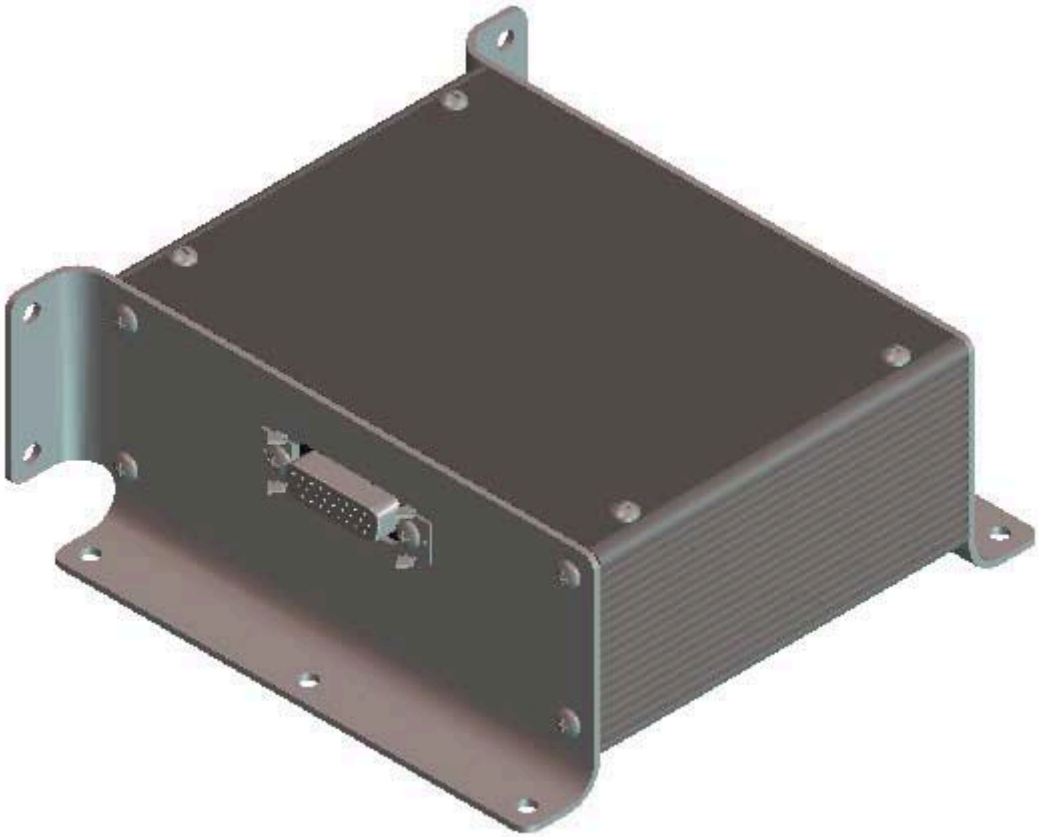
GARMIN

GTA 82
Trim Adapter
Installation Manual



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This manual reflects the operation of the system and boot block software version 2.00 for the GTA 82. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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GTA 82 HARDWARE MOD LEVEL HISTORY

The following table identifies hardware modification (Mod) Levels for the GTA 82. 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

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1 GENERAL DESCRIPTION

1.1 Introduction

This manual presents mechanical and electrical installation requirements for installing the Garmin GTA 82 Trim Adapter as part of the G1000 Integrated Cockpit System. The GTA 82 can be incorporated into a variety of airframes under appropriate TC or STC. Each airframe installation may vary. Interconnect drawings and procedures that are aircraft-manufacturer approved must be used during actual installation.

1.2 Equipment Description

The Garmin GTA 82 Trim Adapter is a remote mounted device that is used to allow the GFC 700 to drive a trim actuator provided by the airframe manufacturer. In such cases, the trim adapter provides the required interface.

