

# GMA 240 Installation Manual



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### **RECORD OF REVISIONS**

<b>Revision</b>	<b>Revision Date</b>	<b>Description</b>
A	06/09/08	Initial Release
B	01/18/11	Clarified backlighting info
C	04/13/11	Clarified mono/stereo headset switch info
D	06/16/12	Corrected temperature range spec
E	09/29/15	Updated lighting bus info and interconnect drawings

### **AVIATION LIMITED WARRANTY**

GMA 240 warranty information is available at [garmin.com/aviationwarranty](http://garmin.com/aviationwarranty).

## **INFORMATION SUBJECT TO EXPORT CONTROL LAWS**

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## **DEFINITIONS OF WARNINGS, CAUTIONS, AND NOTES**



### **WARNING**

*Warnings are used to bring to the installer's immediate attention that not only damage to the equipment but personal injury may occur if the instruction is disregarded.*



### **CAUTION**

**Cautions** are used to alert the individual that damage to equipment may result if the procedural step is not followed to the letter.



### **NOTE**

*Notes are used to expand and explain the preceding step and provide further understanding of the reason for the particular operation.*



### **WARNING**

*This product, its packaging, and its components contain chemicals known to the State of California to cause cancer, birth defects, or reproductive harm. This Notice is being provided in accordance with California's Proposition 65. If you have any questions or would like additional information, please refer to our web site at [www.garmin.com/prop65](http://www.garmin.com/prop65).*

### CURRENT REVISION DESCRIPTION

Revision	Page Number	Section Number	Description of Change
E	2-3, 2-4	<a href="#">2.3.2</a>	Updated/added volume/mute adjustments info
	4-5	<a href="#">4.3.2</a>	Updated lighting bus info
	B-1–B-3	<a href="#">Appdx B</a>	Updated interconnect drawing to show both J & P connectors

### GMA 240 HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GMA 240 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](http://www.garmin.com) using their Garmin-provided user name and password.

Mod Level	Service Bulletin Number	Service Bulletin Date	Purpose Of Modification

## TABLE OF CONTENTS

PARAGRAPH	PAGE
<b>Section 1 GENERAL DESCRIPTION .....</b>	<b>1-1</b>
1.1 Introduction.....	1-1
1.2 Equipment Description .....	1-1
1.3 Technical Specifications .....	1-2
1.4 Reference Documents .....	1-4
<b>Section 2 INSTALLATION OVERVIEW.....</b>	<b>2-1</b>
2.1 Introduction.....	2-1
2.2 Installation Materials .....	2-1
2.3 GMA 240 Wiring, Configuration, and Adjustment Options .....	2-1
2.4 Noise .....	2-5
2.5 GMA 240 Mounting .....	2-6
<b>Section 3 INSTALLATION PROCEDURE.....</b>	<b>3-1</b>
3.1 Unpacking Unit.....	3-1
3.2 Electrical Connections .....	3-1
3.3 Audio Shield Termination .....	3-2
3.4 GMA 240 Installation .....	3-2
3.5 Post Installation Checkout.....	3-3
3.6 Configuration Adjustments.....	3-4
3.7 Continued Airworthiness .....	3-4
<b>Section 4 SYSTEM INTERCONNECTS.....</b>	<b>4-1</b>
4.1 Connector Description .....	4-1
4.2 Pin List.....	4-1
4.3 Aircraft Power and Lighting.....	4-4
4.4 Configuration Pins .....	4-5
4.5 Audio Inputs/Outputs and Mic Keys .....	4-6
<b>Appendix A Outline and Installation Drawings .....</b>	<b>A-1</b>
<b>Appendix B Interconnect Drawings.....</b>	<b>B-1</b>
<b>Appendix C Configuration Jumpers Drawing.....</b>	<b>C-1</b>

**LIST OF FIGURES**

<b>FIGURE</b>	<b>PAGE</b>
<b>Section 1 GENERAL DESCRIPTION .....</b>	<b>1-1</b>
Figure 1-1. GMA 240 Unit View.....	1-1
<b>Section 2 INSTALLATION OVERVIEW.....</b>	<b>2-1</b>
Figure 2-1 ESD Caution Logo .....	2-2
Figure 2-2 Access Hole Locations (Top View).....	2-4
Figure 2-3 GMA 340 (used for GMA 240) Unit Rack (115-00262-00).....	2-6
<b>Section 3 INSTALLATION PROCEDURE .....</b>	<b>3-1</b>
Figure 3-1 Audio Shield Termination.....	3-2
<b>Section 4 SYSTEM INTERCONNECTS.....</b>	<b>4-1</b>
Figure 4-1 Rear View of Backplate and Rack .....	4-1
Figure 4-2 Rear Connectors J2401 & J2402, Viewed from Back of Unit.....	4-1
Figure 4-3 2.5 mm Plug Used with J2403 .....	4-4
Figure 4-4 Audio Jack Wiring .....	4-10
<b>Appendix A Outline and Installation Drawings .....</b>	<b>A-1</b>
Figure A-1 GMA 240 Outline Drawing .....	A-1
Figure A-2 GMA 240 Connector/Rack Assembly Drawing .....	A-2
Figure A-3 GMA 240 Recommended Panel Cutout Dimensions.....	A-3
<b>Appendix B Interconnect Drawings .....</b>	<b>B-1</b>
Figure B-1 GMA 240 Interconnect Drawing (page 1 of 3) .....	B-1
Figure B-1 GMA 240 Interconnect Drawing (page 2 of 3) .....	B-2
Figure B-1 GMA 240 Interconnect Drawing (page 3 of 3) .....	B-3
Figure B-2 GMA 240, J2401 & J2402 Connector Layout Drawing .....	B-4
<b>Appendix C Configuration Jumpers Drawing.....</b>	<b>C-1</b>
Figure C-1 GMA 240 Internal Configuration Jumper Layout Drawing.....	C-1

**LIST OF TABLES**

<b>TABLE</b>	<b>PAGE</b>
<b>Section 1 GENERAL DESCRIPTION .....</b>	<b>1-1</b>
Table 1-1 Physical Characteristics .....	1-2
Table 1-2 Electrical Characteristics .....	1-3
Table 1-3 Power Requirements .....	1-4
Table 1-4 Reference Documents .....	1-4
<b>Section 2 INSTALLATION OVERVIEW .....</b>	<b>2-1</b>
Table 2-1 .....	2-1
<b>Section 3 INSTALLATION PROCEDURE .....</b>	<b>3-1</b>
Table 3-1 Pin Contact Part Numbers .....	3-1
Table 3-2 Recommended Crimp Tools .....	3-1
<b>Section 4 SYSTEM INTERCONNECTS .....</b>	<b>4-1</b>
Table 4-1 J2401 Pin Assignments .....	4-1
Table 4-2 J2402 Pin Assignments .....	4-3
Table 4-3 J2403 Connector .....	4-4
Table 4-4 Aircraft Power .....	4-4
Table 4-5 Lighting Bus .....	4-5
Table 4-6 External Configuration Pins .....	4-5
Table 4-7 Mic Audio Inputs and Mic Keys .....	4-6
Table 4-8 Intercom Key Inputs .....	4-6
Table 4-9 COM Audio and Mic Keys .....	4-7
Table 4-10 Alert Audio I/O .....	4-7
Table 4-11 AUX and NAV Audio Inputs .....	4-7
Table 4-12 Failsafe Warning Audio .....	4-8
Table 4-13 Music Inputs .....	4-8
Table 4-14 Tel Audio I/O .....	4-8
Table 4-15 Headset Outputs .....	4-9
Table 4-16 COM Swap .....	4-10

# 1 GENERAL DESCRIPTION

## 1.1 Introduction

This manual provides the installation instructions for the Garmin GMA 240 Audio Panel. References to GMA 240 throughout this manual refer to all versions of the unit. Information pertaining to the maintenance of the unit can be found in the GMA 240 Maintenance Manual, P/N 190-00917-02. Information pertaining to the operation of the unit can be found in the GMA 240 Pilot's Guide, P/N 190-00917-00.

## 1.2 Equipment Description

The Garmin GMA 240 Audio Panel is not a TSO-certified product and has received no FAA approval or endorsement.

The GMA 240 meets the needs of aircraft owners and operators who require reliability and versatility in the essential audio switching function. LED-illuminated push-button simplicity and intuitive panel layout allow audio selection of both NAV and COM audio. Large, single-button activation of the COM microphone and audio for two COM transceivers simplifies cockpit workload. Photocell dimming circuitry automatically adjusts the brightness of the annunciators to a level appropriate for ambient cockpit light. The brightness of the backlighting is controlled by the aircraft lighting bus. A fail-safe circuit connects the pilot's headset and microphone directly to COM1 and a fail-safe warning audio input in the event that power is interrupted or the unit is turned off.

Additionally, the GMA 240 includes a four-position intercom (ICS) with electronic cabin noise de-emphasis, two stereo music inputs, and independent pilot and copilot/passenger volume controls. To further simplify the cockpit workload, the intercom provides for pilot isolation. One hundred percent solid state circuitry and extensive use of surface mount technology are employed.



Figure 1-1. GMA 240 Unit View



### 1.2.1 Features Summary

- User-friendly, intuitive front panel layout
- LEDs indicate selected function
- Four position intercom: pilot, copilot, two passengers
- Two stereo headset amplifiers: one for pilot, one for copilot/passengers
- Two differential stereo music source inputs
- Front panel music volume control, source selection, and master music on/off switch
- Front panel controls for music muting by intercom and selected radios
- Two selectable intercom operational modes
- Selectable aural pushbutton annunciation (beep)
- Independent pilot, copilot/passenger intercom volume and squelch controls
- Individual VOX circuits for each of four (4) mic inputs
- Automatic selection of COM audio source when corresponding mic is selected
- Memory of explicitly selected COM audio source(s) when changing COM mic selection
- MASQ™ Processing with configurable mute threshold
- COM swap function
- PTT indication
- Power-off fail-safe to connect Pilot PTT, mic, and Headset to COM 1 if unit is turned off
- Power-off fail-safe warning audio input
- Full duplex Telephone interface
- Front Panel Mini-Jack (MP3 player, cellular phone, etc.)

### 1.3 Technical Specifications

#### 1.3.1 Physical Characteristics

**Table 1-1 Physical Characteristics**

Characteristic	Specification
Bezel Height	1.30 inches (33 mm)
Bezel Width	6.29 inches (159.77 mm)
Rack Height (Dimple to Dimple)	1.33 inches (34 mm)
Rack Width	6.30 inches (160.02 mm)
Depth Behind Panel with Connectors (measured from face of aircraft panel to rear of connector backshells)	7.12 inches (181 mm)
GMA 240 Weight (Unit Only)	15.5 oz (440 g)
GMA 240 Weight (Installed with rack and connectors)	24 oz (680 g)

### 1.3.2 Electrical Characteristics

**Table 1-2 Electrical Characteristics**

Characteristic	Specification															
Temperature Range	-20 C to +55 C (operation) -55 C to +85 C (storage)															
Altitude	55,000 Feet															
Audio Panel Functions	Dedicated Transceiver inputs: 3 (including TEL) Dedicated Receiver inputs: 4 (all independently selectable) Alert (unswitched) inputs: 3 (each with configurable volume) Input impedance: 500 $\Omega$ Input isolation: 60 dB minimum Alert/Receiver/Transceiver bandwidth: 100 Hz to 6.5 kHz Special functions: Fail-safe operation MASQ™ processing (Master Avionics Squelch) Configurable button push aural annunciation															
Intercom Functions	Positions: 4 (pilot, copilot, 2 passengers) Volume controls: 3 (pilot, copilot/passengers, music) VOX level controls: 2 (pilot, copilot/passengers) VOX circuits: 4 (one per mic input) Microphone input impedance: 450 $\Omega$ (compatible with 150 to 600 $\Omega$ mics) Microphone bias voltage: about 10 Vdc delivered through 450 $\Omega$ Microphone response: 9-pole characteristic cabin noise de-emphasis Intercom isolation modes: 2 - all, pilot (or configure for all, crew) Telephone interfaces: 1 full-duplex (use LRU pins or front jack)															
Headphone Outputs	Output amplifiers: 2 stereo (pilot, copilot/passengers) Fidelity: <table border="1" data-bbox="454 1260 1104 1470"> <thead> <tr> <th>Load</th> <th>Power</th> <th>Distortion (typ.)</th> </tr> </thead> <tbody> <tr> <td>150 <math>\Omega</math></td> <td>50 mW</td> <td>&lt;0.03% THD+N</td> </tr> <tr> <td>150 <math>\Omega</math></td> <td>100 mW</td> <td>&lt;0.07% THD+N</td> </tr> <tr> <td>50 <math>\Omega</math></td> <td>150 mW</td> <td>&lt;0.07% THD+N</td> </tr> <tr> <td>50 <math>\Omega</math></td> <td>300 mW</td> <td>&lt;0.10% THD+N</td> </tr> </tbody> </table> Compatible with higher headphone impedances, those shown are for worst-case distortion and bandwidth	Load	Power	Distortion (typ.)	150 $\Omega$	50 mW	<0.03% THD+N	150 $\Omega$	100 mW	<0.07% THD+N	50 $\Omega$	150 mW	<0.07% THD+N	50 $\Omega$	300 mW	<0.10% THD+N
Load	Power	Distortion (typ.)														
150 $\Omega$	50 mW	<0.03% THD+N														
150 $\Omega$	100 mW	<0.07% THD+N														
50 $\Omega$	150 mW	<0.07% THD+N														
50 $\Omega$	300 mW	<0.10% THD+N														

