

GMA 350/350H Installation Manual

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RECORD OF REVISIONS

Revision	Revision Date	Description
A	1/20/11	Production Release
B	5/10/11	Added reference to Configuration Tool and added new mechanical drawing

CURRENT REVISION DESCRIPTION

Revision	Page Number(s)	Section Number	Description of Change
B	1-2	1.2.1	Clarified number of intercom positions and added 3D Audio
	1-4	1.3.2	Clarified number of intercom positions
	1-6	1.5	Added reference to the GMA 350/350H Configuration Tool User's Guide
	3-3	3.7	Added configuration summary
	4-2	4.1.1	Edited name of pin 44
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INFORMATION SUBJECT TO EXPORT CONTROL LAWS

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GMA 350/350H HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GMA 350/350H Audio Panel. 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 using their Garmin-provided user name and password.

MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION

1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the Garmin GMA 350/350H audio panel. The GMA 350/350H can be incorporated into a variety of airframes under appropriate TC or STC. Each airframe installation may vary. Use only approved (type or supplemental type) data for specific installation instructions in a particular aircraft.

1.2 Equipment Description

The Garmin GMA 350/350H is a horizontally oriented panel-mounted audio controller and marker beacon system. that collects, processes, and distributes audio signals between avionics, crew, and passengers.

The GMA 350/350H is a high-fidelity digital audio product with improved circuitry that make audio signals less prone to noise (e.g. whining sound of an alternator or blip sound from a radar). At the GMA's core is a digital signal processor (DSP) that cleans up audio using advanced filtering techniques and provides VOX control for mic inputs. On the outputs, the GMA 350/350H features high-quality digital-to-analog converters and headset amplifier circuits that are used to minimize noise and distortion.

The GMA 350/350H provides a speaker output that may be used as a cockpit speaker or for a PA system to address passengers. The GMA 350/350H also includes a digital recording and playback feature. The GMA 350/350H allows ICS volume adjustments for pilot, copilot, and passenger. Additionally there is a volume adjustment for the MKR, AUX, MUSIC, and TEL sources.



Figure 1-1. GMA 350 Unit View



Figure 1-2. GMA 350H Unit View

1.2.1 Features Summary

- 3D Audio
 - In-panel configurable
 - Voice commands and voice feedback
 - Supports both DSP intercom auto-squelch and manual intercom squelch modes
 - DSP audio processing for low noise, high fidelity, highly configurable and upgradeable operation
 - In flight volume control (with bar annunciation) for all selectable sources except COMs and NAVs
 - Six/Seven position intercom (pilot, copilot, four/five passengers) with five isolation modes*
 - Remote toggling of passenger isolation supported (passengers can change their ICS ISO state)
 - User selectable MUSIC/TEL input distribution to ICS positions independent of isolation modes
 - Any combination of private or conference telephone conversations available
 - User toggling of muting features
 - Mute passenger mic audio to crew during COM RX
 - Monitor Mute (mute other selected COM(s) during transmit selected COM RX)
 - Mute Music during selected audio RX
 - Mute TEL during selected audio RX
 - Copilot can be configured as a passenger
 - Front panel jack for music or telephone input (stereo/smart-phone compatible)
 - Clearance recorder with playback
 - Individual processing of muting thresholds for inputs to reduce noise from wiring
 - Marker beacon receiver with SmartMute audio muting
 - Split-COM mode (for GMA 350H, 1/2, 1/3, and 2/3 splits allowed, pilot gets lower COM number)
 - COM swap input (for GMA 350H, cycles through all three COMs)
 - PA mode for keyed addressing to speaker and headsets
 - Power-off fail safe connection for Pilot PTT, Pilot mic, and Pilot's Headset-Left to COM 1
- *Depends on configuration settings

1.3 Technical Specifications

It is the responsibility of the installing agency to obtain the latest revision of the GMA 350/350H Environmental Qualification Form. This form is available directly from Garmin under the following part number:

GMA 350 Environmental Qualification Form, Garmin part number 005-00593-01

To obtain a copy of this form, see the dealer/OEM portion of the Garmin web site (www.garmin.com).

1.3.1 Physical Characteristics

Characteristic	Specification
Bezel Height	1.30 inches (3.30 cm)
Bezel Width	6.25 inches (15.88 cm)
Rack Height (Dimple to Dimple)	1.33 inches (3.38 cm)
Rack Width	6.30 inches (16.00 cm)
Depth Behind Panel with Connectors (measured from face of aircraft panel to rear of connector backshells)	8.13 inches (20.65)
Weight (Unit Only)	1.5 lbs (0.7 kg)
Weight (Installed with rack and connectors)	2.4 lbs (1.1 kg)

1.3.2 Electrical Characteristics

Characteristic	Specification
Environmental Compliance	RTCA DO-160E and EUROCAE ED-14D Environmental Conditions
Software Compliance	RTCA DO-178B Level C and D
Temperature Range	-45°C to +55°C (normal operation) -55°C to +70°C (short term)
Altitude	55,000 Feet
Audio Panel Functions	Transceiver inputs: 3 Receiver inputs: 5 Alert (unswitched) inputs: 5 Input impedance: 600 Ω Input isolation: 60 dB minimum Maximum input signal: 5 Vrms
Intercom Functions	Positions: 6 or 7 (pilot, copilot, 4 or 5 passengers)* ICS volume controls: 3 (pilot, copilot, passenger) Manual ICS VOX level controls: 1 shared control VOX processing: individual processing for each mic input ICS auto-squelch/VOX: independent DSP determined thresholds for each mic
Entertainment Functions	GMA 350 Stereo HiFi music inputs: 3 (two rear connectors and one front panel jack) GMA 350H Stereo HiFi music inputs: 2 (one rear connector and one front panel jack) Telephone interfaces: 2 (one rear connector and one front panel jack) Music and TEL sources individually distributable independent of ICS modes to allow any combination of source to ICS position distribution. Combined with independent ICS mode selection, any ICS position can have private TEL conversations or conference conversations of any combination.
Headphone Outputs	Output amplifiers: 3 stereo (pilot, copilot, passengers) Power, Load, and Distortion: 65 mW into 150 Ohms with <10% THD+N @ 10% output <3% THD+N Typical Operating Distortion: <1% THD+N 3dB Frequency Response Bandwidth: 20 Hz to 20 kHz for Music 350 Hz to 6.5 kHz for Other Audio (MICs, Radios, Alerts)

*Depends on configuration settings

Characteristic	Specification															
Speaker Output	<p>Outputs: 1, pilot selectable</p> <p>Power output, Rated load, and Power input voltage:</p> <table border="1"> <thead> <tr> <th>Aircraft Voltage</th> <th>Speaker Impedance</th> <th>Output Power</th> </tr> </thead> <tbody> <tr> <td>14 V</td> <td>8 Ohms</td> <td>Not recommended</td> </tr> <tr> <td>14 V</td> <td>4 Ohms</td> <td>3 W</td> </tr> <tr> <td>28 V</td> <td>8 Ohms</td> <td>7 W</td> </tr> <tr> <td>28 V</td> <td>4 Ohms</td> <td>10 W</td> </tr> </tbody> </table> <p>Distortion: <10% THD+N full power, <3% THD+N @ 10% power 3dB Frequency Response Bandwidth: 350 Hz to 6.5 kHz</p>	Aircraft Voltage	Speaker Impedance	Output Power	14 V	8 Ohms	Not recommended	14 V	4 Ohms	3 W	28 V	8 Ohms	7 W	28 V	4 Ohms	10 W
Aircraft Voltage	Speaker Impedance	Output Power														
14 V	8 Ohms	Not recommended														
14 V	4 Ohms	3 W														
28 V	8 Ohms	7 W														
28 V	4 Ohms	10 W														
Marker Beacon Receiver	<p>Frequency: Crystal controlled at 75 MHz</p> <p>Sensitivity: LO 1000 μV hard; HI 200 μV hard</p> <p>Selectivity: 6 dB @ \pm10 kHz min, 40 dB @ \pm200 kHz max.</p> <p>Input impedance: 50 Ω</p> <p>External lamp drive: 125 mA max each output</p> <p>Other outputs: Middle MKR sense</p> <p>Special functions: SmartMute™ marker audio muting</p>															

1.3.3 Power Requirements

Characteristic	Specification
Power Input Voltage	14 Vdc or 28 Vdc. See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages.
Power Consumption	<p>0.8 A @ 14 V (typical)</p> <p>1.5 A @ 14 V (maximum)</p> <p>0.4 A @ 28 V (typical)</p> <p>1.0 A @ 28 V (maximum)</p>

1.4 Certification

The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

1.4.1 TSO Compliance

Function	TSO/ETSO	Category	Applicable LRU Software Part Numbers	Applicable LRU Boot Block Part Numbers
Airborne Radio Marker Receiving Equipment	TSO-C35d	A	006-B0772-0() 006-B0773-0()	All 006-B0772-B() except 006-B0772-BA and all 006-B0773-B() except 006-B0773-BA
Aircraft Audio Systems and Equipment	TSO-C139	Class Ib		

1.4.2 TSO Deviations

TSO	Deviation
TSO-C35d	1. Garmin was granted a deviation from TSO-C35d to use FAR §21.607(d) instead of FAR §37.7 as the general rules governing holders of the TSO authorizations.
	2. Garmin was granted a deviation from TSO-C35d to use RTCA DO-160E instead of RTCA DO-138 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
TSO-C139	1. Garmin was granted a deviation from TSO-C139 paragraph 7a.
	2. Garmin was granted a deviation from TSO-C139 paragraph 7.b.

1.5 Reference Documents

The following publications are sources of additional information for installing the GMA 350/350H. Before installing the unit, the technician should read all referenced materials along with this manual.

Part Number	Document
190-01134-14	GMA 350H Pilot's Guide
190-01134-12	GMA 350 Pilot's Guide
190-01134-13	GMA 350 Maintenance Manual
190-01349-00	GMA 350/350H Configuration Tool User's Guide

1.6 Limited Warranty

All Garmin avionics products are warranted to be free from defects in materials or workmanship for: two years from the date of purchase for new Remote-Mount and Panel-Mount products; one year from the date of purchase for new portable products and any purchased newly-overhauled products; six months for newly-overhauled products exchanged through a Garmin Authorized Service Center; and 90 days for factory repaired or newly-overhauled products exchanged at Garmin in lieu of repair. Within the applicable 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 apply to: (i) cosmetic damage, such as scratches, nicks and dents; (ii) consumable parts, such as batteries, unless product damage has occurred due to a defect in materials or workmanship; (iii) damage caused by accident, abuse, misuse, water, flood, fire, or other acts of nature or external causes; (iv) damage caused by service performed by anyone who is not an authorized service provider of Garmin; or (v) damage to a product that has been modified or altered without the written permission of Garmin. In addition, Garmin reserves the right to refuse warranty claims against products or services that are obtained and/or used in contravention of the laws of any country.