1.3 Interface Summary

The GTA 82 interfaces with two GIA 63 Integrated Avionics units through serial communication on separate RS-485 ports. See Section 4 and Appendix B for connection details.

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 GTA 82 Environmental Qualification Form. The form is available directly from Garmin under the following part number:

GTA 82 Environmental Qualification Form, Garmin part number 005-00189-02.

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

Specification	Characteristic
GTA 82 Weight	(Unit Only) 1.1 lbs. (0.51 kg) (Installed with connectors) 1.3 lbs. (0.60 kg)
Physical Dimensions: GTA 82	Height: 2.11 inches (53.6 mm) Width: 5.25 inches (133.4 mm) Length: 5.31 inches (134.9 mm)

1.4.3 General Specifications

The table below contains general environmental specifications. For detailed specifications, see the Environmental Qualification Form for the GTA 82.

Specification	Characteristic
Regulatory Compliance	RTCA/DO-160E Environmental Conditions and EUROCAE/ED-14E
Unit Software	RTCA/DO-178B Level B
Operating Temperature Range	-55° C to +70° C
Altitude	55,000 Feet

1.4.4 Power Requirements

Specification	Characteristic
GTA 82 Power Requirements	Supply Voltage: 28 Vdc. See the Environmental Qualification Form for details on surge ratings and minimum/maximum operating voltages. Operating Current: 1.25 A typical – loaded, 28 Vdc, 36 mA max – no load, 28 Vdc.

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, installation of this TSO approved article is only approved when installed in an aircraft as part of a Garmin G1000 system.

1.5.1 TSO/ETSO Compliance

The following table provides a list of applicable TSO/ETSOs for the GTA 82.

Function	TSO/ETSO/SAE/ RTCA/EUROCAE	Category	Applicable LRU SW Part Numbers
Automatic Pilots	TSO-C9c SAE AS402B		006-B0267-()

1.5.2 TSO/ETSO Deviations

The following table provides a list of applicable TSO/ETSO and SAE deviations for the GTA 82.

TSO/ETSO	Deviation
TSO-C9c	1. Garmin was granted a deviation from TSO-C9c to use SAE AS-402B instead of AS-402A. The justification for this deviation is to use the latest accepted environmental standards.
	2. Garmin was granted a deviation from TSO-C9c to use DO-160E instead of specified environmental tests. The justification for this deviation is to use the latest accepted environmental standards.
	3. Garmin was granted a deviation from TSO-C9c subpart A (c), which requires marking the weight of the unit on the unit. Garmin will provide this information in the installation manual in lieu of marking on the serial tag. Garmin does not currently list the weight on other avionics units.

1.6 Reference Publications

The following publications are sources of additional information for installing the GTA 82. Before installing the unit, the technician should read all referenced materials along with this 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.

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2 INSTALLATION OVERVIEW

2.1 Introduction

This section provides hardware equipment information for installing the GTA 82 Trim Adapter. Installation of the GTA 82 must 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 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.

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.

2.3 Cooling Air

No cooling air is needed for the GTA 82. Refer to the G1000 System Installation manual, Garmin part number 190-00303-00, for information on G1000 system cooling requirements.

2.4 Installation Material

2.4.1 Configurations Available

Model	Catalog Part Number	Unit Part Number
GTA 82	010-00334-00	011-00960-00

2.4.2 Equipment Available

Item	Garmin P/N
Sub Assy, Connector Kit, GTA 82 w/Shield Block	011-01030-01

2.4.3 Additional Equipment Required

The following installation accessories are required but not provided:

- Cables – The installer will supply all system cables including circuit breakers. Cable requirements and fabrication is detailed in Section 3 of this manual.
- Hardware – #8-32 x 1/2" Panhead SS Screw [(or other approved fastener) (6 minimum, 10 maximum.]

2.5 Installation Approval Considerations for Pressurized Aircraft

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

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

1. Obtain approved installation design data from the aircraft manufacturer.

2. Obtain an FAA approved Supplemental Type Certificate (STC) or Type Certificate (TC) pertaining to and valid for the subject installation.

