

GCU 47X

Installation Manual



(GCU 475 Shown)

© Copyright 2004-2008
Garmin Ltd. or its subsidiaries
All Rights Reserved

Except as expressly provided herein, no part of this manual may be reproduced, copied, transmitted, disseminated, downloaded or stored in any storage medium, for any purpose without the express prior written consent of Garmin. Garmin hereby grants permission to download a single copy of this manual and of any revision to this manual onto a hard drive or other electronic storage medium to be viewed and to print one copy of this manual or of any revision hereto, provided that such electronic or printed copy of this manual or revision must contain the complete text of this copyright notice and provided further that any unauthorized commercial distribution of this manual or any revision hereto is strictly prohibited.

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

Garmin (Europe) Ltd
Liberty House
Bulls Copse Road
Hounslow Business Park
Southampton, SO40 9RB, UK
Telephone: 44/0870.851241

RECORD OF REVISIONS

Revision	Revision Date	Description
A	8/26/05	Production Release
B	8/4/06	Added ETSO information and made consistent with install manual standard
C	5/11/07	Added -10 unit
D	3/13/08	Added the GCU 477 and 478

DOCUMENT PAGINATION

Section	Page Range
Table of Contents	i – vi
Section 1	1-1 – 1-8
Section 2	2-1 – 2-4
Section 3	3-1 – 3-4
Section 4	4-1 – 4-2
Appendix A	A-1 – A-4
Appendix B	B-1 – B-24
Appendix C	C-1 – C-2

This manual reflects the operation of software version 2.00 for the GCU 477 and GCU 478, software version 3.00 for the GCU 475, and software version 3.01 for the GCU 476. 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

This document may contain information which is subject to the Export Administration Regulations (“EAR”) issued by the United States Department of Commerce (15 CFR, Chapter VII Subchapter C) and which may not be exported, released or disclosed to foreign nationals inside or outside the United States without first obtaining an export license. The preceding statement is required to be included on any and all reproductions in whole or in part of this manual.

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.

NOTE

Throughout this document references made to the GCU 47X shall equally apply to the GCU 475, 476, 477, and 478 except where specifically noted.

This page intentionally left blank

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	1-4
1.6 Reference Documents	1-7
1.7 Limited Warranty.....	1-8
2 INSTALLATION OVERVIEW	2-1
2.1 Introduction.....	2-1
2.2 Installation Materials	2-1
2.3 Installation Considerations	2-2
2.4 Cabling & Wiring	2-2
2.5 Cooling Air	2-3
2.6 Mounting Requirements	2-3
3 INSTALLATION PROCEDURE.....	3-1
3.1 Unpacking Unit.....	3-1
3.2 Wiring Harness Installation	3-1
3.3 Backshell Assembly.....	3-2
3.4 Unit Installation	3-2
3.5 Post Installation Configuration & Checkout.....	3-2
3.6 Continued Airworthiness	3-3
4 SYSTEM INTERCONNECTS.....	4-1
4.1 Pin Function List.....	4-1
4.2 Power	4-1
4.3 Serial Data	4-2
4.4 Lighting.....	4-2
APPENDIX A: GCU 475 and 476 BOOT BLOCK UPLOADING INSTRUCTIONS	A-1
APPENDIX B: OUTLINE & INSTALLATION DRAWINGS	B-1
APPENDIX C: INTERCONNECT EXAMPLE.....	C-1

LIST OF FIGURES

FIGURE	PAGE
1-1 GCU 475	1-1
1-2 GCU 476	1-1
1-3 GCU 477	1-1
1-4 GCU 478	1-1
2-1 GCU 475 Locking Socket	2-2
2-2 GCU 476 Unit Rack	2-3
3-1 GCU 475 ¼ Turn Fastener	3-2
B-1 GCU 475 Cutout Drawing (Not To Scale)	B-1
B-2 GCU 476 Cutout Drawing (Not To Scale)	B-3
B-3 GCU 477 Cutout Drawing (Not To Scale)	B-5
B-4 GCU 478 Cutout Drawing (Not To Scale)	B-7
B-5 GCU 475 Outline Drawing	B-9
B-6 GCU 476 Outline Drawing	B-11
B-7 GCU 477 Outline Drawing	B-13
B-8 GCU 478 Outline Drawing	B-15
B-9 GCU 475 Installation Drawing	B-17
B-10 GCU 476 Installation Drawing	B-19
B-11 GCU 477 Installation Drawing	B-21
B-12 GCU 478 Installation Drawing	B-23
C-1 GCU 47X Example Interconnect	C-1

LIST OF TABLES

TABLE	PAGE
3-1 Pin Contact Part Numbers	3-1
3-2 Recommended Crimp Tools	3-1

GCU 47X HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GCU 47X. Mod Levels are listed with the associated service bulletin number, service bulletin date, and the purpose of the modification. The table is current at the time of publication of this manual (see date on front cover) and is subject to change without notice. Authorized Garmin Sales and Service Centers are encouraged to access the most up-to-date bulletin and advisory information on the Garmin Dealer Resource web site at www.garmin.com using their Garmin-provided user name and password.

MOD LEVEL	SERVICE BULLETIN NUMBER	SERVICE BULLETIN DATE	PURPOSE OF MODIFICATION

This page intentionally left blank

1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the GCU 47X as part of the G1000 Integrated Flight Deck. The GCU 47X 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 GCU 47X refers to the Garmin Flight Management System (FMS) Controller used in the G1000 Integrated Flight Deck. The GCU 47X Line Replaceable Unit (LRU) provides alphanumeric, softkey, and flight planning function keys used to interface with the G1000. In addition to alphanumeric, softkey, and flight planning function keys the GCU 476, 477, and 478 provide COM/NAV tuning capabilities. The GCU 478 also provides heading, course, and altitude controls. The GCU 475, 477, and 478 mounts flush to the aircraft instrument panel using four ¼ turn fasteners. The GCU 476 mounts flush to the aircraft instrument panel using a jackscrew.



Figure 1-1. GCU 475



Figure 1-2. GCU 476



Figure 1-3. GCU 477



Figure 1-4. GCU 478

1.3 Interface Summary

The GCU 475 interfaces with the GDU 1XXX MFD via RS-232 digital interface. The GCU 476/477/478 interfaces with the GDU 1XXX PFD/MFD via RS-232 digital interface.

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 GCU 47X Environmental Qualification Form. This form is available under the following part number:

GCU 475 Environmental Qualification Form, Garmin part number 005-00219-01

GCU 476 Environmental Qualification Form, Garmin part number 005-00299-01

GCU 477 Environmental Qualification Form, Garmin part number 005-00461-03

GCU 478 Environmental Qualification Form, Garmin part number 005-00440-03

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

1.4.2 Physical Characteristics

GCU 475	
Characteristics	Specifications
Width	4.90 inches (12.45 cm)
Height	3.75 inches (9.53 cm)
Depth w/Connector Kit*	3.68 inches (9.35 cm)
Unit Weight w/out Connector Kit	0.7 lbs. (0.32 kg)
Unit Weight with Connector Kit	0.8 lbs. (0.36 kg)
Mounting Hardware	0.03 lbs. (0.01 kg)

*Depth is measured from front of knob to back of connector kit.

GCU 476	
Characteristics	Specifications
Width	3.66 inches (9.30 cm)
Height	5.43 inches (13.79 cm)
Depth w/Connector Kit*	3.68 inches (9.35 cm)
Unit Weight w/out Connector Kit	0.7 lbs. (0.32 kg)
Unit Weight with Connector Kit	0.8 lbs. (0.36 kg)
Installation Rack	0.13 lbs. (0.06 kg)

*Depth is measured from front of knob to back of connector kit.

GCU 477	
Characteristics	Specifications
Width	5.52 inches (14.02 cm)
Height	3.75 inches (9.53 cm)
Depth w/Connector Kit*	4.68 inches (11.89 cm)
Unit Weight w/out Connector Kit	0.8 lbs. (0.36 kg)
Unit Weight with Connector Kit	0.9 lbs. (0.40 kg)
Mounting Hardware	0.03 lbs. (0.01 kg)

*Depth is measured from front of knob to back of connector kit.

GCU 478	
Characteristics	Specifications
Width	6.25 inches (18.76 cm)
Height	4.40 inches (11.18 cm)
Depth w/Connector Kit*	4.52 inches (11.48 cm)
Unit Weight w/out Connector Kit	1.0 lbs. (0.45 kg)
Unit Weight with Connector Kit	1.1 lbs. (0.50 kg)
Mounting Hardware	0.03 lbs. (0.01 kg)

*Depth is measured from front of knob to back of connector kit.

1.4.3 General Specifications

For detailed specifications, see the Environmental Qualification Form.

Characteristics	Specifications
Operating Temperature Range	-45°C to +70°C. For more details see Environmental Qualification Form.
Humidity	95% non-condensing
Altitude Range	-1,500 ft to 55,000 ft

1.4.4 Power Requirements

Characteristics	Specifications
Power Requirements	14/28 Vdc. See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages.
Power Consumption (GCU 475)	220 mA @ 14V 115 mA @ 28V
Power Consumption (GCU 476)	277 mA @ 14V 140 mA @ 28V
Power Consumption (GCU 477)	175 mA @ 14V 85 mA @ 28V
Power Consumption (GCU 478)	260 mA @ 14V 130 mA @ 28V

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 tables provide a list of applicable TSO/ETSOs for the GCU 47X.

