



# **GDL 69/69A Installation Manual**

**(Includes Optional GRT 10/GRC 10 Wireless Remote System)**



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### **RECORD OF REVISIONS**

<b>Revision</b>	<b>Revision Date</b>	<b>Description</b>
1	12/3/04	Experimental Release
A	12/8/04	Production Release
B	2/3/05	Add 400/500 interface
C	7/27/05	Add GDU 104x interface and SW version 3.00
D	9/15/05	Corrected specification sheet
E	6/30/06	Remove XM antenna installation data and added GA 55A and GA 57 antenna references.
F	12/13/07	Add GRC 10 and GRT 10 remote system and conditional use of Discrete 1 and 2. Update symbology of wiring diagrams. Added checkout logs for the GDL 69/69A, GRT 10, and GRC 10.
G	7/9/08	Changed maximum current for GRT 10 from 36 mA to 44 mA in Section 2.8.
H	8/15/08	Added GDU 620 configuration information. Updated Figure D-2.
J	7/1/09	Added configuration module information, updated Figure D-1 and Figure D-7, and changed strip length of wires. See "Current Revision Description" for list of detailed changes.

This manual is written for software version 2.13 or later. The software version and information in this document are subject to change without notice. Visit the Garmin web site ([www.garmin.com](http://www.garmin.com)) for current updates and supplemental information concerning the operation of this and other Garmin products.

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### CURRENT REVISION DESCRIPTION

<u>Revision</u>	<u>Page Number(s)</u>	<u>Section Number</u>	<u>Description of Change</u>
J	iii		Added e-mail address to receive comments about guide.
	1-1	1.1	Added –D to STC number.
	1-7	1.8	Added new section, “Ethernet (HSDB) Routing Information”. Also added Table 1-3, GDL 69/69A Primary Routing Support List.
	1-7	1.9	Software compliance was changed from Level D to Level B, D in Table 1-4.
	1-8	1.9	Update remote rack weight in Table 1-8, and added note. Updated Figures 1-4 and 1-5 for new CGs. Added note about similarity in CGs of GDL 69/69A.
	2-4	2.4.2	Added caution about tightening the handle screw more than 14 in-lbs. See Figure 2-2.
	2-7	2.5.1	Changed strip length of wires from 1/8” to 0.17”.
	2-10	2.5.2.2	Changed strip length of wires from 1/8” to 0.17”.
	2-12	2.5.2.5	Changed strip length of wires from 1/8” to 0.17” (2 places).
	2-17	2.5.3.3	Changed strip length of wires from 1/8” to 0.17” in Figure 2-10.
	2-24	2.7	Updated weights in Table 2-12 and added notes [2] and [3].
	4-1	4.4	Added information to note about loading information into the configuration module.
	4-2	4.4	Added note about which display should be used for setting configuration information.
	A-1	Appendix A	Added –D to STC number.
	C-1	Appendix C	Updated weights in Table C-1 and C-2.
	D-3	Appendix D	Changed pin number from 23 to 22 on port 2 for the GMX 200 in Figure D-1.
D-9	Appendix D	Corrected formatting of note 6 in Figure D-7.	

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### HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at [www.garmin.com](http://www.garmin.com) using their Garmin-provided user name and password.

#### **GDL 69/69A Mod Level History**

<b>Mod Level</b>	<b>Service Bulletin No.</b>	<b>Service Bulletin Date</b>	<b>Purpose Of Modification</b>
1	----	----	Mod 1 unit identical to no mod unit

#### **GRC 10 Mod Level History**

<b>Mod Level</b>	<b>Service Bulletin No.</b>	<b>Service Bulletin Date</b>	<b>Purpose Of Modification</b>

#### **GRT 10 Mod Level History**

<b>Mod Level</b>	<b>Service Bulletin No.</b>	<b>Service Bulletin Date</b>	<b>Purpose Of Modification</b>

#### **GRC 10 Mod Level History**

<b>Mod Level</b>	<b>Service Bulletin No.</b>	<b>Service Bulletin Date</b>	<b>Purpose Of Modification</b>

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# 1 GENERAL DESCRIPTION

## 1.1 Scope

The information in this manual is STC approved (STC #SA01487SE-D). Only the equipment interfaces covered in this manual are within the scope of this STC. Other equipment may be suitable for use with the GDL 69/69A, but use of such equipment is beyond the scope of this STC. Additional FAA approval may be required if equipment not covered in this manual is used to interface to the GDL 69/69A.

This document describes the GDL 69/69A operating with software version 2.13 or later, and the optional GRT 10/GRC 10 wireless remote system.

Refer to Section 6, Limitations for additional information.

It is possible for installers to seek evaluation and approval of an alternate installation by means of the field approval process. This manual and all the data contained within may be used by the installer in pursuit of a field approval.

## 1.2 Introduction

This manual presents mechanical and electrical installation requirements for installing the datalink equipment used to deliver XM WX Satellite Weather™ to a variety of Garmin navigation systems. For audio entertainment in the cockpit, the GDL 69A also provides XM Satellite Radio. If equipped with the optional GRT 10/GRC 10 wireless remote system, passengers are able to remotely control the audio functions of the GDL 69A datalink receiver using the GRC 10 wireless remote.

Equipment needed for receiving XM weather and radio:

- GDL 69/69A – (datalink receiver)
- GA37, GA 55, or GA55A (XM antenna)
- GRT 10 (transceiver) –optional
- GRC 10 (remote control) – optional

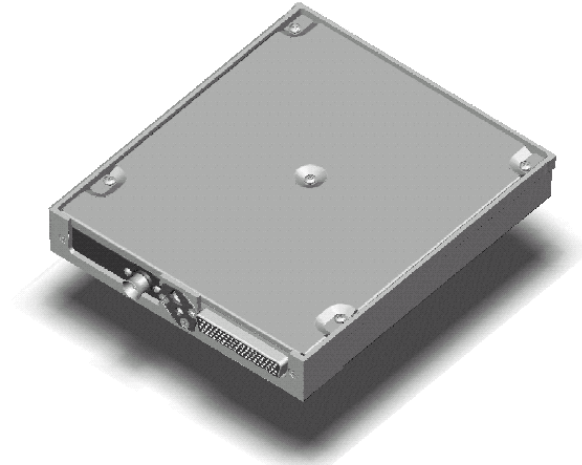
The datalink equipment operates with the systems and displays listed below. A detailed list of the systems and displays that the datalink equipment will operate with is listed in Table 1-1.

- 400W/500W series displays
- 400/500 series displays
- MX20 Multi-Function Display (MFD)
- GMX 200 MFD
- G1000 Integrated Cockpit System (G1000 Display Systems)
- G600 Integrated Avionics System (GDU 620)

The GDL 69/69A can be integrated into a variety of airframes under an appropriate TC or STC. Each airframe installation may vary. Interconnect drawings and procedures that are approved by the aircraft-manufacturer should be used during actual installation.

## 1.3 Equipment Description

The GDL 69/69A is an XM Satellite Radio data link receiver. The XM Satellite Radio antenna receives the XM satellite signal and passes it to the GDL 69/69A. The GDL 69 is a weather data receiver and the GDL 69A is a weather receiver with the addition of XM Satellite Radio audio entertainment. To display weather information and control the audio channel and volume, the GDL69/69A can be interfaced with a GMX200, MX20, 400/500, or 400W/500W series unit via an RS-232 bus. This same information can be displayed on the G1000 Display Systems or GDU 620 via an Ethernet link. Audio volume and channel changes may also be controlled with mounted optional switches located in the cabin or by remotely using the GRC 10 wireless remote. The GDL 69A may also be interfaced to a Garmin audio panel for amplification and distribution of the audio signal.



**Figure 1-1. GDL 69/69A Unit View**

The optional GRT 10/GRC 10 wireless remote system is for use by passengers in the aircraft to control the audio functions of the Garmin GDL 69A Datalink Receiver. The system consists of two components: (1) The GRT 10 Wireless Transceiver installed in the aircraft and connected to the GDL 69A serial port, and (2) the GRC 10 Wireless Remote with an LCD display.

**CAUTION**



**Other transmitting systems which may exist in the aircraft:**

Bluetooth and other non-aviation transmitters require separate authorization for use in an aircraft. If they are present, note that interference from such devices may degrade the performance of the GRT 10/GRC 10 wireless remote system. The GRC 10/GRT10 wireless remote system may also degrade the performance of other wireless transceiver systems such as Bluetooth or IEEE 802.11 which operate in the same frequency band, though functional testing suggests these protocols are robust enough to maintain acceptable performance in the presence of the GRC 10/GRT 10 system.



**Figure 1-2. GRT 10 Transceiver Unit View**



**Figure 1-3. GRC 10 Remote Control Unit View**

### CAUTION



Stow the GRC 10 in a secure location (i.e. glove box, seat back pocket, etc.) when not in use to prevent damage to the aircraft interior or injury to occupants caused by aircraft maneuvers.

### WARNING



Do not use lithium batteries in the GRC 10.

### CAUTION



When replacing batteries, use only new or fully charged batteries. Do not mix new and old batteries as this can cause battery leakage and damage to the unit. Do not mix battery types (i.e. rechargeable with non-rechargeable).

### CAUTION



Remove batteries if the GRC 10 will not be in use for several months. Storing batteries in the unit for prolonged periods may result in leakage and damage to the battery compartment.

### NOTE



Failure of the GRC 10 (i.e. dead batteries) has no impact on normal aircraft operations and is only used for passengers to control audio entertainment.

### NOTE



The USB Port on the GRC 10 is for factory use only.

### NOTE



The GRC 10 is paired to the aircraft's GRT 10 at installation. The GRC 10 will not control the XM audio functions of another aircraft.

### 1.4 Interfaced Equipment

Accomplishment of installation of the GDL 69/69A under this STC requires previous or concurrent installation of the following equipment. If installing the model GDL 69, a control display unit is required. If installing a GDL 69A, a control display unit and audio panel are required; the GRT 10/GRC 10 wireless remote system is optional.

**Table 1-1. GDL 69/69A Interfaced Equipment List**

	Description	Software Version (or later FAA approved version)
OR	GMX 200 MFD Control Display Unit	Ver. 2.0
	MX20 MFD Control Display Unit	5.5
	GDU 1040 MFD Control Display Unit	4.01
	GDU 1040A MFD Control Display Unit	4.01
	GDU 1042 MFD Control Display Unit	5.00
	GDU 1043 MFD Control Display Unit	5.00
	GDU 1044 MFD Control Display Unit	5.00
	GDU 1044B MFD Control Display Unit	5.00
	GDU 1045 MFD Control Display Unit	5.00
	GDU 1240A MFD Control Display Unit	8.10
	GDU 1500 MFD Control Display Unit	6.10
	GDU 620	2.01
	GPS 400*	4.04
	GPS 400W	2.00
	GNC 420*	4.04
	GNC 420W	2.00
	GNC 420A*	4.04
	GNC 420AW	2.00
	GNS 430*	4.04
	GNS 430W	2.00
	GNS 430A*	4.04
	GNS 430AW	2.00
	GPS 500*	5.04
	GPS 500W	2.00
	GPS 500W with TAWS	2.00
	GNS 530*	5.04
	GNS 530W	2.00
	GNS 530W with TAWS	2.00
	GNS 530A*	5.04
	GNS 530AW	2.00
GNS 530AW with TAWS	2.00	
OR	SL15 Audio Panel Unit	N/A
	SL15M Audio Panel Unit	N/A
	SL10 Audio Panel Unit	N/A
	SL10S Audio Panel Unit	N/A
	SL10MS Audio Panel Unit	N/A
	GMA 340 Audio Panel Unit	N/A
	GMA 1347 Audio Panel Unit	N/A
	GRC 10 Remote	2.00
	GRT 10 Transceiver	2.01

\*400/500 series units must use Pilot Guide Addendum 190-00140-13 Revision D, or later. 400/500 series units may be connected to a GDL 69A. The 400/500 series units do not have audio control capabilities, but the aircraft may be provisioned with a GDL 69A and wiring for future 400W/500W series upgrade that will provide audio control and display.

## 1.5 Audio Entertainment Installation Limitations

The GDL 69A XM Satellite Radio audio entertainment and optional GRT 10/GRC 10 wireless remote system may be installed to all passenger locations for all aircraft on the STC Approved Model List (AML). XM audio entertainment to crew locations depends on aircraft installation, which must meet requirements of 14 CFR §23.1431(e).

For purpose of this STC, 14 CFR §23.1431(e) requires that each pilot station must be able to hear the aircraft's stall warning horn with the entertainment system audio set to the maximum pilot controllable setting. This also applies to aircraft with a gear extension warning horn. Aircraft which have electric stall/gear warning may utilize the GDL 69A audio suppression discrete input to turn off the music during an event. For these installations, the XM audio may be provided to the crew locations.

For aircraft installations with non-electric stall/gear warning horns, this STC does not provide data for installation of audio entertainment to crew locations. The GDL 69A audio entertainment may not be wired to crew locations without a separate evaluation that is beyond the scope of this STC. It is possible for installers to seek evaluation and approval of an alternate installation by means of the field approval process. Each installation or aircraft type must be evaluated for compliance with 14 CFR §23.1431(e). This evaluation may determine that the required horns can be heard satisfactorily without disabling the GDL 69A audio entertainment to the crew.

The optional GRT 10/GRC 10 wireless remote system has been tested for interference as part of the STC. Its operation must not interfere with the proper operation of any required aircraft equipment or systems. STC installation requires that the installer verify that there is no interference using the post-installation check-out procedure detailed in Section 4. Operators may use the STC qualification of the device as a basis for showing compliance with 14 CFR Part 91.21.

## 1.6 XM Satellite Radio

Welcome to the Next Generation of Radio. America's most popular satellite radio service gives you the power to choose what you want to hear - wherever and whenever you want it around the Continental United States.

XM Satellite Radio provides commercial-free music channels, channels of news, sports, talk and entertainment, dedicated channels of instant traffic and weather, the deepest play list in the industry with access to over 2 million titles, and coast-to-coast coverage. XM features digital quality audio.

Subscriptions to XM Satellite Radio weather and audio entertainment services are required before the GDL 69/69A can be activated for the first use. Refer to Section 4.8 for instructions for activating your unit.

### NOTE

It is prohibited to copy, decompile, disassemble, reverse engineer, or manipulate any technology incorporated in receivers compatible with the XM Satellite Radio system. Furthermore, the AMBE(R) voice compression software included in this product is protected by intellectual property rights including patent rights, copyrights, and trade secrets of Digital Voice Systems, Inc. The user of this or any other software contained in an XM Satellite Radio is explicitly prohibited from attempting to copy, decompile, reverse engineer, or disassemble the object code, or in any other way convert the object code into human-readable form. The software is licensed solely for use within this product.



## 1.7 Interface Summary

The following list is an interface summary for the GDL 69/69A units. Note that the GDL 69 does not have the audio interface.

- 3 RS-232 Inputs/Outputs
- 4 Ethernet Inputs/Outputs
- 5 Audio Discrete Control Inputs (Volume Up, Volume Down, Channel/Preset Up, Channel/Preset Down, Mute)
- 6 Audio Suppression Inputs (3 Active High, 3 Active Low)
- 1 Stereo Audio Output (Left Audio, Right Audio with internal volume control and audio suppression)
- 1 Stereo Monitor Output (Line Out Left, Line Out Right with fixed volume level and no audio suppression)
- 1 Remote Power On/Off Discrete Input
- 2 Discrete Inputs (Reserved for Manufacturing Use – Test, Debug Port Enable)
- 1 Discrete Input (Configures audio channel control inputs)
- Configuration Module (for storing aircraft configuration data)
- Aircraft Power Input (Power-on controlled by aircraft avionics power bus)

The following list is an interface summary for the GRT 10 Wireless Transceiver:

- 1 RS-232 Input/Output
- 1 Discrete Input (Volume Lock Enable)
- Aircraft Power Input (Power-on controlled by aircraft avionics power bus)



## 1.8 Ethernet

The GDL 69/69A is designed to route HSDB GWX 68 Weather Radar data packets through the GDL 69/69A. This provides for a primary or single-thread data path (see Table 1-3). This function is not authorized in STC SA01487SE-D. The routing function may also be used as a redundant or backup data path for specific other Garmin products (see Table 1-2 for a list of the products supported by the GDL 69/69A). The software that performs this routing function was developed to RTCA DO-178B Level B. The hardware that performs the routing function was developed to support a loss of the routing function for the HSDB data as a major failure condition. Airworthiness approval for the routing function is the responsibility of the system using the GDL 69/69A routed data.

**Table 1-2. GDL 69/69A Redundant Routing Support List**

Garmin Product	GDL 69/69A SW Version (or later FAA approved version)
All G1000 System MFD Display Units	v3.10
All G1000 System PFD Display Units	v3.10
GIA 63	v3.10
GIA 63W	v3.20
GSD 41	v3.20
All G600 System MFD Display Units	v3.10
All G600 System PFD Display Units	v3.10

**Table 1-3. GDL 69/69A Primary Routing Support List**

Garmin Product	GDL 69/69A SW Version (or later FAA approved version)
GWX 68	v3.00

## 1.9 Technical Specifications

The GDL 69/69A, GA 55, and GA55A antenna, and optional GRT 10/GRC 10 wireless remote system are PMA approved and there is no applicable TSO. The GA 37 and GA 57 GPS/WAAS – XM antennas are TSO authorized under TSO-C144, but the GA 57 is not recommended for new installations. It is the responsibility of those desiring to install this equipment either on or within a specific type of class of aircraft to determine that the aircraft installation standards are within the prescribed standards. The following table presents general environmental specifications. For detailed specifications, see the Environmental Qualification form in Appendix B.

**Table 1-4. GDL 69/69A Specifications**

GDL 69/69A Characteristics	Specification
Operating Temperature Range	-45° C to +70° C
Input Voltage Range	9.0 to 33.0 VDC
Software Compliance	RTCA DO-178B Level B, D
Environmental Compliance	RTCA DO-160D

**Table 1-5. GA 37, GA 55, GA 55A, and GA 57 Specifications**

GA 37, GA 55, GA 55A Characteristics	Specification
Operating Temperature Range	-55° C to +85° C
Input Voltage Range	Power provided by GDL 69/69A
Software Compliance	None
Environmental Compliance	RTCA DO-160D

**Table 1-6. GRC 10 Remote Control Specifications**

GRC 10 Remote Control Characteristics	Specification
Operating Temperature Range	-20° C to +55° C
Input Voltage Range	Power provided by 2 AA batteries
Software Compliance	RTCA DO-178B Level D
Environmental Compliance	RTCA DO-160E

**Table 1-7. GRT 10 Transceiver Specifications**

GRT 10 Transceiver Characteristics	Specification
Operating Temperature Range	-30° C to +70° C
Input Voltage Range	9.0 to 33.0 VDC
Software Compliance	RTCA DO-178B Level D
Environmental Compliance	RTCA DO-160E

**NOTE**



See Table 2-12 for a detailed list of weights for the GDL 69, GDL 69A, remote rack, modular rack, GRT 10 transceiver, and GRC 10 remote control.

**Table 1-8. GDL 69/69A Unit Dimensions**

Characteristic	Specification
Width	1.05 inches (2.66 cm)
Height	6.15 inches (15.62 cm)
Depth (Rack w/ Connectors)	7.20 inches (18.26 cm)
Unit Weight (GDL 69)	1.72 lbs (0.78 kg)
Unit (GDL 69) and Remote Rack Weight	2.92 lbs (1.32 kg)
Unit Weight (GDL 69A)	1.86 lbs (0.84 kg)
Unit (GDL 69A) and Remote Rack Weight	3.06 lbs (1.39 kg)

**NOTE**



The characteristic, “Unit (GDL 69A) and Remote Rack Weight”, in Table 1-8 is the combined weight of the GDL 69A (011-00987-00), the Back Plate (011-00796-35), the Connector Kit (011-00997-00) and the Remote Rack (115-00658-00).

The characteristic, “Unit (GDL 69) and Remote Rack Weight”, in Table 1-8 is the combined weight of the GDL 69 (011-00986-00), the Back Plate (011-00796-35), the Connector Kit (011-00997-00) and the Remote Rack (115-00658-00).

**Table 1-9. GRT 10 Transceiver Dimensions**

Characteristic	Specification
Width	2.74 inches (7.0 cm)
Height	0.92 inches (2.3 cm)
Length	3.93 inches (10.0 cm)
Unit Weight (excluding connector kit)	0.15 lbs (0.07 kg)
Unit Weight (including connector kit)	0.27 lbs (0.12 kg)

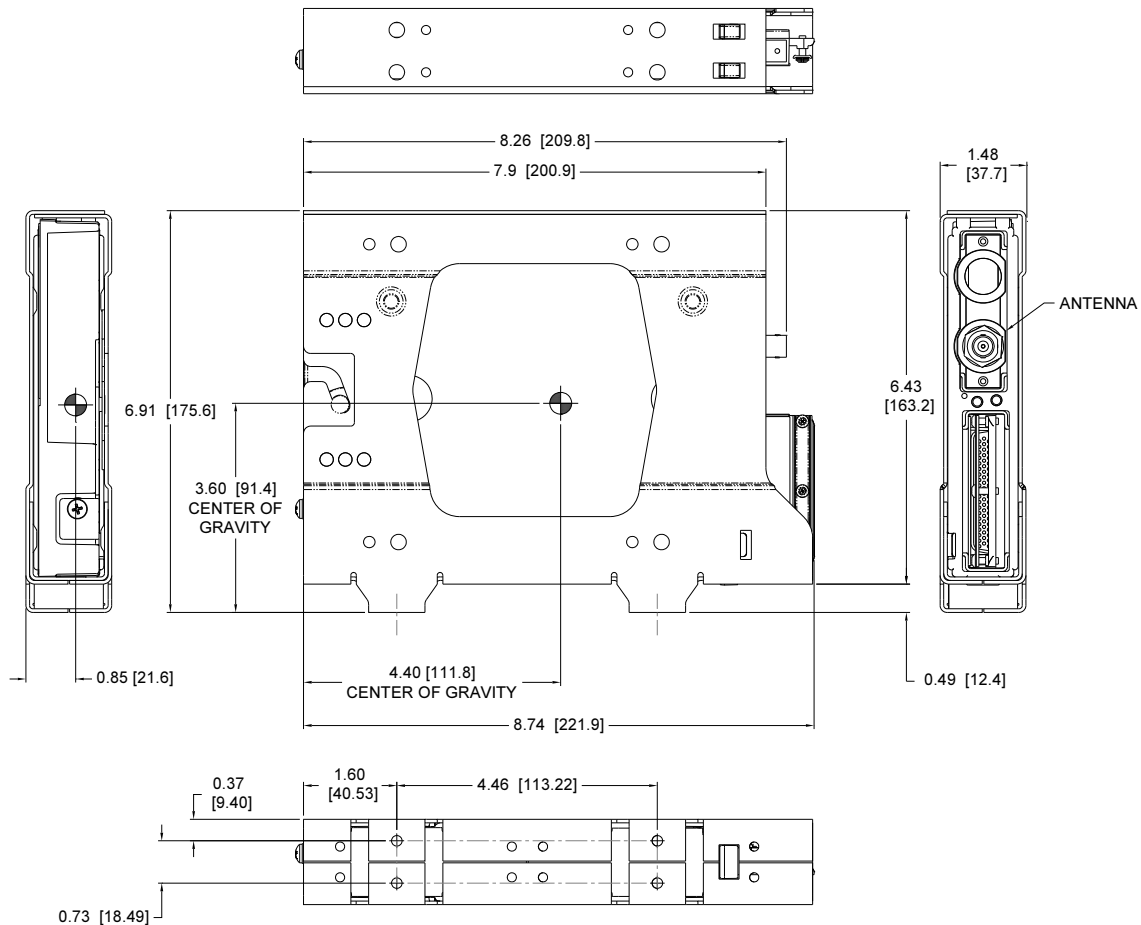
**Table 1-10. GRC 10 Remote Control Dimensions**