3. Contact the FAA Aircraft Certification Office in the appropriate Region and request identification of FAA Designated Engineering Representatives (DERs) who are authorized to prepare and approve the required installation engineering data.

4. Obtain FAA Advisory Circular AC-183C and select (and contact) a DER from the roster of individuals identified thereunder.

5. Contact an aviation industry organization such as the Aircraft Electronics Association and request their assistance.

2.6 GTA 82 Mounting

The GTA 82 remote rack can be installed in a variety of locations, such as the electronics bay, under a seat or on an avionics shelf behind the rear baggage area. The GTA 82 mounting surface must be capable of providing structural support and electrical bond to the aircraft. The GTA 82 mounting location is not critical. It may be mounted rigidly to the aircraft primary structure in any attitude. Shock mounting is not required.

Use typical #8 mounting hardware to fasten the GTA 82 to the airframe. The installer may attach typical #8 blind nuts to the airframe to facilitate installation and removal or assemble the unit to the airframe using #8 flat washers and #8-32 locknuts. The installer must provide any additional remote mounting equipment. Ensure that the GTA 82 chassis has a ground path to the airframe by having at least one mounting screw in contact with the airframe.

After the cable assemblies are made and wiring installed to the unit, route the wiring bundle as appropriate. Use cable ties to secure the cable assemblies to provide strain relief.

The GTA 82 must be mounted using at least 6 screws as shown in Fig. 2-1, but may also be mounted using 10 screws as shown in Fig. 2-2.

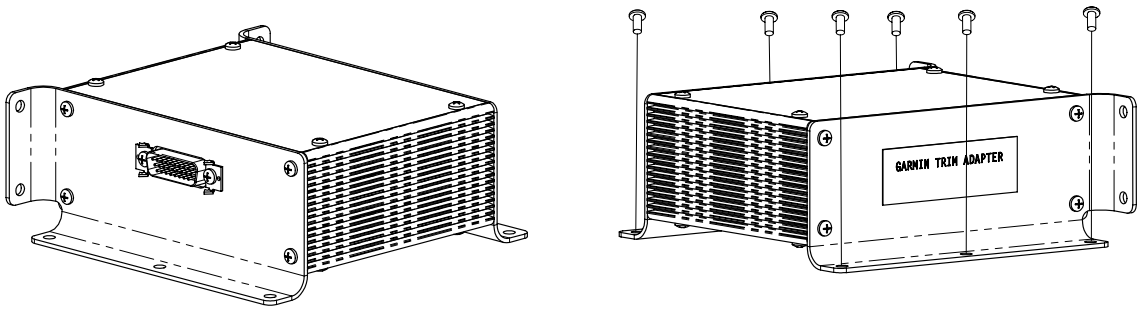

Figure 2-1. GTA 82 Required Mounting (any attitude)

