

GARMIN®

GHA™ 15

Part 23 AML STC Maintenance Manual

**Contains Instructions for Continued Airworthiness
for STC SA12219WI**

Aircraft make, model, registration number, and serial number, along with the applicable STC configuration information, must be completed in Appendix A and saved with aircraft permanent records.

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RECORD OF REVISIONS

Rev	Revision Date	Description
1	12/17/25	Initial release.

DEFINITIONS**WARNING**

*A **Warning** means injury or death is possible.*

**CAUTION**

*A **Caution** means that damage to the equipment is possible.*

**NOTE**

*A **Note** provides additional information.*

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1 INTRODUCTION

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1.1 Purpose

The purpose of this document is to provide Instructions for Continued Airworthiness (ICA) and maintenance information for the Garmin GHA 15 as installed under STC SA12219WI. This document also satisfies the requirement for continued airworthiness as required by 14 CFR 23.1529 and Part 23 Appendix G.

1.2 Scope

This document provides maintenance instructions and identifies the Instructions for Continued Airworthiness for the installation and maintenance of the Garmin GHA 15 as installed under the AML STC.

1.3 Organization

The following outline briefly describes the organization of this manual:

Section 2.1: System Overview

Provides a description of the GHA 15.

Section 2.2: Description, Control, and Operation

Provides basic control and operation information specifically tailored to maintenance practices.

Section 3: Instructions for Continued Airworthiness

Provides Instructions for Continued Airworthiness of the GHA 15.

Section 4: Troubleshooting

Provides troubleshooting information, including connector information, pinouts, and flowcharts to aid in diagnosing and resolving problems with GHA 15.

Section 5: Equipment Maintenance and Checkout Procedures

Provides instructions for the removal and replacement of the GHA 15, including system checkout procedures.

Appendix A: Installation-Specific Information

Provides a template to record aircraft-specific installation and configuration data for the GHA 15.

1.4 Applicability

This document applies to all aircraft with the GHA 15 installed in accordance with AML STC SA12219WI. Modification of an aircraft by this 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.

1.5 Publications

In addition to this manual, the following documents are recommended for performing maintenance on the GHA 15. It is the responsibility of the owner/operator to ensure the latest applicable versions of these documents are used during operation, servicing, or maintenance of the GHA 15.

Table 1-1 Reference Documentation

Document	Garmin P/N
<i>GHA 15 Part 23 AML STC Installation Manual</i>	190-03122-00
<i>AFMS, GHA 15 Part 23 AML STC</i>	190-03122-02

1.6 Revision and Distribution

This document is required for maintaining the continued airworthiness of the aircraft. Garmin dealers may obtain the latest revision of this document at the Garmin [Dealer Resource Center](#) website. Dealers are notified of manual revision changes via Garmin Service Bulletins posted to the Dealer Resource Center. Owners and operators may obtain the latest revision of this document at flyGarmin.com or by contacting a Garmin dealer. Garmin contact information is available at flyGarmin.com.

1.7 Terminology and Acronyms

1.7.1 Terminology

Unless otherwise stated, all units of measure are US standard units.

1.7.2 Acronyms

The following acronyms are used within this document:

A	
ADI	Attitude Direction Indicator
AFMS	Airplane Flight Manual Supplement
AGL	Above Ground Level
AML	Approved Model List
B	
BIT	Built-In Test
C	
CAN	Controller Area Network
CFR	Code of Federal Regulations
D	
DA	Decision Altitude
DH	Decision Height
F	
FAA	Federal Aviation Administration
G	

GHA	Garmin Height Advisor
GI	Garmin Indicator
GSB	Garmin Serial Bus
H	
HSI	Horizontal Situation Indicator
I	
ICA	Instructions for Continued Airworthiness
IFR	Instrument Flight Rules
L	
LRU	Line Replaceable Unit
M	
MFD	Multi-Function Display
N	
ODA	Organization Designation Authorization
P	
P/N	Part Number
PMA	Parts Manufactured Approval
R	
RAGL	Radio Above Ground Level
RAM	Random Access Memory
RTV	Room-Temperature Vulcanizing
S	
SAE	Society of Automotive Engineers
STC	Supplemental Type Certificate
SW	Software
T	
UNF	Unified Fine
USB	Universal Serial Bus

2 SYSTEM DESCRIPTION

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2.1 System Overview

The GHA 15 is a Radio Height Advisor that provides referential radio height above ground level (RAGL) when interfaced to a Garmin GI 275 Multi-Function Instrument. The GI 275 can display RAGL within a range of 0-500 feet or 0-160 meters and can provide RAGL aural callouts between 0-300 feet or 0-100 meters.

The GHA 15 includes the transmitter, receiver, and processor in one housing that is installed externally on the bottom of aircraft fuselage.

The GHA 15 is advisory only. Use of the GHA 15 for Decision Altitude (DA) or Decision Height (DH) in IFR operations is prohibited. Refer to *AFMS, GHA 15 Part 23 AML STC* (P/N 190-03122-02) for more information.

The software versions and information in this document are subject to change without notice. Visit the Garmin [Dealer Resource Center](#) for current updates and supplemental information concerning operation of the GHA 15 Height Advisor.

The GHA 15 is a remote mounted unit with no user controls. Normal operation is completely automated. All user interface is accomplished through the GI 275 display where the pilot can optionally turn off the RAGL aural alert through the GI 275 interface.



Figure 2-1 GHA 15

2.1.1 Electrical Load Information

Electrical load information for the GHA 15 is provided below.

Table 2-1 GHA 15 Electrical Load

LRU	Current Draw			
	14V System		28V System	
	Typical	Maximum	Typical	Maximum
GHA 15	260 mA	350 mA	135 mA	175 mA

2.2 Normal Operation

Normal operation of the GHA 15 occurs through an interfaced GI 275. The GI 275 can enable and disable the display of RAGL as a Miscellaneous Data Field on the *ADI*, *HSI*, and *HSI Map* pages, if configured. RAGL can also be displayed on the *Radio AGL* and/or *MFD Data* MFD pages, if configured. The GI 275 can enable and disable RAGL aural callouts from the GHA 15.

2.3 Configuration

Configuration of the GHA 15 occurs through Configuration mode of the interfaced GI 275. Additionally, the configuration summary can be saved and the configuration files can be imported or exported to a USB drive via the interfaced GI 275.

2.3.1 Entering Configuration Mode on the GI 275

GI 275 Configuration mode can be accessed by holding down the inner knob located at the bottom-left of the unit upon initial power-up. The knob must be pressed until the splash screen appears. Touch **Accept** to proceed to the Configuration mode home page.

2.3.2 Configuration Options

2.3.2.1 Summary

A configuration summary can be saved to a USB drive by touching **SW/Config** → **Config Options** → **Summary** → **Save Summary**. The file will detail configuration settings for all GI 275s in the system and can be viewed on a computer web browser.



NOTE

Files will be saved to a “aircraft_cfg” folder on the USB drive.

A configuration summary can be viewed by touching **SW/Config** → **Config Options** → **Summary** → **View Summary** and then selecting the desired option.

2.3.2.2 Import Configuration

Configuration settings can be imported via USB using the following procedure:

1. Power on all GI 275s into Configuration mode, and power on all LRUs connected to the CAN bus. Ensure the RAGL circuit breaker is closed.
2. Insert the USB drive containing the configuration files into the USB dongle or GSB 15 (if installed). A USB icon should appear on the left of the display once the GI 275 has recognized the device. If the icon doesn't appear after 1 minute, remove the drive and re-insert it.
3. Touch **SW/Config** → **Config Options** → **Import Configuration**.
4. Touch **Select Files** and select the configuration file to be imported.
5. Touch **Select Configuration**, select the applicable configurations, then touch **Back**.
6. Touch **Import Config** () and then touch **Start**.

2.3.2.3 Export Configuration

Configuration settings can be exported via USB using the following procedure:

1. Power on all GI 275s into Configuration mode, and power on all LRUs connected to the CAN bus. Ensure the RAGL circuit breaker is closed.
2. Insert a USB drive into the USB dongle or GSB 15 (if installed). A USB icon should appear on the left of the display once the GI 275 has recognized the device. If the icon doesn't appear after 1 minute, remove the drive and re-insert it.
3. Touch **SW/Config** → **Config Options** → **Export Config**.
4. Touch **Select Name** and enter a name for the saved file.
5. Touch **Export Config**.