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International Purchases: A separate warranty may be provided by international distributors for devices purchased outside the United States depending on the country. If applicable, this warranty is provided by the local in-country distributor and this distributor provides local service for your device. Distributor warranties are only valid in the area of intended distribution. Devices purchased in the United States or Canada must be returned to the Garmin service center in the United Kingdom, the United States, Canada, or Taiwan for service.

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GMA 350/350H Audio Panel, related hardware and suggestions relating to the marker beacon antenna. Installation of the GMA 350/350H should follow the aircraft TC or STC requirements. Cabling is fabricated by the installing agency to fit each particular aircraft. The guidance of FAA advisory circulars AC 43.13-1B and AC 43.13-2B, where applicable, may be found useful for making retro-fit installations that comply with FAA regulations.

2.2 Installation Materials

The GMA 350/350H is available as a single unit under the following part number:

Item	Catalog Part Number
GMA 350, Unit Only, (011-02385-00)	010-00871-00
GMA 350, Standard, (011-02385-00)	010-00871-01*
GMA 350H, Unit Only, (011-02385-10)	010-00871-10
GMA 350H, Standard, (011-02385-10)	010-00871-11*

*Includes GMA 35 Connector Kit (011-02302-00), GMA 350 Install Rack (115-01452-00), and GMA 35 Backplate (011-02300-00).

2.2.1 Equipment Available

Each of the following accessories is provided separately for the GMA 350 unit.

Item	Garmin P/N
Connector Kit, GMA 35	011-02302-00
Backplate, GMA 35	011-02300-00
Install Rack, GMA 350	115-01452-00

2.2.2 Additional Equipment Required

Hardware #6-32 x 100° Flat Head SS Screw [(MS24693, AN507R or other approved fastener) (6 ea.)] and #6-32 Self-Locking Nut [MS21042 or other approved fastener (6 ea.)]. Hardware required to mount the installation rack is not provided.

2.3 Installation Considerations

The GMA 350/350H interfaces with various avionics equipment. Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are required for installation of the GMA 350/350H.

2.3.1 Marker Beacon Antenna Installation

2.3.1.1 Location Considerations

The marker beacon antenna should be mounted on a flat surface on the underside of the aircraft body.

NOTE

Do not install the antenna inside the aircraft. Installing the antenna inside the aircraft limits the antenna reception and increases the antennas susceptibility to radiation from components inside the aircraft.

Mount the antenna so that there is a minimum of structure between it and the ground radio stations. Locate it as far away as possible from transmitter antennas.

2.3.1.2 Marker Beacon Antenna Mounting

Install the antenna according to the antenna manufacturer's instructions. If the antenna is being installed on a composite aircraft, ground planes must sometimes be added. Conductive wire mesh, radials or thin aluminum sheets embedded in the composite material provide the proper ground plane allowing the antenna pattern (gain) to be maximized for optimum performance.

2.3.1.3 Marker Beacon Antenna Cable

Use coaxial cable meeting the applicable aviation regulation for the marker beacon antenna. Any cable meeting specifications is acceptable for the installation. When routing antenna cables, observe the following precautions:

- All cable routing should be kept as short and as direct as possible
- Avoid sharp bends
- Avoid routing cables near power sources (e.g., 400 Hz generators, trim motors, etc.) or near power for fluorescent lighting
- Allow a 12 inch minimum separation between any other cables, including antenna cables (e.g ADF, COM, NAV, GS, MARKER)

2.3.1.4 Marker Beacon Antenna Cable Installation

This section provides guidance for terminating the coaxial cable into the D-Sub connector. See the system interconnect section for pin assignments.

NOTE

Use coaxial cable meeting the applicable aviation regulation for the marker beacon antenna. Route the cable to the D-Sub as described in Section 2.3.1.3.

When terminating the coaxial cable into the D-Sub observe the following guidance (refer to Figure 2-1):

- Keep the distance from the end of the exposed shield to D-Sub as short as possible.
- Ensure the distance from the beginning of the exposed shield to D-Sub is no more than 1.5 inches long.
- Terminate the center conductor by directly connecting it to the D-sub through a crimp pin without a pigtail.

Figure 2-1 below represents a suggested method for terminating the marker beacon coaxial cable using M17/128-RG400 terminated into a high density D-Sub connector. Refer to Table 2-1 for Crimp Tool, Pin, and Crimp Tool Insert part numbers.

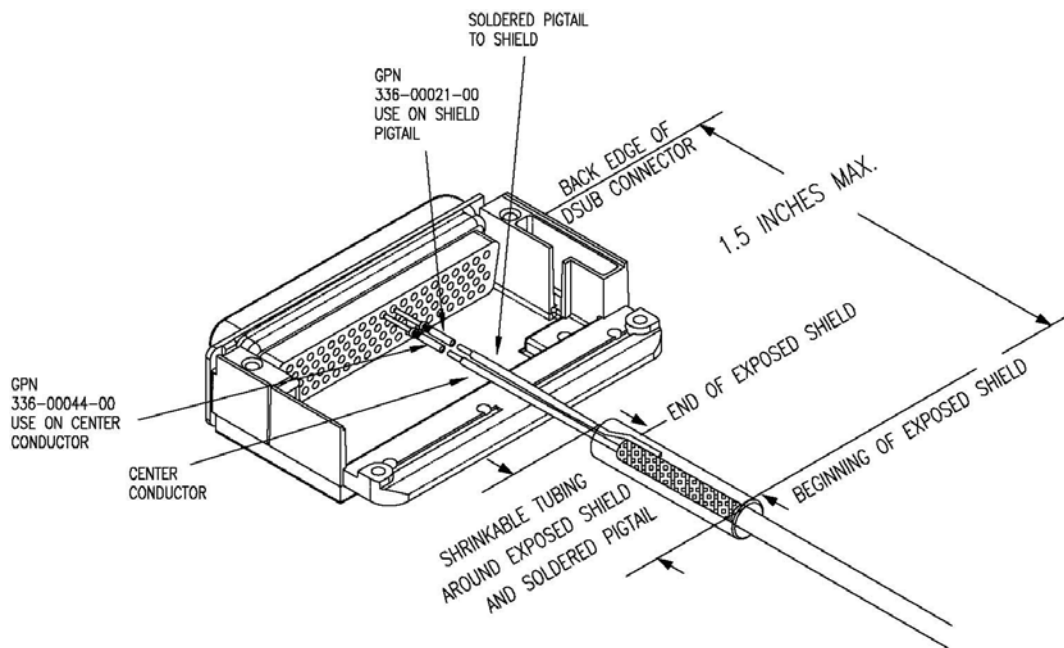


Figure 2-1. GMA Marker Beacon Coaxial Cable D-Sub Termination

Table 2-1. Pin and Crimp Tool Part Numbers

CRIMP TOOL	PIN	CRIMP TOOL INSERT
DANIELS MANUFACTURING CORP DMC M22520/2-01 GAGE AFM8 CRIMPING TOOL	Garmin Part Number 336-00021-00	K42
	Garmin Part Number 336-00044-00	K774

2.4 Cabling & Wiring

Refer to the interconnect examples in Appendix B for wire gauge guidance.

In some cases, a larger gauge wire such as AWG #16, #18, or #20 may be needed for power connections. Special thin-wall heat shrink tubing is also provided to insulate the extended barrels inside the backshell. If using AWG #16 or #18 barrel contacts, ensure that no two contacts are mounted directly adjacent to each other. This minimizes the risk of contacts touching and shorting to adjacent pins and to ground.

Ensure that routing of the wiring does not come in contact with sources of heat, RF or EMI interference. Check that there is ample space for the cabling and mating connectors. Avoid sharp bends in cabling and routing near aircraft control cables.

2.5 Cooling Air

The GMA 350/350H does not have provisions for attaching cooling air and does 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.

2.6 Mounting Requirements

The GMA 350/350H mounting surface must be capable of providing structural support and electrical bond to the aircraft to minimize radiated EMI and provide protection from High-Intensity Radiation Fields (HIRF).

The GMA 350/350H is mounted using its own unit rack (Figure 2-2). Refer to Appendix A for installation drawings. The installer must provide any additional remote mounting equipment.

NOTE

To ensure a sturdy mount, rear support is highly recommended.

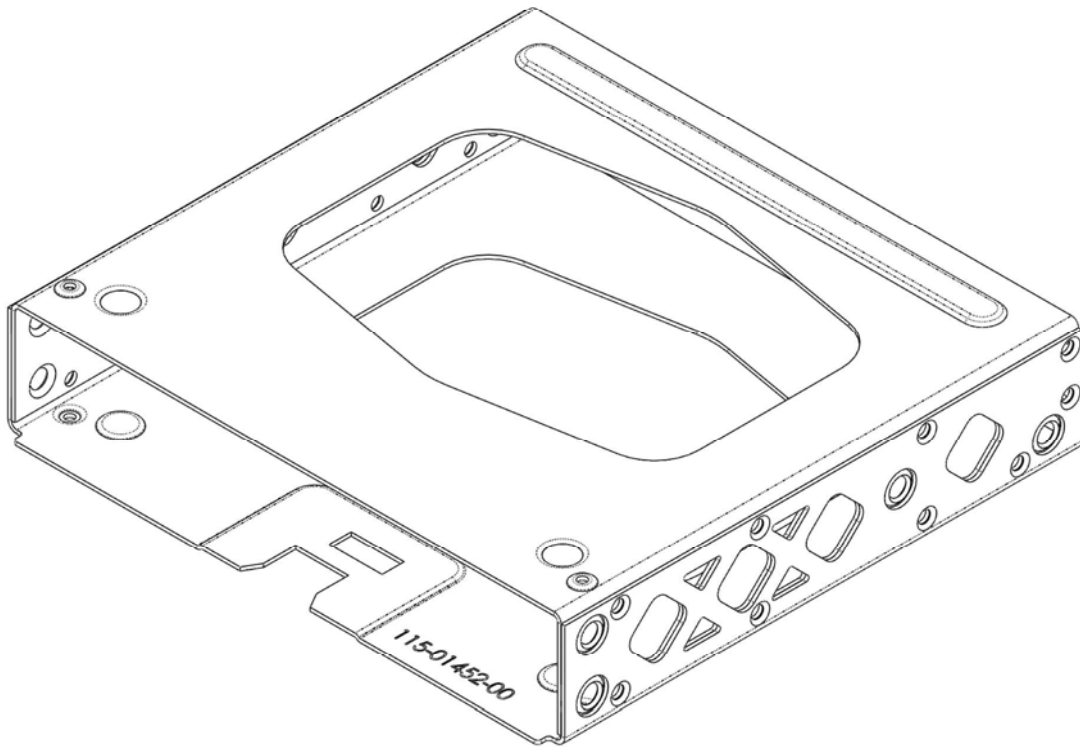


Figure 2-2. GMA 350/350H Unit Rack

2.7 Installation Approval Considerations for Pressurized Aircraft

Antenna and cable installations on pressurized cabin aircraft require FAA approved installation design and engineering substantiation data whenever such installations incorporate alteration (penetration) of the cabin pressure vessel by connector holes and/or mounting arrangements.

