

# GDU 104X

## Installation Manual



(GDU 1040 Shown)

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Garmin International, Inc.  
1200 E. 151<sup>st</sup> Street  
Olathe, KS 66062 USA  
Telephone: 913-397-8200  
Aviation Dealer Technical Support Line (Toll Free): (888) 606-5482  
[www.garmin.com](http://www.garmin.com)

Garmin (Europe) Ltd  
Liberty House  
Bulls Copse Road  
Hounslow Business Park  
Southampton, SO40 9RB, UK  
Telephone: 44 (0) 8708501241

### **RECORD OF REVISIONS**

<b>Revision</b>	<b>Revision Date</b>	<b>Description</b>
A	11/8/04	Production Release
B	2/8/05	Added TSO-C52 and TSO-C9c
C	4/13/05	Added notes on TSO applicability
D	10/6/05	Added TSO-C151b and TSO-C63c
E	6/12/06	Update GDU 1040A information, added 1044B, TSO-C146a, TSO-C169, and Non-TSO Baro VNAV
F	8/22/06	Added GDU 1044, 1045, and CLD part numbers
G	1/17/07	Added TSO-C87 and TSO-C118
H	4/11/07	Revised ICA
J	8/8/07	Revised ICA

### **DOCUMENT PAGINATION**

<b>Section</b>	<b>Page Range</b>
Table of Contents	i – vi
Section 1	1-1 – 1-18
Section 2	2-1 – 2-6
Section 3	3-1 – 3-4
Section 4	4-1 – 4-6
Appendix A	A-1 – A-10
Appendix B	B-1 – B-2

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This manual reflects the operation of software version 8.10. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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

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#### **JavaScript Engine**

The GDU 104X uses the JavaScript engine located at <http://www.mozilla.org/js/spidermonkey/>. The source is available upon request or can be downloaded from the website under the Mozilla Public License Version 1.1.

#### **AES Encryption**

The GDU 104X uses AES encryption and decryption routines initially written by Dr. Brian Gladman. The source code for these routines is available under an open source BSD or GPL license from [http://fp.gladman.plus.com/cryptography\\_technology/fileencrypt/](http://fp.gladman.plus.com/cryptography_technology/fileencrypt/) on Dr. Gladman's web site.

#### **NOTE**

Throughout this document references made to the GDU 104X shall equally apply to the GDU 1040, 1040A, 1042, 1043, 1044, 1044B, and 1045 except where specifically noted.

#### **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).

#### **WARNING**

The GDU 104X lamps contain mercury and must be recycled or disposed of according to local, state, or federal laws. If you have any questions or would like additional information, please refer to our web site at [www.garmin.com/aboutGarmin/environment/disposal.jsp](http://www.garmin.com/aboutGarmin/environment/disposal.jsp).

#### **CAUTION**

The GDU 104X lens is coated with a special anti-reflective coating which is very sensitive to skin oils, waxes and abrasive cleaners. **CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING.** It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.

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## TABLE OF CONTENTS

PARAGRAPH	PAGE
1 GENERAL DESCRIPTION.....	1-1
1.1 Introduction.....	1-1
1.2 Equipment Description .....	1-1
1.3 Interface Summary.....	1-2
1.4 Technical Specifications .....	1-2
1.5 Certification .....	1-3
1.6 Reference Documents .....	1-17
1.7 Limited Warranty.....	1-17
2 INSTALLATION OVERVIEW .....	2-1
2.1 Introduction.....	2-1
2.2 Installation Considerations .....	2-4
2.3 Cabling and Wiring.....	2-5
2.4 Cooling Requirements .....	2-5
2.5 Mounting Requirements .....	2-5
3 INSTALLATION PROCEDURE.....	3-1
3.1 Unpacking Unit.....	3-1
3.2 Wiring Harness Installation .....	3-1
3.3 Backshell Assemblies .....	3-2
3.4 CHiPS Harness Installation .....	3-2
3.5 Unit Installation .....	3-3
3.6 Post Installation Configuration & Checkout.....	3-3
3.7 Continued Airworthiness .....	3-4
4 SYSTEM INTERCONNECTS.....	4-1
4.1 Pin Function List.....	4-1
4.2 Power .....	4-2
4.3 Configuration.....	4-3
4.4 Serial Data .....	4-4
4.5 Lighting.....	4-4
4.6 Fan Monitor .....	4-5
APPENDIX A: OUTLINE & INSTALLATION DRAWINGS.....	A-1
APPENDIX B: INTERCONNECT EXAMPLE.....	B-1

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## LIST OF ILLUSTRATIONS

FIGURE	PAGE
2-1 CHiPS Harness .....	2-4
2-2 GDU 104X Locking Socket.....	2-5
3-1 CHiPS Conduit Assembly Mounting.....	3-2
3-2 GDU 104X ¼ Turn Fastener.....	3-3
A-1 GDU 104X Cutout Drawing (Not To Scale) .....	A-1
A-2 GDU 104X Outline Drawing.....	A-3
A-3 CHiPS Outline Drawing .....	A-5
A-4 Installation Drawing (Sheet 1 of 2).....	A-7
A-4 Installation Drawing (Sheet 2 of 2).....	A-9
B-1 GDU 104X Example Interconnect.....	B-1

## LIST OF TABLES

TABLE	PAGE
3-1 Pin Contact Part Numbers.....	3-1
3-2 Recommended Crimp Tools .....	3-1
3-3 Long Term Power Interrupt Category (200 mS) Mod Status .....	3-4

## GDU 104X HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GDU 104X. 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.

APPLICABLE LRU PART NUMBER	MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION
011-00972-00	1	0527	9/7/05	Some GDU 1040 units produced prior to December 1, 2004 may have display delamination. This occurs when “bubbles” develop in the adhesive that holds the cover glass to the LCD.
	2	N/A	N/A	More robust capacitors installed in the power supply backup circuit.
011-00972-02	1	N/A	N/A	More robust capacitors installed in the power supply backup circuit.
011-00972-03				
011-00916-00				
011-01080-00				
011-01079-00				
011-01078-01				
011-01274-00				
011-00819-04				

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# 1 GENERAL DESCRIPTION

## 1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the GDU 104X as part of the G1000 Integrated Cockpit System. The GDU 104X can be integrated into a variety of airframes under an 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 GDU 104X provides a central display and user interface for the G1000 Integrated Cockpit System. The display is mounted flush to the aircraft instrument panel using four ¼ turn fasteners. A GDU 104X can be configured as either a Multi Function Display (MFD) or Primary Flight Display (PFD). The GDU 104X provides the following functions:

### 1.2.1 Flight Instrument Functions

- Display of attitude (pitch and roll), rate of turn, slip/skid, heading, airspeed, altitude, and vertical speed information (PFD or reversionary modes only)
- Display of engine and airframe instrumentation (MFD or reversionary modes only)
- Display of the AFCS flight director command bars and modes (PFD or reversionary modes only)

### 1.2.2 Navigation Instrument Functions

- Display of position and ground speed for use by the pilot/flight crew
- Display of stored navigation and map databases for use by the pilot/flight crew
- Control and display of the HSI, Selected Heading and Selected Course (PFD or reversionary modes only)
- Area navigation functions using the determined position/velocity and stored navigation data
- Approach navigation functions and associated databases
- Baro-altitude Vertical Navigation

### 1.2.3 System Interface Functions

- Interfacing with the GIA 63/63W Integrated Avionics Unit (IAU) and other GDU 104Xs
- Control and display of dual communications transceivers operating in the 118.00 to 136.975 MHz range in 8.33 kHz or 25 kHz frequency spacing
- Control and display of dual VOR/ILS receivers tuning from 108.00 to 117.95 MHz in 50 kHz increments
- Control and display of transponder(s) GTX 32 or 33, GFC 700 autopilot (GDU 1042, 1043, 1044, 1044B, and 1045 only), GDL 69/69A data link, GWX 68 Weather Radar, etc.

### 1.3 Interface Summary

The GDU 104X is designed as an open architecture system that uses typical ARINC 429, RS-232, and Ethernet communications interfaces. The GDU 104X communicates with the following G1000 LRUs:

- GRS 77 AHRS
- GDC 74A/74B Digital Air Data Computer
- GDU 1500/GDU 104Xs
- GMA 1347/1347D Audio Panel
- GIA 63/63W IAU
- GDL 69/69A Data Link
- GWX 68 Weather Radar

### 1.4 Technical Specifications

#### 1.4.1 Environmental Qualification Form

It is the responsibility of the installing agency to obtain the latest revision of the GDU 10XX Environmental Qualification Form. This form is available directly from Garmin under the following part number:

GDU 10XX Environmental Qualification Form, Garmin part number 005-00150-02

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

#### 1.4.2 Physical Characteristics

Characteristics	Specifications
Width	11.80 inches (29.97 cm)
Height	7.70 inches (19.56 cm)
Depth with Connector Kit	3.77 inches (9.58 cm)
Unit Weight w/out Connector Kit	6.3 lbs. (2.85kg)
Unit Weight with Connector Kit	6.5 lbs. (2.94kg)
ChiPS module & connector	0.9 lbs. (0.41kg)
ChiPS module w/out Connector Kit	0.7 lbs. (0.32kg)

#### 1.4.3 General Specifications

The table below contains general specifications. For detailed environmental specifications, see the Environmental Qualification Form.

Characteristics	Specifications
Operating Temperature Range	-40°C to +55°C.
Humidity	95% non-condensing
Altitude Range	-1,500 ft to 55,000 ft
Software Compliance	RTCA/DO-178B levels B, C, and D
Hardware Compliance	RTCA/DO-254 Level B
Environmental Compliance	RTCA/DO-160D
Power Requirements	14/28 Vdc. See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages.

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## 1.4.4 Power Consumption

Ambient temperature above -15°C:

	<b>14V (Maximum)</b>	<b>14V (Typical)</b>	<b>28V (Maximum)</b>	<b>28V (Typical)</b>
<b>GDU 104X</b>	38W	33W	35W	30W

Ambient temperature at or below -15°C:

	<b>14V (Maximum)</b>	<b>14V (Typical)</b>	<b>28V (Maximum)</b>	<b>28V (Typical)</b>
<b>GDU 104X</b>	47W	42W	70W	65W

Note : Dash numbers -00 and -02 for the GDU1040 (011-00972-( )) and GDU1045 (011-00819-( )) do not include internal heaters so the power consumption numbers in the top row apply at any temperature. All other GDU104X part numbers include an internal heater. The heater will be on for approximately 15 minutes in air at -40°C that is circulated by a typical avionics fan across the units heat sink.

