUs.

Table 2-1 – Power Requirements

LRU	Characteristics	Specifications
GMC 605	Average Current Draw @ 14 VDC	0.53 A
	Max Current Draw @ 14 VDC	1.15 A
	Average Current Draw @ 28 VDC	0.27 A
	Max Current Draw @ 28 VDC	0.70 A
GSA 87	Average Current Draw @ 14 VDC	2.6 A
	Max Current Draw @ 14 VDC	3.0 A
	Average Current Draw @ 28 VDC	1.3 A
	Max Current Draw @ 28 VDC	1.5 A
GI 285	Average Current Draw @ 14 VDC	65 mA
	Max Current Draw @ 14 VDC	154 mA
	Average Current Draw @ 28 VDC	36 mA
	Max Current Draw @ 28 VDC	84 mA

2.4 Electrical Bonding

For the purposes of this STC, aircraft ground reference definitions vary according to airframe type as defined in Table 2-2. Refer to the periodic test and reconditioned resistance values corresponding to these ground reference definitions when performing the equipment bonding tests in Section 4.5.

The periodic test value is the value allowed during the bonding checks specified in Section 4.5. The reconditioned value is the value allowed on initial installation or if the bond must be reworked if the periodic test value is exceeded.

Refer to SAE ARP 1870 Section 5 when surface preparation is required to achieve electrical bond.

Table 2-2 – Electrical Bonding

Aircraft Type	Ground Reference	Maximum Resistance Between GFC 600 Equipment Chassis and Ground Reference (mΩ)	
		Periodic Test	Reconditioned
Metallic Airframe	Nearby metal structure for servos Instrument panel for GMC 605 and GI 285	10.0	2.5

2.4.1 Consideration for Untreated or Bare Dissimilar Metals

The correct material finish is important when mating untreated or bare dissimilar metals. Materials should be galvanically compatible. When corrosion protection is removed to make an electrical bond any exposed area after the bond is completed should be protected again. Additional guidance can be found in AC 43.13-1B and SAE ARP 1870. Typical electrical bonding preparation examples are shown in Figure 2-6, Figure 2-7, and Figure 2-8.

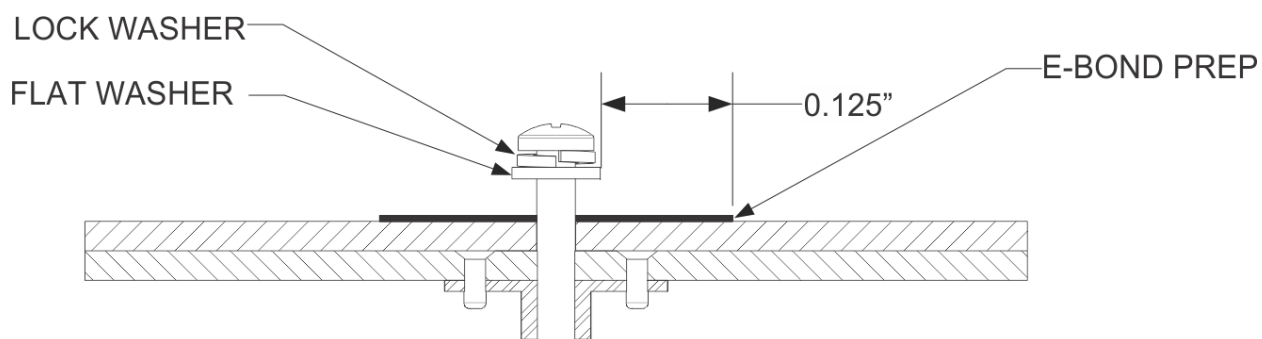


Figure 2-6 – Electrical Bonding Preparation – Nut Plate

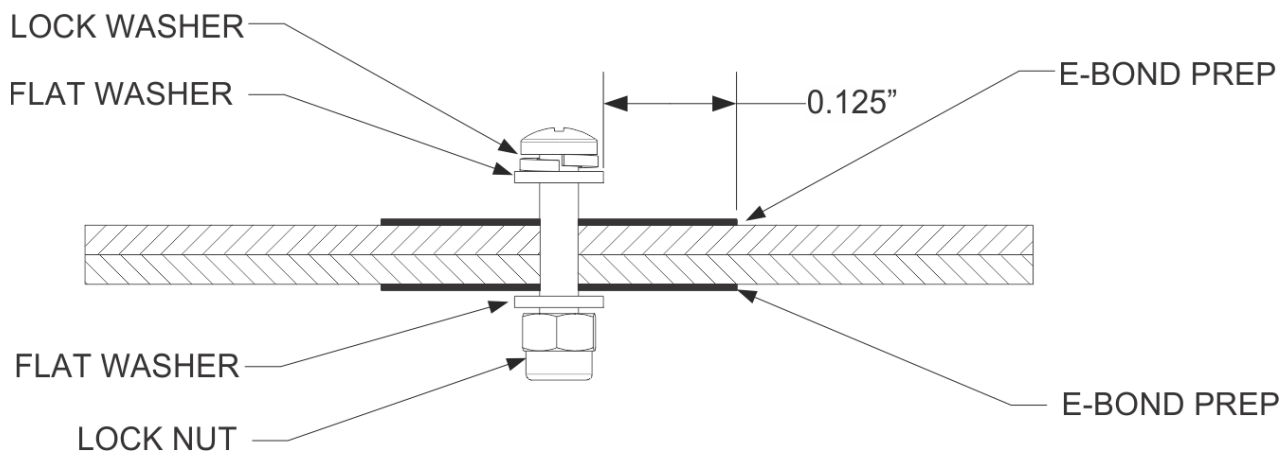


Figure 2-7 – Electrical Bonding Preparation – Bolt/Nut Joint

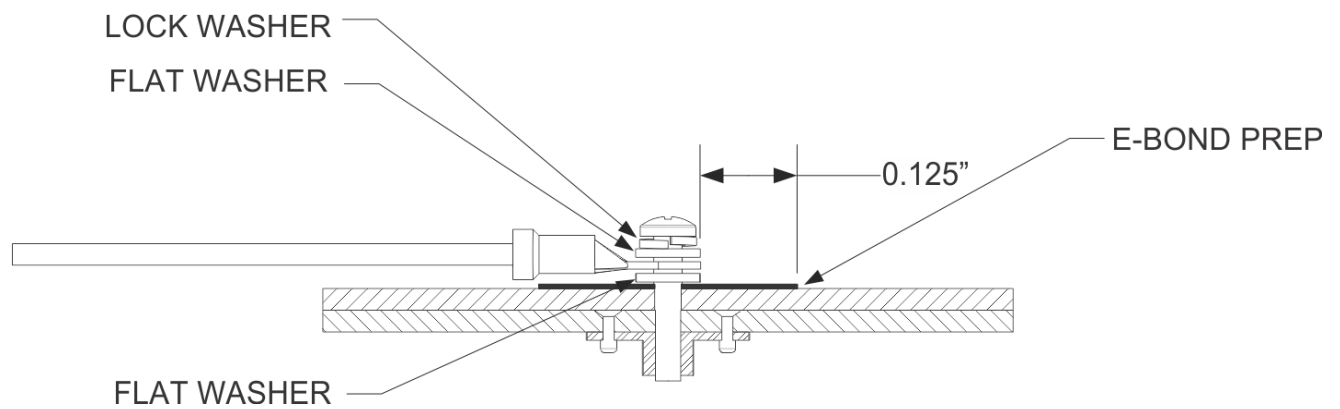


Figure 2-8 – Electrical Bonding Preparation – Terminal Lug

2.4.2 Preparation of Aluminum Surfaces

The following general procedure is recommended to prepare an aluminum surface for proper electrical bonding. Refer to Figure 2-6, Figure 2-7, and Figure 2-8 for additional information.

1. Clean grounding location with solvent.
2. Remove non-conductive films or coatings from the grounding location.
3. Apply a chemical conversion coat such as Alodine 1200 to the bare metal.
4. Once the chemical conversion coat is dry, clean the area.
5. Install bonding equipment at grounding location.
6. After bond is complete, if any films or coatings were removed from the surface, reapply a suitable film or coating to the surrounding area within 24 hours.

In cases where the parts come in with certain areas spot-faced, or if there is no finish on the part (bare metal), apply conformal coating over the bond joint and hardware per MIL-I-46058 or clear lacquer per TT-L-20A in order to facilitate future inspection. Refer to the model specific Aircraft Maintenance Manual or Standard Practices Manual for surface protection requirements applicable to affected areas. When corrosion protection is removed to make an electrical bond, any exposed area after the bond is completed should be protected again. Additional guidance can be found in AC 43.13-1B and SAE ARP 1870.

For a more detailed procedure, refer to SAE ARP 1870 Sections 5.1 and 5.5.

3. Control and Operation

3.1 GMC 605

The GMC 605 provides GFC 600 AFCS mode selections and annunciations. Refer to the GFC 600 Pilot's Guide, 190-01488-00, for operational characteristics of the system.

3.2 Autopilot Disconnect/Trim Interrupt Switch

An AP DISC/TRIM INT switch is provided on the pilot's flight controls to allow for manual disconnect of the autopilot system and to interrupt the electric pitch trim. Pressing and holding the AP DISC/TRIM INT switch for more than 5 seconds will turn off the Electronic Stability and Protection (ESP) feature.

3.3 Trim Switch

If the GFC 600 AFCS includes a pitch trim servo, a TRIM switch is provided on the pilot's flight controls to allow for manual electric control of the pitch trim system. Both halves of the TRIM switch must be pushed simultaneously for the pitch trim servo to engage and run in the requested direction. If the autopilot is engaged and the TRIM switch is pressed, the autopilot will disengage.

3.4 Control Wheel Steering (CWS) Switch

A CWS switch is provided on the pilot's flight controls. Pressing the CWS switch will disengage the autopilot servos from the flight control system for as long as the switch is pressed. The autopilot servos will re-engage at the current flight attitude when the switch is released.

3.5 Go Around (GA) Switch

A GO AROUND switch is provided for engagement of the go around mode. When go around mode is engaged, the autopilot engages in wings level roll attitude and nose up pitch attitude. The pitch attitude is dependent on the aircraft model. Refer to the appropriate GFC 600 AFCS Airplane Flight Manual Supplement for the go around pitch attitude. Refer to the appropriate model-specific installation manual addendum (190-01937-XX) for switch installation location.

4. Instructions for Continued Airworthiness

This document is designed as Instructions for Continued Airworthiness in accordance with 14 CFR 23.1529 Appendix G for use by the owner/operator of the airplane to adequately maintain the GFC 600 Automatic Flight Control System installed under STC SA01844WI.

4.1 Airworthiness Limitations

The GFC 600 AFCS is airworthy when installed, configured, and maintained in accordance with this section.

There are no new or additional Airworthiness Limitations associated with this equipment and/or this installation.

The Airworthiness Limitations section is FAA-approved and specifies maintenance required under §§ 43.16 and 91.403 of Title 14 of the Code of Federal Regulations, unless an alternative program has been FAA-approved.

FAA APPROVED



Paul Mast
STC Unit Administrator
ODA-240087-CE



Date

4.2 Servicing Information

Servicing of the GFC 600 AFCS equipment is 'on condition'. In the event of system failure, troubleshoot the GFC 600 AFCS in accordance with Section 5.

4.2.1 On Condition Servicing

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

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

- Section 4.3 lists maintenance requirements related to the GFC 600 AFCS.
- Section 6 gives instructions regarding the removal and replacement of GFC 600 equipment and parts.
- Section 7 gives configuration and testing instructions to be accomplished if GFC 600 equipment or parts are removed or replaced.
- Section 9 specifies system return-to-service procedures.

4.2.2 Required Tools

The following tools are needed to perform maintenance tasks on GFC 600 AFCS equipment:

- Calibrated Milliohm meter with Kelvin probes, OR
 - Ammeter capable of measuring 1.5 Amps of current with a minimum resolution of 0.1A.
 - Voltmeter capable of measuring millivolts with a minimum resolution of 0.1mV
 - Variable DC Power Supply capable of providing 1 amp current
- 3/32" Hex tool
- Calibrated VHF NAV/COM/ILS ramp tester
- Calibrated pitot/static ramp tester
- Outdoor line-of-site to GPS satellite signals or GPS indoor repeater
- Headset/microphone
- Ground Power Unit
- Calibrated Flight Control Cable Tension Meter
- Calibrated torque wrench capable of measuring 0 – 70 in/lbs.
- Standard sockets & wrenches

4.2.3 Special Tools

There are no special tools required to perform maintenance on the GFC 600 AFCS.

4.3 Maintenance Intervals

Table 4-1 shows systems and items, installed by this STC, which must undergo tests or checks at specific intervals. If the interval is shown to be in flight time as well as calendar months, the first interval reached should be used as the limit.

Those inspections that are based on flight time or calendar elapsed time or cycles shall have specific intervals stated in Table 4-1.