Characteristic	Specification
Width	2.46 inches (6.2 cm)
Height	1.16 inches (2.9 cm)
Length	5.00 inches (12.7 cm)
Unit Weight (with batteries)	0.34 lbs (0.15 kg)
Unit Weight (without batteries)	0.23 lbs (0.11 kg)

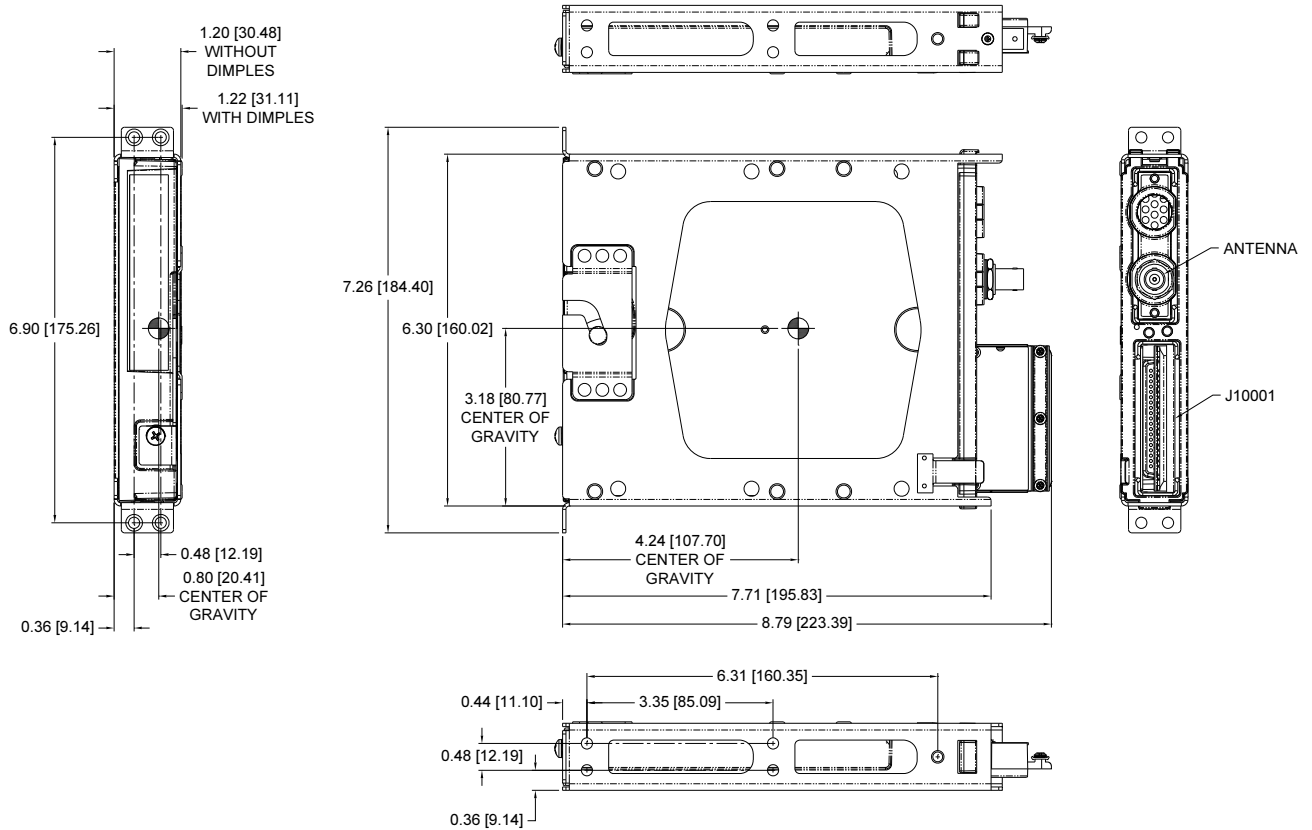
**NOTE**



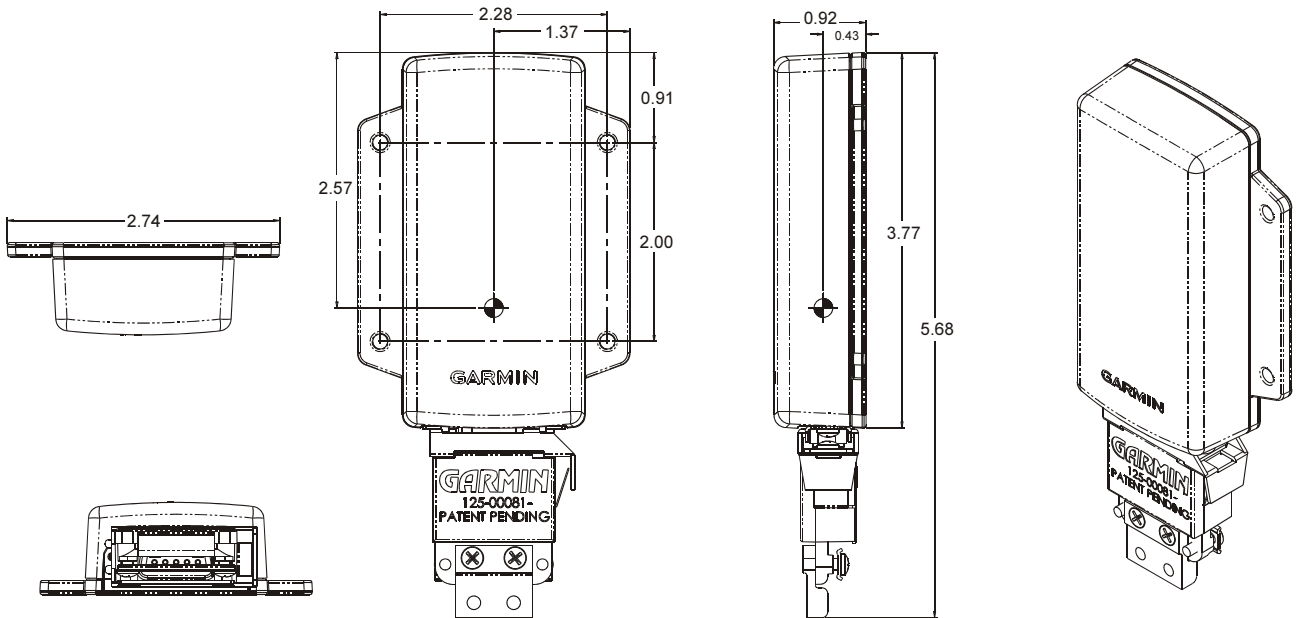
The center of gravity of the GDL 69 and the GDL 69A are so similar that they share the same center of gravity for their respected rack configurations. See Figure 1-4 and Figure 1-5.



**Figure 1-4. GDL 69/69A Remote Rack Unit Dimensions**



**Figure 1-5. GDL 69/69A Modular Rack Unit Dimensions**



**Figure 1-6. GRT 10 Transceiver Dimensions**

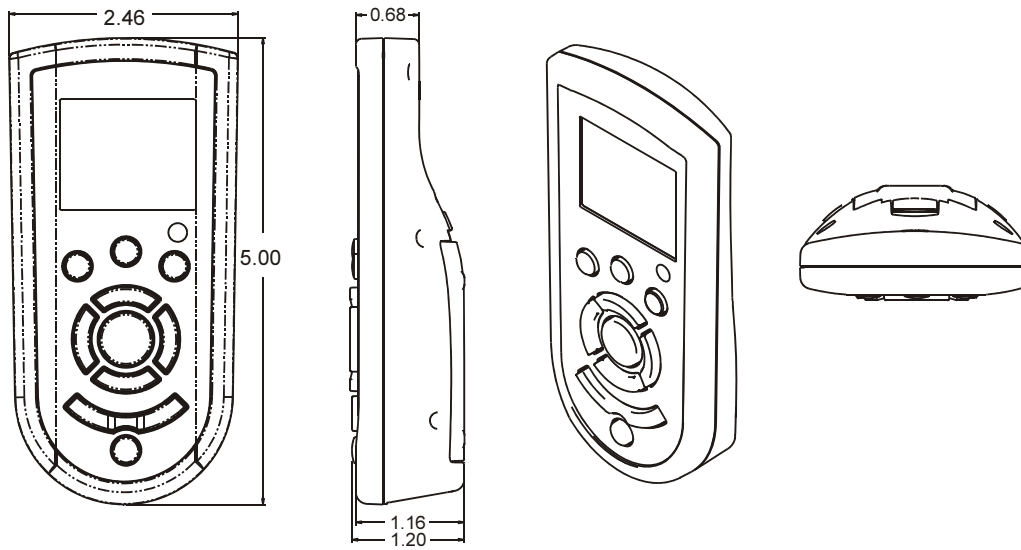


Figure 1-7. GRC 10 Remote Control Dimensions

### 1.9.1 General Antenna Requirements

Garmin recommends the Garmin XM antennas shown in the Table 1-11 below. These antennas are approved with the certification of the GDL 69/69A. However, any equivalent XM antenna with specifications listed in Table 1-12 should work with the GDL 69/69A. Antennas must provide protection from direct lightning strikes. This STC does not support installations of equivalent antennas.

**Table 1-11. XM Antennas**

Model	Part Number	Description	Mounting Configuration
GA 37	013-00245-00	GPS/WAAS + XM Antenna	Thru-mount (ARINC 743 style mount)
GA 55	011-01033-00	XM Antenna	Stud mount Tear-drop form factor
GA 55A	011-01153-00	XM Antenna	Thru-mount (ARINC 743 style mount)
GA 57*	011-01032-00	GPS/WAAS + XM Antenna	Thru-mount (ARINC 743 style mount)

\* Not recommended for new installations

**Table 1-12. XM Satellite Radio Antenna Minimum Requirements**

Frequency Range	2332.5 to 2345 MHz
Gain (Typical)	24 dB ± 1 dB**
Noise Figure	<1.2 dB
Nominal Output Impedance	50 ohms
Supply Voltage	3.6 to 5.5 VDC
Supply Current (maximum)	55 mA
Operating Temperature Gain	-50 to +85°C

\*\* For each 1 dB gain over 24 dB, add 1 dB of attenuation into the antenna cable path between the antenna and the GDL 69/69A.

**Table 1-13. GA 37, GA 55, and GA 55A XM Antenna Specifications**

Frequency Range	2332.5 to 2345 MHz
Gain	25 ± 2 dB
Noise Figure	<1.2 dB
Nominal Output Impedance	50 ohms
Supply Voltage	3.6 to 5.5 VDC
Supply Current	40 to 55 mA
Operating Temperature Range	-50 to +85 ° C
Output Connector	TNC

## 1.10 Reference Documents

The following publications are sources of additional information for installing the GDL 69/69A and optional GRT 10/GRC 10 wireless remote system. Before installing the GDL 69/69A, the technician should read all referenced materials applicable to the installation along with this manual.

**Table 1-14. Referenced Publications**

Part Number	Document
190-00149-01	GMA 340 Audio Panel Installation Manual
190-00303-20	GMA 1347 Audio Panel Installation Manual
190-00181-02	500 Series Installation Manual
190-00140-02	400 Series Installation Manual
190-00140-13	400/500 Series Garmin Optional Displays
190-00356-02	400W Series Installation Manual
190-00357-02	500W Series Installation Manual
190-00719-00	G900X Installation Manual
190-00303-00	G1000 System Installation Manual
190-00303-01	GDU 1040 Installation Manual
190-00303-14	GDU 124X Installation Manual
190-00303-09	GDU 1500 Installation Manual
190-00601-04	GDU 620 Installation Manual
190-00522-01	GA 55A, GA 56A and GA 57 Antenna Installation Manual
190-00848-00	GA 35, GA 36, and GA 37 Antenna Installation Manual
190-00355-04	XM™ Satellite Radio Activation Instructions
190-00607-04	GMX 200 Installation Manual
560-1025-( )	MX20 Installation Manual
560-0979-( )	SL15 Audio Panel Installation Manual
560-0978-( )	SL10 Audio Panel Installation Manual

## 1.11 Certification

The GDL 69/69A XM Satellite Radios, XM Satellite Radio Antenna and optional GRT 10/GRC 10 wireless remote system have Parts Manufacturing Approval (PMA) for the aircraft listed on the STC Approved Mode List (AML).

### 1.11.1 TSO/ETSO Compliance

The GA 37 and GA 57 are TSO-C144 authorized. The GA 57 is not recommended for new installations. There are no other applicable TSO standards.

### 1.11.2 Other Regulatory Criteria

#### 1.11.2.1 FCC Compliance Information

The GRT 10 complies with Part 15 of the FCC regulations and with Canada RSS-210.

#### NOTE



The GRT 10 and GRC 10 have been approved for use in the United States and Canada.

### 1.11.2.2 FCC Grant of Equipment Authorization

- GRT 10: FCC ID: IPH-01179  
IC: 1792A-01179

#### NOTE



This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### NOTE



This device does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

- GRC 10: FCC ID: IPH-01178  
IC: 1792A-01178

#### NOTE



This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

#### NOTE



This device does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could result in permanent damage to the equipment, and void your warranty and your authority to operate this device under Part 15 regulations.

### 1.12 Unpacking Unit

Carefully unpack the equipment and make a visual inspection of the unit for evidence of damage incurred during shipment. If the unit is damaged, notify the carrier and file a claim. To justify a claim, save the original shipping container and all packing materials. Do not return the unit to Garmin until the carrier has authorized the claim.

Retain the original shipping containers for return shipments. If the original containers are not available, a separate cardboard container should be prepared that is large enough to accommodate sufficient packing material to prevent movement.

#### NOTE



For GRC 10 Users: Record the GRC 10 serial number for installation purposes. See Section 4.5.



## 1.13 Warranty Statement

### Limited Warranty

This Garmin product is warranted to be free from defects in materials or workmanship for two years (one year for GRC 10) from the date of purchase. Within this period, Garmin will at its sole option, repair or replace any components that fail in normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost. This warranty does not cover failures due to abuse, misuse, accident or unauthorized alteration or repairs.

THE WARRANTIES AND REMEDIES CONTAINED HEREIN ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESS OR IMPLIED OR STATUTORY, INCLUDING ANY LIABILITY ARISING UNDER ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, STATUTORY OR OTHERWISE. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, WHICH MAY VARY FROM STATE TO STATE.

IN NO EVENT SHALL GARMIN BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE, MISUSE, OR INABILITY TO USE THIS PRODUCT OR FROM DEFECTS IN THE PRODUCT. Some states do not allow the exclusion of incidental or consequential damages, so the above limitations may not apply to you.

Garmin retains the exclusive right to repair or replace the unit or software or offer a full refund of the purchase price at its sole discretion. SUCH REMEDY SHALL BE YOUR SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY.

To obtain warranty service, contact your local Garmin Authorized Service Center. For assistance in locating a Service Center near you, call Garmin Customer Service at one of the numbers shown below.

Products sold through online auctions are not eligible for rebates or other special offers from Garmin. Online auction confirmations are not accepted for warranty verification. To obtain warranty service, an original or copy of the sales receipt from the original retailer is required. Garmin will not replace missing components from any package purchased through an online auction.

Garmin International, Inc.  
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## 2 INSTALLATION

### 2.1 Introduction

This section provides hardware equipment information for installing the GDL 69/69A and optional GRT 10, cabling for the XM antenna (GA 37, GA 55, GA 55A, or GA 57), and related hardware. Installation of the GDL 69/69A and GRT 10 should follow the aircraft TC or STC requirements. For interconnects with the GDU 620, G1000 Display Systems, MX20 MFD, GMX 200 MFD, 400W/500W series or 400/500 series refer to Appendix D of this manual. For installation information on the GDU 620, G1000 Display Systems, MX20 MFD, GMX 200 MFD, 400W/500W series or 400/500 series, refer to their installation manuals.

Installation of the XM antennas is covered under separate Garmin GA Antenna AML STC number SA01695SE.

### 2.2 Pre-Installation Information

Always follow acceptable avionics installation practices per FAA Advisory Circulars (AC) 43.13-1B, 43.13-2A, or later FAA approved revisions of these documents.

Follow the installation procedure in this manual as it is presented for a successful installation. Read the entire manual before beginning the procedure. Prior to installation, consider the structural integrity of the GDL 69/69A and GRT 10 installation as defined in AC 43.13-2A, Chapter 1 and evaluate the necessity for audio suppression inputs in accordance with the GDL 69A Audio Limitations in Section 6. Perform the post installation checkout before closing the work area in case problems occur.

Complete an electrical load analysis in accordance with AC 43.13-1B, Chapter 11, on the aircraft prior to starting modification to ensure aircraft has the ability to carry the GDL 69/69A and GRT 10 load. Refer to Section 2.8 for the power consumption of the GDL 69/69A and the GRT 10. Document the results of the electrical load analysis on FAA Form 337.

### 2.3 Installation Materials

#### 2.3.1 Configurations Available

The GDL 69, GDL 69A, and GRT 10/GRC 10 wireless remote system can be ordered in different kits, each of which may contain components listed in the following table.

**Table 2-1. GDL 69/69A Kit Contents**

	Description	Part Number
	GDL 69 XM Weather Data Receiver	011-00986-00
	GDL 69A XM Weather/Audio Data Receiver	011-00987-00
	Back Plate Assembly	011-00796-35
	Remote Mount Rack GDL 69	115-00658-00
	Connector Kit Assembly	011-00997-00
	Configuration Module Assembly	011-00979-00
OR	GA 37 XM and GPS Antenna	013-00245-00
	GA 55 XM Antenna	011-01033-00
	GA 55A XM Antenna	011-01153-00
	GA 57 XM and GPS Antenna (Not recommended for new installations)	011-01032-00
	Rack Nut Plate, 2 POS	011-00915-00
	Modular Rack	115-00411-00

**Table 2-2. GRT 10 Transceiver Kit Contents**

Description	Part Number
GRT 10 (Wireless Transceiver)	011-01557-00
Connector Kit	011-01556-00

**Table 2-3. GRC 10 Remote Control Kit Contents**

Description	Part Number
GRC 10 (Wireless Remote Control)	011-01558-00
Two AA Batteries	360-00004-00
GRC 10 User's Guide	190-00355-11

### 2.3.2 Equipment Required But Not Supplied

Hardware for the GDL 69/69A:

- Wire: MIL-W-22759/16 or equivalent
- Shielded Wire: MIL-C-27500 or equivalent

Hardware for Remote Mount Rack:

- Vertical Mount: Four #8-32 Pan Head Screws (MS35206, AN526 or equivalent)
- Horizontal Mount: Four #6-32 x 100° Counter-Sunk Flat Head Screw (MS24693, AN507R or equivalent)
- Circuit Breaker: Appropriate for selected wire size

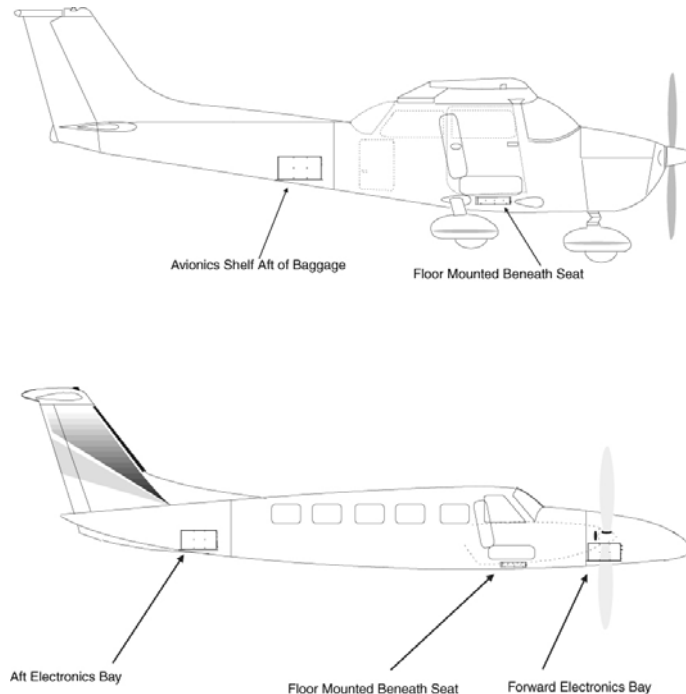
Hardware for GRT 10 Transceiver:

- Four #6-32 Pan Head Screws (MS35206, AN526 or equivalent)

## 2.4 Equipment Mounting

### 2.4.1 Rack Location and Installation

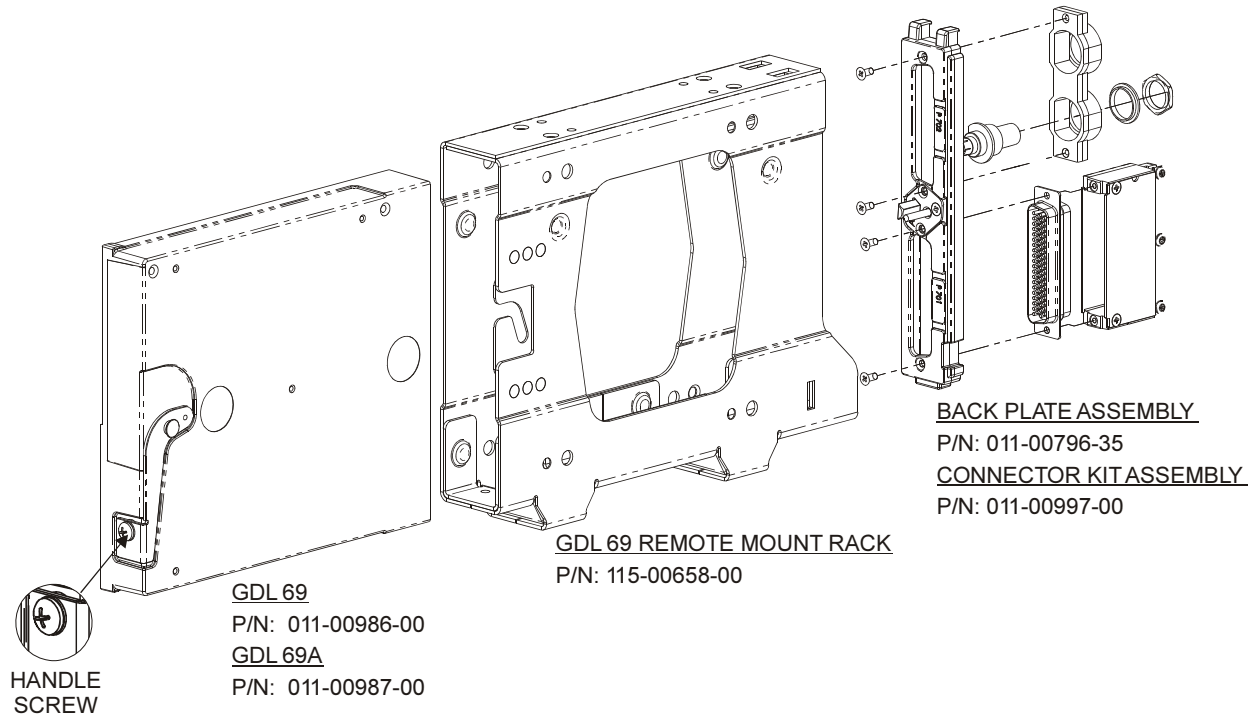
The GDL 69/69A and optional GRT 10 may be mounted in a pressurized or unpressurized location, neither unit requires forced-air cooling. When mounting, avoid locating the equipment near sources that produce high levels of heat. The GDL 69/69A has two mounting rack options available, the remote rack and the modular rack for use with the G1000 system.