**Table 1-2 Electrical Characteristics**

Characteristic	Specification
Music Functions	<p>Music inputs (stereo): 2</p> <p>Music input impedance: 600 <math>\Omega</math> (differential)</p> <p>Music gain: -20dB @ min volume, +26dB @ max. volume (typ.)</p> <p>Music input level: &lt;200 mVrms for full power* output @ max music volume knob position (typ.)</p> <p>3.5 Vrms max music input level</p> <p>Music bandwidth: 20 Hz to 20 kHz @ full power output</p> <p>Music distortion: &lt;0.1% THD+N (typ.) @ full power, full bandwidth</p> <p>Special Functions: Front panel selection and volume control</p> <p>    Front panel control for muting by radios and ICS</p> <p>    Muting by alerts configurable</p> <p>*Full power output refers to 300 mW into 50 <math>\Omega</math> (three 150 <math>\Omega</math> headsets in parallel each driven to 100 mW)</p>
Front Panel Mini-Jack Functions	<p>Input Impedance: 5.1 k<math>\Omega</math></p> <p>Music Input: Auto detection of music source will use jack as Music 1</p> <p>Telephone Input: Auto detection of TEL source will use jack for TEL Telephone ring signal is heard without TEL selected</p>

### 1.3.3 Power Requirements

**Table 1-3 Power Requirements**

Characteristic	Specification
Input Voltage Range	11 to 33 Vdc
Power Input	4.3 W normal operation (310mA @ 13.8 V) 7.5 W max. operation (540 mA @ 13.8 V)

### 1.4 Reference Documents

The following publications are sources of additional information for installing the GMA 240. Before installing the unit, the technician should read all referenced materials along with this manual.

**Table 1-4 Reference Documents**

Part Number	Document
190-00917-00	GMA 240 Pilot's Guide
190-00917-02	GMA 240 Maintenance Manual

## 2 INSTALLATION OVERVIEW

### 2.1 Introduction

This section provides the necessary information for the installation and checkout of the GMA 240 Audio Panel. Installation of the GMA 240 will differ according to equipment location and other factors. Cabling will be fabricated by the installing agency to fit these various requirements. The appendices contain interconnect wiring diagrams, mounting dimensions, and information pertaining to installation.

### 2.2 Installation Materials

#### 2.2.1 Equipment Available

GMA 240 Audio Panel, Ship Level Assembly, P/N 010-00735-() includes the following, depending on part number:

**Table 2-1**

Item	Garmin P/N
Connector Kit, GMA 340	011-00652-00
Rack Backplate, GMA 340	011-00678-00
Unit Assembly, GMA 240	011-01988-00
Audio Cables, 2.5 mm RA Stereo Plug	011-02079-00
Install Rack, GMA 340 (used for GMA 240)	115-00262-00

#### 2.2.2 Additional Equipment Required

- Cables: The installer will fabricate and supply all system cables. Interconnect wiring diagrams are detailed in [Appendix B](#).
- Hardware: #6-32 100° flat head screw (6 ea.) and #6-32 self-locking nut (6 ea.). Hardware required to mount the installation rack is not provided.
- Stereo headphone jacks (up to 4), microphone jacks (up to 4), 3.5mm stereo jacks (up to 2). Insulating type jacks or insulating washers should be used for all jacks to isolate them from aircraft chassis.

### 2.3 GMA 240 Wiring, Configuration, and Adjustment Options

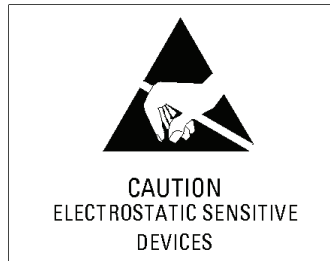
The GMA 240 has several configuration/adjustment options, consideration of these options should be discussed with the end user(s) of the aircraft before wiring begins. These configuration/adjustments are described in the following sections:

- Wiring options - [Section 2.3.1](#) and [Section 4.4.1](#)
- Internal configuration jumpers - [Section 2.3.1](#)
- Volume/Mute adjustments - [Section 2.3.2](#)

### 2.3.1 Internal Configuration Jumpers

The following internal configuration adjustments may be made by removing or replacing jumpers on the PCB. The jumper positions are designed to accept a 0Ω resistor of 0603 size. Refer to [Appendix C](#) for component location.

This service should only be performed by a qualified technician. Garmin is not responsible for damage caused during adjustment of these internal configuration jumper settings. Refer to the GMA 240 Maintenance Manual for disassembly/reassembly instructions.



**Figure 2-1 ESD Caution Logo**



**NOTE**

*The GMA 240 contains static sensitive components. Observe proper anti-static procedures when performing any solder procedures on the unit.*

**Table 2-1 Configuration Jumpers**

Component	Name	Default	Description
R0303	Alert Mutes Music	Populated	If this jumper is removed, music will not be interrupted by alert audio. Default operation is recommended.
R0304	COM1 Internal Sidetone	Empty	If a jumper is supplied in these positions, internal sidetone will be heard during PTT to simulate received sidetone from a radio that does not provide one during transmission. This should only be used if a radio does not perform this function already.
R0305	COM2 Internal Sidetone	Empty	
R0308	TEL Internal Sidetone	Populated	If this jumper is removed, intercom audio and intercom sidetone will not be heard when the TEL button is selected. Many phones supply sidetone when a call is in session. This causes a noticeable change in intercom sound quality but it is usually not disruptive. Default operation is recommended unless the effect of sidetone from the telephone is disruptive to intercom operation.
R0315	TEL jack detect bypass	Empty	If a jumper is supplied in this position, when TEL is selected the audio panel will assume a telephone is in use in the front jack regardless of phone detection. This should be used only if the audio panel is not capable of properly detecting the telephone that will be used in the installation.

**Table 2-1 Configuration Jumpers**

Component	Name	Default	Description
R0314	Only Primary COM mutes MUSIC	Empty	If a jumper is supplied in this position, the RADIO button will mute music only when the Primary COM (the COM selected for transmission) is receiving audio. Default RADIO mutes music operation occurs when any selected COM / NAV / AUX radio is receiving audio.
R0313	Enable KEYED ICS	Empty	If a jumper is supplied in this position, the intercom system (ICS) will only allow intercom MIC audio to be heard when the corresponding ICS KEY for the MIC position is pressed. When this configuration is used, the VOX knobs should be set fully CCW (live MIC). See <a href="#">Section 4.5.2</a> for information on wiring intercom keys.
R0312	Reserved	Empty	Reserved
R0309	Reserved	Empty	Reserved
R0302	Reserved	Empty	Reserved
R0301	Reserved	Empty	Reserved
R0300	Reserved	Empty	Reserved

### 2.3.2 VOLUME/MUTE Configuration Adjustments

There are six access holes in the GMA 240 top cover ([Figure 2-2](#)) that allow access to potentiometers which can be used to make adjustments to input volume levels and the MASQ (Master Avionics Squelch) mute level. The specific adjustments and their associated label on the back cover are:

- Alert 1 Volume. . . . . ALRT 1 VOL
- Alert 2 Volume. . . . . ALRT 2 VOL
- Alert 3 Volume. . . . . ALRT 3 VOL
- Rear connector TEL input volume . . . . . REAR TEL VOL
- Front panel jack TEL input volume. . . . . FRONT TEL VOL
- MASQ (Master Avionics Squelch) mute level . . . MUTE LVL



**NOTE**

*Adjusting these levels is not generally needed or recommended for most installations.*

For Alert 1, 2, & 3 volume inputs, rear conn TEL input, and front panel jack TEL inputs, a CW (clockwise) adjustment increases the levels for volume inputs.

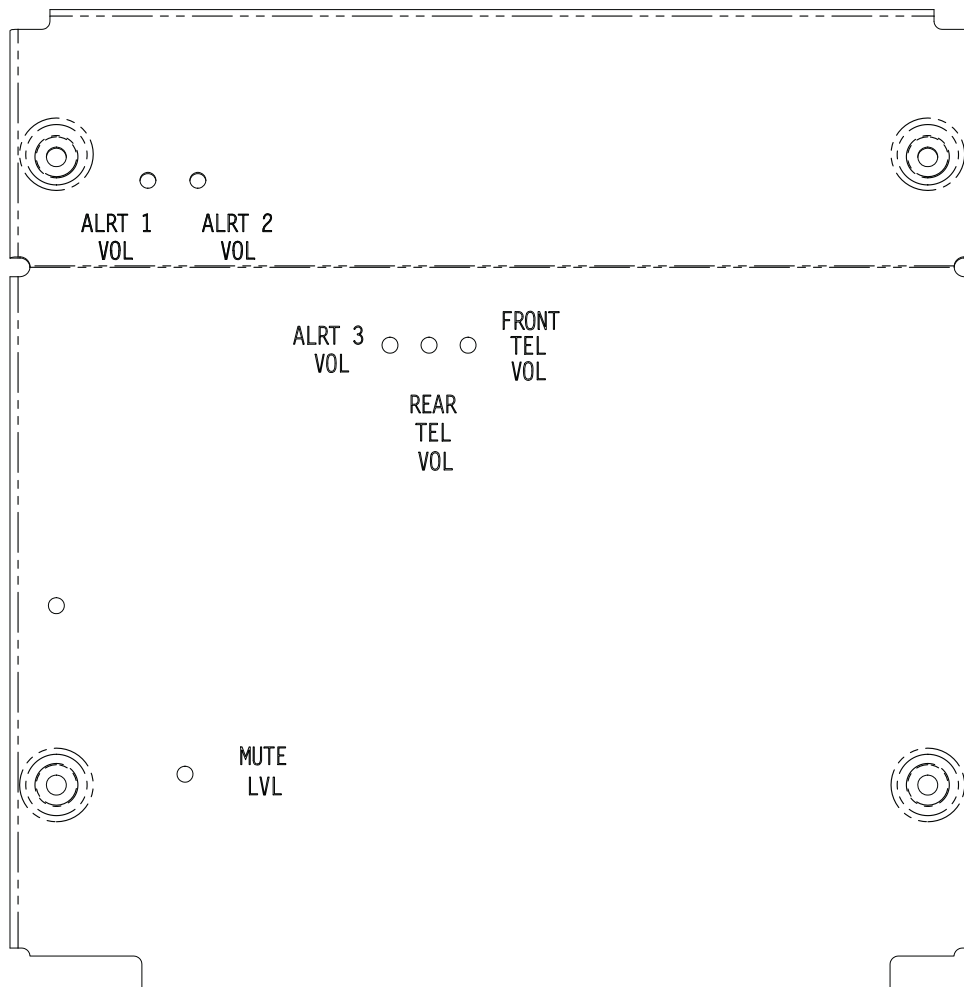
For MASQ mute level, a CW (clockwise) adjustment increases the level for the mute threshold for radio inputs. MASQ circuitry functions to prevent low level noise from being passed to the headset ear speakers, this is known as “squelching” or muting the audio. To “break” or “open” squelch means that enough audio signal is present that the signal is passed through the audio circuitry and can be heard. Increasing (CW adjustment) this setting increases the signal level required to break/open squelch. If needed, adjust the MASQ SQ level so the audio background noise is muted.