For needed engineering support pertaining to the design and approval of such pressurized aircraft antenna installations, it is recommended that the installer proceed according to any of the following listed alternatives:

1. Obtain approved antenna installation design data from the aircraft manufacturer.
2. Obtain an FAA approved Supplemental Type Certificate (STC) pertaining to and valid for the subject antenna installation.
3. Contact the FAA Aircraft Certification Office in the appropriate Region and request identification of FAA Designated Engineering Representatives (DERs) who are authorized to prepare and approve the required antenna installation engineering data.
4. Locate an appropriate consultant FAA DER, by reviewing the “FAA Consultant DER Directory”, which can be found at the FAA “Designee and Delegation” web page.
5. Contact an aviation industry organization such as the Aircraft Electronics Association and request their assistance.

2.8 Electrical Noise

Because the audio panel is a point in the aircraft where signals from many pieces of equipment are brought together, take care to minimize effects from coupled interference and ground loops.

Coupled interference can sneak into audio system interconnecting cables when they are routed near large AC electric fields, AC voltage sources and pulse equipment (strobos, spark plugs, magnetos, EL displays, CRTs, etc). Interference can also couple into audio system interconnecting cables by magnetic induction when they are routed near large AC current-carrying conductors or switched DC equipment (heaters, solenoids, fans, autopilot servos, etc).

Ground loops are created when there is more than one path in which return currents flow or when signal returns share the same path as large currents from other equipment. These large currents create differences in ground potential between the various equipment operating in the aircraft. These differences in potential can produce an additive effect on audio panel input signals.

The audio panel may “see” the desired input signal plus an unwanted component injected by ground differentials, a common cause of alternator-related noise. This is the main reason why all audio jacks should be isolated from ground. Terminating audio shields just at one end eliminates another potential ground loop injection point.

Single-point grounding cannot be overstressed for the various avionics producing and processing audio signals. Single-point, in this context, means that the various pieces of equipment share a single common ground connection back to the airframe. Good aircraft electrical/charging system ground bonding is also important.

The wiring diagrams and accompanying notes in this manual should be followed closely to minimize noise effects.

3 INSTALLATION PROCEDURE

3.1 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 storage. 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.

3.2 Antenna Installation

Install the antenna according to the antenna manufacturer's instructions.

3.3 Antenna Cable Connectors

The antenna cable requires a BNC plug connector. Follow BNC connector manufacturer instructions for assembly of the BNC connector.

3.4 Electrical Connections

All electrical connections to the GMA 350/350H, including the marker beacon antenna and shield ground, are made through two 44-pin D-subminiature connectors. Tables in Section 4 define the electrical characteristics of all input and output signals. Required connector and associated hardware are supplied in the connector kit (P/N 011-02302-00). See figures in Appendix B for interconnect wiring diagrams.

CAUTION

Check wiring connections for errors before inserting the GMA 350/350H into the rack. Incorrect wiring could cause internal component damage.

Table 3-1. Pin Contact Part Numbers

Manufacturer	44 pin D-Subminiature Connectors (P3501, 3502)		
	16 AWG (Power Only)	18-20 AWG (Power Only)	22-28 AWG
Garmin P/N	336-00044-01	336-00044-00	336-00021-00
Military P/N	N/A	NA	M39029/58-360
AMP	N/A	NA	204370-2
Positronic	N/A	NA	MC8522D
ITT Cannon	N/A	NA	030-2042-000

Table 3-2. Recommended Crimp Tools

Manufacturer	Hand Crimping Tool	18-20 AWG		22-28 AWG	
		Positioner	Insertion/ Extraction Tool (Note 2)	Positioner	Insertion/ Extraction Tool
Military P/N	M22520/2-01	N/A	M81969/1-04	M22520/2-09	M81969/1-04
Positronic	9507	9502-11	M81969/1-04	9502-3	M81969/1-04
ITT Cannon	995-0001-584	N/A	N/A	995-0001-739	N/A
AMP	601966-1	N/A	91067-1	601966-6	91067-1
Daniels	AFM8	K774	M81969/1-04	K42	M81969/1-04
Astro	615717	N/A	M81969/1-04	615725	M81969/1-04

NOTES

1. Non-Garmin part numbers shown are not maintained by Garmin and consequently are subject to change without notice.
2. Extracting the #16, #18 and #20 contact requires that the expanded wire barrel be cut off from the contact. It may also be necessary to push the pin out from the face of the connector when using an extractor due to the absence of the wire. A new contact must be used when reassembling the connector.
3. For applications using 16 AWG wire, contact Garmin for information regarding connector crimp positioner tooling.

3.5 Backshell Assembly

The GMA 350/350H connector kit includes two Garmin backshell assemblies. Garmin's backshell connectors give the installer the ability to quickly and easily terminate shield grounds at the backshell housing using the Shield Block. To assemble the backshell connectors and grounding system, refer to instructions provided in the Shield Block Installation Instructions (190-00313-09).

3.6 GMA 350/350H Unit Installation

CAUTION

Do not use excessive force when inserting the GMA 350/350H into the rack. This may damage the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, stop! Remove the GMA 350/350H and identify the source of resistance.

For final installation and assembly, refer to the outline and installation drawings shown in Appendix A of this manual.

1. Assemble the backshell as described in Section 3.5.
2. Connect both backshells to the rear plate using the screws provided in the connector kit.
3. Mount the unit rack to a suitable mounting location on the panel using the provided nutplates.
4. Assemble the rear plate into the GMA 350/350H unit rack.
5. Insert the GMA 350/350H into the rack, noting proper orientation as shown on the installation drawing in Appendix A.
6. Lock the GMA 350/350H in place using the appropriate size hex wrench.

3.7 Post Installation Configuration

The GMA 350/350H Configuration Tool (006-A0245-00) and GMA 350/350H Configuration Tool User's Guide (190-01349-00) are available for download from the Garmin Dealers web site. With this configuration tool and a GMA 350 USB cable (320-00672-00), configuration settings can be made to the GMA 350/350H without removing the unit from the panel allowing adjustments to be tested quickly.

Examples of configuration settings and adjustments (for a complete list of options refer to the GMA 350/350H Configuration Tool User's Guide):

- Backlight bus voltage
- Marker sensitivity and max volume
- Audio input gains (max volumes) and muting thresholds
- Music muting options not adjustable by user interface
- Enable/Disable 3D audio (default is enabled)
- Pilot sits in left or right seat (for proper 3D location of ICS audio)
- Programmable input configuration (keyed ICS and Voice Command keys)

3.8 Post Installation Checkout

NOTE

The GMA 350/350H does not provide valid outputs until the aircraft post installation configuration procedures are completed.

3.8.1 Verify Failsafe Operation with a Mono Headset

1. Remove power to the unit by pulling the audio breaker.
2. Connect a mono headset to the pilot's headset output jack and pilot's mic jack.

NOTE

Use of a true mono headset is required for this test to insure proper wiring even if a stereo jack is provided in the installation. Wiring left channel (tip contact) and right channel (ring contact) backwards will cause failsafe mode not to function with mono headsets. Use of a true mono headset is required for this test (not a stereo headset with a mono/stereo switch because headset manufactures differ on how they accomplish this switching). This will guarantee the condition of the right channel (ring terminal) being shorted to the return (sleeve terminal) by the mono headset's plug. This short occurs because of the physical design of the headset plug contacts and is an inevitable consequence of plugging a mono headset into a stereo jack. During power-on operation, this short will not damage the audio panel.

3. Verify that the COM1 transceiver can be heard in the pilot's headset.
4. Verify that COM1 can key and transmit the pilot's mic audio by verifying received sidetone or checking reception of the transmission with another radio tuned to receive this transmission (verify Pilot PTT and mic operation is delivered to this transceiver).
5. Apply unit power by restoring the audio breaker to the normal operating position.

3.8.2 Verify Installed Transceivers (COMs) are able to Transmit and Receive

1. Connect a headset to the pilot's headset output and mic input jack.
2. Verify that each installed transceiver (COM) can be heard when selected.

NOTE

Depending on settings, the mic selected COM may mute audio from other COMs.

-
3. Verify that each installed transceiver keys for transmission and transmits clear audio from the pilot's mic when selected for transmission and the Pilot PTT key is pressed. (Because the audio panel can be configured to simulate received sidetone internally, verifying transmission with a separate radio not in the system is recommended.)

NOTE

Depending on configuration and sometimes COM system wiring, other transceivers may be muted during transmit. Also, the audio panel may mute the speaker during PTT.

4. Move the headset to the copilot's headset jacks and verify that any one of the installed transceivers (testing each is not necessary) receives and transmits copilot mic properly as above.

3.8.3 Verify Audio from Installed Receiver and Alert Sources

1. Connect a headset to the pilot's headset output and mic input jack (depending on configuration and ICS mode, copilot or passenger positions may not hear all of these sources).
2. Verify each installed receiver (NAV/ADF/DME) can be heard when selected (use test signal generators/transmitters when necessary).
3. Verify each installed unswitched (alert) source can be heard when the source is instructed to play a simulated alert/message.

3.8.4 Verify Speaker Output (if installed)

1. Select the speaker output and verify any one transceiver or receiver is heard clearly.
2. Verify that any one unswitched (alert) source is heard clearly in the speaker (depending on configuration, these may be heard in the speaker regardless of speaker selection).
3. Initiate PA (Passenger Address) mode and verify that from both the pilot and copilot position the crew position that is pressing PTT has their mic delivered to the speaker clearly.

NOTE

If a loud squeal is heard while testing PA, it is because there is too much acoustic feedback between the speaker and the mic. If they cannot be placed further apart, a lower volume configuration should be used. In some installations, there is insufficient distance between the speaker and crew seat positions for PA to speaker to reliably operate. In these conditions, the "PA to speaker" volume can be set very low and PA audio will still be delivered to the headsets.

3.8.5 Verify ICS (Intercom System) Operation

1. Place the audio panel into all ICS mode (refer to the applicable pilot's guide) so that all ICS positions hear all others.
2. Deselect or turn off other audio sources (MKR, transceivers, receivers, alerts). Some configurations may mute passenger intercom audio to crew when aircraft audio is present.
3. From the pilot headset position, verify the pilot, copilot, and all passenger mic inputs can be heard in the pilot's headset when speaking into the mic input under test (adjust pilot ICS volume if necessary).
4. Speak into the pilot's mic and verify that pilot mic audio is heard in the copilot headset (adjust copilot ICS volume if necessary) and in each passenger headset (adjust passenger ICS volume if necessary).

3.8.6 Verify Telephone and Music Operation (if installed)

1. Deselect or turn off other audio sources (MKR, transceivers, receivers, alerts). Some configurations may mute telephone and/or music audio when aircraft audio is present.
2. From the pilot's headset position, initiate a phone call and verify that two-way communication over the telephone can be heard when selected (refer to the applicable pilot's guide for information on how telephone and music audio can be distributed and insure that it is configured to be heard by the pilot).
3. Verify that all installed music sources can be heard when selected (refer to the applicable pilot's guide for information on how telephone and music audio can be distributed and insure that it is configured to be heard by the pilot).