**Figure 2-1. Suggested Mounting Locations for Remote Rack**

### 2.4.2 Remote Mount Rack

The remote mount rack can be installed in a variety of locations, such as the electronics bay, behind the instrument panel, under the seat or behind the rear baggage area. Leave sufficient clearance between the GDL 69/69A and any obstruction. Install the rack in accordance with AC43.13-2A Chapter 2 Radio Installations. The remote mount rack should be mounted to a surface known to have sufficient structural integrity to withstand additional inertial forces imposed by a 1.86 pound unit (1.72 lbs. for GDL 69). If it is necessary to build a shelf or bracket to mount the GDL 69/69A rack or if is not certain that the chosen location is of sufficient structural integrity, refer to Appendix C. Refer to Figure 1-4 for the GDL 69/69A remote mount rack dimensions. The rack can be mounted vertically using four 8-32 pan head screws (MS35206, AN526 or equivalent.) It can also be mounted horizontally using four 6-32 100° counter-sunk flathead screws (MS24693, AN507R or equivalent.) Ensure that the rack has a ground path to the airframe by having at least one mounting screw in contact with the airframe to minimize radiated electromagnetic interference (EMI).



**CAUTION**



Start the handle screw into the hole carefully, to avoid cross-threading. Do not apply torque in excess of 14 in-lbs to the handle screw. The application of torque exceeding 14 in-lbs to this screw will damage the LRU case and/or retaining hardware.

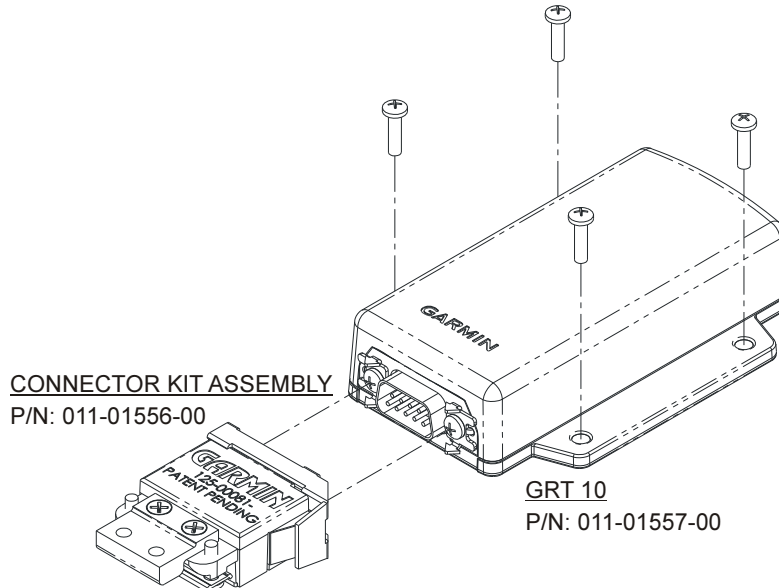
**Figure 2-2. GDL 69/69A Remote Mount Rack**

**2.4.3 G1000 Modular Rack**

The G1000 modular rack is used to install the GDL 69/69A in the standard G1000 integrated avionics system rack. This modular rack may be mounted behind the instrument panel or in the avionics bay. Refer to Figure 1-5 for the GDL 69/69A G1000 modular rack dimensions. This STC covers the installation of the GDL 69/69A modular rack into the installed G1000 integrated avionics system rack, but does not cover the installation of the G1000 integrated avionics system rack.

### 2.4.4 GRT 10 Mounting

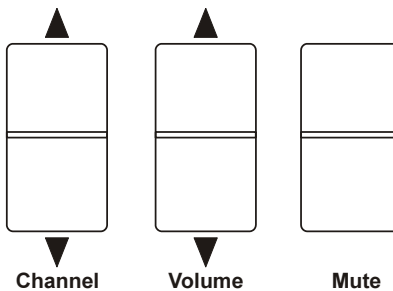
The optional GRT 10 transceiver is mounted using four #6 pan head screws (MS35206, AN526, or equivalent) onto a solid surface. Install the GRT 10 in accordance with AC43.13-2A Chapter 2 Radio Installations. Because the weight of the GRT 10 is only 0.27 lbs, the impact of the weight to the surrounding structure is negligible and no structural validation procedures are required. If the GDL 69A is mounted behind a metal bulkhead, the GRT 10 should be mounted inside the cabin to get better signal strength. For optimal performance, the end of the GRT 10 opposite the 9-pin D-sub should face the cabin.



**Figure 2-3. GRT 10 Mounting**

### 2.4.5 Remote Switches

Installation of rocker switches should be made on a flat surface and located at a convenient location within the cabin. Each rocker switch installed must be properly marked of its function. Use of rocker switches vs. toggle switches will prevent the possibility of raising and lowering the volume at the same time or raising and lowering the channels at the same time. Wire used for discrete switches should be 24 AWG (MIL Spec M22759) and should be routed as appropriate, avoiding kinking or sharp bends. Figure 2-4 shows typical rocker switches.

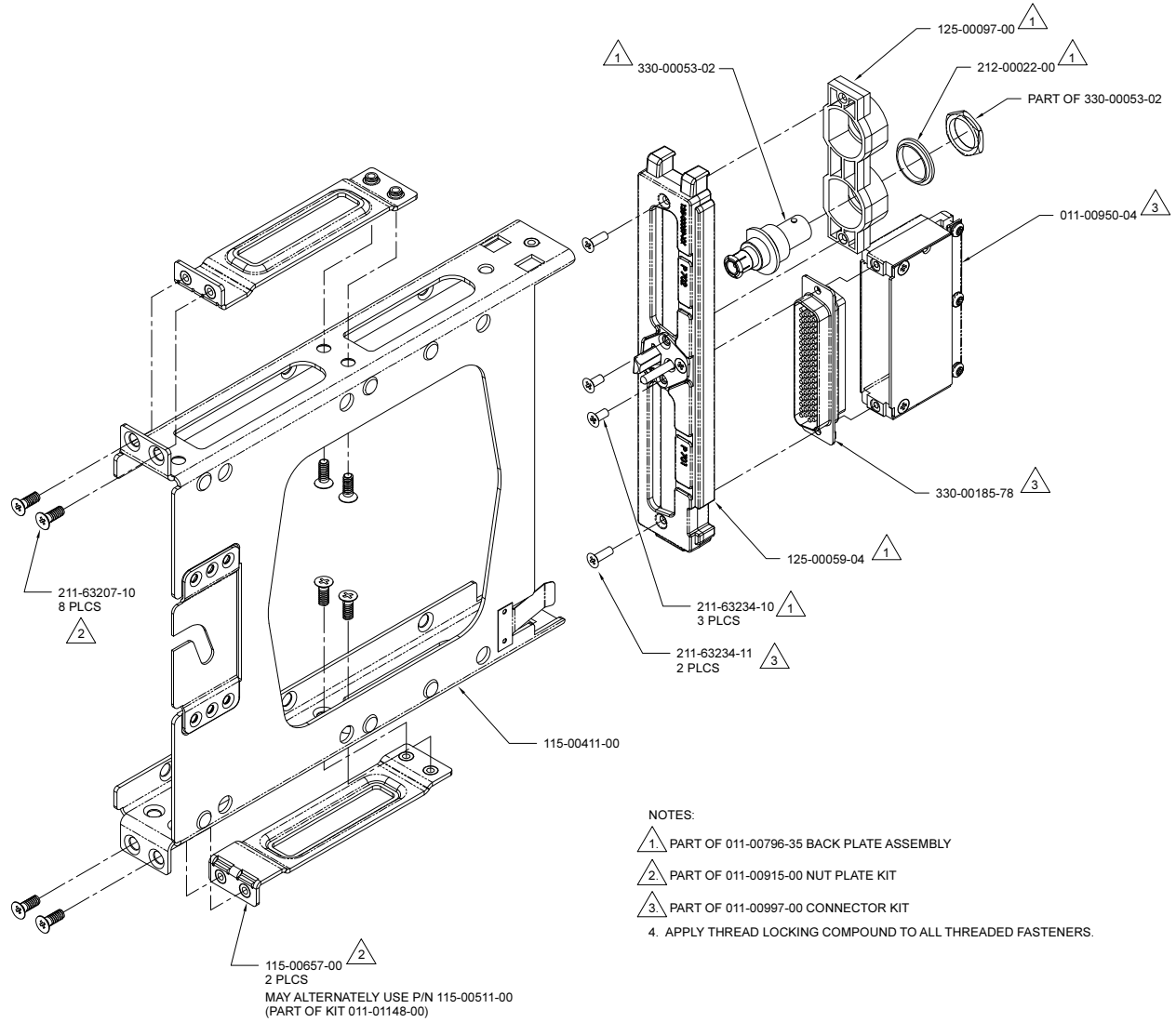


**Figure 2-4. Typical Rocker Switches**

**NOTE**



Remote switches can be installed even if a GRT 10 is installed.



**Figure 2-5. Modular Rack for the G1000**



## 2.5 Cabling and Wiring

Wiring should be installed in accordance with AC 43.13-1B Chapter 11. When wire separation cannot be achieved, the following issues should be addressed:

- The cable harness should not be located near flight control cables and control, high electrical capacity lines or fuel lines
- The cable harness should be located in a protected area of the aircraft
- Do not route cable near high-energy sources

Refer to the interconnection diagrams in Appendix D for the appropriate wiring. Once the cable assemblies have been made, attach the cable connector to the rear of the rack. Route the wiring bundle as appropriate. Avoid sharp bends.

For the GDL 69/69A use 22 or 24 AWG wire for all connections except for power. Use 22 AWG for power/ground. For the GRT 10 use 22 AWG wire for all connections including power/ground.

After the GDL 69/69A cable assemblies are made assemble the backshell as shown in Figure 2-7. Then install the backshell connector to the rear plate using the screws provided in the connector kit. After the rack is installed, assemble the rear plate into the rack.

### 2.5.1 Wiring Harness

Allow adequate space for installation of cables and connectors. The installer supplies and fabricates all of the cables. Except for the antenna connection, all electrical connections are made through a 78-pin D-sub (GDL 69/69A) and 9-pin D-sub (GRT 10) connectors provided by Garmin. Construct the wiring harness according to the information contained in this and the following sections. Cable lengths will vary depending upon installation. Strip all wires going to the D-sub connectors 0.17". Insert the wire into the pin and crimp with one of the recommended (or equivalent) crimping tools. Insert the pin into the D-sub connector housing locations as specified by the interconnect drawing in Appendix D. Verify the pin is properly engaged into the connector by gently tugging on the wire. Route and secure the cable run from the GDL 69/69A and GRT 10 to the other units away from sources of electrical noise.

Section 3 defines the electrical characteristics of all input and output signals. Required connectors and associated hardware are supplied with the connector kit. See Appendix D for interconnect wiring diagrams.

### CAUTION



Check wiring connections for errors before inserting the GDL 69/69A into the rack or mounting bracket or connecting the 9-pin D-sub to the GRT 10. Incorrect wiring could cause component damage.

**Table 2-4. Pin Contact Part Numbers**

Wire Gauge	78-pin connectors 22-28 AWG	9-pin connectors 20-24 AWG
Garmin P/N	336-00021-00	336-00022-00
Military P/N	M39029/58-360	M39029/63-368
AMP	204370-2	205090-1
Positronic	MC8522D	M39029/63-368
ITT Cannon	030-2042-000	031-1007-42

**Table 2-5. Recommended Crimp Tools**

Wire Gauge	Hand Crimping Tool	20-24 AWG	
		Positioner	Insertion/ Extraction Tool
Military P/N	M22520/2-01	M22520/2-09	M81969/1-04
Positronic	9507	9502-3	M81969/1-04
ITT Cannon	995-0001-584	995-0001-739	N/A
AMP	601966-1	601966-6	91067-1
Daniels	AFM8	K42	M81969/1-04
Astro	615717	615725	M81969/1-04

**NOTE**



Insertion/extraction tools from ITT Cannon are all plastic; others are plastic with metal tip. Non-Garmin part numbers shown are not maintained by Garmin and are subject to change without notice.

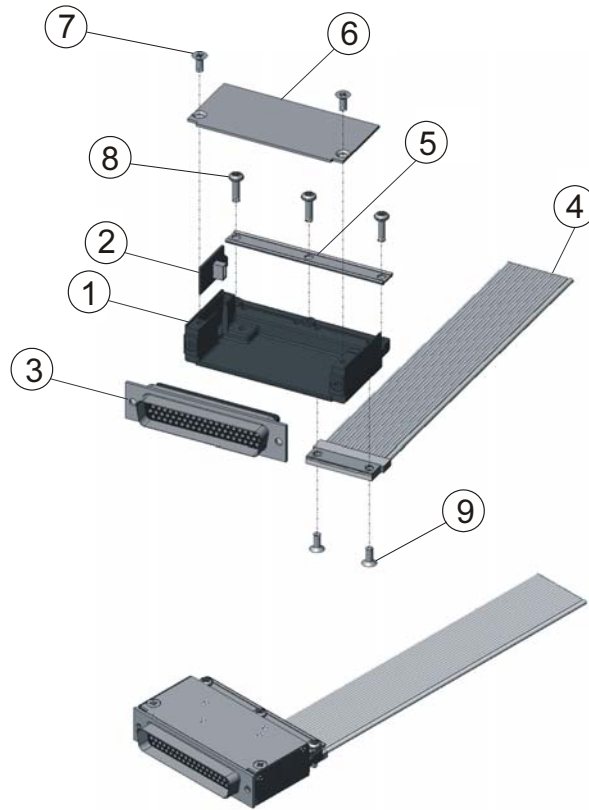
**2.5.2 GDL 69/69A Backshell Assembly and D-Sub Connector**

**2.5.2.1 GDL 69/69A Connector Assembly**

1. Backshell Cast Housing: Provides a mounting point for all other connector accessories.
2. Configuration Module: Installation details provided in Section 2.5.2.2.
3. D-sub Connector: Installation details provided in Section 2.5.2.2.
4. Spider Ground System: Allows shield grounds to be made to the backshell housing. Installation details provided in Section 2.5.2.5.
5. Strain Relief Tab: Provides strength and support to wiring bundles.
6. Backshell Lid: Provides easy access when servicing connector.

**Table 2-6. GDL 69/69A Connector Assembly**

Item Number (Reference Figure 2-6)	Description	Qty	Garmin Part Number
1	Backshell, with Config 50/78 Pin	1	125-00085-00
2	PCB Assembly, Configuration Module	1	012-00605-00
3	Connector, High Density, 78 Pin	1	330-00185-78
4	Wire Harness, Backshell Ground	1	320-00212-00
5	Clamp, Backshell, 62/78 Pin	1	115-00499-03
6	Cover, Backshell, 50/78 Pin	1	115-00500-04
7	Screw, 4-40 x .187 FLHP100, Stainless Steel	2	211-63234-06
8	Screw, 4-40 x .375, Phillips, Stainless Steel	3	211-60234-10
9	Screw, 4-40 x .250, FLHP, Stainless Steel	2	211-63234-08

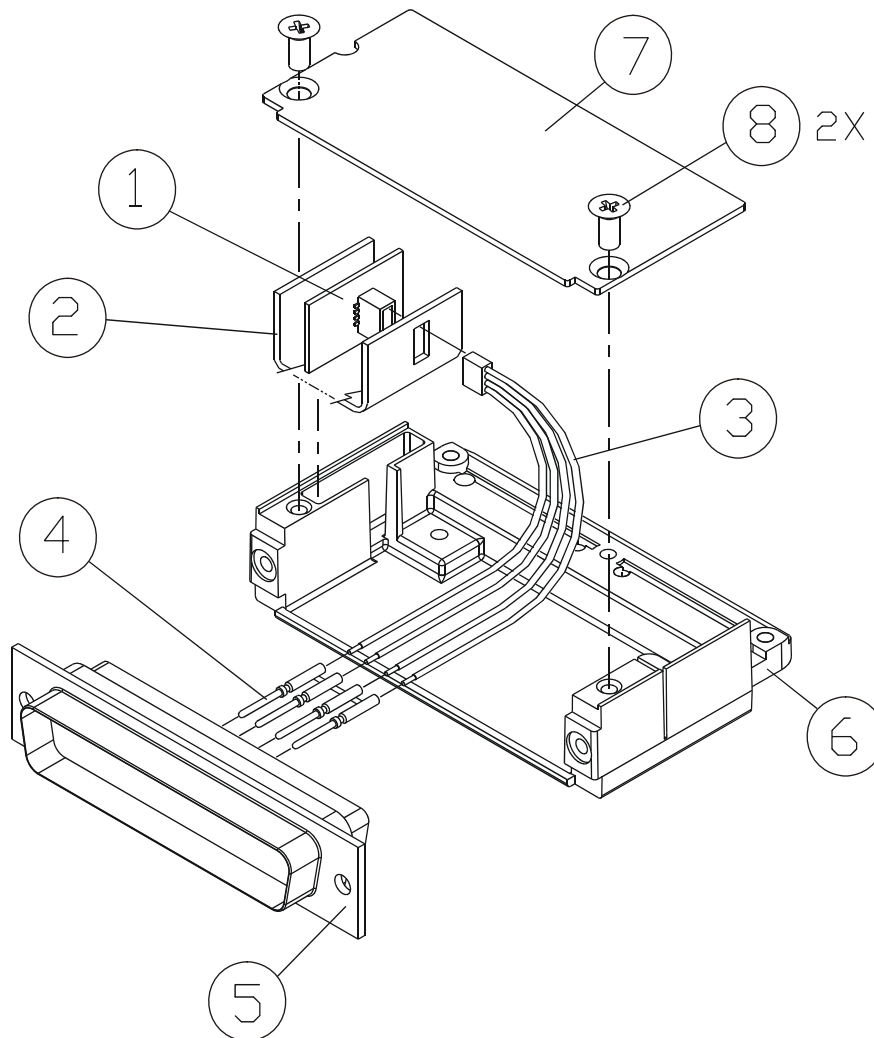


**Figure 2-6. Garmin Connector Assembly**

**2.5.2.2 Configuration Module Installation for GDL 69/69A**

The GDL 69/69A connector kit includes one Garmin backshell assembly. The backshell assembly houses the configuration module. Garmin’s backshell also gives the installer the ability to easily terminate shield grounds at the backshell housing using the Spider grounding kit. Refer to Figure 2-7 for details and item numbers referenced below.

1. Crimp pins (4) onto each wire of the four-conductor wire harness (3). Strip 0.17” of insulation from each wire prior to crimping.
2. Insert newly crimped pins and wires (3, 4) into the appropriate connector housing (5) location as specified by the interconnect drawings in Appendix D.
3. Apply the spacer (2) by wrapping it around the PCB board (1) making sure to insert the plastic connector mounted on the board into the provided hole of the spacer.
4. Plug the four-conductor wire harness (3) into the connector on the PCB Board (1).
5. Insert into the backshell (6) recess, PCB board (1) with pad (2) in position.
6. Attach cover (7) to backshell (6) using screws (8).



**Figure 2-7. Backshell Assembly**

### 2.5.2.3 Spider Grounding Installation for GDL 69/69A

The Spider Grounding Kit, part of the connector kit, allows shielded cables that go to a backshell to be terminated to the backshell. Twenty AWG #24 wires are available to splice with the cable shields. The wires all terminate to a terminal that is fastened to the backshell. A single AWG #16 wire provides ground reference to the terminal, thereby grounding all Spider leads to the aircraft.

Spider Kit terminals are screwed to the backshell using the tapped holes provided.

**Table 2-7. Spider Kits**

Reference Figure 2-7	Description	Qty. Included	Garmin Part Number
Spider Kit w/ 21 Conductors: 011-00980-00 (Included in 011-00997-00)			
2	Wire Harness, Backshell Ground, 21 Conductor	1	320-00212-00
3	1 Conductor, 24", AWG #16		
4	20 Conductor, 6", AWG #24		
5	Screw, 4-40 x .250, FLHP 100°, SS/P, Nylon	2	211-63234-08

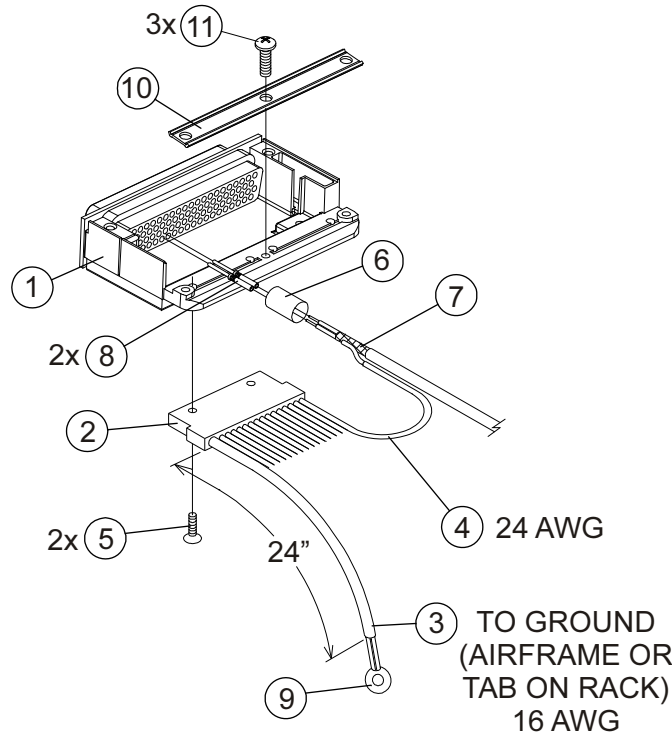
### 2.5.2.4 Spider Parts List

The following table provides a list of parts needed to install a Spider kit. Most parts for this installation are included in the Spider installation kits shown in Table 2-7. Some are to be provided by the installer. The following tables show the list of required parts as well as callouts for the drawings shown in Figure 2-8.

**Table 2-8. Spider Installation Required Parts**

Reference Figure 2-8	Description	Qty. Included	Garmin Part Number/MIL Spec
1	Cast Housing from Garmin Backshell Kit	0	011-00950-( )
2, 3, 4, 5	Spider Kit	1	011-00980-00 or 011-00980-01
6	Shield Termination (method optional, see Step 3 below)	0	Parts used depend on method chosen
7	Multiple-Conductor Shielded Cable (2 –conductor demonstrated here)	0	Reference Interconnect Diagrams
8	Pins	0	336-00021-00
9	Ring Terminal	0	MS25036-152
10	Strain Relief from Garmin Backshell Kit	0	011-00950-( )
11	Screw, 4-40x.375, PHP, SS/P, w/NYL	0	211-60234-10

**2.5.2.5 Spider and Connector Assembly Procedure**



**Figure 2-8. Spider Installation Drawing**

1. At one end of the shielded cable (7), strip back 2.0” to 3.5” of jacket while retaining the shield. Trim away enough to leave 0.5” of shield exposed.
2. Strip 0.17” of insulation from one of the AWG #24 wires (4) on the Spider.
3. Connect the prepared AWG #24 Spider wire (4) to the shield (7) using an approved shield termination technique.

Installation Options:

- a) Slide a solder sleeve (6) onto the prepared wire assembly (4, 7) and shrink with a heat gun. The size of solder sleeve must accommodate the number of conductors present in the cable. Reference the following MIL-Specs for solder sleeves (M83519/1-1, M83519/1-2, M83519/1-3, M83519/1-4, M83519/1-5).
- b) Solder the prepared wire assembly (4, 7). Slide a piece of shrink tube (6) onto the prepared wire assembly and shrink using a heat gun. The size of shrink tube must accommodate the number of conductors present in the cable.
4. Strip 0.17” of insulation from the shielded cable end and crimp a pin (8) to each of the conductors (7).
5. Insert crimped pins and wires (7, 8) into the appropriate housing location as specified by the installation wiring diagrams.
6. Repeat steps 1 through 3 as needed for the remaining shielded cables (7). Use only one Spider wire (4) per shield. Remaining AWG #24 wires should be tied back and dressed with shrink tubing.
7. Wrap the cable bundle with Silicone Fusion Tape (Garmin P/N: 249-00114-00 or a similar version) at the point where the backshell strain relief (10) and cast housing (1) contacts the cable bundle. Separation of the bundle into two smaller bundles, wrapped individually, may make installation of the strain relief easier.
8. Place the smooth side of the backshell strain relief (10) across the cable bundle and secure using the three screws (11).