#### 2.3.2.1 MASQ/ICS Squelch Descriptions

The Master Avionics Squelch (MASQ) mute level adjustment is a different/separate function from the ICS squelch that is controlled by the pilot/copilot squelch knobs on the unit’s front panel. MASQ is a squelch or noise threshold adjustment that applies to the radio/alert type inputs.

The ICS (intercom) squelch (sound level that opens the mic audio for pilot/copilot/passengers) is manually adjusted by the pilot and copilot with dedicated front panel knobs, and is totally separate from MASQ. CW rotation of the ICS adjustment knobs increases the amount of mic audio (VOX level) required to break squelch, see the GMA 240 Pilot's Guide (190-00917-00) for details.

The MASQ affects the noise threshold for the COM, NAV, AUX, TEL, and Alert 1/2/3 audio inputs. It is factory adjusted to a level that works well for most installations, so it seldom needs to be adjusted by installers. When necessary, the MASQ is adjusted using a small screwdriver (see following note) through the MUTE LVL top access hole in the cover. For example, if one of the alert inputs has some background noise that is sometimes or always heard in the headset and causes music to be undesirably muted, raising the MASQ threshold may eliminate this issue. Anytime the MASQ is adjusted, it is very important to verify that all audio inputs, including alerts, still function correctly.



**Figure 2-2 Access Hole Locations (Top View)**



**NOTE**

*Adjusting the MASQ mute level to a high level may squelch the desired audio.*



**NOTE**

*Exercise care when inserting adjustment tools through the top cover. Damage to the unit may occur if an adjustment tool is accidentally forced against unintended components or circuit board paths. Use a 2 mm (max blade width) flat-blade non-conductive screw driver or adjustment tool.*

### 2.3.3 Hardwire Configuration Option

The following configuration options are available by externally wiring pins to aircraft chassis. When change of operation is desired during flight, these can optionally be wired to chassis through a suitable switch mounted in reach of the operator. See [Section 4.4.1](#) for connector and pin details for implementing these configuration options.

**MASQ™ INHIBIT:** The Master Avionics SQuelch inhibit configuration option allows selected avionics audio inputs (COM, NAV, AUX) and alerts to be heard even if they do not exceed the MASQ threshold. This increases background noise during otherwise quiet operation because noise from these inputs is not squelched. This option is most useful as a troubleshooting tool.

**CREW ISO:** This input configures the audio panel for crew intercom isolation in place of pilot isolation. When the PILOT ISO key is selected, the pilot and copilot will hear each other but will be isolated from the passengers. When the CREW ISO configuration is selected, the copilot's headphone jack must be wired in parallel with the pilot headset output. Microphones are wired as normal.

**PILOT ISO MUSIC:** This input configures music to be heard by the pilot during PILOT ISO mode (or by the pilot and copilot if crew isolate mode is configured). Normally, the isolated ICS positions do not hear music.

**BUTTON PRESS TONE ENABLE:** This input enables an audible tone to be heard when a button press is detected.

**MUTE ON COM TX:** This input configures the audio panel to mute all selected radios (COM, NAV, AUX) except the mic selected COM (COM selected for transmission) when a PTT key is activated for COM transmit.

## 2.4 Noise

Because the audio panel is a point in the aircraft where signals from many pieces of equipment are brought together, care must be taken 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 can 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 at an audio panel signal input.

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.



## 2.5 GMA 240 Mounting

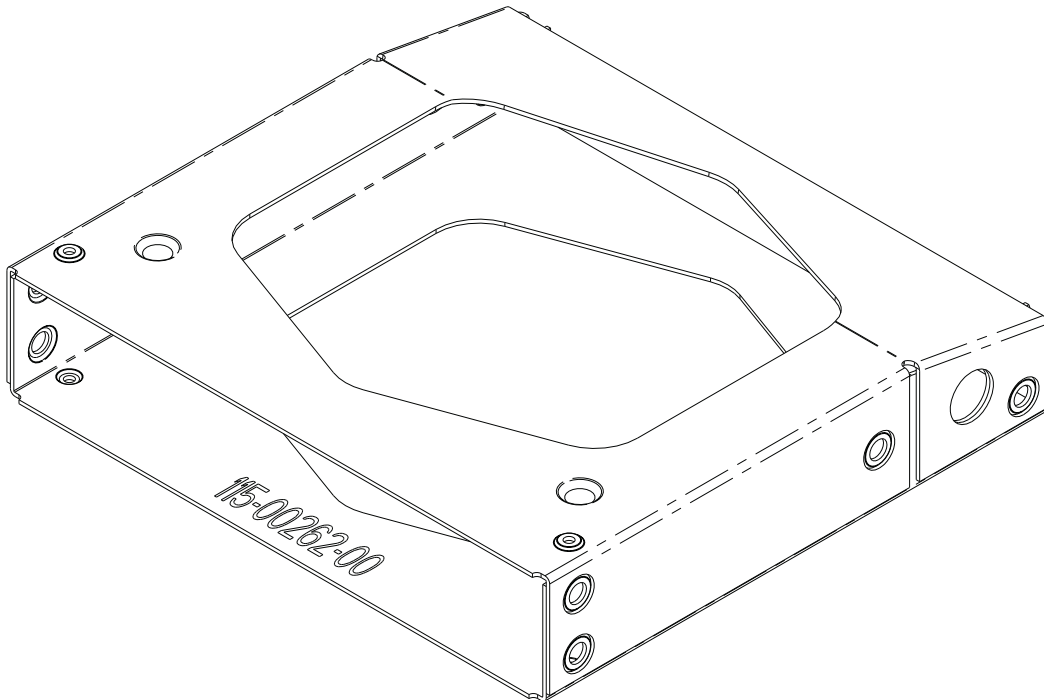
The GMA 240 mounting surface must be capable of providing structural support and electrical bond to the aircraft to minimize radiated EMI and provide protection from High-Intensity Radiation Fields (HIRF).

The GMA 240 is mounted using a GMA 340 unit rack. Figure 2-3 shows the GMA 340 unit rack. See [Section 3.4](#) for installation instructions.



### NOTE

*Rear support is recommended to ensure a sturdy mount.*



**Figure 2-3 GMA 340 (used for GMA 240) Unit Rack (115-00262-00)**

### 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 Electrical Connections

All electrical connections to the GMA 240 are made through two 44-pin D-subminiature connectors (see [Figure 3-1](#)). [Section 4](#) defines the electrical characteristics of all input and output signals. Required connector and associated hardware are supplied in the connector kit (P/N 011-00652-00). See [Appendix B](#) for interconnect wiring diagrams.

Check wiring connections for errors before inserting the GMA 240 into the rack. Incorrect wiring could cause internal component damage.

**Table 3-1 Pin Contact Part Numbers**

Manufacturer	22-28 AWG
Garmin P/N	336-00021-00
Military P/N	M39029/58-360

**Table 3-2 Recommended Crimp Tools**

Manufacturer	Hand Crimping Tool	High Density 22-28 AWG	
		Positioner	Insertion/Extraction Tool
Military P/N	M22520/2-01	M22520/2-09	M81969/1-04

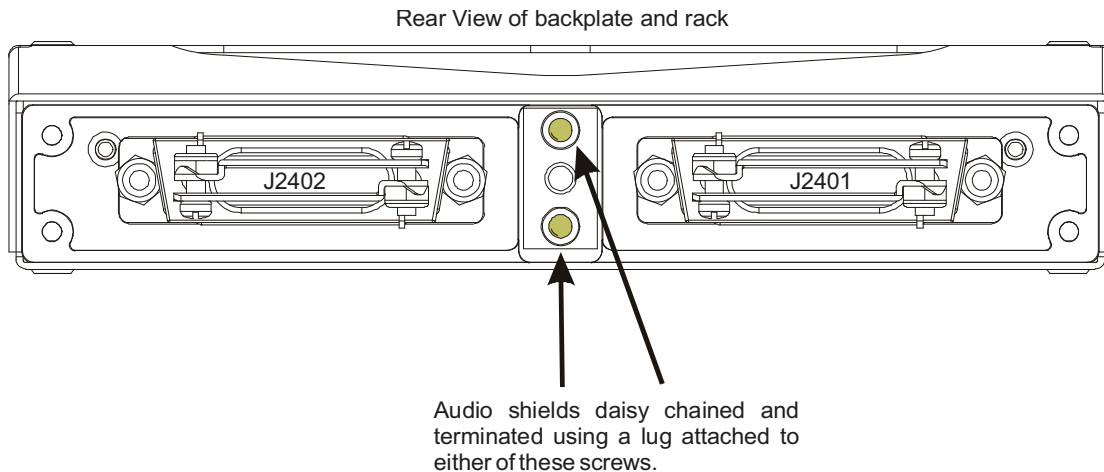


**NOTE**

*Non-Garmin part numbers shown are not maintained by Garmin and consequently are subject to change without notice.*

### 3.3 Audio Shield Termination

The audio shield wires should be terminated at the rear of the unit to the screws between J2401 and J2402 as shown in Figure 3-1.



**Figure 3-1 Audio Shield Termination**

### 3.4 GMA 240 Installation



#### NOTE

*Avoid installing the unit near heat sources. If this is not possible, ensure that additional cooling is provided. Allow adequate space for installation of cables and connectors. The installer will supply and fabricate all of the cables.*

1. Assemble the connector/rack kit according to [Table 4-1](#), [Table 4-2](#); and [Figure B-1](#) and [Figure B-1](#). Install the rack assembly according to the dimensions given in [Figure A-1](#) and [Figure A-3](#). Mounting brackets are not supplied due to the wide range of mounting configurations available. Suitable mounting brackets may be fabricated from sheet metal or angle stock. To ensure a sturdy mount, rear support for the unit should be provided.
2. Slide the unit into the rack until the jackscrew makes contact with the receptacle located in the back plate.
3. Insert a 3/32" Allen wrench into the jackscrew access hole on the faceplate.
4. Turn the Allen wrench clockwise until the unit is secured in the rack. Continue turning until tight, but do not over-tighten.



#### CAUTION

Do not use excessive force when inserting the GMA 240 into the rack. This may damage the connectors, unit, and/or unit rack. If heavy resistance is felt during installation, stop, and remove the GMA 240 and identify the source of resistance.

5. To remove the unit from the rack, turn the Allen wrench counterclockwise until it disengages from the rack.

### 3.5 Post Installation Checkout



#### CAUTION

Check wiring connections for errors before inserting the GMA 240 into the rack. Incorrect wiring could cause internal component damage.

An in-aircraft checkout may be performed in the aircraft on the ramp with known good microphone, headset, and avionics receivers.

#### 3.5.1 Lamp Test

1. Apply power to the unit by rotating the pilot intercom knob clockwise.
2. Verify that all annunciators on the front panel are illuminated during initial power up.

#### 3.5.2 Failsafe Operation Check

1. Turn the unit off by rotating the pilot intercom knob fully counter clockwise.
2. Check the failsafe operation by exercising the COM 1 microphone, microphone key, and monitoring received COM 1 audio over the pilot headphone's left earpiece.
3. If installed, check that the failsafe warning is heard in the pilot headphone's left earpiece.
4. Turn the unit back on to continue testing.

#### 3.5.3 Transceiver Operational Check

1. Perform a ramp test radio check by exercising the installed transceivers, microphone, microphone key, and audio over the headphone.
2. Verify that communications are loud and clear and PTT operation is correct.