Table 4-1 – Maintenance Intervals

Item	Description/Procedure	Manual Section No.	Interval
Equipment electrical Bonding Test	Verify bonding of GMC 605 rack, GI 285 rack (if installed), GSA 87 mounting brackets, and any associated bonding components	4.5	Following removal and replacement of the racks or brackets AND Every 2000 flight hours or ten years, whichever is first
Equipment Bonding Visual Inspection – suspected lightning strike	Inspection of bonding Components	Table 4-3	At any suspected or actual lightning strike
GFC 600 Equipment Visual Inspection	Visual inspection of GFC 600 components	4.4	At every annual inspection
Sonalert Disconnect Tone Check (if installed)	Functional test of Sonalert	4.6	At every annual inspection
GSA 87 Servos	Removal and Replacement	6.3	On Condition
GMC 605 Autopilot Computer	Removal and Replacement	6.1	On Condition
Air Data Module	Removal and Replacement	6.4	On Condition
GI 285 Autopilot Annunciator	Removal and Replacement	6.2	On Condition
Servos, Servo Control Cables and associated hardware	Visual Inspection	Table 4-2	With aircraft manufacturer's required primary control cable checks

4.4 Visual Inspection

Perform a visual inspection in accordance with requirements in Table 4-2. Check for corrosion, damage, or other defects of the GMC 605, GI 285 (if installed), and the GSA 87s. Replace any damaged parts as required. Inspection may require the temporary removal of a unit or units to gain access to connectors. Follow guidance in Section 6 for equipment removal and replacement. Refer to the aircraft manufacturer service or maintenance manual for instructions on access panel locations.

Table 4-2 – Visual Inspection Procedure

Item	Description/Procedure	Initials
GFC 600 Equipment Visual Inspections	<ul style="list-style-type: none"> a) Conduct a visual inspection of the GMC 605, GI 285 (if installed), and GSA 87 equipment installations in accordance with 14 CFR Part 43, Appendix D. If the equipment does not pass the visual inspection, complete the following procedure: <ul style="list-style-type: none"> i. Correct improper installations and ensure that all install racks, brackets, and fasteners are secure. Correct improper wire routing and ensure that the wire harness is securely mounted. Replace install racks, brackets, wiring and associated electrical bonding or shielding components with obvious defects ii. Complete the equipment electrical bonding test as described in section 4.5 for any components that are replaced. b) Inspect all exposed wire harness for chafing, damage, proper routing of wire bundles and security of attachment in accordance with AC 43.13-1B, Chapter 11, Section 8, Paragraph 11-96. 	
Servos, Servo Control Cables, and associated hardware	<ul style="list-style-type: none"> a) Using a flashlight, inspect the GSA 87 servos, connectors, support structure, and control cables to ensure that no corrosion, chafing, cracks, or other defects exist. b) Have an assistant manually move the control surfaces from stop to stop and visually observe the servo and control cabling/chain. Ensure there is no binding in the control cabling or chain, that the capstan/sprocket rotates freely, and that there is no rough turning or noise from the servo bearings. c) Check the servo control cables in accordance with AC 43.13-1B, Chapter 7, Section 8, Paragraph 7-149 to ensure no fraying, corrosion, or other damage exists. If the condition of any cable is questionable, replace it with a new one. d) Check the tension on the servo control cables. Refer to the appropriate Install Manual Addendum for the aircraft type for cable tension specifications: e) Ensure that each cable is correctly attached to the clamps. f) Visually inspect the hydrophobic vents on the GSA 87 servos to ensure that there is no debris present. g) Visually inspect the condition of lock nuts, cable guard support plate, cable guard posts, self-locking castle nuts, cotter pin, split lock washer, flat washer and the output shaft to ensure no corrosion, cracks, or other defects exist. h) For continuous travel servos only (p/n 011-03780-01), visually inspect the condition of the idler pulley, shaft, washer, and E-ring, to ensure no corrosion, chafing, cracks, or other defects exist. 	

Table 4-3 – Lightning Strike Inspection Procedure

Item	Description/Procedure	Initials
GMC 605, GI 285 (if installed), GSA 87	In the event of a suspected or actual lightning strike to the aircraft, the bonding components for the GFC 600 AFCS (bonding straps, mounting hardware etc.) must be inspected. If any damage is found, damaged components must be replaced in accordance with specifications and procedures shown in Section 6. If any bonding components are replaced, measure the resistance between the replaced component and aircraft ground. Verify the resistance is less than or equal to 2.5mΩ.	

4.5 Electrical Bonding Test

The following bonding tests are provided for aircraft that have a GFC 600 AFCS installed as a requirement beyond any that may be given in the aircraft maintenance manual.

4.5.1 Requirements

All GFC 600 equipment must be installed. For the GMC 605 and GI 285, the tests are performed with the connectors connected. For the GSA 87, tests are conducted with the connector disconnected. Gain access for the procedure listed below in Section 4.5.3 as required and in accordance with the aircraft maintenance manual. It is recommended that these tests are conducted after visual inspection of the zone to minimize access requirements.

4.5.2 Test Equipment

A milliohm meter and Kelvin probes are recommended for this test. However, an alternate method may be used to provide equivalent results by using the following procedure and a standard voltmeter, power supply with adjustable current limit, and ammeter. The test set up for this alternate method is described below.

All test equipment used for the bond checks must be calibrated.

1. Connect the positive lead of the power supply to airframe ground. Connect/touch the positive lead of the voltmeter to the same point.

NOTE

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

2. Touch negative lead of power supply to each of the test points listed while performing Step 3. At each required point, configure the power supply to produce 1 amp before measuring voltage. (Use an ammeter to ensure current is within minimum of 1 amp ±100 milliamp at each point). Do not allow the reference current to exceed 1.5 amps for safety.
3. With the current set to 1A, the voltage reading will be the value of the bonding resistance. Set the voltmeter to measure millivolts and null the reading. Measure the voltage from airframe ground (step 1) to each required test points and record the voltage. (Perform Step 2 at each required point and ensure that minimum of 1 amp ±100 milliamp is present when measuring the voltage.)

TIP: When a 1A current is used all the millivolt readings are the same as mΩ, and required no further calculation of bond resistance. If 1 amp reference current cannot

be maintained and is higher divide the measured voltage by current to get the resistance value. Alternatively, calculate the percentage increase in current and then reduce the measured voltage reading by the same percentage. Example: If the measured current is 1.2 amps, (20% high from the desired 1 amp current) and the measured voltage is 3.0 mV, then the value recorded will be 3 mV reduced by 20% which is 2.4 mV which is the same as 2.4 mΩ.

4.5.3 Electrical Bonding Procedure

Using one of the two measurement methods in Section 4.5.2 record the bonding measurement for the following equipment. Some equipment in the list is optional and may not be installed.

Ensure that the measurements do not exceed the values shown in Table 2-2. If the values exceed those listed, perform the reconditioning procedure in Section 2.4.

- GMC 605 case: _____ mΩ
- GI 285 case: _____ mΩ
- GSA 87 (Roll) chassis: _____ mΩ
- GSA 87 (Pitch) chassis: _____ mΩ
- GSA 87 (Pitch Trim) chassis: _____ mΩ
- GSA 87 (Yaw Damper) chassis: _____ mΩ

4.6 Sonalert Functional Test

If a Sonalert is installed, perform the Sonalert Functional Test at the intervals specified in Table 4-1.

1. Apply external electrical power to the aircraft and avionics systems.
2. Ensure that the GFC 600 AFCS passes PFT.
3. Engage the autopilot by pressing the AP button on the GMC 605.
4. Disengage the autopilot by pressing the AP DISC/TRIM INT switch on the pilot's flight controls.
5. Verify that the normal autopilot disconnect tone plays through the sonalert. **NOTE:** *The normal autopilot disconnect sonalert tone is a continuous 2000 Hz tone that plays for approximately 10 seconds.*
6. Engage the autopilot by pressing the AP button on the GMC 605.
7. Pull the AUTOPILOT circuit breaker.
8. Verify that the abnormal autopilot disconnect tone plays through the sonalert until the GMC 605 powers down completely. **NOTE:** *The abnormal autopilot disconnect sonalert tone is a continuous 2000 Hz tone.*

5. Troubleshooting

This section provides information to assist with troubleshooting if problems occur. See the GFC 600 AFCS Configuration Log retained in the aircraft permanent records for a list of the interfaced equipment and system configuration data. When troubleshooting the GFC 600 AFCS, refer to the interconnect diagrams retained with the aircraft permanent records.

Before troubleshooting the GFC 600 AFCS, ensure that system configuration settings match those recorded in the completed GFC 600 AFCS Configuration Log that is retained in the aircraft permanent records.

5.1 GMC 605 Configuration Mode Test Faults

During initial installation, or during certain periodic maintenance tasks, there may be tests done in configuration mode. During these tasks, there could be fault messages displayed. Refer to Table 5-1 below for troubleshooting steps.

Table 5-1 – Configuration Mode Test Faults

Procedure	Annunciated Fault	Possible Cause	Troubleshooting Approach
Engine Run-Up test OR	TEST FAILED: TIMEOUT	Data communications failure	Check system wiring.
Pitch/Roll Offset Calibration test	TEST FAILED: INVALID READY STATE	Mounting orientation in configuration is incorrect or the sub-procedure is not known	Ensure that configuration settings are the same as those retained with the aircraft records.
	TEST FAILED: AIRCRAFT IN MOTION	Aircraft is moving, or incorrect sensor calibration, or sensor failure, or incorrect air data information.	Make sure that GMC 605 rack is mounted as shown in the Installation manual Verify valid GPS or air data is available to the GMC.
	TEST FAILED: GRS NOT CALIBRATED	Sensor calibration is not done. Inertial and temperature sensor calibration data may be corrupted.	Contact Garmin Aviation Product Support using the contact information in Section 1.7
	TEST FAILED: UNKNOWN FAILURE	AHRS provided invalid failure code	Contact Garmin Aviation Product Support using the contact information in Section 1.7
Engine Run-Up test	TEST FAILED: CHECK RESULTS	Test completed with no errors, but not all sub-tests passed. Check results page.	Cycle power to the GFC 600 AFCS and repeat the test. If test fails again, contact Garmin Aviation Product Support

			using the contact information in Section 1.7.
	TEST FAILED: INERTIAL MEASUREMENT PROCESSING ERROR	Test completed with inertial measurement processing error.	Cycle power to the GFC 600 AFCS and repeat the test. If test fails again, contact Garmin Aviation Product Support using the contact information in Section 1.7.
Pitch/Roll Offset Calibration test	TEST FAILED: INVALID TILT	AHRS tilt sensor or accelerometer failure. Sensor is bad or calibration data corrupted.	Replace the GMC 605.
	TEST FAILED: INVALID PITCH OFFSET	Zero pitch/roll cal with non-zero pitch value. Pitch offset value out of pre-defined range.	Check aircraft level and repeat test.
	TEST FAILED: INVALID ROLL OFFSET	Zero pitch/roll cal with non-zero roll value	Check aircraft level and repeat test.
	TEST FAILED: RESULT NOT SAVED	Non-volatile storage failed.	Replace the configuration module or air data module.
	TEST FAILED: CRC FAILED	Data communications failure or incorrect data content	Check configuration module or Air Data Module wiring.

5.2 GMC 605 Normal Mode Failure Annunciations

During normal operation of the GFC 600 AFCS, the GMC 605 may annunciate a failure. Consult Table 5-2 below for assistance in troubleshooting.

Table 5-2 – Normal Mode Failures

Annunciated Fault	Possible Cause	Troubleshooting Approach
AP FAIL	GI 285 failure	Check that the GI 285 electrical connector is securely attached. Verify wiring between GMC 605 and GI 285.
	Servo failure	Check each servo and verify that the electrical connectors are securely attached. Verify wiring between GMC 605 and all installed servos.

	Invalid attitude (including AHRS monitor and attitudes outside engage limits)	Recycle GFC 600 power. Verify wiring between GMC 605 and Air Data Computer (or ADM). Verify wiring between GMC 605 and GPS 232 connections.
	AP Disconnect in invalid state	Ensure that the AP DISC / TRIM INT switch is not stuck or shorted. Verify wiring between GMC 605 and AP DISC/TRIM INT Switch.
AIRDAT FAIL	Air Data Inputs have failed	If the system is interfaced to an air data computer, verify that the air data computer is functioning properly.
		If the system includes an ADM, verify that the ADM wiring harness is securely attached to the mating connector on the ADM and that there are no chafed or broken wires.
		Ensure that the pitot and static systems are free of debris and obstructions.
P TRIM FAIL	Pitch Trim Servo failure	Check the pitch trim servo and verify that the electrical connector is securely attached. Verify wiring between Pitch Trim Servo and GMC 600. Verify that the aircraft has a pitch trim servo installed. If it does not, verify the configuration of the GMC 605.
	Stuck TRIM switch	Check the trim switch and ensure that both halves operate smoothly in both directions. Verify wiring between the trim switch and the GMC 605.
ESP FAIL	PFT not passed Invalid Attitude (including AHRS monitor and attitudes outside engage limits)	Recycle GFC 600 power. Verify wiring between GMC 605 and Air Data Computer (or ADM). Verify wiring between GMC 605 and GPS 232 connections.
	GI 285 failure	Check that the GI 285 electrical connector is securely attached. Verify wiring between the GI 285 and the GMC 605.
	Servo failure (Pitch, Roll, or Pitch Tim)	Check each servo and verify that the electrical connectors are securely attached. Verify wiring between the GMC 605 and the servos.
	AP Disconnect in invalid state	Ensure that the AP DISC / TRIM INT switch is not stuck or shorted. Verify wiring between AP DISC/TRIM IT switch and the GMC 605.
YD FAIL	Yaw Damper Servo failure	Check the yaw damper servo and verify that the electrical connector is securely attached. Verify wiring between the Yaw Damper Servo and the GMC 605.