3.8.7 Marker Beacon Operation (if installed)

1. With a marker signal generator/transmitter test set, generate Marker Tones.
2. From the pilot headset position, verify that marker audio can be heard when selected.
3. If the system includes integrated lamp annunciation and/or if external lamps are installed, verify that each marker tone illuminates the proper lamp.

Outer Marker – Blue Lamp – 400 Hz (AM or received audio tone)

Middle Marker – Amber Lamp – 1300 Hz (AM or received audio tone)

Inner Marker – White Lamp – 3000 Hz (AM or received audio tone)

4. If the system is configured and/or wired to allow both HI and LO sensitivity operation, verify that during HI SENS operation, the RF threshold is more sensitive (marker audio/indication occurs as a lower RF power).

3.8.8 Other Optionally Installed or Configured Inputs/Outputs

Verify any other installed/configured inputs and outputs operate as described in the applicable pilot's guide. Possible examples include PTC (voice command "Push to Command") keys, ICS keys, Passenger ISO (isolation) toggle key, clearance recorder Play key, PA Mute output, PA Mode Selected output, Com Active output, and Middle Marker Sense output.

3.9 Continued Airworthiness

Other than for regulatory periodic functional checks, maintenance of the GMA 350/350H is “on condition” only.

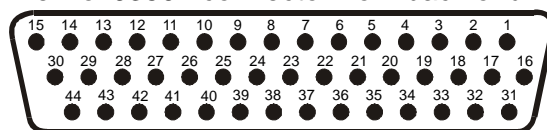
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4 SYSTEM INTERCONNECTS

4.1 Pin Function List

4.1.1 P3501 Connector

View of J3501 connector from back of unit



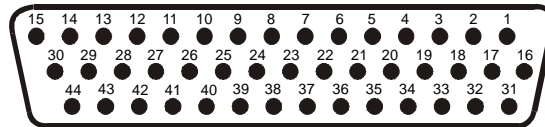
Pin	Pin Name	I/O
1	MARKER ANTENNA IN HI	In
2	MARKER ANTENNA IN LO	In
3	TEL AUDIO IN HI	In
	COM 3 AUDIO IN HI (GMA 350H Only)	In
4	TEL AUDIO LO	--
	COM 3 AUDIO LO (GMA 350H Only)	--
5	TEL AUDIO OUT HI	Out
	COM 3 MIC AUDIO OUT HI (GMA 350H Only)	Out
6	RESERVED	--
	COM 3 MIC KEY* OUT (GMA 350H Only)	Out
7	AUX 2 AUDIO IN HI	In
8	AUX 2 AUDIO IN LO	--
9	COM 1 AUDIO IN HI	In
10	COM 1 AUDIO LO	--
11	COM 1 MIC AUDIO OUT HI	Out
12	COM 1 MIC KEY* OUT	Out
13	COM 2 AUDIO IN HI	In
14	COM 2 AUDIO LO	--
15	COM 2 MIC AUDIO OUT HI	Out
16	PILOT PTC/ICS KEY* IN	In
17	NAV 1 AUDIO IN HI	In
18	NAV 1 AUDIO IN LO	--
19	NAV 2 AUDIO IN HI	In
20	NAV 2 AUDIO IN LO	--
21	AUX 1 AUDIO IN HI	In
22	AUX 1 AUDIO IN LO	--
23	AUX 3 AUDIO IN HI	In
24	COM ACTIVE* OUT	Out
25	RESERVED	--
	TEL AUDIO IN HI (GMA 350H Only)	In
26	RESERVED	--
	TEL AUDIO IN LO (GMA 350H Only)	In
27	RESERVED	--
	TEL MIC OUT HI (GMA 350H Only)	Out
28	RESERVED	--
	TEL MIC OUT LO (GMA 350H Only)	Out
29	ALERT 3 AUDIO IN HI	In
30	COM 2 MIC KEY* OUT	Out
31	ALERT 1 AUDIO IN HI	In

Connector P3501, continued		
Pin	Pin Name	I/O
32	ALERT 1 AUDIO IN LO	In
33	PILOT MIC AUDIO IN HI	In
34	PILOT MIC KEY* IN	In
35	PILOT MIC AUDIO IN LO	In
36	INNER MARKER LAMP OUT	Out
37	OUTER MARKER LAMP OUT	Out
38	MIDDLE MARKER LAMP OUT	Out
39	MIDDLE MARKER SENSE OUT	Out
40	PASS HEADSET AUDIO OUT LEFT	Out
41	PASS HEADSET AUDIO OUT RIGHT	Out
42	PASS HEADSET AUDIO OUT LO	Out
43	ALERT 2,3,4 AUDIO IN LO	In
44	ALERT 4 AUDIO IN HI	In

* Indicates Active Low

4.1.2 P3502 Connector

View of J3502 connector from back of unit



Pin	Pin Name	I/O
1	PILOT HEADSET AUDIO OUT LO	Out
2	COPILOT HEADSET AUDIO OUT LO	Out
3	COPILOT HEADSET AUDIO OUT LEFT	Out
4	COPILOT HEADSET AUDIO OUT RIGHT	Out
5	LIGHTING BUS IN LO	In
6	RESERVED	--
7	LIGHTING BUS IN HI	In
8	AIRCRAFT POWER	In
9	AIRCRAFT POWER	In
10	POWER GROUND	--
11	POWER GROUND	--
12	PA MUTE* OUT	Out
13	MARKER HI SENS* IN	In
14	PASS ISO TOGGLE/ICS KEY* IN	In
15	ALERT 2 AUDIO IN HI	In
16	PILOT HEADSET AUDIO OUT LEFT	Out
17	RS-232 IN	In
18	RS-232 OUT	Out
19	PA MODE SELECTED* OUT	Out
20	COM SWAP* IN (GMA 350 Only)	In
	COM SWAP/CYCLE* IN (GMA 350H Only)	In
21	RESERVED	--
22	PLAY KEY* IN	In
23	MUSIC 1 IN LEFT	In
24	MUSIC 1 IN RIGHT	In
25	MUSIC 1 IN LO	In
26	RESERVED	--
	MUSIC 2 IN LEFT (GMA 350 Only)	In
27	RESERVED	--
	MUSIC 2 IN RIGHT (GMA 350 Only)	In
28	RESERVED	--
	MUSIC 2 IN LO (GMA 350 Only)	In
29	FAILSAFE WARN AUDIO IN HI	In
30	COPILOT PTC/ICS KEY* IN	In
31	PILOT HEADSET AUDIO OUT RIGHT	Out
32	COPILOT MIC AUDIO IN HI	In
33	COPILOT MIC KEY* IN	In
34	COPILOT MIC AUDIO IN LO	In

Connector P3502, continued		
Pin	Pin Name	I/O
35	PASS 1 MIC AUDIO IN HI	In
36	PASS 1 MIC AUDIO IN LO	In
37	PASS 2 MIC AUDIO IN HI	In
38	PASS 2 MIC AUDIO IN LO	In
39	PASS 3 MIC AUDIO IN HI	In
40	PASS 3 MIC AUDIO IN LO	In
41	PASS 4 MIC AUDIO IN HI	In
42	PASS 4 MIC AUDIO IN LO	In
43	SPEAKER AUDIO OUT LO	Out
44	SPEAKER AUDIO OUT HI	Out

* Indicates Active Low

4.2 Power

4.2.1 Aircraft Power

Pin Name	Connector	Pin	I/O
AIRCRAFT POWER	P3502	8	In
AIRCRAFT POWER	P3502	9	In
POWER GROUND	P3502	10	--
POWER GROUND	P3502	11	--

4.3 Serial Data

4.3.1 RS-232

Pin Name	Connector	Pin	I/O
RS-232 IN	P3502	17	In
RS-232 OUT	P3502	18	Out

The RS-232 outputs conform to EIA Standard RS-232C with an output voltage swing of at least $\pm 5V$ when driving a standard RS-232 load.

4.4 Lighting

Pin Name	Connector	Pin	I/O
LIGHTING BUS IN HI	P3502	7	In
LIGHTING BUS IN LO	P3502	5	Out

4.5 Audio Inputs and Outputs

4.5.1 COM Audio Inputs and Outputs

Pin Name	Connector	Pin	I/O
COM 1 AUDIO IN HI	P3501	9	In
COM 1 AUDIO LO	P3501	10	--
COM 2 AUDIO IN HI	P3501	13	In
COM 2 AUDIO LO	P3501	14	--
COM 3 AUDIO IN HI (GMA 350H Only)	P3501	3	In
COM 3 AUDIO LO (GMA 350H Only)	P3501	4	--
COM 1 MIC AUDIO OUT HI	P3501	11	Out
COM 2 MIC AUDIO OUT HI	P3501	15	Out
COM 3 MIC AUDIO OUT HI (GMA 350H Only)	P3501	5	Out

4.5.2 NAV Audio Inputs

Pin Name	Connector	Pin	I/O
NAV 1 AUDIO IN HI	P3501	17	In
NAV 1 AUDIO LO	P3501	18	--
NAV 2 AUDIO IN HI	P3501	19	In
NAV 2 AUDIO LO	P3501	20	--

4.5.3 Receiver Audio Inputs

Pin Name	Connector	Pin	I/O
RCVR 3 AUDIO IN HI	P3501	21	In
RCVR 3 AUDIO IN LO	P3501	22	--
RCVR 4 AUDIO IN HI	P3501	7	In
RCVR 4 AUDIO IN LO	P3501	8	--
RCVR 5 AUDIO IN HI	P3501	23	In

4.5.4 Telephone (GMA 350H)

Pin Name	Connector	Pin	I/O
TEL AUDIO IN HI	P3501	25	In
TEL AUDIO IN LO	P3501	26	--
TEL MIC OUT HI	P3501	27	Out
TEL MIC OUT LO	P3501	28	--

4.5.5 Telephone (GMA 350)

Pin Name	Connector	Pin	I/O
TEL AUDIO IN HI	P3501	3	In
TEL AUDIO LO	P3501	4	--
TEL AUDIO OUT HI	P3501	5	Out

4.5.6 Pilot/Copilot

Pin Name	Connector	Pin	I/O
PILOT MIC AUDIO IN HI	P3501	33	In
PILOT MIC AUDIO IN LO	P3501	35	--
COPILOT MIC AUDIO IN HI	P3501	32	In
COPILOT MIC AUDIO IN LO	P3501	34	--
PILOT HEADSET AUDIO OUT LO	P3502	1	--
PILOT HEADSET AUDIO OUT LEFT	P3502	16	Out
PILOT HEADSET AUDIO OUT RIGHT	P3502	31	Out
COPILOT HEADSET AUDIO OUT LO	P3502	2	--
COPILOT HEADSET AUDIO OUT LEFT	P3502	3	Out
COPILOT HEADSET AUDIO OUT RIGHT	P3502	4	Out