#### 3.5.4 Intercom System (ICS) Check



#### NOTE

*Stereo headsets are recommended if stereo jacks are installed. Alternatively, the installation should employ stereo jacks with a mono/stereo switch that disconnects the audio panel's right channel output from the jack's ring contact when in mono mode. If a monaural headset is used in a stereo jack, the audio panel's right channel output is shorted to ground by the mono headset's plug. This causes excess power supply current to be drawn. While this does not damage the unit's output circuitry, prolonged periods (especially at high volume) may cause the internal power input fuse to open. This is because the unit is optimized for low-power operation in systems with limited power budgets. In the case of copilot/passenger positions wired in parallel, any stereo listener will lose right channel audio when another passenger plugs in a mono headset.*

1. Set the intercom to the ALL mode [Pilot ISO LED off.]
2. Plug in headsets at each ICS position.



#### NOTE

*For helicopter operation using a two-stage Intercom/PTT switch, prior to using the keyed-intercom mode, the VOX level should be set by adjusting the VOX knob while the first detent is actuated and held.*

3. Check Pilot and Copilot ICS positions for isolation and proper operation of volume and squelch controls.

### 3.5.5 Aircraft Receivers Check

1. Select the audio source corresponding to each installed avionics unit and check for audio over the headsets.

### 3.5.6 Music System Check

1. Set the intercom to the ALL mode [Pilot ISO LED off.]
2. Connect a stereo audio source to MUSIC 1 (ensure the front panel jack is empty and the music volume knob is not set to minimum). Verify that stereo audio is heard over all headset positions when MUSIC 1 is selected as the music source and MUSIC LED is on. Pull out on the right side small knob and verify that music volume adjustment is working properly.
3. Select an audio source to COM 1 and verify that the sound is muted by active COM 1 audio when RADIO music mute is selected and by intercom audio when ICS music mute is selected.
4. Connect a stereo music source to MUSIC 2. Verify that stereo audio is heard when MUSIC 2 is selected as the music source and MUSIC LED is on.
5. Connect a stereo audio source to the front panel jack. Verify that stereo audio is heard when MUSIC 1 is selected as the music source and MUSIC LED is on.



#### **CAUTION**

Be sure to check all aircraft control movements before flight is attempted to ensure that the wiring harness does not touch any moving part.

This completes the in-aircraft post installation checkout. Perform a flight test after installing the unit to ensure satisfactory performance of the audio functions.

### 3.6 Configuration Adjustments

Adjustment to the Volume and Squelch settings can be made to the GMA 240 through access holes in the unit's top cover. Refer to [Section 2.3](#) for details.

### 3.7 Continued Airworthiness

Maintenance of the GMA 240 is "on condition" only. Refer to the GMA 240 Maintenance Manual (Garmin P/N 190-00917-02) as needed. Periodic maintenance of the GMA 240 is not required. Instructions for Continued Airworthiness (ICA) are not required for this product under 14 CFR Part 21 since the GMA 240 has received no FAA approval or endorsement.

## 4 SYSTEM INTERCONNECTS

### 4.1 Connector Description

The GMA 240 has two 44-pin connectors located at the rear of the unit designated J2401 and J2402 which are oriented as shown in Figure 4-1.

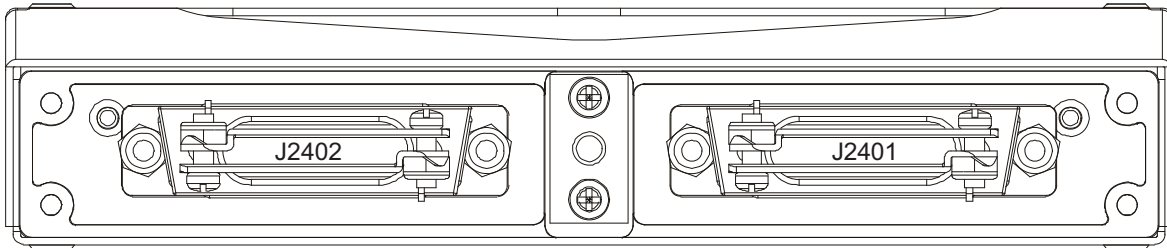


Figure 4-1 Rear View of Backplate and Rack

### 4.2 Pin List

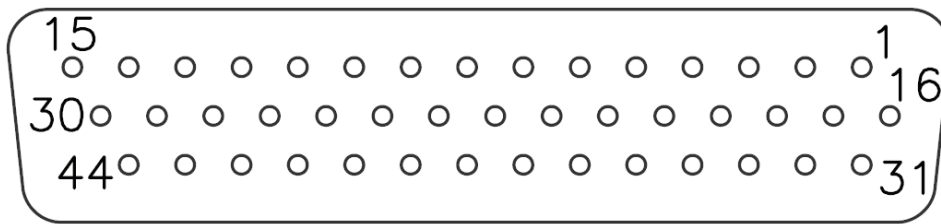


Figure 4-2 Rear Connectors J2401 & J2402, Viewed from Back of Unit

J2401 and J2402 pins are configured as shown in Figure 4-2. J2401 and J2402 pin assignments are given in Table 4-1, [Table 4-2](#), and [Appendix B](#).

Following the pin assignment tables (Table 4-1 & [Table 4-2](#)), additional tables group pin connections by function.

An asterisk (\*) following a signal name denotes that the signal is active low logic. Active low inputs are connected to ground to activate. Active low outputs sink current to ground when active.

#### 4.2.1 J2401 Connector

Table 4-1 J2401 Pin Assignments

Pin	Pin Name	I/O
1	RESERVED	--
2	RESERVED	--
3	TEL AUDIO IN HI	IN
4	TEL AUDIO LO	--
5	TEL MIC AUDIO OUT HI	OUT
6	RESERVED	--
7	AUX2 AUDIO IN HI	IN

**Table 4-1 J2401 Pin Assignments**

Pin	Pin Name	I/O
8	AUX2 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	MASQ INHIBIT* 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	AUX1 AUDIO IN HI	IN
22	AUX1 AUDIO IN LO	--
23	RESERVED	--
24	RESERVED	--
25	RESERVED	--
26	RESERVED	--
27	RESERVED	--
28	RESERVED	--
29	CREW ISO* IN	IN
30	COM 2 MIC KEY* OUT	OUT
31	ALERT 1 AUDIO IN HI	IN
32	ALERT 1 AUDIO IN LO	--
33	PILOT MIC AUDIO IN HI	IN
34	PILOT MIC KEY* IN	IN
35	PILOT MIC AUDIO IN LO	--
36	RESERVED	--
37	RESERVED	--
38	RESERVED	--
39	RESERVED	--
40	PASS HEADSET AUDIO OUT LEFT	OUT
41	PASS HEADSET AUDIO OUT RIGHT	OUT
42	PASS HEADSET AUDIO OUT LO	--
43	ALERT 2,3 AUDIO IN LO	--
44	ALERT 2 AUDIO IN HI	IN

\*Denotes Active Low (Inputs: ground to activate; Outputs: grounded when active)

## 4.2.2 J2402 Connector

**Table 4-2 J2402 Pin Assignments**

Pin	Pin Name	I/O
1	PILOT HEADSET AUDIO OUT LO	--
2	COPILOT HEADSET AUDIO OUT LO	--
3	COPILOT HEADSET AUDIO OUT LEFT	OUT
4	COPILOT HEADSET AUDIO OUT RIGHT	OUT
5	LIGHTING BUS 14V LO/28V LO	--
6	LIGHTING BUS 14V HI/28V LO	IN
7	LIGHTING BUS 14V HI/28V HI	IN
8	AIRCRAFT POWER	IN
9	AIRCRAFT POWER	IN
10	AIRCRAFT GROUND	--
11	AIRCRAFT GROUND	--
12	RESERVED	--
13	PILOT ISO MUSIC* IN	IN
14	PILOT ISO MUSIC* RETURN	--
15	ALERT 3 AUDIO IN HI	IN
16	PILOT HEADSET AUDIO OUT LEFT	OUT
17	RESERVED	--
18	RESERVED	--
19	BUTTON PRESS TONE ENABLE* IN	IN
20	COM SWAP* IN	IN
21	COM SWAP* IN RETURN	--
22	RESERVED	--
23	MUSIC 1 IN LEFT	IN
24	MUSIC 1 IN RIGHT	IN
25	MUSIC 1 IN LO	--
26	MUSIC 2 IN LEFT	IN
27	MUSIC 2 IN RIGHT	IN
28	MUSIC 2 IN LO	--
29	FAILSAFE WARN AUDIO IN HI	IN
30	MUTE ON COM TX* 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	--
35	PASS 1 MIC AUDIO IN HI	IN

\*Denotes Active Low (Inputs: ground to activate; Outputs: grounded when active)



**Table 4-2 J2402 Pin Assignments**

Pin	Pin Name	I/O
36	PASS 1 MIC AUDIO IN LO	--
37	PASS 2 MIC AUDIO IN HI	IN
38	PASS 2 MIC AUDIO IN LO	--
39	RESERVED	--
40	RESERVED	--
41	RESERVED	--
42	RESERVED	--
43	RESERVED	--
44	RESERVED	--

\* Denotes Active Low (Inputs: ground to activate; Outputs: grounded when active)

#### 4.2.3 J2403 Connector (front panel 2.5 mm mini-jack)



**Figure 4-3 2.5 mm Plug Used with J2403**

**Table 4-3 J2403 Connector**

Pin	Pin Name	I/O
TIP	MUSIC 1 LEFT IN/TEL MIC OUT HI	I/O
RING	MUSIC 1 RIGHT IN/TEL AUDIO IN HI	IN
SLEEVE	MUSIC 1 LO IN/TEL AUDIO LO	--

### 4.3 Aircraft Power and Lighting

#### 4.3.1 Aircraft Power

The GMA 240 has four inputs for aircraft power bus inputs of 14/28Vdc.

**Table 4-4 Aircraft Power**

Pin	Connector	Pin Name	I/O
8	J2402	AIRCRAFT POWER	IN
9	J2402	AIRCRAFT POWER	IN
10	J2402	POWER GROUND	--
11	J2402	POWER GROUND	--

### 4.3.2 Lighting Bus

The GMA 240 photocell controls the brightness of the LEDs (annunciators) that show selection of functions (e.g. rectangular LEDs in the buttons).

The external lighting bus (if used) input on pins 5, 6, & 7 (P2402), should be connected as shown in [Figure B-1](#) (page 3 of 3) to control the brightness of the text on the buttons (e.g. “COM1”) and the text in the background of the button fields (e.g. “MUTE MUSIC”). The lighting bus must be capable of supplying 160 mA at 14 V or 100 mA at 28 V to provide backlight power to these pins at full brightness. If pins 5, 6, & 7 are not connected, the text labeling will not be backlit.

**Table 4-5 Lighting Bus**

Pin	Connector	Pin Name	I/O
5	J2402	LIGHTING BUS 14V LO/28V LO	--
6	J2402	LIGHTING BUS 14V HI/28V LO	IN
7	J2402	LIGHTING BUS 14V HI/28V HI	IN

## 4.4 Configuration Pins

### 4.4.1 External Configuration Pins

The following pins may be used to change the configuration of the installation as described.

**Table 4-6 External Configuration Pins**

Pin	Connector	Pin Name	Description
16	J2401	MASQ INHIBIT* IN	Ground to disable Master Avionics Squelch circuitry. This will cause alerts and selected radios to be heard at all times without needing to exceed the mute threshold. This causes an increase in background noise from the inputs during quiet output.
29	J2401	CREW ISO* IN	Ground to configure the unit for CREW ICS isolation. In this configuration, the copilot headset jack should be wired in parallel with the pilot headset output. The mics are wired as normal. In this mode, when the PILOT ISO button is selected, the pilot and copilot will hear each other, but will be intercom isolated from the passengers.
13	J2402	PILOT ISO MUSIC* IN	Ground to allow Music audio to be heard by the pilot during pilot isolate mode.
19	J2402	BUTTON PRESS TONE ENABLE* IN	Ground to enable beep tone annunciation of button presses
30	J2402	MUTE ON COM TX* IN	Ground to enable muting of other selected radios during mic selected COM transmission (mic-selected COM is still heard, but not other selected radios)

\*Denotes Active Low (Ground to activate)

## 4.5 Audio Inputs/Outputs and Mic Keys

### 4.5.1 Mic Audio Inputs and Mic Keys

**Table 4-7 Mic Audio Inputs and Mic Keys**

Pin	Connector	Pin Name	Description	I/O
34	J2401	PILOT MIC KEY* IN	Enables respective MIC audio into the selected transceiver unit	IN
33	J2402	COPILOT MIC KEY* IN		IN
33	J2401	PILOT MIC AUDIO IN HI	Pilot Mic audio input and ground reference	IN
35	J2401	PILOT MIC IN LO		--
32	J2402	COPILOT MIC AUDIO IN HI	Copilot Mic audio input and ground reference	IN
34	J2402	COPILOT MIC IN LO		--
35	J2402	PASS 1 MIC AUDIO IN HI	Passenger 1 Mic audio and ground reference	IN
36	J2402	PASS 1 MIC AUDIO IN LO		--
37	J2402	PASS 2 MIC AUDIO IN HI	Passenger 2 Mic audio and ground reference	IN
38	J2402	PASS 2 MIC AUDIO IN LO		--

\*Denotes Active Low (Ground to activate)

### 4.5.2 Intercom Key Inputs (if configured)

These inputs only perform the described ICS KEY function if the audio panel has been configured for KEYED ICS by configuration jumper settings ([Section 2.3.1](#)). For this configuration, intercom squelch levels should be set fully CCW (live MIC) because the MIC signal must also break the VOX threshold to be heard.