**WARNING**



Placing the strain relief grooved side across the cable bundle may cause damage to wires.

9. Attach the Spider terminal (2) to the backshell (1) by inserting the two screws (5) into the tapped holes on the backshell (1).
10. Attach a ring terminal (9) to the AWG #16 wire (3) length 24” and terminate to ground. The ground connection can be made using either the closest aircraft ground or with tabs on racks. Trimming of this wire to the shortest practical length before attaching the ring terminal is recommended to reduce the effects of noise and interference. Do not extend this wire’s length.

## 2.5.3 GRT 10 Backshell Assembly and D-sub Connector

### 2.5.3.1 GRT 10 Connector Assembly

1. Backshell Cast Housing: Provides a mounting point for all other connector accessories.
2. D-sub Connector: Installation details provided in Section 2.4.4.
3. Shield Block Ground Kit: Allows shield grounds to be made to the backshell housing. Installation details provided in Section 2.5.3.3.
4. Strain Relief Tab: Provides strength and support to wiring bundles.
5. Backshell Lid: Provides easy access when servicing connector.

**Table 2-9. GRT 10 Backshell Assembly**

Reference Figure 2-9	Description	Garmin P/N	Notes
1	Cast Housing (From Garmin Backshell Kit)	125-00081-00	[2]
2	Shield block	117-00147-00	[3]
3	Screw, 4-40 x.250, FLHP100°, SS/P, Nylon	211-63234-08	[3]
4	Multiple Conductor Shielded Cable (See Interconnect Diagrams, Appendix D)	As Required	[4]
5	Shield Terminator	As Required	[4], [5]
6	Wire, Insulated (20 – 22 AWG)	As Required	[4], [5]
7	Socket Contacts	336-00022-00	[1]
8	Ring terminal, #8, insulated, 18-22 AWG, 14-16 AWG	MS25036-149, MS25036-153, MS25036-156	[4]
9	Screw, PHP, 8-32x.312", Stainless or Cad Plated Steel	MS51957-42, MS35206-242	[4]
10	Split Washer, #8, (.045" compressed thickness) Stainless or Cad-plated steel	MS35338-137, MS35338-42	[4]
11	Flat Washer, #8, .032" thick, .174"ID, .375" OD, Stainless or Cad Plated Steel	NAS1149CN832R, NAS1149FN832P	[4]
12	Silicon Fusion Tape	249-00114-00	[4]
13	Strain Relief	115-00499-00	[2]
14	Screw, 4-40x.375, PHP, SS/P, with Nylon	211-60234-10	[2]
15	Cover	115-00500-00	[2]
16	Screw, 4-40x.187, FLHP100, SS/P, with Nylon	211-63234-06	[2]

[1] Supplied as part of GRT 10 Connector Kit P/N 011-01556-00.

[2] Supplied as part of Backshell Kit P/N 011-00950-00 (included in kit 011-01556-00).

[3] Supplied as part of Ground Adapter Kit P/N 011-01169-00 (included in kit 011-01556-00).

[4] Not supplied – must be purchased separately.

[5] Solder sleeve with pre-installed lead may be used instead of items 5 and 6.



### 2.5.3.2 D-Sub Connector and Mounting Hardware

Table 2-10. D-Sub Connector and Hardware

Item	Description	Garmin P/N	Notes
9-Pin Housing (Female)	D-Sub, Standard Density, Mil Crimp, 9 ckt	330-00383-09	[1], [2]
Spring-loaded Slidelock	D-Sub, Slide Lock Kit, 9/15 Pin	330-90006-00	[1]
Screw	Screw, 4-40 x .375, PHP, SS/P, Nylon	211-60234-10	[1]

[1] Supplied as part of the GRT 10 Connector Kit P/N 011-01556-00.

[2] Tabless backshell (330-00383-09) is required for use with the slidelock mount

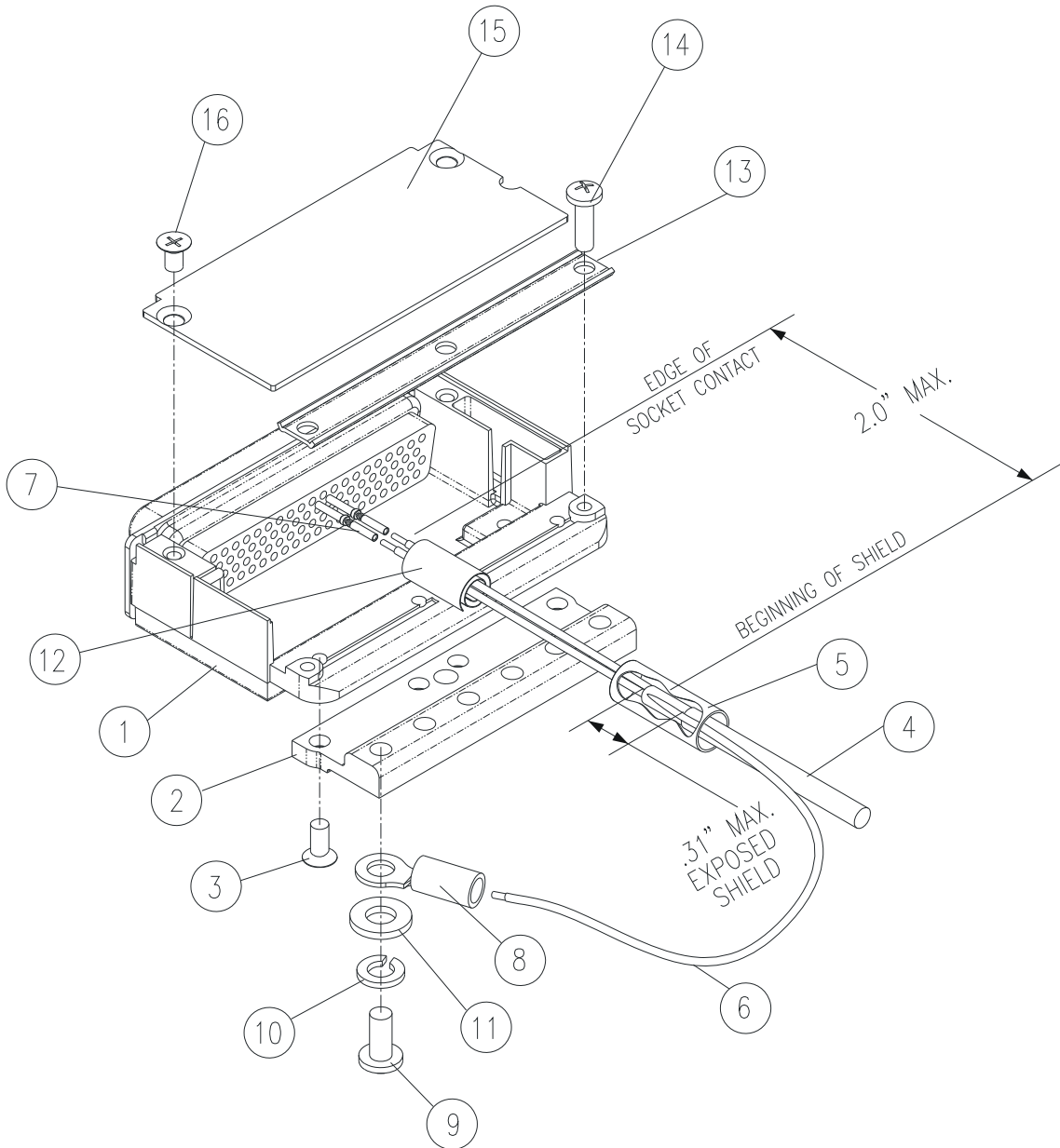
#### CAUTION



When mounting the slidelock, use only the specified screws (211-60234-10). Do not attempt to use self-tapping screws, as these damage the backshell housing.

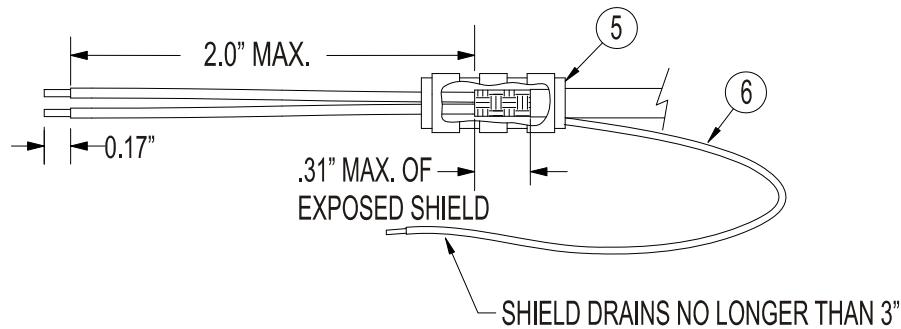
**2.5.3.3 Shield Block Assembly Procedure**

The parts for the connector and backshell assembly for GRT 10 installations are listed in Table 2-9 and shown in Figure 2-9.



**Figure 2-9. Typical Shield Block Install onto Backshell Connector Assembly**

1. Attach the Shield Block (2) to the backshell (1) by inserting the flathead screws (3) through the holes on the Shield Block and threading into the tapped holes on the backshell (1). (See Figure 2-9).



**Figure 2-10. Shielded Cable Preparation**

2. At the end of the shielded cable (4), strip back a 2" maximum length of the jacket to expose the braid. Remove this exposed braid. Carefully score the jacket 1/4" to 5/16" from the end and remove the jacket to leave the braid exposed.

#### NOTE



Solder sleeves with pre-installed shield drains may be used instead of separate shield terminators and individual wires.

3. Connect a 20 or 22 AWG wire (6) to the exposed shield of the prepared cable assembly. (See Figure 2-10). Note: AC 43.13 may be a helpful reference for termination techniques

#### NOTE



**Solder Sleeves with pre-installed lead:** A preferred solder sleeve is the Raychem S03 Series with the thermochromic temperature indicator. These solder sleeves come with a pre-installed lead and effectively take the place of items (5) and (6). For detailed instructions on product use, refer to Raychem installation procedure.

4. Slide a shield terminator (5) onto the prepared cable assembly (4) and connect the 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 wire (6) to be attached.
5. Repeat steps 2 through 4 as needed for the remaining shielded cables.

#### NOTE



Each tapped hole on the shield block (2) may accommodate only two ring terminals (8). It is preferred that a maximum of two wires (6) be terminated per Ring Terminal. Two wires per ring terminal will necessitate the use of a ring terminal, #8, insulated, 14-16 AWG (MS25036-153). If only a single wire is left or if only a single wire is need for this connector a ring terminal, #8, insulated, 18-22 AWG (MS25036-149) can accommodate this single wire. If more wires exist for the connector than two per ring terminal, it is permissible to terminate three wires per ring terminal.

6. Terminate the ring terminals to the shield block (2) by placing items on the pan head screw (9) in the following order: split washer (10), flat washer (11), first ring terminal, second ring terminal if needed, before finally inserting the screw into the tapped holes on the shield block.
7. Wrap the cable bundle with silicone fusion tape (12) (GPN: 249-00114-00 or a similar version) at the point where the backshell strain relief and cast housing will contact the cable bundle.

8. Place the smooth side of the backshell strain relief (13) across the cable bundle and secure using the three screws (14).

**WARNING**



Placing the grooved side of the strain relief across the cable bundle may damage wires.

9. Attach the cover (15) to the backshell (1) using two screws (16).

**2.5.4 Audio Suppression**

XM Audio Entertainment to crew locations may require audio suppression to comply with the STC Limitations. Determine the activation state for each horn installed in the aircraft (aircraft power signifying active high or ground signifying active low) by using one of the following methods:

- Find the horn and compare the installation with Figure D-5.
- Activate the horn per the method described in the aircraft’s maintenance manual. (For the gear horn, this may require having the aircraft raised on jacks).
- With a multimeter, determine which horn contact changes state with the activation signal and if the active state is high or low.

Wire the appropriate audio suppression input (high or low) in accordance with Figure D-5.

**2.5.5 Remote Discrete Switches (Optional)**

If XM audio entertainment is installed in the aircraft, optional functional switches may be installed as desired even if a GRT 10 is installed. The functions of the switches must include the ability to mute the audio, adjust the volume and channels. It may be incorporated as desired depending on the installation. Figure D-1 and Figure D-2 detail the wiring for the optional discrete switches. A common aircraft ground signal may be used for each switch. It is recommended to use a rocker type switch for channel and volume control. Using a rocker type switch will prevent inadvertently raising and lowering the channel at the same time as well as the volume. An acceptable switch for this installation of the remote discrete switches is Carlingswitch P/N 62111281-0-0-N (62111231-0-0-N for the switch used for muting). Since the input signals are active-low it is permissible to use multiple switches for each function. This would allow volume and channel control to be available at each passenger station.

The GDL 69/69A’s 15 preset channels (favorites) can be sequenced using the audio channel control input. On power up, the GDL 69A reads the state of the audio channel control input. When this discrete is active (low), the Channel Up and Channel Down inputs will function as Preset Up and Preset Down, respectively.

## 2.6 XM Antenna

For use with the GDL 69/69A, the GA 37, GA 55, GA 55A, and GA 57 antennas are an XM Satellite Radio antenna operating within a frequency range of 2332-2345 MHz for general aviation.

### NOTE

Depending on specific installations, the installer may want to use a different make/model of XM Satellite Radio antenna. (An alternate antenna may be used providing it meets the minimum requirements shown in Table 1-12).



***It is the installer's responsibility to ensure that their choice of antenna meets FAA certification standards according to the specific installation.*** This installation manual discusses only the antennas listed in Table 1-11, which are used during STC certification by Garmin. Other antennas may be acceptable but their installation is not covered by this manual and is outside the scope of the data approved in the GDL 69/69A STC.

There are several critical factors to take into consideration before installing an antenna for a satellite communications system. These factors are addressed in the following sections.

### 2.6.1 Antenna Mounting

For installation mounting of the XM antenna listed in Table 1-11, use Garmin GA Antenna AML STC number SA01695SE. Verify aircraft model is listed on the AML and follow limitations defined in that STC data.

### 2.6.2 Antenna Grounding

### NOTE



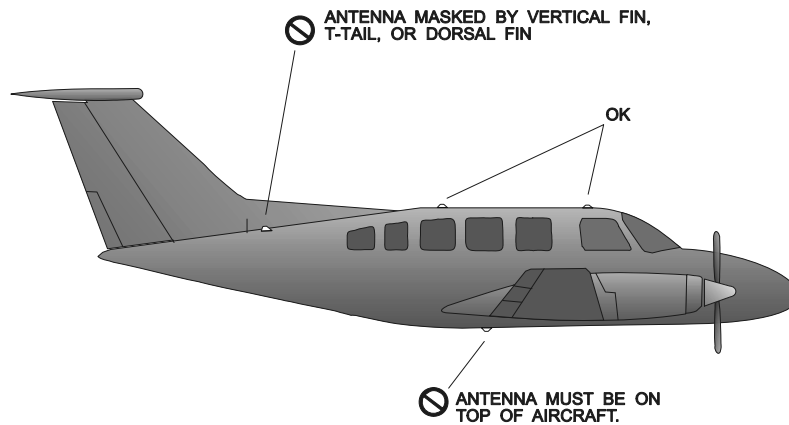
Improper grounding of the antenna is typically the primary cause of reduced signal reception quality.

It is very important to have good conductivity between the coaxial shield and the ground plane. This is ensured when all the fasteners properly ground the antenna base to the skin of the aircraft. The resistance between the antenna and the skin of the aircraft should be less than 10 milliohms.

**2.6.3 XM Antenna Location**

As with any antenna installation, keep the following points in mind:

1. The XM Satellite signal is a line-of-sight signal. Locating antennas too close to obstructions such as the vertical stabilizer will limit the reception of the satellite signal.
2. Maintain about three feet from heater, ignition, autopilot, and other control surface actuators and motors. Maintain about five feet from fluorescent lamps, related ballast, air conditioners, blowers, strobe lights and power supplies.
3. The minimum distances to be observed when selecting an antenna location are as follows:
  - 1.25 inches from any passive (receive only) antenna such as a GPS or another XM.
  - 5 inches from a VHF active antenna such as COM or ACARS.
  - 5 inches from an active radar altimeter (4 GHz).
  - 12 inches from a UHF / Microwave transmitting antenna such as a transponder, DME, active TCAS, UAT, SATCOM, or Flitephone.
4. The XM antenna must be mounted on top of the aircraft for greatest satellite visibility. For best performance, select a location with an unobstructed view of the sky above the aircraft when in level flight. Location of communication antennas too close to the XM antenna may not only degrade the transmission through reflection, but can also absorb and re-radiate the transmission causing a condition similar to having two COM antennas located in close proximity to each other.

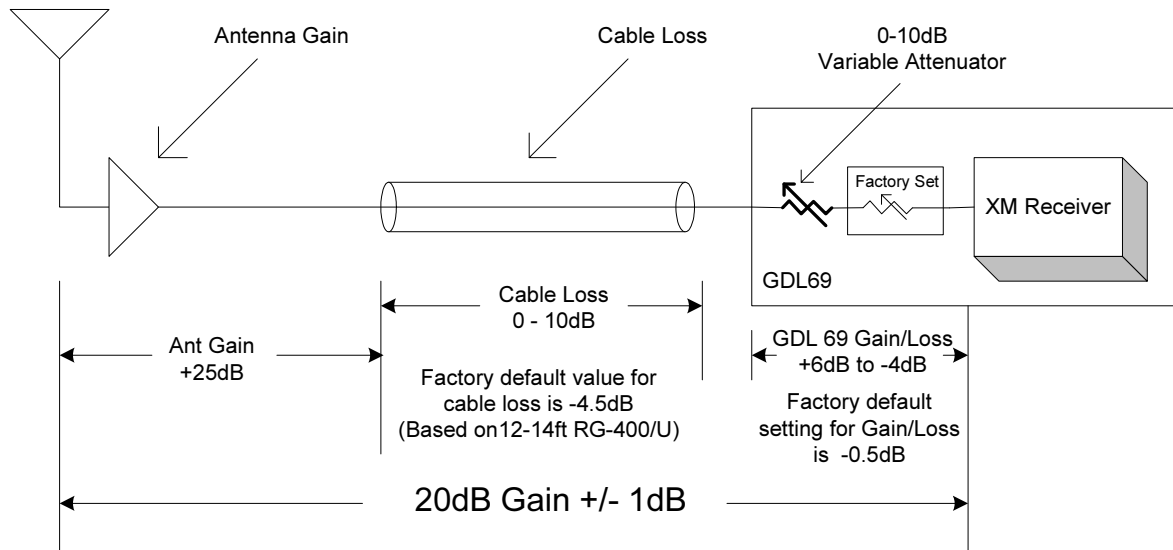


**Figure 2-11. Antenna Installation Location**

### 2.6.4 XM Radio Antenna to Receiver Signal Requirements

The XM Radio Receiver used in the GDL 69/69A has a system signal requirement of 20dB +/- 1dB gain from the input of the antenna to the input of the XM receiver internal to the GDL 69/69A. To insure the proper operation and optimum performance of the GDL 69/69A, the installation must meet the requirements specified in Table 1-12, and the installer must account for the signal gain and loss factors that exist between the antenna and the XM receiver. The gain/loss factors that need to be accounted for are shown in Figure 2-12. The GDL 69/69A has the capability to internally adjust for variances in the gain/loss factors by providing additional gain or loss within the range of +6dB to -4dB. If the GDL 69/69A gain/loss factor is outside this range, additional gain or loss must be added between the antenna and the GDL 69/69A RF input. Record the gain/loss components in Table 2-11 and in the post-installation checkout sheet located at the end of Section 4. The variable attenuation value required to attain the GDL 69/69A gain/loss component will be programmed into the configuration module during post installation checkout.

## GDL69 XM Antenna to Receiver Signal Gain Requirements



Signal Gain Equation  
 $20\text{dB} \pm 1\text{dB} = \text{Antenna Gain} - \text{Cable Loss} (\pm) \text{GDL 69 Internal Gain/Loss}$

Equation Values-----	Range-----
Antenna Gain =	23dB to 40dB
Cable Loss =	0.5dB to 26dB
GDL 69 Internal Gain/Loss =	+6dB to -4dB (Based on Variable Attenuator setting 0dB to 10dB)

Equation using GA 55, GA 55A, GA57 Antenna with 12-16ft RG-400/U cable (Factory Default setting)  
 $25\text{dB} - 4.5\text{dB} - 0.5\text{dB} = 20\text{dB}$

**Figure 2-12. XM Signal Gain Requirements**

**Table 2-11. XM Gain/Loss Component Calculation**

<b>Antenna Gain (1)</b>	<b>+</b>
<b>Cable Loss (2) (3)</b>	<b>-</b>
<b>GDL 69/69A Gain/Loss (4)</b> <b>+6dB ≥ x ≥ -4dB</b>	<b>+/-</b>
<b>Total Gain</b> <b>Antenna/Receiver</b>	<b>= 20 dB</b>

Note:

- (1) Garmin GA 37, GA 55, GA 55A, GA 57 XM antenna typical gain 25 dB. For antenna gain for other antennas, see manufacturer’s specifications.
- (2) If 12-16ft of RG-400/U cable is used, a value of 4.5dB can be used. See Section 2.6.4.1 for explanation of calculation.
- (3) If an antenna with increased gain is installed (antenna other than the Garmin antennas listed in Table 1-11), additional cable length may be required to be coiled to compensate for the required cable loss. Alternately, an external attenuator may be used to obtain the desired antenna cable loss. However, installation of the external attenuator is beyond the scope of this STC. Additional manufacturer’s data may be necessary and FAA approval may be required to cover the installation of an external attenuator.
- (4) The GDL 69/69A Gain/Loss component must be between +6dB and -4dB. If the GDL 69/69A gain/loss component is outside this range, additional gain or loss must be added between the antenna and the GDL 69/69A RF input. The factory default setting for the internal GDL 69/69A component is -0.5dB. The variable attenuation value required to attain the GDL 69/69A gain/loss component will be programmed into the configuration module during post installation checkout. See Section 2.6.4.2 for explanation of calculation.

**2.6.4.1 Determining Antenna Cable Loss Value**

The GDL 69/69A is factory preset with a default cable loss value of 4.5 dB, which is equivalent to 12 to 16 feet of RG-400/U cable with two properly terminated TNC connectors. If the installed antenna cable is within this length, use this value in Table 2-11. If the cable is different from the default cable, use the following formula to determine the cable loss value to use in Table 2-11.

$$\text{Loss in dB} = \frac{(\text{Length} \times \text{Loss})}{100} + (0.5 \times \#\text{Connectors})$$

Where:

- Length** – Cable length in feet
- Loss** – Specified cable loss per 100 feet at 2332-2345 MHz
- Connectors** – Number of connectors on cable

For example:

If an RG-400 coax cable is 10 feet long with 2 TNC connectors, the cable loss component is

$$\text{Loss} = \frac{(10 \times 26.1)}{100} + (0.5 \times 2) = 3.61 \text{ dB}$$



### 2.6.4.2 Determining GDL 69/69A Gain/Loss Component Value

The GDL 69/69A has a zero to 10dB variable attenuator that is used to balance the gain/loss component between its RF input and internal XM Receiver. The gain/loss components can be adjusted between +6dB and -4dB to balance the Antenna input to XM receiver 20dB gain requirement as specified for the XM system. The Gain/Loss component is factory preset with a default value of -0.5 dB. Using the Signal Gain Equation shown in Figure 2-9 and solving for the GDL 69/69A component the equation becomes

$$\mathbf{GLcomp\ in\ dB = XMgain - Antenna + Cable}$$

Where:

**GLcomp** – GDL 69/69A Gain/Loss Component

**XMgain** – XM specified gain from antenna input to XM receiver input (20dB)

**Antenna** – Antenna Gain

**Cable** – Cable Loss

Example:

If the cable loss calculated in the previous example is used, the GDL 69/69A GLcomp component is:

$$\begin{aligned} \text{GLcomp} &= 20\text{dB} - 25\text{dB} + 3.61\text{dB} \\ &= -5\text{dB} + 3.61\text{dB} \\ &= -1.39\text{dB} \end{aligned}$$

The GDL 69/69A gain/loss component will be programmed into the configuration module during post installation checkout.