	AP Disconnect invalid state	Ensure that the AP DISC / TRIM INT switch is not stuck or shorted. Verify wiring between AP DISC/TRIM IT switch and the GMC 605
	Invalid Attitude (including AHRS monitor and attitudes outside of engagement limits)	Recycle GFC 600 power. Verify wiring between GMC 605 and Air Data Computer (or ADM). Verify wiring between GMC 605 and GPS 232 connections.
PFT FAIL	Servo failure	Check each servo and verify that the electrical connectors are securely attached. Verify wiring between GMC 605 and all installed servos.
	Interface failure	Check all interface wiring and verify there are no open wires or shorts to ground.
	GI 285 failure	Check that the GI 285 electrical connector is securely attached. Verify wiring between the GI 285 and the GMC 605.
	AP Disconnect invalid state	Ensure that the AP DISC / TRIM INT switch is not stuck or shorted. Verify wiring between AP DISC/TRIM IT switch and the GMC 605
	Invalid attitude	Recycle GFC 600 power. Verify wiring between GMC 605 and Air Data Computer (or ADM). Verify wiring between GMC 605 and GPS 232 connections.
MANIFEST	One or more units is not reporting the expected software version to the GMC 605.	Recycle GFC 600 power. Verify wiring between GMC 605 and GSA 87's and GI 285 (if installed). Reload software (refer to Section 8.1)

5.3 GMC 605 Troubleshooting

Symptom	Recommended Action
Display blank	<ul style="list-style-type: none"> Check power/ground wiring for GMC 605 unit.
AP will not engage	<ul style="list-style-type: none"> Verify that PFT has passed (cycle AUTOPILOT breaker to cause PFT to restart). Verify wiring to external sensors. Verify wiring to servos.
Failure message displayed on screen	Refer to Section 5.2 for specific troubleshooting.

5.4 GSA 87 Troubleshooting

Symptom	Recommended Action
PFT will not pass	<ul style="list-style-type: none"> Verify wiring between GMC 605 and GSA 87. Verify power/ground wiring to GSA 87.
Servo will not engage (no control resistance felt)	<ul style="list-style-type: none"> Verify wiring of AP DISC/TRIM INT wiring from circuit breaker through AP DISC/TRIM INT switch to the servo Verify cable tensions.

5.5 GI 285 Troubleshooting

Symptom	Recommended Action
No annunciations visible	<ul style="list-style-type: none"> Recycle AUTOPILOT circuit breaker to cause PFT to start. All annunciations will flash briefly during PFT. Verify power/ground wiring to GI 285 Verify wiring between GI 285 and GMC 605.

5.6 Backshell/Backplate Connectors

The following figures depict the unit connectors, with views as described.

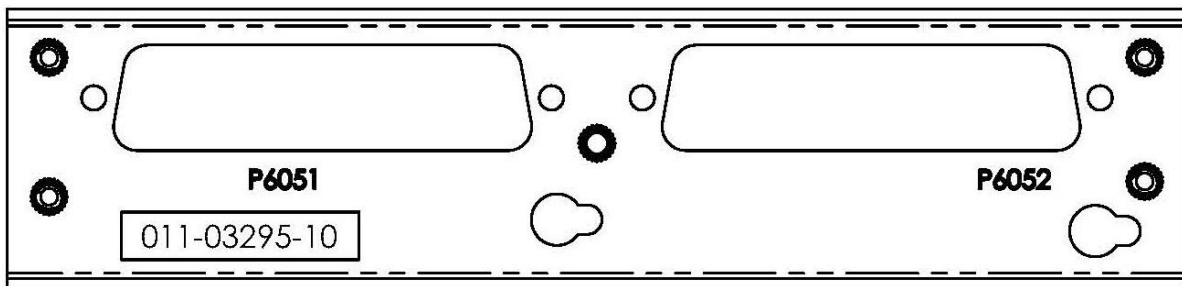


Figure 5-1 – GMC 605 Backplate, viewed from rear of rack

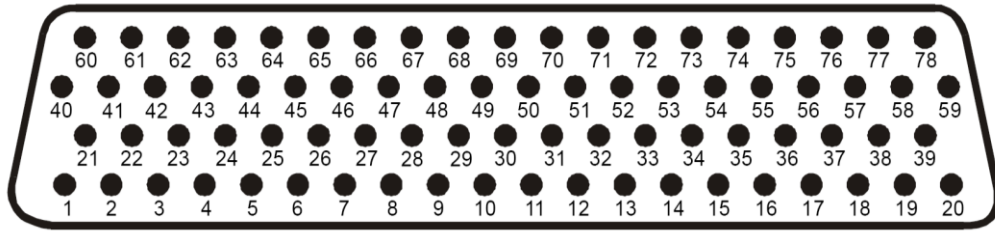


Figure 5-2 – GMC 605 Connector View from Wire Entry (P6051 and P6052)

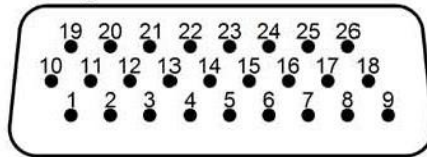


Figure 5-3 – GSA 87 Connector View from Wire Entry (1P871, 2P871, 3P871, 4P871)

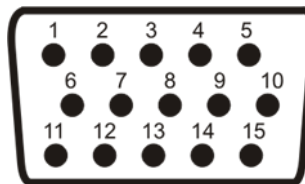


Figure 5-4 – GI 285 Connector from Unit Side (P2851)

6. Equipment Removal & Installation

This section describes how to remove and replace equipment associated with this STC. After removal and replacement, the system must be configured and tested as described in Section 7. Refer to the model-specific Installation Manual Addendums for unit locations and details. Refer to the Master Drawing List, 005-01009-01 for the applicable addendum part number.

CAUTION:

When removing and/or replacing any GFC 600 component, always ensure that aircraft power is off. Unplug any auxiliary power supplies.

NOTE:

MS21044-XX self-locking nuts are for one time use only and must be replaced if removed.

6.1 GMC 605

Removal:

1. De-energize the GFC 600 system by pulling the AUTOPILOT circuit breaker.
2. Insert a 3/32" hex drive tool into the access hole at the bottom of the face of the unit.
3. Turn the hex drive tool counterclockwise until the tool stops.
4. Pull the unit from the rack.

Reinstallation:

NOTE:

Ensure the position of the GMC 605 retention mechanism is correct by inserting a 3/32" hex drive tool into the access hole at the bottom of the face of the unit and turning the tool counterclockwise until it fully stops.

1. Visually inspect the connector and pins for signs of damage. Repair any damage.
2. Slide the unit into the rack until it stops.
3. Insert a 3/32" hex drive tool into the access hole at the bottom of the face of the unit.
4. Gently push on the GMC 605 bezel while turning the tool clockwise until the unit is securely seated in the rack. Do not exceed 8 in-lbs. of torque.
5. Perform a software load (if required) and functional check of the GMC 605 as required per Section 7.1.

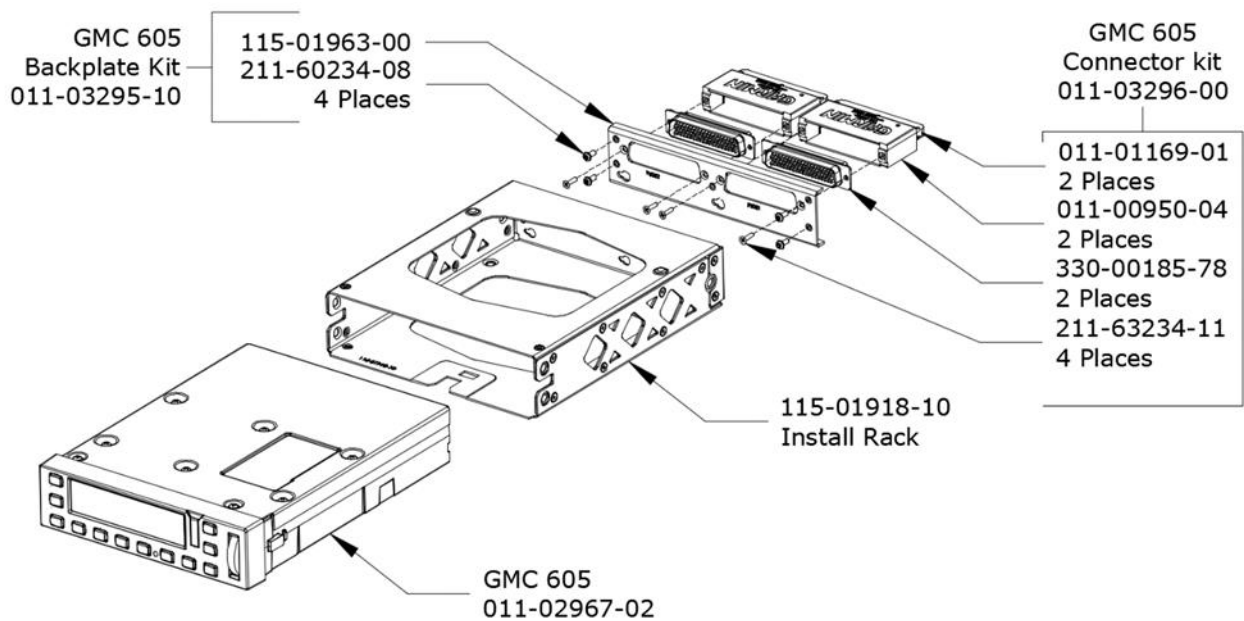


Figure 6-1 – GMC 605 Installation and rack/backplate assembly

6.2 GI 285

Removal:

1. De-energize the GFC 600 system by pulling the AUTOPILOT Circuit breaker.
2. Insert a 3/32" hex drive tool into the access hole at the bottom of the face of the unit.
3. Turn the hex drive tool counterclockwise until the hex drive tool stops.
4. Pull the unit from the rack.
5. Detach P2851 from the mating connector on the GI 285.

Reinstallation:

NOTE:

Ensure the position of the GI 285 retention mechanism is correct by inserting a 3/32" hex drive tool into the access hole at the bottom of the face of the unit and turning the tool counterclockwise until it fully stops.

1. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
2. Reattach P2851 to the mating connector on the GI 285.
3. Slide unit into the rack until it stops.
4. Insert a 3/32" hex drive tool into the access hole at the bottom of the face of the unit.
5. Push on the left side of the GI 285 bezel while turning the hex drive tool clockwise until the unit is securely seated in the rack. Do not exceed 8 in-lbs of torque.
6. Perform a functional check of the GI 285 per Section 7.3.

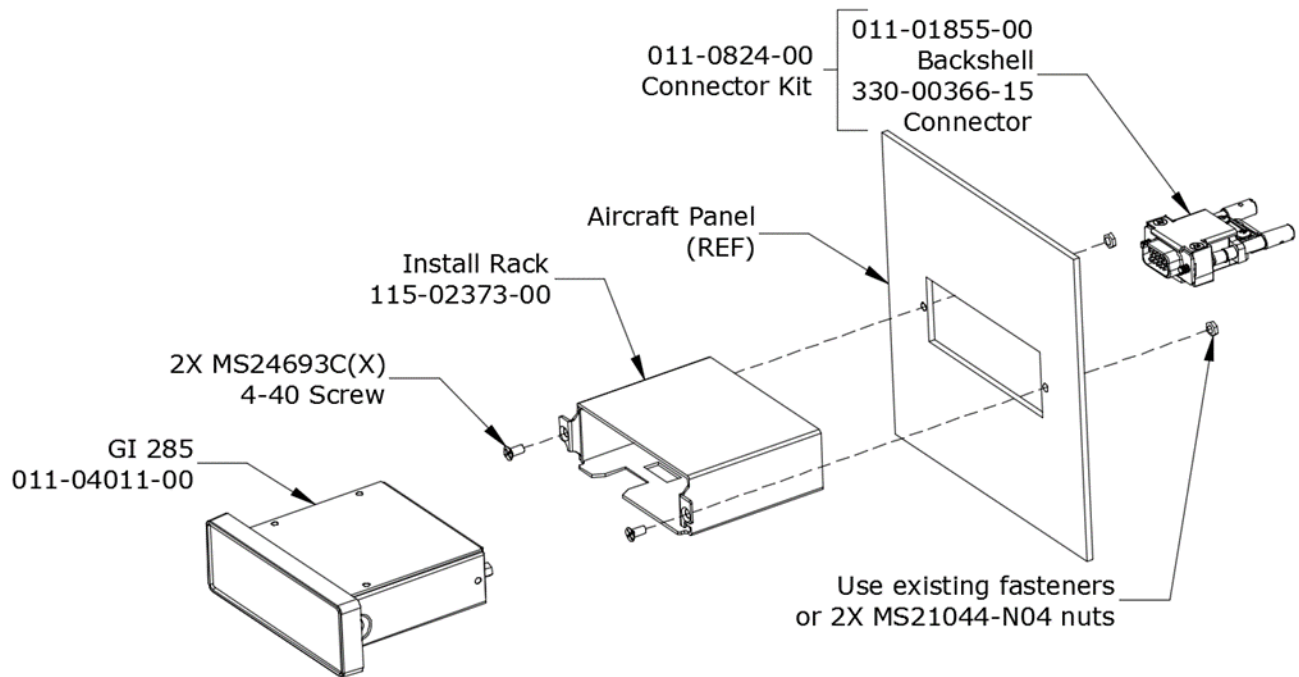


Figure 6-2 – GI 285 Installation

6.3 GSA 87 Servos

Removal:

1. Ensure that there is no electrical power to GSA 87 servos by pulling the AUTOPILOT circuit breaker and AUTOPILOT DISC circuit breaker (14 VDC aircraft only).
2. Disconnect the electrical connector from the mating connector on the servo as necessary (1P871 Roll, 2P871 Pitch, 3P871 Pitch Trim, 4P871 Yaw).
3. Remove the servo using the data provided in the appropriate model-specific installation manual addendum. Refer to the Master Drawing List 005-01009-01.