4.5.7 Passenger

Pin Name	Connector	Pin	I/O
PASS 1 MIC AUDIO IN HI	P3502	35	In
PASS 1 MIC AUDIO IN LO	P3502	36	--
PASS 2 MIC AUDIO IN HI	P3502	37	In
PASS 2 MIC AUDIO IN LO	P3502	38	--
PASS 3 MIC AUDIO IN HI	P3502	39	In
PASS 3 MIC AUDIO IN LO	P3502	40	--
PASS 4 MIC AUDIO IN HI	P3502	41	In
PASS 4 MIC AUDIO IN LO	P3502	42	--
PASS HEADSET AUDIO OUT LEFT	P3501	40	Out
PASS HEADSET AUDIO OUT RIGHT	P3501	41	Out
PASS HEADSET AUDIO OUT LO	P3501	42	--

4.5.8 Alert Inputs

Pin Name	Connector	Pin	I/O
ALERT 1 AUDIO IN HI	P3501	31	In
ALERT 1 AUDIO IN LO	P3501	32	--
ALERT 2 AUDIO IN HI	P3502	15	In
ALERT 2,3,4 AUDIO IN LO	P3501	43	--
ALERT 3 AUDIO IN HI	P3501	29	In
ALERT 4 AUDIO IN HI	P3501	44	In

4.5.9 Speaker Outputs

Pin Name	Connector	Pin	I/O
SPEAKER AUDIO OUT LO	P3502	43	Out
SPEAKER AUDIO OUT HI	P3502	44	Out

4.6 Music Inputs

Pin Name	Connector	Pin	I/O
MUSIC 1 IN LEFT	P3502	23	In
MUSIC 1 IN RIGHT	P3502	24	In
MUSIC 1 IN LO	P3502	25	In
MUSIC 2 IN LEFT (GMA 350 Only)	P3502	26	In
MUSIC 2 IN RIGHT (GMA 350 Only)	P3502	27	In
MUSIC 2 IN LO (GMA 350 Only)	P3502	28	In

4.7 Mic Keys

Pin Name	Connector	Pin	I/O
COM 1 MIC KEY* OUT	P3501	12	Out
COM 2 MIC KEY* OUT	P3501	30	Out
COM 3 MIC KEY* OUT (GMA 350H Only)	P3501	6	Out
PILOT MIC KEY* IN	P3501	34	In
COPILOT MIC KEY* IN	P3502	33	In

4.8 Marker Beacon

Pin Name	Connector	Pin	I/O
MARKER ANTENNA IN HI	P3501	1	In
MARKER ANTENNA IN LO	P3501	2	--
INNER MARKER LAMP OUT	P3501	36	Out
OUTER MARKER LAMP OUT	P3501	37	Out
MIDDLE MARKER LAMP OUT	P3501	38	Out
MIDDLE MARKER SENSE OUT	P3501	39	Out
MARKER HI SENS* IN	P3501	13	In

APPENDIX A OUTLINE AND INSTALLATION DRAWINGS

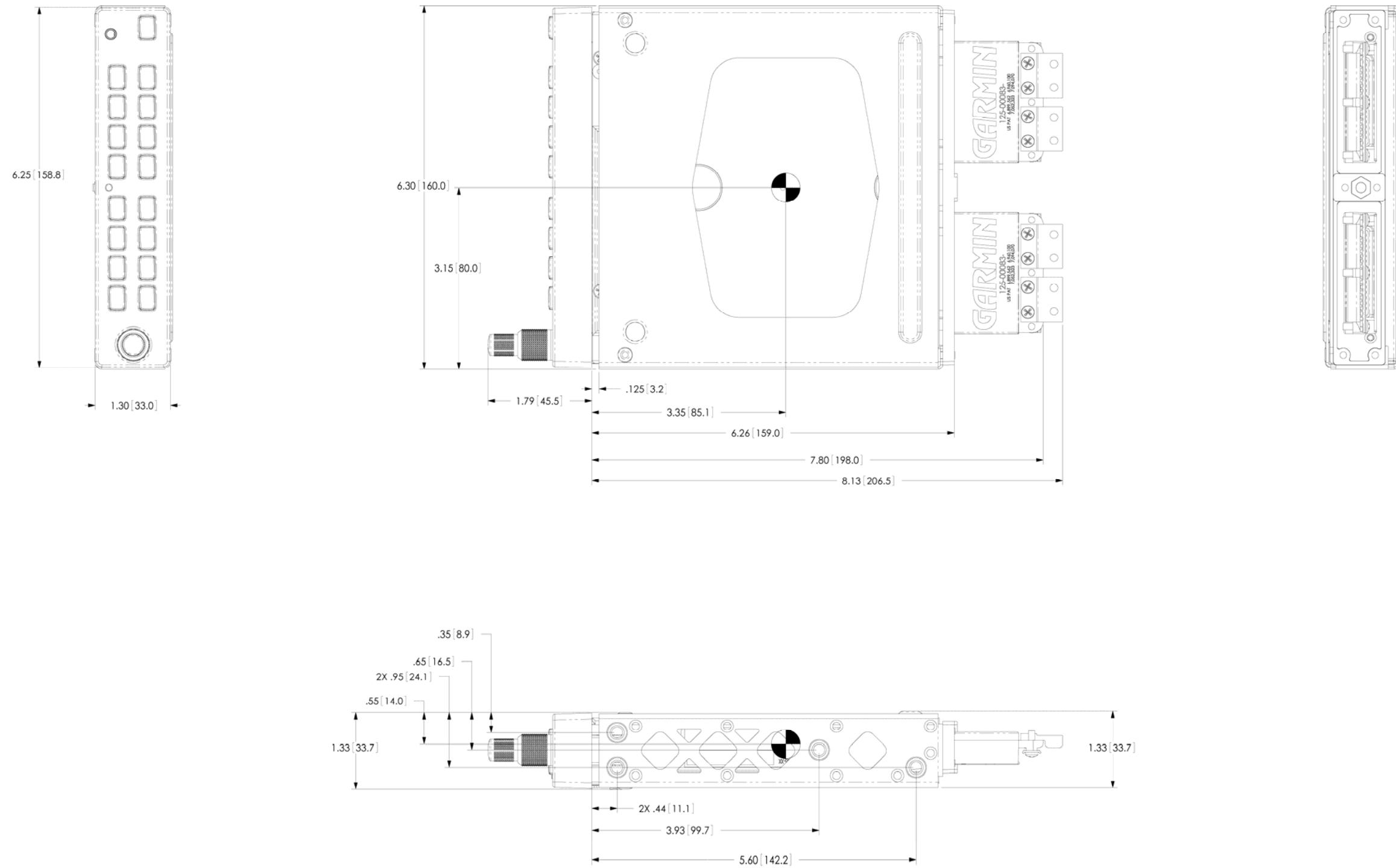
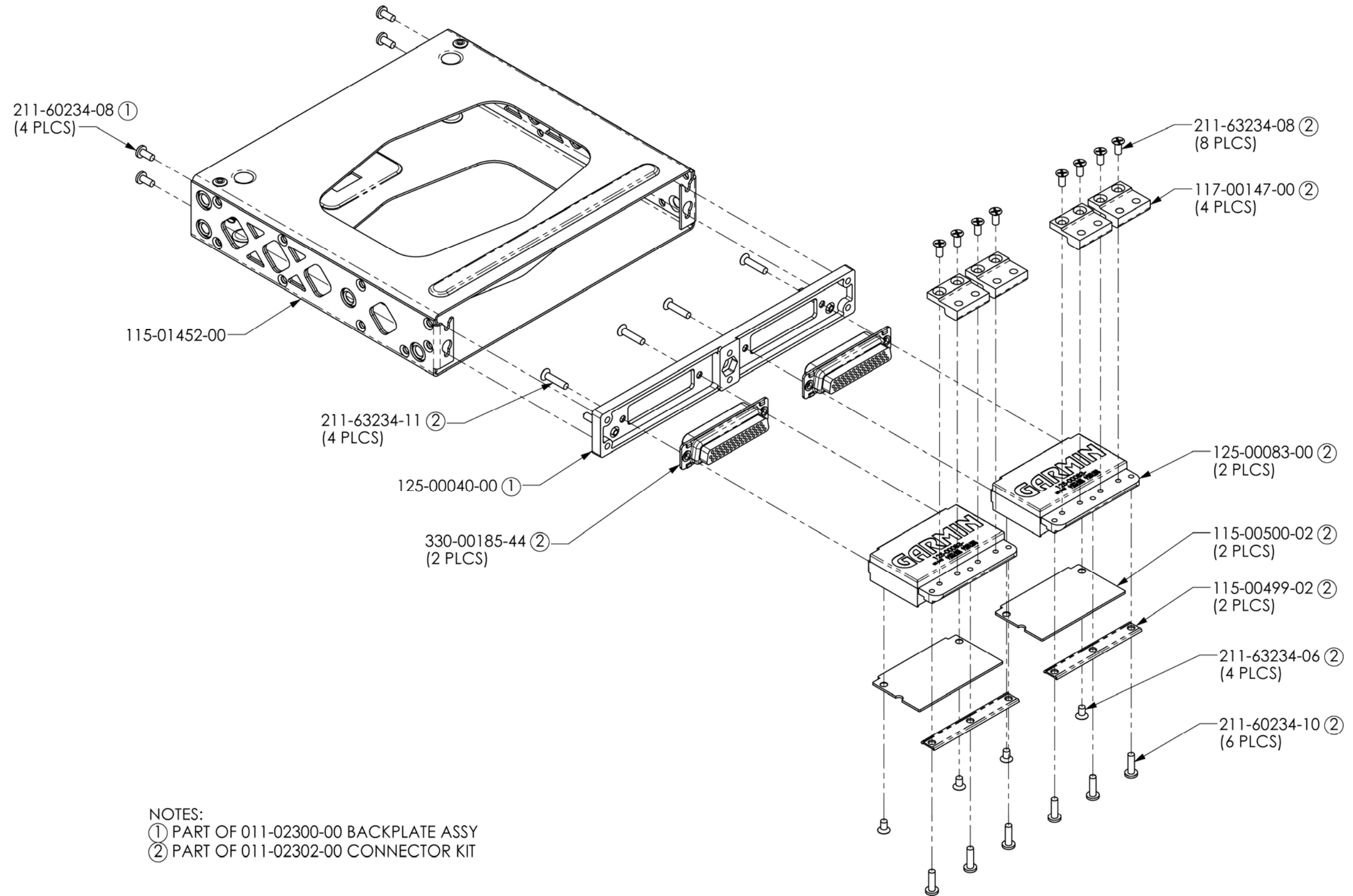