3 INSTRUCTIONS FOR CONTINUED AIRWORTHINESS

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3.1 Airworthiness Limitations

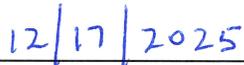
There are no new (or additional) airworthiness limitations associated with this equipment and/or installation.

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



JR Brownell
ODA STC Unit Administrator
ODA-240087-CE



Date

3.2 Servicing Information

There are no servicing requirements for the GHA 15. In the event of a LRU failure, troubleshoot the GHA 15 in accordance with Section 4.

3.2.1 Periodic Maintenance Instructions

The GHA 15 is designed to detect internal failures. A self-test is executed automatically upon application of power to the unit, and built-in tests are continuously executed while the LRU is operating. Detected errors are indicated on the GI 275 display via failure annunciations, system messages, or a combination of the two. A list of reported errors for the system can be printed in the form of a maintenance log using the instructions provided in Section 4.1.1.

3.2.2 Special Tools

A milliohm meter with an accuracy of $\pm 0.1 \text{ m}\Omega$ (or better) is required to measure the electrical bonding between the GHA 15 and aircraft ground.

3.3 Maintenance Intervals

Table 3-1 Periodic Maintenance

Item	Description/ Procedure	Interval
GHA 15 Visual Inspection	The GHA 15 unit and wiring harness must be inspected to ensure continued integrity of the installation. The inspection must be performed in accordance with Section 3.4.	12 calendar months.
Electrical Bonding Check	Perform an electrical bonding check of the GHA 15 in accordance with Section 3.5.	Every 2000 flight hours or 10 years (whichever comes first), AND following removal and re-installation of the GHA 15, AND following removal and re-installation of GHA 15 bond strap in Mooney M20 series aircraft.
Lightning Damage Check	Conduct an inspection of the GHA 15 in accordance with Section 3.7. If the antenna was struck by lightning, the antenna and associated hardware must be replaced in accordance with Section 5.1.	After a suspected or actual lightning strike.
Equipment Removal and Replacement	Removal and replacement of the GHA 15 can be accomplished by referring to Section 5.1 for instructions.	On condition.

3.4 Visual Inspection

Conduct the following visual inspection of the GHA 15 and associated wiring harness to ensure installation integrity:

1. Inspect attachment of the unit to aircraft skin. Check for loose fasteners and torque if required. Inspect environmental seal around the base and verify it is not compromised or damaged.
2. Visually inspect unit’s wiring, connector, cable shield terminations, and electrical bonding straps if installed. Verify there is no wear or damage, the wires are not chafed, and connectors/fasteners are secured. Repair if necessary.
3. Visually check for corrosion. Replace components if practical, or repair in accordance with Aircraft Manufacturer Standard Practice or Maintenance Manual. Return GHA 15 to Garmin for service if damaged.
4. Visually inspect aircraft skin around GHA 15 and verify there are no cracks and aircraft skin is not deformed. Using high-intensity light and 5x or 10x magnifying glass, inspect skin doubler installation to verify there are no cracks around the rivets. Inspect aircraft internal structure if skin is cracked or deformed. Refer to Aircraft Structural Repair Manual for approved skin repair method. Skin repair may require the existing doubler to be removed and a new replacement doubler to be fabricated.

Complete the Electrical Bonding Check per Section 3.5 if GHA 15 was re-attached, including replacement of the environmental seal.

3.5 Electrical Bonding Maintenance Check

The GHA 15 electrical bonding must be checked every 2,000 flight hours or 10 years (whichever occurs first), and following removal and re-installation of the GHA 15, and following removal and re-installation of GHA 15 bonding strap in Mooney M20 series aircraft.

To measure the antenna bonding resistance, perform the following steps:

1. Disconnect the cable harness from the GHA 15 connector.
2. Measure the resistance between the GHA 15 connector body and a nearby exposed portion of conductive aircraft structure (e.g., a nearby exposed rivet on fuselage stringer).
3. Verify the measured resistance is equal to or less than 5 mΩ.

If the measured resistance is greater than 5 mΩ, remove and re-install the antenna per Section 3.5.1, Section 3.5.2, and Section 5.1. The electrical bond must meet requirements of a new installation in accordance with Section 3.5.1.

3.5.1 Electrical Bonding

Electrical bonding is achieved via fasteners (e.g., rivets, bolts, nuts, washers, etc.) and/or bond straps. Bonding surfaces must be clean of any primer, grease, or dirt. If fasteners are used to create the electrical bond, the area under the head of the bolt or washer must be free of primer and a spot face prepared that is at least 0.125 inches wider than the head of the bolt or the washer. Any exposed area still visible after the bond is completed must be primed and finished with the original coating or other suitable film. Rivets used to mechanically attach brackets and shelves provide an inherent electrical bond through the rivets and require no additional bond preparation. Reference the aircraft manufacturer (electrical) standard practices manual for procedures on electrical bond preparation, or follow SAE ARP1870 *Aerospace Systems Electrical Bonding and Grounding for Electromagnetic Compatibility and Safety*, Section 5, Detail Requirements.

The resistance must be measured as 2.5 mΩ with a calibrated milliohm meter with ±0.1 mΩ (or better) accuracy with the connector disconnected.

3.5.2 Aluminum Surface Preparation

In order to prepare the aluminum surface for proper bonding, the following general steps should be followed. For a detailed procedure, refer to SAE ARP1870 Sections 5.1 and 5.5.

1. Clean grounding location with solvent.
2. Remove non-conductive films or coatings from the grounding location. When area is cleaned around fastener heads or washers, the area cleaned should be 0.125 inches wider than the footprint of the washer or the bolt head.
3. Apply a chemical conversion coat, such as Bonderite M-CR 1200S Aero, to the bare metal.
4. Once the chemical conversion coat is dry, clean the area.
5. Install equipment at the prepared location.
6. After the bond is complete, re-apply a suitable film or coating to the surrounding area.

3.6 Overhaul Period

The system does not require overhaul at a specific time period. Power on self-test and continuous BIT will monitor the health of the GHA 15. If the LRU indicates an internal failure, the unit may be removed and replaced. Refer to Section 4 for fault corrective actions.

3.7 Special Inspection Requirements

After a suspected lightning strike, inspect the GHA 15 for signs of lightning damage. Verify that there is no structural damage around areas where lightning may have attached. Refer to Section 3.4 for inspection instructions. If the antenna was struck by lightning, the antenna and associated hardware must be replaced in accordance with Section 5.1.

3.8 Application of Protective Treatments

None.

3.9 Data Relative to Structural Fasteners

Data relative to structural fasteners, such as type, torque, and installation requirements can be found in Section 5.

3.10 Additional Instructions

None.

4 TROUBLESHOOTING

4.1	General Troubleshooting	4-2
4.1.1	GI 275 System Maintenance Log	4-2
4.2	Connector Information.....	4-3
4.3	Troubleshooting Flowcharts	4-4

4.1 General Troubleshooting

Refer to Table 4-1 for basic troubleshooting guidance.

Table 4-1 GHA 15 General Troubleshooting

Symptom	Possible Cause	Recommended Action
Yellow "X" on <i>ADI</i> , <i>HSI</i> , or <i>HSI Map</i> page RAGL display.	Garmin display unit is not receiving GHA 15 data.	Troubleshoot the problem using the Troubleshooting Flowchart in Section 4.3.
"RAGL FAIL" annunciation on the <i>Radio AGL</i> page.		
Three yellow dashes on the RAGL data field on the <i>MFD Data</i> page.		

If issue persists, download the system maintenance log per Section 4.1.1.

4.1.1 GI 275 System Maintenance Log

A maintenance and error log can be downloaded on an interfaced GI 275 using the following procedure:

1. Power on all GI 275s in the system in Configuration mode.
2. Insert a USB drive into the USB dongle or GSB 15 (if installed). A USB icon should appear on the left of the display once the GI 275 has recognized the device. If the icon doesn't appear after 1 minute, remove the drive and re-insert it.
3. Touch **Maintenance** → **Export Logs**.
4. Select the Assert Log.
5. Touch **Start Download**.
6. Once the save process is completed, disconnect the USB drive and insert it into a computer.
7. On the computer, navigate to the USB drive and open the "maintenance_logs" directory and open the .htm file.
8. The file should open in your computer's Internet browser and can be printed using your selected Internet browser print function (in most cases, pressing Ctrl + P buttons simultaneously will access this function).
9. If any GHA faults are reported on the maintenance log, refer to the troubleshooting flowcharts contained in Section 4.3 for corrective actions.

4.2 Connector Information

The GHA 15 mating designator, part number, and associated connector kit are listed in Table 4-2.