## 1.5 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. At the time of publication, installations of this TSO approved article are only approved when installed in an aircraft as part of a Garmin G1000 system.

The following table provides a list of applicable TSO/ETSOs for the GDU 104X.

## 1.5.1 TSO/ETSO Compliance

GDU 1040	GDU 1040A	GDU 1042	GDU 1043	GDU 1044	GDU 1044B	GDU 1045	TSO/ETSO/SAE/ RTCA/EUROCAE	Function	Category	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers
X	X	X	X	X	X	X	TSO-C113	Airborne Multipurpose Electronic Displays	Type I, II, and III	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C113					
X	X	X	X	X	X	SAE AS8034					
X	X	X	X	X	X	X	TSO-C2d	Airspeed Instruments	Type C Range : 20 to 999 kts	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C2d					
X	X	X	X	X	X	SAE AS8019A					
X	X	X	X	X	X	X	TSO-C3d	Turn and Slip Instruments	Type II	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C3d					
X	X	X	X	X	X	SAE AS8004					
X	X	X	X	X	X	X	TSO-C4c	Bank and Pitch Instruments	Turn Error, Category B	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C4c					
X	X	X	X	X	X	SAE AS8001					
X	X	X	X	X	X	X	TSO-C6d	Direction (Heading) Instrument, Magnetic		006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C6d					
X	X	X	X	X	X	SAE AS8013A					
X	X	X	X	X	X	X	TSO-C8d	Vertical Velocity Instruments (Rate- Of-Climb)	Type C Range : -9950 to 9950 ft/min	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C8d					
X	X	X	X	X	X	SAE AS8016A					
X	X	X	X	X	X	X	TSO-C9c	Automatic Pilots		All 006-B0319-() except 006-B0319-00 through 006-B0319-29	006-C0035-() 006-C0036-()
						ETSO-C9c					
X	X	X	X	X	X	SAE AS402B					
X	X	X	X	X	X	X	TSO-C10b	Altimeter, Pressure Actuated, Sensitive Type	Range: -1000 to 99,980 ft	006-B0319-00 through 006-B0319-64 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C10b					
X	X	X	X	X	X	SAE AS8009A					
X	X	X	X	X	X	X	TSO-C34e	ILS Glide Slope Receiving Equipment Operating Within The Radio Frequency Range of 328.6-335.4 Megahertz (MHz)		006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C34f					
X	X	X	X	X	X	RTCA DO-192					
X						EUROCAE ED-47B					

TSO/ETSO Compliance, continued											
GDU 1040	GDU 1040A	GDU 1042	GDU 1043	GDU 1044	GDU 1044B	GDU 1045	TSO/ETSO/SAE/ RTCA/EUROCAE	Function	Category	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers
X	X	X	X	X	X	X	TSO-C35d	Airborne Radio Marker Receiving Equipment	Category A	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C35d					
X	X	X	X	X	X	RTCA DO-143					
X						EUROCAE 1/WG7					
X	X	X	X	X	X	X	TSO-C36e	Airborne ILS Localizer Receiving Equipment Operating Within The Radio Frequency Range of 108-112 Megahertz (MHz)	Class A	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C36f					
X	X	X	X	X	X	RTCA DO-195					
X						EUROCAE ED-46B					
X	X	X	X	X	X	X	TSO-C37d**	VHF Radio Communications Transmitting Equipment Operating Within The Radio Frequency Range 117.975 to 137.000 Megahertz	Class 3 Class 5 200nm 25 kHz 8.33 kHz	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C37e					
X	X	X	X	X	X	RTCA DO-186A					
X						EUROCAE ED-23B					
X	X	X	X	X	X	X	TSO-C38d**	VHF Radio Communications Receiving Equipment Operating Within The Radio Frequency Range 117.975 to 137.000 Megahertz	Class C Class E 200nm 25 kHz 8.33 kHz	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C38e					
X	X	X	X	X	X	RTCA DO-186A					
X						EUROCAE ED-23B					
X	X	X	X	X	X	X	TSO-C40c	VOR Receiving Equipment Operating Within The Radio Frequency Range of 108-117.95 Megahertz (MHz)		006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-2C40c					
X	X	X	X	X	X	RTCA DO-196					
X						EUROCAE ED-22B					
X	X	X	X	X	X	X	TSO-C41d	Airborne Automatic Direction Finding Equipment (ADF)	Class A	All 006-B0319-() except 006-B0319-00 through 006-B0319-06	006-C0035-() 006-C0036-()
X						ETSO-2C41d					
X	X	X	X	X	X	RTCA DO-179					
X	X	X	X	X	X	X	TSO-C43c	Temperature Instruments	Class IIIb	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C43c					
X	X	X	X	X	X	SAE AS8005A					
X	X	X	X	X	X	X	TSO-C44b	Fuel Flowmeters	Type I and II	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C44b					
X	X	X	X	X	X	SAE AS407C					
X	X	X	X	X	X	X	TSO-C45a	Manifold Pressure Instruments	Type II Range : See Note Below	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C45a					
X	X	X	X	X	X	SAE AS8042					
X	X	X	X	X	X	X	TSO-C47	Pressure Instruments – Fuel, Oil, and Hydraulic	Type II Range : See Note Below	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X						ETSO-C47					
X	X	X	X	X	X	SAE AS408C					

TSO/ETSO Compliance, continued											
GDU 1040	GDU 1040A	GDU 1042	GDU 1043	GDU 1044	GDU 1044B	GDU 1045	TSO/ETSO/SAE/ RTCA/EUROCAE	Function	Category	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers
X	X	X	X	X	X	X	TSO-C49b	Electric Tachometer: Magnetic Drag (Indicator and Generator)	Range : See Note Below	006-B0319- (-) 006-B0320- (-)	006-C0035- (-) 006-C0036- (-)
X						ETSO-C49b					
X	X	X	X	X	X	SAE AS404C					
X	X	X	X	X	X	X	TSO-C52b	Flight Director Equipment		All 006-B0319- (-) except 006-B0319-00 through 006-B0319-29	006-C0035- (-) 006-C0036- (-)
X	X	X	X	X	X	ETSO-C52b					
						SAE AS8008					
X	X	X	X	X	X	X	TSO-C55	Fuel and Oil Quantity Instruments (Reciprocating Engine Aircraft)	Range : See Note Below	006-B0319- (-) 006-B0320- (-)	006-C0035- (-) 006-C0036- (-)
X						ETSO-C55					
X	X	X	X	X	X	SAE AS405C					
X	X	X	X	X	X	X	TSO-C63c	Airborne Weather and Ground Mapping Pulsed Radars	Class 7	All 006-B0319- (-) except 006-B0319-00 through 006-B0319-39	006-C0035- (-) 006-C0036- (-)
X	X	X	X	X	X	ETSO-2C63c					
X	X	X	X	X	X	RTCA DO-173					
X	X	X	X	X	X	X	TSO-C66c	Distance Measuring Equipment Operating Within the RF Range of 960-1215 MHz (DME)		All 006-B0319- (-) except 006-B0319-00 through 006-B0319-06	006-C0035- (-) 006-C0036- (-)
X						ETSO-2C66b					
X	X	X	X	X	X	RTCA DO-189					
X						EUROCAE ED-54					
X	X	X	X	X	X	X	TSO-C74c	Airborne ATC Transponder Equipment		006-B0319- (-) 006-B0320- (-)	006-C0035- (-) 006-C0036- (-)
X						ETSO-C74d					
X	X	X	X	X	X	X	TSO-C87†	Airborne Low-Range Radio Altimeter		All 006-B0319- (-) except 006-B0319-00 through 006-B0319-59	006-C0035- (-) 006-C0036- (-)
						ETSO-2C87					
X	X	X	X	X	X	X	TSO-C110a	Airborne Passive Thunderstorm Equipment		006-B0319- (-) 006-B0320- (-)	006-C0035- (-) 006-C0036- (-)
X						ETSO-C110a					
X	X	X	X	X	X	RTCA DO-191					
X	X	X	X	X	X	X	TSO-C112	Air Traffic Control Radar Beacon System/Mode Select (ATCRBS/Mode S) Airborne Equipment		006-B0319- (-) 006-B0320- (-)	006-C0035- (-) 006-C0036- (-)
X						ETSO-2C112a					
X	X	X	X	X	X	RTCA DO-181C					
X						EUROCAE ED-73B					

TSO/ETSO Compliance, continued											
GDU 1040	GDU 1040A	GDU 1042	GDU 1043	GDU 1044	GDU 1044B	GDU 1045	TSO/ETSO/SAE/ RTCA/EUROCAE	Function	Category	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers
X	X	X	X	X	X	X	TSO-C118	Traffic Alert Collision Avoidance System (TCAS) Airborne Equipment, TCAS I		All 006-B0319-() except 006-B0319-00 through 006-B0319-59	006-C0035-() 006-C0036-()
X	X	X	X	X	X	RTCA DO-197A					
						ETSO-C118					
X	X	X	X	X	X	X	TSO-C129a**	Airborne Supplemental Navigation Equipment Using the Global Positioning System (GPS)	Class A1	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()
X							ETSO-C129a				
X	X	X	X	X	X	X	RTCA DO-208				
X							EUROCAE ED-72A				
X	X	X	X	X	X	X	TSO-C146a***	Stand-alone Airborne Navigation Equipment Using the Global Positioning System Augmented by the Wide Area Augmentation System	Class 3	All 006-B0319-() except 006-B0319-00 through 006-B0319-49	006-C0035-() 006-C0036-()
							ETSO-C146				
X	X	X	X	X	X	X	RTCA DO-229C				
X	X	X	X	X	X	X	TSO-C147	Traffic Advisory System (TAS) Airborne Equipment	Class A	All 006-B0319-() except 006-B0319-00 through 006-B0319-19	006-C0035-() 006-C0036-()
X							ETSO-C147				
X	X	X	X	X	X	X	RTCA DO-197A				
X	X	X	X	X	X	X	TSO-C151b†	Terrain Awareness and Warning System	Class B	All 006-B0319-() except 006-B0319-00 through 006-B0319-39	006-C0035-() 006-C0036-()
							ETSO-C151a				
X	X	X	X	X	X	X	TSO-C169***	VHF Radio Communications – Transceiver Equipment	Class 3 Class 5 Class C Class E	All 006-B0319-() except 006-B0319-00 through 006-B0319-49	006-C0035-() 006-C0036-()
X	X	X	X	X	X	X	RTCA DO-186A				

Note : The range for these engine gauges is configurable and will vary with aircraft type.