1.5.1 TSO/ETSO Compliance

1.5.1.1 GCU 475

Function	TSO/ETSO/ SAE/ RTCA/ EUROCAE	Category	GCU 475 (011-01054-00) Applicable LRU SW Part Numbers	GCU 475 (011-01054-10) Applicable LRU SW Part Numbers
Airborne Multipurpose Electronic Displays	TSO-C113 ETSO-C113	Type I,II, and III	All 006-B0387-() except 006-B0387-00 through 006-B0387-02 and 006-B0387-07 through 006-B0387-19	All 006-B0387-() except 006-B0387-00 through 006-B0387-19

1.5.1.2 GCU 476

Function	TSO/ETSO/ SAE/ RTCA/ EUROCAE	Category	GCU 476 (011-01237-00) Applicable LRU SW Part Numbers	GCU 476 (011-01237-10) Applicable LRU SW Part Numbers
Airborne Multipurpose Electronic Displays	TSO-C113 ETSO-C113	Type I,II, and III	All 006-B0472-() except 006-B0472-00 through 006-B0472-01 and 006-B0472-04 through 006-B0472-19	All 006-B0472-() except 006-B0472-00 through 006-B0472-19

1.5.1.3 GCU 477

Function	TSO/ETSO/ SAE/ RTCA/ EUROCAE	Category	GCU 477 (011-01428-00) Applicable LRU SW Part Numbers
Airborne Multipurpose Electronic Displays	TSO-C113	Type I,II, and III	006-D1125-0(_)
			All 006-B0742-0(_) except 006-B0742-00 through 006-B0742-04

1.5.1.4 GCU 478

Function	TSO/ETSO/ SAE/ RTCA/ EUROCAE	Category	GCU 478 (011-01757-00) Applicable LRU SW Part Numbers
Airborne Multipurpose Electronic Displays	TSO-C113	Type I,II, and III	006-D1125-0(_)
			All 006-B0742-0(_) except 006-B0742-00 through 006-B0742-04

1.5.2 TSO/ETSO Deviations

1.5.2.1 GCU 475

TSO	Deviation
TSO-C113	1. 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.
	2. Garmin was granted a deviation from TSO-C113 to use RTCA DO-178B instead of RTCA DO-178A as the standard for Software Considerations in Airborne Systems and Equipment Certification.

1.5.2.2 GCU 476

TSO/ETSO	Deviation
TSO-C113	1. Garmin was granted a deviation from TSO-C113 to use RTCA DO-160E, 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-C113 to use RTCA DO-178B instead of RTCA DO-178A as the standard for Software Considerations in Airborne Systems and Equipment Certification.
ETSO-C113	1. Garmin was granted a deviation from ETSO-C113 to use RTCA DO-160E, instead of RTCA DO-160D as the standard for Environmental Conditions and Test Procedures for Airborne Equipment.

1.5.2.3 GCU 477

TSO/ETSO	Deviation
TSO-C113	1. Garmin was granted a deviation from TSO-C113 to use RTCA DO-160E, 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-C113 to use RTCA DO-178B instead of RTCA DO-178A as the standard for Software Considerations in Airborne Systems and Equipment Certification.

1.5.2.4 GCU 478

TSO/ETSO	Deviation
TSO-C113	1. Garmin was granted a deviation from TSO-C113 to use RTCA DO-160E, 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-C113 to use RTCA DO-178B instead of RTCA DO-178A as the standard for Software Considerations in Airborne Systems and Equipment Certification.

1.6 Reference Documents

The following publications are sources of additional information for installing the GCU 47X. Before installing the GCU 47X, the technician should read all referenced materials along with this manual.

Part Number	Document
190-00303-00	G1000 System Installation Manual
190-00313-11	Jackscrew Backshell Installation Instructions
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: 44/0870.851241

2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GCU 47X and related hardware. Installation of the GCU 47X 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.

2.2 Installation Materials

The GCU 47X is available as a single unit under the following part numbers:

Item	Catalog P/N
GCU 475 Unit Only, (011-01054-00)	010-00359-00
GDU 475 Unit Only, (011-01054-10)*	010-00359-10*
GCU 476 Unit Only, (011-01237-00)	010-00457-00
GCU 476 Unit Only, (011-01237-10)**	010-00457-10**
GCU 477 Unit Only, (011-01428-00)	010-00551-00
GCU 478 Unit Only (011-01757-00)	010-00669-00

*Garmin recommends this GCU 475 for new TC/STC approvals. Garmin does not recommend the use of the 011-01054-00 for new TC/STC approvals. Unit maintains the same form, fit, and function of the 011-01054-00.

**Garmin recommends this GCU 476 for new TC/STC approvals. Garmin does not recommend the use of the 011-01237-00 for new TC/STC approvals. Unit maintains the same form, fit, and function of the 011-01237-00.

2.2.1 Equipment Available

Each of the following accessories are provided separately from the GCU 47X LRU and are required to install the unit.

2.2.1.1 GCU 47X

Applicable Unit	Item	Garmin P/N
GCU 475 GCU 476	GMC 710 Connector Kit	011-01040-01
GCU 477 GCU 478	Jackscrew Connector Kit	011-01824-00

Applicable Unit	Item	Garmin P/N (only one is required)
GCU 475 GCU 477 GCU 478	Mounting Hardware, 0.080" ± 0.005 Sheet Metal Panel Thickness	011-00821-00
	Mounting Hardware, 0.125" ± 0.005 Sheet Metal Panel Thickness	011-00821-01
	Mounting Hardware, 0.090" ± 0.005 Sheet Metal Panel Thickness	011-00821-02
	Mounting Hardware, 0.100" ± 0.005 Sheet Metal Panel Thickness	011-00821-03

Applicable Unit	Item	Garmin P/N
GCU 476	GCU 476 Installation Rack	115-00736-00

2.3 Installation Considerations

Fabrication of a wiring harness is required. Sound mechanical and electrical methods and practices are required for installation of the GCU 47X.

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

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

2.5 Cooling Air

Cooling is not required for the GCU 47X. Refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for information on G1000 system cooling requirements.

2.6 Mounting Requirements

The GDU 1040 mounting hardware (011-00821-XX, used in the installation of the GCU 475, 477, and 478) is designed to accommodate various sheet metal panel thickness (see Section 2.2.1.1). The locking socket (see Figure 2.1) can be attached by using a rivet or screw. If using rivets, the rivet should be 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 Appendix B for the appropriate Panel Cutout.

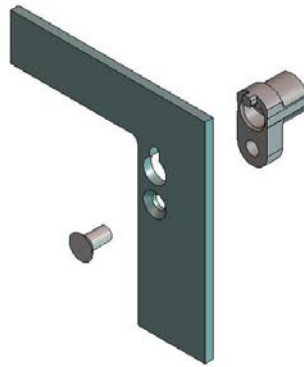


Figure 2-1. GCU 475, 477, and 478 Locking Socket

The GCU 476 is to be mounted using the GCU 476 Unit Rack, see Figure 2-2. Aircraft manufacturer must fabricate any additional mounting equipment needed, use outline and installation drawings in Appendix B for reference.

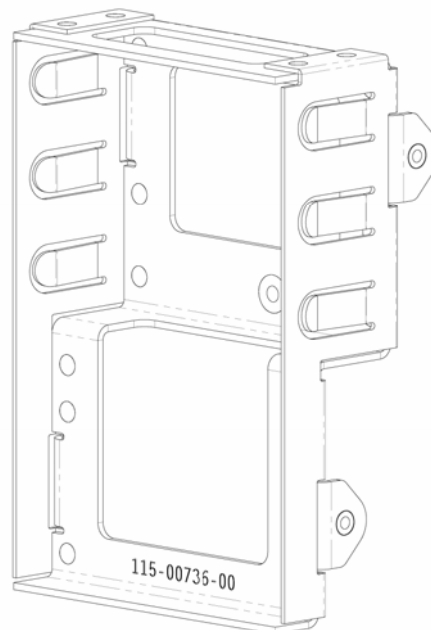


Figure 2-2. GCU 476 Unit Rack

This page intentionally left blank

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 15-pin 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 C for examples of interconnect wiring diagrams. Construct the actual harnesses in accordance with aircraft manufacturer authorized interconnect standards.

Table 3-1. Pin Contact Part Numbers

Manufacturer	15 pin D-Subminiature connector (P4751)		
	16 AWG (Power Only)	18-20 AWG (Power Only)	22-28 AWG
Garmin P/N	336-00044-01	336-00044-00	336-00021-00
Military P/N	N/A	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, #18 and #20 contact requires that the expanded wire barrel be cut off from the contact. It may also be necessary to push the pin out from the face of the connector when using an extractor due to the absence of the wire. A new contact must be used when reassembling the connector.
3. For applications using 16 AWG wire, contact Garmin for information regarding connector crimp positioner tooling.

3.3 Backshell Assembly

The GCU 47X connector kit includes one Garmin backshell assembly. Garmin's backshell gives the installer the ability to easily terminate shield grounds at the backshell housing using the Shield Block grounding kit. To assemble the GCU 475 and 476 backshell, refer to instructions provided in the G1000 System Installation Manual, Garmin part number 190-00303-00. To assemble the GCU 477 and 478 backshell, refer to instructions provided in the Jackscrew Backshell Installation Instructions, Garmin part number 190-00313-11.

3.4 Unit Installation

The GCU 475, 477, and 478 are installed by holding the unit flush with the instrument panel. The locking studs should be orientated 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.

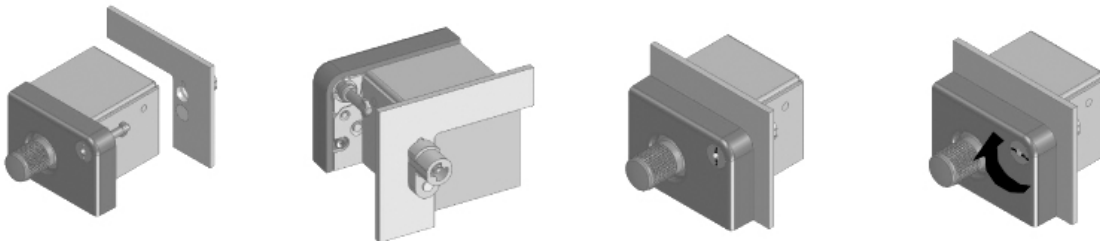


Figure 3-1. GCU 475, 477, and 478 ¼ Turn Fastener

The GCU 476 is installed by gently pushing the unit into the rack. A 3/32" hex drive tool is then used to turn the jack screw clockwise until it is firmly seated into the rack, ensuring jack screw is not over-tightened.

3.5 Post Installation Configuration & Checkout

NOTE

The GCU 47X does not provide valid outputs until the aircraft post installation configuration procedures are completed.

The GCU 47X must be installed with a Garmin G1000 system and have FAA approved configuration data. The GCU 47X serves as the user interface for the installer configuring the G1000. For actual aircraft installation/checkout, use only aircraft manufacturer approved checkout procedures.