Reinstallation:

1. Visually inspect the connectors to ensure there are no bent or damaged pins. Repair any damage.
2. Reinstall the servo using the data provided in the appropriate model-specific installation manual addendum. Refer to the Master Drawing List 005-01009-01.
3. Reconnect the electrical connector (1P871 for Roll, 2P871 for Pitch, 3P871 for Pitch Trim, or 4P871 for Yaw, as applicable) to the mating connector on the servo.
4. Perform a functional check of the GSA 87 per Section 7.2

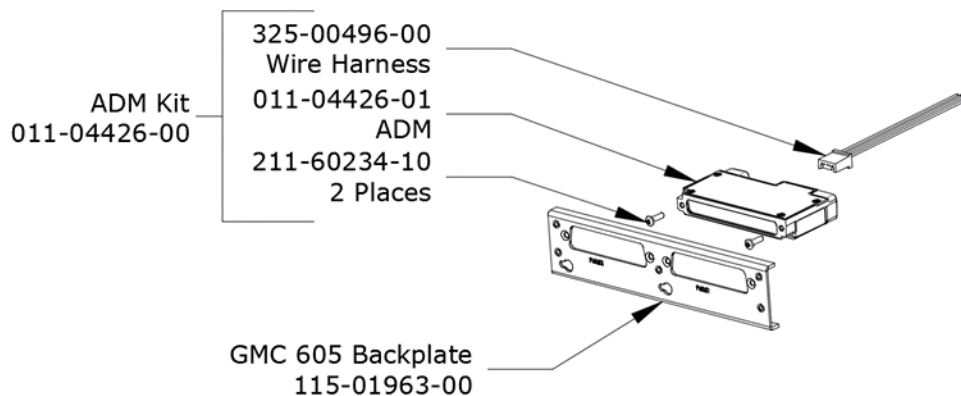
6.4 Air Data Module (ADM)

Removal:

1. Verify that the GFC 600 is de-energized by pulling the AUTOPILOT circuit breaker.
2. Remove the GMC 605 per Section 6.1.
3. Disconnect the pitot and static hoses from the ADM.
4. Detach the ADM wiring harness from the mating connector on the ADM by depressing the lock tab and pulling on the connector.
5. Loosen the two attaching screws (in the GMC 605 rack) and slide the ADM to disengage from the key slot holes in the rack.

Reinstallation:

1. Insert the two screws partially into the ADM.
2. Engage the ADM mounting screws in the key slot holes.
3. Slide the ADM to fully engage the key slots. Note that the ADM screws must be installed through both the rack and the backplate assembly.
4. Tighten the mounting screws.
5. Connect the ADM wiring harness by lining up the connector and inserting it until the lock tab engages.
6. Connect the pitot and static hoses to the appropriate ports on the ADM.
7. Reinstall the GMC 605 per Section 6.1.
8. Perform a functional check of the ADM per Section 7.5.
9. Perform a functional check of the GMC 605 per Section 7.1.



Note: Partially install screws so the head can pass through the key hole in the backplate. Backplate must be secured to the rack before installing the ADM.

Figure 6-3 – ADM Installation

6.5 Configuration Module Removal & Replacement

NOTE

Garmin Configuration Modules are not ESD sensitive. Configuration modules do not require special ESD protection for handling during installation or maintenance.

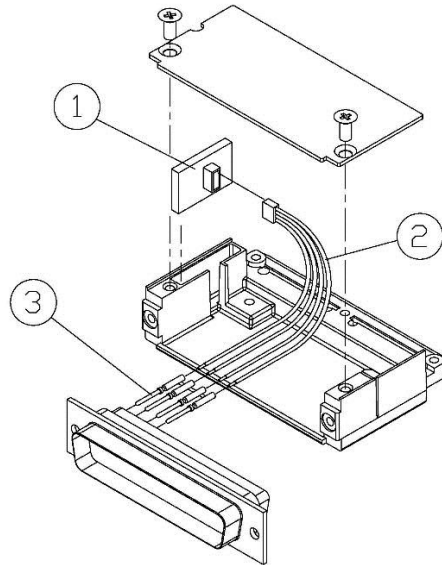


Figure 6-4 – Configuration Module Installation

Table 6-1 – Configuration Module Kit

Item	Description	Qty Needed	Garmin Part Number
1	Potted Configuration Module PCB Board Assembly w/EEPROM & Temp Sensor	1	011-02178-00
2	Cable, 4-Conductor Harness	1	325-00122-00
3	Pins, #22 AWG (HD)	4	336-00021-00

Removal:

1. De-energize the GFC 600 system by pulling the AUTOPILOT circuit breaker.
2. Remove the GMC 605 per Section 6.1.
3. Loosen the four screws holding the backplate assembly to the rack.
4. Slide the backplate assembly up to disengage the key hole slots in the rack.
5. Remove connector P6052 from the backplate by removing the two attaching screws.
6. Remove the backshell cover from P6052 by removing the two screws.
7. Disconnect the configuration module wiring harness from the configuration module.
8. Remove the configuration module from the backshell.

Installation:

1. Visually inspect the connector to ensure there are no bent or damaged pins. Repair any damage
2. Place configuration module in position.
3. Insert connector into configuration module.
4. Assembly of the connector is the reverse of disassembly.
5. Checkout per Section 7.4.

7. Garmin GFC 600 LRU Replacement/Configuration & Testing

This section provides procedures to be followed after a piece of GFC 600 equipment is replaced. At the beginning of each LRU section, instructions are given to guide the technician for various removal/replacement scenarios. These instructions define necessary procedures to be followed for situations where original equipment was reinstalled as well as for situations where new equipment (new serial number) is installed.

7.1 GMC 605

Original GMC 605 Reinstalled

If the removed GMC 605 is reinstalled, no software or configuration loading is required. This does not include units that were returned for repair as their software and configuration files are deleted during the repair testing process. Continue to GMC 605 Test Procedure, Sections 9.3 and 9.4.2.

New Repair or Exchange GMC 605 Installed

If a new, repaired or exchanged GMC 605 is installed, the correct software must be loaded to the unit. Refer to Section 8.1 for software loading procedures. If the configuration module or ADM is left in place, no configuration is necessary. Continue to the GMC 605 Test Procedure, Section 9.3 and 9.4.2.

7.2 GSA 87 Servo

Original GSA 87 Reinstalled

No software/gains loading is required if the removed GSA 87 is re-installed. This does not include units that were returned for repair as their software and gains files are deleted during the repair testing process. Continue to the applicable GSA 87 Test Procedure for the servo that was replaced:

Section 9.3 and 9.4.1.1 for Roll Servo

Section 9.3 and 9.4.1.2 for Pitch Servo

Section 9.3 and 9.4.1.3 for Pitch Trim Servo

Section 9.3 and 9.4.1.4 for Yaw Damper Servo

New, Repaired or Exchange GSA 87 Installed

If a new, repaired or exchanged GSA 87 is installed, the correct software and gains files must be loaded to the unit. Refer to Section 8.1 for software loading procedures. Continue to the applicable GSA 87 Test Procedure for the servo that was replaced:

Section 9.3 and 9.4.1.1 for Roll Servo

Section 9.3 and 9.4.1.2 for Pitch Servo

Section 9.3 and 9.4.1.3 for Pitch Trim Servo

Section 9.3 and 9.4.1.4 for Yaw Damper Servo.

7.3 GI 285 AFCS Mode Annunciator

Original GI 285 Reinstalled

No software or configuration loading is required for the GI 285. Continue to the return-to-service checks in Section 9.3.

New, Repaired or Exchange GI 285 Installed

If a new, repaired or exchange GI 285 is installed, perform the return to service checks in Section 9.3.

7.4 Configuration Module

Original Configuration Module Reinstalled

No configuration is required if the removed configuration module is re-installed. Continue to the return-to-service checks in Section 9.3 and 9.4.2.

New, Configuration Module Installed

If a new configuration module is installed, the system must be reconfigured in accordance with Section 8.3 using the original configuration data that is kept with the aircraft permanent records. Continue to Section 9.2, 9.3, and 9.4.2 for return to service tests.

7.5 Air Data Module (ADM)

Original ADM is Reinstalled

No configuration is required if the removed ADM is re-installed. Perform a pitot/static system leak check in accordance with Section 9.1 if the pitot/static lines were disconnected. Continue to Section 9.3 and 9.4.2 for return to service tests.

New ADM is Installed

If a new ADM is installed, the system must be reconfigured in accordance with Section 8.3 using the original configuration data that is kept with the aircraft permanent records. Perform a pitot/static leak check in accordance with Section 9.1 . Continue to Sections 9.2, 9.3, and 9.4.2 for return to service tests.

8. GFC 600 Software Load and Configuration Procedures

NOTE:

To start the GMC 605 in configuration mode, ensure the system is de-energized, then press and hold the FD button while applying power to the system. Release the FD button when the splash screen is displayed. Press the HDG button when CONT is displayed on the GMC 605.

Use the NOSE UP/DN thumbwheel on the GMC 605 to scroll up and down through the page selections. Use the IAS and VS buttons on the GMC 605 to move the cursor to the left or right, respectively. The VS button is also used to accept the desired selections.

8.1 GMC 605 and GSA 87 Software Loading

1. Go to the Dealer Resource Center at www.garmin.com and download the appropriate software loader image as specified on the Equipment List, 005-01009-05.
2. Execute the file to load the software to a USB flash drive.
3. Ensure that power is not applied to the GMC 605 by pulling the AUTOPILOT circuit breaker.
4. Connect the USB flash drive to the GMC 605 using a USB adapter cable (p/n 320-00726-00 or 320-00726-01).
5. Press and hold the HDG button on the GMC 605 while applying power to the GMC 605.
6. When the splash screen appears, release the HDG button.
7. Remove power from the GMC 605 by pulling the AUTOPILOT circuit breaker.
8. Start the GMC 605 in configuration mode.
9. Navigate to the SYS -> SW UPLOAD page.
10. Start the software upload process. When the software upload process is complete, a results screen will display. Press HDG to continue.
11. The GMC 605 will restart in normal mode. After the GMC 605 restarts, verify that the version number in the lower right corner of the splash screen matches the version number on the equipment list, 005-01009-05.
12. Remove the USB adapter cable and flash drive from the GMC 605.
13. Press HDG to continue from the splash screen.
14. Verify that the unit passes PFT, and does not display a MANIFEST message on the screen.

8.2 GI 285 Software

The GI 285 comes preloaded with the correct software and is not field loadable. No load procedure is required.

8.3 GFC 600 System Configuration

Configure the GFC 600 AFCS to the original configuration settings which are retained with the aircraft permanent records.

Each configuration item is saved to the configuration module or ADM (if installed) as it is made. When the configuration item is selected by pressing the VS button to accept the value, the new value is stored in the configuration module or ADM at that time.