\*TSO-C151b applies only when the system is configured to enable TAWS. A TERRAIN configuration only partially complies with TSO-C151b, excluding audio, excessive rate of descent alerting, negative climb rate alerting, altitude loss after takeoff alerting, the 500 foot voice callout, and the TAWS self test capability. Hence, TSO-C151b does not apply to units without the TAWS configuration.

\*\*Applies only when installed with a GIA 63 (non-WAAS unit).

\*\*\*Applies only when installed with a GIA 63W (WAAS unit).

† Applies only when installed with a Bendix/King KRA-405B.

## 1.5.2 TSO/ETSO Deviations

See Section 1.5.1 for GDU 104X TSO/ETSO applicability.

TSO/ETSO	Deviation
TSO-C2d	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C2d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C2d to use SAE AS 8019A instead of SAE AS 8019 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>3. Garmin was granted a deviation from TSO-C2d to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>4. Garmin was granted a deviation from TSO-C2d to eliminate the requirement 3.2.3 in SAE AS 8019A that requires “the instrument face to be marked with ‘Airspeed’ or ‘IAS’ and also with the applicable units of measure.”</li> <li>5. Garmin was granted a deviation from TSO-C2d to modify the requirement 3.2.5 in SAE AS 8019A that requires “The indicating means to be visible from all points on a surface defined as making an angle of 30 degrees with the perpendicular.”</li> </ol>
ETSO-C2d	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C2d to use SAE AS 8019A instead of SAE AS 8019 as the Minimum Performance Standard.</li> <li>2. Garmin was granted a deviation from ETSO-C2d to eliminate the requirement 3.2.3 in SAE AS 8019A.</li> <li>3. Garmin was granted a deviation from ETSO-C2d to modify the requirement 3.2.5 in SAE AS 8019A.</li> </ol>
TSO-C3d	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C3d to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>2. Garmin was granted a deviation from TSO-C3d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>3. Garmin was granted a deviation from TSO-C3d to modify the requirement 3.7 in SAE AS 8004 that requires “The indicating means to be visible from all points on a surface defined as making an angle of 30 degrees with the perpendicular.”</li> </ol>
ETSO-C3d	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C3d to modify the requirement 3.7 in SAE AS 8004</li> </ol>
TSO-C4c	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C4c to use SAE AS 8001 instead of SAE AS 396B for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from SAE Aerospace Standard AS 8001 to use RTCA DO-160D instead of RTCA DO-138 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>3. Neither TSO-C4c nor SAE Aerospace Standard AS 8001 specifies use of a standard for software development; Garmin intends to use RTCA DO-178B as the standard for Software Considerations in Airborne Systems and Equipment Certification.</li> </ol>
ETSO-C4c	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C4c to use SAE AS 8001 instead of SAE AS 396B for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from SAE Aerospace Standard AS 8001 to use RTCA DO-160D instead of RTCA DO-138 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>3. Neither ETSO-C4c nor SAE Aerospace Standard AS 8001 specifies use of a standard for software development; Garmin intends to use RTCA DO-178B as the standard for Software Considerations in Airborne Systems and Equipment Certification.</li> </ol>



<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C6d	1. Garmin was granted a deviation from TSO-C6d to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C6d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
	3. Garmin was granted a deviation from TSO-C6d to use SAE AS 8013A instead of SAE AS 8013 as the Minimum Performance Standard.
	4. Garmin was granted a deviation from TSO-C6d to modify the requirement 3.10.2 in SAE AS 8013A.
ETSO-C6d	1. Garmin was granted a deviation from ETSO-C6d to use SAE AS 8013A instead of SAE AS 8013 as the Minimum Performance Standard.
	2. Garmin was granted a deviation from ETSO-C6d to modify the requirement 3.10.2 in SAE AS 8013A.
TSO-C8d	1. Garmin was granted a deviation from TSO-C8d to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C8d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
	3. Garmin was granted a deviation from TSO-C8d to use SAE AS 8016A instead of SAE AS 8016 as the Minimum Performance Standard
	4. Garmin was granted a deviation from TSO-C8d to modify the requirement 3.2.4 in SAE AS 8016A.
ETSO-C8d	1. Garmin was granted a deviation from ETSO-C8d to use SAE AS 8016A instead of SAE AS 8016 as the Minimum Performance Standard.
	2. Garmin was granted a deviation from ETSO-C8d to modify the requirement 3.2.4 in SAE AS 8016A.
TSO-C9c	1. Garmin was granted a deviation from AS-402B paragraph 4.4.1 to limit autopilot engagement to attitudes considered safe for the certified aircraft.
	2. Garmin was granted a deviation from TSO-C9c to use SAE AS-402B instead of AS-402A.
	3. Garmin was granted a deviation from TSO-C9c to use DO-160D instead of specified environmental tests.
	4. Garmin was granted a deviation from TSO-C9c subpart A (c), which requires marking the weight of the unit on the unit.
	5. Garmin was granted a deviation from AS402B paragraph 4.3.2 to not provide servo effort indications when the automatic pilot is not engaged.

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C10b	1. Garmin was granted a deviation from TSO-C10b to use SAE AS 8009A instead of SAE AS 392c as the Minimum Performance Standard.
	2. Garmin was granted a deviation from TSO-C10b to use RTCA DO-160D instead of RTCA DO160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	3. Garmin was granted a deviation from TSO-C10b to modify the requirement 3.7 in SAE AS 8009A.
	4. Garmin was granted a deviation from SAE AS 8009A Section 3.11 to not display ALTITUDE or ALT next to the tape indicating altitude.
ETSO-C10b	1. Garmin was granted a deviation from ETSO-C10b to use SAE AS 8009A instead of SAE AS 392C as the Minimum Performance Standard.
	2. Garmin was granted a deviation from ETSO-C10b to modify the requirement 3.7 in SAE AS 8009A.
	3. Garmin was granted a deviation from SAE AS 8009A Section 3.11 to not display ALTITUDE or ALT next to the tape indicating altitude.
	4. Garmin was granted a deviation from ETSO-C10b to use RTCA DO-160D instead of SAE AS 8009A as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
TSO-C34e	1. Garmin was granted a deviation from TSO-34e to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C34e to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
TSO-C35d	1. Garmin was granted a deviation from TSO-C35d to use RTCA DO-160D instead of RTCA DO-138 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. 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.
	3. Garmin was granted a deviation from TSO C-35d which calls out RTCA DO-143 Section 2.15 to allow the visual indication of the Standard.
ETSO-2C35d	1. Garmin was granted a deviation from ETSO-2C35d which calls out EUROCAE 1/WG7 Section 3.16 to allow the visual indication of the Standard.
TSO-C36e	1. Garmin was granted a deviation from TSO36e to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C36e to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
TSO-C37d	1. Garmin was granted a deviation from TSO-C37d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
	2. Garmin was granted a deviation from TSO-C37d to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	3. Garmin was granted a deviation from TSO-C37d paragraph (a)(1) to allow using RTCA document DO-186a instead of RTCA document DO-186 to specify minimum performance standards.
	4. Garmin was granted a deviation from TSO-C37d paragraph (a)(5) to allow 8.33 kHz spacing in addition to the 25 kHz spacing.
	5. Garmin was granted a deviation from TSO-C37d paragraph (b)(1) to allow the marking to call out 8.33 kHz spacing in addition to the 25 kHz spacing.

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C38d	1. Garmin was granted a deviation from TSO-C38d to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
	2. Garmin was granted a deviation from TSO-C38d to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	3. Garmin was granted to deviate from TSO-C38d paragraph (a)(1) to allow using RTCA document DO-186a instead of RTCA document DO-186 to specify minimum performance standards.
	4. Garmin was granted a deviation from TSO-C38d paragraph (a)(5) to allow 8.33 kHz spacing in addition to the 25 kHz spacing.
TSO-C40c	1. Garmin was granted a deviation from TSO-C40c to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.
	2. Garmin was granted a deviation from TSO-C40c to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
TSO-C41d	1. Garmin was granted a deviation from TSO-C41d to use RTCA DO-178B instead of RTCA DO-178 to demonstrate compliance for the verification and validation of the computer software.
	2. Garmin was granted a deviation from TSO-C41d to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
TSO-C43c	1. Garmin was granted a deviation from TSO-C43c to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-C43c to use SAE AS 8005A instead of SAE AS 8005 as the Minimum Performance Standard.
ETSO-C43c	1. Garmin was granted a deviation from ETSO-C43c to use SAE AS 8005A instead of SAE AS 8005 as the Minimum Performance Standard.
TSO-C44b	1. Garmin was granted a deviation from TSO-C44b section a.3 to use DO-160D for the Environmental Standard.
	2. Garmin was granted a deviation from TSO-C44b section b.1 to not display the software part number on the outside of the unit.
	3. Garmin was granted a deviation from TSO-C44b to use SAE AS 407C instead of SAE AS 407B to demonstrate compliance for Fuel Flowmeters.
	4. Garmin was granted a deviation from TSO-C44b to modify the requirement 4.2.5 in SAE AS 407C.
	5. Garmin was granted a deviation from TSO-C44b to modify the requirement 4.1.1 in SAE AS 407C.
ETSO-C44b	1. Garmin was granted a deviation from ETSO-C44b to use RTCA DO-160D instead of SAE AS 407B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from ETSO-C44b to use SAE AS 407C instead of SAE AS 407B to demonstrate compliance for Fuel Flowmeters.
	3. Garmin was granted a deviation from ETSO-C44b to modify the requirement 4.2.5 in SAE AS 407C.
	4. Garmin was granted a deviation from ETSO-C44b to modify the requirement 4.1.1 in SAE AS 407C.
TSO-C45a	1. Garmin was granted a deviation from TSO-45a to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from TSO-45a SAE 8042 3.10.5 to use MAN as abbreviation instead of MANIFOLD PRESSURE or MANIF PRESS.
	3. Garmin was granted a deviation from TSO-C45a to modify the requirement 3.10.9 in SAE AS 8042.
ETSO-C45a	1. Garmin was granted a deviation from ETSO-C45a to use RTCA DO-160D instead of SAE AS 411 as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.
	2. Garmin was granted a deviation from ETSO-C45a to use SAE AS 8042 instead of SAE AS 411 for Minimum Performance Standards.
	3. Garmin was granted a deviation from ETSO-C45a SAE 8042 3.10.5 to use MAN as abbreviation instead of MANIFOLD PRESSURE or MANIF PRESS.
	4. Garmin was granted a deviation from ETSO-C45a to modify the requirement 3.10.9 in SAE AS 8042.