3.6 Continued Airworthiness

Maintenance of the GCU 47X is “on condition” only. For regulatory periodic functional checks, refer to approved aircraft maintenance manuals or manual supplements for actual aircraft maintenance requirements.

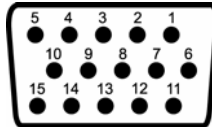
This page intentionally left blank

4 SYSTEM INTERCONNECTS

4.1 Pin Function List

4.1.1 P4751

View of J4751 connector from back of unit



Pin	Pin Name	I/O
1	RS-232 OUT 1	Out
2	RS-232 IN 1	In
3	RS-232 OUT 2	Out
4	RS-232 IN 2	In
5	POWER GROUND	--
6	SIGNAL GROUND	--
7	AIRCRAFT POWER 1	In
8	SIGNAL GROUND	--
9	AIRCRAFT POWER 2	In
10	CONTROL UNIT REMOTE POWER OFF	In
11	LIGHTING BUS HI	In
12	LIGHTING BUS LO	In
13	RESERVED	--
14	RESERVED	--
15	POWER GROUND	--

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	P4751	7	In
AIRCRAFT POWER 2	P4751	9	In
POWER GROUND	P4751	5	--
POWER GROUND	P4751	15	--

AIRCRAFT POWER 1 and AIRCRAFT POWER 2 are “diode ORed” to provide power redundancy.

4.2.1.2 Remote Power Off

Pin Name	Connector	Pin	I/O
CONTROL UNIT REMOTE POWER OFF	P4751	10	In

This input is used to power down the GCU 47X, by a remote source. An input voltage between 6.5 Vdc and 33 Vdc will power-off the GCU 47X. An input voltage of 3.5 Vdc or less will allow the GCU 47X to power on.

4.3 Serial Data

4.3.1 Serial Data Electrical Connections

4.3.1.1 RS-232

Pin Name	Connector	Pin	I/O
RS-232 OUT 1	P4751	1	Out
RS-232 IN 1	P4751	2	In
RS-232 OUT 2	P4751	3	Out
RS-232 IN 2	P4751	4	In
SIGNAL GROUND	P4751	6	--
SIGNAL GROUND	P4751	8	--

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

4.4 Lighting

Pin Name	Connector	Pin	I/O
LIGHTING BUS HI	P4751	11	In
LIGHTING BUS LO	P4751	12	In

The GCU 47X can be configured to track a 28 Vdc, 14 Vdc, 5 Vdc, or 5 Vac lighting bus using these inputs. The GCU 47X can also automatically adjust for ambient lighting conditions based on photocell input. GCU 475 and GCU 476 units with software version 3.00 and later can be configured to adjust the lighting based on a 10 Hz periodic lighting message from the GDU's. GCU 477 and GCU 478 units with software version 2.00 and later can be configured to adjust the lighting based on a 10 Hz periodic lighting message from the GDU's.

APPENDIX A GCU 475 and 476 BOOT BLOCK UPLOADING INSTRUCTIONS

NOTE

This appendix only applies to the GCU 475 and 476.

A.1 Introduction

This appendix contains instructions on how to upgrade boot block software for the GCU 475 and 476. Boot block version 3.01 is required for GCU 475 Software Version 3.00 or later. Boot block version 3.01 is required for GCU 476 Software Version 3.01 or later.

CAUTION

While performing this procedure ensure the aircraft is connected to and drawing power from a power cart. A loss of power during this procedure may result in a defective GCU.

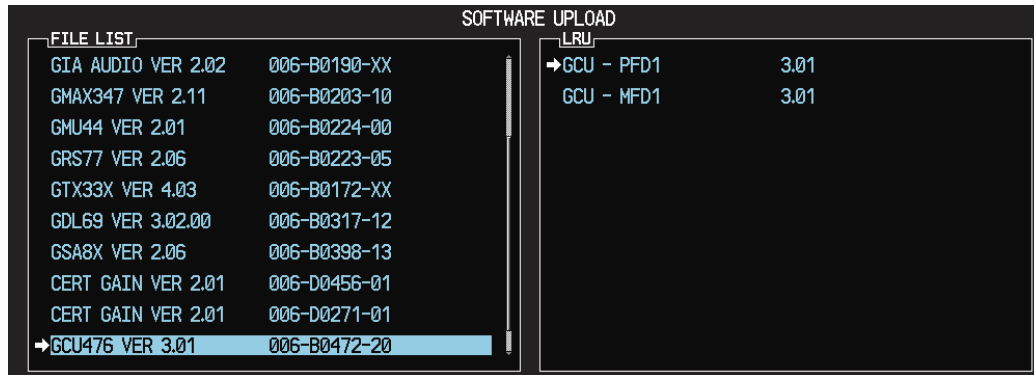
A.2 Determining Current Boot Block

1. Ensure the G1000 is powered off.
2. Insert the airframe specific approved software loader card (containing GCU software version 3.00 or later for the GCU 475, or 3.01 or later for the GCU 476) into the top slot of the PFD.
3. While holding the ENT key on the PFD, restore power to the PFD.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the PFD, release the ENT key.
5. Press the CLR key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
6. Repeat step 3 and 4 for the MFD.
7. Restore power to all remaining G1000 LRUs.
8. On the MFD use the FMS knob to highlight ‘GCU’ on the System Status page.



9. On the PFD use the FMS knob to turn to the Software Upload page.

10. Use the FMS knob to highlight GCU software.



11. Press the LRU softkey and highlight 'GCU – PFD1'.
12. Press the ENT key to begin loading software.
13. The boot block version should now appear on the MFD.
14. If the GCU boot block version is 3.00 or earlier press the CANCEL softkey on the PFD and select 'YES' at the prompt. Continue to Section A.3 for instructions on loading GCU boot block version 3.01.

NOTE

If GCU boot block version is 3.01, do not cancel the software upload.

A.3 Loading Boot Block Version 3.01

1. Remove power from the PFD only.
2. Insert the GCU boot block version 3.01 loader card into the top slot of the PFD.
3. While holding the ENT key on the PFD, restore power to the PFD.
4. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the PFD, release the ENT key.
5. Use the FMS knob to turn to the Software Upload page on the PFD.
6. Verify 'GCU Boot Block 3.01' appears in the File List.
7. Verify 'GCU' appears in the LRU window.
8. Press the FMS knob to highlight 'GCU Boot Block 3.01'.
9. Press the LOAD softkey.
10. Press the ENT key at the "BEGIN FILE UPLOAD?" prompt.

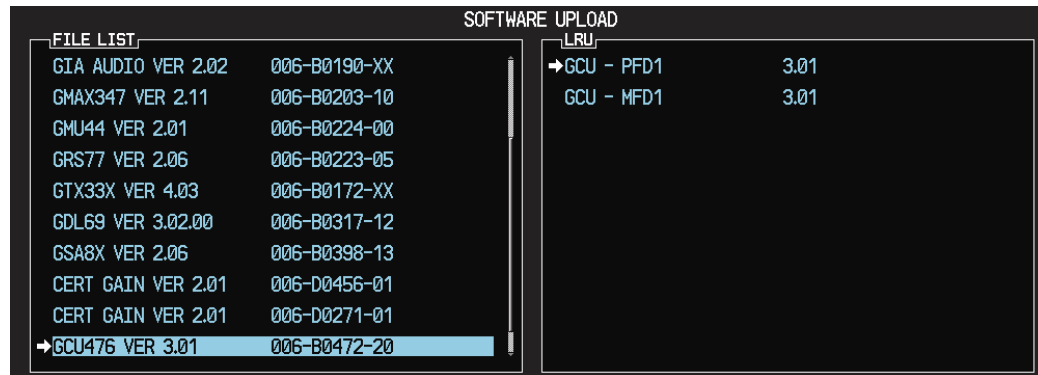
CAUTION

Do not turn power off or cancel the software upload while the boot block is loading.

11. Confirm update completion and press the ENT key.
12. On the MFD use the FMS knob to turn to the System Status page.
13. Highlight 'GCU'.
14. Verify 'G1000 GMC710/GCU 475' or 'G1000 GCU 476' is being reported in the description field.
15. Power down the G1000.
16. Remove the GCU boot block version 3.01 loader card from the PFD.
17. Continue to Section A.4.

A.4 Loading GCU Software (only if GCU software was cancelled in Section A.2)

1. Insert the airframe specific approved software loader card (containing GCU 475 software version 3.00 or later, or GCU 476 software version 3.01 or later) into the top slot of the PFD.
2. While holding the ENT key on the PFD, restore power to the PFD.
3. When the words **INITIALIZING SYSTEM** appear in the upper left corner of the PFD, release the ENT key.
4. Press the CLR key at the “DO YOU WANT TO UPDATE SYSTEM FILES?” prompt.
5. Repeat step 2 and 3 for the MFD.
6. Restore power to all remaining G1000 LRUs.
7. On the PFD use the FMS knob to turn to the Software Upload page.
8. Use the FMS knob to highlight GCU software.



9. Press the LOAD softkey.
10. Press the ENT key at the “BEGIN FILE UPLOAD?” prompt.
11. Confirm update completion and press the ENT key.