The following is a block diagram of the GMC 605 configuration pages:

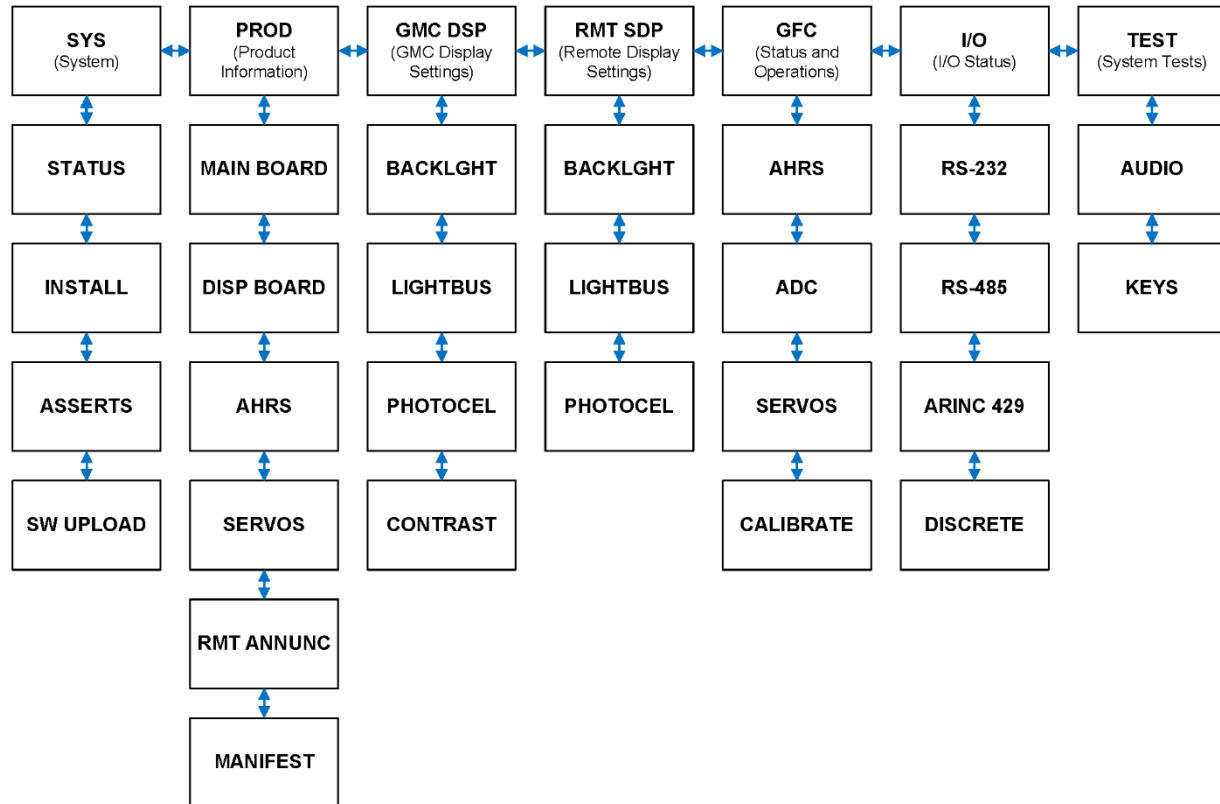


Figure 8-1 – Configuration Pages Block Diagram

NOTE:

To start the GMC 605 in configuration mode, ensure the system is de-energized, then press and hold the FD button while applying power to the system. Release the FD button when the splash screen is displayed. Press the HDG button when CONT is displayed on the GMC 605.

Use the NOSE UP/DN thumbwheel on the GMC 605 to scroll up and down through the page selections. Use the IAS and VS buttons on the GMC 605 to move the cursor to the left or right, respectively. The VS button is also used to accept the desired selections.

Only the SYS -> INSTALL, GMC DSP, RMT DSP, and GFC -> CALIBRATE pages are used for configuring the system. All of the other pages displayed while in configuration mode provide system information that is useful for maintenance and troubleshooting.

To exit configuration mode, cycle power to the GFC 600 system.

Configure the system using the following sections when the configuration module or ADM is replaced.

8.3.1 SYS -> INSTALL Pages

1. Navigate to the SYS -> INSTALL pages on the GMC 605.
2. Move the cursor through each of the following configuration items on INSTALL page 1/2 to make the appropriate selections:

Configuration Item	Setting	Notes
PTRM	YES or NO	Select YES if the installation includes a pitch trim servo. Otherwise, select NO.
YAW DAMPER	YES or NO	Select YES if the installation includes a yaw damper servo. Otherwise, select NO.
GI 285	YES or NO	Select YES if the installation includes a GI 285 remote mode annunciator panel. Otherwise, select NO.
HSI/DG	NO, KI525, CENT NSD, 52D54, or G502A	Select NO if the system is interface to a Garmin GDU, or if the installation does not include an HSI or DG interface. Select KI525 if the system is interfaced to a KI-525A, Aspen EFD1000, or Sandel SN 3500 or SN 4500. Select CENT NSD if the system is interfaced to a Century NSD 360 or NSD 1000. Select 52D54 if the system is interfaced to an EDO Aire 52D54 or Sigmatek 4000C Series directional gyro. Refer to the manufacturer's data to determine equivalency for specific dash numbers Select G502A if the system is interfaced to an ARC G502A or Sigmatek 4000D or 4000H series directional gyro. Refer to the manufacturer's data to determine equivalency for specific dash numbers.

3. Select INSTALL page 2/2.
4. Move the cursor through each of the configuration items on page 2/2 to set the following configuration items:

Configuration Item	Setting	Notes
FLT DIR	NO, GDU, ASPEN	Select NO if the system is not interfaced to a flight director. Select GDU if the system is interfaced with a Garmin GDU. Select ASPEN if the system is interfaced to an Aspen EFD1000 flight director.
GPS ROLSTR	YES or NO	Select YES if ARINC 429 or HSDB roll steering is provided directly to the GMC 605. Otherwise, select NO.
GPS DEV	ANGULR or LINEAR	Select ANGULR for any TSO-C146 (WAAS) GPS Select LINEAR for any non-WAAS GPS.

8.3.2 GMC DISP Pages

NOTE: Make sure that the GMC 605 display and key brightness levels match the lighting levels of other equipment in the instrument panel under night lighting conditions.

Suggested default levels are provided in Install Manual Addendum (190-01937-XX).

1. Go to the GMC DSP -> BACKLIGHT page.
2. Move the cursor through each of the following configuration items and make the appropriate selections:

Configuration Item	Setting	Notes
SOURCE	PHOTOCELL, 14 VDC, 28 VDC, 5 VDC, 5 VAC	Select PHOTOCELL if the lighting level uses ambient lighting for photocell dimming, otherwise select the appropriate lighting bus voltage.
DSP MIN	0 - 100	Configures the minimum brightness of the display. The higher the number, the brighter the minimum brightness.
KEY MIN	0 - 100	Configures the minimum brightness of the keypad. The higher the number, the brighter the minimum brightness.

3. Go to the GMC DSP -> LIGHTBUS page.
4. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
SLOPE	0 - 100	Configures the sensitivity of the display and keys for any given lighting bus input level. Set the slope higher for a brighter display for a given increase in the lighting bus input level.
OFFSET	0 - 100	Adjusts the lighting level up or down for any given lighting bus input level. Use the offset setting to match lighting curves with other equipment in the panel.
TRANSITION	0 - 100	Configures a point on the photocell lighting curve. When the ambient lighting is below this point, the GMC 605 uses the photocell to adjust the display brightness.

5. Go to the GMC DSP -> PHOTOCEL page.
6. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
SLOPE	0 - 100	Configures the sensitivity of the photocell input level. Adjusting the slope higher results in a greater display brightness change for a given increase in the photocell input level.
OFFSET	0 - 100	Adjusts the lighting level up or down for any given photocell input level. Use the offset setting to match lighting curves with other equipment in the panel.

7. Go to the GMC DSP -> CONTRAST page.
8. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
OFFSET	-50 - 50	Manually configures the default contrast offset value from -50 to 50.

8.3.3 RMT DISP Pages

The following procedures must be completed when a GI 285 AFCS Mode Annunciator Panel is installed. Skip this section if a GI 285 is not installed.

NOTE: Make sure that the GMC 605 display and key brightness levels match the lighting levels of other equipment in the instrument panel under night lighting conditions.

Suggested default levels are provided in Install Manual Addendum (190-01937-XX).

1. Go to the RMT DSP -> BACKLIGHT page.
2. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
SOURCE	PHOTOCELL, 14 VDC, 28 VDC, 5 VDC, 5 VAC	Select PHOTOCELL if the lighting level uses ambient lighting, otherwise select the appropriate lighting bus voltage.
MIN	0 - 100	Configures the minimum brightness of the LEDs in the GI 285. The higher the number, the brighter the minimum brightness.

3. Go to the RMT DSP -> LIGHTBUS page.
4. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
SLOPE	0 - 100	Configures the sensitivity of the GI 285 for any given lighting bus input level. Set the slope higher for a brighter display for a given increase in the lighting bus input level.
OFFSET	0 - 100	Adjusts the lighting level up or down for any given lighting bus input level. Use the offset setting to match lighting curves with other equipment in the panel.
TRANSITION	0 - 100	Configures a point on the photocell lighting curve. When the ambient lighting is below this point, the GMC 605 uses the photocell to adjust the display brightness.

5. Go to the RMT DSP -> PHOTOCEL page.
6. Move the cursor through each of the following configuration items and make the appropriate selections.

Configuration Item	Setting	Notes
SLOPE	0 - 100	Configures the sensitivity of the photocell input level. Adjusting the slope higher results in a greater display brightness change for a given increase in the photocell input level.
OFFSET	0 - 100	Adjusts the lighting level up or down for any given photocell input level. Use the offset setting to match lighting curves with other equipment in the panel.

9. GFC 600 Return to Service Procedure

The following sections will verify the proper operation of the GFC 600 AFCS after maintenance has been performed on the system. Operational information regarding the GFC 600 AFCS can be found in the GFC 600 Pilot's Guide, p/n 190-01488-00.

9.1 Pitot and Static System Leak Check

If an Air Data Module (ADM) is installed in the system and if the pitot and/or static system were opened during maintenance, a pitot and static system leak check must be performed. Refer to the aircraft maintenance manual for pitot and static system leak test instructions.

NOTE: *Disable any ADS-B Transmitting equipment for this test to avoid interference with air traffic control.*

9.2 Configuration Mode Tests

Perform the following tests if the configuration module (or ADM) is replaced, or when the GMC 605 rack is removed or loosened.

9.2.1 Pitch/Roll Offset Calibration

NOTE: *Level the aircraft in accordance with the manufacturer's aircraft maintenance manual prior to applying external electrical power to the aircraft, existing avionics systems, and GFC 600 AFCS and starting the Pitch/Roll offset calibration test.*

NOTE: *Use the NOSE UP/DN thumbwheel on the GMC 605 to scroll up and down through the page selections. Use the IAS and VS buttons on the GMC 605 to move the cursor left or right, respectively. The VS button is also used to accept the desired selections.*

NOTE: *To exit configuration mode, cycle power to the GFC 600 system.*

1. Start the GMC 605 in configuration mode by pressing and holding the FD button while applying power to the system. Press the HDG button when CONT is displayed on the GMC 605.
2. Navigate to the GFC -> CALIBRATE -> PITCH/ROLL page.
3. Scroll through each of the pitch/roll calibration pages, following the instructions on each page to ensure that the system is ready for calibration.
4. Select BEGIN CALIBRATION to start the calibration process.
5. When the test is complete, select QUIT to return to the GFC -> CALIBRATE -> PITCH/ROLL page.

NOTE: *STATUS -> TEST IN PROGRESS will be displayed while the pitch and roll offset is being calibrated.*

NOTE: *Select QUIT to quit the calibration process if necessary.*

NOTE: *TEST COMPLETE: SUCCESS will be displayed if the process completes successfully.*

NOTE: *TEST COMPLETE: FAILURE will be displayed if the process does not complete successfully. Refer to Section 5.1 for troubleshooting tips.*

9.2.2 Engine Run-Up Test

WARNING:

Ensure that the aircraft is outside in a location where the engine(s) can be run safely. Make sure that all equipment and personnel are clear of the engine(s) and/or propeller(s) before proceeding with these tests.

1. With engine(s) running, and avionics powered, start the GMC 605 in configuration mode by pressing and holding the FD button while applying power to the GMC 605. Press the HDG button when CONT is displayed on the GMC 605.
2. Navigate to the GFC -> CALIBRATE -> ENGINE page.
3. Scroll through each of the engine run-up pages, following the instructions on each page to ensure that the system is ready for calibration.
4. Select BEGIN RUN-UP TEST to start the engine run-up test.

NOTE: *TEST IN PROGRESS. PRESS COMPLETE WHEN FINISHED will be displayed while the engine run-up test is in progress.*

5. Select COMPLETE when the test procedures have been completed.
6. Select GET RESUL to view the test results.
7. After viewing the test results, select QUIT to return to the GFC -> CALIBRATE -> ENGINE page.
8. Shut down the engine(s) in accordance with the appropriate airplane flight manual (AFM), airplane flight manual supplement (AFMS), or pilot's operating handbook (POH).

NOTE: *Select QUIT to quit the engine run-up test if necessary.*

NOTE: *If a TEST COMPLETE: FAILURE message is displayed, refer to Section 5.1 for troubleshooting tips.*

9.3 Pre-Flight Test (PFT)

Pre-Flight Test (PFT) is accomplished automatically by the GFC 600 AFCS after the system is powered up in normal mode and after the splash screen is acknowledged.

1. Apply electrical power to the aircraft.
2. After the GMC 605 displays the splash screen, push the HDG button to continue to normal mode operation.
3. Verify the following events occur during PFT.
 - a. GMC displays PFT on the display
 - b. GDU (if installed) displays PFT in black text on a white background at the top of the display
 - c. The three LED's on the face of the GMC 605 (next to the AP, FD, and YD buttons) are illuminated yellow for one second, then red for one second.
 - d. The GI 285 (if installed) illuminates all lateral mode annunciations in yellow for one second, followed by AP/YD/TRIM annunciations for one second, the all vertical mode annunciations in yellow for one second, then AP/YD/TRIM annunciations in red for one second.
4. Verify the following occur at the conclusion of PFT.
 - a. Normal autopilot disconnect tone (two high-low tones approximately two seconds in duration) is played through the cockpit speaker and headphones.
 - b. PFT is removed from the GMC 605 and GDU (if installed).
 - c. ESP roll indices are displayed at the appropriate left and right roll attitude on the GDU (if installed). Refer to the appropriate model-specific installation manual addendum for model specific information on the placement of the roll indices.