### 2.6.5 Coaxial Cable Installation

1. Choose the correct coax: RG-400/U has good characteristics for loss, size, and flexibility.

#### NOTE

The cable loss of the antenna cable is critical to the performance of the GDL 69/69A operation. To accommodate this, the GDL 69/69A has the ability to be configured for the amount of antenna cable loss. To reduce the need to configure the GDL 69/69A for cable loss, the GDL 69/69A is factory-preset with a cable loss of 4.5 dB, which is equivalent to 12 to 16 feet of RG-400/U with two properly terminated TNC connectors. If the cable loss is different than the default value, the cable loss must be calculated or measured and the loss value programmed into the GDL 69's configuration module. Refer to Section 4.2 for additional information on determining antenna cable loss value and how to program the configuration module.



#### NOTE

To avoid programming the configuration module, use a coax cable length that is within the factory default cable loss value (refer to Section 2.6.4.1). When using the default cable loss value, additional cable after routing through the aircraft may be coiled and secured as needed. Do not coil the cable tighter than a one foot diameter.



2. Trim the coaxial cable to the desired length and install TNC connectors at each end per the cabling instructions listed in Figure 2-13. For routing convenience, one end of the coaxial run can be terminated prior to installation.
3. With the GDL 69/69A receiver and antenna installed, route and clamp the coaxial cable in position. Secure cable in accordance with AC 43.13-1B, Chapter 11.

## 2.7 Weight and Balance

Weight and balance computation is required after the installation of the GDL 69/69A and optional GRT 10. Follow the guidelines as established in AC 43.13-1B, Chapter 10, Section 2. Make appropriate entries in the equipment list indicating items added, removed, or relocated along with the date accomplished. Include your name and certificate number in the aircraft records. Table 2-12 identifies the weight of the new GDL 69/69A and optional GRT 10 and GRC 10 equipment. Figure 1-4, Figure 1-5, and Figure 1-6 show the center of gravity.

**Table 2-12. Unit Weights**

Item	Weight	Notes
GDL 69 Weight	1.72 lbs (0.78 kg)	
GDL 69 and Remote Rack Weight	2.92 lbs (1.32 kg)	[2]
GDL 69 and Modular Rack Weight	2.46 lbs (1.12 kg)	[3]
GDL 69A Weight	1.86 lbs (0.84 kg)	
GDL 69A and Remote Rack Weight	3.06 lbs (1.39 kg)	[2]
GDL 69A and Modular Rack Weight	2.60 lbs (1.18 kg)	[3]
GA 37 Antenna	0.50 lbs (0.23kg)	
GA 55 Antenna	0.25 lbs (0.11 kg)	
GA 55A Antenna	0.43 lbs (0.20 kg)	
GA 57 Antenna	0.47 lbs (0.21 kg)	
GRT 10 Transceiver Weight (excluding connector kit)	0.15 lbs (0.07 kg)	
GRT 10 Transceiver Weight (including connector kit)	0.27 lbs (0.12 kg)	
GRC 10 Remote Control Weight (without batteries)	0.23 lbs (0.11 kg)	[1]
GRC 10 Remote Control Weight (with batteries)	0.34 lbs (0.15 kg)	[1]

- [1] The GRC 10 is a portable unit whose weight is negligible and does not need to be included in the weight and balance computation.
- [2] This weight is equal to the unit weight (GDL 69, 011-00986-00 or GDL 69A, 011-00987-00) plus the remote rack weight (115-00658-00) plus the back plate weight (011-00796-35) plus the connector kit weight (011-00997-00). The weight of the configuration module assembly (011-00979-00) is very small when compared to the weights in Table 2-12.
- [3] This weight is equal to the unit weight (GDL 69, 011-00986-00 or GDL 69A, 011-00987-00) plus the modular rack weight (115-00411-00) plus the back plate weight (011-00796-35) plus the connector kit weight (011-00997-00). The weight of the configuration module assembly (011-00979-00) is very small when compared to the weights in Table 2-12.

## 2.8 Electrical Load Analysis

An electrical load analysis should be completed on each aircraft prior to installation in accordance with AC 43.13-1B, Chapter 11 and recorded on FAA Form 337. Use the following values for computation:

### GDL 69

Unit Status	Max Current @ 28 VDC	Max Current @ 14 VDC
Off	0.01 A	0.01 A
On	0.28 A	0.425 A

### GDL 69A

Unit Status	Max Current @ 28 VDC	Max Current @ 14 VDC
Off	0.01 A	0.01 A
On	0.35 A	0.65 A

Note: Unit OFF is defined as the unit has power but is turned off with the remote power control signal.

### GRT 10 Transceiver

Unit Status	Max Current @ 28 VDC	Max Current @ 14 VDC
On	44 mA	44 mA

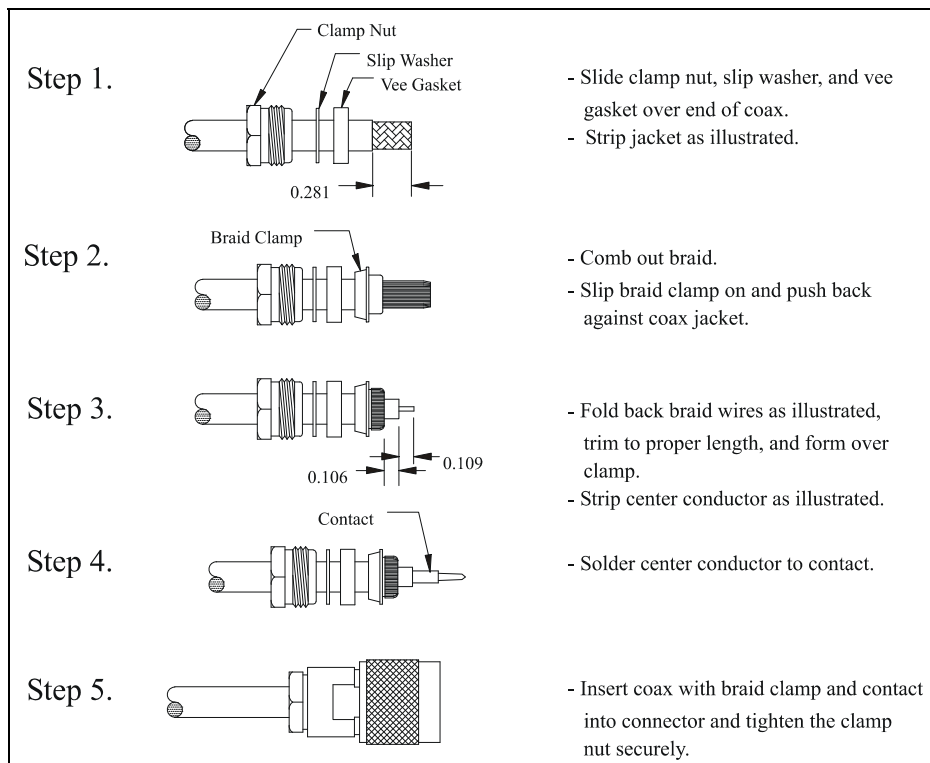
### GRC 10 Remote Control

The GRC 10 Remote Control is a portable battery-powered unit.

### NOTE



Circuits should be protected in accordance with guidelines in AC 43.13-1B, chapter 11, Section 4.



## Figure 2-13. TNC Connector Installation

### 2.9 Cooling Air

The GDL 69/69A and optional GRT 10 do not require cooling air and do not generate an excessive amount of heat during typical operations; however the thermal characteristics of the installation should always be assessed. An undesirable thermal condition could be created due to the unit's own internal power dissipation combined with restricted ventilation, or due to heat generated by adjacent equipment. Limiting thermal build up, by means of fan or natural convection is always a good practice and recommended to increase the product life.

### 2.10 Installing/Inserting Unit

For final installation and assembly, refer to the outline and installation drawings shown in Figure 2-2 or Figure 2-5 of this manual. The two installation configurations available are the G1000 modular rack or remote mount. For both configurations, insert the GDL 69/69A into the rack, noting proper orientation as shown on the installation drawing in Figure 2-2 or Figure 2-5.

#### NOTE



The following steps are for the remote mounting rack which is illustrated in Figure 2-14. The steps are identical for the modular rack.

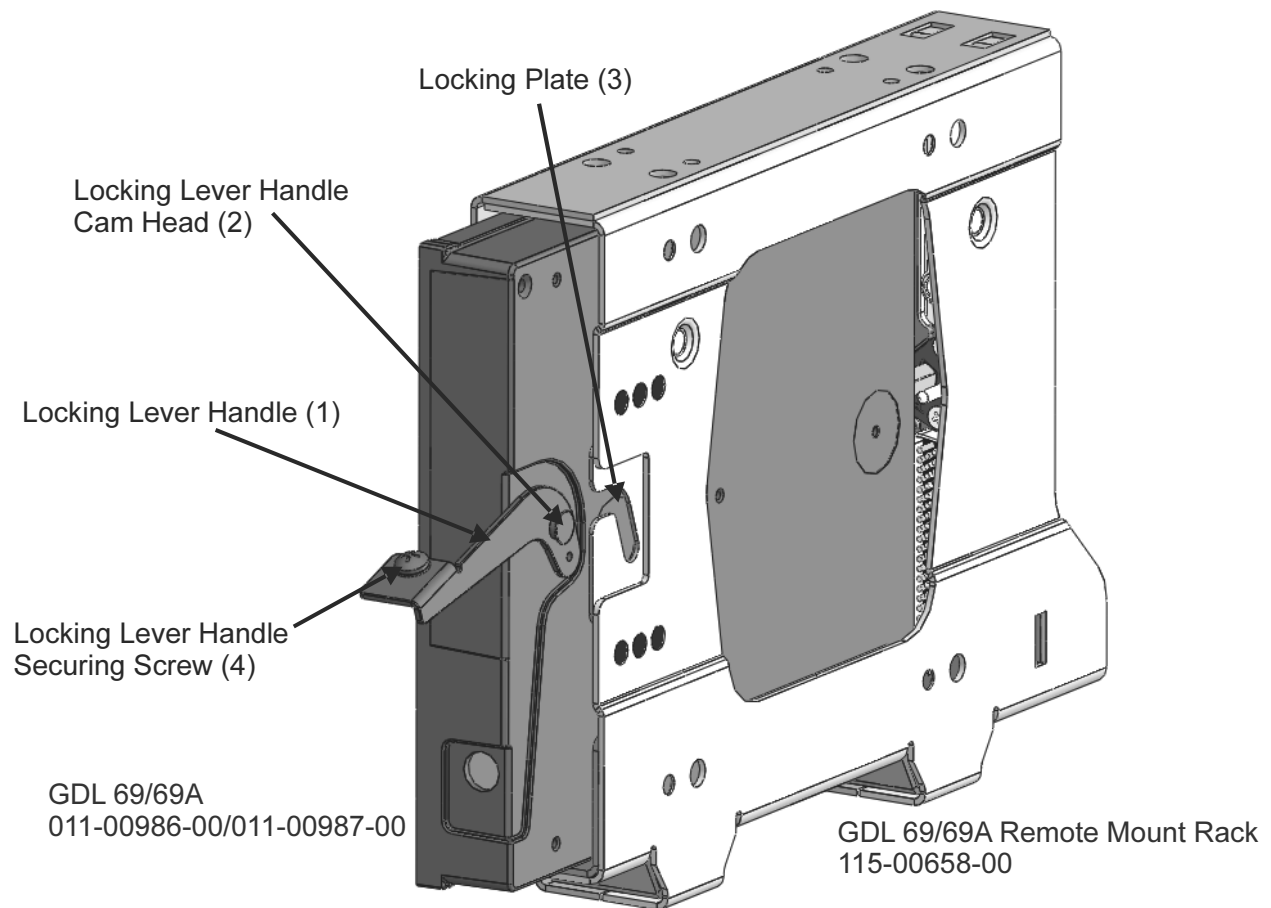
1. Loosen and remove the Locking Lever Handle Securing Screw (4). Then, lift up on the end of the Locking Lever Handle (1).
2. Slide the GDL 69/69A unit into the Mount Rack carefully fitting the Locking Lever Handle Cam Head (2) into the slot of the Locking Plate (3) of the Mount Rack.
3. After fully inserting the unit into the mount rack, visually note that the Cam Head (2) remains seated in the slot of the Locking Plate (3).

#### NOTE



When inserting the GDL 69/69A into the Remote Mount Rack, it may be possible for the Pivot Pin (2) to fit between the unit and the mount rack without going into the slot of the Locking Plate (3). If the Cam Head (2) does not seat in the slot of the Locking Plate (3), the unit will not firmly engage with the mount rack and the unit could come loose from the rack.

4. With the unit firmly engaged with the mount rack, lower the Locking Lever Handle (1). Then, insert and tighten the Locking Lever Handle Securing Screw (4) to mechanically secure the unit to the Mount Rack.

**Figure 2-14. GDL 69/69A Installation****CAUTION**

Do not use excessive force when inserting the GDL 69/69A into the rack. This may cause damage to occur to the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, **STOP!** Remove the GDL 69/69A and identify the source of resistance. The unit is designed with a key and the back plate is designed to float in the unit rack. Check to ensure the rear plate is not bound by the connector harness.

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### 3 SYSTEM INTERCONNECTS

#### 3.1 GDL 69/69A Pin Out List

View of P691 connector looking at rear of unit.

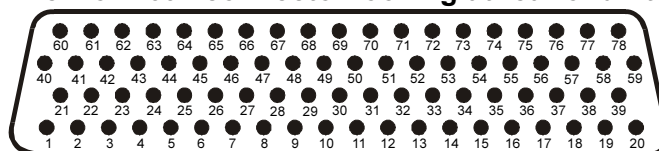


Figure 3-1. Pin Out

Table 3-1. Pin Out List for 78-Pin D-Sub

Pin #	Name	I/O	Notes
1	Config Module Ground	Out	
2	RS-232 Out 2	Out	
3	RS-232 Out 3	Out	
4	Signal Ground	--	
5	RS-232 In 2	In	
6	RS-232 In 3	In	
7	RS-232 In 1	In	SW Version 3.10 or higher
8	RS-232 Out 1	Out	SW Version 3.10 or higher
9	Reserved	--	
10	Reserved	--	
11	Signal Ground	--	
12	Spare	--	
13	Signal Ground	--	
14	Spare	--	
15	Spare	--	
16	Spare	--	
17	Audio Out 1 Lo (Spare For GDL 69)	Out	GDL 69A Only
18	Audio Out 1 Right (Spare For GDL 69)	Out	GDL 69A Only
19	Audio Out 1 Left (Spare For GDL 69)	Out	GDL 69A Only
20	Power Ground	--	
21	Config Module Power Out	Out	
22	Ethernet In 1 B	In	
23	Ethernet In 1 A	In	
24	Ethernet Out 1 B	Out	
25	Ethernet Out 1 A	Out	
26	Ethernet In 2 B	In	
27	Ethernet In 2 A	In	
28	Ethernet Out 2 B	Out	
29	Ethernet Out 2 A	Out	
30	Ethernet In 3 B	In	
31	Ethernet In 3 A	In	
32	Ethernet Out 3 B	Out	
33	Ethernet Out 3 A	Out	
34	Spare	--	
35	Aircraft Power 1	In	

Pin #	Name	I/O	Notes
36	Spare	--	
37	Aircraft Power 2	In	
38	Spare	--	
39	Signal Ground	--	
40	Config Module Data	I/O	
41	Spare	--	
42	Spare	--	
43	Spare	--	
44	Spare	--	
45	Spare	--	
46	Spare	--	
47	Spare	--	
48	Spare	--	
49	Spare	--	
50	Spare	--	
51	Spare	--	
52	Line Out Lo (Spare For GDL 69)	Out	GDL 69A Only (Note 1)
53	Line Out Right (Spare For GDL 69)	Out	GDL 69A Only (Note 1)
54	Line Out Left (Spare For GDL 69)	Out	GDL 69A Only (Note 1)
55	Spare	--	
56	Ethernet In 4 B	In	
57	Ethernet In 4 A	In	
58	Ethernet Out 4 B	Out	
59	Ethernet Out 4 A	Out	
60	Config Module Clock	Out	
61	Audio Suppression Select 1 (Spare For GDL 69)	In	GDL 69A Only
62	Audio Suppression Select 2 (Spare For GDL 69)	In	GDL 69A Only
63	Audio Suppression Select 3 (Spare For GDL 69)	In	GDL 69A Only
64	Audio Suppression Select* 4 (Spare For GDL 69)	In	GDL 69A Only
65	Audio Suppression Select* 5 (Spare For GDL 69)	In	GDL 69A Only
66	Audio Suppression Select* 6 (Spare For GDL 69)	In	GDL 69A Only
67	Discrete In* 2 (Audio Channel Control)	In	GDL 69A Only
68	Reserved	--	For Factory Use Only
69	Reserved	--	For Factory Use Only
70	Audio Mute*	In	
71	Channel Increment*	In	
72	Channel Decrement*	In	
73	Volume Increment*	In	
74	Volume Decrement*	In	
75	Signal Ground	--	
76	Spare	--	
77	Data Link Remote Power Off	In	
78	Power Ground	--	

Note 1: Line Out Audio is not supported in GDL 69A with software version prior to 3.00.

\* Indicates signals that are active low (ground to activate). On installation wiring diagrams, the more traditional overline symbology is used.



## 3.2 GRT 10 Pin Out List

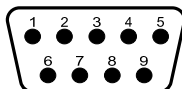


Table 3-2. GRT 10 Pin Out List

Pin #	Name	I/O	Notes
1	Reserved	--	
2	RS-232 TxD	Out	
3	RS-232 RxD	In	
4	Signal Ground	--	
5	Reserved	--	
6	Reserved	--	
7	Power Ground	--	
8	Aircraft Power	In	
9	Volume Lock*	In	

\* Indicates signals that are active low (ground to activate). On installation wiring diagrams, the more traditional overline symbology is used.

## 3.3 GDL 69/69A Interface Descriptions

All connections to the GDL 69/69A are provided on the D-sub DB-78 connector labeled P691. The antenna cable connection is provided on a TNC coaxial connector.

### 3.3.1 Power

The GDL 69/69A will accept input power from 9 to 33 VDC. The two aircraft power inputs (Aircraft Power 1, Aircraft Power 2) are intended to allow power to be provided by two different power busses. Typically, both power input pins are connected on a single bus through a single circuit breaker. If power is obtained from two different power busses, each leg should have its own circuit breaker.

P691-35	Aircraft Power 1 +
P691-37	Aircraft Power 2 +
P691-20	Power Ground
P691-78	Power Ground

Refer to Appendix D for recommended power connections.

### 3.3.2 Configuration Module

The GDL 69/69A stores installation-specific configuration information in an aircraft configuration module located in the DB-78's backshell. This eliminates the need to set up aircraft specific configuration items again if a new GDL 69/69A is installed. Since configuration module input pins contain no lightning protection, the configuration module must be mounted within the connector backshell as described in Section 2.5.2.2.

P691-1	Configuration Module Ground
P691-21	Configuration Module Power (from GDL 69/69A)
P691-40	Configuration Module Data (bi-directional)
P691-60	Configuration Module Clock (from GDL 69/69A)

Refer to Appendix D for interconnect information.

The configuration module is not used when installed with G1000 Display Systems series units. The configuration module does not store XM Satellite Radio subscription information. When a new GDL 69/69A is installed in the aircraft, contact XM Satellite Radio to update the radio IDs on the current subscription or start a new subscription.

### 3.3.3 RS-232 Ports (Qty 3)

Three RS-232 ports are available and can be used to connect the GDL 69/69A to control/display devices (e.g., the MX20 or GMX 200). Support for Port 1 was enabled with software version 3.10.

P691-2	Port 2 TX (out)
P691-3	Port 3 TX (out)
P691-4	Signal Ground
P691-5	Port 2 RX (in)
P691-6	Port 3 RX (in)
P691-7	Port 1 RX (in)
P691-8	Port 1 TX (out)
P691-11	Signal Ground
P691-13	Signal Ground

#### NOTE



In order for a serial port to function correctly, the baud rate of the RX and TX channels on a given RS-232 port must be the same. This must be considered when assigning serial ports to interfacing equipment.

### 3.3.4 Ethernet Ports (Qty 4)

Four Ethernet ports are provided. All four ports are set up to a connection speed of 10 Mb/s and can be used to transmit weather data to the display.

#### PORT 1

- P691-22 Ethernet Receiver input Ch1-B
- P691-23 Ethernet Receiver input Ch1-A
- P691-24 Ethernet Receiver output Ch1-B
- P691-25 Ethernet Receiver output Ch1-A

#### PORT 2

- P691-26 Ethernet Receiver input Ch2-B
- P691-27 Ethernet Receiver input Ch2-A
- P691-28 Ethernet Receiver output Ch2-B
- P691-29 Ethernet Receiver output Ch2-A

#### PORT 3

- P691-30 Ethernet Receiver input Ch3-B
- P691-31 Ethernet Receiver input Ch3-A
- P691-32 Ethernet Receiver output Ch3-B
- P691-33 Ethernet Receiver output Ch3-A

#### PORT 4

- P691-56 Ethernet Receiver input Ch4-B
- P691-57 Ethernet Receiver input Ch4-A
- P691-58 Ethernet Receiver output Ch4-B
- P691-59 Ethernet Receiver output Ch4-A

### 3.3.5 Discrete Inputs (GDL 69A Only)

The discrete inputs are used to control the XM radio channels and volume. All of these inputs are active low (i.e. grounded when active, and open otherwise). Each input presents a load of greater than 10 k $\Omega$ .

#### 3.3.5.1 Audio Volume Inputs (Up, Down, Mute)

The Up, Down, and Mute discrete provides audio volume control of the audio output. (Note: The volume and mute controls have no affect on the Line Out output volume.)

P691-73	Volume Increment
P691-74	Volume Decrement
P691-70	Audio Mute

#### 3.3.5.2 Audio Channel Control Inputs (Up, Down)

P691-71	Channel Increment
P691-72	Channel Decrement

Or

If Discrete 2 (P691-67) is grounded,

P691-71	Preset/Favorite Channel Increment
P691-72	Preset/Favorite Channel Decrement

#### 3.3.5.3 Audio Channel Control Option Discrete

Discrete 2 is used to determine how the audio channel control inputs function. See Section 3.3.5.2.

P691-67	Discrete 2
---------	------------

#### 3.3.5.4 Audio Suppression Inputs

There are six discrete inputs for audio suppression. There are three active low and three active high inputs. The Audio Suppression inputs suppress the Audio Out output by activating any one of multiple inputs. The threshold voltages are as follows:

Active HIGH discrete inputs: Input will go active with input voltages above 8.5V

Active LOW discrete inputs: Input will go active with input voltages below 5.0V

P691-61	Active HIGH discrete input
P691-62	Active HIGH discrete input
P691-63	Active HIGH discrete input
P691-64	Active LOW discrete input
P691-65	Active LOW discrete input
P691-66	Active LOW discrete input

#### 3.3.5.5 Other Discrete Inputs (Not Used)

The following discrete input pins are reserved for factory use.