Figure A-1. GMA 350/350H Outline Drawing

APPENDIX A OUTLINE AND INSTALLATION DRAWINGS



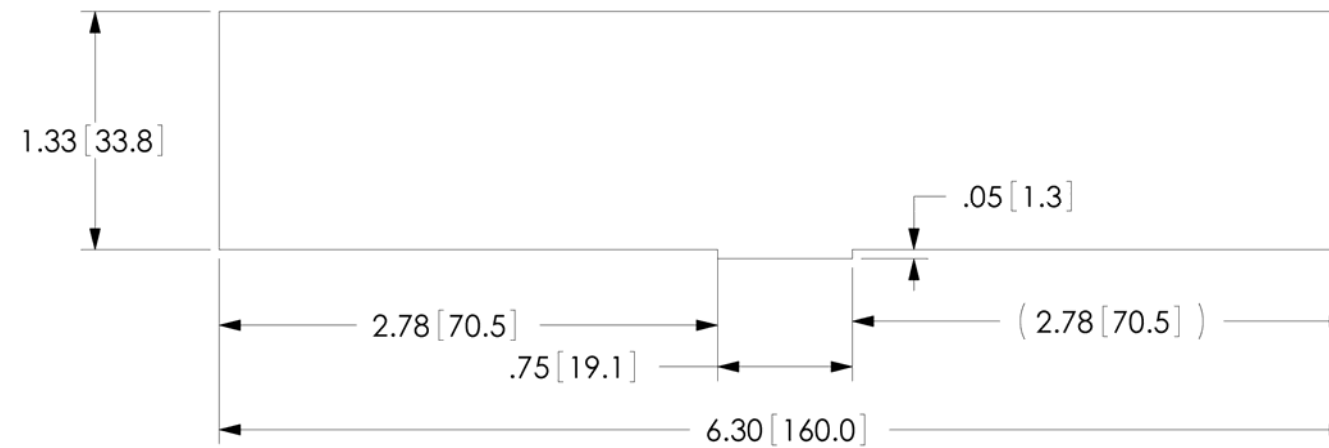
NOTES:
 (1) PART OF 011-02300-00 BACKPLATE ASSY
 (2) PART OF 011-02302-00 CONNECTOR KIT

Figure A-2. GMA 350/350H Connector/Rack Assembly Drawing

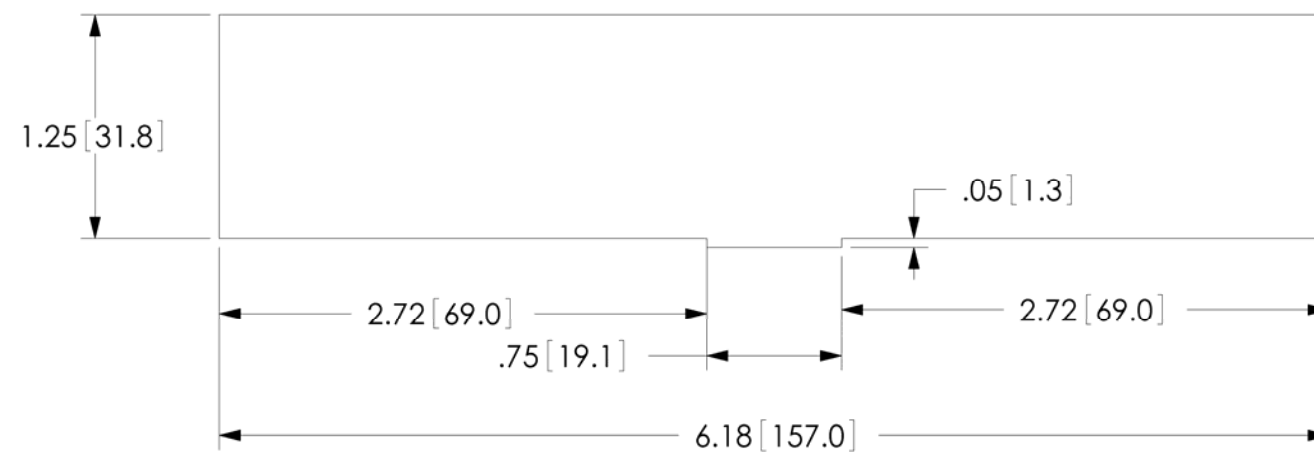
OPTION 1:
 STACK CUTOUT (RACK INSTALLED
 FROM FRONT OF AIRCRAFT PANEL)



OPTION 2:
 RADIO CUTOUT (RACK INSTALLED
 FROM FRONT OF AIRCRAFT PANEL)



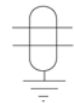
OPTION 3:
 RADIO CUTOUT (RACK INSTALLED
 FROM BACK OF AIRCRAFT PANEL
 ONLY) MAXIMUM AIRCRAFT PANEL
 THICKNESS IS .125 INCH [3.2 mm]



NOTES:
 1. DIMENSIONS: INCH [mm]
 2. IF THE FRONT LIP OF THE
 MOUNTING RACK IS BEHIND
 THE SURFACE OF THE AIRCRAFT
 PANEL THE UNIT CONNECTORS
 MAY NOT FULLY ENGAGE.

Figure A-3. Recommended Panel Cutout Drawings

- NOTES:
1. UNLESS OTHERWISE INDICATED, ALL SHIELDS MUST BE TERMINATED AT THE GMA END ONLY.
 2. ALL WIRES ARE 24 AWG OR LARGER, TEFLON INSULATED, EXCEPT FOR THE FOLLOWING:
J3502 pins 8, 9, 10, 11, 43, 44: AWG 22, TEFLON INSULATED
 3. ALL HEADSET, MICROPHONE, AND MUSIC PHONE PLUGS MUST BE ELECTRICALLY ISOLATED FROM GROUND. THIS MAY REQUIRE THE USE OF INSULATING WASHERS WHEN MOUNTING THE PHONE PLUGS. ADDITIONALLY, THE SPEAKER RETURN MUST BE ISOLATED FROM GROUND.
 4. IF THE TRANSCEIVER HAS A SEPARATE RETURN FOR AUDIO IN AND AUDIO OUT, CONNECT BOTH TO GMA AUDIO LO AT THE GMA.
 5. SYMBOL DESIGNATIONS

 TWISTED SHIELD PAIR
SHIELD TERMINATED TO GROUND

 TWISTED SHIELDED 3 CONDUCTOR
SHIELD TERMINATED TO GROUND

 TWISTED SHIELDED PAIR
SHIELD FLOATS

 TWISTED SHIELDED 3 CONDUCTOR
SHIELD FLOATS

 UNIT GROUND

 WIRE SPLICE CONNECTION

 PUSH BUTTON SWITCH, SINGLE POLE

Figure B-1. Notes

GMA 350 Interconnects (refer to B-4 and B-5 for GMA 350H interconnects)

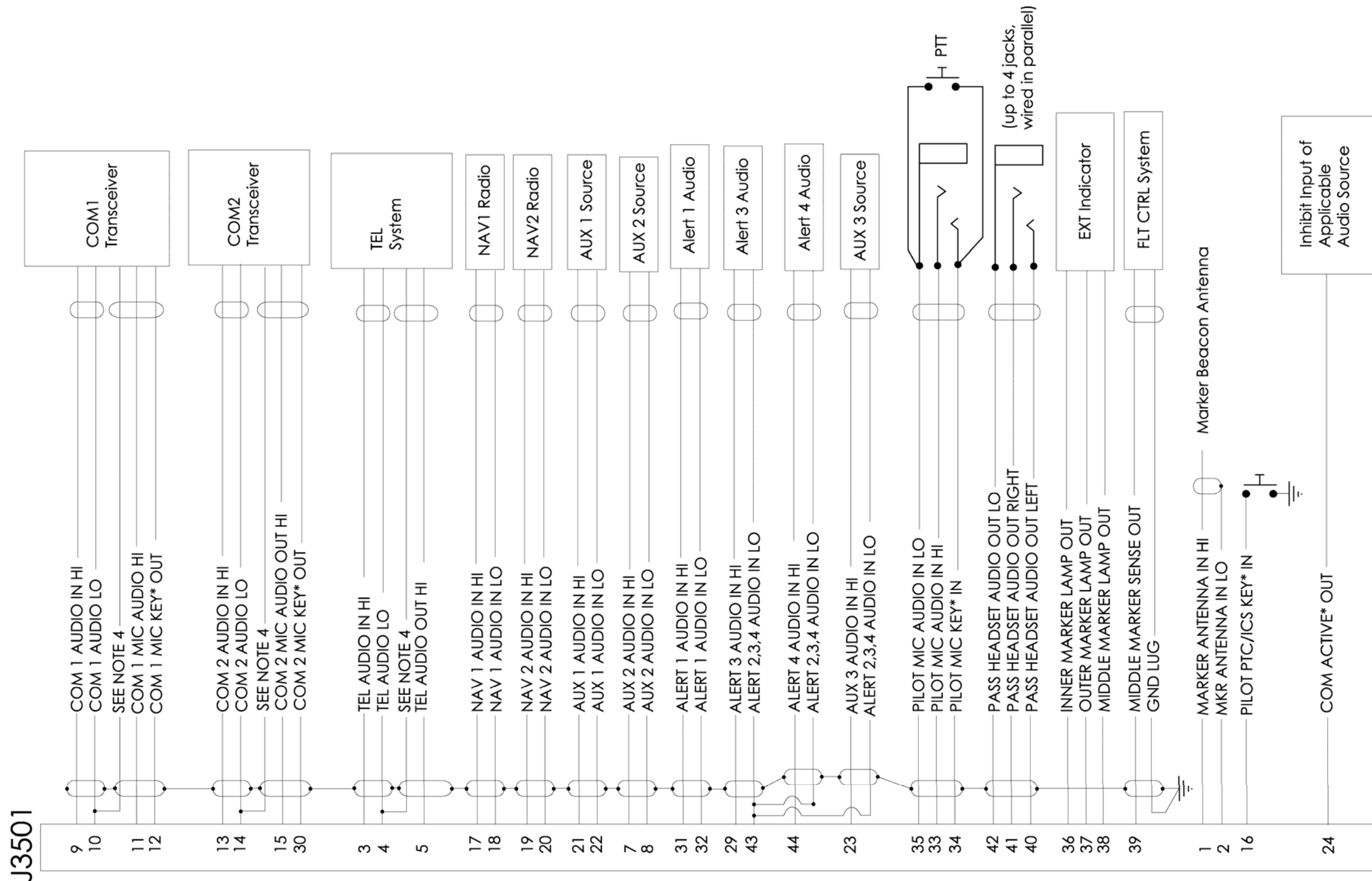


Figure B-2. GMA 350 J3501 Interconnects

GMA 350 Interconnects (refer to B-4 and B-5 for GMA 350H interconnects)