9.4 Normal Mode Tests

The tests in the following sections are performed with the system in normal mode.

NOTE: Throughout the following sections:

1. A normal autopilot disconnect will be accompanied by a normal disconnect aural alert (two high-low tones approximately two seconds in duration) through the cockpit speaker(s) and headphones and a continuous tone from the sonalert for approximately 10 seconds (if installed).
2. An abnormal disconnect will be accompanied by an abnormal disconnect aural alert (continuous high-low tones) through the cockpit speaker(s) and headphones and a continuous tone from the sonalert (if installed). The abnormal disconnect tones can be cancelled by pressing the AP button on the GMC 605 or the AP DISC/TRIM INT switch on the pilot's flight controls.
3. GFC 600 AFCS mode and status annunciations are displayed on the PFD only if the PFD is a Garmin GDU.
4. If the aircraft does not have a GI 285 AFCS mode annunciator, disregard any steps calling on the GI 285.
5. If the aircraft is not equipped with a flight director, disregard any steps for flight director command bars.
6. If the aircraft is not equipped with a pitch trim servo, disregard the steps for pitch trim servos.
7. If the aircraft is not equipped with a yaw damper servo, disregard the steps for yaw damper servos.
8. Depending on the aircraft and the control system, the pitch trim may run automatically at any time while the autopilot is engaged. If it gets to the end of its travel, an amber TRIM annunciation may appear. If this is causing undesirable results, press and hold the CWS switch while manually operating the aircraft trim wheel in the opposite direction. Release the CWS switch when the trim wheel is no longer on its stop.

9.4.1 Servo Tests

If a servo has been removed and reinstalled (or replaced), perform the following steps.

1. Load software as shown in Section 8.1.
2. Power the GFC 600 in normal mode.
3. Complete Pre-Flight Test (PFT) as shown in Section 9.2.
4. Proceed to the sub-section below as appropriate for the servo that has been replaced.

9.4.1.1 Roll Servo Functional Check

1. Verify that the steps in Section 9.4.1 have been completed.
2. Center the heading bug on the aircraft heading.
3. Engage the autopilot by pressing the AP button on the GMC 605.
4. Verify that the roll servo is restricting free movement of the flight controls.
5. Press the HDG button to engage roll mode.
6. Rotate the heading bug to the left of the current aircraft heading.
7. Ensure that the command bars indicate a left roll and that the servo drives the flight controls to the left.
8. Rotate the heading bug to the right of the current aircraft heading.
9. Ensure that the command bars indicate a right roll and that the servo drives the flight controls to the right.
10. Firmly grasp the control wheel and press the AP DISC/TRIM INT switch on the pilot's flight controls.
11. Verify that the roll control moves freely.

9.4.1.2 Pitch Servo Functional Check

1. Verify that the steps in Section 9.4.1 have been completed.
2. Center the flight controls approximately mid-travel.
3. Engage the autopilot by pressing the AP button on the GMC 605.
4. Verify that the pitch servo is restricting free movement of the flight controls.
5. Rotate the NOSE UP/DN thumbwheel UP three clicks.
6. Ensure that the flight director command bars indicate a pitch up and that the pitch servo drives the controls in a nose up direction. **NOTE:** *In some aircraft, some assistance may be needed to drive the flight controls against any counterweight or springs.*
7. Press and release the CWS switch to recenter the pitch reference.
8. Apply continuous forward pressure on the pitch control in a nose down direction.
9. Ensure that the pitch trim (if installed) begins running in the nose up direction.
10. Press and release the CWS switch to recenter the pitch reference.
11. Apply continuous aft pressure to the flight controls in a nose up direction.
12. Ensure that the pitch trim (if installed) begins running in the nose down direction.

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13. Press and release the CWS switch to recenter the pitch reference.
 14. Rotate the NOSE UP/DN thumbwheel DN three clicks.
 15. Ensure that the flight director command bars indicate a pitch down and that the pitch servo drives the controls in a nose down direction.
 16. Firmly grasp the control wheel and press the AP DISC/TRIM INT switch on the pilot's flight controls.
 17. Verify that the pitch control moves freely.

9.4.1.3 Pitch Trim Servo Functional Check (If Installed)

1. Verify that the steps in Section 9.4.1 have been completed.
2. Depress both halves of the PITCH TRIM switch on the pilot's flight controls in the NOSE UP direction.
3. Verify that the trim runs in the nose up direction.
4. While the trim is running, depress the AP DISC/TRIM INT switch on the pilot's flight controls and verify that the pitch trim stops running.
5. Depress both halves of the PITCH TRIM switch on the pilot's flight controls in the NOSE DN direction.
6. Verify that the trim runs in the nose down direction.
7. Manually adjust the trim all the way to the nose down stop.
8. While monitoring elapsed time, actuate both halves of the PITCH TRIM Switch on the pilot's flight controls in the NOSE UP direction until the trim runs against the nose up mechanical stop.
9. Verify that the elapsed time for full travel of the pitch trim is within the tolerances specified in the appropriate model-specific installation manual addendum (190-01937-XX).
10. While monitoring elapsed time, actuate both halves of the PITCH TRIM Switch on the pilot's flight controls in the NOSE DN direction until the trim runs against the nose down mechanical stop.
11. Verify that the elapsed time for full travel of the pitch trim is within the tolerances specified in the appropriate model-specific installation manual addendum (190-01937-XX).

9.4.1.4 Yaw Damper Functional Check (If Installed)

1. Verify that the steps in Section 9.4.1 have been completed.
2. Engage the Yaw Damper by pressing the YD button on the GMC 605.
3. Verify that resistance is felt in the rudder pedals.

9.4.2 GFC 600 Functional Checks

Perform the following test procedures when the configuration module (or ADM) is replaced or when the GMC 605 is replaced.

9.4.2.1 AFCS Switch Checks

1. If the GMC 605 was replaced, load the software in accordance with Section 8.1.
2. Power up the system in normal mode.
3. Complete Pre-Flight Test (PFT) as shown in Section 9.2.
4. Actuate both halves of the PITCH TRIM switch on the pilot's flight controls in the nose down (forward) direction.
5. Verify that the Pitch Trim Servo engages and drives the airplane trim system in a Nose Down direction.
6. Release the PITCH TRIM Switch.
7. Actuate both halves of the PITCH TRIM switch on the pilot's flight controls in the nose up (aft) direction.
8. Verify that the Pitch Trim Servo engages and drives the airplane trim system in a Nose Up direction.
9. Release the PITCH TRIM switch.
10. Engage the Autopilot by pressing the AP button on the GMC 605.
11. Actuate the left half of the PITCH TRIM switch in the nose down (forward) direction.
12. Verify that the Autopilot disengages, as evidenced by the following:
 - a. Normal Autopilot disconnect tone is played through the speakers and headsets.
 - b. Continuous tone played through the Sonalert for approximately 10 seconds.
 - c. Flashing yellow LED is illuminated next to the AP button on the GMC 605 for approximately 10 seconds.
 - d. Flashing yellow AP on the GI 285 for approximately 10 seconds.
 - e. Flashing yellow AP on the PFD for approximately 10 seconds.
13. Engage the Autopilot by pressing the AP button on the GMC 605.
14. Actuate the left half of the PITCH TRIM switch in the nose up (aft) direction.
15. Verify that the Autopilot disengages.
16. Engage the Autopilot by pressing the AP button on the GMC 605.
17. Actuate the right half of the PITCH TRIM switch in the nose down (forward) direction.
18. Verify that the Autopilot disengages.
19. Engage the Autopilot by pressing the AP button on the GMC 605.
20. Actuate the right half of the PITCH TRIM switch in the nose up (aft) direction.
21. Verify that the Autopilot disengages.
22. Engage the Autopilot by pressing the AP button on the GMC 605.
23. Press and hold the CWS Switch.
24. Verify the following:

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- a. CWS ON is displayed on the GMC 605.
 - b. The green LED next to the AP button on the GMC 605 begins flashing.
 - c. The white AP is displayed in place of the green AP on the GI 285.
 - d. White CWS is displayed in place of the green AP on the PFD.
 - e. Flight Controls move freely in the pitch and roll axes.
25. Release the CWS Switch.
 26. Press the AP DISC/TRIM INT switch on the pilot's flight controls.
 27. Verify that the autopilot disengages.
 28. Engage the Autopilot by pressing the AP Button on the GMC 605.
 29. Press the AP button on the GMC 605.
 30. Verify that the autopilot disengages but the YD remains engaged.
 31. Press the GO AROUND switch.
 32. Verify the following:
 - a. GA is annunciated for both lateral and vertical modes on the GMC 605.
 - b. GA is annunciated for both lateral and vertical modes on the GI 285.
 - c. GA is annunciated for both lateral and vertical modes on the PFD.
 - d. The green LED next to the FD button on the GMC 605 is illuminated.
 - e. The flight director command bars are displayed and indicate wings level and pitch up to the angle as shown on the appropriate Install Manual Addendum (190-01937-XX).
 33. Press the FD button on the GMC 605.
 34. Verify that the LED next to the FD button on the GMC 605 extinguishes and that the flight director command bars are no longer displayed.
 35. Press and hold the AP DISC/TRIM INT Switch for at least 5 seconds.
 36. Verify the ESP OFF message appears on the GMC 605.
 37. Engage the autopilot by pressing the AP button on the GMC 605.
 38. Verify that the ESP OFF message is removed from the GMC 605.
 39. Disengage the autopilot by pressing the AP DISC/TRIM INT switch on the pilot's flight controls.

9.4.2.2 Manual Electric Pitch Trim Speed Check

1. Manually adjust pitch trim fully against either mechanical stop.
2. Actuate the PITCH TRIM switch on the pilot's flight controls until the trim runs against the other mechanical stop while monitoring the run time.
3. Verify that the elapsed time for full travel of the pitch trim is within the range specified on the appropriate model-specific installation manual addendum (190-01937-XX).
4. Repeat the test in the opposite direction.

9.4.2.3 Interface Checks

NOTE: For systems that are interfaced to a Garmin GDU, ALTS and the selected altitude (in FT) will be displayed on the GMC, and ALTS will be displayed in white on the PFD. These annunciations are separately tested in Section 9.4.2.11 and may be ignored in all other sections of these procedures.

1. Set the heading bug to the current aircraft heading.
2. Engage the autopilot by pressing the AP button on the GMC 605.
3. Verify that ROL and PIT are displayed on the GMC 605 and that the green LED's next to the AP, FD, and YD buttons illuminate.
4. Verify that ROL, AP, YD, and PIT are displayed in green on the PFD and on the GI 285.
5. Verify that the flight director command bars are displayed in level pitch and roll attitude.
6. Press the HDG button on the GMC 605 to engage heading mode.
7. Verify that HDG replaces ROL on the GMC 605, the PFD, and the GI 285.
8. Adjust the heading bug to the left of the aircraft heading.
9. Verify that the flight director command bars indicate a left turn, and that the flight controls move toward the left.
10. Adjust the heading bug to the right of the aircraft heading.
11. Verify that the flight director command bars indicate a right turn, and that the flight controls move toward the right.
12. Center the heading bug at the aircraft heading.
13. Press and hold the CWS switch.
14. Center the aircraft pitch control while continuing to hold the CWS switch.
15. Release the CWS switch.
16. Click the NOSE UP/DN thumbwheel to the UP position four times.
17. Verify that the command bars indicate a fly up command and that the flight controls drive in the pitch up direction. **NOTE:** In some aircraft, it may be necessary to counteract any counterweight or control system springs to assist the servo.
18. Press and hold the CWS switch.
19. Center the aircraft pitch control while continuing to hold the CWS switch.
20. Release the CWS switch.
21. Click the NOSE UP/DN thumbwheel to the DN position four times.
22. Verify that the command bars indicate a fly down command and that the flight controls drive in the pitch down direction.
23. Press and release the CWS switch.
24. Press the AP DISC/TRIM INT switch to disengage the autopilot.