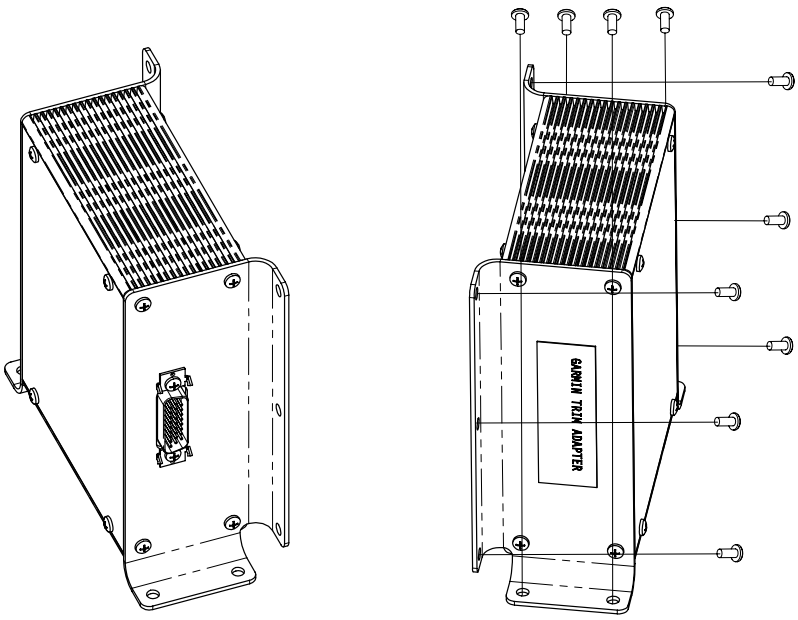

Figure 2-2. GTA 82 Optional Mounting (any attitude)

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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 Electrical Connections

All electrical connections to the GTA 82 are made through one 26-pin D-subminiature connector (see Figure 4-1). Table 4-1 lists the electrical connections of all input and output signals. See Appendix B for interconnect wiring diagrams and cable requirements for each signal. Required connectors and associated hardware are supplied with the connector kit.

Construct the actual harnesses in accordance with the aircraft manufacturer authorized interconnect standards.

CAUTION

Check wiring connections for errors before inserting the GTA 82 into the rack. Incorrect wiring could cause internal component damage.

3.3 Backshell Assembly

The GTA 82 connector kit includes a Garmin backshell assembly. Garmin's backshell connector gives the installer the ability to quickly and easily terminate shield grounds at the backshell housing. To assemble the backshell and grounding system, refer to instructions provided in the G1000 System Installation Manual, Garmin part number 190-00303-00.

3.4 Circuit Breaker Placard

Install a Circuit Breaker Placard labeled Trim Adapter as indicated in FAA Advisory Circular AC 43.13-2A, paragraph 27c(4).

3.5 Post Installation Configuration and Checkout

After the installation is complete, refer to the G1000 configuration manual, Garmin part number 190-00303-04, for basic system configuration, calibration and checkout. For actual aircraft installation/checkout, use only aircraft manufacturer approved checkout procedures.

NOTE

The GTA 82 will not provide valid outputs until the aircraft post installation calibration procedures are completed.

4 SYSTEM INTERCONNECTS

4.1 Pin Function List

Following the pin assignment tables, additional tables group pin connections by function.

4.1.1. Connector J821

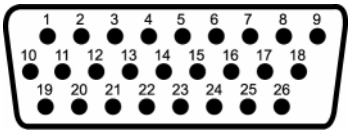

Figure 4-1. Connector J821

Table 4-1. P821 Pin Assignments

Pin	Pin Name	I/O
1	MANUAL TRIM CW*	In
2	AIRCRAFT POWER	In
3	POWER GROUND	--
4	SERVO ENABLE	In
5	AP DISCONNECT	In
6	SERVO PROGRAM 1	In
7	SERVO PROGRAM 2	In
8	SERVO PROGRAM 3	In
9	MOTOR CW	Out
10	MANUAL TRIM ARM*	In
11	MANUAL TRIM CCW*	In
12	RESERVED	--
13	RESERVED	--
14	RESERVED	--
15	RESERVED	--
16	PROGRAM GROUND	--
17	PROGRAM GROUND	--
18	MOTOR COMMON	Out
19	MANUAL TRIM ENABLE*	In
20	RS-485 2 A	I/O
21	RS-485 2 B	I/O
22	RS-485 1 B	I/O
23	RS-485 1 A	I/O
24	RESERVED	--
25	RESERVED	--
26	MOTOR CCW	Out

An asterisk (*) following a signal name denotes that the signal is an Active Low, requiring a ground to activate.

4.2 Power Function

Power Input requirements are listed in Table 4-2. The power-input pins accept 20.5-32.2 Vdc. Refer to Figure B-1 in Appendix B for power connections.