P691-68	Discrete 1
P691-69	Test Enable

#### 3.3.6 Remote Power ON/OFF Input

The unit will turn off if this input is pulled above 3 volts. The unit will turn ON if the input is left floating or grounded. The input presents a load of greater than 100 k $\Omega$ .

P691-77	Data Link Remote power off
---------	----------------------------

### **3.3.7 Audio Out (GDL 69A Only)**

The Audio Out provides stereo output for XM radio to be interconnected to an audio panel. The Audio Out is affected by the volume controls, mute function, and suppression inputs. See Limitations Section 6.2 for requirements on use of suppression inputs.

- P691-17 Audio Out Lo. This is the common ground for the audio output
- P691-18 Audio Out Right. This is the right channel audio
- P691-19 Audio Out Left. This is the left channel audio

### **3.3.8 Line Out (GDL 69A Only)**

The Line Out output is always at a fixed output. The Line Out is not affected by the volume controls, mute function, and suppression inputs. Support for Line Out was enabled with software version 3.00.

- P691-52 Line Out Lo. This is the common ground for the Line Out audio output
- P691-53 Line Out Right. This is the right channel audio
- P691-54 Line Out Left. This is the left channel audio

### **3.3.9 Reserved Pins**

These pins are reserved and should not be connected.

- P691-9
- P691-10

### **3.3.10 Spare Pins**

The following pins are spare pins and not connected inside the GDL 69/69A. Wires should not be routed to these pins as they may be used in future configurations of the GDL 69/69A. Use of these pins may result in unintended behavior.

- P691-12 P691-44
- P691-14 P691-45
- P691-15 P691-46
- P691-16 P691-47
- P691-34 P691-48
- P691-36 P691-49
- P691-38 P691-50
- P691-41 P691-51
- P691-42 P691-55
- P691-43 P691-76

## **3.4 GRT 10 Interface Descriptions**

All connections to the GRT 10 are provided on the 9-pin D-Sub connector.

### **3.4.1 Power**

The GRT 10 accepts input power from 9 to 33 VDC. The power input pins are connected to the aircraft power bus through a single circuit breaker.

- Pin 8 Aircraft Power +
- Pin 7 Power Ground

Refer to Appendix D for recommended power connections.

### 3.4.2 RS-232 Port (Qty 1)

One RS-232 port is used to connect the GRT 10 to GDL 69A.

Pin 2 TX (out)

Pin 3 RX (in)

Pin 4 Signal Ground

### 3.4.3 Volume Lock

The volume lock discrete input is used to disable the volume controls of the GRC 10 remote control. When this input is active low (i.e. grounded when active, and open otherwise), the volume up, volume down and mute features of the GRC 10 are disabled; all other features of the GRC 10 remain functional. Each input presents a load of greater than 10 k $\Omega$ .

Pin 9 Volume Lock

### 3.4.4 Reserved Pins

These pins are reserved and should not be connected.

Pin 1

Pin 5

Pin 6

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## 4 SYSTEM CONFIGURATION AND CHECKOUT

Once the GDL 69/69A and optional GRT 10 have been installed, configure the units for the particular installation and then complete the checkout procedures herein to verify proper operation. The steps that are not applicable to a particular installation may be ignored. A checkout log sheet is included at the end of this section. It is to be filled out during the checkout procedure. The completed checkout log sheet(s) should be maintained with the aircraft permanent records.

### 4.1 Post Installation Power Check

Move the aircraft outside and ensure that there is an unobstructed view of the Southern sky. Attach a ground power cart to the external power connector on the aircraft and apply power.

#### NOTE



Use of an external power cart is optional in order to prevent the aircraft battery from discharging to a critically low level.

Power on all systems and allow two to four minutes for initialization. Verify that the control/display unit and the audio panel are connected and operating properly. Ensure the circuit breaker for the GDL 69/69A and GRT 10 (if installed) is closed and the Remote Power Discrete (if wired), is enabled.

### 4.2 Configure RS-232 Port

For installations with the MX20 or GMX 200, refer to the corresponding installation manual for configuring the correct RS-232 port of the MX20 or GMX 200 that the GDL 69/69A is connected. For installations with the 400/500 and 400W/500W series units, refer to the 400/500 Series Pilot's Guide Addendum or the 400W/500W Series Pilot's Guides for configuring the correct RS-232 port of the 400/500 or 400W/500W series unit that the GDL 69/69A is connected.

### 4.3 Configure Ethernet Port

For installations with the G1000 Display Systems, refer to the G1000 Display Systems installation manual, P/N 190-00303-01, for configuring the GDL 69/69A Ethernet ports. For installations with the GDU 620, refer to GDU 620 Installation Manual (P/N 190-00601-04) for configuring the Ethernet ports.

### 4.4 Initialization of Configuration Module

The GDL 69/69A requires aircraft installation information to be stored in the configuration module.

For GMX 200, MX20, 400/500 Series units, and 400W/500W Series units the configuration module is installed in the back panel connector backshell assembly and the only parameter stored in the configuration module is the variable attenuator value needed to obtain the required GDL 69/69A gain/loss component.

For installations with the GDU 620 and G1000 Display Systems, the configuration information is stored with the GDU 620 or G1000 avionics system, therefore the configuration module is not installed in the GDL 69/69A connector backshell. For installations with the GDU 620 and G1000 avionics system, the configuration information contains the variable attenuator value and may contain several other parameters.

#### NOTE



The GDL 69/69A does not provide proper operation until the configuration initialization procedure is completed and the GDL 69/69A is power cycled so the new configuration information can be loaded.

## NOTE



In installations with a GDU 620 and/or G1000 Display systems, either display can be used to store the configuration information. Other display heads that might be part of the installation (GMX 200, MX20, 400/500 Series units, and 400W/500W Series units) are not to be used to set the GDL 69/69A's configuration information for this installation setup. Example: In an installation with a GDU 620 and a GMX 200, that are both connected to the GDL 69/69A, the GDU 620 is to be used to set the configuration information, not the GMX 200.

### 4.4.1 Configuration Module Procedure for Installation with MX20 and GMX 200

Refer to the latest revision of the MX20 or GMX 200 Installation Manual (Garmin AT P/N 560-1025-( ) and 190-00607-04) for instructions. Be sure to power cycle the GMX 200 or MX20 after the attenuation information is entered. The configuration information is loaded into the GDL 69/69A's configuration module as the GMX 200 or MX20 is powering back up. After the GMX 200 or MX20 has finished powering up, power cycle the GDL 69/69A so it loads any new information from its configuration module.

### 4.4.2 Configuration Module Procedure for Installation with 400/500 and 400W/500W Series

Perform the following steps to program the configuration module of the GDL 69/69A when using the 400/500 Series or 400W/500W Series as the control and display unit:

1. Power up the 400/500 or 400W/500W in Configuration Mode (refer to the 400/500 or 400W/500W Install Manual for instructions)
2. Go to GDL CONFIG Page
3. Enter in the Attenuation value, which is computed as in the following formula:

$$\text{Attenuation} = (6 - \text{GLcomp}) * 10$$

GLcomp = GDL 69/69A gain/loss component value from Table 2-11.

Example: If GLcomp from Table 2-11 is -1.39dB (calculated from example in Section 2.6.4.2) than;

$$\begin{aligned} \text{Attenuation} &= (6 - (-1.39)) * 10 \\ &= (6 + 1.39) * 10 \end{aligned}$$

Attenuation = 7.39 \* 10 = 73.9 rounded up 74 to enter in the 400/500 Series or 400W/500W Series.

## NOTE



If attenuation from the above calculation is < zero or > 100 then the gain/loss compensation is outside the range required for proper operation. Review Section 2.6.4.2 for appropriate corrective action.

### 4.4.3 Configuration Procedure for G1000 Display Systems

1. Insert the correct Loader Card into the top slot of the PFD.
2. Start the G1000 system in Configuration mode.
3. On the PFD, go to the Configuration Upload page using the FMS knob.
4. Activate the cursor and use the small FMS knob to highlight the airframe type in the FILE field.

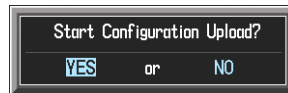


**NOTE**



Ensure that the correct airframe type is selected before proceeding; otherwise, incorrect configuration information will be loaded.

5. Press the ENT key to select the appropriate airframe type. Once an airframe type is selected the configuration files in the SECTION field will be displayed.
6. Using the FMS knob, highlight 'GDL69' in the FILE LIST field.
7. Press the LOAD softkey.
8. Select YES and press the ENT key to acknowledge the following prompt:



9. Monitor the status of the upload. When the upload is finished, press the ENT key to acknowledge the following confirmation:



10. View the SUMMARY field and ensure that all items are 'complete', then de-activate the cursor.
11. Go to the System Status page.
12. Activate the cursor and highlight 'GDL69' in the LRU window.
13. Verify that the reported part number and version of the software matches the data in the Required Equipment List.
14. Continue to the GDL 69A system operational checkout.

**4.4.4 Configuration Procedure for the GDU 620**

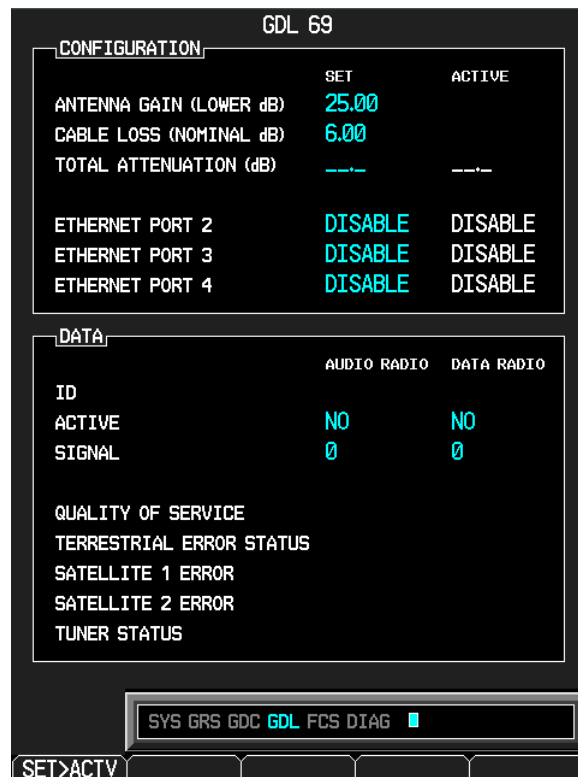
This page allows installers to configure the GDL 69/69A.



1. Start the GDU 620 in Configuration mode. Refer to GDU 600 installation manual (Garmin Part #: 190-00601-06) for information on how to do this.
2. On the PFD, go to the 'SYS' page by rotating the outer part of the FMS knob.

**INTERFACING SYSTEMS Window:**

3. Press the FMS knob and use the outer part of the FMS knob to navigate to the 'Data Link' configuration. Use the inner part of the FMS knob to select either 'GDL 69' or 'GDL 69A' depending on the unit being used. Press the 'ENT' key to update any changes made. The box next to the 'Data Link' configuration should now be green.
4. Wait 20 sec, and then verify that the box next to 'DATA LINK' on the PFD's 'DEVICES ONLINE' Window is green. Once the box is green, the GDU 620 is successfully communicating with the GDL 69/69A. If the box does not turn green after 20 sec check the cable harness for any issues and repeat steps 1-4.
5. On the MFD, go to the 'GDL' page by rotating the outer part of the FMS knob.



**CONFIGURATION Window:**

6. The different configurations in the Configuration window can be edited by pressing the FMS knob. Once pressed, the configurations can be selected by rotating the outer part of the FMS knob and adjusted by rotating the inner part of the FMS knob. To write the adjusted configuration values into the GDL 69/69A Configuration Module, press the 'ENT' key on the GDU 620.

**NOTE**



Refer to Section 2.6.4 for antenna gains and calculation of cable loss.

7. **ANTENNA GAIN (LOWER dB)**, this is used to specify the antenna gain from 22.00 to 40.00 dB in 0.25 dB increments.

8. **CABLE LOSS (NOMINAL dB)**, this is used to specify the antenna cable loss from 3.00 to 11.00 dB in 0.1 dB increments.

#### NOTE



The GDU 620 automatically calculates the total attenuation value that is required by the GDL 69/69A. The GDU 620 prevents the installer from entering antenna gain and cable loss values that result in a total attenuation that is outside the acceptable range of the GDL 69/69A.

9. **TOTAL ATTENUATION (dB)**, this field is automatically calculated based upon the antenna gain and cable loss values.
10. **ETHERNET PORT 2/3/4**, this is used to enable or disable Ethernet ports 2, 3, or 4 on the GDL 69/69A.

#### DATA Window:

1. **ID**, displays the identification number for the data (GDL 69/69A) and audio (GDL 69A) radios.
2. **ACTIVE**, displays the active status for the data (GDL 69/69A) and audio (GDL 69A) radios.
3. **SIGNAL**, displays the signal strength for the data (GDL 69/69A) and audio (GDL 69A) radios.
4. **QUALITY OF SERVICE**, displays the quality of service for the data (GDL 69/69A) and audio (GDL 69A) radios.
5. **TERRESTRIAL ERROR STATUS**, displays the terrestrial status for the data (GDL 69/69A) and audio (GDL 69A) radios.
6. **SATELLITE 1 ERROR**, displays the error status for satellite 1.
7. **SATELLITE 2 ERROR**, displays the error status for satellite 2.
8. **TUNER STATUS**, displays the tuner status for the data (GDL 69/69A) and audio (GDL 69A) radios.

The SET>ACTV soft key can be used to write the configuration settings that are stored in the GDU 620 configuration module to the GDL 69/69A. In general, this soft key would only be used when replacing a GDL 69/69A.

### 4.5 Configure GRC 10 (Optional)

For installations with the optional GRT 10/GRC 10 wireless remote system, the GRC 10 must be configured to communicate with the specific GRT 10 that is installed in the aircraft. To configure the RF Pairing ID of the GRC 10:

#### NOTE



GRT 10 serial number is required for installation. Serial number is located on the bottom of the unit.

1. Insert two AA batteries in GRC 10. For battery replacement see Section 7.3.
2. On the GRC 10 press any key to power the remote.
3. When the “GRT 10 not found” message is displayed on the GRC 10, press the following buttons in order:  

UP, DOWN, LEFT, RIGHT, MINUS (-), PLUS (+), PSET
4. Use the arrow buttons on the GRC 10 to enter the serial number of the GRT 10 transceiver that is installed in the aircraft. Verify that the correct GRT 10 transceiver serial number has been entered.
5. Press the XM button to store the GRT 10 serial number.

## 4.6 System Operational Checkout

Before performing system checkout, ensure that the configuration module (if applicable) is properly programmed and the GDL 69/69A connected to the correct communication port.

### 4.6.1 Data Link Status and Connection

Power up the GDL 69/69A. View the data link status on the display/control device to verify XM signals are being received. Refer to the MX20 installation manual, GMX 200 installation manual, 400W/500W Series Pilot's Guide or the 400/500 Series Pilot's Guide Addendum for instructions on how to access the data link status page on those units. For G1000 Display Systems units, refer to the G1000 Configuration Manual, 190-00303-04 or the aircraft specific configuration manual.

The antenna gain setting should be 25 for the GA 37, GA 55, and GA 55A, and may be different for equivalent antennas. The cable loss setting should be set to 4.5 dB at the factory. Set this setting to the value computed in Section 2.6.4.1 if it is different from the default value.



**Figure 4-1. Data Link Configuration Page on the MX20**



**Figure 4-2. Data Line Configuration Page on the GMX 200**



**Figure 4-3. Data Link Configuration Page on the 400/500 Series**  
(500 Series shown, 400 Series screen is similar)



**Figure 4-4. Data Link Configuration Page on the 400W/500W Series**  
(500W Series shown, 400W Series screen is similar)

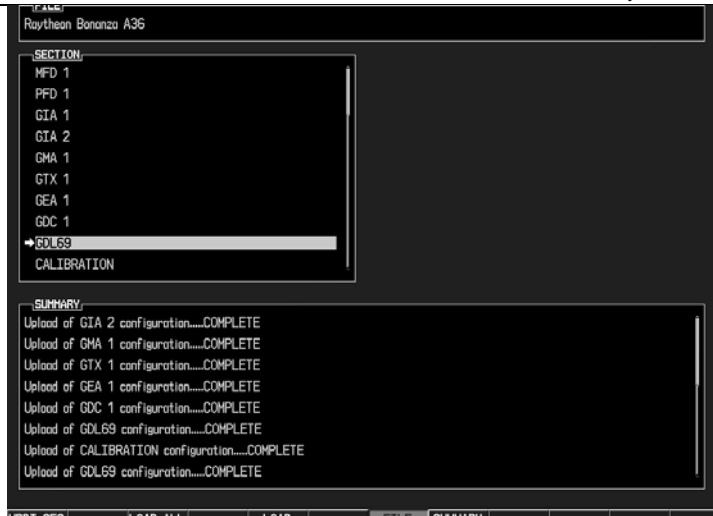


Figure 4-5. Configuration Upload Page - G1000 Display Systems



Figure 4-6. Configuration Page – G1000 Display Systems

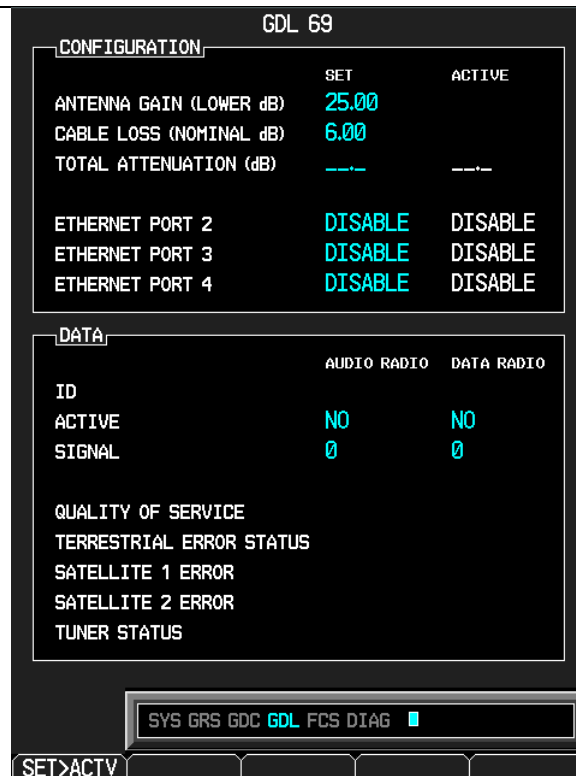


Figure 4-7. Configuration Page – GDU 620

#### 4.6.2 Verifying XM Receiver Signal Strength

The following check will verify the XM antenna connection to the GDL 69/69A XM Receiver. Verify the XM signal level has a minimum of three bars.

#### CAUTION



Make sure the aircraft is outside and that there is an unobstructed view of the Southern sky.

Refer to the appropriate installation manual of the display device for instructions to view the signal status.

#### 4.6.3 Audio Output (for GDL 69A connected to GMX 200, MX20, 400W/500W, GDU 620 or G1000 Display Systems)

#### CAUTION



If GDL 69A is connected to an audio panel, the audio input should be used. A test must be conducted to ensure COMM radio signals will mute audio output from the GDL 69A.

#### NOTE



If a GDL 69A is installed with the 400/500 series, the GDL 69A audio feature is not operational.

Verify Channel 0 or other channel is displayed. The GDL 69A powers up with the audio muted. Press mute or volume keys (switch or on display/control device). Verify sound output from speakers. The GDL 69A may come with a trial activation to XM audio entertainment. With this trial activation, all audio channels for the given subscription should be available.

**4.6.4 Discrete Switches (for GDL 69A only, if installed)**

Channel Up/Down— Press the Channel Up or Down switches and observe that channel display on the display/control device increments or decrements, respectively.

Volume Up/Down— Press the Volume Up or Down switches and observe that speaker volume increases or decreases, respectively.

Mute—Pressing the Mute switch should terminate sound from speakers. Pressing it again should resume audio.

More optional checkout procedures are available after the GDL 69/69A is activated with XM Satellite Radio Corporation. Refer to the XM Activation Procedure document, P/N 190-00355-04.

**4.6.5 Audio Suppression Input (GDL 69A only)**

The GDL 69A has audio suppression inputs to disable the audio output when an electronic aural warning, such as a stall warning or gear warning, is activated.

With installations where the Audio Suppression is used, activate the Stall Warning, Gear Warning, or other interfaced inputs to the Audio Suppression inputs, one at a time. Verify the GDL 69A audio to the crew headphones is muted when each warning alarm is activated. The stall warning horn may be activated by simply raising the stall vane on the leading edge of the wing. The gear warning horn may be simulated by providing power or ground, as appropriate, directly to the horn. This can only be done provided the horn has been tested for proper operation when a gear retraction test was performed.



## 4.7 GRT 10/GRC 10 Post Installation Checkout Procedures (If installed)

### 4.7.1 Functional Check

#### 4.7.1.1 Power On/Off

Turn on the GRC 10 by pressing and releasing any key.

The unit will automatically power off after a period of inactivity. To manually turn off the unit, press the Menu key, highlight the Power Down option, and press the XM key.

#### 4.7.1.2 Channel Controls

Channel Up/Down— Press the Up or Down buttons on GRC 10 Remote Control and observe that channel display on the GRC 10 Remote Control and display/control device increments or decrements, respectively.

#### 4.7.1.3 Volume Controls

Volume Up/Down— Press the Plus (+) or Minus (-) buttons on GRC 10 Remote Control and observe that speaker volume increases or decreases, respectively.

Mute—Pressing the Mute button on GRC 10 Remote Control should terminate sound from audio speakers. Pressing it again should resume audio.

#### 4.7.1.4 Volume Controls (if Volume Lock Enabled)

Verify that the lock symbol is present next to the volume indicator on the GRC 10 remote control.

Volume Up/Down/Mute: Press the Plus (+), Minus (-), and Mute buttons on the GRC 10 remote control and observe that the speaker volume does not change and that the message, “Volume Controls Locked” briefly appears on the GRC 10 display.

### 4.7.2 GRT 10/GRC 10 Software Versions

The system information, which includes the GRC 10 software version, the GRT 10 software version, and the RF pairing ID that is programmed in the GRC 10, can be viewed on the GRC 10. To view the system information, press the Menu key, highlight the System Info menu selection, and press the ► key. To return to the Menu screen, press the Menu or XM key.

### 4.7.3 GPS Interference Check

Check that the GRT 10/GRC 10 wireless remote system does not interfere with the existing GPS installation. This test should be performed for each GPS unit installed in the aircraft. Perform the test with the GRC 10 in a horizontal and vertical orientation.

1. Power on the GPS installation and view the GPS signal strength of each satellite being received.

#### NOTE



If the unit is unable to acquire satellites, relocate the aircraft away from obstructions which might be shading GPS reception.

2. Power on the GDL 69A and GRT 10.
3. Power on the GRC 10 and verify that Channels page and Categories page are populated. NOTE: It may take up to 10 minutes from the time the GDL 69A is powered on for the GDL 69A to acquire this information and pass it to the GRC 10.
4. Manually power off the GRC 10.

**NOTE**



For composite aircraft, hold the GRC 10 as close to the antenna under test as practical from inside the cabin. For metal aircraft, hold the GRC 10 close to the window nearest the antenna under test. Repeat the test for the other GPS antenna when complete.