9.4.2.4 VOR Mode Check

1. Set the Course pointer on the CDI 15 degrees to the left of aircraft heading and ensure that the CDI is displaying VOR navigation information.
2. Simulate a VOR signal with a "TO" course equal to the aircraft heading.
3. Engage the autopilot by pressing the AP button on the GMC 605.
4. Verify ROL and PIT are displayed on the GMC 605.
5. Press the NAV button on the GMC 605.
6. Verify VOR is displayed below ROL on the GMC 605.
7. Verify that VOR is displayed in white with ROL, AP, YD, and PIT in green on the PFD and GI 285.
8. Verify that the flight director command bars are displayed in level pitch and roll attitude.
9. Slowly adjust the course pointer on the CDI toward the aircraft heading.
10. When the course pointer is approximately five degrees away from aircraft heading, verify that VOR replaces ROL on the GMC 605, that VOR displays green on the PFD and GI 285 and that ROL is not displayed on the PFD and GI 285.
11. Center course pointer on the aircraft heading.
12. Adjust the simulated course and the aircraft course pointer 20 degrees to the left of current aircraft heading.
13. Verify that the flight director command bars indicate a left turn and that the flight controls move toward a left turn.
14. Adjust simulated course to aircraft heading.
15. Press and hold the CWS switch while recentering the flight controls.
16. Adjust the simulated course on the nav test set and the aircraft course pointer 20 degrees to the right of current aircraft heading.
17. Verify that the flight director command bars indicate a right turn and that the flight controls move toward a right turn.
18. Adjust the simulated course to aircraft heading.
19. Press the NAV button on the GMC 605.
20. Verify ROL and PIT are displayed on the GMC 605, GI 285, and PFD.
21. Press the APR button.
22. Verify VAPP displays on the GMC 605 in place of ROL.
23. Disengage the autopilot.

9.4.2.5 GPS Mode Check

1. On the GPS Navigator, enter a Direct-To flight plan to an airport that is generally in front of the aircraft.
2. Ensure GPS is displayed on the CDI.
3. Engage the autopilot by pressing the AP button on the GMC 605.
4. Verify that ROL and PIT are displayed on the GMC 605.
5. Press the NAV button on the GMC 605.
6. Verify that GPS replaces ROL on the GMC 605, GI 285, and PFD.
7. Select OBS mode on the GPS navigator.
8. Adjust the OBS 3 degrees higher than the current DTK (Example: If the DTK is 272 degrees, adjust the OBS to 275 degrees).
9. Verify that the CDI moves to the left.
10. Verify that the flight director command bars indicate a left turn and that the flight controls drive to the left.
11. Adjust the OBS three degrees lower than the current DTK.
12. Verify that the CDI moves to the right.
13. Verify that the flight director command bars indicate a right turn and that the flight controls drive to the right.
14. Press the AP DISC/TRIM INT Switch to disengage the autopilot.

9.4.2.6 ILS APR (including LOC/BC) Checks

1. Simulate an ILS (Localizer and Glideslope) using a ramp tester.
2. Tune the NAV radio to the Localizer frequency
3. Set the CDI to display the ILS.
4. Set the signal generator to simulate 0.093 DDM Left and 0.091 DDM Up signals.
5. Adjust the course pointer to aircraft heading.
6. Engage the autopilot by pressing the AP button on the GMC.
7. Verify ROL and PIT are displayed on the GMC, GI 285, and PFD.
8. Press the APR button on the GMC 605.
9. Verify LOC and GS are the armed modes (smaller text below ROL and PIT on the GMC, and in white on the GI 285 and PFD).
10. Slowly center the LOC deviation on the test set.
11. Verify that LOC replaces ROL on the GMC 605 and LOC turns green and ROL is extinguished on the GI 285 and PFD.
12. Slowly center the GS deviation on the test set.
13. Verify that GS replaced PIT on the GMC 605 and GS turns green and PIT is extinguished on the GI 285 and PFD.
14. Apply left LOC deviation on the test set.

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15. Verify that the flight director command bars indicate a left turn and that the flight controls turn to the left.
 16. Apply right LOC deviation on the test set.
 17. Verify that the flight director command bars indicate a right turn and that the flight controls turn to the right.
 18. Apply up GS deviation on the test set.
 19. Verify that the flight director command bars indicate a pitch up and that the flight controls drive in the pitch up direction.
 20. Apply down GS deviation on the test set.
 21. Verify that the flight director command bars indicate a pitch down and that the flight controls drive in the pitch down direction.
 22. Press the AP DISC/TRIM INT switch to disengage the autopilot.

9.4.2.7 VNV Check

1. Press the VNV key on the GMC 605.
2. Verify that DISABLD KEY appears on the GMC 605.

9.4.2.8 IAS Mode Check

An air data test set is required for this section

NOTE: *Disable any ADS-B Transmitting equipment for this test to avoid interference with air traffic control.*

1. Set the air data test set to 3000 ft. altitude and 120 kts airspeed.
2. Engage the autopilot by pressing the AP button on the GMC 605.
3. Verify ROL and PIT are displayed on the GMC 605.
4. Press the IAS button on the GMC 605.
5. Verify IAS replaces PIT on the GMC 605 and that IAS is displayed in green and PIT extinguishes on the GI 285 and PFD.
6. Verify that 120 KT (+/- 2 KT) is displayed on the GMC 605.
7. Rotate the NOSE UP/DN thumbwheel UP until 100 KT is displayed on the GMC 605
8. Verify that the flight director command bars indicate a pitch up command and the flight controls respond in a nose up direction.
9. Rotate the NOSE UP/DN thumbwheel DN until 140 KT is displayed on the GMC 605
10. Verify that the flight director command bars indicate a pitch down command and the flight controls respond in a nose down direction.
11. Rotate the NOSE UP/DN thumbwheel UP until 120 KT is displayed on the GMC 605
12. Verify that the flight director command bars indicate level pitch attitude.
13. Adjust the air data test set for 100 kts airspeed.
14. Verify that the flight director command bars indicate a pitch down command and the flight controls respond in a nose down direction.
15. Adjust the air data test set for 140 kts airspeed.

-
16. Verify that the flight director command bars indicate a pitch up command and the flight controls respond in a nose up direction.
 17. Return the air data test set to 3000 ft. altitude and 120 kts airspeed.
 18. Press the IAS button on the GMC 605 to deselect IAS mode.
 19. Verify that PIT is displayed in place of IAS on the GMC 605 and that PIT illuminates in green on the PFD and GI 285 and that IAS is extinguished on the GI 285.
 20. Press the AP DISC/TRIM INT switch on the pilot's flight controls to disengage the autopilot.

9.4.2.9 VS Mode Check

NOTE: *Disable any ADS-B Transmitting equipment for this test to avoid interference with air traffic control.*

1. Set the air data test set to 3000 ft. altitude and 120 kts airspeed, if not already there.
2. Engage the autopilot by pressing the AP button on the GMC 605.
3. Verify ROL and PIT are displayed on the GMC 605.
4. Press the VS button on the GMC 605 to engage VS mode
5. Verify VS replaces PIT on the GMC 605 and that VS is displayed in green and PIT extinguishes on the GI 285 and PFD.
6. Verify that 0 FPM is displayed to the right of VS on the GMC 605.
7. Rotate the NOSE UP/DN thumbwheel UP until ↑1000 FPM is displayed on the GMC 605
8. Verify that the flight director command bars indicate pitch up and the flight controls respond in the direction of the command bars.
9. Rotate the NOSE UP/DN thumbwheel DN until ↓1000 FPM is displayed on the GMC 605
10. Verify that the flight director command bars indicate pitch down and the flight controls respond in the direction of the command bars.
11. Rotate the NOSE UP/DN thumbwheel UP until 0 FPM is displayed on the GMC 605
12. Verify that the flight director command bars indicate level pitch attitude and the flight controls are centered in pitch and roll.
13. Set the air data test set for 4000 ft. altitude at a vertical speed of 1000 fpm.
14. Verify that the flight director command bars indicate pitch down and the flight controls respond in the direction of the command bars.
15. Set the air data test set for 2000 ft. altitude at a vertical speed of 1000 fpm.
16. Verify that the flight director command bars indicate pitch up and the flight controls respond in the direction of the command bars.
17. Set the air data test set for 3000 ft. altitude and 120 kts airspeed.
18. Press the VS button on the GMC 605 to deselect VS mode.
19. Verify that PIT is displayed in place of VS on the GMC 605 and that PIT illuminates in green on the PFD and GI 285 and that VS is extinguished on the GI 285.

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20. Press the AP DISC/TRIM INT switch on the pilot's flight controls to disengage the autopilot.

9.4.2.10 ALT Mode Check

NOTE: *Disable any ADS-B Transmitting equipment for this test to avoid interference with air traffic control.*

1. Set the air data test set to 3000 ft. altitude and 120 kts airspeed, if not already there.
2. Press the AP button on the GMC 605 to engage the autopilot.
3. Verify ROL and PIT are displayed on the GMC 605.
4. Press the ALT button on the GMC 605 to select ALT mode.
5. Verify ALT replaces PIT on the GMC 605 and that ALT is displayed in green and PIT extinguishes on the GI 285 and PFD.
6. Adjust the air data test set for 3500 ft. altitude.
7. Verify that the flight director command bars indicate a pitch down and the flight controls respond in the direction of the command bars.
8. Adjust the air data test set for 2500 ft. altitude.
9. Verify that the flight director command bars indicate pitch up and the flight controls respond in the direction of the command bars.
10. Return the air data test set to 3000 ft. altitude and 120 kts airspeed.
11. Press the ALT button on the GMC 605 to deselect ALT mode.
12. Verify that PIT is displayed in place of ALT on the GMC 605 and that PIT illuminates in green on the PFD and GI 285 and that ALT is extinguished on the GI 285.
13. Press the AP DISC/TRIM INT switch on the pilot's flight controls to disengage the autopilot.

9.4.2.11 ALTS Mode Check

NOTE: *Disable any ADS-B Transmitting equipment for this test to avoid interference with air traffic control.*

This check is only applicable to installations where a Garmin GDU is interfaced to the GMC 605.

1. Set the air data test set to 3000 ft. altitude and 120 kts airspeed, if not already there.
2. Set the selected altitude on the PFD to 3500 ft.
3. Press the AP button on the GMC 605 to engage the autopilot.
4. Verify ROL and PIT are displayed on the GMC 605 with ALTS and 3500FT being displayed below PIT.
5. Verify green ROL, AP, YD, PIT, and white ALTS are displayed on the PFD.
6. Verify green ROL, AP, YD, PIT, and white ALT are illuminated on the GI 285.
7. Adjust the air data test set for 3500 ft. altitude at a vertical speed of 500 fpm.
8. When the altitude reaches 3450 +/- 20 feet, verify the following annunciations and displays:

-
- a. ALT is flashed for approximately 3 seconds in place of PIT on the GMC 605, then displays steady, along with 3500 FT.
 - b. Green ALT 3500 flashes for approximately 3 seconds in place of PIT on the PFD and then displays steady.
 - c. Green ALT flashes for approximately 3 seconds on the GI 285 and then is illuminated steady and PIT is not illuminated.

NOTE

The flight director command bars and flight controls may move up or down as the GFC 600 AFCS is capturing the selected altitude.

9. Adjust the air data test set for 4000 ft. altitude at a vertical speed of 500 fpm.
10. Verify that the flight director command bars indicate a pitch down and the flight controls respond in the direction of the command bars.
11. Adjust the air data test set for 3000 ft. altitude at a vertical speed of 500 fpm.
12. Verify that the flight director command bars indicate a pitch up and the flight controls respond in the direction of the command bars when the altitude goes below 3500 ft.
13. Return the air data test set to 3000 ft. altitude and 120 kts airspeed.
14. Allow the air data test set to stabilize at the target altitude and airspeed.
15. Adjust the selected altitude on the PFD to 0 FT.
16. Press the ALT button on the GMC 605 to deselect ALT mode.
17. Verify PIT is displayed place of ALT on the GMC 605 with ALTS 0FT below PIT.
18. Verify green PIT on the PFD and GI 285 and that ALT is not illuminated on the GI 285.
19. Press the AP DISC/TRIM INT switch on the pilot's flight controls to disengage the autopilot.
20. Return the air data test set to field elevation and 0 kts airspeed.

9.4.2.12 LVL Mode Check

Perform steps 1 through 13 if there is a flight director interface installed. If there is no flight director interface installed, skip to Step 14 of this section.

1. Set the heading bug to the aircraft heading.
2. Press the FD button on the GMC 605 to engage the flight director.
3. Verify ROL and PIT are displayed on the GMC 605, GI 285, and PFD.
4. Press the HDG button on the GMC 605 to select heading mode.
5. Verify HDG and PIT are displayed on the GMC 605, and that HDG and PIT are illuminated in green and ROL is extinguished on the GI 285 and the PFD.
6. Adjust the heading bug to the left.
7. Verify that the flight director command bars indicate a left turn command.
8. Rotate the NOSE UP/DN thumbwheel UP four times.
9. Verify that the flight director command bars indicate a pitch up command.
10. Press the LVL button on the GMC 605.

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11. Verify that LVL and LVL are displayed on the GMC 605.
 12. Verify that LVL and LVL are displayed in green and HDG and PIT are extinguished on the GI 285 and the PFD.
 13. Verify that the flight director command bars show level attitude.

 14. Set the heading bug to the aircraft heading.
 15. Press the AP button on the GMC 605 to engage the autopilot.
 16. Verify ROL and PIT are displayed on the GMC 605, GI 285, and PFD.
 17. Press the HDG button on the GMC 605 to select heading mode.
 18. Verify HDG and PIT are displayed on the GMC 605, and that HDG and PIT are illuminated in green and ROL is extinguished on the GI 285 and the PFD.
 19. Adjust the heading bug to the left.
 20. Verify that the autopilot drives the flight controls into a left turn.
 21. Rotate the NOSE UP/DN thumbwheel UP four times.
 22. Verify that the autopilot drives the flight controls to a nose up direction.
 23. Press the LVL button on the GMC 605.
 24. Verify that LVL and LVL are displayed on the GMC 605.
 25. Verify that LVL and LVL are displayed in green and HDG and PIT are extinguished on the GI 285 and the PFD.
 26. Verify that the autopilot stops driving the flight controls.