**Table 4-8 Intercom Key Inputs**

Pin	Connector	Pin Name	Description
17	J2402	PILOT ICS KEY* IN	Enables respective mic audio to be heard in the intercom
36	J2401	COPILOT ICS KEY* IN	
37	J2401	PASSENGER ICS KEY* IN	

\*Denotes Active Low (Ground to activate)

### 4.5.3 COM Audio and Mic Keys

**Table 4-9 COM Audio and Mic Keys**

Pin	Connector	Pin Name	Description	I/O
12	J2401	COM 1 MIC KEY* OUT	Enables transmission on the respective transceiver unit	OUT
30	J2401	COM 2 MIC KEY* OUT		OUT
9	J2401	COM 1 AUDIO IN HI	COM 1 Audio Input	IN
11	J2401	COM 1 MIC AUDIO OUT HI	COM 1 Audio Output	OUT
10	J2401	COM 1 AUDIO LO	Ground Reference for COM 1	--
13	J2401	COM 2 AUDIO IN HI	COM 2 Audio Input	IN
15	J2401	COM 2 MIC AUDIO OUT HI	COM 2 Audio Output	OUT
14	J2401	COM 2 AUDIO LO	Ground Reference for COM 2	--

\*Denotes Active Low (Sinks current to ground when active)

### 4.5.4 Alert Audio I/O

**Table 4-10 Alert Audio I/O**

Pin	Connector	Pin Name	Description	I/O
31	J2401	ALERT 1 AUDIO IN HI	Alert 1 Audio Input	IN
32	J2401	ALERT 1 AUDIO IN LO	Ground Reference for Alert 1	--
44	J2401	ALERT 2 AUDIO IN HI	Alert 2 Audio Input	IN
15	J2402	ALERT 3 AUDIO IN HI	Alert 3 Audio Input	IN
43	J2401	ALERT 2,3 AUDIO IN LO	Ground Reference for Alert 2 & 3	--

### 4.5.5 AUX and NAV Audio Inputs

**Table 4-11 AUX and NAV Audio Inputs**

Pin	Connector	Pin Name	Description	I/O
21	J2401	AUX1 AUDIO IN HI	AUX1 Audio Input	IN
22	J2401	AUX1 AUDIO IN LO	Ground Reference for AUX1 Input	--
7	J2401	AUX2 AUDIO IN HI	AUX2 Audio Input	IN
8	J2401	AUX2 AUDIO IN LO	Ground Reference for AUX2 Input	--
17	J2401	NAV 1 AUDIO IN HI	NAV 1 Audio Input	IN
18	J2401	NAV 1 AUDIO IN LO	NAV 1 Ground Reference	--
19	J2401	NAV 2 AUDIO IN HI	NAV 2 Audio Input	IN
20	J2401	NAV 2 AUDIO IN LO	NAV 2 Ground Reference	--

#### 4.5.6 Failsafe Warning Audio

**Table 4-12 Failsafe Warning Audio**

Pin	Connector	Pin Name	Description	I/O
29	J2402	FAILSAFE WARN AUDIO IN HI	Failsafe Warning Audio Input	IN

#### 4.5.7 Music Inputs

**Table 4-13 Music Inputs**

Pin	Connector	Pin Name	Description	I/O
23	J2402	MUSIC 1 IN LEFT	Music 1 Input	IN
24	J2402	MUSIC 1 IN RIGHT		IN
25	J2402	MUSIC 1 IN LO	Ground Reference for Music 1	--
26	J2402	MUSIC 2 IN LEFT	Music 2 Input	IN
27	J2402	MUSIC 2 IN RIGHT		IN
28	J2402	MUSIC 2 IN LO	Ground Reference for Music 2	--

#### 4.5.8 Tel Audio I/O

**Table 4-14 Tel Audio I/O**

Pin	Connector	Pin Name	Description	I/O
3	J2401	TEL AUDIO IN HI	Telephone Audio Input	IN
4	J2401	TEL AUDIO LO	Ground Reference for Telephone	--
5	J2401	TEL MIC AUDIO OUT HI	TEL MIC Audio Output	OUT

## 4.5.9 Headset Outputs

**Table 4-15 Headset Outputs**

Pin	Connector	Pin Name	Description	I/O
16	J2402	PILOT HEADSET AUDIO OUT LEFT	Pilot Headset Audio Output	OUT
31	J2402	PILOT HEADSET AUDIO OUT RIGHT		OUT
1	J2402	PILOT HEADSET AUDIO OUT LO		--
3	J2402	COPILOT HEADSET AUDIO OUT LEFT	Copilot Headset Audio Output	OUT
4	J2402	COPILOT HEADSET AUDIO OUT RIGHT		OUT
2	J2402	COPILOT HEADSET AUDIO OUT LO		--
40	J2401	PASS HEADSET AUDIO OUT LEFT	Passenger Headset Audio Output	OUT
41	J2401	PASS HEADSET AUDIO OUT RIGHT		OUT
42	J2401	PASS HEADSET AUDIO OUT LO		--



### NOTE

*Copilot and Passenger headset outputs are internally the same connection. Separate Passenger headset output pins are provided for wiring convenience and GMA 340 pin compatibility.*



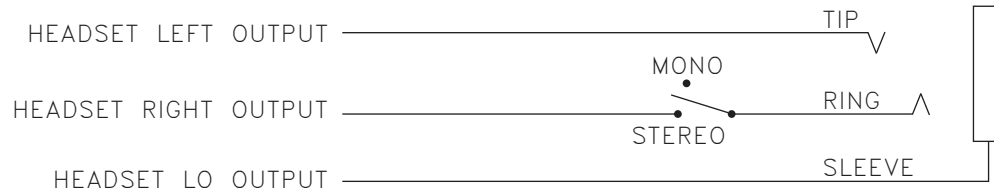
### NOTE

*For CREW ISO configuration, the copilot's headphone jack should be wired in parallel with the pilot jack to the Pilot headset output pins. Passengers may be connected to either the copilot or passenger pins.*



**NOTE**

Using a mono headset with an audio jack wired for stereo may damage the GMA 240. Installations using only mono headsets may use a stereo audio jack and leave the ring contact unconnected or install a switch as shown in Figure 4-4. Also note that many stereo headsets have a mono/stereo switch to be compatible with mono or stereo-wired jacks.



**Figure 4-4 Audio Jack Wiring**

**4.5.10 COM Swap**

**Table 4-16 COM Swap**

Pin	Connector	Pin Name	Description	I/O
20	J2402	COM SWAP* IN	Ground Through a Momentary PB Switch to Swap Active COM (COM 1 or COM 2)	IN
21	J2402	COM SWAP RETURN	Return Path for PB Switch	--