Table 4-2 GHA 15 Connector

Ref. Des.	Description	Connector P/N	Kit P/N
J2001	Circular Connector Plug, 22 Socket, Crimp	330-01288-01	011-05278-00
	Backshell, Circular, Size 13	330-90049-03	

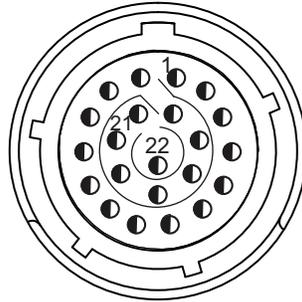


Figure 4-1 GHA 15 J2001/P2001 Connector (Looking at Unit)

Table 4-3 GHA 15 J2001 Connector

Pin	Pin Name	I/O
1	POWER GROUND	--
2	STANDBY MODE*	IN
3	RS-422 OUT Z	OUT
4	RS-422 OUT Y	OUT
5	RS-422 IN B	IN
6	RS-422 IN A	IN
7	CAN BUS LO	I/O
8	CAN BUS HI	I/O
9	USBO DP	I/O
10	USBO DM	I/O
11	AUDIO OUT	OUT
12	ARINC 429 OUT 1B	OUT
13	ARINC 429 OUT 1A	OUT
14	AIRCRAFT POWER	IN
15	RESERVED	--
16	RESERVED	--
17	N/C	--
18	CAN BUS TERM	I/O
19	USB VBUS	IN
20	SIGNAL GROUND	--
21	TEST MODE*	--
22	SIGNAL GROUND	--

*Denotes Active-Low (ground to activate)

4.3 Troubleshooting Flowcharts

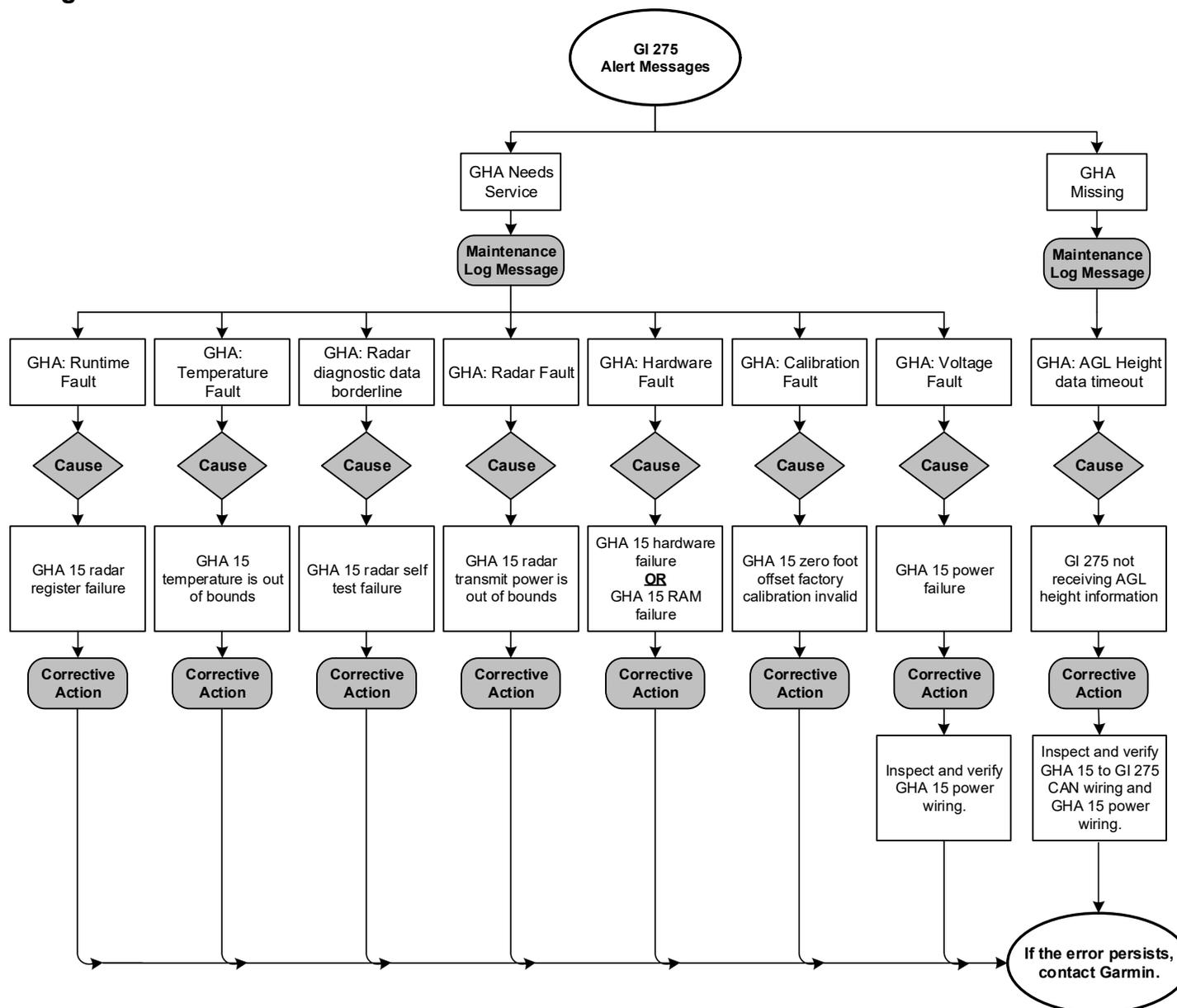
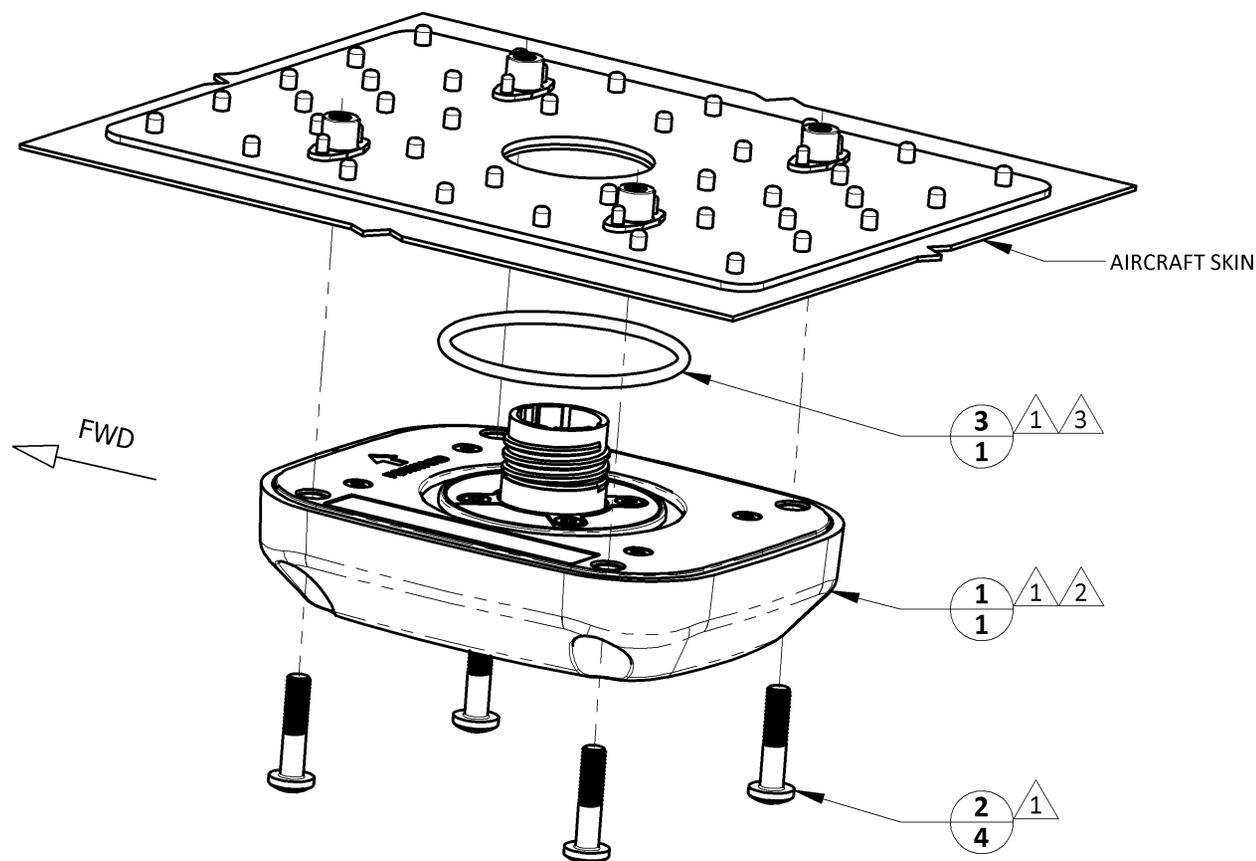