This page intentionally left blank

PANEL CUTOUT

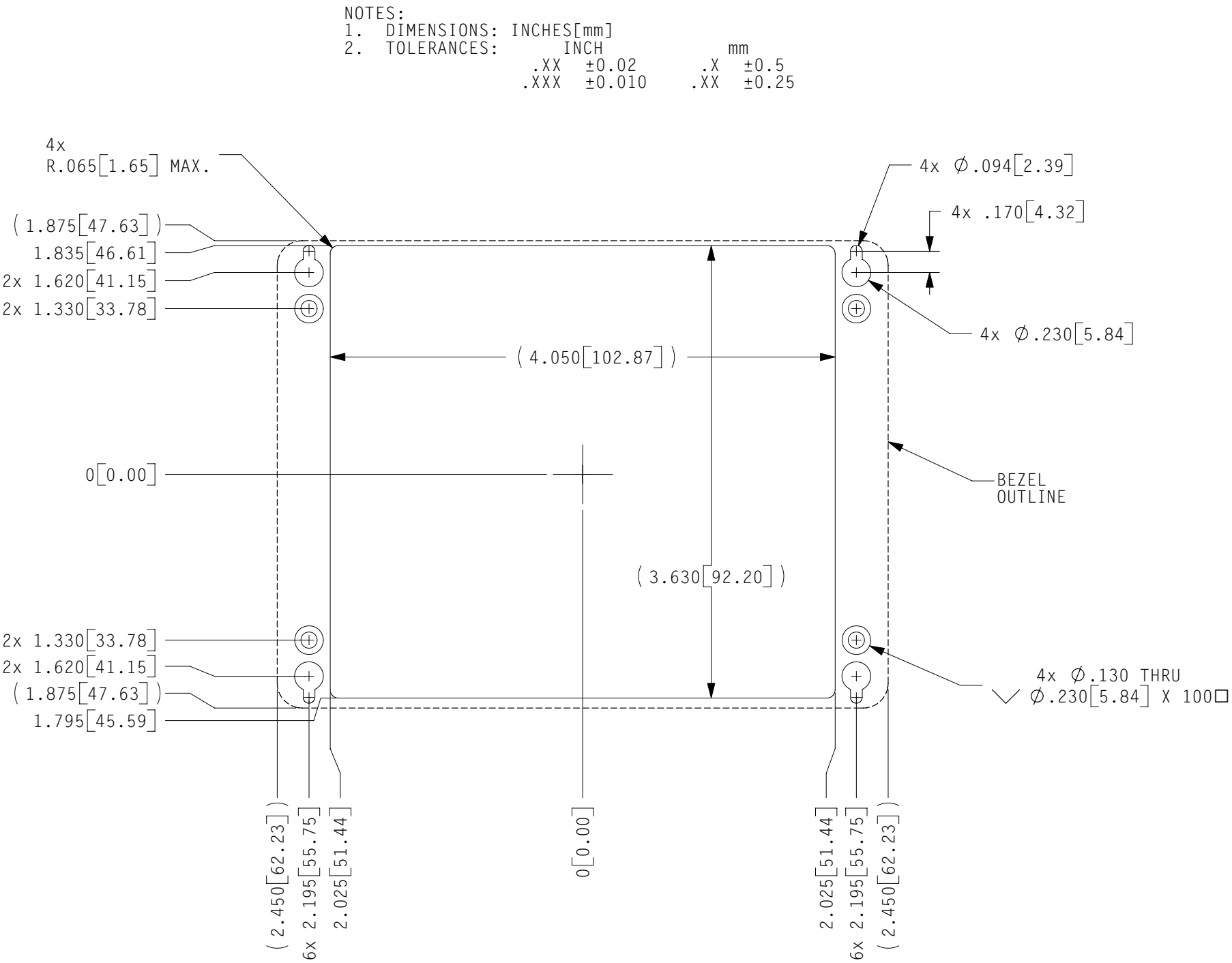


Figure B-1. GCU 475 Cutout Drawing (Not To Scale)

PANEL CUTOUT

- NOTES:
- 1. DIMENSIONS: INCHES [mm]
 - 2. TOLERANCES: INCH mm
 - .XX ±0.02 .X ±0.5
 - .XXX ±0.010 .XX ±0.25

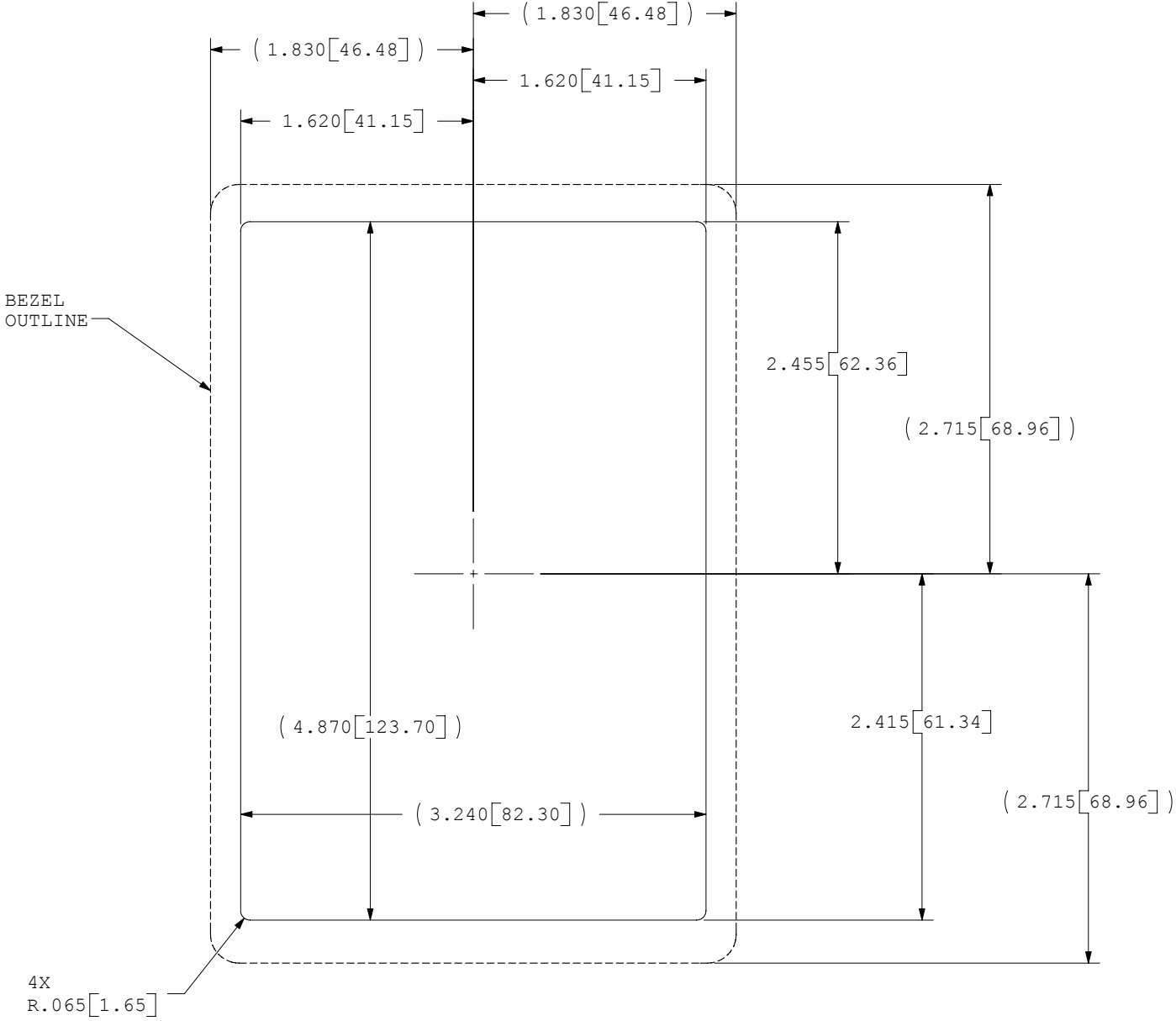


Figure B-2. GCU 476 Cutout Drawing (Not To Scale)

PANEL CUTOUT

NOTES:

NOTES:

1.	DIMENSIONS: INCHES	[mm]		
2.	TOLERANCES:	INCH	mm	
		.XX	0.02	.X 0.5
		.XXX	0.010	.XX 0.25

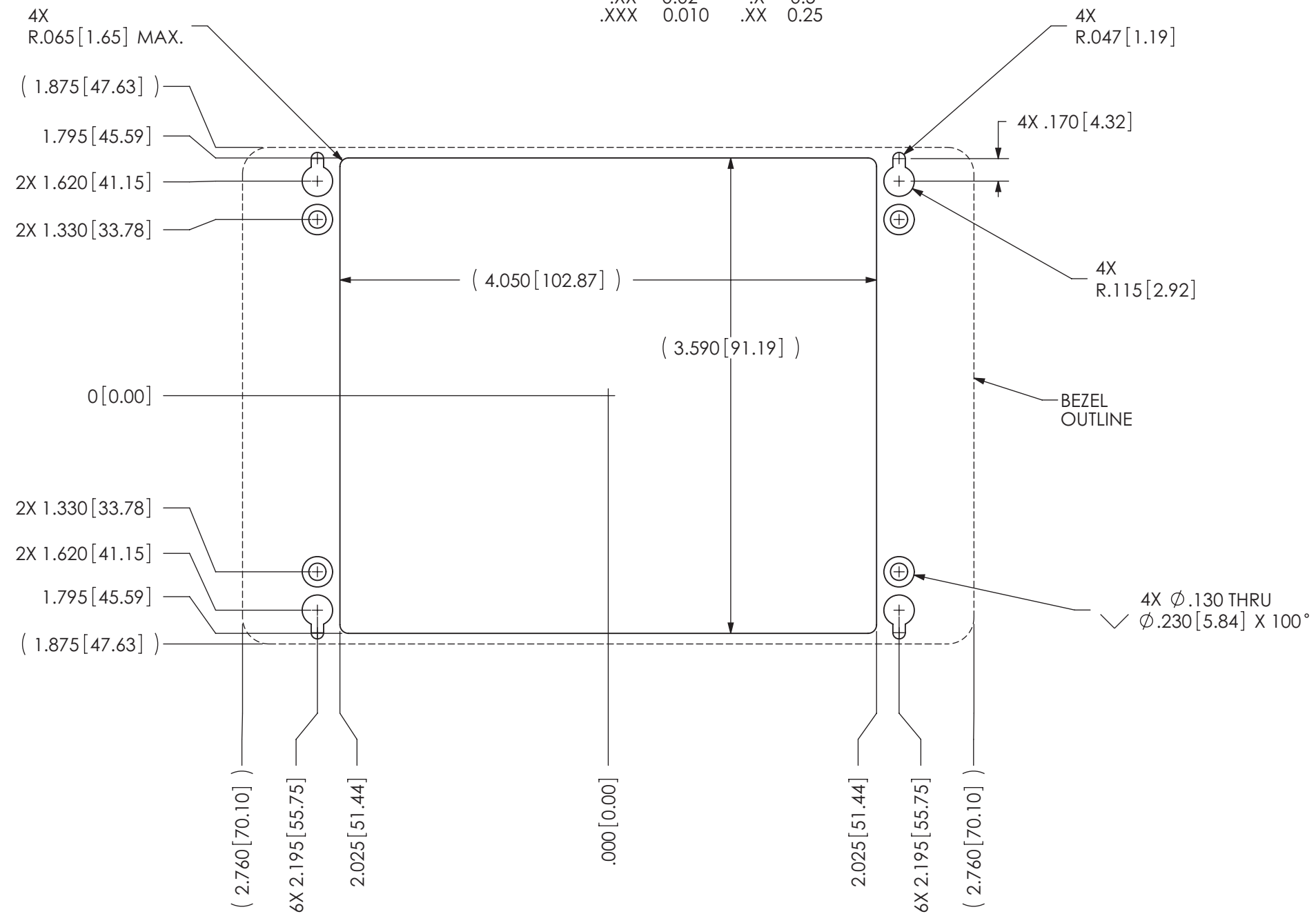


Figure B-3. GCU 477 Cutout Drawing (Not To Scale)