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C47	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C47 to use SAE AS 408C instead of SAE AS 408A for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from TSO-C47 to modify the requirement 4.1.5 in SAE AS 408C.</li> <li>3. Garmin was granted a deviation from TSO-C47 to use RTCA DO-160D instead of AS 408C as the standard for Environmental Standards.</li> </ol>
ETSO-C47	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C47 to use SAE AS 408C instead of SAE AS 408A for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from ETSO-C47 to modify the requirement 4.1.5 in SAE AS 408C.</li> <li>3. Garmin was granted a deviation from ETSO-C47 to use RTCA DO-160D instead of AS 408C as the standard for Environmental Standards.</li> </ol>
TSO-C49b	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C49b to use SAE AS 404C instead of SAE AS 404B for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from TSO-C49b to modify the requirement 4.1.2 in SAE AS 404C.</li> <li>3. Garmin was granted a deviation from TSO-C49b, SAE AS 404C requirement 4.1.3.2.</li> <li>4. Garmin was granted a deviation from TSO-C49b to use DO-160D instead of SAE AS 407B as the Environmental Standard.</li> </ol>
ETSO-C49b	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C49b to use SAE AS 404C instead of SAE AS 404B for Minimum Performance Standards and Environmental Standards.</li> <li>2. Garmin was granted a deviation from ETSO-C49b to modify the requirement 4.1.2 in SAE AS 404C.</li> <li>3. Garmin was granted a deviation from ETSO-C49b, SAE AS 404C requirement 4.1.3.2.</li> <li>4. Garmin was granted a deviation from ETSO-C49b to use DO-160D instead of SAE AS 404B as the Environmental Standard.</li> </ol>
TSO-C52b	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from AS-8008 paragraph 3.6 to limit flight director operation to attitudes considered safe for the certified aircraft.</li> <li>2. Garmin was granted a deviation from TSO-52b to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> </ol>
TSO-C55	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C55 to use SAE AS 405C instead of SAE AS 405B to demonstrate compliance for Fuel and Oil Quantity Instruments.</li> <li>2. Garmin was granted a deviation from TSO-C55 to modify the requirement 4.2.5 in SAE AS 405C.</li> <li>3. Garmin was granted a deviation from TSO-C55 to modify the requirement 4.2.4 in SAE AS 405C.</li> </ol>
ETSO-C55	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from ETSO-C55 to use SAE AS 405C instead of SAE AS 405B to demonstrate compliance for Fuel and Oil Quantity Instruments.</li> <li>2. Garmin was granted a deviation from ETSO-C55 to modify the requirement 4.2.5 in SAE AS 405C.</li> <li>3. Garmin was granted a deviation from ETSO-C55 to modify the requirement 4.2.4 in SAE AS 405C to allow "FUEL QTY" to be used to abbreviate "Fuel Quantity".</li> <li>4. Garmin was granted a deviation from ETSO-C55 to use DO-160D instead of SAE AS 405B as the Environmental Standard.</li> </ol>
TSO-C63c	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-63c to use RTCA DO-160D instead of RTCA DO-160A as the standard Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>2. Garmin was granted a deviation from TSO-63c to use RTCA DO-178B instead of RTCA DO-178 to demonstrate compliance for the verification and validation of the computer software.</li> </ol>

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C66c	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C66c to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C66c to use RTCA DO-160D instead of RTCA DO-160C as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> </ol>
TSO-C74c	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C74c section (c) Marking to allow the environmental categories to be left off of the S/N Tag.</li> </ol>
TSO-C87	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C87 to use RTCA/DO-160D instead of the FAA Document for "Environmental Test Procedures for Airborne Electronic Equipment," dated August 31, 1962.</li> </ol>
TSO-C110a	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C110a to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C110a to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> </ol>
TSO-C112	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C112 to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C112 to use Section 2 of RTCA DO-181C to meet the minimum performance standard instead of the revisions DO-181 revisions and changes listed. DO-181C contains all the revisions listed by the TSO.</li> <li>3. Garmin was granted a deviation from TSO-C112 to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> </ol>
TSO-C113	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C113 to use RTCA DO-178B instead of RTCA DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C113 to use RTCA DO-160D instead of RTCA DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> </ol>
TSO-C118	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C118 to use RTCA/DO-178B sections 2 through 11 instead of RTCA/DO-178A to demonstrate compliance for the verification and validation of the computer software.</li> <li>2. Garmin was granted a deviation from TSO-C118 to use RTCA/DO-160D instead of RTCA/DO-160B as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.</li> <li>3. Garmin was granted a deviation from TSO-C118 to use RTCA/DO-197A instead of RTCA/DO-197 as the Minimum Operational Performance Standards.</li> </ol>
TSO-C129a	<ol style="list-style-type: none"> <li>1. Garmin was granted a deviation from TSO-C129a to use DO-160D instead of DO-160C for the environmental standard.</li> <li>2. Garmin was granted a deviation from TSO-C129a to eliminate the annunciation for pending CDI scale change 3.0 NM from the FAF.</li> <li>3. Garmin was granted a deviation from TSO-C129a involving the use of GPS calibrated altitude in approach mode.</li> <li>4. Garmin was granted a deviation from TSO-C129a to extend automatic CDI sensitivity changes to non-approach mode navigation.</li> <li>5. Garmin was granted a deviation from TSO-C129a to eliminate the requirement in (a)(3)(xi)1.b.ii to "alert the pilot of the need to manually insert the barometric pressure".</li> <li>6. Garmin was granted a deviation from TSO-C129a to modify the requirement (a)(3)(xii)(3) to allow the approach mode to be deselected by performing a direct-to action on the unit.</li> <li>7. Garmin was granted a deviation from TSO-C129a to eliminate the requirement in (a)(3)(xv)4.b to provide a "means to manually identify a satellite that is expected to be unavailable at the destination (for scheduled maintenance as identified in FAA Notice to Airmen) shall be provided" for the RAIM prediction process.</li> <li>8. Garmin was granted a deviation from TSO-C129a to change the requirement in paragraph (a)(7)(ii) to match the WAAS TSO-C145a and DO-229 requirements for Power input testing.</li> </ol>

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
ETSO-C129a	<p>1. Garmin was granted a deviation from ETSO-C129a (ED-72A 3.2.2.1f(3) and 3.2.2.4j(4)) to eliminate the annunciation for pending CDI scale change 3.0 NM from the FAF.</p> <p>2. Garmin was granted a deviation from ETSO-C129a (ED-72A 3.2.2.1f(4), 3.2.2.3e(4), and 3.2.2.4j(2)) to eliminate the requirement to “alert the pilot of the need to manually insert the barometric pressure.</p> <p>3. Garmin was granted a deviation from ETSO-C129a (ED-72A 3.2.2.4j(8)) to modify the requirement to allow the approach mode to be deselected by performing a direct-to action on the unit.</p> <p>4. Garmin was granted a deviation from ETSO-C129a (ED-72A 3.2.2.3d(2)).</p> <p>5. Garmin was granted a deviation from ETSO-C129a to change the requirement in ED-72A paragraph 4.16.2.</p>
TSO-C146a	<p>1. Garmin was granted a deviation from RTCA/DO-229C 2.2.1.1.4.3.</p> <p>2. Garmin was granted a deviation from RTCA/DO-229C 2.2.1.4.9.c.</p> <p>3. Garmin was granted a deviation from RTCA/DO-229C 2.2.4.2.3.</p> <p>4. Garmin was granted a deviation from RTCA/DO-229C 2.2.4.6.4 and 2.2.5.6.4 pertaining to the low altitude alerting function.</p> <p>5. Garmin was granted a deviation to not furnish each person receiving a GDU 1XXX copies of the following data</p> <p style="margin-left: 20px;">TSO-C146a 5.c(2)</p> <p style="margin-left: 20px;">TSO-C146a 5.a(13)</p> <p style="margin-left: 20px;">TSO-C146a 5.a(14)</p> <p>6. Garmin was granted a deviation from RTCA/DO-229C 2.2.1.1.6 to use the terms “ADVISORY” and “ALERTS” in addition to “MSG” depending upon the installation.</p>

<b>TSO/ETSO Deviations, continued</b>	
<b>TSO/ETSO</b>	<b>Deviation</b>
TSO-C151b	<p>1. Garmin was granted a deviation from TSO-C151b 5.c(2)</p> <p>TSO-C151b 5.a(11) states “An environmental qualification form as described in RTCA/DO-160D or the most current revision for each component of the TAWS equipment.”</p> <p>TSO-C151b 5.a(12) primarily states “A list of all drawings and processes, including revision level, necessary to define the article's design.”</p> <p>TSO-C151b 5.a(13) primarily states “If the article includes software: Plan for Software Aspects of Certification (PSAC); Software Configuration Index; and Software Accomplishment Summary.”</p> <p>Garmin was granted a deviation to not furnish each person receiving a GDU 1XXX copies of the data in 5.a(12) and 5.a(13).</p>
TSO-C169	<p>1. Garmin was granted a deviation to TSO-C169, paragraph 4.e requirement to mark (DEV) after the TSO number on the equipment. Garmin will mark as follows, as TSO-C169 is not the primary TSO and the Install Manual contains all of the TSO-C169 information including deviations.</p> <p>TSO-C113 See Install Manual for additional TSO's</p>

### 1.5.3 Non-TSO Functions

These functions were tested to RTCA/DO-160D environmental qualifications and were demonstrated only when the GDU 104X is installed as a component of a G1000 system.