Figure 4-2 GHA 15 Troubleshooting Flowchart

5 EQUIPMENT MAINTENANCE AND CHECKOUT PROCEDURES

5.1	Removal and Installation	5-2
5.1.1	Backshell Assembly	5-6
5.1.2	Shielded Cable Preparation	5-8
5.2	Software	5-10
5.3	GHA 15 Configuration	5-11
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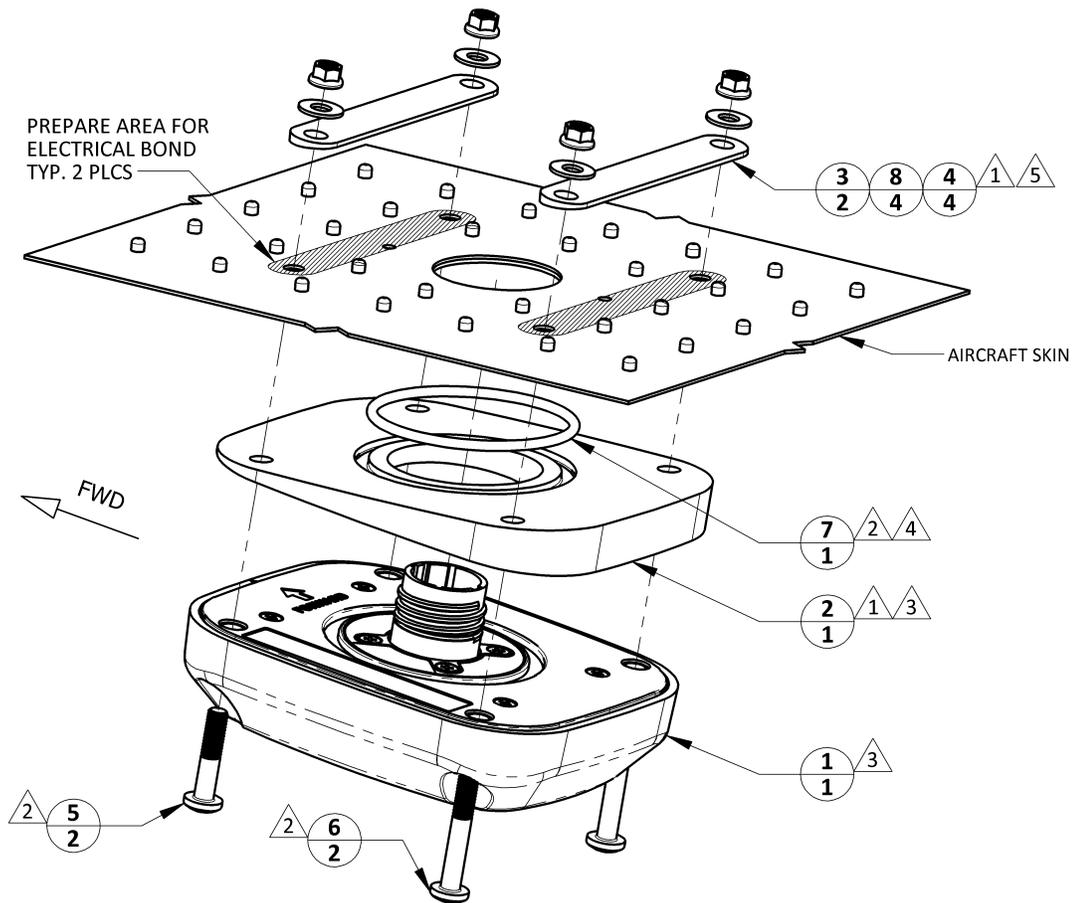
5.1 Removal and Installation



QTY.	ITEM	PART NUMBER	DESCRIPTION
1	3	MS28775-134	PACKING, PREFORMED, HYDRAULIC, 275F ("O"-RING), ID Ø1.852 IN×Ø0.100 IN
4	2	MS27039C1-13	SCREW, MACHINE, PAN HEAD, STRUCTURAL, CROSS RECESSED .1900-32 UNF-3A, 0.844 IN
1	1	011-05259-51	GHA 15 HEIGHT ADVISOR, PMA

- 1 MAKE SURE THE GHA 15 UNIT IS POINTED FORWARD AND O-RING PLACED IN THE GROOVE AROUND UNIT CONNECTOR. TORQUE .1900-32 UNF FASTENERS 12 TO 15 IN.-LB. MS51958 IS AN ACCEPTABLE SUBSTITUTE FOR MS27039.
- 2 APPLY MIL-A-46146 RTV SILICONE ADHESIVE SEALANT BETWEEN GHA 15 BASE AND AIRCRAFT SKIN.
- 3 O-RING IS INCLUDED WITH GHA 15 INSTALLATION KIT.

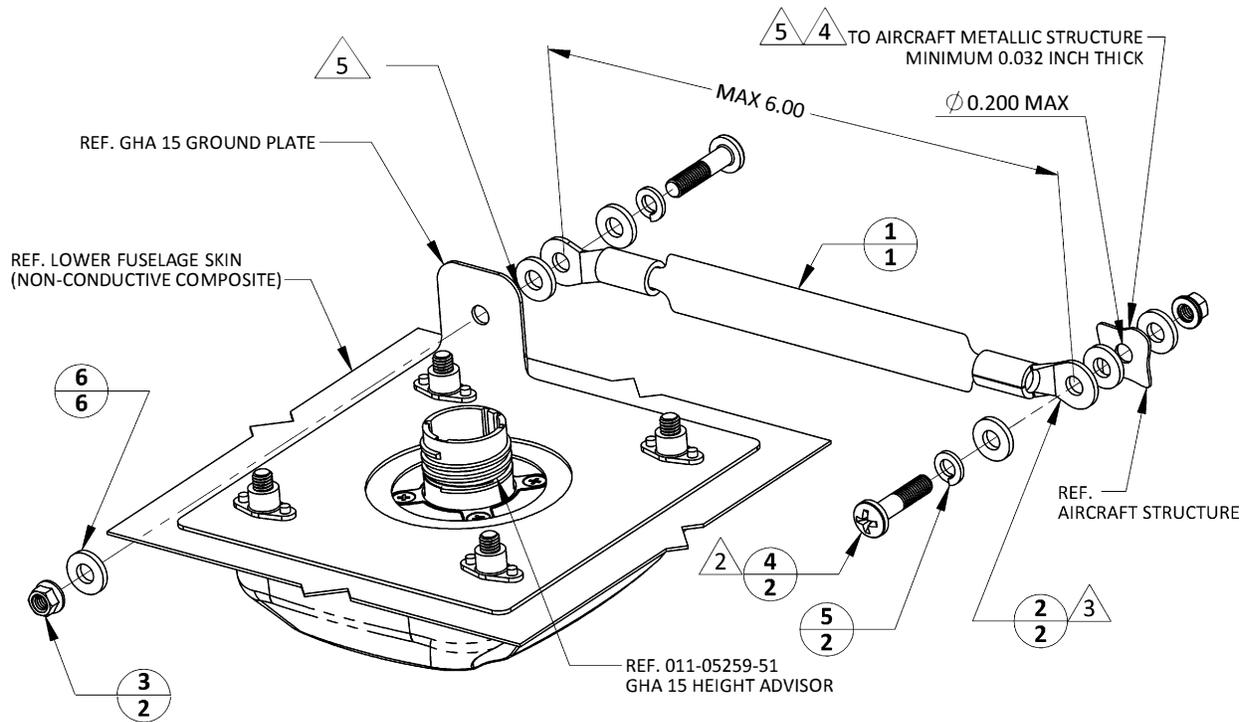
Figure 5-1 GHA 15 Installation



4	8	NAS1149D0332J	WASHER, FLAT, ALUMINUM, Ø0.203 IN ID, Ø0.438 IN OD, 0.032 IN THICK
1	7	MS28775-134	PACKING, PREFORMED, HYDRAULIC, 275F ("O"-RING), ID Ø1.852 IN×Ø0.100 IN
2	6	MS27039-1-19	SCREW, MACHINE, PAN HEAD, STRUCTURAL, CROSS RECESSED .1900-32 UNF-3A, 1.219 IN
2	5	MS27039-1-14	SCREW, MACHINE, PAN HEAD, STRUCTURAL, CROSS RECESSED .1900-32 UNF-3A, 0.906 IN
4	4	MS21042L3	NUT, SELF-LOCKING, REDUCED HEXAGON, REDUCED HEIGHT, RING BASE .1900-32UNJF-3B
2	3	117-02306-00	LEVELING ADAPTER, INTERNAL, GHA 15
1	2	117-02305-00	LEVELING ADAPTER, EXTERNAL, GHA 15
1	1	011-05259-51	GHA 15 HEIGHT ADVISOR, PMA
QTY.	ITEM	PART NUMBER	DESCRIPTION