Appendix A. Installation Specific Information

A copy of this appendix must be used to record information for a specific installation of the GFC 600 AFCS system. The completed copy must be kept with the aircraft permanent records. This appendix includes the following information:

- General installation information
- Interfaced equipment
- GFC 600 AFCS configuration log
- GFC 600 AFCS wiring diagrams

A.1. General Installation Information

Aircraft

Aircraft Make and Model _____

Serial Number _____

Registration Number _____

GMC 605 AFCS Mode Controller

Part Number _____

Serial Number _____

Mod Level _____

Software Loader Card Part Number (shown on splash screen) _____

Air Data Module (ADM) (if installed)

Part Number _____

Serial Number _____

Mod Level _____

GI 285 AFCS Mode Annunciator (if installed)

Part Number _____

Serial Number _____

Mod Level _____

GSA 87 Pitch Servo

Part Number _____

Serial Number _____

Mod Level _____

GSA 87 Roll Servo

Part Number _____

Serial Number _____

Mod Level _____

GSA 87 Pitch Trim Servo (if installed)

Part Number _____

Serial Number _____

Mod Level _____

GSA 87 Yaw Damper Servo (if installed)

Part Number _____

Serial Number _____

Mod Level _____

A.2. Interfaced Equipment

NOTE: Completion of this section and its retention with the aircraft records is recommended but not required.

A.2.1. Garmin Equipment

Use Table A-1 to document GFC 600 AFCS system interfaces with other Garmin equipment installed in the aircraft. GFC 600 AFCS system interfaces to all equipment listed in Table A-1 are covered by this STC. Refer to installation specific interconnect diagrams retained with the aircraft permanent records for detailed equipment interface information.

Table A-1 – Garmin Equipment

Equipment	Interfaced	Notes
GDU 620	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GDU7XX/GDU1060	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GTN 6XX	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GTN 7XX	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GNS 400/500 Series	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GNS 480 (CNX 80)	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GPS 155XL / GNC 300XL	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GNC 255	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GTX 3X5 (R) w/ GPS	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GDC 72()	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GDC 74()	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GSU 75()	<input type="checkbox"/> Yes <input type="checkbox"/> No	
SL 30	<input type="checkbox"/> Yes <input type="checkbox"/> No	
GMA 35 / 350	<input type="checkbox"/> Yes <input type="checkbox"/> No	

A.2.2. Other Equipment

Use Table A-2 to document GFC 600 AFCS system interfaces with other equipment installed in the aircraft, but not listed in Table A-1. Refer to the GFC 600 AFCS Part 23 STC Installation Manual, 190-01937-00, to determine whether interfaces between the GFC 600 AFCS and the equipment listed in Table A-2 are covered by this STC.

Table A-2 – Other Equipment

Equipment	Model	Interface Format	Covered by this STC?	Notes
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	
			<input type="checkbox"/> Yes <input type="checkbox"/> No	

A.3. Configuration Log

Configuration Item	Setting
SYS > INSTALL Page 1/2	
PTRM	<input type="checkbox"/> No <input type="checkbox"/> Yes
YAW DAMPER	<input type="checkbox"/> No <input type="checkbox"/> Yes
GI 285	<input type="checkbox"/> No <input type="checkbox"/> Yes
HSI/DG	<input type="checkbox"/> No <input type="checkbox"/> KI525 <input type="checkbox"/> Cent NSD <input type="checkbox"/> 52D54 <input type="checkbox"/> G502A
SYS > INSTALL Page 2/2	
FLT DIR	<input type="checkbox"/> No <input type="checkbox"/> GDU <input type="checkbox"/> Aspen
GPS ROLSTR	<input type="checkbox"/> No <input type="checkbox"/> Yes
GPS DEV	<input type="checkbox"/> Angulr <input type="checkbox"/> Linear
GMC DSP > BACKLIGHT page	
SOURCE	<input type="checkbox"/> PHOTOCELL <input type="checkbox"/> 14VDC <input type="checkbox"/> 28VDC <input type="checkbox"/> 5VDC <input type="checkbox"/> 5VAC
DSP MIN	
KEY MIN	
GMC DSP > LIGHTBUS page	
SLOPE	
OFFSET	
TRANSITION	
GMC DSP > PHOTOCCEL page	
SLOPE	
OFFSET	
GMC DSP > CONTRAST page	
OFFSET	
RMT DSP > BACKLGHT page	
SOURCE	<input type="checkbox"/> PHOTOCELL <input type="checkbox"/> 14VDC <input type="checkbox"/> 28VDC <input type="checkbox"/> 5VDC <input type="checkbox"/> 5VAC
MIN	
RMT DSP > LIGHTBUS page	
SLOPE	
OFFSET	
TRANSITION	
RMT DSP > PHOTOCCEL page	
SLOPE	
OFFSET	

A.4. Equipment Locations and Wiring

For the locations of installed equipment, refer to the appropriate Install Manual Addendum (190-01937-XX).

Record equipment locations and sketch the approximate location of wire routing in or as applicable.

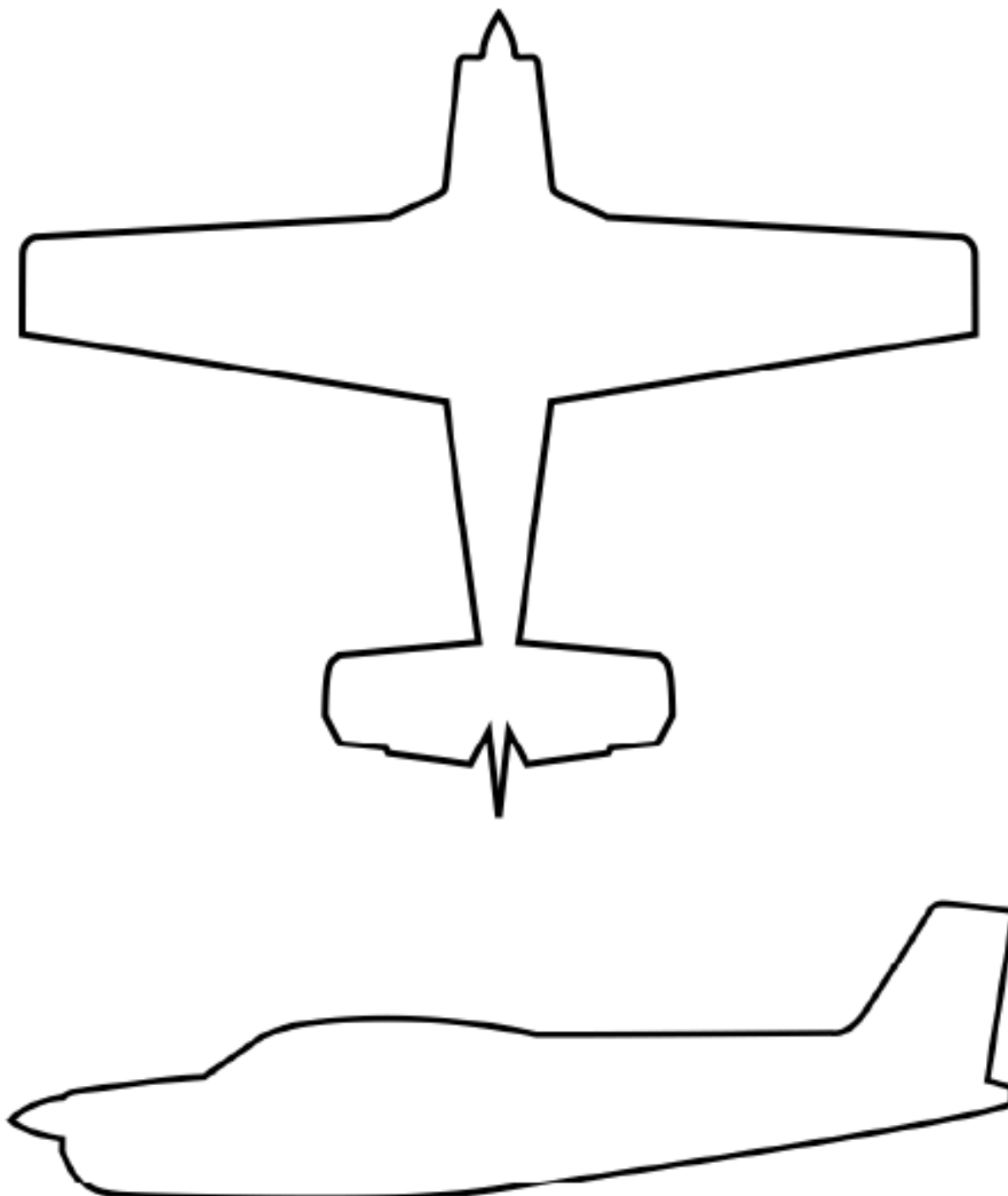


Figure A-1 – Equipment Location and Wire Routing – Single Engine Airplane

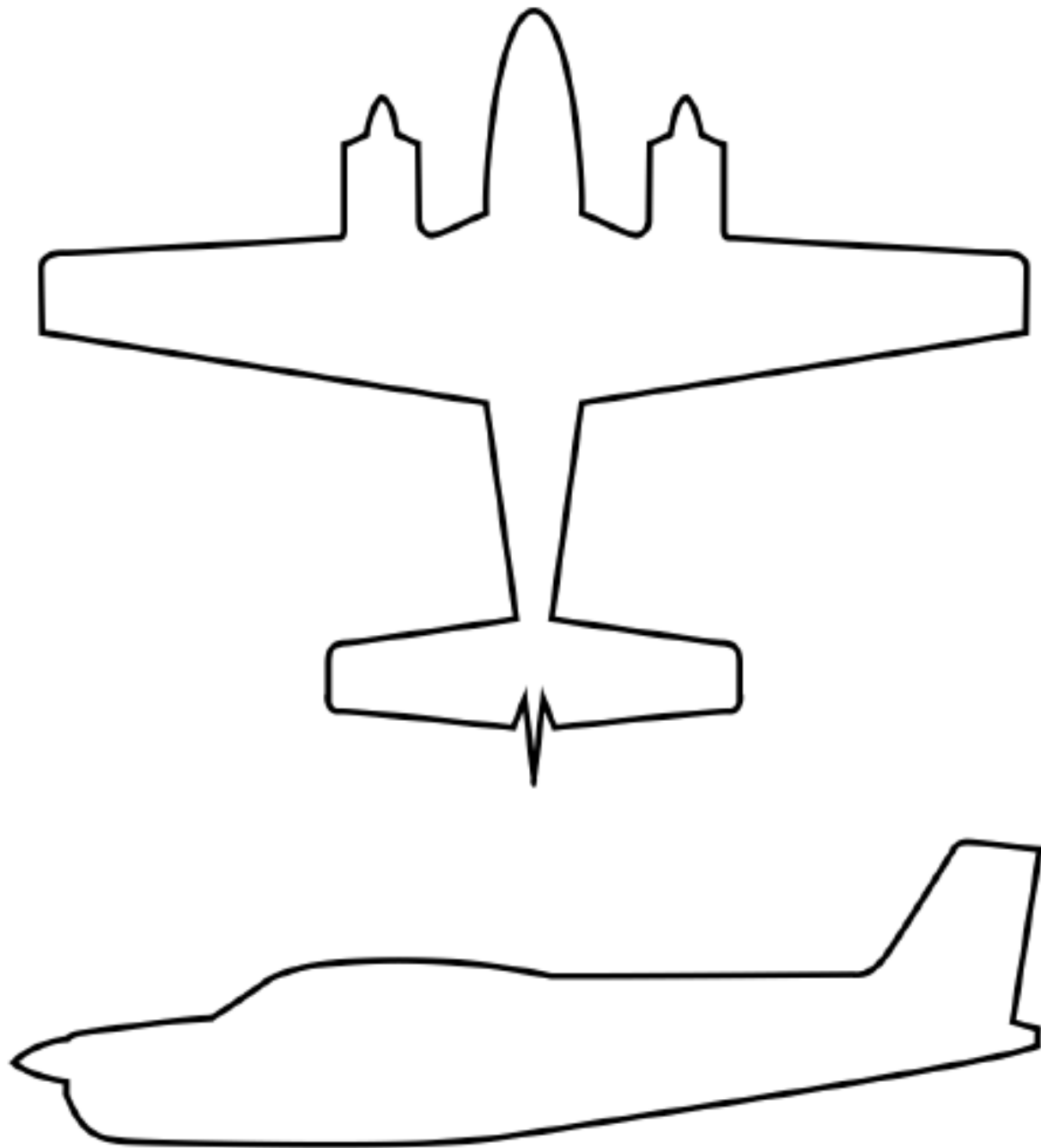


Figure A-2 – Equipment Location and Wire Routing – Twin Engine Airplane