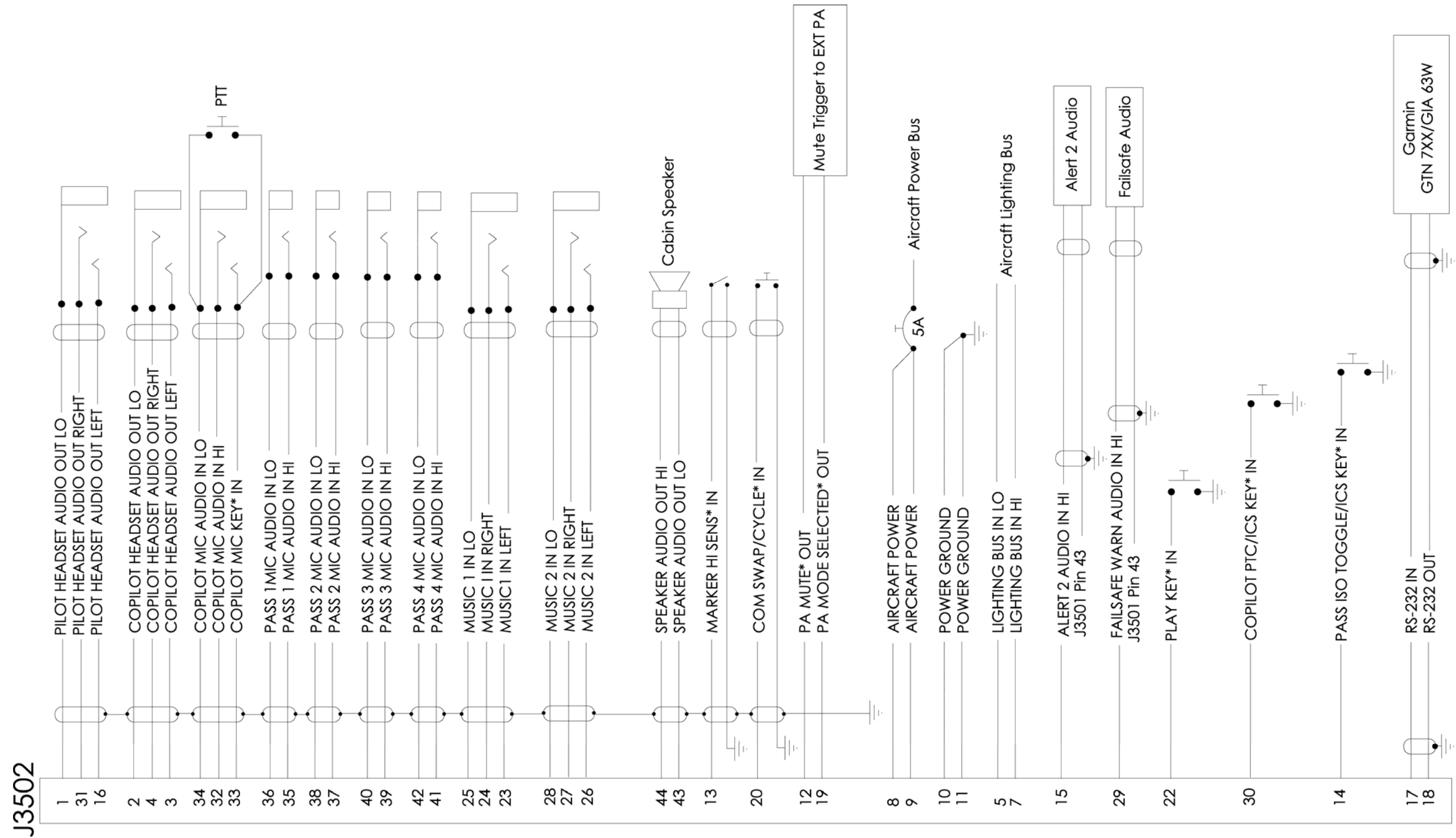


Figure B-3. GMA 350 J3502 Interconnects

GMA 350H Interconnects (refer to B-2 and B-3 for GMA 350 interconnects)

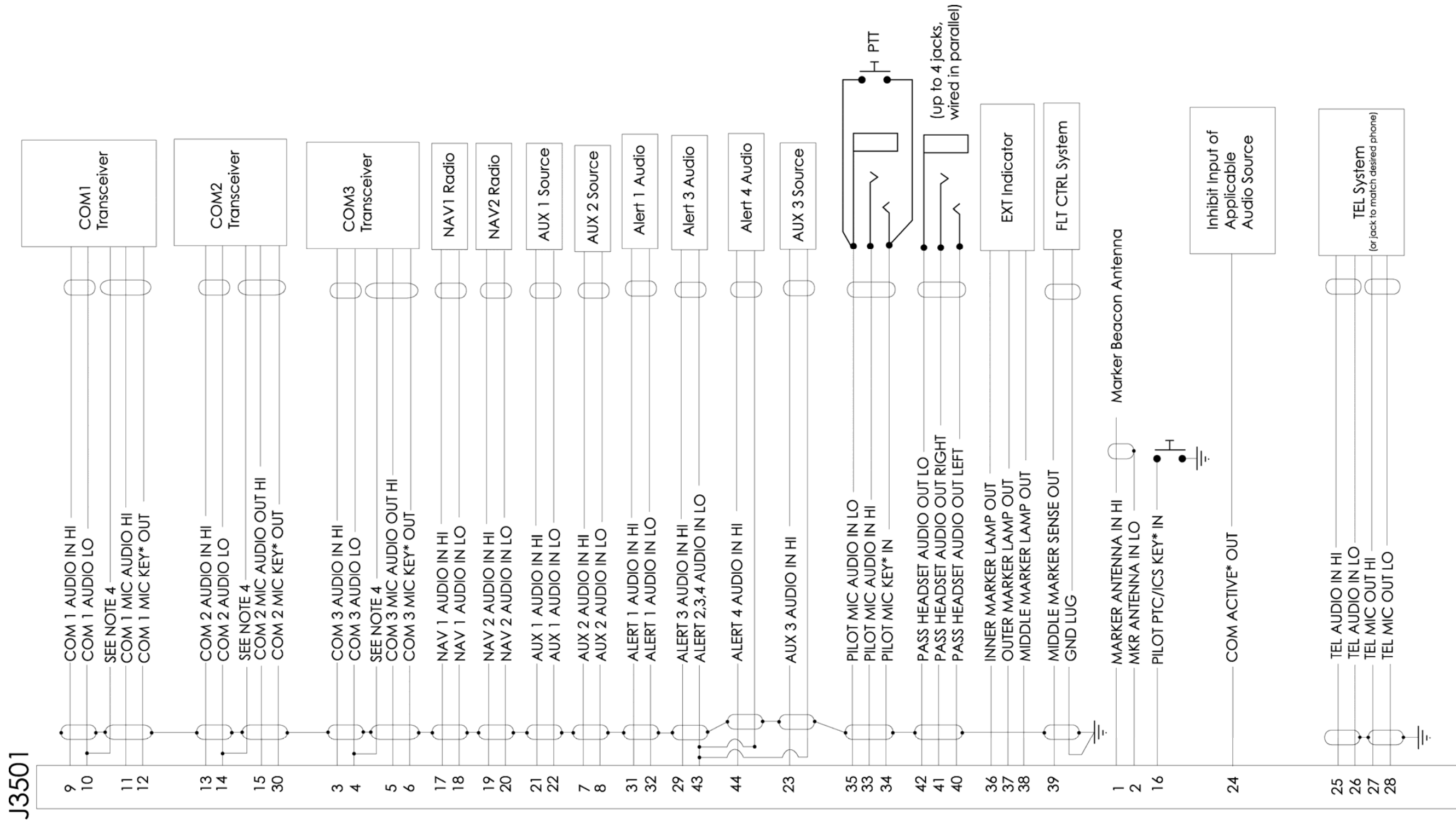


Figure B-4. GMA 350H J3501 Interconnects

GMA 350H Interconnects (refer to B-2 and B-3 for GMA 350 interconnects)

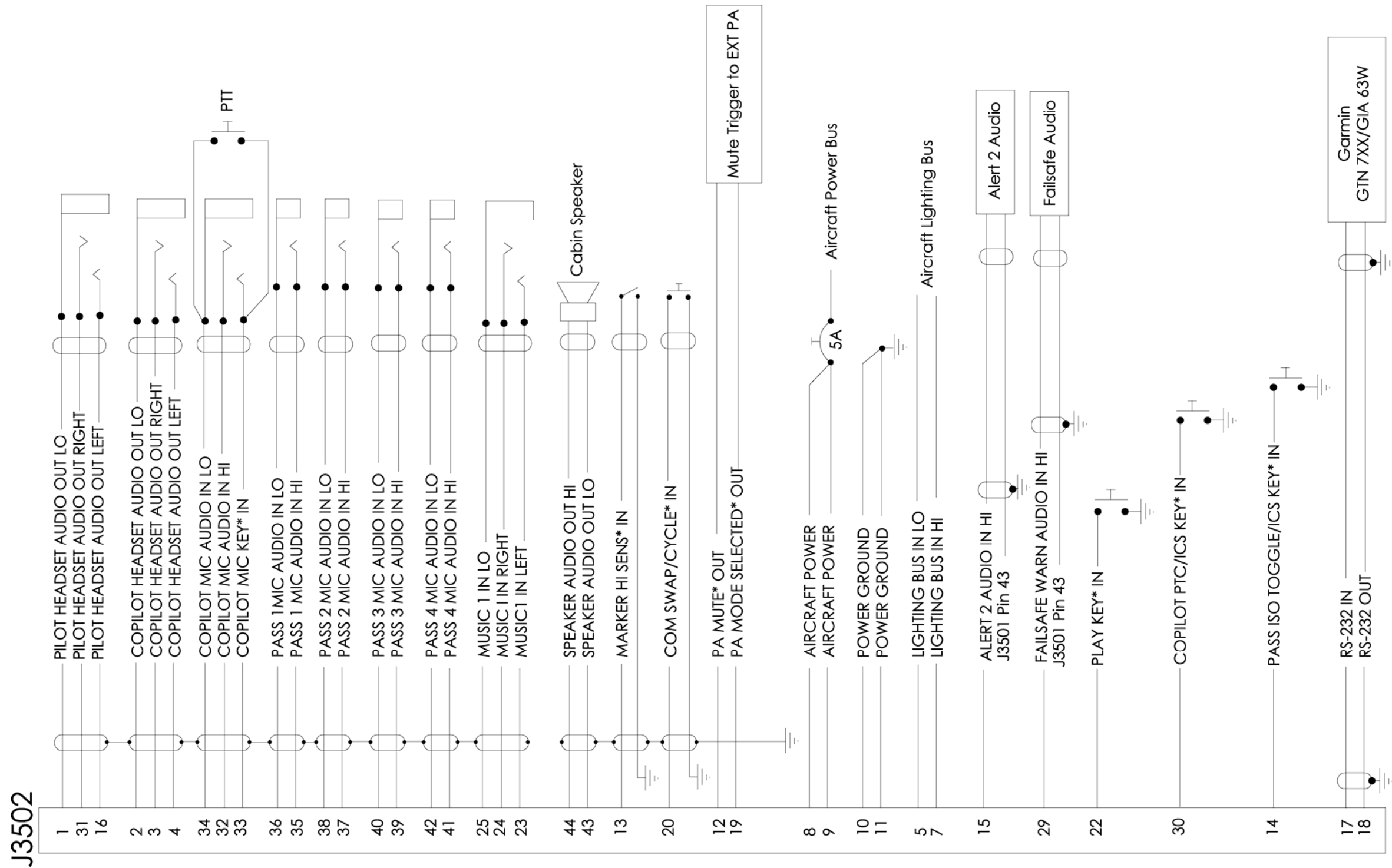


Figure B-5. GMA 350H J3502 Interconnects

GMA350 J3501

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
COM 2 MIC AUDIO OUT HI	COM 2 AUDIO LO	COM 2 AUDIO IN HI	COM 1 MIC KEY* OUT	COM 1 MIC AUDIO OUT HI	COM 1 AUDIO LO	COM 1 AUDIO IN HI	AUX 2 AUDIO IN LO	AUX 2 AUDIO IN HI	(RESERVED)	TEL AUDIO OUT HI	TEL AUDIO LO	TEL AUDIO IN HI	MARKER ANTENNA IN LO	MARKER ANTENNA IN HI
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
COM 2 MIC KEY* OUT	ALERT 3 AUDIO IN HI	(RESERVED)	(RESERVED)	(RESERVED)	(RESERVED)	COM ACTIVE* OUT	AUX 3 AUDIO IN HI	AUX 1 AUDIO IN LO	AUX 1 AUDIO IN HI	NAV 2 AUDIO IN LO	NAV 2 AUDIO IN HI	NAV 1 AUDIO IN LO	NAV 1 AUDIO IN HI	PILOT PTC/ICS KEY* IN
44	43	42	41	40	39	38	37	36	35	34	33	32	31	
ALERT 4 AUDIO IN HI	ALERT 2,3,4 AUDIO IN LO	PASS HEADSET AUDIO OUT LO	PASS HEADSET AUDIO OUT RIGHT	PASS HEADSET AUDIO OUT LEFT	MIDDLE MARKER SENSE OUT	MIDDLE MARKER LAMP OUT	OUTER MARKER LAMP OUT	INNER MARKER LAMP OUT	PILOT MIC AUDIO IN LO	PILOT MIC KEY* IN	PILOT MIC AUDIO IN HI	ALERT 1 AUDIO IN LO	ALERT 1 AUDIO IN HI	