Aircraft power is supplied to the GTA 82 Trim Adapter through two power-input pins, identified as Aircraft Power, Pin 2 and Autopilot Disconnect Pin 5. The Aircraft Power pin supplies power to the GTA 82, and the Autopilot Disconnect pin supplies power to the trim actuator. Aircraft power is routed to the Autopilot Disconnect pin through a normally closed AP disconnect switch in the aircraft. Whenever the pilot presses the AP disconnect switch, power is removed from the trim actuator, guaranteeing an absence of motor drive current.

Table 4-2. Aircraft Power Pin Assignments

Pin	Pin Name	Description	I/O
2	AIRCRAFT POWER	Unit Power	In
5	AP DISCONNECT	Autopilot Disconnect	In
3	POWER GROUND	Aircraft Ground	--

4.3 Serial Data Electrical Characteristics

4.3.1 RS-485 Input/Output

The GTA 82 has two bi-directional, half-duplex RS-485 ports to interface with one or two GIA 6x units. The GTA 82 uses the same RS-485 interface to the GIA as a GSA 8X servo. These ports are identified as ports #1 and #2.

Table 4-3. RS-485 Pin Assignments

Pin	Pin Name	Description	I/O
20	RS-485 2 A	Data In/Out	I/O
21	RS-485 2 B	Data In/Out	I/O
22	RS-485 1 B	Data In/Out	I/O
23	RS-485 1 A	Data In/Out	I/O

4.4 Manual Electric Trim Connections

There are four manual electric trim inputs to the GTA 82. These lines may be used to control the operation of the trim actuator if RS-485 control is not used.

Table 4-4. Manual Electric Trim Pin Connections

Pin	Pin Name	Description	I/O
1	MANUAL TRIM CW*		In
10	MANUAL TRIM ARM*		In
11	MANUAL TRIM CCW*		In
19	MANUAL TRIM ENABLE*		In

An asterisk (*) following a signal name denotes that the signal is an Active Low, requiring a ground to activate.

4.5 Servo Input Program Connections

The servo program inputs are installation straps that program the GTA 82 to function in the appropriate flight-control axis. The installer grounds the appropriate strap line(s) to the strap ground pin(s), to achieve the desired servo function. A logic high state occurs when the servo program input is grounded, and a logic low state occurs when the line is left open.

The logic states are read once at power-up, by the processor to determine the required servo function. Changes in state of the servo program input after unit power-up is recognized and logged as an error condition but does not change the function of the GTA 82.

Table 4-5. Servo Input Program Pin Connections

Pin	Pin Name	Description	I/O
6	SERVO PROGRAM 1		In
7	SERVO PROGRAM 2		In
8	SERVO PROGRAM 3		In

4.6 Servo Enable Input

The Servo Enable input provides an alternate autopilot disconnect function, independent of the Autopilot Disconnect input. An output from the GIA 63 feeds into the Servo Enable input. As long as this input is high, and power is present on the Autopilot Disconnect input, the processor may control the Switched Power line and can drive the trim actuator in the aircraft. When either the Autopilot Disconnect switch is pressed, or the Servo Enable input goes low, Switched Power is disabled, preventing the trim adapter from driving the trim actuator in the aircraft.

Table 4-6. Servo Enable Pin Connection

Pin	Pin Name	Description	I/O
4	SERVO ENABLE		In

4.7 Motor Outputs

The GTA 82 has three outputs to be connected to an external motor. In installations having a two-wire motor, the Motor CW line will be connected to one side of the motor and the Motor CCW line will be connected to the opposite side. The Motor Common line will not be connected. In installations with a three-wire motor, the Motor CW line will be tied to one side of the motor, the Motor CCW line will be tied to the opposite side and the Motor Common line will be tied to the common line of the motor.