- 1 ADAPTER ORIENTATION DETERMINED BY SLOPE OF FUSELAGE UNDERSIDE. EXTERNAL AND INTERNAL LEVELING ADAPTERS ARE INCLUDED WITH GHA 15 LEVELING INSTALL KIT.
- 2 MAKE SURE THE GHA 15 UNIT IS POINTED FORWARD AND O-RING PLACED IN THE GROOVE AROUND UNIT CONNECTOR. TORQUE .1900-32 UNF FASTENERS 12 TO 15 IN.-LB. MS1958 IS AN ACCEPTABLE SUBSTITUTE FOR MS27039.
- 3 APPLY MIL-A-46146 RTV SILICONE ADHESIVE SEALANT BETWEEN GHA 15 BASE AND LEVELING ADAPTER AND BETWEEN ADAPTER AND AIRCRAFT SKIN.
- 4 NUTS, SCREWS, O-RING, AND WASHER ARE INCLUDED WITH GHA 15 LEVELING INSTALL KIT.
- 5 MS21044N3 IS AN ACCEPTABLE SUBSTITUTE FOR MS21042L3. NAS1149F0332P IS AN ACCEPTABLE SUBSTITUTE FOR NAS1149D0332J.

Figure 5-2 GHA 15 Installation with Leveling Adapter



6	6	NAS1149F0363P	WASHER, FLAT, STEEL, CAD PLATED, 0.063 INCH THICK, ID 0.203, OD 0.438
2	5	MS35338-43	WASHER, LOCK-SPRING, HELICAL, REGULAR SERIES, ID 0.190, CARBON STEEL, CAD PLATED
2	4	MS27039-1-09	SCREW, MACHINE, PAN HEAD, STRUCTURAL, CROSS RECESSED .1900-32 UNF-3A, 0.594 IN
2	3	MS21042L3	NUT, SELF-LOCKING, REDUCED HEXAGON, REDUCED HEIGHT, RING BASE .1900-32 UNJF-3B
2	2	MS20659-107	TERMINAL, LUG, CRIMP STYLE, COPPER, UNINSULATED, RING TONGUE, NO. 8 WIRE, Ø 0.190 IN STUD
1	1	AA59569F36T0375	BRAID, WIRE, COPPER, TIN-COATED, FLAT, Ø 0.375 IN, AA59569
QTY	ITEM	PART NUMBER	DESCRIPTION

1. DIMENSIONS ARE IN INCHES

2 TORQUE .1900-32 UNF-3A SCREW 15 ± 2 IN-LB. AN3 BOLT IS ACCEPTABLE SUBSTITUTE FOR MS27039-1-09 SCREW.

3 SOLISTRAND 31807 TERMINAL, RING TONGUE, NO. 8 WIRE, 0.190 IN STUD IS ACCEPTABLE SUBSTITUTE FOR MS20659-107.

4 USE EXISTING HOLE IN AIRCRAFT STRUCTURE FOR BONDING STRAP FASTENER HARDWARE. IF NECESSARY OVERSIZE EXISTING HOLE TO Ø 0.200 MAX. ELECTRICAL ASPECTS OF BONDING STRAP INSTALLATION IN ACCORDANCE WITH AC 43.13-1B SECTION 15 GROUNDING AND BONDING.

5 PREPARE AREA UNDER FASTENER FOR ELECTRICAL BOND PER SECTION 3.5.2.

Figure 5-3 Bonding Strap Installation

Removal

1. Power on all GI 275s into Configuration mode.
2. On the GI 275 configured to interface to the GHA 15 via CAN bus, export the GI 275 configuration file using the following procedure:
 - a. Insert a USB drive into the USB dongle or GSB 15 (if installed).
 - b. Touch **SW/Config** → **Config Options** → **Export Configuration**.
 - c. Touch **Select Name**, enter a name for the saved file, and touch **Enter**.
 - d. Touch **Export Config**.
3. Once the configuration has been exported, power off and disconnect power from the GHA 15 and interfaced GI 275.
4. Remove the environmental seal from GHA 15 base and aircraft skin (and leveling adapter, if used).
5. Remove the four screws and pull the GHA 15 down away from aircraft skin to expose the connector.
6. Disconnect the GHA 15 connector and remove the unit from aircraft.
7. Clean the remaining sealant from the GHA 15 and aircraft skin using a non-marking scraper (plastic or Teflon type). Wipe with isopropyl alcohol to remove remaining sealant.

Installation

Install GHA 15 in accordance with Figure 5-1 or Figure 5-2 if installed with the leveling adapter. On curved skins, use MIL-A-46146 RTV silicone adhesive to form a gasket under the GHA 15. Hand-tighten the GHA 15 screws and let the adhesive cure before torquing the screws.

If the GI 275 unit was replaced or the configuration was lost for any reason, import the GI 275 configuration using the following procedure:

1. Power on all GI 275s into Configuration mode.
2. Insert the USB drive containing the configuration files into the USB dongle or GSB 15 (if installed).
3. Touch **SW/Config** → **Config Options** → **Import Configuration**.
4. Touch **Select Files** and select the configuration file to be imported.
5. Touch **Select Configuration**, select the applicable configurations, and then touch **Back**.
6. Touch **Import Config** () and then touch **Start**.

Checkout

Perform the following checkout procedures to return the aircraft to service after re-installation of the GHA 15:

1. Verify the electrical bond is in accordance with Section 3.5.
2. If the GHA 15 was replaced, verify correct GHA 15 software in accordance with Section 5.2.
3. Perform the GHA 15 Signal Check in accordance with Section 5.4.

5.1.1 Backshell Assembly

Table 5-1 Connector Installation

Figure 5-4 Ref	Description	Part Number
1	Circular Connector	330-01288-01 [1]
2	Contacts	M39029/56-348
3	Saddle Clamp Strain Relief Right Angle	330-90049-03 [1] (M85049/126S13Z)
	#4 Captive Self-Locking Nut and #4 Screw	Parts supplied with strain relief
	Cable Clamps	Parts supplied with strain relief
4	Multiple Conductor Shielded Cable (2 –conductor demonstrated here) [2]	Reference Installation Wiring Diagrams
5	Drain Wire Shield Termination	AS83519/1-X
6	22 AWG Shield Drain Wire [2]	MIL-W-22759/34 or MIL-W-22759/16
7	Heat Shrink Tubing	M23053/4-301-X
8	Ring terminal, #4, insulated, 18-22 AWG	MS25036-148
9	Flat Washer, Stainless, #4, .032" thick, .115"ID, .209"OD	NAS620C4
10	Silicone Fusion Tape (as required to provide strain relief with secured cable clamps)	249-00114-00 or similar
Not Shown	Connector Seal Plug	330-90013-01 [1]

Notes:

[1] Part is included in Garmin Connector Kit (P/N 011-05278-00).

[2] Wire and cable shown as examples only. CAN terminal wire and splice (if required) not shown.