APPENDIX A Outline and Installation Drawings

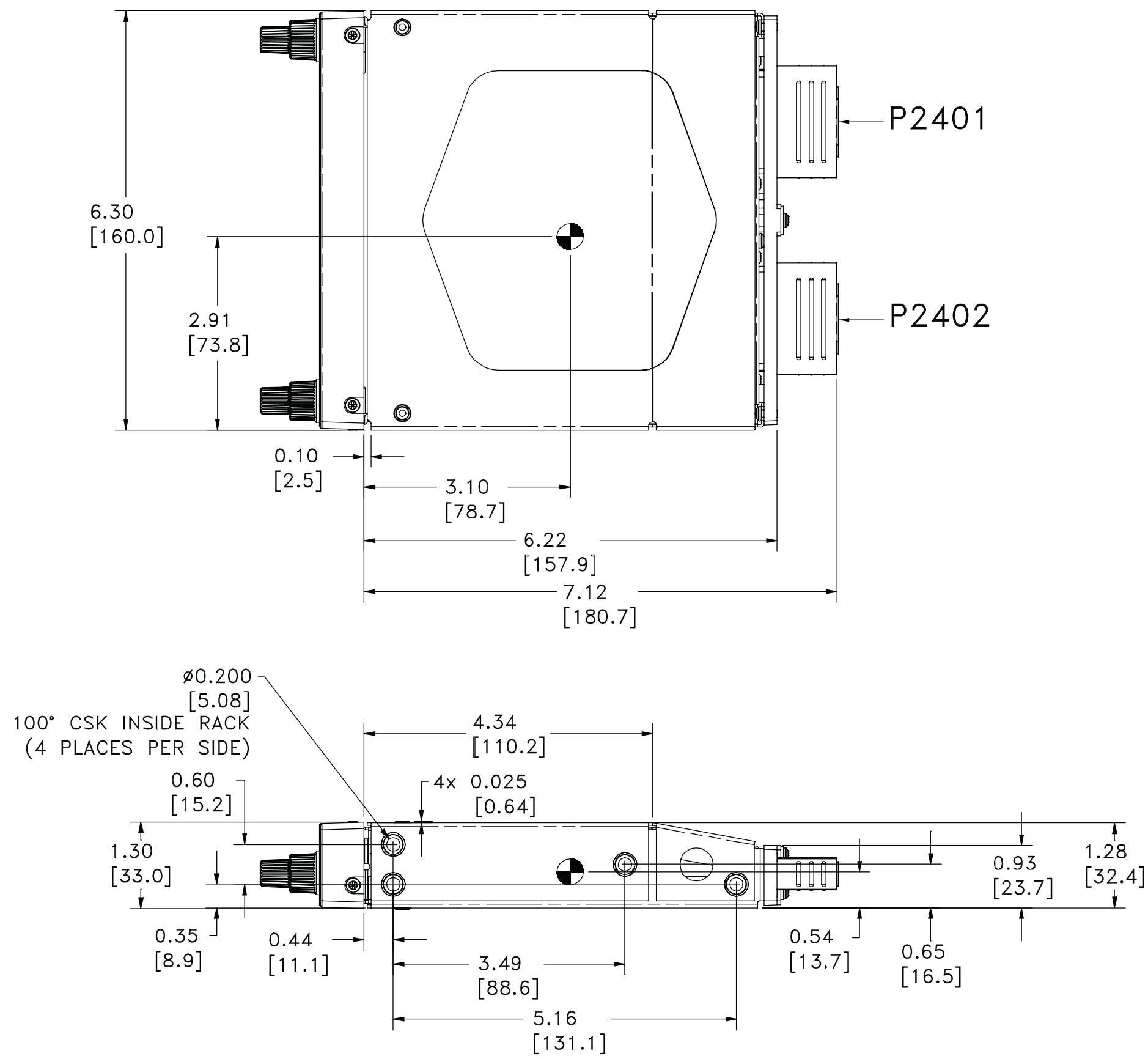


Figure A-1 GMA 240 Outline Drawing



APPENDIX A Outline and Installation Drawings

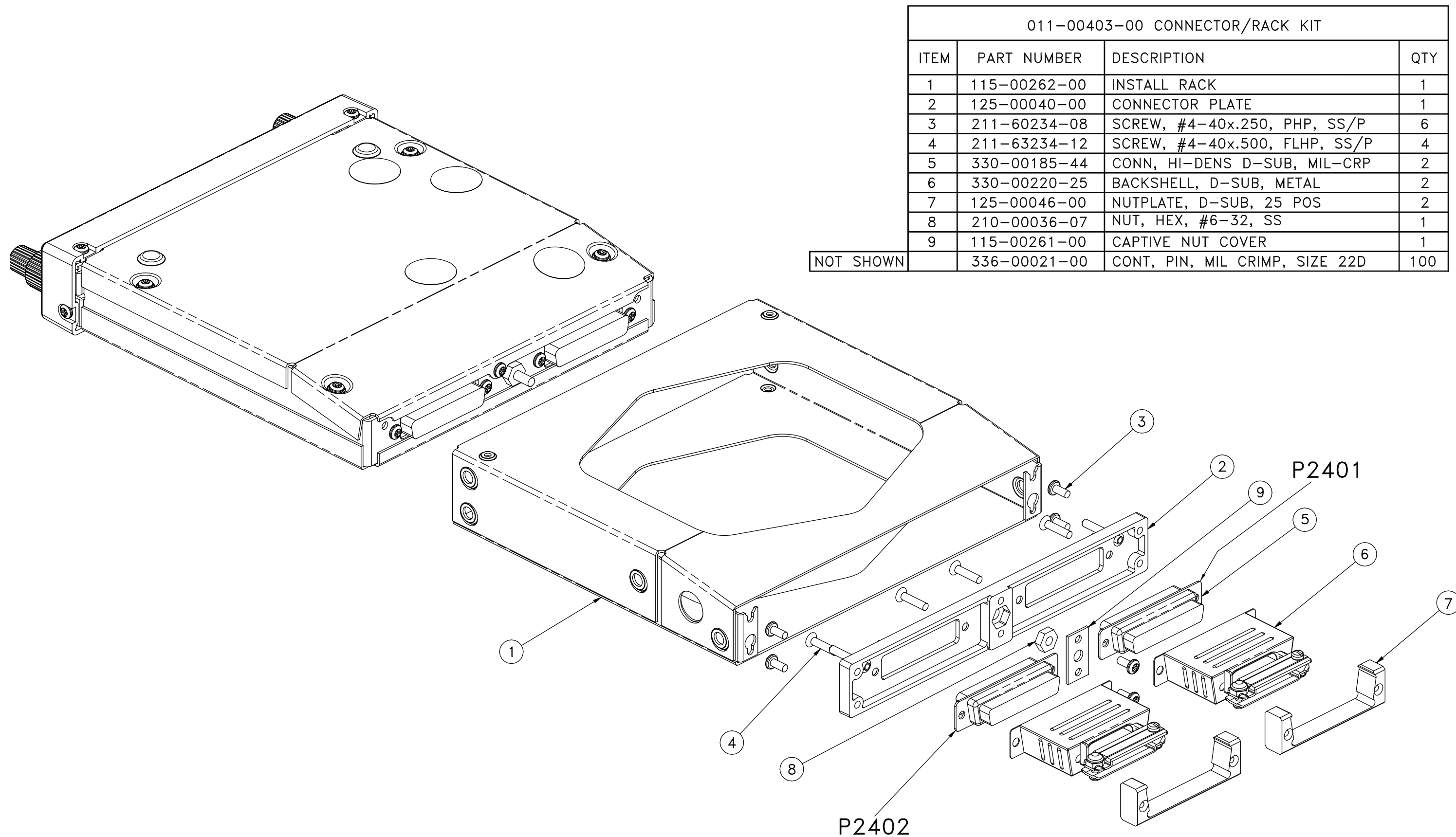
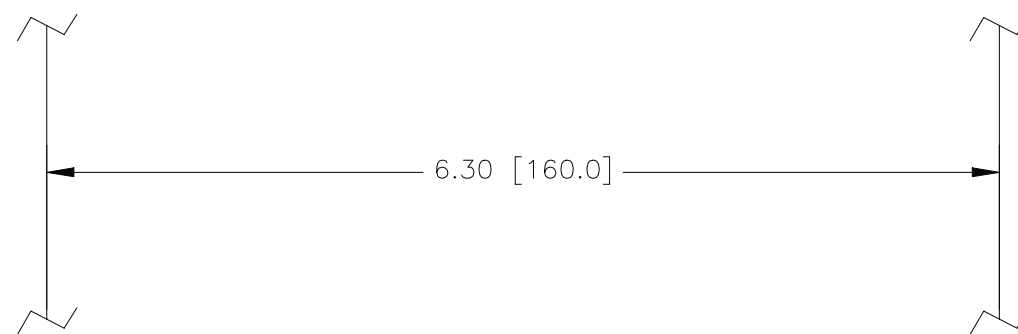


Figure A-2 GMA 240 Connector/Rack Assembly Drawing

APPENDIX A Outline and Installation Drawings

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]

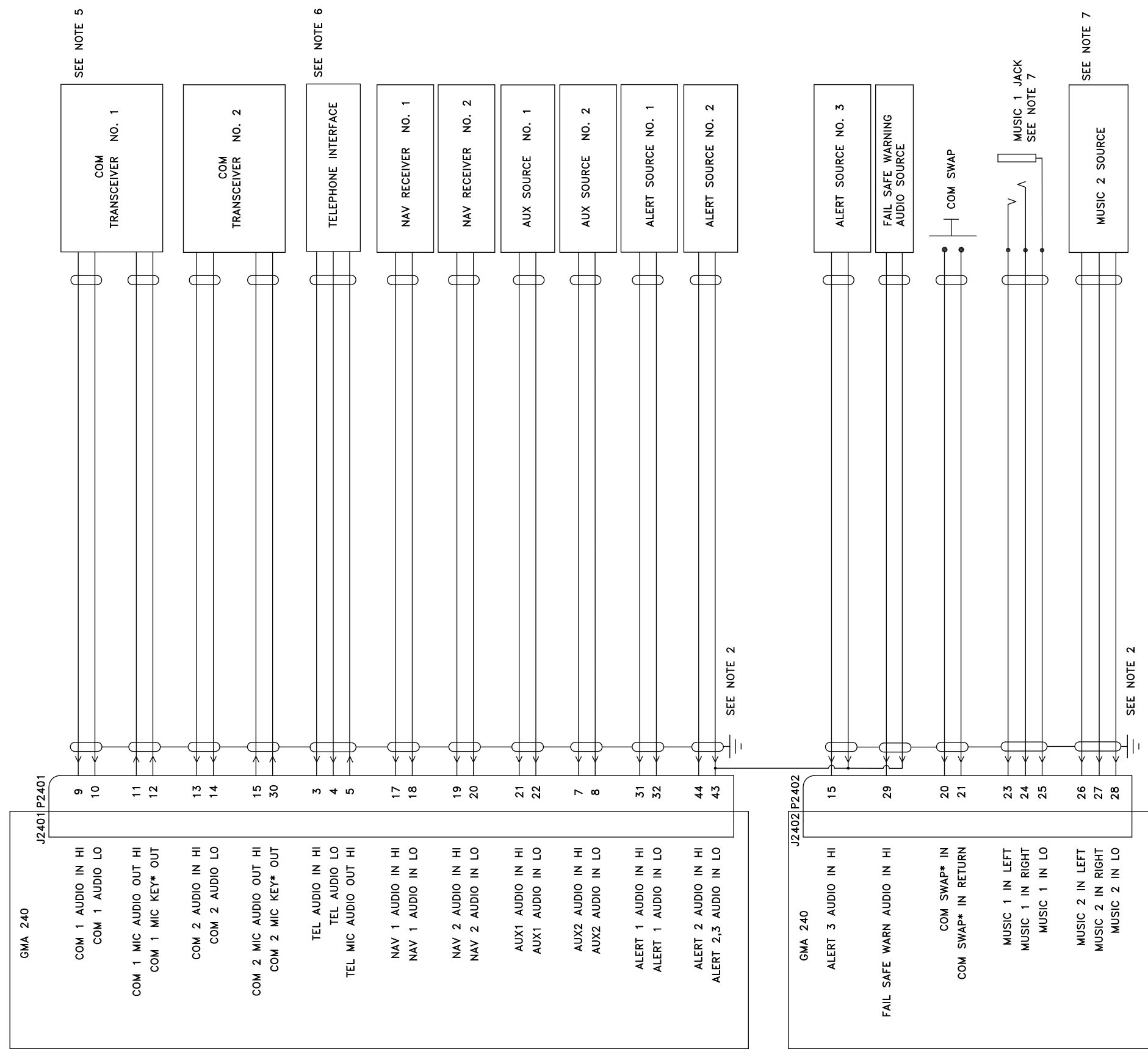


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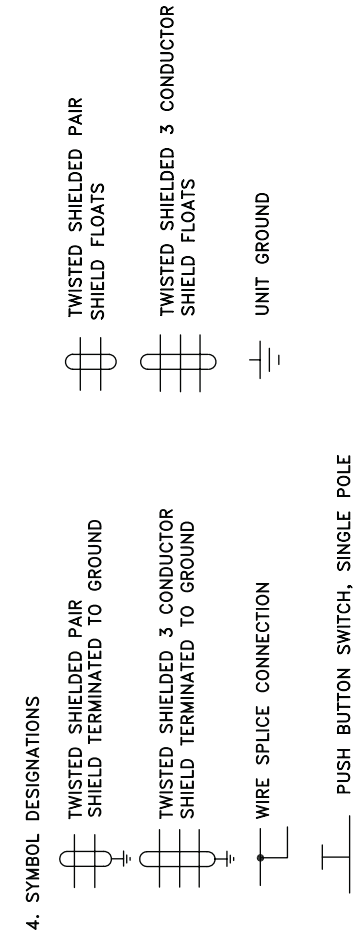
1. DIMENSIONS: INCH [mm].
2. IF THE FRONT LIP OF THE MOUNTING RACK IS BEHIND THE SURFACE OF THE AIRCRAFT PANEL, THE UNIT CONNECTORS MAY NOT FULLY ENGAGE.

Figure A-3 GMA 240 Recommended Panel Cutout Dimensions

APPENDIX B Interconnect Drawings



- NOTES:
1. ALL WIRE SHOULD BE 24 AWG OR LARGER TEFLON INSULATED.
  2. UNLESS OTHERWISE INDICATED, ALL SHIELDS MUST BE TERMINATED AT THE GMA 240 END ONLY. DAISY CHAIN SHIELDS TO A SUITABLE RING TERMINAL AND ATTACH TO CENTER GROUNDING LUGS IN BACK OF CONNECTOR BACKPLATE.
  3. ALL AUDIO JACKS USED IN THE INSTALLATION MUST BE ELECTRICALLY ISOLATED FROM CHASSIS TO AVOID GROUND LOOPS. THIS MAY REQUIRE THE USE OF INSULATION WASHERS WHEN MOUNTING JACKS. USE OF ISOLATED TYPE JACKS IS HIGHLY RECOMMENDED TO SIMPLIFY INSTALLATION.



5. TRANSCIVER INTERFACES CAN ALSO BE WIRED THROUGH SUITABLE JACKS AND CABLES TO HANDHELD COMS THAT HAVE HEADSET INTERFACE CAPABILITY. THE HANDHELD'S HEADSET OUTPUT (LEFT CHANNEL ONLY IF STEREO) CONNECTS TO THE GMA'S COM AUDIO IN HI AND COM AUDIO LO PINS. THE HANDHELD'S MIC INPUT CONNECTS TO GMA'S COM MIC AUDIO OUT HI AND COM AUDIO LO PINS, AND THE HANDHELD'S PTT KEY CONNECTS TO GMA'S COM MIC KEY\* OUT. SEE THE TRANSCIVER'S INSTRUCTION MANUAL.
6. THE TELEPHONE INTERFACE MAY BE WIRED TO A FIXED MOUNTED TELEPHONE SOURCE (SHOWN) OR TO A SUITABLE JACK FOR A PORTABLE TELEPHONE.
7. BOTH MUSIC INPUTS MAY BE WIRED TO EITHER AN EXTERNAL JACK (AS SHOWN FOR MUSIC 1) OR A FIXED MOUNTED MUSIC SOURCE (AS SHOWN FOR MUSIC 2).