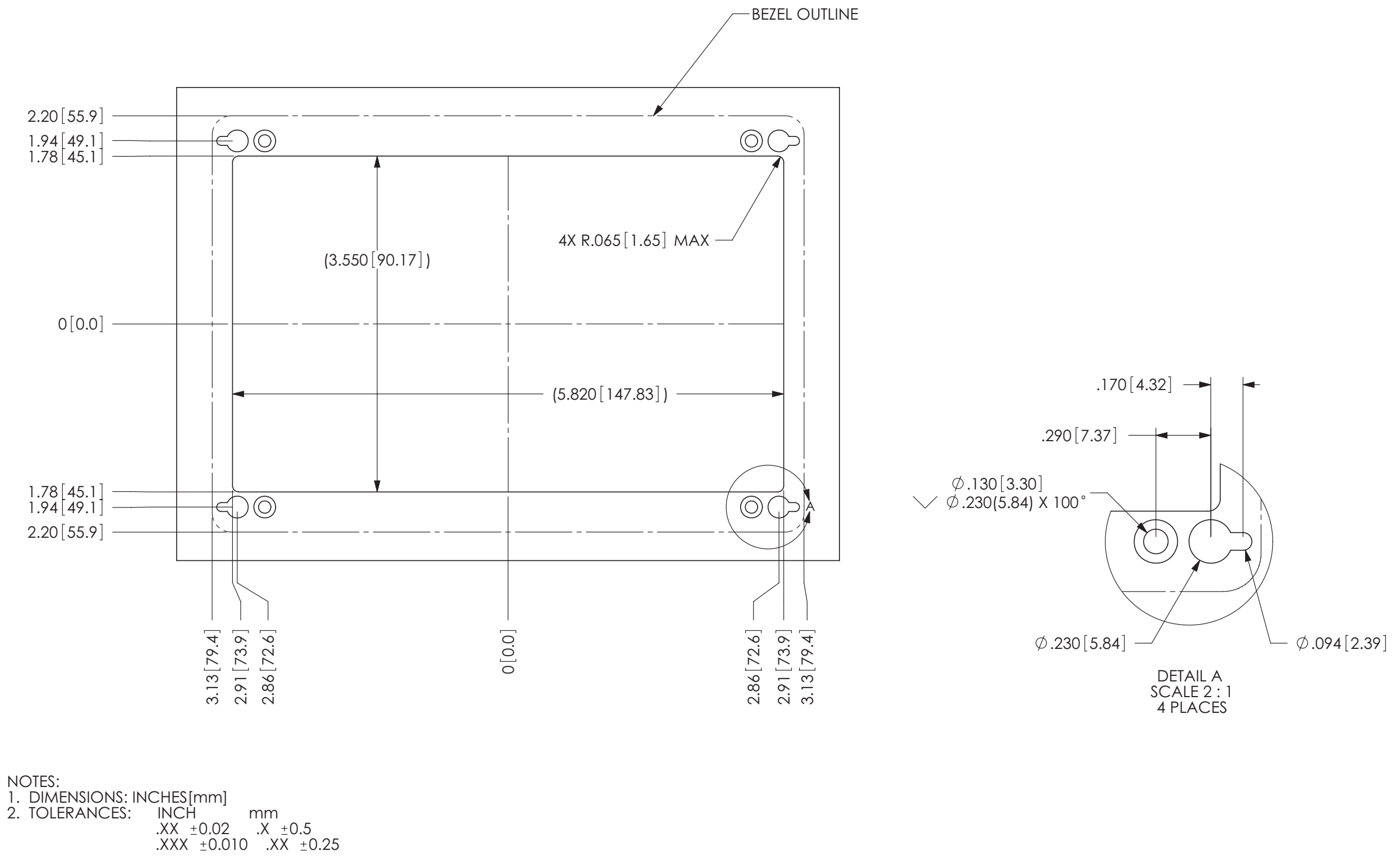


Figure B-4. GCU 478 Cutout Drawing (Not To Scale)