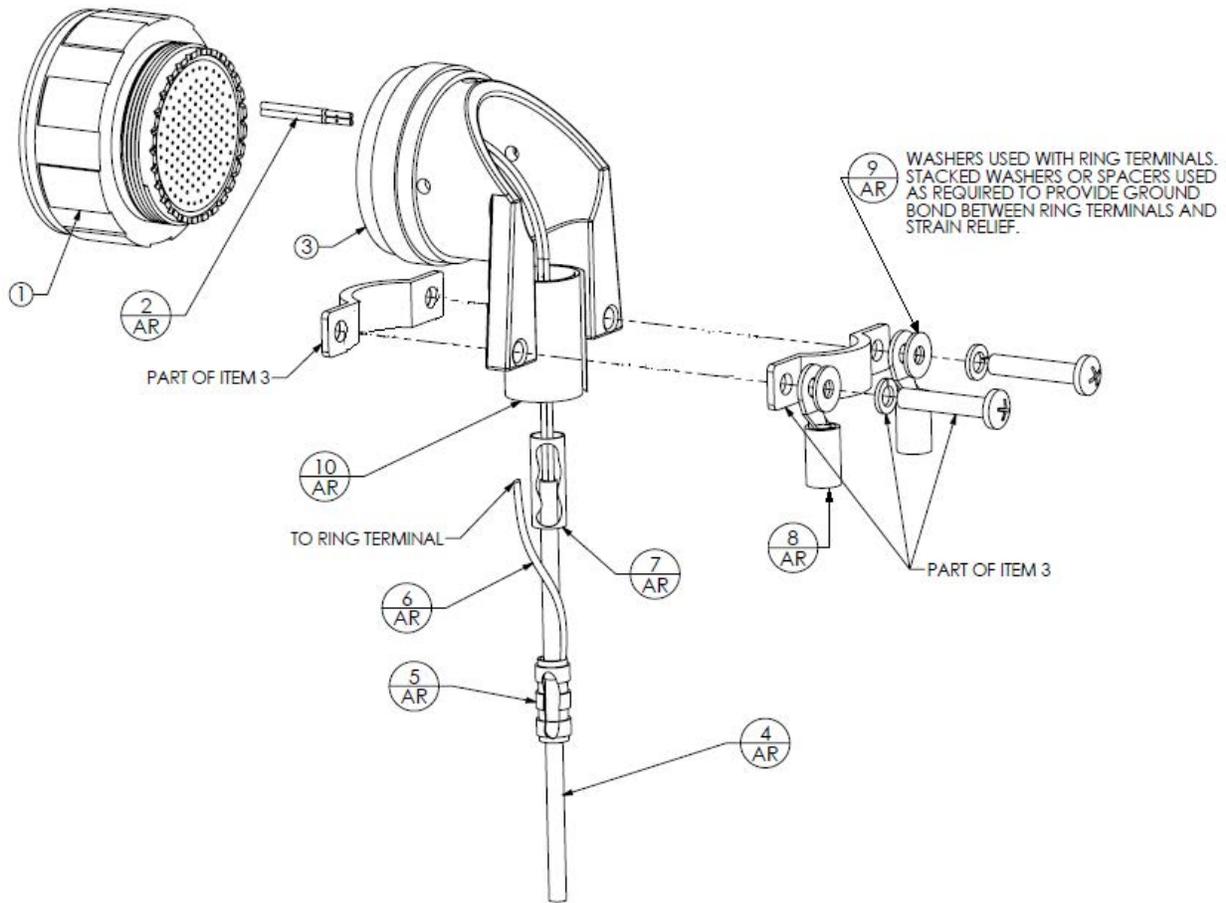


Figure 5-4 Backshell Assembly

5.1.2 Shielded Cable Preparation

Prepare all of the shielded cables in accordance with Figure 5-5.

1. At the end of the shielded cable, strip back a 2.5-inch maximum length of the jacket to expose the braid. When the unit is located at the end of the CAN bus backbone, a CAN bus termination splice is required. If a splice at a connector requires additional length, the max length of unshielded wire is 4.0 inches. The use of single conductor MIL-W-22759/16 or MIL-W-22759/34 wire is acceptable.
2. Remove this exposed braid.
3. Carefully score the jacket 1/4 to 5/16 inches from the end and remove the jacket to leave the braid exposed.
4. Connect a 22 AWG wire (6) to the exposed shield of the prepared cable assembly. Refer to AC 43.13-1B for termination techniques.



NOTE

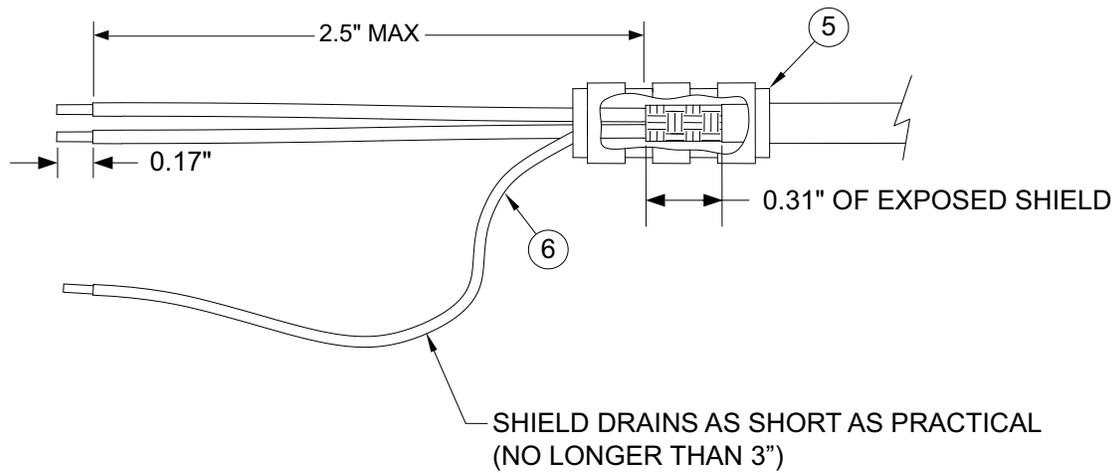
Solder sleeves with pre-installed shield drains may be used instead of separate shield terminators and individual wires. Refer to Table 5-1.

5. Slide a shield terminator (5) onto the prepared cable assembly.
6. Connect the shield wire (6) to the shield using a heat gun approved for use with solder sleeves. The chosen size of solder sleeve must accommodate both the number of conductors present in the cable and the shield wire (6) to be attached.
7. Crimp contacts onto the cable wires.
8. Repeat steps 1 through 7 as needed for the remaining shielded cables.
9. Wrap the cable bundle with silicone fusion tape A-A-59163 (MIL-I-46852C) at the point where the backshell strain relief and cast housing will contact the cable bundle.
10. Install a ring terminal onto the cable shield termination wires (6), grouping wires as applicable for the connector. Make sure each shield drain is 3 inches or shorter.

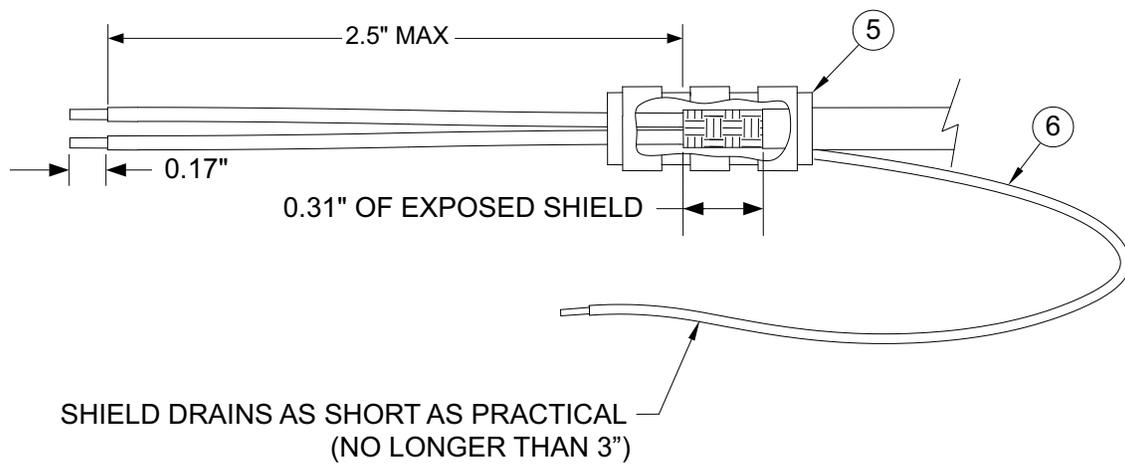


NOTE

A maximum of two ring terminals can be attached to each screw on the GI 275 connector backshell. No more than three shield drain leads per ring terminal.



PREFERRED METHOD



ALTERNATE METHOD

Figure 5-5 Shield Termination Methods

5.2 Software

Updating the GHA 15 software is accomplished via the GI 275 software loader card. To update the GHA 15 software via the GI 275, use the following procedure:

1. Create a GI 275 Software Loader Card using software and instructions available on the Garmin [Dealer Resource Center](#).
2. Power on all GI 275s into Configuration mode, and power on all other LRUs connected to the CAN bus.
3. Insert the USB drive into the GI 275's USB dongle or GSB 15 (if installed).
4. On the GI 275 connected to the dongle/GSB 15, touch **SW/Config** → **Loader Card** and select the GHA 15 software update.
5. Touch **Update Packages ()** → **Begin Update**.
6. Once the installation is complete, touch **Restart now**.