Function	Design Assurance	Applicable LRU SW Part Numbers	Applicable Custom Logic Device Part Numbers
<p>Traffic Information Service (TIS)</p> <p>The GDU contains a subset of the TIS function. The Minimum Operational Performance Specifications (MOPS) for TIS are contained in RTCA/DO-239. The GDU 1500 has been demonstrated to meet these MOPS only when installed as a component in a G1000 system, using a GTX 33/GTX 33D transponder.</p>	<p>RTCA/DO-178B Level D</p> <p>RTCA/DO-254 Level B</p>	<p>006-B0319-() 006-B0320-()</p>	<p>006-C0035-() 006-C0036-()</p>
<p>Configurable Minor and Major Alert</p> <p>Configurable alerts can provide alert information both audibly and visually. These alerts are airframe specific, and are defined during the airframe specific software upload process. The Configurable Alert function provides the logic to support the generation of alerts up to "Hazardous" level of criticality, however the criticality of each alert configured with this function is considered separately and is consistent with the data used by the function to generate the alert or the capability of the display function to communicate it to the pilot/crew. Each alert provided by this function is at a criticality level that is appropriate for that alert.</p>	<p>RTCA/DO-178B Level B</p> <p>RTCA/DO-254 Level B</p>	<p>006-B0319-() 006-B0320-()</p>	<p>006-C0035-() 006-C0036-()</p>
<p>En Route and Terminal Baro-altitude Vertical Navigation (BARO VNAV)</p> <p>Guidance based on specified altitudes at waypoints in the active flight plan or the direct-to waypoint is provided. The Minimum Operational Performance Specifications (MOPS) for BARO VNAV are based on RTCA/DO-236B and RTCA/DO-283A. It includes vertical path guidance to a descending path, which is provided to the flight crew as a linear deviation from the desired path. The desired path is defined by a line joining two waypoints with specified altitudes or as a vertical angle from a specified waypoint/altitude. The desired vertical path is pilot selectable. The vertical waypoints are integrated into the active flight plan display and thus accessible by a single press of the FPL key. A vertical direct-to function similar to the lateral direct-to feature is provided. Both manual and autopilot-coupled guidance are supported. Compensation of altitudes at extreme cold temperatures is not provided. No performance management related capability, such as speed control, is provided.</p>	<p>RTCA/DO-178B Level C</p> <p>RTCA/DO-254 Level B</p>	<p>All 006-B0319-() except 006-B0319-00 through 006-B0319-49</p>	<p>006-C0035-() 006-C0036-()</p>



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## 1.6 Reference Documents

The following publications are sources of additional information for installing the GDU 104X. Before installing the GDU 104X, the technician should read all referenced materials along with the manual.

Part Number	Document
190-00303-00	G1000 System Installation Manual
190-00303-04	G1000 Line Maintenance and Configuration Manual

## 1.7 Limited Warranty

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

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

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

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

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

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

Garmin International, Inc.  
1200 E. 151st Street  
Olathe, KS 66062, U.S.A.  
Phone: 800/800.1020  
FAX: 913/397.0836

Garmin (Europe) Ltd.  
Liberty House  
Bulls Copse Road  
Hounslow Business Park  
Southampton, SO40 9RB, UK  
Telephone: 44 (0) 8708501241

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## **2       INSTALLATION OVERVIEW**

### **2.1     Introduction**

This section provides hardware equipment information for installing the GDU 104X and related hardware. Installation of the GDU 104X 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 43.13-2A, where applicable, may be found useful for making retro-fit installations that comply with FAA regulations. Refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for further details on the mechanical aspects of the G1000 system.

## 2.1.1 Unit Configurations

The GDU 104X is only available as a single unit under the following part numbers:

**NOTE**

All units are black, unless otherwise noted.

Item	Applicable LRU Software Part Numbers	Applicable Custom Logic Device Part Numbers	Garmin P/N
GDU 1040 Unit Only, (011-00972-00) <sup>1,2,4</sup>	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()	010-00337-00
GDU 1040 Unit Only, ETSO, (011-00972-02) <sup>2,4</sup>	006-B0319-() 006-B0320-()	006-C0035-() 006-C0036-()	010-00337-02
GDU 1040 Unit Only, HTR, (011-00972-03) <sup>2,4</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-29	006-C0035-() 006-C0036-()	010-00337-03
GDU 1040A Unit Only, (011-00916-00) <sup>3,4</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-41	006-C0035-() 006-C0036-()	010-00320-00
GDU 1042 Unit Only, (011-01080-00) <sup>4</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-29	006-C0035-() 006-C0036-()	010-00367-00
GDU 1043 Unit Only, (011-01079-00) <sup>4</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-29	006-C0035-() 006-C0036-()	010-00366-00
GDU 1044 Unit Only, (011-01078-01) <sup>5</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-49	006-C0035-() 006-C0036-()	010-00365-01
GDU 1044B Unit Only, (011-01274-00) <sup>5</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-49	006-C0035-() 006-C0036-()	010-00471-00
GDU 1045 Unit Only, (011-00819-04) <sup>5</sup>	All 006-B0319-() except 006-B0319-00 through 006-B0319-49	006-C0035-() 006-C0036-()	010-00279-04

1. Dash numbers -00 and -01 for the GDU 1040 (011-00972-( )) do not meet the following :  
ETSO requirements (ETSO-2C112a (EUROCAE ED-73A Section 4.23, ESD)).  
All other GDU 1040 (011-00972-( )) dash numbers do meet ETSO requirements.
2. All dash numbers for the GDU1040 (011-00972-( )) do not meet the following :  
Control functions in SAE AS8008 Section 3.7 (TSO-C52b/ETSO-C52b), except Preselect Altitude and Preselect Heading.  
SAE AS402B Section 4.2.3 (TSO-C9c/ETSO-C9c).  
All other applicable TSO-C9c/ETSO-C9c and TSO-C52b/ETSO-C52b requirements are met.
3. All dash numbers for the GDU1040A (011-00916-( )) do not meet the following :  
Control functions in SAE AS8008 Section 3.7 (TSO-C52b/ETSO-C52b).  
SAE AS402B Section 4.2.3 (TSO-C9c/ETSO-C9c).  
All other applicable TSO-C9c/ETSO-C9c and TSO-C52b/ETSO-C52b requirements are met.
4. All dash numbers for the GDU 1040 (011-00972-()), the 1040A (011-00916-()), the 1042 (011-01080-()), and the 1043 (011-01079-()) do not provide control functions to support auto-pilot coupled guidance for non-TSO function BARO VNAV. All other non-TSO function BARO VNAV requirements are met.
5. These units meet all applicable requirements.

## 2.1.2 Required Accessories

Each of the following accessories is provided separately from the GDU 104X unit and is required to install the unit.

Item	Garmin P/N
GDU 1040 Connector Kit w/SPIDER	011-00820-00
GDU 1040 Connector Kit w/Shield Block	011-00820-01
GDU 1040 Mounting Hardware	011-00821-XX (See Section 2.5)

## 2.1.3 Additional Items

Each of the following optional accessories are provided separately from the GDU 104X unit.

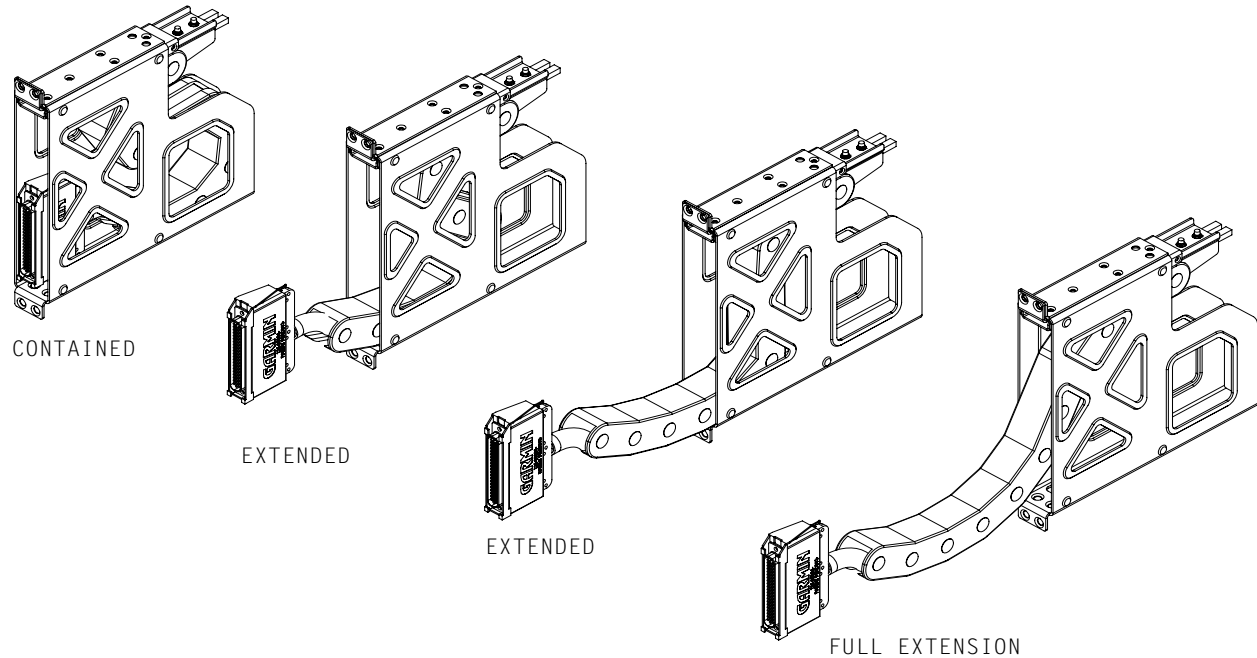
Item	Garmin P/N
G1000 System Rack	115-00413-00 or 115-00635-00
G1000 Rack Nutplate Kit	011-01148-00 or 011-00915-00
G1000 System Rack Nutplate Kit	011-01622-00 or 011-01622-01
CHiPS Mounting Rack	115-00483-00
CHiPS Cable Conduit	011-00890-00

## 2.2 Installation Considerations

Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are required for installation of the GDU 104X.

### 2.2.1 CHiPS Harness

The CHiPS (Cable Harness Protection System) can be used when the display is mounted in front of the main system rack. The flexible chain link conduit protects the harness and also eases the retraction of the harness back into the rack when installing the display.



**Figure 2-1. CHiPS Harness**

## 2.3 Cabling and Wiring

Use AWG #24 or larger wire for all connections unless otherwise specified by the aircraft manufacturer or Garmin. The standard pin contacts supplied in the connector kit are compatible with up to AWG #22 wire. In cases where some installations have more than one unit sharing a common circuit breaker, sizing and wire gauge is based on aircraft circuit breaker layout, length of wiring, current draw of units, and internal unit protection characteristics. Do not attempt to combine more than one unit on the same circuit breaker unless it is specified on aircraft manufacturer approved drawings.

In some cases, a larger gauge wire such as AWG #16, #18, or #20 may be needed for power connections. The provided connector kit supplies extended barrel contacts for AWG #16 and #18 wire, if required. Special thin-wall heat shrink tubing is also provided to insulate the extended barrels inside the backshell. If using #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.

## 2.4 Cooling Requirements

Refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for information on G1000 system cooling requirements.