5. While monitoring the signal status of each satellite being received on the GPS, power on the GRC 10 using the XM button and immediately press the ▼ button at least once a second for a minimum of 35 seconds and check the GPS signal reception to make sure it is not affected (no significant signal degradation). Perform the test with the GRC 10 in the horizontal orientation with the unit pointing at the antenna. Repeat test with the GRC 10 in the vertical orientation with the back of the unit pointing at the antenna.

**NOTE**



If the GDL 69A subscription services with XM Satellite Radio Corporation have not been activated, only a limited number of channels will be available. In this case, repeated pressing of the GRC 10 ▼ button will not change channels once the last channel is reached. The GRC 10 is still communicating with the GRT 10 even though the channel display may not be updated.

**4.8 Activation with XM Satellite Radio**

Before the GDL 69/69A can be used, the unit has to be activated by XM Satellite Radio and services have to be subscribed to XM Satellite Radio Corporation. Refer to Garmin Document P/N 190-00355-04.

<b>GDL 69/69A Post-Installation Checkout Log</b>		Date: ___ / ___ / ___ By: _____
<b>INSTALLATION INFORMATION:</b>	Aircraft Model _____ Aircraft Serial # _____	
	GDL 69/69A Unit P/N _____ Mod Level _____ Serial # _____	
	Antenna P/N _____ Antenna Model _____ Serial # _____	
<b>CONFIGURATION ITEMS:</b>		
<p style="text-align: center;"><i>GDL 69/69A Installations</i></p> <p><b>Remote Power Discrete</b> <input type="checkbox"/> Enabled <input type="checkbox"/> N/A</p> <p><b>RS-232 Serial Interface</b> Port 1 Device _____ Port 2 Device _____ Port 3 Device _____</p> <p><b>Ethernet Ports</b> Port 1 Device _____ Port 2 Device _____ Port 3 Device _____ Port 4 Device _____</p> <p><b>Gain/Loss (GLcomp) Value</b> Calculated Value _____</p>		<p style="text-align: center;"><i>GDL 69A Installations Only</i></p> <p><input type="checkbox"/> <b>Audio Output</b>      <input type="checkbox"/> <b>Line Output</b> Device _____      Device _____</p> <p><b>Audio Suppression Input</b>      <b>Audio/Channel Control</b></p> <p>#1 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____      <input type="checkbox"/> Volume Control <input type="checkbox"/> N/A #2 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____      <input type="checkbox"/> Volume Mute <input type="checkbox"/> N/A #3 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____      <input type="checkbox"/> Channel Control <input type="checkbox"/> N/A #4 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____      <input type="checkbox"/> Preset Option <input type="checkbox"/> N/A #5 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____ #6 <input type="checkbox"/> N/A <input type="checkbox"/> Active _____</p>
<b>SYSTEM CHECKOUT</b>		
<b>GROUND CHECKS (NORMAL MODE)</b>		
<p><b>INTERFERENCE CHECKOUT</b></p> <p><input type="checkbox"/> [<input type="checkbox"/> N/A] Serial Interference to Display Devices checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Ethernet Interference to Display Devices checked  <input type="checkbox"/> Configuration Module (GLcomp) checked  <input type="checkbox"/> XM Signal Reception checked</p>		<p><b>AUDIO CHECKOUT (GDL 69A ONLY)</b></p> <p><input type="checkbox"/> [<input type="checkbox"/> N/A] Line Output checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Audio Output checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Channel Control checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Volume Control checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Audio Mute Control checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] Audio Suppression checked  <input type="checkbox"/> [<input type="checkbox"/> N/A] GRC/GRT Device checked</p>
<b>COMMENTS:</b>		

<b>GRT 10/GRC 10 Post-Installation Checkout Log</b>		Date: ___ / ___ / ___ By: _____
<b>INSTALLATION INFORMATION:</b>	Aircraft Model _____ Aircraft Serial # _____	
	GRT 10 Unit P/N _____ Mod Level _____ Serial # _____	
	GRC 10 Unit P/N _____ Mod Level _____ Serial # _____	
<b>CONFIGURATION ITEMS:</b>		
<i><b>GRT 10 Discrettes</b></i> Volume Lock: <input type="checkbox"/> No <input type="checkbox"/> Yes (Pin 9 grounded)		
<b>SYSTEM CHECKOUT</b>		
<b>GROUND CHECKS (NORMAL MODE)</b>		
<b>GPS INTERFERENCE</b> Interference from GRT 10/GRC 10 checked <input type="checkbox"/> Vertical Orientation <input type="checkbox"/> Horizontal Orientation		
<b>COMMENTS:</b>		

## 5 TROUBLESHOOTING

Table 5-1. GDL 69/69A Troubleshooting Guide

Problem	Action
No communication with GDL 69/69A.	<ul style="list-style-type: none"> <li>• Check power wiring and pin out.</li> <li>• Verify correct communication port setting on display/control device.</li> </ul>
No or low-quality XM signal	<ul style="list-style-type: none"> <li>• Ensure the XM antenna has an unobstructed view of satellite constellation.</li> <li>• Check the antenna cable and connectors.</li> <li>• Verify correct antenna loss value in the configuration module.</li> <li>• Verify antenna ground plane is adequate.</li> </ul>
No audio output (for GDL 69A)	<ul style="list-style-type: none"> <li>• Verify installed unit is GDL 69A, and not GDL 69 (with no audio feature).</li> <li>• Verify wiring of audio suppression input. Verify wiring is going to correct active high or active low input sense.</li> <li>• Check wiring from GDL 69A to audio panel.</li> <li>• Verify 'Mute' is not on.</li> <li>• Increase volume by pressing Volume Up.</li> <li>• If there is audio output only on Channel 1, verify that audio XM service has been activated. Reference 190-00355-04.</li> </ul>
Incorrect or no XM subscribed services displayed	<ul style="list-style-type: none"> <li>• Verify subscription with XM Satellite Radio.</li> <li>• GDL 69/69A might not have been properly activated. Reference 190-00355-04.</li> </ul>
XM audio entertainment does not mute when audio suppression interfaced inputs (stall, gear) are activated. <b>(GDL 69A only)</b>	<ul style="list-style-type: none"> <li>• Verify wiring of audio suppression inputs.</li> <li>• Verify alarm activation state of warning active high and active low.</li> <li>• Verify Audio is not connected to Line Output.</li> </ul>
No response from GDL 69A to control commands on GRC 10 Remote Control.	<ul style="list-style-type: none"> <li>• Check batteries in GRC 10 Remote Control.</li> <li>• Verify wiring between GDL 69A and GRT 10.</li> <li>• Verify that GRT 10 is not mounted in a metal enclosure.</li> </ul>

**Table 5-2. GRT 10/GRC 10 Wireless Remote System Troubleshooting Guide**

<b>Problem</b>	<b>Action</b>
GRT 10 not found	<ul style="list-style-type: none"> <li>• Verify GRT 10 is receiving power.</li> <li>• Verify GRT 10 is not mounted behind RF blocking material (i.e. bulkhead).</li> <li>• Verify the RF pairing ID entered into GRC 10 is correct.</li> <li>• Change mounting orientation of GRT 10 per recommendation in Section 2.4.4.</li> </ul>
GRT 10 connection lost	<ul style="list-style-type: none"> <li>• Verify that the GRC 10 is in RF range of the GRT 10.</li> <li>• Verify GRT 10 wiring and power.</li> <li>• Verify GRT 10 is not mounted behind RF blocking material (i.e. bulkhead).</li> <li>• Change mounting orientation of GRT 10 per recommendation in Section 2.4.4.</li> </ul>
GDL 69A not found	<ul style="list-style-type: none"> <li>• Verify wiring between GDL 69A and GRT 10.</li> <li>• Verify GDL 69A is powered on.</li> <li>• If connected to Port 1 and the GDL 69A is using software version 3.10, verify that Port 1 is not in debug mode.</li> </ul>
GDL 69A connection is lost	<ul style="list-style-type: none"> <li>• Verify wiring between GDL 69A and GRT 10.</li> <li>• Verify GDL 69A is powered on.</li> </ul>
GRC 10 will not power on.	<ul style="list-style-type: none"> <li>• Verify batteries are installed.</li> <li>• Install fresh batteries. See Section 7.3.</li> </ul>

## 6 LIMITATIONS

### 6.1 Operation

The installation of a GDL 69/69A and optional GRT 10/GRC 10 wireless remote system into an aircraft does not alter the operation approvals previously granted to the aircraft. Additional operation approvals may require FAA evaluation of all systems installed in a particular aircraft and is outside the scope of the GDL 69/69A STC.

Any higher priority audio cautions or alerts, such as the stall warning or gear warning, must disable XM audio to crew locations by muting the GDL 69A XM audio with the use of the audio suppression discrete inputs on the GDL 69A.

The optional GRT 10/GRC 10 wireless remote system has been tested for interference as part of the STC. Its operation must not interfere with the proper operation of any required aircraft equipment or systems. STC installation requires that the installer verify that there is no interference using the post-installation check-out procedure detailed in Section 4. Operators may use the STC qualification of the device as a basis for showing compliance with 14 CFR Part 91.21.

### 6.2 Installation

The GDL 69A XM Satellite Radio audio entertainment and optional GRT 10/GRC 10 wireless remote system may be installed to all passenger locations for all aircraft on the STC Approved Model List (AML). XM audio entertainment to crew locations depends on aircraft installation, which must meet requirements of 14 CFR §23.1431(e).

For purpose of this STC, 14 CFR §23.1431(e) requires that each pilot station must be able to hear the aircraft's stall warning horn with the entertainment system audio set to the maximum pilot controllable setting. This also applies to aircraft with a gear extension warning horn. Aircraft which have electric stall/gear warning may utilize the GDL 69A audio suppression discrete input to turn off the music during an event. For these installations, the XM audio may be provided to the crew locations.

For aircraft installations with non-electric stall/gear warning horns, this STC does not provide data for installation of audio entertainment to crew locations. The GDL 69A audio entertainment may not be wired to crew locations without a separate evaluation that is beyond the scope of this STC. It is possible for installers to seek evaluation and approval of an alternate installation by means of the field approval process. In both cases, each installation or aircraft type must be evaluated for compliance with 14 CFR §23.1431(e). This evaluation may determine that the required horns can be heard satisfactorily without disabling the GDL 69A audio entertainment to the crew.

#### NOTE



For installations with non-electric stall warnings, the installer may attenuate the GDL 69A audio provided to crew locations to assist meeting the requirements of 14 CFR §23.1431(e). The GDL 69A audio output may be attenuated by installing series resistors per Figure D-6.

#### NOTE



The Audio Suppression Discrete controls the audio output only and has no effect on the line output.

For preservation of essential equipment in aircraft with multiple power busses, the GDL 69/69A and optional GRT 10 should be powered from a non-essential bus.

#### 6.2.1 Antenna

The GDL 69/69A is compatible with the Garmin antennas listed in Table 1-11 or those with equivalent specifications. Refer to Table 1-13 for specifications.

### **6.2.2 Equipment Interfaced to the GDL 69/69A**

Any aircraft systems, other than those shown in this installation manual, that interface to the GDL 69/69A or GRT 10 Transceiver with the GRC 10 Remote Control are outside the scope of this manual and may require further evaluation and/or certification approval. All equipment interfaced to the GDL 69/69A must be previously or concurrently approved.

### **6.2.3 Preservation of Previous Systems**

It is the installer's responsibility to preserve the essential characteristic of the aircraft being modified by this manual to be in accordance with the aircraft manufacturer's original design. This includes the preservation of multiple power buses, which reduce the probability of interrupting power to essential instruments and avionics. The GDL 69/69A and optional GRT 10/GRC 10 wireless remote system are non-essential equipment and as such, if an option to power the unit from a non-essential bus is available, it must be used.



## 7 PERIODIC MAINTENANCE

The GDL 69/69A and the optional GRT 10/GRC 10 wireless remote system do not require maintenance except as included in this section.

### 7.1 Audio Suppression

If installation requires use of audio suppression inputs, each installed input must be verified for proper operation on an annual basis.

### 7.2 Equipment Calibration

No schedule servicing tasks or internal manual adjustments are required on the GDL 69/69A, GRT 10 Transceiver or GRC 10 Remote Control.

### 7.3 GRC 10 Remote Control Battery Replacement

If the unit does not turn on, or the battery level indicator on the display shows no bars, replace the batteries. To replace the batteries in the GRC 10 Remote Control, remove the back cover of the remote. Insert fresh batteries with the orientation as shown in the diagram in the battery compartment. Both batteries should be replaced with fresh batteries at the same time.



Figure 7-1. Diagram in Battery Compartment

#### WARNING



Do not use lithium batteries in the GRC 10.

#### NOTE



Remove batteries when the GRC 10 is stored for extended periods.

#### CAUTION



When replacing batteries, use only new or fully charged batteries. Do not mix new and old batteries as this can cause battery leakage and damage to the unit. Do not mix battery types (i.e. rechargeable with non-rechargeable).

#### CAUTION



Remove batteries if the GRC 10 will not be in use for several months. Storing batteries in the unit for prolonged periods may result in leakage and damage to the battery compartment.

#### NOTE



Failure of the GRC 10 (i.e. dead batteries) has no impact on normal aircraft operations and is only used for passengers to control audio entertainment.

## **7.4 Cleaning**

The GDL 69/69A and GRT 10 Transceiver do not require regular cleaning. The GRC 10 Remote Control may need occasional wiping of the LCD lens using a lint-free cloth slightly damp with a mild cleaner.

## **Appendix A STC DATA**

### **A.1 STC/PMA Information**

The STC SA01487SE-D with Approved Model List (AML), Master Data List (Garmin P/N 005-C0217-00) information is available on the Garmin web site at [www.garmin.com](http://www.garmin.com). Download from the 'Dealers Only' page on the Garmin website at [www.garmin.com](http://www.garmin.com).

### **A.2 Permission to use STC**

An STC permission letter is available and can be downloaded from the 'Dealers Only' page on the Garmin website at [www.garmin.com](http://www.garmin.com).

### **A.3 Continued Airworthiness Instructions**

Refer to the GDL 69/69A XM Satellite Radio Instructions for Continued Airworthiness (Garmin P/N 190-00355-00). A copy of the instructions for Continued Airworthiness can be downloaded from the 'Dealers Only' page on the Garmin website at [www.garmin.com](http://www.garmin.com).

### **A.4 STC Approved Model List**

This STC SA01487SE-D includes an Approved model List (AML) attached to the STC. The GDL 69/69A XM Satellite Radio and GRT 10 Transceiver with the GRC 10 Remote Control are approved for installation on all aircraft listed on the AML following installation instructions and limitations described in this GDL 69/69A Installation Manual. The AML is attached to the STC and may be downloaded from the 'Dealers Only' page on the Garmin web site at [www.garmin.com](http://www.garmin.com).

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## Appendix B ENVIRONMENTAL QUALIFICATION FORM

For the latest Environmental Qualification Form, visit the ‘Dealers Only’ page on Garmin’s website at [www.garmin.com](http://www.garmin.com). Refer to the table below for the form or document number.

**Table B-1. Environmental Qualification Form Numbers and Documents**

<b>Model</b>	<b>Qualification Form Number/Document</b>
GDL 69/69A Datalink Receiver	005-00217-33
GA 37 Antenna	TSO2300-126G
GA 55 Antenna	005-00233-00
GA 55A Antenna	005-00240-00
GA 57 Antenna (Not recommended for new installations)	005-00240-00
GRC 10 Wireless Remote Control	005-00217-85
GRT 10 Wireless Transceiver	005-00217-86

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## Appendix C CONSTRUCTION AND VALIDATION OF STRUCTURES

This appendix includes information necessary for testing load-carrying capabilities of equipment mounting structures, such as shelves, mounting plates and mounting brackets, used to mount the GDL 69/69A remote rack. Because the weight of the GRT 10 is only 0.27 lbs, the impact of the weight to the surrounding structure is negligible and no structural validation procedures are required.

Baggage compartments and cabins or cockpit floors are good mounting platforms providing the floor attachments meet the strength requirements. If support racks, brackets or shelves need to be fabricated, they should be fabricated and attached to the aircraft structure in accordance with the methods outlined in AC 43.13-2A Chapter 2. After the structure is installed, it should be tested as outlined in AC43.13-2A Chapter 1 to verify that it is capable of supporting the required loads.

The GDL 69/69A installation must be capable of withstanding the Ultimate Load Factors listed in Table C-1 for at least 3 seconds in each direction specified without damage or permanent deformation. Note that these required loads differ somewhat from those normally required for equipment installations. The following tables, C-1 and C-2, show the static test loads for the GDL 69/69A with both types of racks.

The combined weight of the **GDL 69, remote rack, back plate, and the connector kit** is 2.92 lbs, the static loads which must be applied (Load Factor x 2.92 lbs.) will be the following:

**Table C-1. Static Test Load (GDL 69 with Remote Rack)**

Direction of Force	Load Factor	Static Test Load (Load Factor x (GDL 69 weight + Remote Rack weight + Connector Kit weight + Back Plate weight))
Downward	6.6 g	$(6.6 \times 2.92) = 19.27$ lbs
Upward	6.0 g	$(6.0 \times 2.92) = 17.52$ lbs
Sideward	4.5 g	$(4.5 \times 2.92) = 13.14$ lbs
Forward	18.0 g	$(18.0 \times 2.92) = 52.56$ lbs

The combined weight of the **GDL 69A and the remote rack** is 3.06 lbs, the static loads which must be applied (Load Factor x 3.06 lbs.) will be the following:

**Table C-2. Static Test Load (GDL 69A with Remote Rack)**

Direction of Force	Load Factor	Static Test Load (Load Factor x (GDL 69A weight + Remote Rack weight + Connector Kit weight + Back Plate weight))
Downward	6.6 g	$(6.6 \times 3.06) = 20.20$ lbs
Upward	6.0 g	$(6.0 \times 3.06) = 19.36$ lbs
Sideward	4.5 g	$(4.5 \times 3.06) = 13.77$ lbs
Forward	18.0 g	$(18.0 \times 3.06) = 55.08$ lbs

One method of determining the static load capability is as follows:

1. Mark and drill the holes where the GDL 69/69A equipment rack will be mounted.
2. Install four 8-32 machine screws (MS35206, AN526 or equivalent) in the four holes which will be used to mount the GDL 69/69A remote rack.

### NOTE

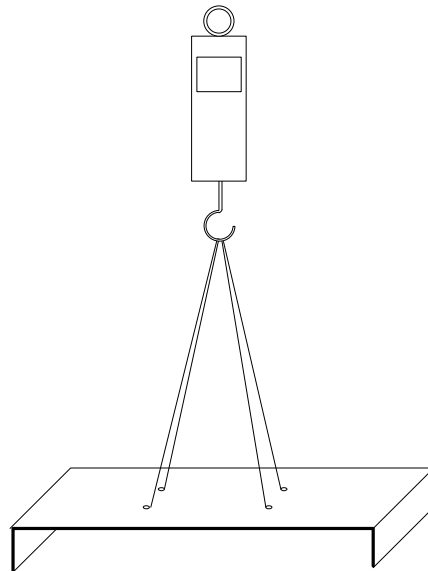


Some means of a locking fastener must be used, such as lock nuts and lock washers.

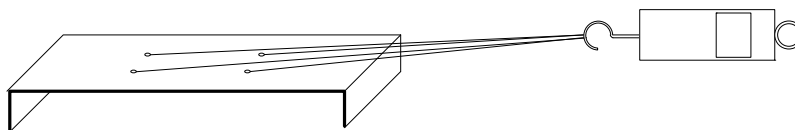
3. For testing downward loading, place shot bags or other suitable weights totaling the weight of your equipment plus the rack (See Tables C-1 and C-2) within the footprint outlined by the four

screw holes (assuming the mounting surface is horizontal) or use a calibrated force gauge at the location of the center of gravity when the unit is mounted.

4. Verify there is no damage or permanent deformation of the structure after 3 seconds.
5. Fasten a 36 inch loop of suitable material such as fishing line, braided wire, or other similar material having a breaking strength of at least 150 lbs, diagonally between two of the screws. Then fasten another loop diagonally between the other two screws, adjusting the length of the loop so it exactly matches the first.
6. Hook a calibrated force gauge through both loops and apply a sustained pull for at least 3 seconds in each of the other three directions (upward, sideward and forward) at the above calculated forces shown for your particular unit and rack. The values are found in Tables C-1 and C-2.
7. Examine the support structure carefully. If there has been damage or permanent deformation, the structure is not suitable and must be replaced with one which is strong enough to withstand the test loads. Examine all aircraft stringers, bulkheads and skin surfaces, which may have direct or indirect contact with the fabricated shelf. If it is determined that no damage or permanent deformation has occurred, the structure is of sufficient strength and the GDL 69/69A equipment rack may be permanently mounted on it.