Figure B-1 GMA 240 Interconnect Drawing (page 1 of 3)

APPENDIX B Interconnect Drawings

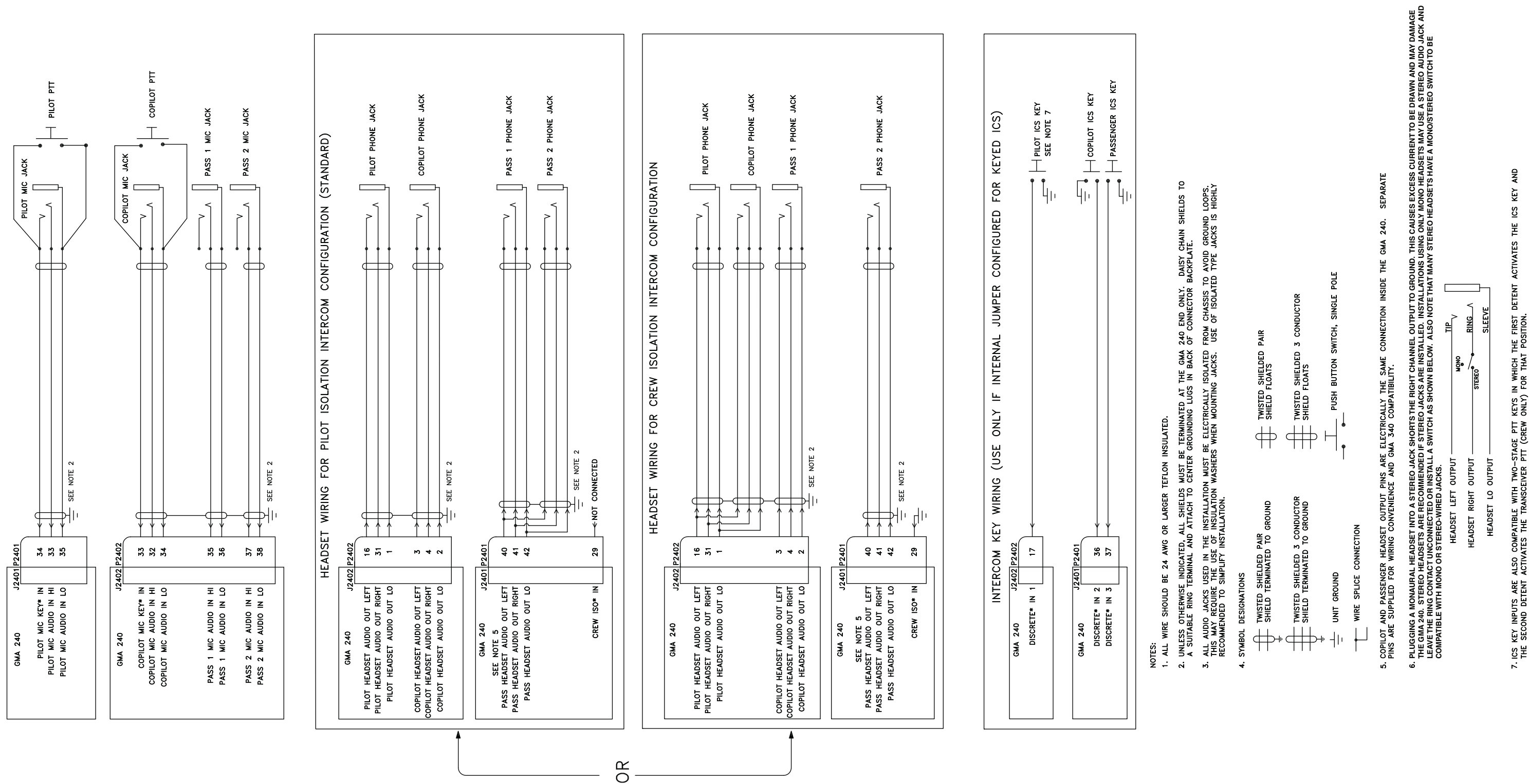






Figure B-1 GMA 240 Interconnect Drawing (page 2 of 3)

APPENDIX B Interconnect Drawings

NOTES:

1. ALL WIRE SHOULD BE 24 AWG OR LARGER TEFLON INSULATED.
2. UNLESS OTHERWISE INDICATED, ALL SHIELDS MUST BE TERMINATED AT THE GMA 240 END ONLY. DAISY CHAIN SHIELDS TO A SUITABLE RING TERMINAL AND ATTACH TO CENTER GROUNDING LUGS IN BACK OF CONNECTOR BACKPLATE.
3. ALL AUDIO JACKS USED IN THE INSTALLATION MUST BE ELECTRICALLY ISOLATED FROM CHASSIS TO AVOID GROUND LOOPS. THIS MAY REQUIRE THE USE OF INSULATION WASHERS WHEN MOUNTING JACKS. USE OF ISOLATED TYPE JACKS IS HIGHLY RECOMMENDED TO SIMPLIFY INSTALLATION.
4. SYMBOL DESIGNATIONS
 

	WIRE SPLICE CONNECTION		CIRCUIT BREAKER
	AIRFRAME GROUND		UNIT GROUND
5. CONFIGURATION PINS ARE GROUNDED TO INITIATE THE LABELED FUNCTION. OPTIONALLY, THEY MAY BE CONNECTED THROUGH A SWITCH TO GROUND IF TOGGLING IS DESIRED. SEE INSTALLATION MANUAL TEXT FOR DETAILS.
6. IF A DEDICATED CIRCUIT BREAKER IS DESIRED, 1 A RATING IS RECOMMENDED. AIRCRAFT GROUND SHOULD BE CONNECTED DIRECTLY TO THE AIRFRAME USING MINIMAL WIRE LENGTH.
7. THE PROVIDED FRONT PANEL JACK AUDIO CABLES ARE COMPATIBLE WITH MANY PHONES AND PORTABLE AUDIO PLAYERS. SOME DEVICES HAVE OTHER CONNECTOR STYLES.
8. IF THE PHONE HAS A 2.5 MM JACK, THE PROVIDED 2.5 MM CABLE IS THE MOST COMMON CONFIGURATION. SOME PHONES WITH 2.5 MM JACKS USE CROSSOVER CABLES THAT SWAP THE MIC AND EARPIECE CONNECTION. IF THIS CONVERSION IS NECESSARY, OR IF A DIFFERENT STYLE CONNECTOR IS NEEDED TO INTERFACE TO THE PHONE, USE THE ABOVE CONNECTION DIAGRAM AS A GUIDE FOR HOW THE PROVIDED CABLE SHOULD BE MODIFIED. ALSO CONSIDER CHECKING WITH THE PHONE MANUFACTURER OR ACCESSORY PROVIDER TO SEE IF A SUITABLE ADAPTOR CABLE IS COMMERCIALY AVAILABLE.
9. FOR AUDIO PLAYERS, THE PROVIDED CABLES ARE STANDARD FOR DEVICES THAT USE STEREO AUDIO JACKS. SOME DEVICES USE SPECIAL CONNECTOR STYLES. IF A DIFFERENT STYLE CONNECTOR IS NEEDED TO INTERFACE TO THE AUDIO PLAYER, USE THE ABOVE CONNECTION DIAGRAM AS A GUIDE FOR HOW THE PROVIDED CABLE SHOULD BE MODIFIED. ALSO CONSIDER CHECKING WITH THE DEVICE MANUFACTURER OR ACCESSORY PROVIDER TO SEE IF A SUITABLE ADAPTOR CABLE IS COMMERCIALY AVAILABLE.
10. THE PHOTOCELL CONTROLS THE BRIGHTNESS OF THE LEDs (ANNUNCIATORS) THAT SHOW SELECTION OF FUNCTIONS (e.g. LEDs IN BUTTONS). THE EXTERNAL LIGHTING BUS INPUTS ON PINS 5, 6, & 7 (P2402) MUST BE CONNECTED TO CONTROL THE BRIGHTNESS OF THE TEXT LABELING ON THE BUTTON FIELDS (e.g. "MUTE MUSIC"). A LIGHTING BUS MUST BE CAPABLE OF SUPPLYING 160 mA AT 14 V OR 100 mA AT 28 V IF USED TO PROVIDE BACKLIGHT POWER FOR THESE PINS. IF PINS 5, 6, & 7 ARE NOT CONNECTED, THE TEXT LABELING WILL NOT BE BACKLIT.

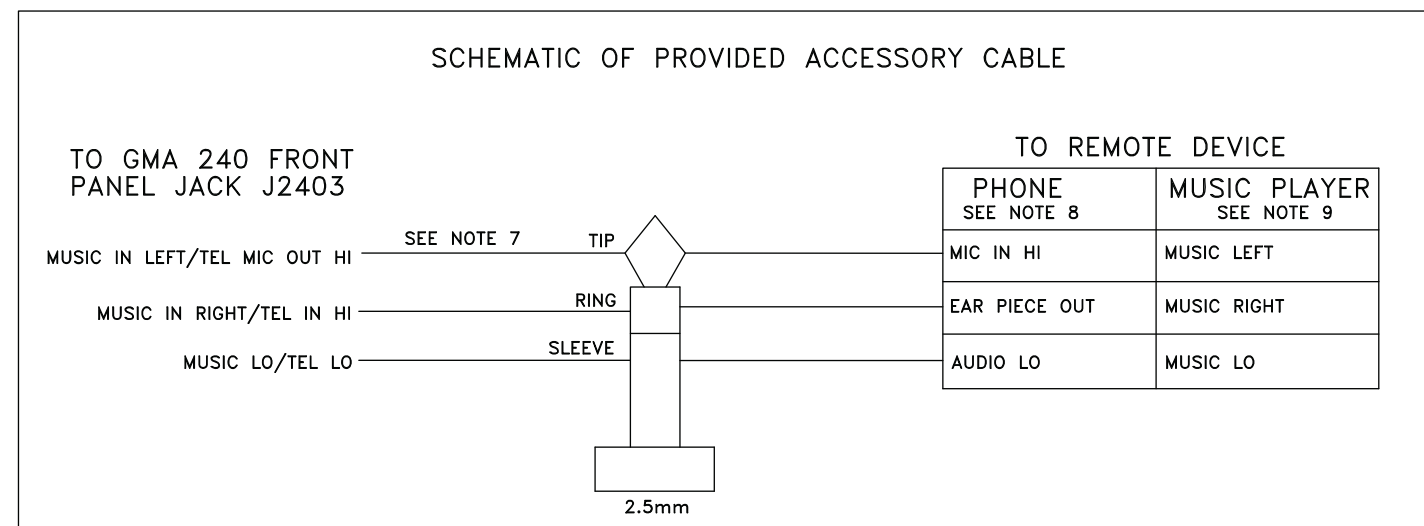
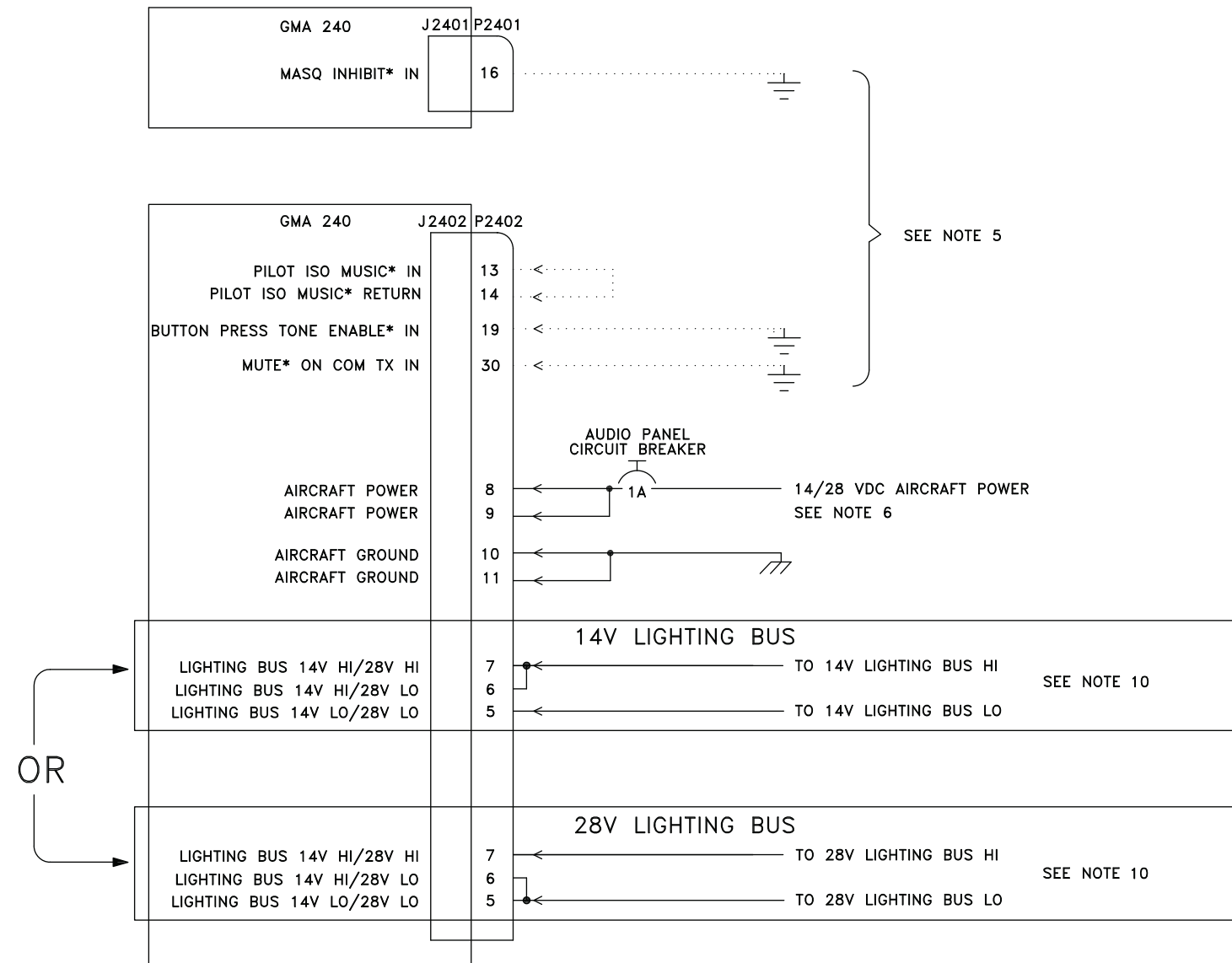