## 2.5 Mounting Requirements

The GDU 104X mounting hardware is designed to accommodate various sheet metal panel thickness (see the following table).

GDU 104X Mounting Hardware P/N	Sheet Metal Panel Thickness
011-00821-00	0.080" $\pm$ 0.005
011-00821-01	0.125" $\pm$ 0.005
011-00821-02	0.090" $\pm$ 0.005
011-00821-03	0.100" $\pm$ 0.005

The locking socket (See Figure 2-2) can be attached by using a rivet or screw. If using rivets, the rivet should be a 1/8" flat head 100° countersunk solid rivet. If using screws, the screw should be #4-40 flat head 100° countersunk screws with standard hex nuts on the back. If screws are used, thread locking compound (Loctite or equivalent) or a self locking nut with a nylon locking feature should be used. The specified screws and rivets are designed to provide a flush front surface. See Figure A-1 for the GDU Panel Cutout.

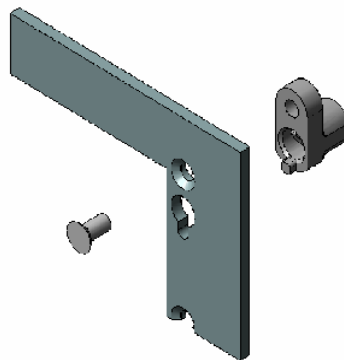


Figure 2-2. GDU 104X Locking Socket

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### 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 Wiring Harness Installation

Allow adequate space for installation of cables and connectors. The installer shall supply and fabricate all of the cables. All electrical connections are made through a single 62-pin high-density D subminiature connector. Section 4 defines the electrical characteristics of all input and output signals. Required connectors and associated hardware are supplied with the connector kit.

See Appendix B for examples of interconnect wiring diagrams. Construct the actual harness in accordance with aircraft manufacturer authorized interconnect standards.

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

Manufacturer	62 pin D-Subminiature connector (P10001)		
	16 AWG (Power Only)	18-20 AWG	22-28 AWG
Garmin P/N	336-00044-01	336-00044-00	336-00021-00
Military P/N	N/A	N/A	M39029/58-360
AMP	N/A	N/A	204370-2
Positronic	N/A	N/A	MC8522D
ITT Cannon	N/A	N/A	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 and #18 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.

### 3.3 Backshell Assemblies

The GDU 104X connector kit includes one Garmin backshell assembly. The backshell assembly houses the configuration module/temperature sensor, if applicable. Garmin's backshell also gives the installer the ability to easily terminate shield grounds at the backshell housing using one of two methods available (SPIDER or Shield Block). To assemble the backshell, configuration module, and grounding system, refer to instructions provided in the G1000 System Installation Manual (190-00303-00), as well as the SPIDER Installation Instructions (190-00313-03) and Shield Block Installation Instructions (190-00313-09).

#### NOTE

Information about the SPIDER grounding system is provided in support of existing installations. All new installation shall use the Shield Block grounding system.

### 3.4 CHiPS Harness Installation

1. Connect the CHiPS Mounting Rack to the G1000 System Rack using the G1000 Rack Nutplate Kit as shown in Figure A-4. The CHiPS Mounting Rack can only be mounted in the right most position.
2. Press wires through the bottom of the CHiPS Conduit Assembly.

#### NOTE

For ease of insertion wires should only be inserted in groups of 5 or less, insuring retention tabs are returning to their original position.

3. Secure wire bundle to the CHiPS Mounting Rack strain relief protrusion using 1 tie wrap, as shown in Figure A-3.

#### NOTE

Tie wraps should not be used within the CHiPS Conduit Assembly.

4. Connect the CHiPS Conduit Assembly to the CHiPS Mounting Rack by aligning the locking tabs located on the CHiPS Mounting Rack with the CHiPS Conduit Assembly. Push the CHiPS Conduit Assembly up and slide back to lock in place as shown in Figure 3-1. Fasten the CHiPS Conduit Assembly to the CHiPS Mounting Rack using the G1000 Rack Nutplate Kit as shown in Figure A-4.

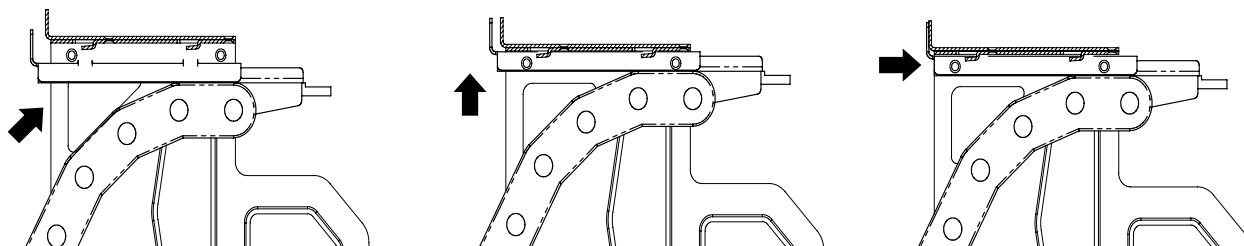


Figure 3-1. CHiPS Conduit Assembly Mounting

### 3.5 Unit Installation

The GDU 104X is installed by holding the unit flush with the instrument panel. The locking studs should be oriented with the alignment marks in the vertical position for installation. A 3/32" hex drive tool is then used to turn each of the four locking sockets ¼ turn clockwise. When locked, the alignment marks are in the horizontal position.

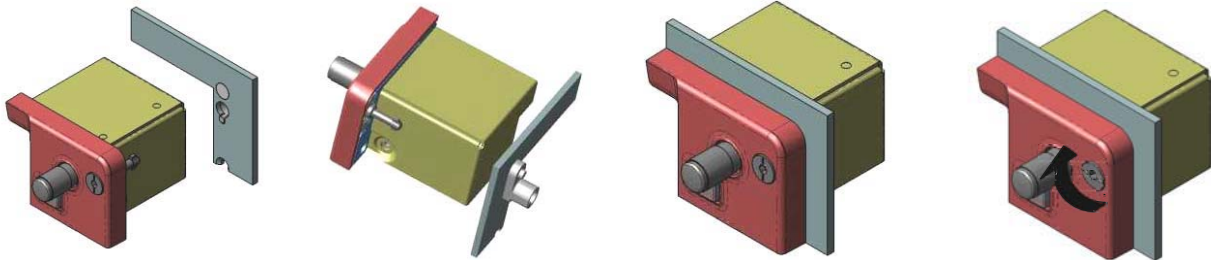


Figure 3-2. GDU 104X ¼ Turn Fastener

### 3.6 Post Installation Configuration & Checkout

**NOTE**

The GDU 104X does not provide valid outputs until the aircraft post installation configuration procedures are completed.

The GDU 104X must be installed with a Garmin G1000 system and have FAA approved configuration data. Configuration data is loaded to the GDU 104X from an aircraft-specific G1000 SW Loader Card. GDU 104X settings are predetermined for a specific aircraft and are typically contained within the file names:

- 'AIRFRAME'
- 'SYSTEM'
- 'MANIFEST'
- 'PFD1'
- 'MFD1'
- 'PFD2' (Dual PFD installation only)

For basic configuration information, refer to the G1000 Line Maintenance and Configuration Manual, Garmin Part Number 190-00303-04. For actual aircraft installation/checkout, use only aircraft manufacturer approved checkout procedures.

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### 3.7 Continued Airworthiness

For all units that comply with the mod status level listed in Table 3-3, maintenance of the GDU 104X is “on condition” only.

For all units that do **not** comply with the mod status level listed in Table 3-3, perform the power interrupt annual inspection as described in the applicable airframe specific G1000 maintenance manual.

**Table 3-3. Long Term Power Interrupt Category A (200 mS) Mod Status**

Unit	Unit Part Number	Long Term Power Interrupt Category A (200 mS)* Mod Status
GDU 1040	011-00972-00	2
	011-00972-02	1
	011-00972-03	1
GDU 1040A	011-00916-00	1
GDU 1042	011-01080-00	1
GDU 1043	011-01079-00	1
GDU 1044	011-01078-01	1
GDU 1044B	011-01274-00	1
GDU 1045	011-00819-04	1

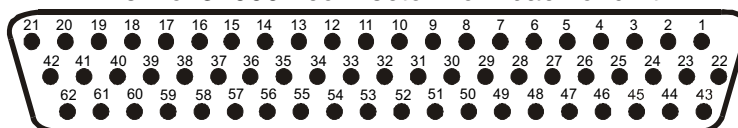
\*Per RTCA DO-160D Section 16

## 4 SYSTEM INTERCONNECTS

### 4.1 Pin Function List

#### 4.1.1 P10001 Connector

View of J10001 connector from back of unit



Pin	Pin Name	I/O
1	CONFIG MODULE GROUND	Out
2	ETHERNET OUT 1 A	Out
3	ETHERNET OUT 1 B	Out
4	ETHERNET IN 1 A	In
5	ETHERNET IN 1 B	In
6	ETHERNET OUT 2 A	Out
7	ETHERNET OUT 2 B	Out
8	ETHERNET IN 2 A	In
9	ETHERNET IN 2 B	In
10	ETHERNET OUT 3 A	Out
11	ETHERNET OUT 3 B	Out
12	ETHERNET IN 3 A	In
13	ETHERNET IN 3 B	In
14	FAN MONITOR VALID*	In
15	REVERSIONARY MODE SELECT 2	In
16	ARINC 429 IN 2 A	In
17	ARINC 429 IN 2 B	In
18	ARINC 429 IN 1 A	In
19	ARINC 429 IN 1 B	In
20	SIGNAL GROUND	--
21	SIGNAL GROUND	--
22	CONFIG MODULE DATA	I/O
23	CONFIG MODULE POWER OUT	Out
24	RESERVED	--
25	RESERVED	--
26	SIGNAL GROUND	--
27	POWER GROUND	--
28	RESERVED	--
29	POWER GROUND	--
30	SIGNAL GROUND	--
31	POWER GROUND	--
32	SIGNAL GROUND	--
33	POWER GROUND	--
34	SIGNAL GROUND	--

Connector P10001, continued		
Pin	Pin Name	I/O
35	AIRCRAFT POWER 1	In
36	SIGNAL GROUND	--
37	AIRCRAFT POWER 1	In
38	SIGNAL GROUND	--
39	AIRCRAFT POWER 2	In
40	SIGNAL GROUND	--
41	AIRCRAFT POWER 2	In
42	SIGNAL GROUND	--
43	CONFIG MODULE CLOCK	Out
44	RS-232 OUT 1	Out
45	RS-232 IN 1	In
46	RS-232 OUT 2	Out
47	RS-232 IN 2	In
48	UNIT 5 REMOTE POWER OFF	Out
49	UNIT 4 REMOTE POWER OFF	Out
50	UNIT 3 REMOTE POWER OFF	Out
51	UNIT 2 REMOTE POWER OFF	Out
52	UNIT 1 REMOTE POWER OFF	Out
53	RESERVED	--
54	DEMO MODE SELECT*	In
55	CDU SYSTEM ID PROGRAM* 1	In
56	CDU SYSTEM ID PROGRAM* 2	In
57	CDU SYSTEM ID PROGRAM* 3	In
58	REVERSIONARY MODE SELECT 1	In
59	LIGHTING BUS HI	In
60	LIGHTING BUS LO	In
61	RESERVED	--
62	RESERVED	--

\* Indicates Active Low

## 4.2 Power

### 4.2.1 Power Functions

This section covers the power input requirements.