Table 4-7. Motor Outputs Pin Connections

Pin	Pin Name	Description	I/O
9	Motor CW		Out
26	Motor CCW		Out
18	Motor Common		--

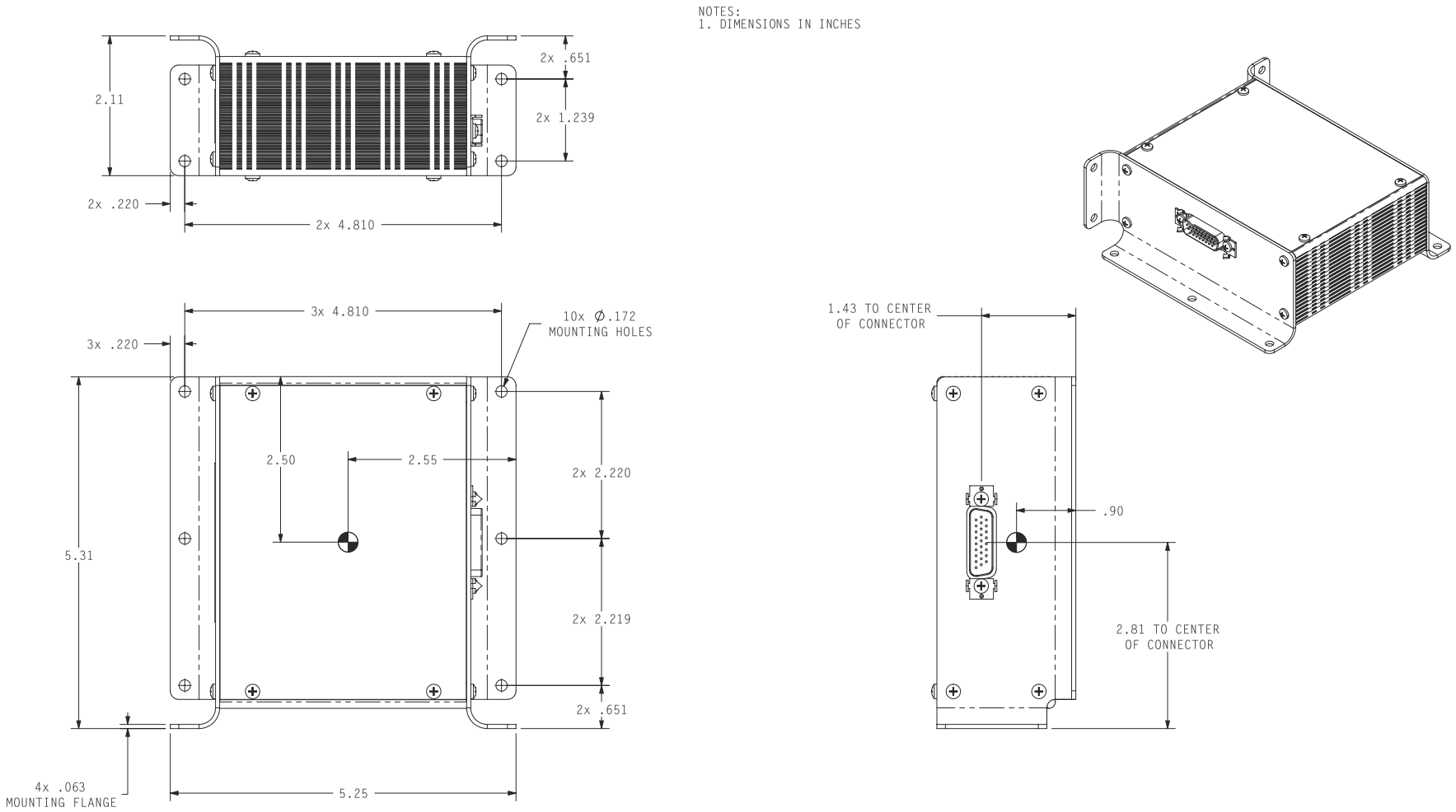