APPENDIX B OUTLINE & INSTALLATION DRAWINGS

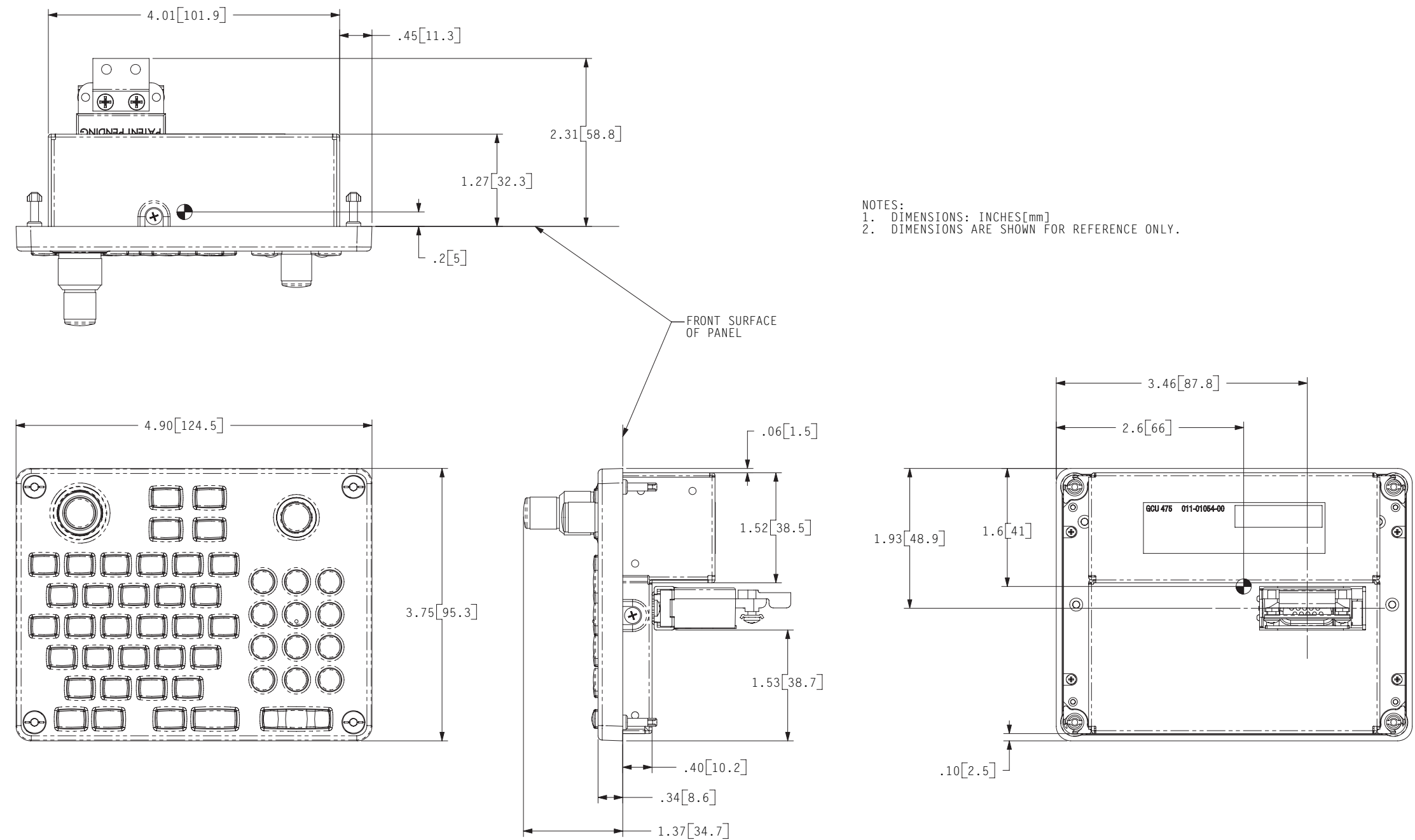


Figure B-5. GCU 475 Outline Drawing

APPENDIX B OUTLINE & INSTALLATION DRAWINGS

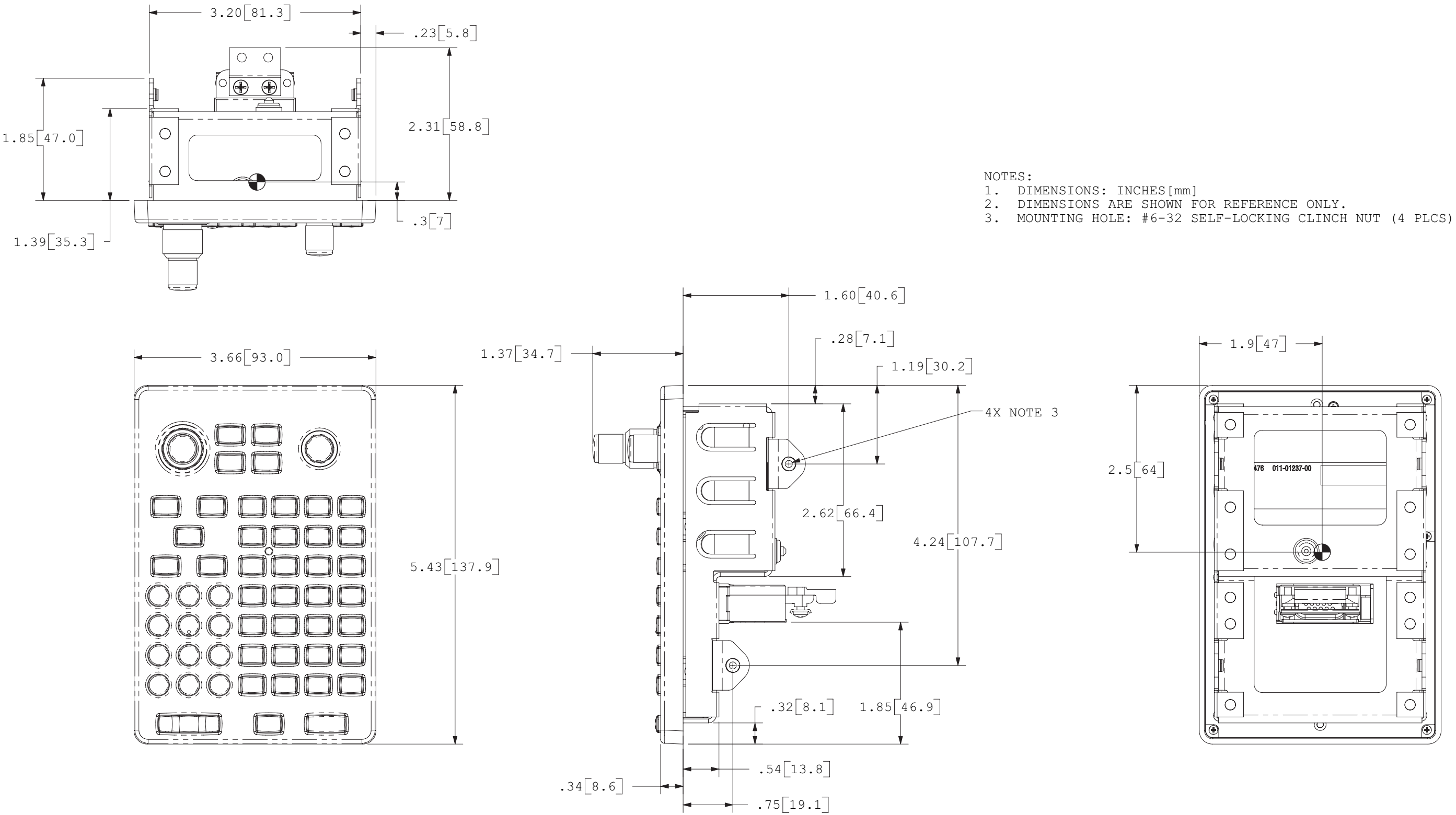
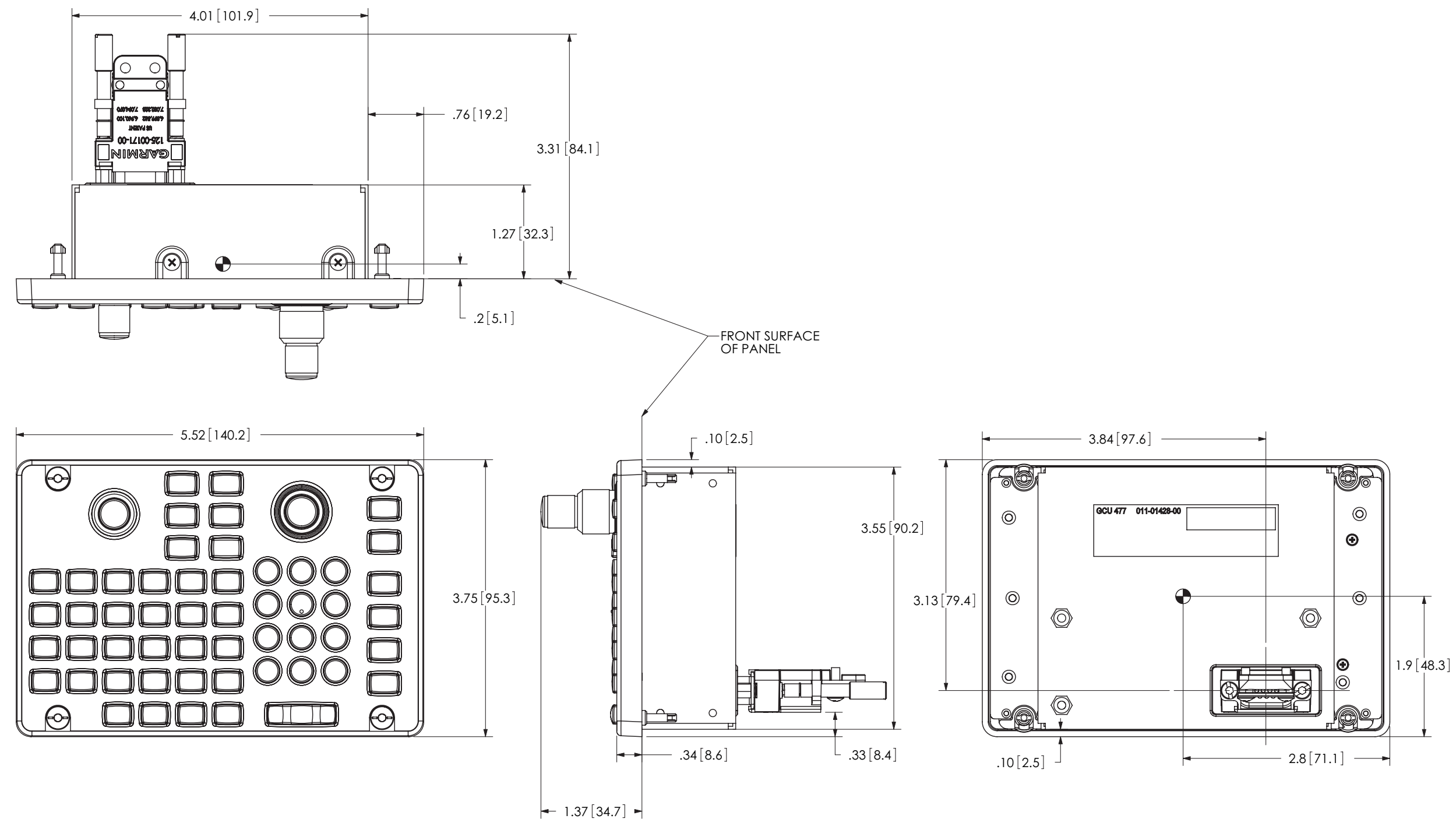


Figure B-6. GCU 476 Outline Drawing

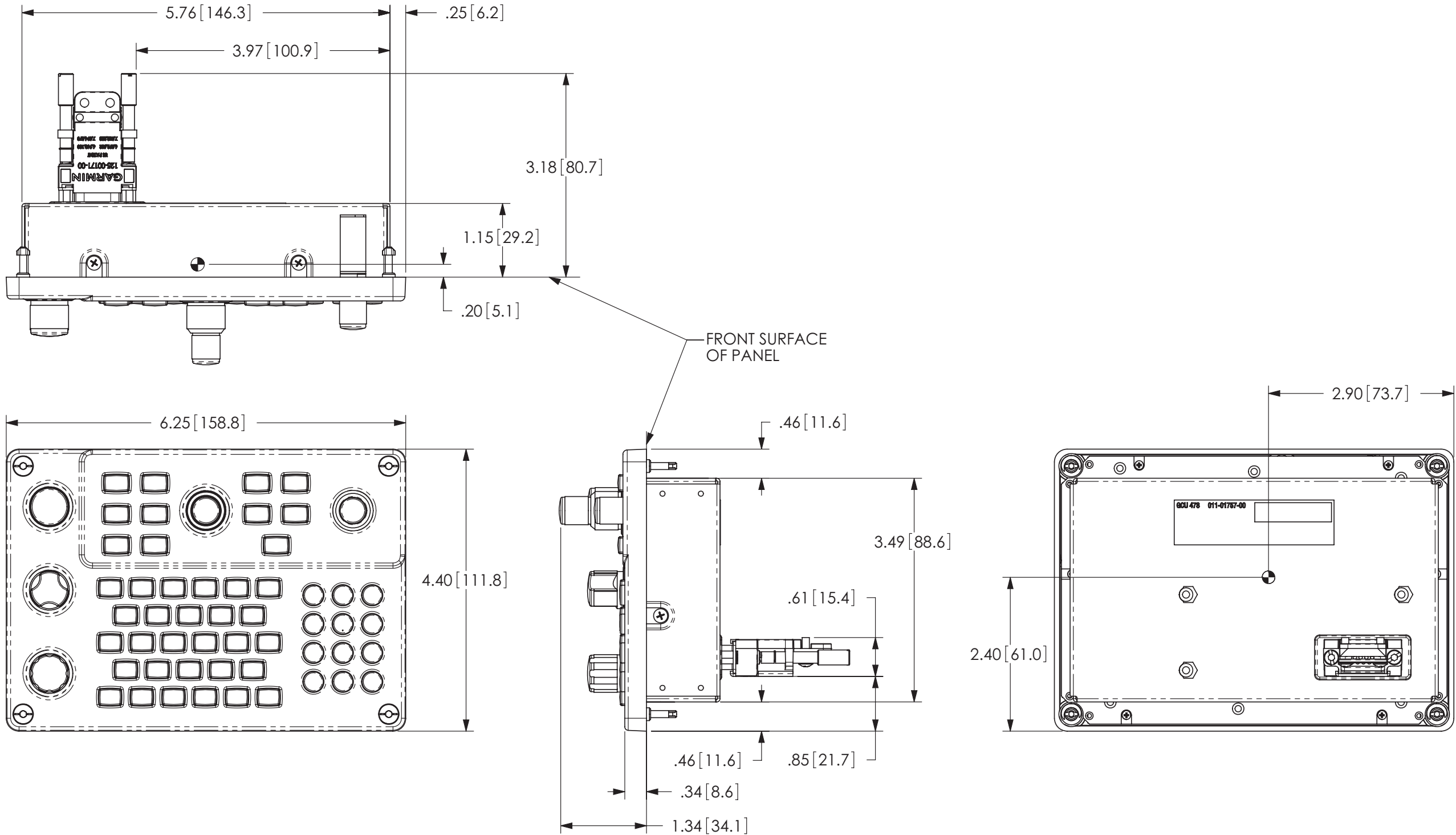
APPENDIX B OUTLINE & INSTALLATION DRAWINGS