#### 4.2.1.1 Aircraft Power

Pin Name	Connector	Pin	I/O
AIRCRAFT POWER 1	P10001	35	In
AIRCRAFT POWER 1	P10001	37	In
AIRCRAFT POWER 2	P10001	39	In
AIRCRAFT POWER 2	P10001	41	In
POWER GROUND	P10001	27	--
POWER GROUND	P10001	29	--
POWER GROUND	P10001	31	--
POWER GROUND	P10001	33	--

Pins 35 and 37 are internally connected to form AIRCRAFT POWER 1. Pins 39 and 41 are internally connected to form AIRCRAFT POWER 2. AIRCRAFT POWER 1 and AIRCRAFT POWER 2 are “diode ORed” to provide aircraft power redundancy.

### 4.2.1.2 Remote Power

Pin Name	Connector	Pin	I/O
UNIT 5 REMOTE POWER OFF	P10001	48	Out
UNIT 4 REMOTE POWER OFF	P10001	49	Out
UNIT 3 REMOTE POWER OFF	P10001	50	Out
UNIT 2 REMOTE POWER OFF	P10001	51	Out
UNIT 1 REMOTE POWER OFF	P10001	52	Out

Used to control power of a remote sub-system. 28 Volts DC turns the remote unit off. Ground/Open turns the remote unit on.

## 4.3 Configuration

### 4.3.1 CDU System ID Program

CDU SYSTEM ID PROGRAM 1 (P10001, Pin 55)	CDU SYSTEM ID PROGRAM 2 (P10001, Pin 56)	CDU SYSTEM ID PROGRAM 3 (P10001, Pin 57)	DISPLAY
Open	Open	Ground	MFD
Open	Open	Open	PFD1
Ground	Open	Open	PFD2

These inputs determine if the GDU 104X is a MFD or PFD.

### 4.3.2 Configuration Module

Pin Name	Connector	Pin	I/O
CONFIG MODULE GROUND	P10001	1	Out
CONFIG MODULE DATA	P10001	22	I/O
CONFIG MODULE POWER OUT	P10001	23	Out
CONFIG MODULE CLOCK	P10001	43	Out

### 4.3.3 Reversionary Mode

Pin Name	Connector	Pin	I/O
REVERSIONARY MODE SELECT 1	P10001	58	In
REVERSIONARY MODE SELECT 2	P10001	15	In

These inputs determine whether to place the system in reversionary mode.

### 4.3.4 Demo Mode

Pin Name	Connector	Pin	I/O
DEMO MODE SELECT	P10001	54	In

This is an active low input that places the unit in demo mode. This input is not to be used in aircraft installations.

## 4.4 Serial Data

### 4.4.1 RS-232

Pin Name	Connector	Pin	I/O
RS-232 OUT 1	P10001	44	Out
RS-232 IN 1	P10001	45	In
RS-232 OUT 2	P10001	46	Out
RS-232 IN 2	P10001	47	In

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.

### 4.4.2 ARINC 429

Pin Name	Connector	Pin	I/O
ARINC 429 IN 2 A	P10001	16	In
ARINC 429 IN 2 B	P10001	17	In
ARINC 429 IN 1 A	P10001	18	In
ARINC 429 IN 1 B	P10001	19	In

The ARINC 429 inputs conform to ARINC 429 electrical specifications when loaded with up to 2 standard ARINC 429 transmitters.

### 4.4.3 Ethernet

Pin Name	Connector	Pin	I/O
ETHERNET OUT 1 A	P10001	2	Out
ETHERNET OUT 1 B	P10001	3	Out
ETHERNET IN 1 A	P10001	4	In
ETHERNET IN 1 B	P10001	5	In
ETHERNET OUT 2 A	P10001	6	Out
ETHERNET OUT 2 B	P10001	7	Out
ETHERNET IN 2 A	P10001	8	In
ETHERNET IN 2 B	P10001	9	In
ETHERNET OUT 3 A	P10001	10	Out
ETHERNET OUT 3 B	P10001	11	Out
ETHERNET IN 3 A	P10001	12	In
ETHERNET IN 3 B	P10001	13	In

This Ethernet based HSDB (High Speed Data Bus) meets the hardware aspects of IEEE standard 802.3 for 10 base T Ethernet communications.

## 4.5 Lighting

Pin Name	Connector	Pin	I/O
LIGHTING BUS HI	P10001	59	In
LIGHTING BUS LO	P10001	60	In

The GDU 104X display and keys can be configured to track 28 Vdc, 14 Vdc, 5 Vdc, or 5 Vac lighting busses using these inputs. Alternatively, the GDU 104X can be configured to automatically adjust for ambient lighting conditions based on the photocell. See the G1000 Line Maintenance and Configuration manual, Garmin part number 190-00303-04, for more information.



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## 4.6 Fan Monitor

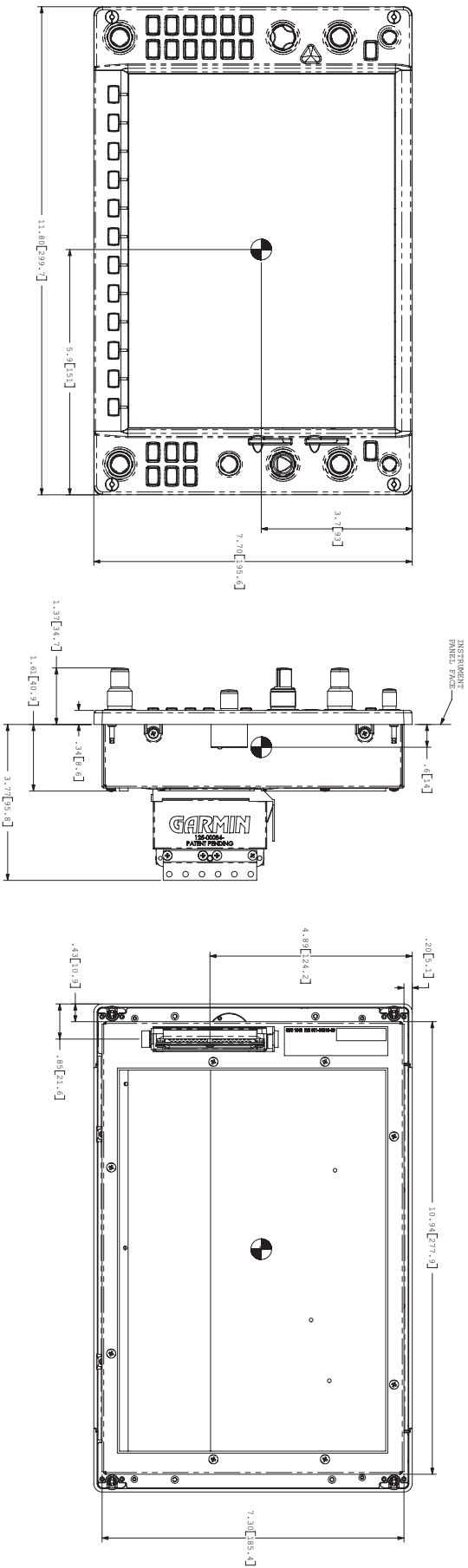
Pin Name	Connector	Pin	I/O
FAN MONITOR VALID*	P10001	14	In

An active low input that monitors the status of the cooling fan.

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NOTES:  
 1. DIMENSIONS: INCHES [mm].  
 2. DIMENSIONS ARE SHOWN FOR REFERENCE ONLY.