5.3 GHA 15 Configuration



NOTE

Normally, it is not necessary to configure the GHA 15 after removal and re-installation of the GHA 15 and/or the GI 275. However, if it becomes necessary to configure the GHA 15 or verify the configuration, use the following procedure.

The GHA 15 is configured via an interfaced GI 275 using the following procedure:

1. Power on each GI 275 into Configuration mode. Power on the GHA 15.
2. On one GI 275 connected to the CAN bus, touch **Interfaces** → **Radio AGL** → **Interface** and select *GHA 15 (CAN)*.



NOTE

Only a single GI 275 can be configured to interface to the GHA 15 via the CAN bus. All other GI 275s displaying RAGL must be configured to interface with the GHA 15 via HSDB using the instructions beginning with step 6.

3. Touch **Configure** and set the GHA options as follows:
 - a. **Zero Ft Offset:** Enter the measured physical distance between the GHA 15 and the ground in feet (to the nearest tenth). The minimum distance from the ground that the GHA 15 can be installed is 16 inches (1.3 feet).
 - b. **Beam Wdth Snstvtv:** Set to *Normal Sensitivity*.
 - c. **Disable Callouts:** When enabled, all RAGL callouts are disabled. Refer to *AFMS, GHA 15 P23 AML STC*, Section 1.2, to determine if voice callouts should be disabled.
 - d. **Ascending Callouts:** Must be disabled per this STC.
 - e. **Callouts (FT/MT):** Enable the desired default callouts that match the units on the altimeter. Disable all the callouts of the unused units. Enabled callouts can be changed in Normal mode.
4. To enable Radio AGL as a selectable Miscellaneous Field for the **ADI**, **HSI**, and/or **HSI Map** pages, from the Configuration mode homepage touch **Setup** → **Miscellaneous** → **Misc Field Enable** and ensure Radio AGL is enabled.



NOTE

The ADI page is only displayed on units configured as an ADI or MFD/Standby ADI. The HSI and HSI Map pages are only displayed on units configured as an HSI, MFD, or MFD/Standby ADI.

5. To enable a dedicated page for display of Radio AGL, from the Configuration mode homepage touch **Setup** → **Page Config** and ensure the Radio AGL page is configured.



NOTE

The Radio AGL page is only available on units configured as an MFD or MFD/Standby ADI.

For each additional GI 275 that will display Radio AGL, complete the following steps:

6. Touch **Interfaces** → **Radio AGL** → **Interface** and select *GHA 15 (HSDB)*.
7. To enable Radio AGL as a selectable Miscellaneous Field for the **ADI**, **HSI**, and/or **HSI Map** pages, from the Configuration mode homepage touch **Setup** → **Miscellaneous** → **Misc Field Enable** and ensure Radio AGL is enabled.
8. To enable a dedicated page for the display of Radio AGL, from the Configuration mode homepage touch **Setup** → **Page Config** and ensure the Radio AGL page is configured.

5.3.1 Audio Configuration

When a GI 275 standby is interfaced with G500/G600 TXi, both must be connected to an audio panel. Configure the GI 275 using the following procedure:

1. Power on each GI 275 into Configuration mode.
2. On a GI 275 connected to the audio panel, from the Configuration mode homepage touch **Setup** → **Audio Alert Config** → **Minimums Source** and set it to *Other*.
3. On a GI 275 connected to the audio panel, from the Configuration mode homepage touch **Setup** → **Miscellaneous** → **Altitude Alerter** and select *OFF*.

When a GI 275 is not wired to the audio panel, disable voice callouts using the following procedure:

1. Power on the GI 275 configured to interface to the GHA 15 via CAN bus into Configuration mode.
2. Touch **Interfaces** → **Radio AGL**. Ensure “GHA 15 (CAN)” is shown on the **Interface** button.
3. Touch **Configure** → **Disable Callouts**.

5.4 System Checks

If the GHA 15 was removed and re-installed, perform the following checks to verify the connection to the GI 275.

5.4.1 LRU Status Check

1. Power on each GI 275 that is configured to display Radio AGL from the GHA 15 into Configuration mode. Ensure the RAGL circuit breaker is closed.
2. Touch **System Info** → **Devices Online**.
3. Verify that the Rad AGL entry has a green check mark.
4. Touch **Back** and then **Device Info**.
5. Touch **Device** and select *Radio AGL*.
6. Verify that the displayed Serial Number matches the serial number of the installed GHA 15.
7. Verify that the Software PN and Software Version match the GHA 15 software part number and software version.
8. Return the Configuration mode home screen.



NOTE

*The following steps must be performed on the GI 275 that is configured to interface with the GHA 15 on the CAN bus. To verify, touch **Interfaces** and scroll down to Radio AGL. It should show “GHA 15 (CAN)”.*

9. Touch **Diagnostics** → **CAN Network** → **Device** and select *GHA 1*.
10. Verify that the Error Rate and other data values do not display white dashes (e.g., the Error Rate shows “0%”).

5.4.2 GHA 15 Connection Check

1. Power on the GI 275 that is configured to interface with the GHA 15 on the CAN bus. Ensure the RAGL circuit breaker is closed.
2. Depending on the configuration of the GI 275, verify the RAGL displays correctly using one of the following methods:
 - a. If the GI 275 is configured to display the *ADI* page, complete the following on the *ADI* page:
 - i. Press and hold the knob to open the menu.
 - ii. Touch **ADI Options** → **Misc. Field**.
 - iii. Enable RAGL and exit the menu.
 - iv. Verify that the RAGL readout is displayed as 0.
 - v. Open the RAGL circuit breaker, and verify that the GI 275 RAGL readout displays a yellow “X”.
 - vi. Close the RAGL circuit breaker, and verify the readout normalizes at 0.
 - b. If the GI 275 is configured to display the *HSI* and/or *HSI Map* pages, complete the following on the *HSI* or *HSI Map* page:
 - i. Press and hold the knob to open the menu.
 - ii. Touch **HSI (Map) Options** → **Misc. Field**.
 - iii. Enable RAGL and exit the menu.

- iv. Verify that the RAGL readout is displayed as 0.
 - v. Open the RAGL circuit breaker, and verify that the GI 275 RAGL readout displays a yellow “X”.
 - vi. Close the RAGL circuit breaker, and verify the readout normalizes at 0.
- c. If the GI 275 is configured to display the ***MFD Data*** page, complete the following on the ***MFD Data*** page:
- i. Touch one of the data fields and select RAGL.
 - ii. Verify that the RAGL readout is displayed as 0.
 - iii. Open the RAGL circuit breaker, and verify that the GI 275 RAGL readout displays three yellow dashes.
 - iv. Close the RAGL circuit breaker, and verify the readout normalizes at 0.
- d. If the GI 275 is configured to display the ***Radio AGL*** page, complete the following on the ***Radio AGL*** page:
- i. Verify that the RAGL readout is displayed as 0.
 - ii. Open the RAGL circuit breaker, and verify that the GI 275 RAGL readout displays “RAGL FAIL” in yellow.
 - iii. Close the RAGL circuit breaker, and verify the readout normalizes at 0.

APPENDIX A INSTALLATION SPECIFIC INFORMATION

A.1	General Information.....	A-2
A.2	LRU Information	A-2
A.3	Equipment Location.....	A-2
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A.4.1	Single Engine	A-3
A.4.2	Twin Engine	A-4

Include a copy of the aircraft wiring diagrams in the permanent records along with the forms specified in this appendix.

Reference the aircraft manufacturer (electrical) standard practices manual and equipment manufacturer documentation for guidance on wire type, gauge, routing, and wire identification. Methods, techniques, and practices defined in AC 43.13-1B Chapter 11, *Aircraft Electrical Systems*, are acceptable.

Acrobat Reader 8.0 or later is necessary to view and fill out the form. You can download Acrobat Reader by visiting www.adobe.com.

When updating software, it is unnecessary to fill out a new configuration log. Fill out the applicable pages and append them to the back of the existing configuration log.

A.1 General Information

Date: _____ / _____ / _____ By: _____

AIRCRAFT

AIRCRAFT YEAR: _____

AIRCRAFT MAKE: _____

AIRCRAFT MODEL: _____

AIRCRAFT SERIAL #: _____

AIRCRAFT REG. #: _____

A.2 LRU Information

For each unit included in the installation, record the LRU information in the table below.