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

Figure B-7. GCU 477 Outline Drawing

APPENDIX B OUTLINE & INSTALLATION DRAWINGS



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

Figure B-8. GCU 478 Outline Drawing

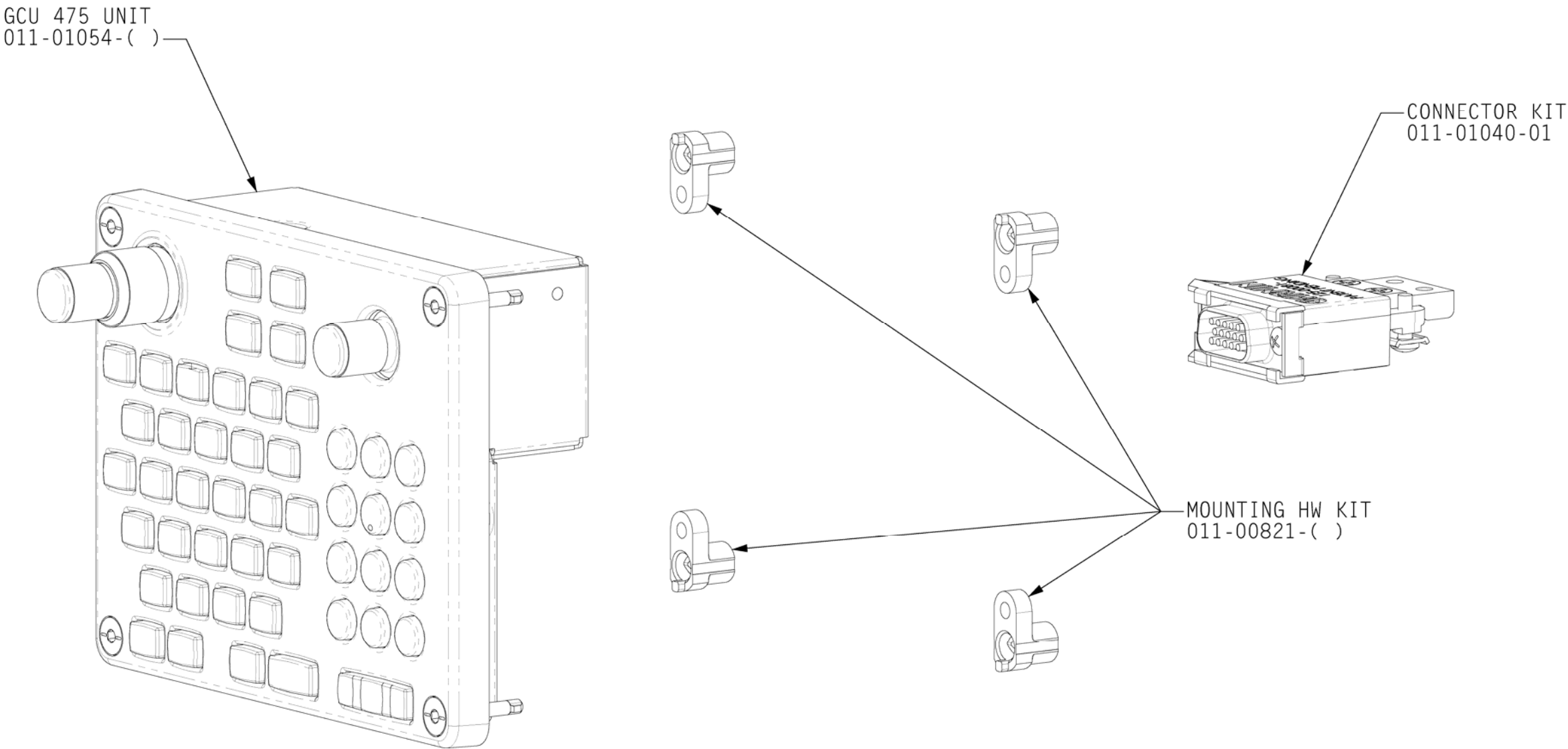


Figure B-9. GCU 475 Installation Drawing

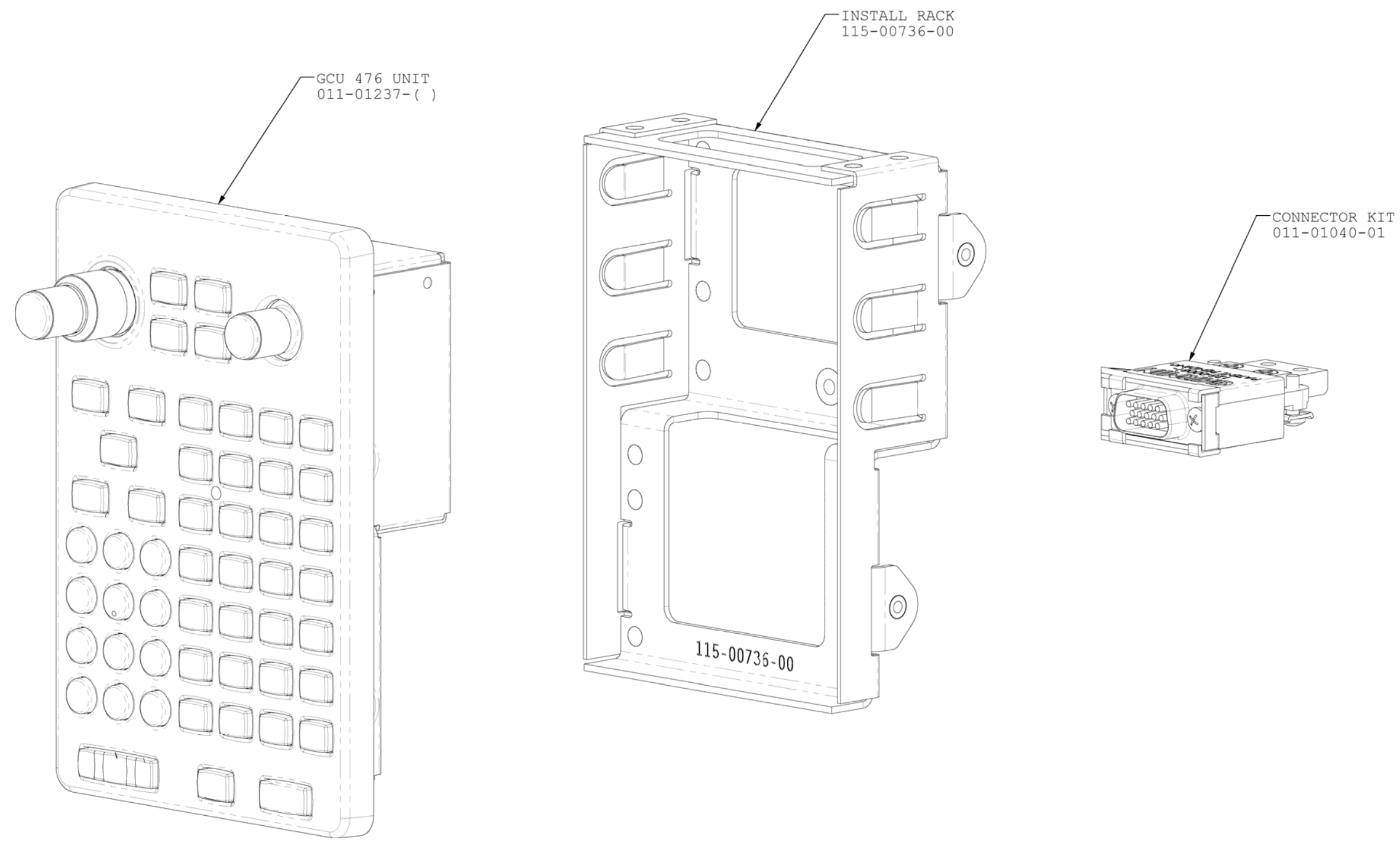


Figure B-10. GCU 476 Installation Drawing

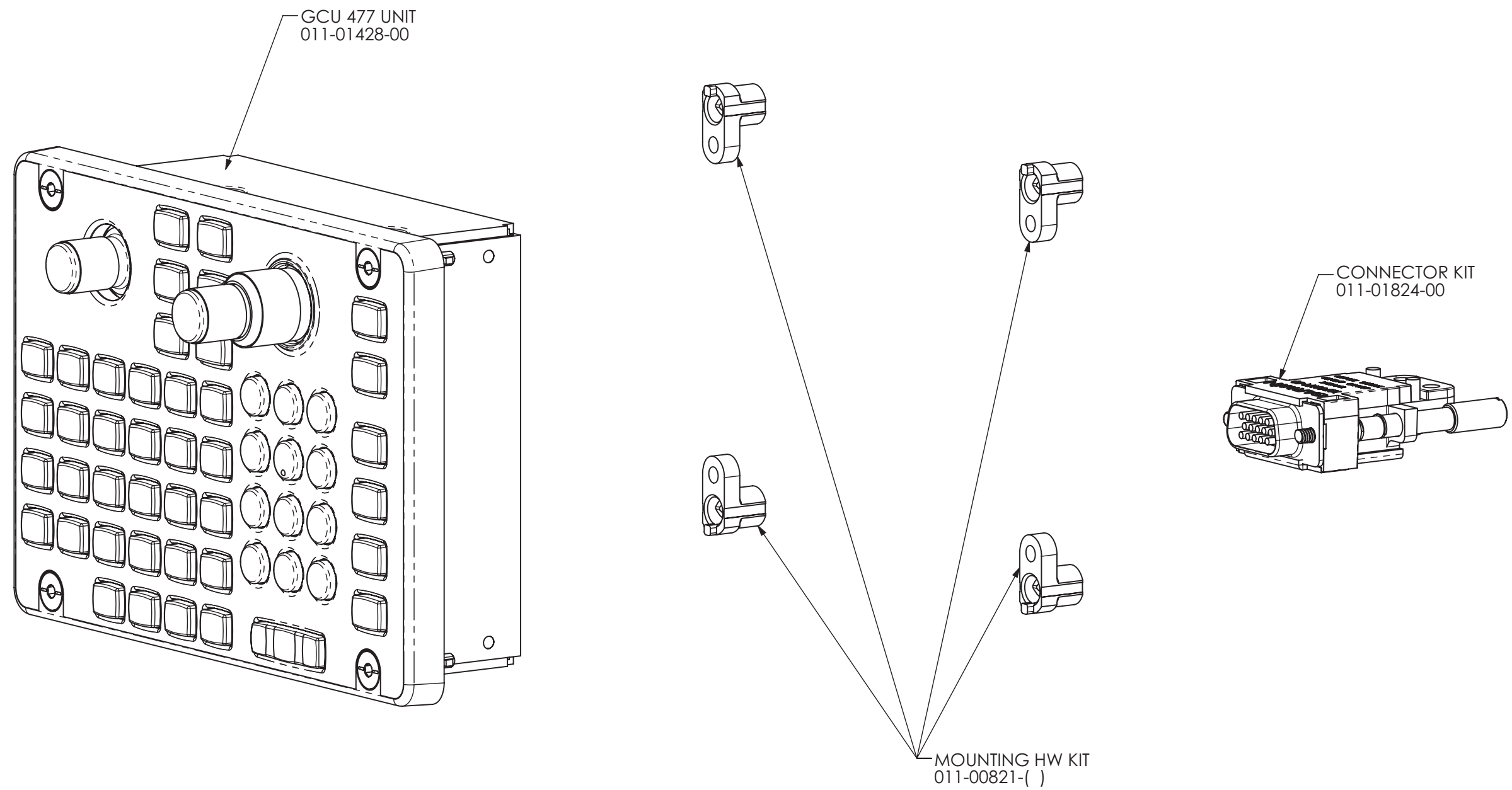


Figure B-11. GCU 477 Installation Drawing

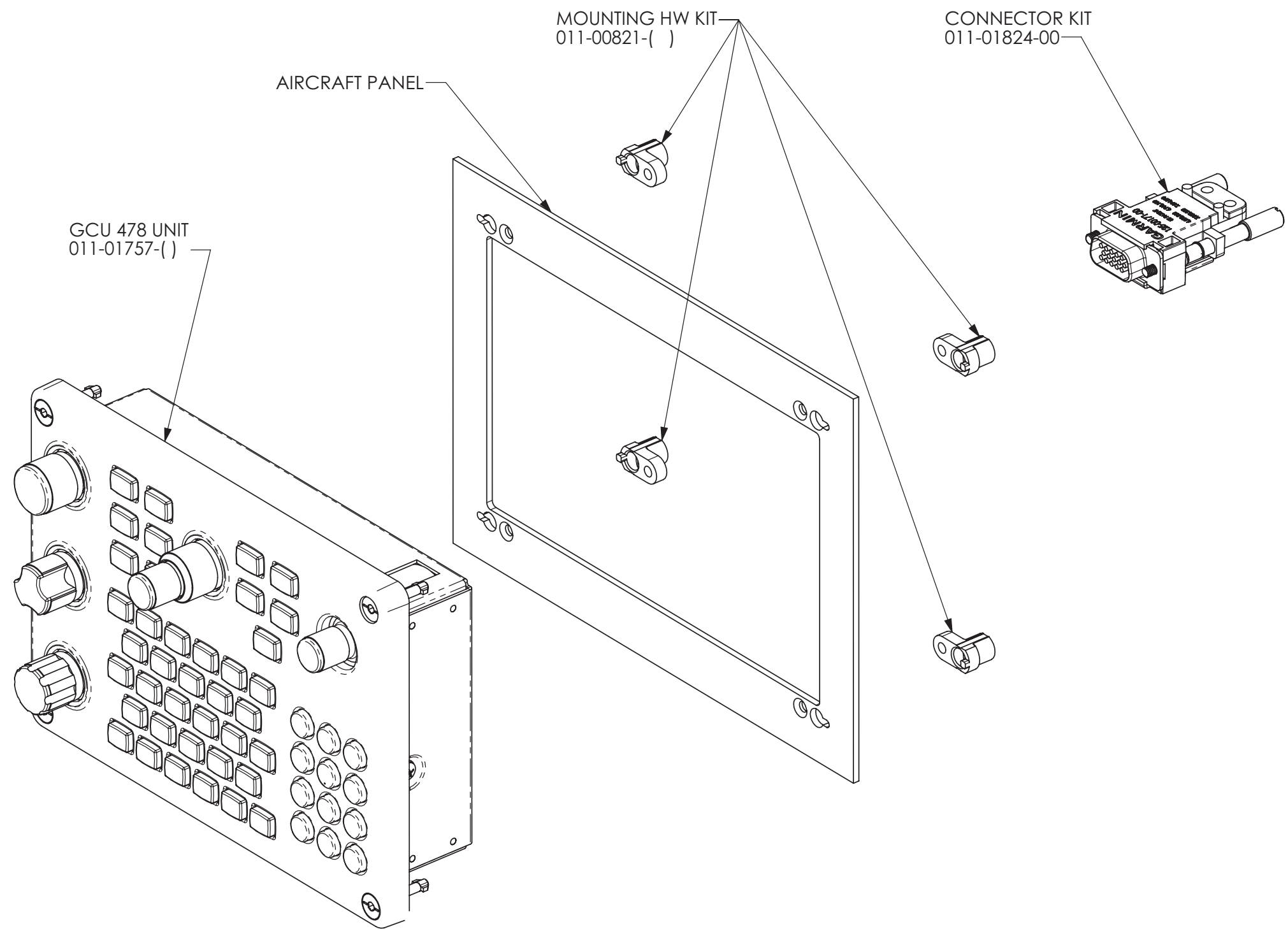
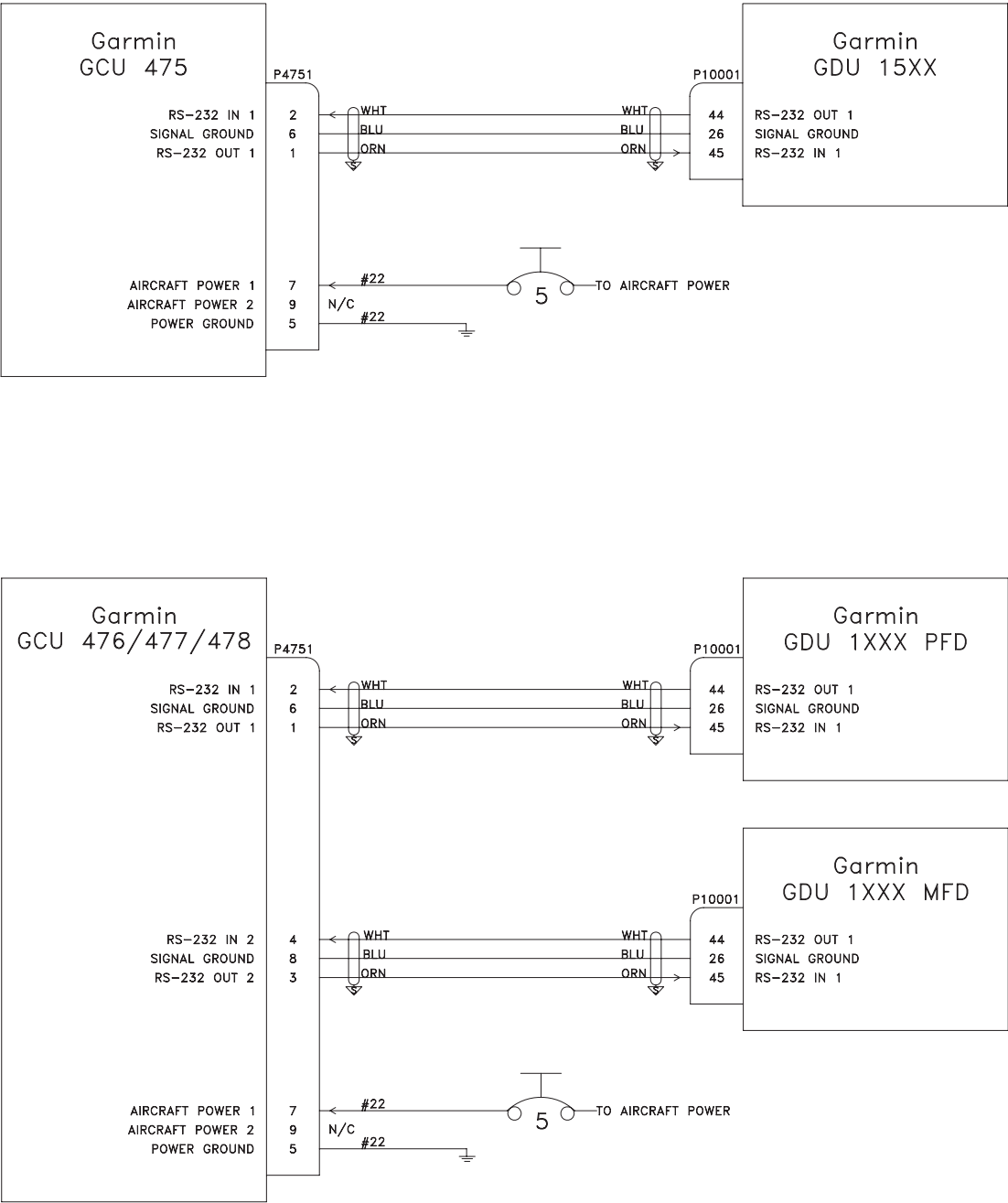


Figure B-12. GCU 478 Installation Drawing

APPENDIX C INTERCONNECT EXAMPLE



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 SHIELD TERMINATED TO GROUND
 - TWISTED SHIELDED SINGLE CONDUCTOR SHIELD FLOATS
 - TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND
 - TWISTED SHIELDED PAIR SHIELD FLOATS
 - TWISTED SHIELDED 3 CONDUCTOR SHIELD TERMINATED TO GROUND
 - TWISTED SHIELDED 3 CONDUCTOR SHIELD FLOATS
 - TWISTED SHIELDED 4 CONDUCTOR SHIELD TERMINATED TO GROUND
 - TWISTED SHIELDED 4 CONDUCTOR SHIELD FLOATS
 - AIRCRAFT GROUND
 - GARMIN (SHIELD BLOCK) GROUND PLEASE REFER TO 190-00313-09
 - 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)
- FOR GROUNDING PROCEDURES, REFER TO THE G1000 SYSTEM INSTALLATION MANUAL (GARMIN P/N 190-00303-00).

Figure C-1. GCU 47X Example Interconnect