GMA350 J3502

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
ALERT 2 AUDIO IN HI	PASS ISO TOGGLE/ICS KEY* IN	MARKER HI SENS* IN	PA MUTE* OUT	AIRCRAFT GROUND	AIRCRAFT GROUND	AIRCRAFT POWER	AIRCRAFT POWER	LIGHTING BUS IN HI	(RESERVED)	LIGHTING BUS IN LO	COPILOT HEADSET AUDIO OUT RIGHT	COPILOT HEADSET AUDIO OUT LEFT	COPILOT HEADSET AUDIO OUT LO	PILOT HEADSET AUDIO OUT LO
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
COPILOT PTC/ICS KEY* IN	FAILSAFE WARN AUDIO IN HI	MUSIC 2 IN LO	MUSIC 2 IN RIGHT	MUSIC 2 IN LEFT	MUSIC 1 IN LO	MUSIC 1 IN RIGHT	MUSIC 1 IN LEFT	PLAY KEY* IN	(RESERVED)	COM SWAP* IN	PA MODE SELECTED* OUT	RS-232 OUT	RS-232 IN	PILOT HEADSET AUDIO OUT LEFT
44	43	42	41	40	39	38	37	36	35	34	33	32	31	
SPEAKER AUDIO OUT HI	SPEAKER AUDIO OUT LO	PASS 4 MIC AUDIO IN LO	PASS 4 MIC AUDIO IN HI	PASS 3 MIC AUDIO IN LO	PASS 3 MIC AUDIO IN HI	PASS 2 MIC AUDIO IN LO	PASS 2 MIC AUDIO IN HI	PASS 1 MIC AUDIO IN LO	PASS 1 MIC AUDIO IN HI	COPILOT MIC AUDIO IN LO	COPILOT MIC KEY* IN	COPILOT MIC AUDIO IN HI	PILOT HEADSET AUDIO OUT RIGHT	

Figure B-6. GMA 350 J3501 & J3502 Connector Layout Drawing

GMA350H J3501

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
COM 2 MIC AUDIO OUT HI	COM 2 AUDIO LO	COM 2 AUDIO IN HI	COM 1 MIC KEY* OUT	COM 1 MIC AUDIO OUT HI	COM 1 AUDIO LO	COM 1 AUDIO IN HI	AUX 2 AUDIO IN LO	AUX 2 AUDIO IN HI	COM 3 MIC KEY* OUT	COM 3 MIC AUDIO OUT HI	COM 3 AUDIO LO	COM 3 AUDIO IN HI	MARKER ANTENNA IN LO	MARKER ANTENNA IN HI
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
COM 2 MIC KEY* OUT	ALERT 3 AUDIO IN HI	TEL MIC OUT LO	TEL MIC OUT HI	TEL AUDIO IN LO	TEL AUDIO IN HI	COM ACTIVE* OUT	AUX 3 AUDIO IN HI	AUX 1 AUDIO IN LO	AUX 1 AUDIO IN HI	NAV 2 AUDIO IN LO	NAV 2 AUDIO IN HI	NAV 1 AUDIO IN LO	NAV 1 AUDIO IN HI	PILOT PTC/ICS KEY* IN
44	43	42	41	40	39	38	37	36	35	34	33	32	31	
ALERT 4 AUDIO IN HI	ALERT 2,3,4 AUDIO IN LO	PASS HEADSET AUDIO OUT LO	PASS HEADSET AUDIO OUT RIGHT	PASS HEADSET AUDIO OUT LEFT	MIDDLE MARKER SENSE OUT	MIDDLE MARKER LAMP OUT	OUTER MARKER LAMP OUT	INNER MARKER LAMP OUT	PILOT MIC AUDIO IN LO	PILOT MIC KEY* IN	PILOT MIC AUDIO IN HI	ALERT 1 AUDIO IN LO	ALERT 1 AUDIO IN HI	

GMA350H J3502

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
ALERT 2 AUDIO IN HI	PASS ISO TOGGLE/ICS KEY* IN	MARKER HI SENS* IN	PA MUTE* OUT	AIRCRAFT GROUND	AIRCRAFT GROUND	AIRCRAFT POWER	AIRCRAFT POWER	LIGHTING BUS IN HI	(RESERVED)	LIGHTING BUS IN LO	COPILOT HEADSET AUDIO OUT RIGHT	COPILOT HEADSET AUDIO OUT LEFT	COPILOT HEADSET AUDIO OUT LO	PILOT HEADSET AUDIO OUT LO
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
COPILOT PTC/ICS KEY* IN	FAILSAFE WARN AUDIO IN HI	(RESERVED)	(RESERVED)	(RESERVED)	MUSIC 1 IN LO	MUSIC 1 IN RIGHT	MUSIC 1 IN LEFT	PLAY KEY* IN	(RESERVED)	COM SWAP/CYCLE* IN	PA MODE SELECTED* OUT	RS-232 OUT	RS-232 IN	PILOT HEADSET AUDIO OUT LEFT
44	43	42	41	40	39	38	37	36	35	34	33	32	31	
SPEAKER AUDIO OUT HI	SPEAKER AUDIO OUT LO	PASS 4 MIC AUDIO IN LO	PASS 4 MIC AUDIO IN HI	PASS 3 MIC AUDIO IN LO	PASS 3 MIC AUDIO IN HI	PASS 2 MIC AUDIO IN LO	PASS 2 MIC AUDIO IN HI	PASS 1 MIC AUDIO IN LO	PASS 1 MIC AUDIO IN HI	COPILOT MIC AUDIO IN LO	COPILOT MIC KEY* IN	COPILOT MIC AUDIO IN HI	PILOT HEADSET AUDIO OUT RIGHT	

Figure B-7. GMA 350H J3501 & J3502 Connector Layout Drawing

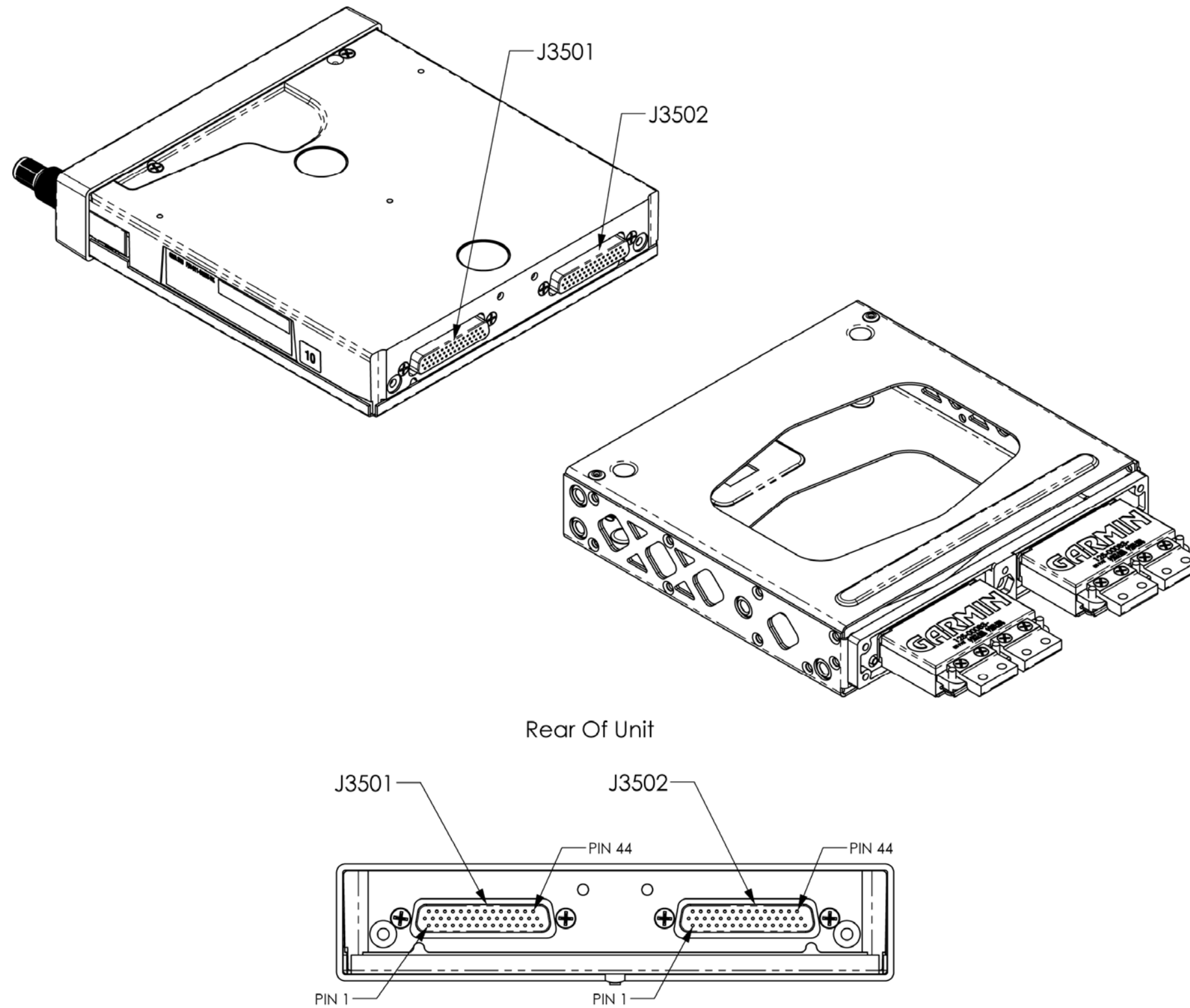


Figure B-8. GMA 350/350H J3501 & J3502 Connector Layout Drawing