Unit	Unit Part Number	Unit Serial Number	Unit Mod Level
GHA 15	011-05259-51		
Software Part Number		Software Version	
006-B3772-			

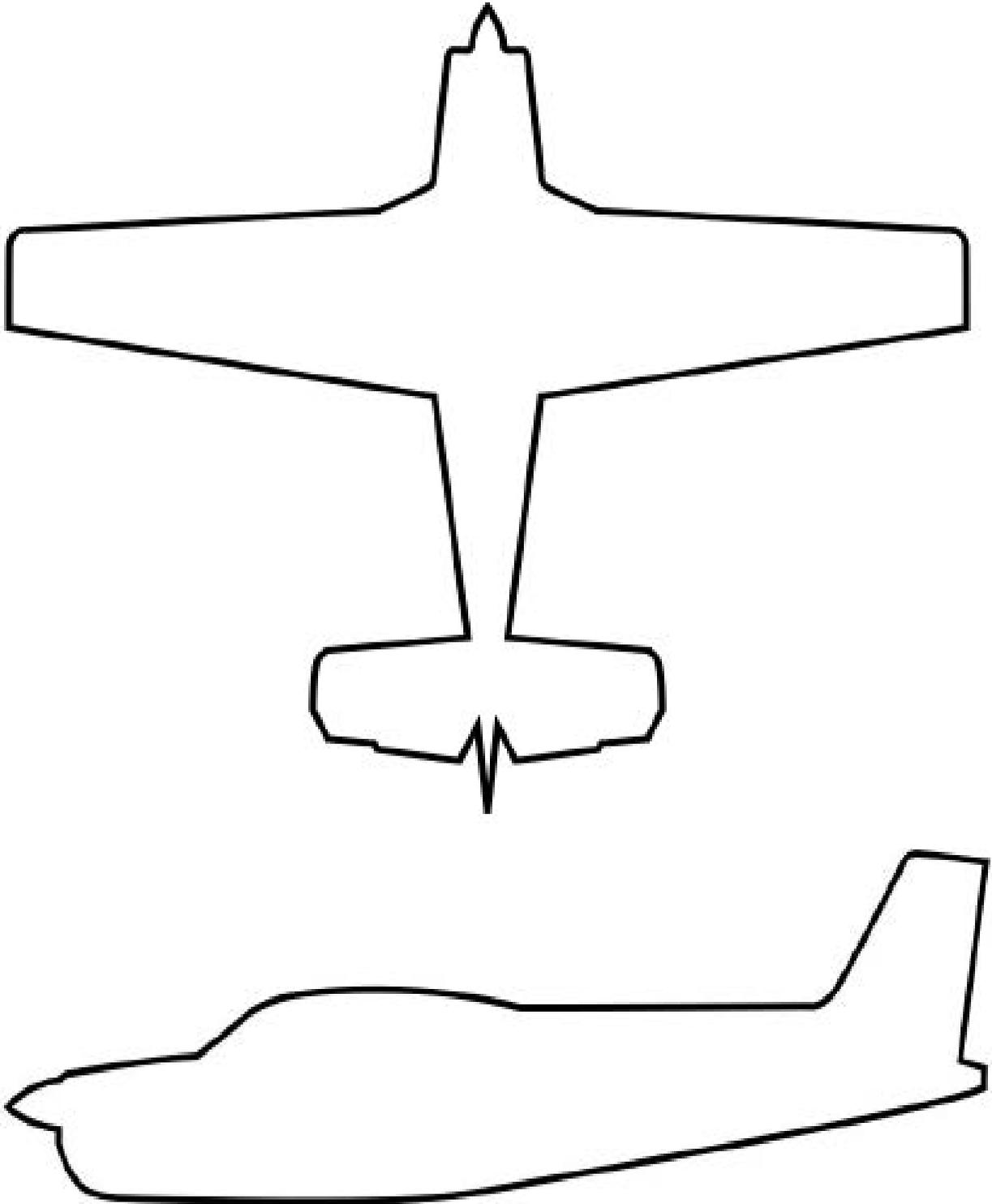
A.3 Equipment Location

For each unit included in the installation, record the fuselage station and provide a brief description of the location.

Unit	Station	Description of Location
GHA 15	in.	

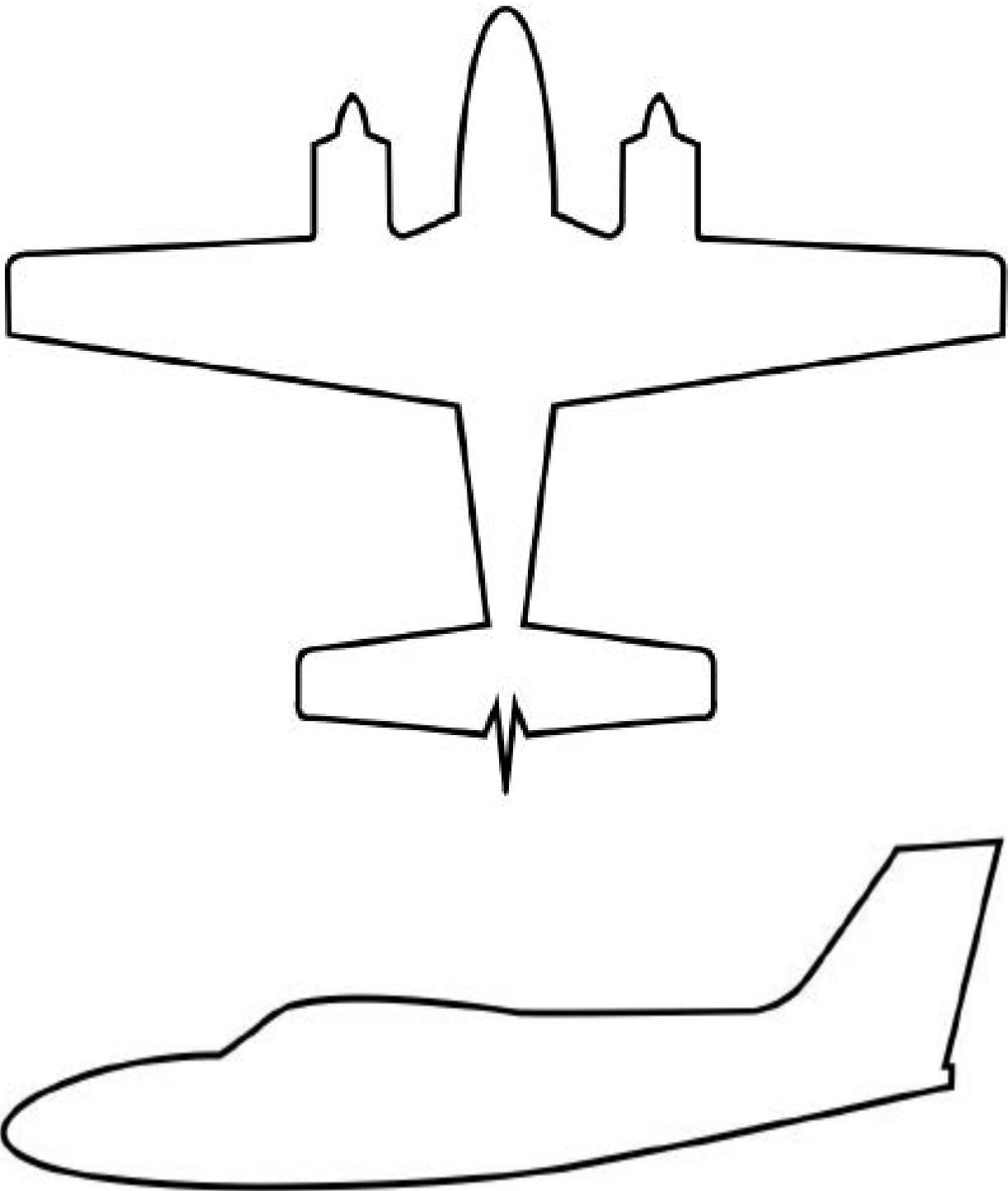
A.4 Wire Routing**A.4.1 Single Engine**

The following diagram depicts the wire routing for the GHA 15 throughout the aircraft structure for a single-engine aircraft.



A.4.2 Twin Engine

The following diagram depicts the wire routing for the GHA 15 throughout the aircraft structure for a twin-engine aircraft.



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