Figure B-1 GMA 240 Interconnect Drawing (page 3 of 3)

APPENDIX B Interconnect Drawings

### GMA240 J2401

15 COM 2 MIC AUDIO OUT HI	14 COM 2 AUDIO LO	13 COM 2 AUDIO IN HI	12 COM 1 MIC KEY* OUT	11 COM 1 MIC AUDIO OUT HI	10 COM 1 AUDIO LO	9 COM 1 AUDIO IN HI	8 AUX2 AUDIO IN LO	7 AUX2 AUDIO IN HI	6 RESERVED	5 TEL MIC AUDIO OUT HI	4 TEL AUDIO LO	3 TEL AUDIO IN HI	2 RESERVED	1 RESERVED
30 COM 2 MIC KEY* OUT	29 CREW ISO* IN	28 RESERVED	27 RESERVED	26 RESERVED	25 RESERVED	24 RESERVED	23 RESERVED	22 AUX1 AUDIO IN LO	21 AUX1 AUDIO IN HI	20 NAV 2 AUDIO IN LO	19 NAV 2 AUDIO IN HI	18 NAV 1 AUDIO IN LO	17 NAV 1 AUDIO IN HI	16 MASQ INHIBIT* IN
44 ALERT 2 AUDIO IN HI	43 ALERT 2,3 AUDIO IN LO	42 PASS HEADSET AUDIO OUT LO	41 PASS HEADSET AUDIO OUT RIGHT	40 PASS HEADSET AUDIO OUT LEFT	39 RESERVED	38 RESERVED	37 RESERVED	36 RESERVED	35 PILOT MIC AUDIO IN LO	34 PILOT MIC KEY* IN	33 PILOT MIC AUDIO IN HI	32 ALERT 1 AUDIO IN LO	31 ALERT 1 AUDIO IN HI	

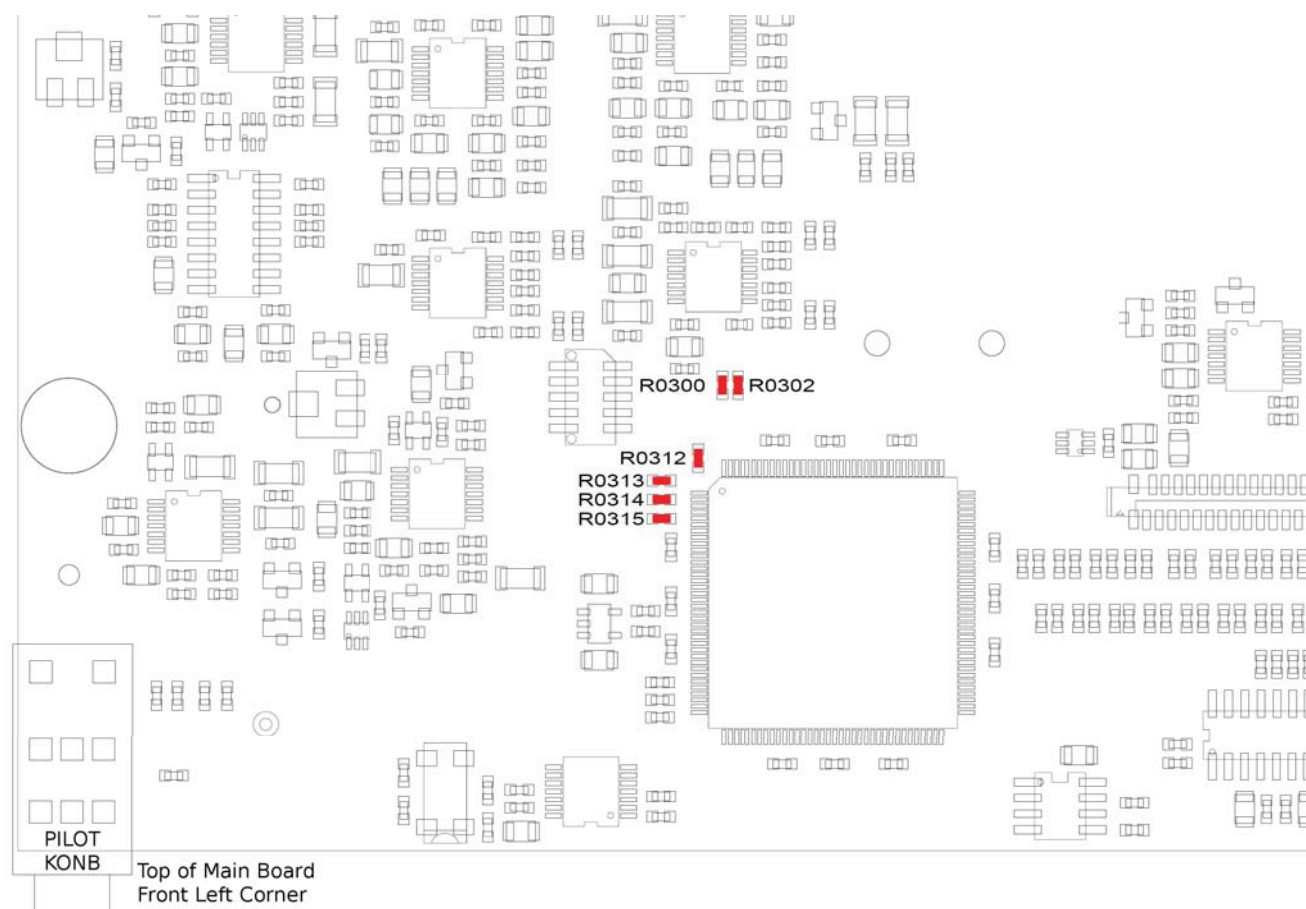
### GMA240 J2402

15 ALERT 3 AUDIO IN HI	14 PILOT ISO MUSIC* RETURN	13 PILOT ISO MUSIC* IN	12 RESERVED	11 AIRCRAFT GROUND	10 AIRCRAFT GROUND	9 AIRCRAFT POWER	8 AIRCRAFT POWER	7 LIGHTING BUS 14V HI/28V HI	6 LIGHTING BUS 14V HI/28V LO	5 LIGHTING BUS 14V LO/28V LO	4 COPILOT HEADSET AUDIO OUT RIGHT	3 COPILOT HEADSET AUDIO OUT LEFT	2 COPILOT HEADSET AUDIO OUT LO	1 PILOT HEADSET AUDIO OUT LO
30 MUTE* ON COM TX IN	29 FAILSAFE WARN AUDIO IN HI	28 MUSIC 2 IN LO	27 MUSIC 2 IN RIGHT	26 MUSIC 2 IN LEFT	25 MUSIC 1 IN LO	24 MUSIC 1 IN RIGHT	23 MUSIC 1 IN LEFT	22 RESERVED	21 COM SWAP* IN RETURN	20 COM SWAP* IN	19 BUTTON PRESS TONE ENABLE* IN	18 RESERVED	17 RESERVED	16 PILOT HEADSET AUDIO OUT LEFT
44 RESERVED	43 RESERVED	42 RESERVED	41 RESERVED	40 RESERVED	39 RESERVED	38 PASS 2 MIC AUDIO IN LO	37 PASS 2 MIC AUDIO IN HI	36 PASS 1 MIC AUDIO IN LO	35 PASS 1 MIC AUDIO IN HI	34 COPILOT MIC AUDIO IN LO	33 COPILOT MIC KEY* IN	32 COPILOT MIC AUDIO IN HI	31 PILOT HEADSET AUDIO OUT RIGHT	

Figure B-2 GMA 240, J2401 & J2402 Connector Layout Drawing

APPENDIX C Configuration Jumpers Drawing

Top of Main Board



Bottom of Main Board

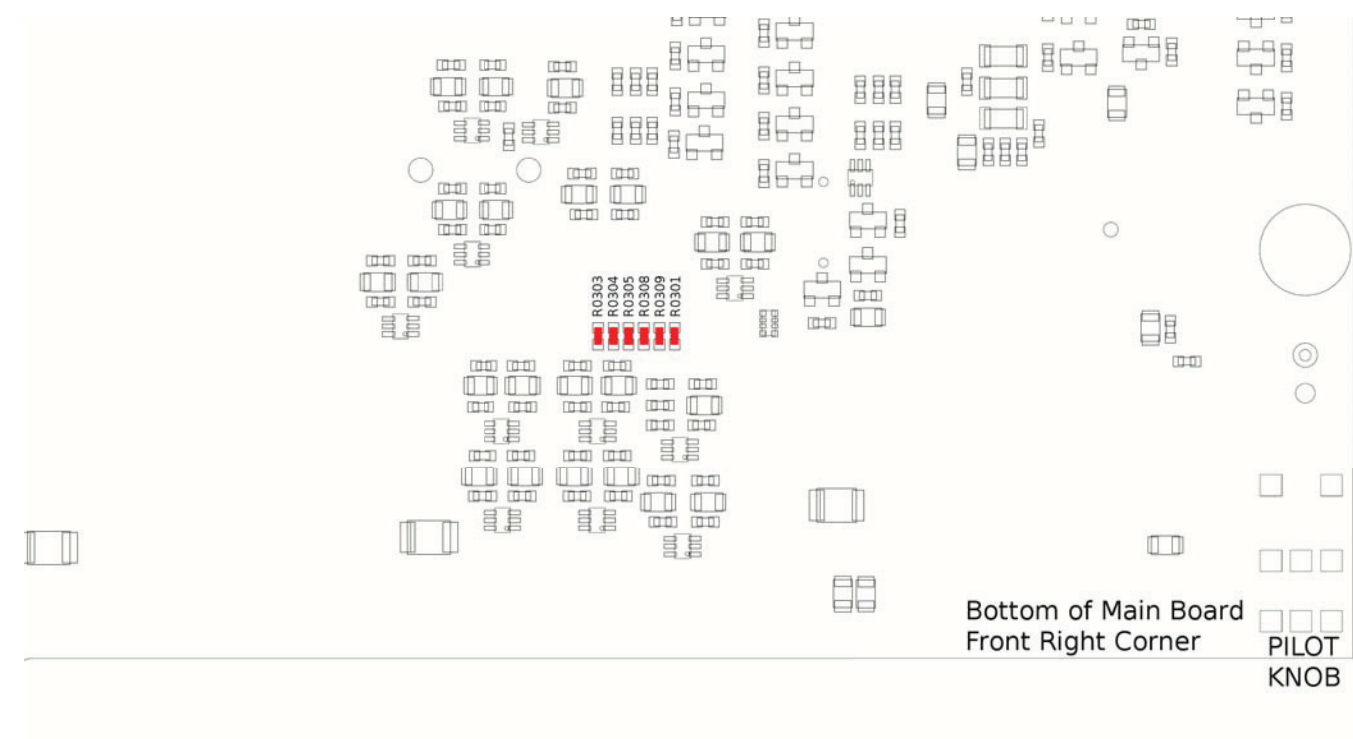


Figure C-1 GMA 240 Internal Configuration Jumper Layout Drawing