Figure A-1. GTA 82 Outline Drawing

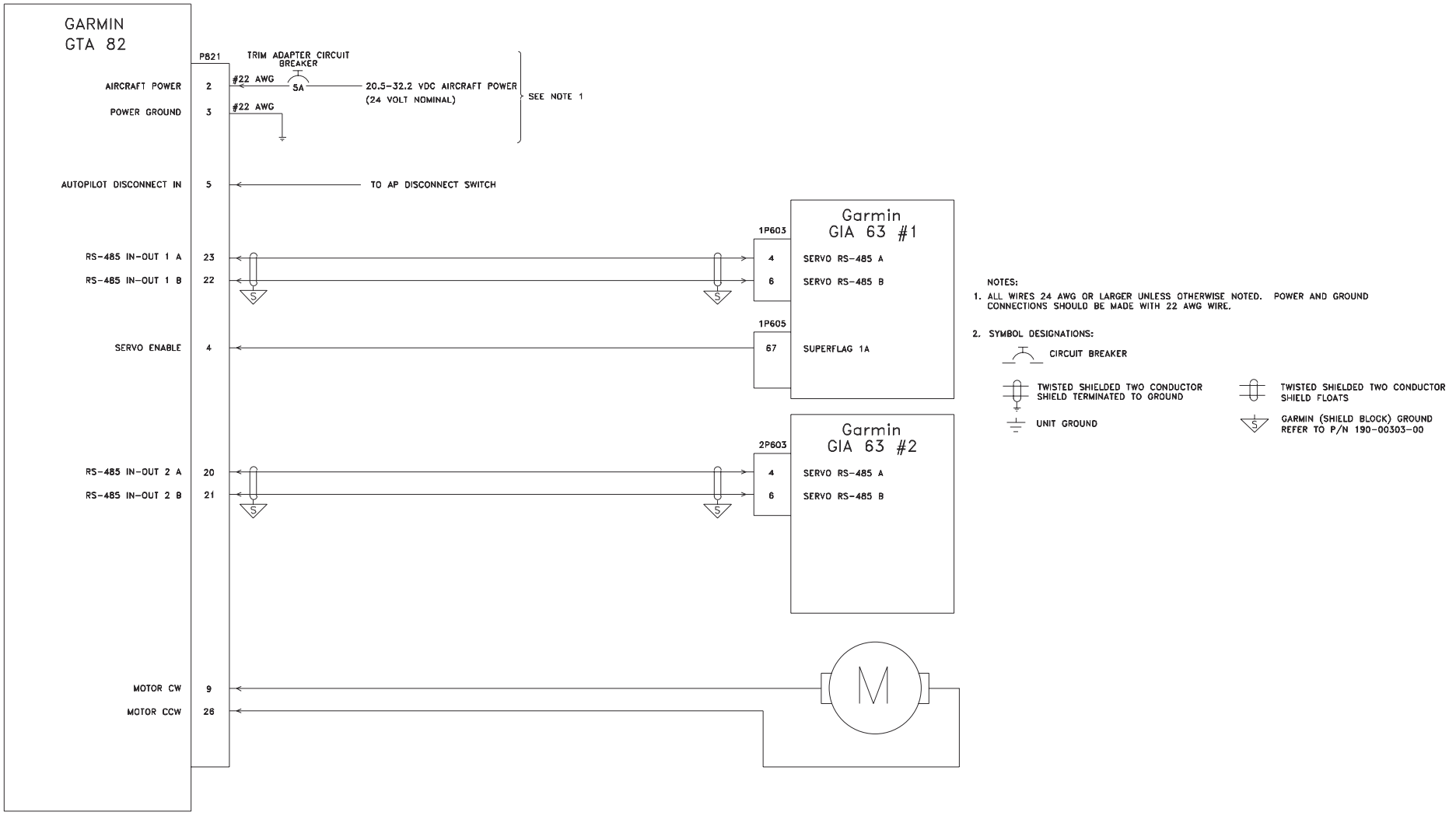

Figure B-1. Typical GTA 82 Interconnect Wiring Diagram