Figure A-2. GDU 104X Outline Drawing



APPENDIX A OUTLINE & INSTALLATION DRAWINGS

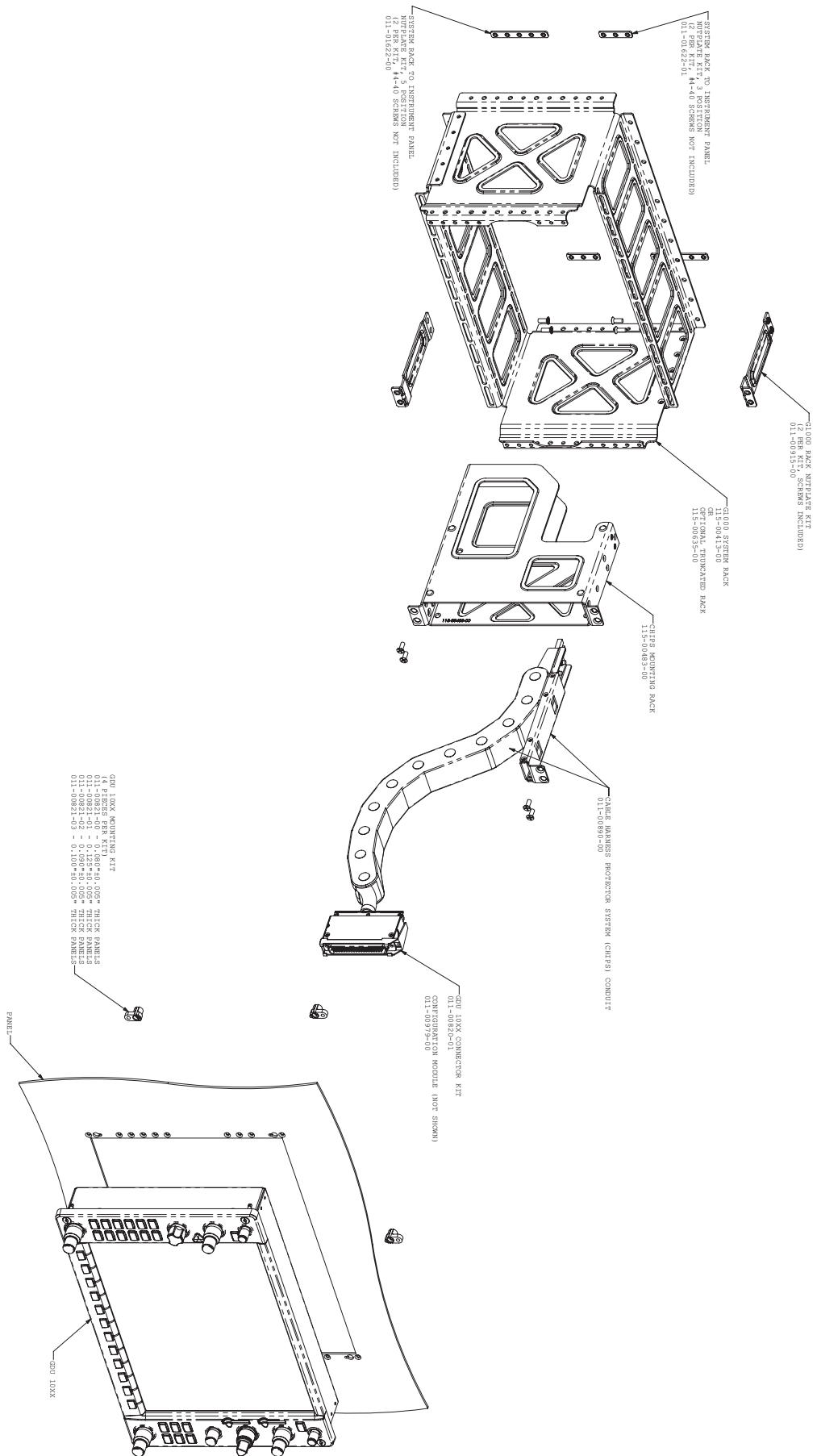


Figure A-4. Installation Drawing (Sheet 1 of 2)

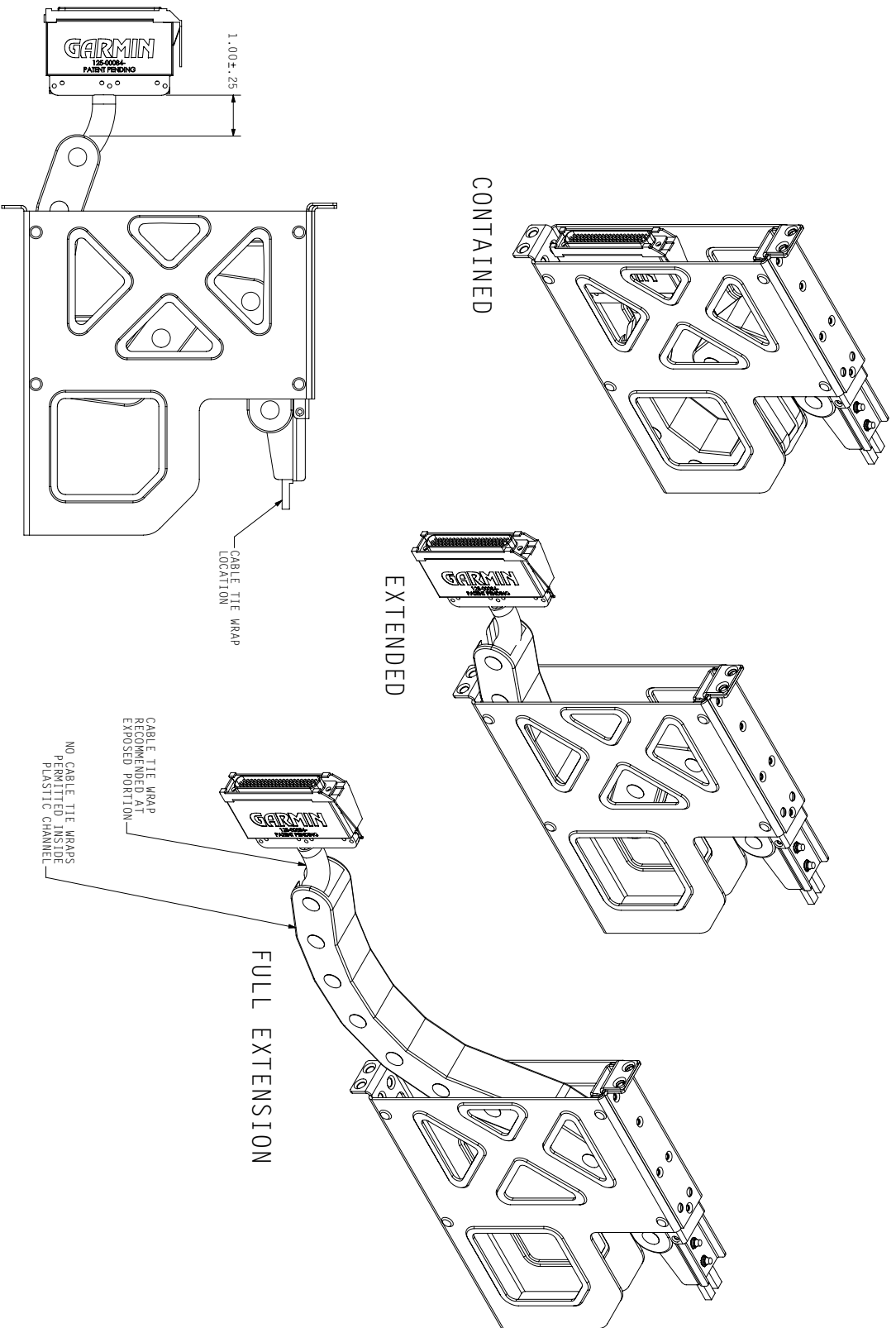
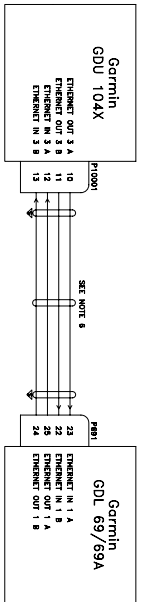
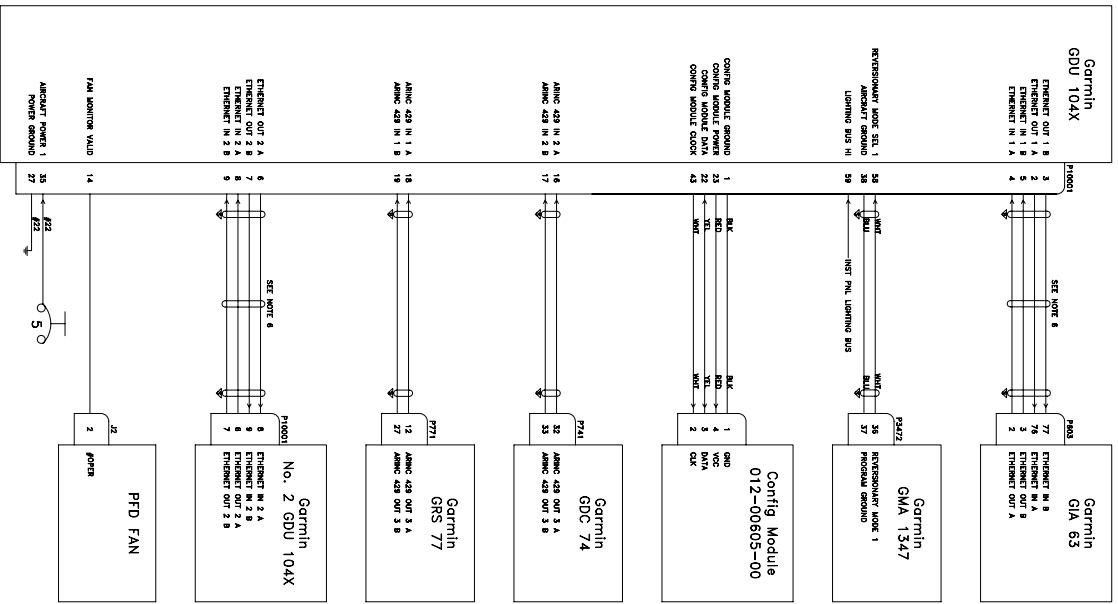


Figure A-4. Installation Drawing (Sheet 2 of 2)



NOTES:

- UNLESS OTHERWISE NOTED, ALL STRANDED WIRE MUST CONFORM TO MIL-W-22759/16 OR EQUIVALENT
- UNLESS OTHERWISE NOTED, ALL SHIELDED WIRE MUST CONFORM TO MIL-C-27500 OR EQUIVALENT
- UNLESS OTHERWISE NOTED, ALL WIRES ARE 24 GAUGE MINIMUM.
- SYMBOL DESIGNATIONS
  - TWISTED SHIELDED SINGLE CONDUCTOR
  - TWISTED SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND
  - TWISTED SHIELDED SINGLE CONDUCTOR SHIELD FLOATS
  - TWISTED SHIELDED PAIR
  - TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND
  - TWISTED SHIELDED PAIR SHIELD FLOATS
  - TWISTED SHIELDED 4 CONDUCTOR
  - TWISTED SHIELDED 4 CONDUCTOR SHIELD TERMINATED TO GROUND
  - TWISTED SHIELDED 4 CONDUCTOR SHIELD FLOATS
  - AIRCRAFT GROUND
  - GARMIN (SHIELD BLOCK) GROUND
  - WIRE SPLICE CONNECTION
  - COAXIAL CABLE
  - N/C = NO CONNECTION
- UNLESS OTHERWISE NOTED, ALL SHIELD GROUNDS MUST BE MADE TO THE RESPECTIVE UNIT BACKSHELLS. ALL OTHER GROUNDS SHOULD BE TERMINATED TO AIRCRAFT GROUND AS CLOSE TO THE RESPECTIVE UNIT AS POSSIBLE.
- USE AIRCRAFT GRADE CATEGORY 5 ETHERNET CABLE. THESE INCLUDE ELECTRONIC CABLE SPECIALIST P/N 392404.

MANUFACTURER	P/N
PIC WIRE AND CABLE	E10422 (22 GAUGE)
PIC WIRE AND CABLE	E10424 (24 GAUGE)
ELECTRONIC CABLE SPECIALIST	392404 (24 GAUGE)

Figure B-1. GDU 104X Example Interconnect