**Figure C-1. Upward Static Load Test**



**Figure C-2. Forward Static Load Test**



## **Appendix D INSTALLATION DRAWINGS**

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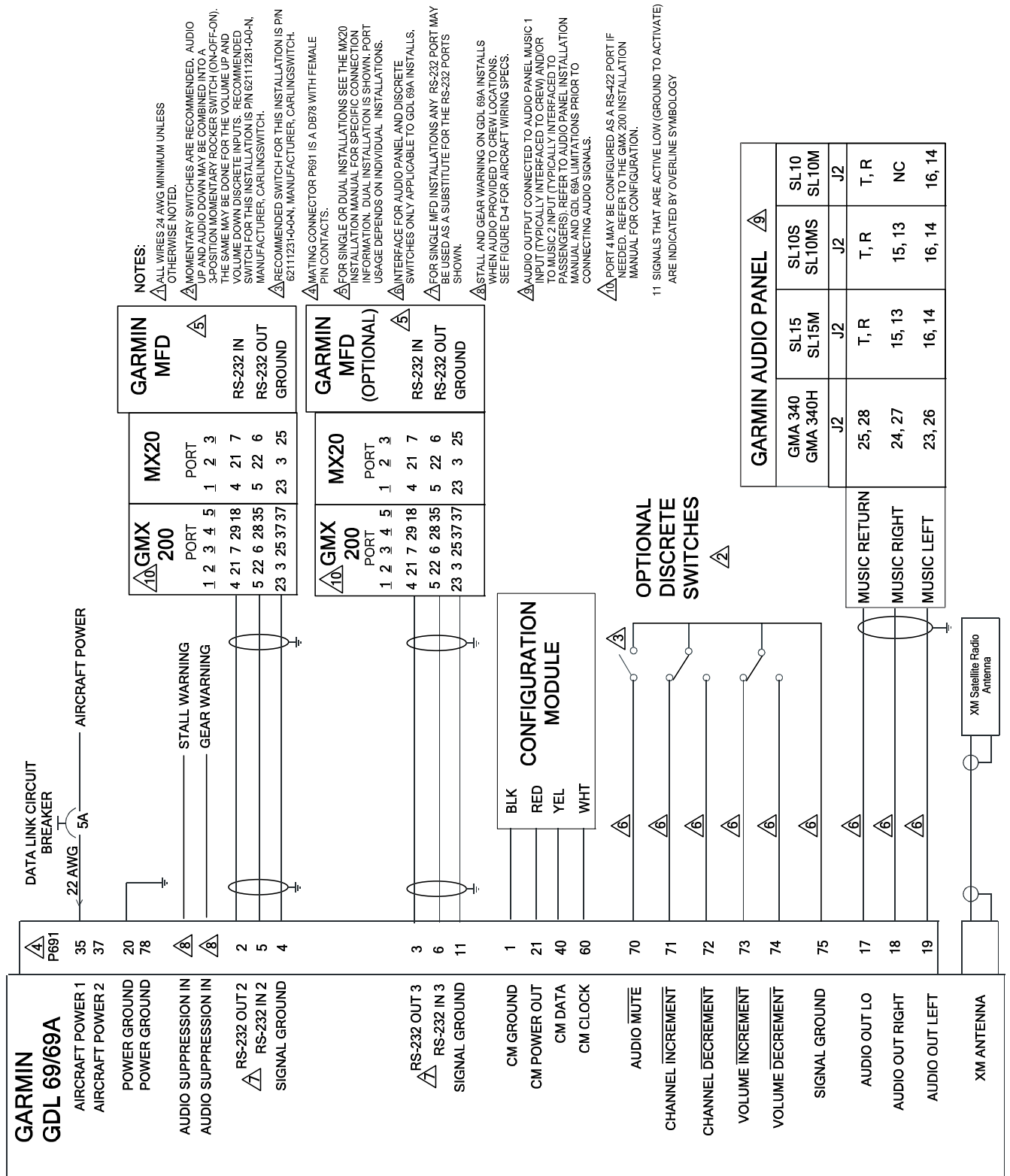
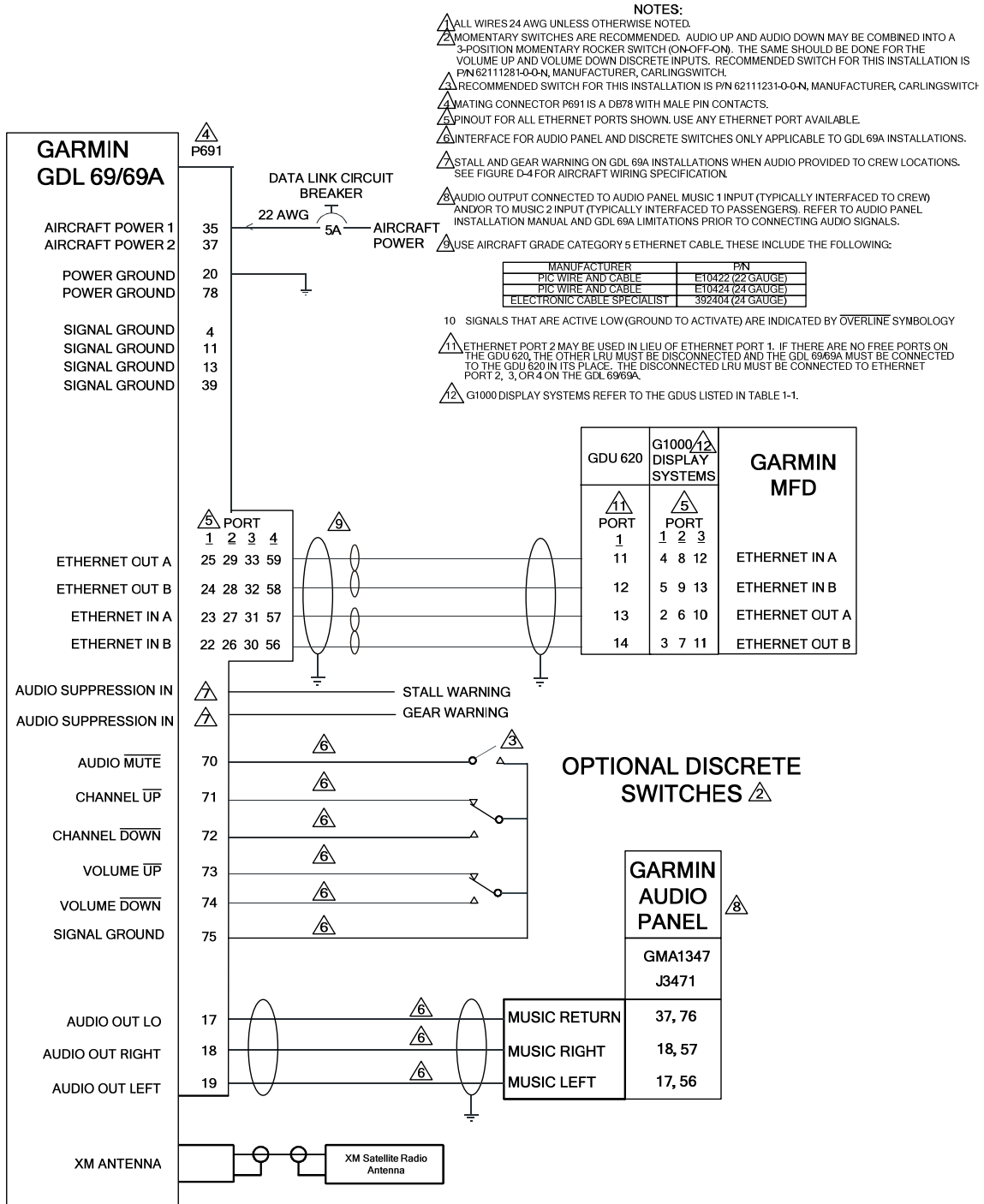


Figure D-1. GDL 69 Interconnect to MFD and Audio Panel



**Figure D-2. GDL 69 Interconnect to G1000 Display Systems or GDU 620**

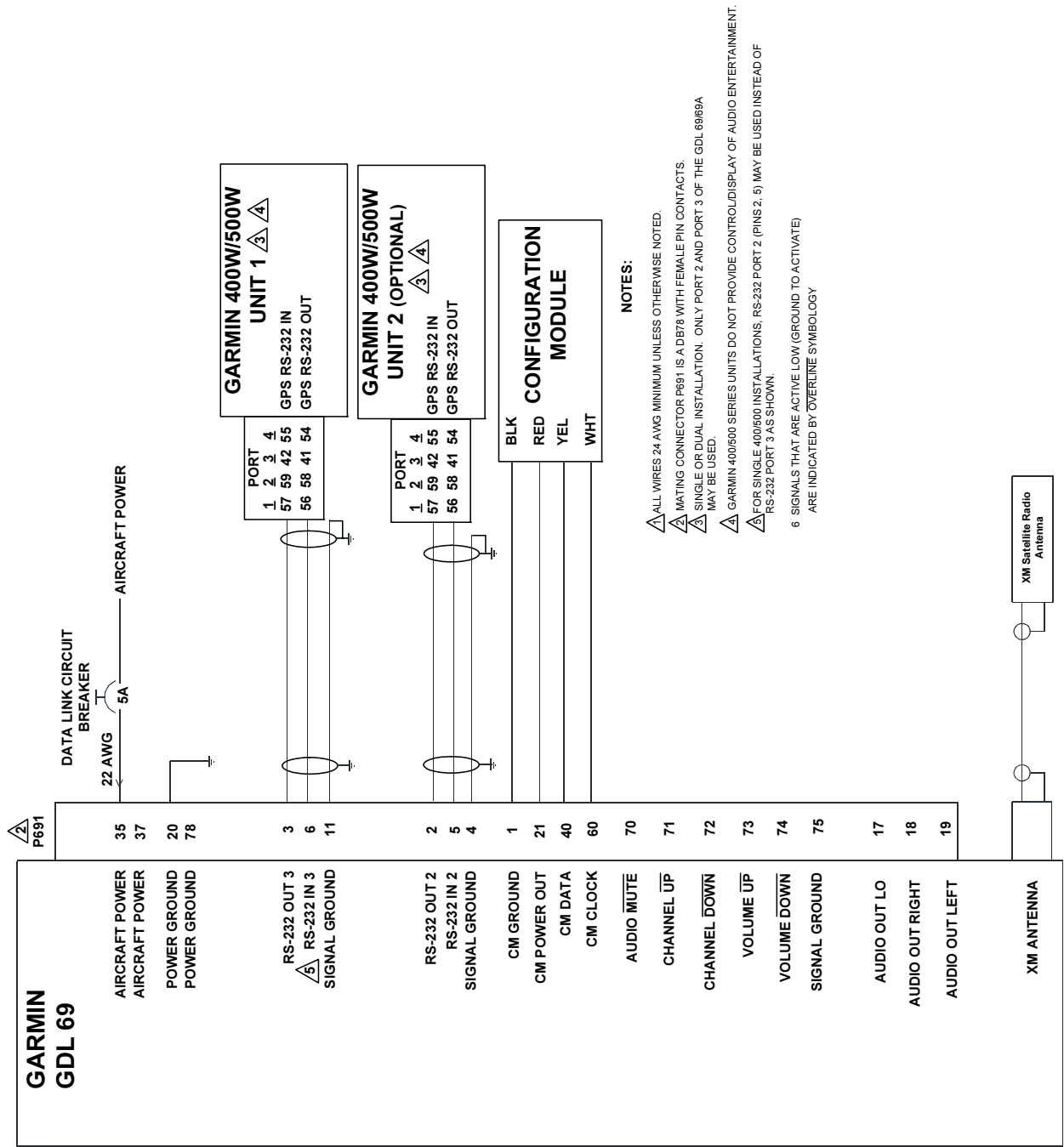


Figure D-3. GDL 69 Interconnect to 400W/500W Series

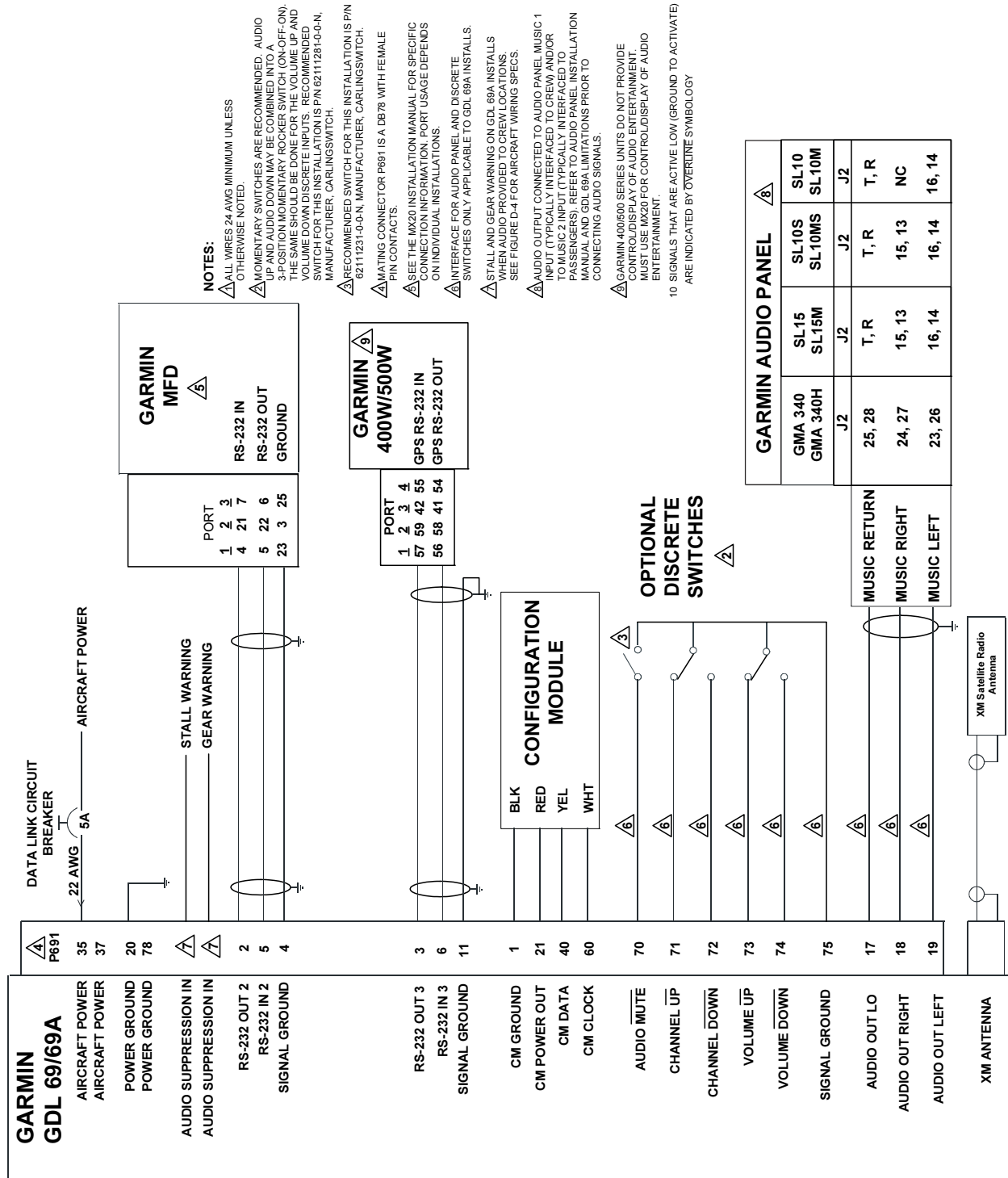


Figure D-4. GDL 69 Interconnect to MFD and 400W/500W Series

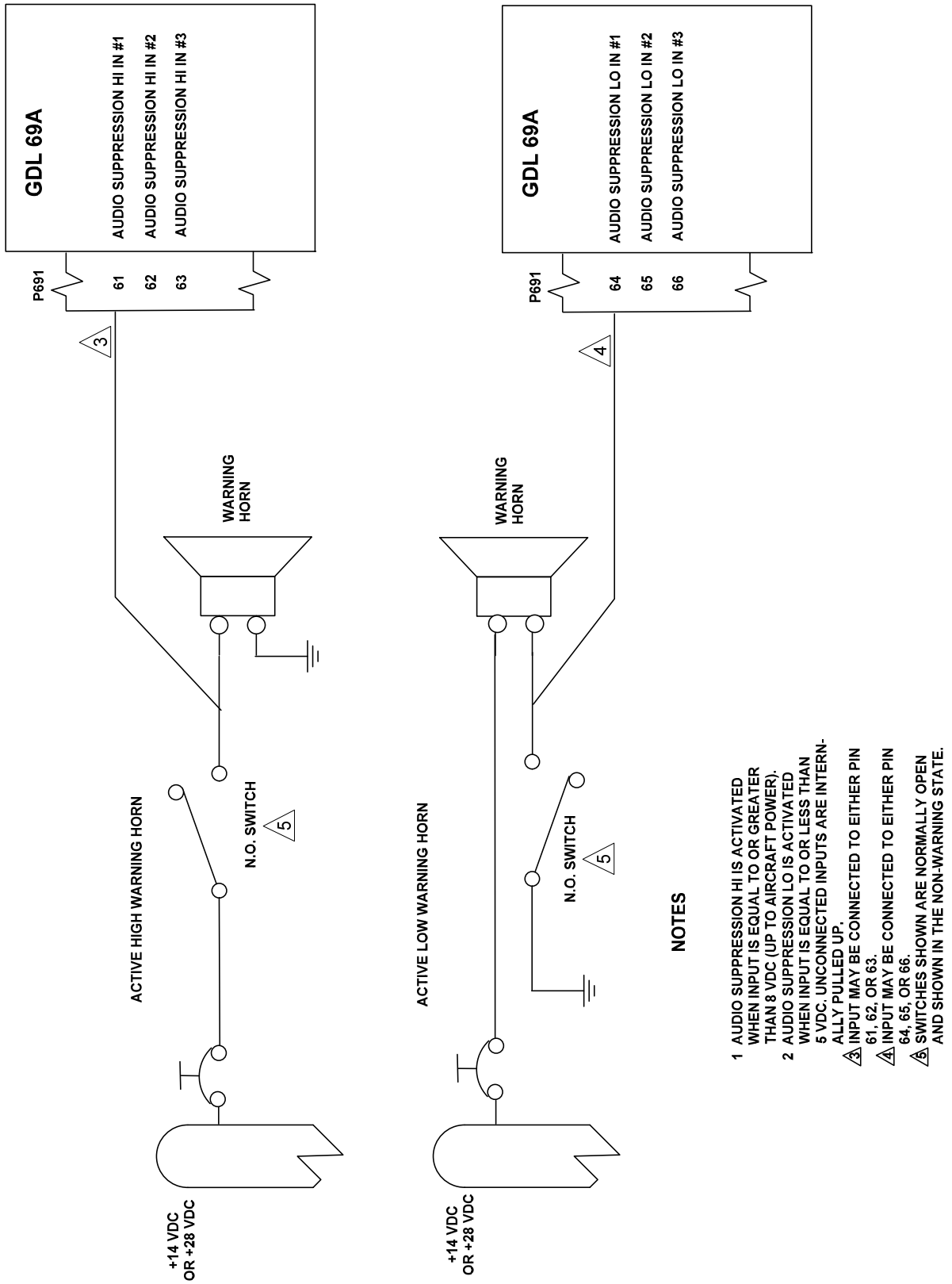


Figure D-5. Interconnect to Warning Horns

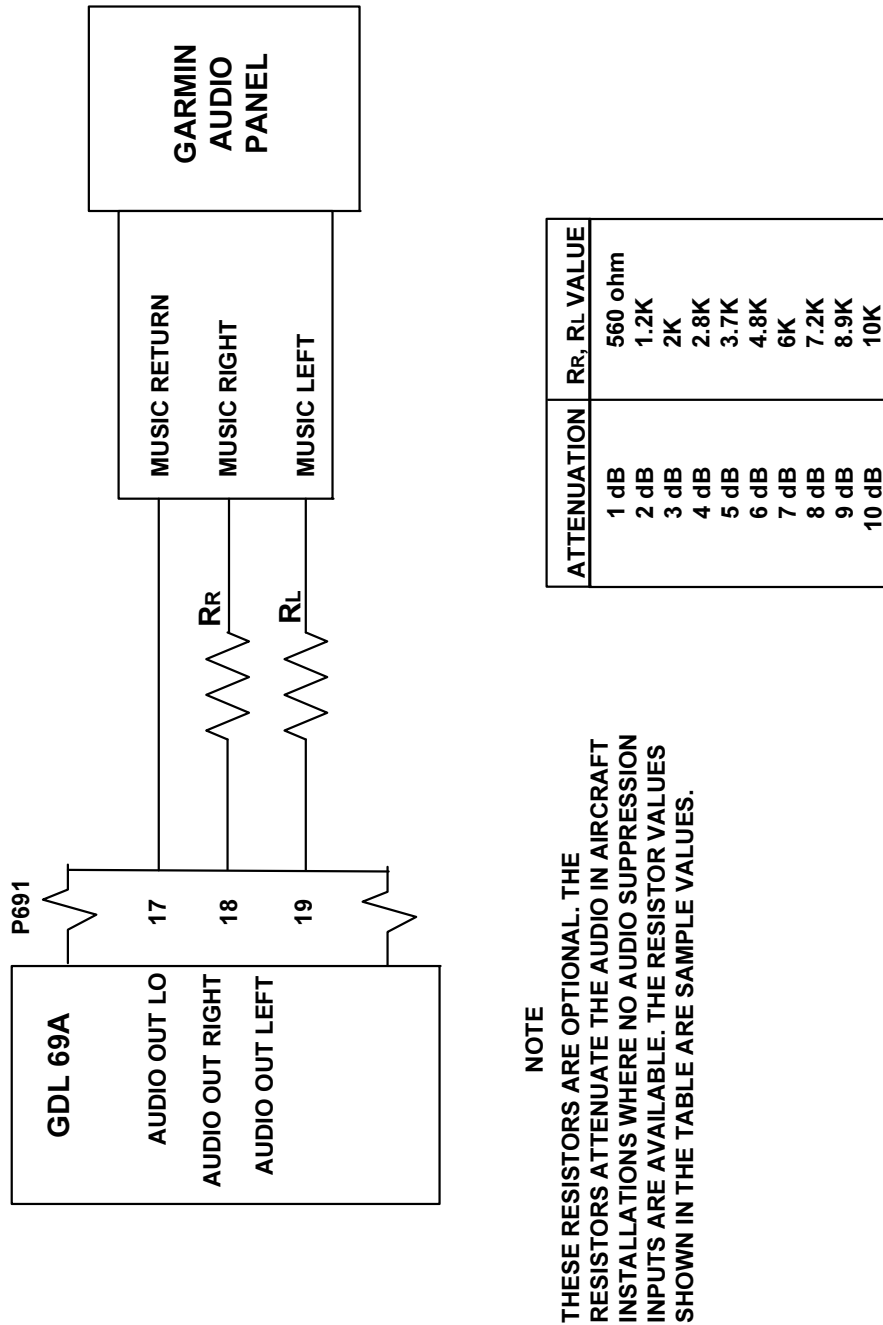
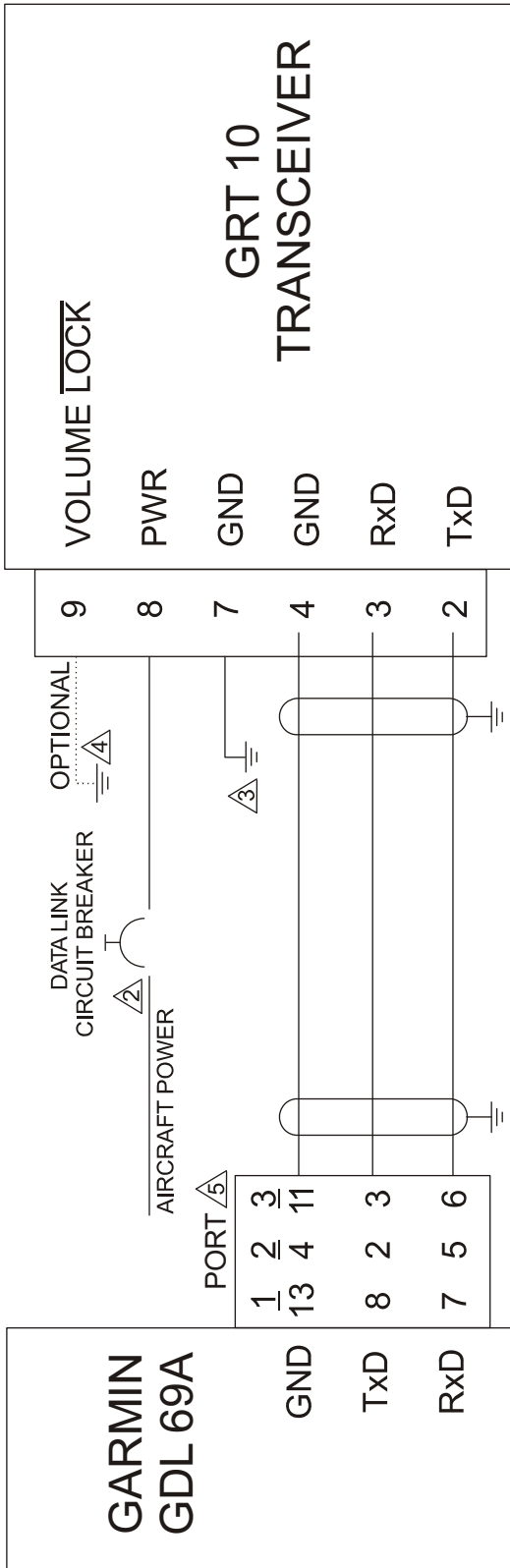


Figure D-6. Optional Audio Attenuation





NOTES

- 1 UNLESS OTHERWISE SPECIFIED, USE 22 AWG WIRE FOR ALL CONNECTIONS TO AND FROM THE GRT 10.
- 2 IT IS RECOMMENDED THAT THE GRT 10 POWER TO BE CONNECTED TO SAME CIRCUIT BREAKER AS THE GDL 69A.
- 3 GROUND DIRECTLY TO AIRFRAME. DO NOT TIE TO GDL 69A.
- 4 GROUND DISCRETE INPUT 9 TO DISABLE THE VOLUME CONTROLS OF THE GRC 10. THIS CAN BE A SWITCHED GROUND.
- 5 PORT 2 IS THE PREFERRED PORT. PORT 1 IS ONLY SUPPORTED BY SOFTWARE VERSION 3.10 OR HIGHER.
- 6 SIGNALS THAT ARE ACTIVE LOW (GROUND TO ACTIVATE) ARE INDICATED BY OVERLINE SYMBOLOGY.
- 7 MAXIMUM LENGTH OF SERIAL CABLE IS 25 FEET.

Figure D-7. GRT 10 Interconnect Drawing

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